Jones River Watershed Association

781-585-2322 • 55 LANDING ROAD, KINGSTON, MASSACHUSETTS 02364 • WWW.JONESRIVER.ORG

Mr. David Abel
Boston Globe
P.O. Box 55819
Boston, MA 02205-5819

October 5, 2015

Dear Mr. Abel,

We are writing in regard to your article in the Boston Globe on Sept. 17, 2015, "Pilgrim nuclear plant says it may shut down." In your piece, you highlight the fact that "Nuclear power doesn't emit carbon," and also note concerns about the impact of Pilgrim's closure on carbon emissions. You also state that Pilgrim "…provides an average of about 12.5 percent of the state's electricity…," which we believe is a partial portrayal of Pilgrim's role in our region's energy story. We would like to address these comments. There are many layers to this complex story, which we hope will be considered in future articles.

Nuclear is NOT Carbon-Free

Nuclear energy is not emissions-free – no form of energy production is. Unlike coal and oil-burning plants, the process of nuclear fission does not produce carbon emissions; however, there are emissions associated with the life-cycle of nuclear power. For example, there are emissions associated with uranium mining/processing, construction of plants and decommissioning processes, and general daily plant operations. One study estimates that, while nuclear CO2 emission levels are well below that of coal and natural gas, it emits twice as much CO2 as solar and wind.[1] Even the World Nuclear Association – a private-sector organization that supports the global nuclear energy industry – published a report in 2011, which shows that nuclear produces substantially less carbon emissions that coal and oil-burning plants, but it produces slightly more emissions than wind and solar.[2] Calculating the carbon footprint of energy sources is difficult and research findings vary, but one thing is clear – nuclear DOES emit carbon emissions. While it's fair to say that nuclear, similar to renewables, is a low carbon source of energy like wind and solar, that's where similarities end.

Environmental Costs

Unlike renewables, nuclear power production is fraught with problems related to pollution, water usage, destruction of aquatic life, generation of highly toxic nuclear waste that currently has no repository, etc.

[1] Sovacool, B. 2008. Valuing the greenhouse gas emissions from nuclear power: a critical survey. Energy Policy (36): 2950–2963. <https://www.nirs.org/climate/background/sovacool_nuclear_ghg.pdf>

[2] http://www.world-nuclear.org/uploadedFiles/org/WNA/Publications/Working_Group_Reports/comparison_of_lifecycle.pdf

Nuclear reactors use uranium as fuel. In the U.S., in-situ leaching is the most common way to mine uranium – especially in the western part of the country. Uranium ore that is naturally found in the ground is dissolved using chemicals and pumped up to the surface, where it is processed using more chemicals. This process contaminates water, air and soil and has caused significant health problems for mine-workers and surrounding communities. Pollution from uranium mining has had serious health impacts on Native American nations in the U.S., especially the Navajo nation.[3] Just this past April, the U.S. EPA and U.S. DOJ announced a record-breaking $5 billion settlement related to the significant environmental damage and toxic pollution caused by the Kerr-McGee company at multiple sites across the country, including uranium mines in the Navajo Nation. The company exposed people to radioactive waste and contaminated soil and water, and tried to leave it all for the local communities and government to clean up.[4]

Unlike renewable forms of energy, nuclear plants require huge quantities of water for cooling and generating power. This is especially true for older generation nuclear plants, such as Pilgrim, that still rely on antiquated once-through cooling systems, which withdraw millions of gallons of water from natural sources daily. Pilgrim is permitted to use up to 510 million gallons of sea water every day from Cape Cod Bay. While some plants recycle water in a closed-loop system, those, like Pilgrim, that use once-through systems negatively impact the environment through water consumption, wastewater discharge, thermal pollution of source waters, and direct impacts on aquatic organisms of all life stages. Further, in the case of Pilgrim, its Clean Water Act NPDES permit that regulates the usage and impacts of a once-through cooling system has long been expired (19 years), and conditions are not being followed.

Unlike renewables, nuclear operations generate large quantities of highly radioactive nuclear waste as a byproduct, and there is currently no national plan for safe long-term storage of this toxic substance. Nuclear waste is expected to be highly radioactive for hundreds of thousands of years according to the Nuclear Regulatory Commission;[5] however we currently do not know how to safely store it for even a few hundred years. Plymouth's shoreline is already home to three dry casks, filled earlier this year. Further, its spent fuel pool that was designed to hold 880 spent fuel assemblies not contains over 3,200 assemblies – and could remain that way for 60 year post decommissioning.

Closure Will Drive Up Carbon Emissions?

In your September 17th article, you quote Entergy's assertion that Pilgrim's closure will increase carbon emissions. This may be true, but only in the very short-term and only if the state fails to fully embrace conservation and efficiency. The south shore of Massachusetts is among the brightest places in the night sky. Given proper incentives, certainly the residents and businesses of the region can save as much

[3] Klauke E. 2013. Impacts of Resource Development on Native American Lands: Human Health Impacts on the Navajo Nation from Uranium Mining. Integrating Research and Education.[PDF]

[4] U.S. EPA. Case summary: settlement agreement in Anadarko fraud case results in billions for environmental cleanups across the country. <http://www2.epa.gov/enforcement/case-summary-settlement-agreement-anadarko-fraud-case-results-billions-environmental>

[5] U.S. NRC. 2012. High-level waste. <http://www.nrc.gov/waste/high-level-waste.html>

power as Pilgrim produces. If another form of energy production does replace Pilgrim in the near-term, and it's not a renewable source, it will likely add carbon emissions.

However when Pilgrim shuts down, in the more important, long-term basis, it will likely be an impetus to further increase renewables such as solar and wind. As solar and wind expand, and battery storage and technologies improve, these systems will begin to be able to provide energy at any time and in all weather conditions – filling the role of a "base load" provider, as Entergy claims Pilgrim to be. Carbon emissions, in the long-term, will be reduced dramatically.

IMPACTS *FROM* CLIMATE CHANGE

A lot of attention is legitimately given to energy producers' impacts *to* climate change (i.e., CO2 emissions). However, it's also important to note the serious impacts on some technologies *from* climate change patterns that are now inevitable.

In July 2013, the U.S. Department of Energy published a report outlining vulnerabilities to these climate trends at energy facilities, including nuclear power stations.[6] The report specifically cites climate change patterns such as increasing air and water temperatures, increasing intensity of storm events, sea level rise, and storm surges as having potential negative implications for thermoelectric forms of power generation (including nuclear facilities). Implications for coastally-based nuclear facilities include: 1) reduction in plant efficiencies and generation capacity due to increasing air and water temperatures, 2) increased risk of exceeding thermal discharge limits due to increasing water temperatures, and 3) increased risk of physical damage and disruption due to increasing intensity of storm events, sea level rise, and storm surge.

In the case of Pilgrim, the effect of climate change patterns (e.g., rising sea levels, warming sea water and air temperatures, increasing intensity of storms and related storm surges) are increasing risks to safety and environmental health. These patterns threaten the facility's cooling system that is essential to normal (and safe) operations are likely to cause flooding events that will have site-wide impacts. They also pose significant risk to the stability of dry cask nuclear waste storage facility being constructed within 175 feet from the shore of Cape Cod Bay.

Pilgrim's Output and Regional Needs

You state in your September 17th article that "Pilgrim…provides an average of about 12.5 percent of the state's electricity…"We would like to offer some facts to consider, in terms of our regional energy needs.

- On average, Pilgrim sends 612 MW to the grid.
- Depending on how much electricity the grid needs, this 612 MW can be a higher or lower percentage of the total.
- At 4:00 am the demand is the lowest of the day (demand can drop as low as 11,000 MW on a cool night). Pilgrim's output can be 5.6% of the total demand at times like this.

[6] U.S. Dpt. of Energy. 2013. U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather. 84 pp.

- At 4:00 pm the demand is the highest of the day, and other generators also turn on. Demand can peak higher in summer months due to running air conditioners, and in summer 2015 the peak was 24,398 MW -- 79% of total grid capacity (21% reserve not used). At this time, Pilgrim may only be 2.5% of the total demand.
- The highest demand to date was in August 2, 2006 at 28,130 MW. Pilgrim would be about 2.2% of the total load, and the grid would be operating at 91% capacity (9% still in reserve).
- If you take Pilgrim's total output for a year, and compare that to total ISO-New England load, you get about 4.1%. So this means that on average over the year, Pilgrim's supplies about 4.1% to the region. Ultimately, we can do without Pilgrim's output.

Entergy claims that Pilgrim is a "critical and extremely reliable baseload source of power because it provides a steady flow of power regardless of total demand by the grid."[7] Pilgrim was closed 77 days in 2014 for various reasons, including multiple emergency shutdowns due to storms, and often ran at less than 100% when it was online. That cannot be called reliable base load power.

Energy Efficiency is Often Overlooked

We know that conservation efforts and energy efficiency improvements have had a great role in reducing demand for power and controlling carbon emissions in the state.

Based on an ISO-New England state profile for Massachusetts (Feb 2013), over the next decade the state's overall electricity demand is expected to grow 1% annually and its peak demand (summer) is expected to grow 1.6% annually. However, energy efficiency efforts are helping to slow the growth of this demand. Compared to a traditional forecast, the state's rate of overall energy use will be 13% less by 2021 due to energy efficiency improvements.

Massachusetts enacted legislation called the Green Communities Act in 2008, which promotes energy efficiency and encourages investment in renewables. Since then, Massachusetts has sponsored a variety of energy efficiency programs for residents, organizations, businesses, municipalities, and state agencies. From 2011-2013, Massachusetts was ranked #1 in the nation for energy efficiency by the American Council for an Energy Efficient Economy's (ACEEE's) State Energy Efficiency Scorecard.

A report by the Barr Foundation in 2014[8] found that efficiency efforts have been an economic benefit to the Commonwealth – albeit not large – from the enactment of the Green Communities Act. Additionally, the Act has resulted in unquestionable environmental and health benefits (not included in the study).

Massachusetts continues to lead the nation in energy efficiency and clean energy policies and technology. The state developed a new three year plan (2013-2015) with goals to further save energy

[7] www.pilgrimpower.com/safe-secure-vital/r4ny.html

[8] https://www.bostonglobe.com/business/2014/03/04/green-communities-act-yields-modest-economic-benefits-says-study/HyqJARJ31bBkDh85AfxMVP/story.html

and provide incentives to businesses and homeowners willing to be more energy efficient. The third round of these efficiency plans, for 2016-2018, is now in the planning phase.

It's not all about how much energy can be produce for the region, but also how efficient we can become.

Federal and State Clean Power Plans

It's also important to keep in mind how nuclear energy fits into our new federal and pending state clean energy plans.

Federal Clean Power Plan: On Aug. 3, 2015, President Obama announced the U.S. Environmental Protection Agency's (EPA) Clean Power Plan final rule, which is a plan for electric-generating facilities in the US in response to President Obama's Climate Action Plan. The final plan got a lot right. Existing nuclear plants, and nuclear plants under construction (or under license renewal) will not be included in the plan. In other words, nuclear will get no subsidies and the plan will rely on renewable sources of energy and energy efficiency to reduce carbon emissions. As expected, the plan primarily targeted the coal industry – but also included setting standards for nuclear and gas.

Here is an overview of how the final Clean Power Plan rule relates to nuclear power:

1. Existing nuclear plants, those going through relicensing, and those under construction are not counted when setting emissions goals.
2. There is no need to "preserve" nuclear reactors at risk of closure since they can be replaced with renewables.
3. EPA will only allow new/increased nuclear generation to count toward complying with emissions goals. That means, states can only count new reactors that actually operate before 2030 (the five in construction or any others) and power uprates of existing reactors toward meeting their emissions goals.
4. That means there is no incentive under the final rule to keep uneconomical reactors operating and no incentive to complete building new reactors. States can meet their goal with new nuclear (but not with existing nuclear), but they are given no justification for preferring nuclear over renewables. In fact, there are several statements in the rule that indicate just the opposite.
5. And only those new/additional amounts of nuclear can qualify to sell emissions offset credits in cap-and-trade programs. Existing reactors cannot qualify as emissions offsets for fossil fuel generation, because they do not actually reduce carbon emissions.
6. The final rule does not prevent states from creating subsidies for nuclear, but there is absolutely no incentive for them to do so.

The final rule also establishes that new natural gas plants will not count toward reducing carbon emissions, recognizing the global warming impact of methane releases and forcing states to rely on renewables and energy efficiency to meet most of their emissions reduction goals. The natural gas industry is just as upset as the nuclear industry about the federal Clean Power Plan.

State Clean Energy Standard: To achieve an 80 percent reduction in greenhouse gas emissions by 2050, MassDEP intends to implement a Clean Energy Standard (CES). A CES would provide a long-term incentive to deliver increasing amounts of clean electricity to consumers in Massachusetts, and thereby move the state toward a stable and reliable energy system. A draft plan was issued in January 2015 and one of the questions MassDEP was trying to answer was how to handle nuclear power and whether to label it as a "clean" energy source. The state's Clean Energy Standard is still pending.

Summary

In sum, nuclear does in fact emit carbon emissions, and is at best considered a low-carbon form of energy production. While emissions could increase in the short-term if Pilgrim is replaced with something other than renewable energy, emissions over the long-term will be reduced dramatically as the state further increases renewables.

Pilgrim only provides about 2.5-5.6% of the total electricity demand regionally, meaning we really do not need Pilgrim's electricity. Even *if* we absolutely needed Pilgrim's power and it was truly carbon-free, is that enough reason to ignore the pollution problems, massive water usage and destruction of aquatic life, and especially the production of lasting, highly toxic nuclear waste that currently has no repository?

The risks posed *by* climate patterns are also worth attention. We strongly believe that Pilgrim is inherently unsafe due to structural, environmental, and site-specific problems (e.g., located in a salt water/air environment and approximately 2 ft. above the FEMA flood zone, facing N-NE directly on the Atlantic Ocean, subjected to ocean-based storms, waves and wind, suffering from age-related degradation, etc.). Not only is Pilgrim's power clearly not a solution to climate change, but changing climate patterns are also increasing the hazard Pilgrim poses to our region.

Even President Obama's Clean Power Plan relies heavily on renewables and energy efficiency–the cornerstones of a sustainable energy system–and no longer promotes nuclear power as a climate solution.

Pilgrim is dangerous and environmentally destructive, and certainly not the answer to get us to the cleaner energy future we all need.

Sincerely,

Karen Vale

Karen Vale
Campaign Manager, Cape Cod Bay Watch
Jones River Watershed Association
508-951-4723
www.capecodbaywatch.org