December 16 2024

Joint Comments of Council on Intelligent Energy & Conservation Policy (CIECP) and Promoting Health and Sustainable Energy (PHASE) to New York State Energy Planning Board and New York State Energy Research and Development Authority (NYSERDA)

Re: Draft Scope of the New York State Energy Plan

Submitted Via email to: nysenergyplan@nyserda.ny.gov

Preliminary Statement

The Council on Intelligent Energy & Conservation Policy (CIECP) and Promoting Health and Sustainable Energy (PHASE) support many of the goals articulated in the Draft Scope of the New York State Energy Plan and appreciate many of the initiatives New York has embarked upon over the last few years. However, much more coordinated and forceful action needs to be taken to ensure the State's transition to a *truly* clean, healthy, socially just and sustainable future.

New York could redirect the course of energy policy in a way that will invigorate our economy today and keep New York safe, clean and prosperous for generations to come.

Energy is one of the few core realms that directly and powerfully connect to virtually all human endeavor. Energy policy will largely determine whether the planet remains habitable. Energy policy will affect whether future generations are sick or well. Energy policy directly ties to issues of global security and nuclear proliferation.

America is still the global superpower. New York State is a prime national economy engine. What New York does will matter.

With vision and resolve, our State can be at the vanguard of a new global energy era.

What is most important is to keep in mind the question: What kind of world do we want?

NEW YORK SHOULD PLAN FOR AN ENERGY FUTURE WITHOUT HEAVILY POLLUTING, DANGEROUS, FUEL-BASED FORMS OF POWER GENERATION

The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil.

This observation, interestingly, was made by a Saudi Arabian oil minister decades ago. Yet it serves to illustrate an important point. Energy is largely a product of what is promoted.

Government has long used its money and power to promote nuclear power and fossil fuels. This has been done through massive subsidies and tax incentives, building codes and infrastructure, municipal and education expenditure, regulatory schemes and energy market design.

There is no longer any defensible argument for continuing to prop up extractive toxic forms of power. The burden they impose – upon the environment, human health, and the climate – is now and will increasingly be untenable. How many more radiation leaks and chemicals do we want streaming into our water supplies? How much more fission products and micro-particulates do we want our children to draw into their lungs and bloodstreams? How many more nuclear waste dumps, fracking-despoiled lands, Superfund sites, brownfields and hazard zones do we need? How many more cancers and neurological problems and developmental disorders and immune diseases are enough?

Both nuclear power plants and natural gas plants, in different ways, are highly polluting, and threatening to the life and wellbeing of millions of New Yorkers.

As the pollutant and climate impacts of fossil fuel are well publicized, the remainder of these Comments will primarily address the less understood realities of nuclear power.

New York must cease all manner of support for highly-polluting forms of power.

Make the decisions needed and marshal the resources available to accelerate the development of clean energy, distributed generation, and smart end use.

A crucial step is to send a strong signal to the energy markets that New York will no longer shackle itself to nuclear plants and natural gas pipelines. These dirty dangerous lumbering giants are ill-suited to a future energy system which must be agile and efficient. Nuclear plants are a heavy drag on the system because they must run constantly and have to always dispose of their power production, regardless of whether it is needed. Diverting public resources to fossil, either directly or indirectly through enabling mechanisms like carbon capture and storage, only promotes continued dependence upon such fuels.

Cheaper, cleaner, safer, more sustainable and broadly supported and desirable alternatives to both nuclear and fossil fuel generation exist today. (Barnaby 2007; Bradford 2017; Brown 2018; Diesendorf 2016; Dunai 2019; Jacobson 2023; Jacobson 2020; Jacobson 2018; Lovins 2020; Lovins 2018; Makhijani 2018; Mez 2016; Perez 2019; Ramana 2018; Sovacool 2020; Smith 2006)

Truly, the largest obstacles to their implementation are not technical. Cut off the spigot of subsidies and end the market design preferences given nuclear (and also fossil). Provide renewables and efficiency an even playing field and let them go. If New York aims to lead the world towards decarbonization and a sustainable future, that is the way to do it.

It should be emphasized that New York could blink off the map entirely as an energy user and greenhouse gas emitter. The climate impact would be too miniscule to measure. This is because, geographically and industrially, New York State's carbon production is miniscule compared to that of the world. Where New York could make a measurable, and, if done soon, a potentially monumental contribution to global decarbonization – the only metric scientifically relevant – is by sending strong signals to investors the global capital markets: **New York is Promoting Green**.

In the Reforming the Energy Vision – or REV – framework, New York floated the promise to do just that. We urge the State to dust off that vision and help renew the REV. The 2015 New York Energy Plan was also bold in word and proposal. But then the State faltered. Support for change was fractured, fraught with bureaucratic red tape, and proffered through uncoordinated temporary and uncertain financial support. Even customer choice – vigorously advocated in the REV and 2015 Energy Plan – was abandoned in favor of ensuring provision of ratepayer money to uncompetitive upstate reactors.

New York, through an ill-advised August 1, 2016 Public Service Commission (PSC) administrative decision, diverted some **$7.6 billion** of public money from support of new renewables and energy efficiency to support aging upstate nuclear reactors. (Grossman 2016; Jacobson 2016)

This funding has effectively added over a decade of additional nuclear waste inventory buildup, thermal pollution, and radioactive emissions to New York environs.

Notably, that 2016 PSC decision funneled $7.6 billion into the coffers of the nuclear and fossil distribution giant Exelon/Constellation, without even conducting an analysis of whether funding directed towards spurring renewable, efficiency, and demand side alternatives might reduce in-state generated greenhouse gas emissions sooner and at less cost.

At the time, we and other environmental and public policy groups were befuddled as to why the New York's laudable Large Scale Renewables Proceeding morphed into a massive bailout of aging nuclear plants.

That mystery may have been partially solved by reporting of the New York State Joint Commission on Public Ethics (NY JCOPE), which detailed prodigious lobbying expenditures by Exelon and noted: "Some of the largest retainers paid to lobbyists in 2017 related to nuclear energy, zoning, and development. However, the largest single retainer, $593,853, from the Nuclear Energy Institute, Inc., a nuclear industry trade

group, to APCO Worldwide LLC (F/K/A APCO Worldwide Inc.) primarily reimbursed the lobbyist for a media buy. The ads were placed in an effort to support zero emission credits for nuclear plants." (NY JCOPE 2018)

And where did some of that New York ratepayer largess go? To a $33.5 billion conglomerate. (Exelon Form 10-K 2016) Before, as, and after it was seeking subsidies from New York, Exelon and its subsidiaries were aggressively opposing support for renewable and acquiring natural gas distribution assets. (Alexander 2014; Constellation 2016; Elsner 2015; Geiger 2016; Lydersen 2015; Passary 2016; Polson 2015) In fact, on its web pages, Exelon proclaimed: "Clean energy plus relatively low prices put natural gas in demand. Clean burning natural gas has become an attractive fuel for serving increased demand…. Exelon Generation is also expanding our gas fleet through development. Two new 1,000 MW CCGT units are now in operation in Texas at existing sites, using new General Electric technology that make them among the cleanest, most efficient CCGTs in the state and the nation. Exelon Generation has also begun construction of a 195 MW simple cycle plant in Massachusetts." (Exelon web 2020; See also Power Technology 2015)

For pure economic reasons alone, nuclear and fossil should no longer be supported by New York's ratepayers through obsolete energy market design or via added charges, levies, etc. to electric bills.

NEW YORK SHOULD ACCELERATE ADOPTION OF ENERGY MARKET DESIGN SUPPORT FOR EFFICIENCY And WIDELY DISTRIBUTED RENEWABLE, STORAGE/BATTERY, AND DEMAND-SIDE OPTIONS

New York State is way behind where it needs to be in meeting the goals articulated in the Climate Leadership and Community Protection Act (CLCPA), including the mandate to achieve a 70% renewable energy grid by 2030.

Instead of resigned acceptance of failure, the State should vigorously step up its efforts to support renewable projects already in the pipeline and incentivize the acceleration of renewable energy development and expansion.

Such an effort will obviously include increasing near-term procurement targets. It must also include giving a high priority to efficiency, reducing red tape, building out and increasing access to energy storage, and continued improvements of New York's electric grid's distribution system. There are many ways ideas advanced and smart models for decarbonization can be pulled together under a streamlined, user-friendly schema that is also versatile and adaptable.

It is well established that accelerating progress requires a shift of investments towards energy efficiency. (Lovins 2018) Energy efficiency is often called the "first fuel" for tackling the climate crisis. "Policy action to improve efficiency is the single best approach to simultaneously achieve sustained energy intensity gains, reduce costs for

consumers and enhance access to energy services." (IEA: Energy Efficiency 2024) Efficiency reduces reliance on energy generation, reduces strain on the electric grid, and lowers particulate, toxic and CO2 emissions. Efficiency is especially impactful for low and moderate income communities.

Efficiency is far broader than more effective use of electric power generation alone; although that is important. Efficiency requires reconceptualizing how infrastructure is designed and used. New York, with its premier universities and thriving architectural, design, and engineering sectors, is optimally suited to drive innovation in efficiency – especially in buildings.

The renewable energy revolution is here. (Benham 2023; Bond 2024) New York must act now to harness its power, not only to combat climate change and create a healthier environment, but to ensure the State becomes a leader in the renewable-based energy ecosystem – that includes finance, and workforce development.

The International Energy Agency's (IEA) Renewables 2024 report, issued in October 2024, finds renewable power capacity expected to surge over the rest of the decade with global additions on course to roughly equal the current total power capacity of China, the EU, India, and the US. Key findings include:

- Solar PV and wind are now the cheapest options for adding new electricity generation in almost every country.
- By 2026, the IEA projects, wind and solar power generation will both surpass nuclear.
- The world is set to add more than 5,500 GW of new renewable capacity between 2024 and 2030.
- Cumulative renewable capacity is expected to reach almost 9,760 GW in 2030. (This is IEA's 'main case' forecast.)
- Global renewable capacity could reach almost 11,000 GW in 2030. (This is IEA's 'accelerated case' estimation. (In the US, this would require reducing long permitting timelines and stimulating investment in new grid capacity and flexible assets to unlock additional deployment.)
- Renewables are on course to generate close to 50% of the world's electricity (with solar and wind doubling to provide 30%) by 2030.
- Renewable capacity additions will continue to increase every year, reaching almost 940 GW annually by 2030.
- Solar PV and wind combined account for 95% of renewable capacity growth through the end of the decade, due to their growing economic attractiveness in almost all countries.
- Renewables are being deployed so fast that nearly 70 countries are poised to reach or surpass their current renewable targets for 2030.
- Solar PV is forecast to account for 80% of renewable growth by 2030, benefitting from both utility scale and rooftop installations by companies and households. PV will surpass hydropower to become the largest renewable generation source by 2030. ("Adoption accelerates due to declining costs, shorter permitting timelines

and widespread social acceptance. Cost-competitiveness and policy support also stimulate the growth of distributed applications among residential and commercial consumers as more households and companies seek to reduce their electricity bills.")

- Global solar manufacturing capacity is expected to surpass 1,100 GW by the end of 2040.
- Despite recent supply chain and macroeconomic challenges, the wind sector is poised for recovery. Compared with 2017-2023, IEA sees the rate of global wind capacity expansion doubling between 2024 and 2030.

(IEA Renewables 2024)

IEA forecasts distributed applications (residential, commercial, industrial and off-grid projects) will comprise almost 40% of overall solar PV expansion. "As more policies enable self-consumption and as economic attractiveness increases, more consumers and companies are seeking to reduce their electricity bills by installing small-scale solar PV systems." (IEA Renewables 2024 p 33)

IEA anticipates that most countries will be in the later phases of variable renewable integration by 2030 and observes that, besides variable renewable share, phase assessment must look at the specific generation mix (e.g., distributed solar PV, utility-scale solar, offshore/onshore wind); system flexibility across different time scales, and system ability to manage disturbances (e.g., frequency control, system inertia); and factors such as behind-the-meter-storage, changes in load or generation output, demand-response, and interconnection. Modernizing the system necessitates improved strategic planning and reformed regulatory frameworks which properly compensate flexible assets. "Market designs must evolve to support power systems dominated by solar and wind, emphasizing procurement and compensation of system services beyond just energy." (IEA Renewables 2024, pp 113-114)

NUCLEAR REALITIES DO NOT MATCH UP TO THE HYPE

While incumbents are now trying to spin nuclear technologies as exciting and novel, they deserve relegation to the past. New York should look to the technologies which are *actually* advancing and will – supported by wide expert consensus – be the technology powerhouses of the 21st century.

Innovations and advances in efficiency resources, storage/battery, and renewable energies have occurred at a rapid pace over the past decade.

Nuclear, in sharp contrast and despite heavy subsidization and liability protection for 70 years, is increasingly costly with a negative learning curve. (Cooper 2021; Kerrisdale 2024; Koplow 2011) Small modular reactors (SMRs) and unconventional (non-light water) reactors which have been dubbed with the nebulous PR term 'advanced', are nothing really new. The basic concepts have been around since the 1950s and 1960s and were not widely adopted because of exorbitant cost and operational problems.

(Makhijani 2021; Ramana 2024; Ramana 2018) The idea SMRs and unconventional reactors will somehow miraculously advance is counter to both historic and experience and utterly speculative. (Barnard 2023; Brugge 2024; Cooke 2023; Schlissel 2024; Steigerwald 2023; Warren 2023)

Putting aside all the other problems, time alone makes investing state resources – and that includes human capital – in nuclear a foolhardy bet.

As succinctly put by Dr. Allison Macfarlane, a former Chairman of the U.S. Nuclear Regulatory Commission (NRC): “Given the long lead times to develop engineered, full-scale prototypes of new advanced designs and the time required to build a manufacturing base and a customer base to make nuclear power more economically competitive, it is unlikely that nuclear power will begin to significantly reduce our carbon energy footprint even in 20 years—in the United States and globally. No country has developed this technology to a point where it can and will be widely and successfully deployed.” (Macfarlane 2021. See also Macfarlane 2023)

Another former NRC Chairman, Gregory Jaczko, together with the former heads of nuclear power regulation in Germany and France, along with the former secretary to the UK’s government radiation protection committee, also elucidate why nuclear is not a viable approach for attenuating climate change. In a joint statement, they write: “The central message, repeated again and again, that a new generation of nuclear will be clean, safe, smart and cheap, is fiction. The reality is nuclear is neither clean, safe or smart; but a very complex technology with the potential to cause significant harm. Nuclear isn’t cheap, but extremely costly. Perhaps most importantly nuclear is just not part of any feasible strategy that could counter climate change. To make a relevant contribution to global power generation, up to more than ten thousand new reactors would be required, depending on reactor design.” (Power Magazine 2022. See also Jaczko 2021)

There is also no evidence that these novel paper designs (which are not really novel because they have been in development for well over half-a-century) will be safer than traditional conventional reactors. (Lyman 2021; Lyman 2013)

In fact, as noted below, climate change conditions will make nuclear ever more unreliable and risky. Given the need for a commercial fuel reprocessing program many of the proposed designs anticipate using, going forward with them will also have troubling security implications. (von Hippel 2019)

NUCLEAR IS INIMICAL TO STATE RIGHTS

New York should be aware from its decades-long effort to protect New York’s precious Hudson River and to prevent the relicensing of Indian Point, that once nuclear reactors become licensed and sited in a state, the state has limited authority over the matter.

Even after a terrorist attack on New York City, even after Indian Point was identified as a potential target for further attack, even after the 9/11 Commission Report found that the nuclear site had been eyed as an alternative target to the World Trade Center, even after a major report commissioned by New York's governor gave lie to the feasibility of carrying out an emergency plan, New York could not raise the security risks which had the potential to catastrophically impact the New York Metropolitan Region and its 17 million inhabitants in the Atomic Safety Licensing Board (ASLB) proceeding in which New York fought Indian Point's operator and the NRC.

This state of affairs applies to no other form of energy generation.

The extent to which states must relinquish power and rights over nuclear activities and sites within their borders derives from the technology's unique origin and continued high place of prominence in the atomic weapons and defense sphere. The result is a level of state authority constriction with no parallel in any other type of industrial operation.

Nuclear uniquely of all forms of electricity generation also produces high-level nuclear waste, the most dangerous, hazardous, toxic and long-lived material generated by human activity.

New York should be aware from its experience with the West Valley Demonstration Project debacle of the untenable costs which can be imposed upon an area even after the Federal government concedes severity of the radioactive material contamination.

Once a nuclear reactor begins operation, the power plant site becomes a long-term – very possibly a permanent – nuclear waste dump. That too becomes a condition that may imperil the economy, health, safety, and security of the community in which it sits. The extent of risk can be debated, but there is no question that nuclear waste sites impose limitations on the use of land for decades, possibly centuries to come.

Whatever the level of economic or other harm to the state, again, the state's ability to do anything about it is minimal.

New York should be aware from its *own experience* how costly and time-consuming the fight to effectuate and enforce even the state rights which do exist at the state level.

The unprecedented level of national climate, economic, energy, environment, geopolitical, legal and regulatory uncertainty at the Federal level which exists in the present moment adds another layer to this picture. Policy disruption may be for good or ill, but it most certainly creates a landscape that is unsettled. This too must be taken into consideration by New York.

Beyond the matter of state rights, there is simply no supportable rationale for continuing to promote the use of nuclear power. Indeed, expenditure of New York agency staff, and time resources on developing plans for perpetuating this failed technology will divert

from New York's energy transition and seriously jeopardize growth of solar, wind, and other new technologies which are truly sustainable and renewable.

NUCLEAR POWER IS HIGHLY POLLUTING – PRODUCING PRODIGIOUS AMOUNTS OF GREENHOUSE GASES, HEAT, AND HAZARDOUS RADIOACTIVITY THROUGHOUT ITS FULL FUEL LIFECYCLE

A. Nuclear Power is Not a "Clean" Form of Energy, as that Term is in Any Manner Shape or Form Reasonably Construed.

Nuclear power is about as "clean" as tobacco is "healthy."

Query, would anybody reasonably deem a Superfund Site with radioactive contamination to be "clean"? New York, of course, is the unhappy host to the West Valley Superfund radioactive waste site, a legacy of a commercial uranium reprocessing facility that shut in 1972. (Napoleon 2008; Werner 2012)

Even in the absence of accidents, New York's nuclear power plants will generate more high-level nuclear waste and release more long-lived radionuclides into the state's waters and air and contribute massive quantities of thermal pollution to waters every single day they operate.

B. Nuclear is Increasingly Improvident in a Climate Challenged World

In fact, the NRC's astonishingly reckless refusal to consider climate change conditions in licensing decisions argues for the conclusion that continuing with nuclear – whether in the form of license extensions for old deteriorated plants or new reactors – will be a decidedly unsafe proposition. (Jenkins 2020; Stranahan 2019; US GAO 2024)

Global warming will also reduce the reliability and safety of nuclear power (and other thermoelectric) plants. (Ahmad 2023; D'Agostino 2021; Dorfman 2021; Gazette 2020; Jenkins 2020; Luo 2023; Reiser 2020)

C. Nuclear Waste: Communities, Ratepayers and Taxpayers Have Had Enough

Nuclear power generates huge quantities of high level nuclear waste. Despite over 70-years of effort funded by many billions of taxpayer dollars, there's still no solution in sight to the disposal problem. Thanks to the infinite wisdom of Congress, taxpayers are financially responsible.

The promises of vendors that novel designs will ameliorate the waste problem simply do not withstand scrutiny. (Krall 2022)

And the waste keeps piling up. U.S. nuclear plants churn out **2,000 metric tons** of high level nuclear waste (spent fuel) every single year and New York is among the 5 states

with the largest total amount of nuclear waste. (Kent 2021; Matheny 2018; US GAO 2021; Werner 2012) New York's billions of funding to Exelon (now its spin-off Constellation) has effectively ensured over a decade of additional thermal pollution, radioactive emissions and nuclear waste inventory buildup. That is more than enough. Is it not?

The risk and health impacts will endure for generations to come for New Yorkers and other communities which may, at some point in the future, be compelled to hold New York's toxic radioactive waste. It is a matter of egregious environmental injustice that minority, indigenous and low-income communities already bearing the pollution burden of heavy nuclear, oil & gas, and mining operations are the ones being targeted for nuclear waste disposal. (Kamps 2018; Mermelstein 2020; Morgan 2019; Sierra Club 2020)

D. Radioactive Emissions and Leaks

Nuclear power continuously releases radiation into the air, water and soil as part of routine operation.

Using the example of just one radionuclide: it has been estimated by that the atmospheric releases of carbon-14 (or C-14), the radioactive form of carbon, result in "a relatively large contribution to population dose." (NAS 2012) The International Atomic Energy Agency has observed that Carbon-14 can be easily concentrated in the food chain. Additionally, "Carbon-14 is easily transferred during biological processes and soil-plant interactions involving carbon compounds. The metabolism and kinetics of ^{14}C in the human body follow those of ordinary carbon. Inhaled $^{14}CO2$ rapidly equilibrates with the air in the lungs and enters many components of body tissue. The biological half-life of ^{14}C is approximately 40 days." (IAEA 2004)

Virtually every nuclear plant site in the U.S. has also had accidental radiation leaks. (Beyond Nuclear 2015; Chase 2017; Ferkenhoff 2006; GZA 2008; Richards 2006; US GAO 2011) Unplanned radioactive releases into the groundwater, site soil, and Hudson River from Indian Point was one of the reasons the New York State Department of State refused to grant the plant coastal consistency certification. (Perales 2015) While the public spotlight long-favored exposure of the dangers attendant to the emissions from Indian Point, the other reactors in New York also imperil public health and pollute the environment, most critically Lake Ontario.

It must be understood, the damage done by New York nuclear plants is not limited to New York. Uranium mining and enrichment activities have despoiled and devastated Environmental Justice communities – particularly Native American reservation areas – for decades. Continued use of nuclear means continued mining and adding to the environmental injustice imposed upon indigenous and marginalized populations. (AP 2019; Fettus 2012; Hoover 2012; Kamptner 2011; Moore-Nall 2015; Onondaga 2019; US BLM 2021; US DHHS 2010)

Continuing to look the other way and continue exploitation of their lands is simply unconscionable.

E. River Ecosystem Destruction and Thermal Pollution

Water resources are a serious and growing concern. And nuclear power plants impose a heavy burden on lake and river systems. This is *in addition to* their radioactive discharges into source waters and groundwater. (UCS 2013)

As the New York State Department of State noted in its November 6, 2015 determination not to grant Entergy's request for a Coastal Consistency Determination for Indian Point, that site's intake structures, while its units 2 and 3 reactors were operating, withdrew up to 2.5 billion gallons of water per day for cooling, heating the Hudson River water and killing at least a billion fish, fish eggs and other organisms each year.

Thermal pollution represents an especially negative impact in a warming world.

The Great Lakes are heating up and are at especially elevated risk from thermal pollution from nuclear and fossil thermoelectric facilities. (DelSontro 2018; Gustin 2018; Wuebbles 2019)

Eutrophication and harmful algal blooms exacerbated by heat threaten water quality, fisheries, and recreational use essential to upstate tourism. Like the reactors at Indian Point which dumped billions of BTUs of heat into the Hudson River for decades, Lake Ontario's waters continue to be heated by New York's 4 operating reactors; i.e., the heat load equivalent of detonation of multiple Hiroshima-sized bombs into this vital and increasingly fragile aquatic environment.

New York ratepayers, forced to pay subsidies to keep these upstate reactors operating, are literally underwriting the despoliation of Lake Ontario.

Fortunately, in 2023, New York's governor and legislature have recognized the negative economic impact the dumping of radioactive wastewater into the Hudson River from the decommissioning Indian Point nuclear plant would have and passed the 'Save the Hudson' bill into law. (NY Gov 2023)

F. Nuclear's Substantial Greenhouse Gas Contribution

Nuclear power contributes substantially to global warming. Unfortunately, the promotional literature and greenwashing of the industry (like energy industry PR underpinning "clean coal" and "low-carbon" gas) have been swallowed by many without considered thought.

Other kinds of pollution (like chemical spills) stay more or less within a geographic region. Greenhouse gasses, however, pollute not because of where they sit, but

because they rise into the atmosphere and alter atmospheric conditions. **From a climate change perspective, it is entirely irrelevant where an emitter is located.**

Therefore climate change analysis of every form of energy generation – and even every energy efficiency technology – must take into consideration all emissions generated throughout the *entire* fuel cycle. If one stage of a particular cycle produces minimal carbon, but every other stage produces prodigious amounts, that industry is a big climate change polluter.

The full fuel cycle shows why nuclear is a poor choice for the planet. Nuclear power is actually a chain of highly energy-intensive industrial processes which – combined – consume large amounts of fossil fuels and generate potent warming gases. These include:

- Uranium mining
- Milling
- Enrichment
- Fuel fabrication
- Transport
- Construction and maintenance of the heavy concrete nuclear reactors and all the other massive industrial structures
- Emissions of new man-made radioactive carbon and methane atoms, released into atmosphere during reactor operation
- Environmental remediation of closed nuclear facilities
- Disposal and burial of voluminous amounts of so-called “low-level” nuclear waste (all the structures and components and materials which are radioactive and contaminated, but not spent fuel)
- Long-term on-site containment of high-level nuclear waste (spent fuel)
- Transport and permanent disposal of high-level nuclear waste, including the construction and maintenance of all waste depositories

With regard to the mining component of the fuel cycle, it is noteworthy that the fissile form of uranium – U-235 – is found in less than 1% of natural ore. Uranium ore is a finite resource which is expected to become increasingly energy intensive to obtain because most of the globe’s easy to access high quality uranium reserves have already been excavated.

It is worthy of emphasis that, whereas the burning of fossil fuels releases *sequestered* carbon, nuclear fission creates *new carbon* – carbon that never existed in nature.

Nuclear plant carbon generation is described in a 2010 Electric Power Research Institute (EPRI) technical report titled “Estimation of Carbon-14 (C-14) in Nuclear Power Plant Gaseous Effluents.” (EPR) In Boiling Water Reactors (BWRs) like FitzPatrick and Nine Mile Point, radioactive carbon is released from the core in volatile form such as CO-14, CO^2-14. In Pressurized Water Reactors (PWRs) like RE Ginna, EPRI states: “Carbon-14 is produced in the reactor coolant during power operation, and its

production rate increases during the fuel cycle due to increasing neutron flux and ingress of nitrogen. … Analyses of pressurized PWR reactor coolant samples shows that the ^{14}C species are essentially 100% organic, and ~50% of the coolant activity is a volatile species (most likely methane).” (EPRI, Chapter 4, p 1.) Radioactive carbon or methane is then released to the atmosphere via plant venting.

What the EPRI does not address is something which, to our knowledge, is utterly unanalyzed by anyone. That is the additional gas effluent composition created by the increasing use of high burnup nuclear fuel. Such fuel is hotter and far more radioactive than traditional fuel. (Alvarez 2018)

Critically, C-14 has a half-life of 5,700±30 years. As noted by a National Academies panel: “Most of the activity produced is released into the atmosphere” and effluent releases of carbon-14 were not required to be reported to the NRC until 2010. (NAS 2012) Even after 2010, plant licenses are only required to estimate and report releases of C-14. These estimates are not independently validated.

Further, the huge energy debt left by nuclear power continues long, long after the reactors have stopped generating electricity.

CONCLUSION

What is needed from policy makers is an examination of the full consequences of proposed regimes, including examination of the broad ways nuclear would actually further continued dependence upon natural gas. Nuclear is not a flexible technology that can ratchet up and down quickly. Nor is it always reliably in operation. Thus, regardless of all the other negatives associated with the technology, it would be a poor backup for a renewables-based grid. Continuing with nuclear in New York would exacerbate climate change, contribute to the State’s, nation’s and world’s toxic legacy, further environmental injustice, and divert attention and resources away from the efforts needed to rapidly transform our energy system.

Nuclear power is obsolete and should be deemed out-of-scope. The focus of the New York State Energy Plan should be, as was envisioned in 2015, to move the state forward in the creation of a cleaner, healthier, more just, and sustainable energy future.

Respectfully,

Council on Intelligent Energy & Conservation Policy and Promoting Health and Sustainable Energy

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