The New Energy Transition: Why Offshore Wind in the Atlantic?

On June 23, 2022, the White House announced the federal government was joining with eleven governors from up and down the East Coast to launch a new Federal-State Offshore Wind (OSW) Implementation Partnership that will accelerate offshore wind development in the United States. The East Coast plan is part of an overarching goal to deploy 30 gigawatts (GW) of offshore wind by 2030, thought to be capable of producing enough electricity "to power 10 million homes with clean energy…." The driving force for underwriting this "green" energy with federal subsidies and state ratepayer dollars is further reductions in greenhouse gases (GHGs) entering the earth's atmosphere and thereby altering and damaging the physiochemical condition and capability of the planet's air, land, water, and biological assets (hereinafter referred to as geospheric capital or geocapital).

One of the most ambitious off-shore wind programs was planned in New Jersey, where the State's 2020 Energy Master Plan included 11 GW of offshore wind deployment by 2040 as part of a transition to 100 per cent clean energy by 2035. The plan benefited from the federal program subsidies passed as part of the 2022 Inflation Reduction Act, but changing macroeconomic factors, including inflation and interest rate increases, have recently resulted in cancellation of 2.2 GW under development near New Jersey's southern tip by the Danish company Orsted. Burgeoning repair costs and supply chain difficulties are compounding these financial and market factors to negatively affect the offshore wind industry more generally. In addition, Environmental Impact Statements and other federal statutory due process requirements for approving public maritime geocapital access and use by these projects have come under intense legal scrutiny, including in New Jersey, where the recently filed case of *County of Cape May v. U.S.* sets forth numerous claims based on these alleged multi-statute administrative procedure and due process failures.

Emerging questions as to the legal, financial, and operational efficacy of offshore wind notwithstanding, a threshold consideration for eastern seaboard states is …"Why?" Why would states that successfully invested in clean energy as early as the 1960s—and cut absolute and per capita levels of GHGs and conventional emissions to some of the lowest levels in the nation while shouldering the nation's highest electricity prices—again outlay tax- and ratepayer dollars to "transition" their electricity infrastructure portfolios before competing states achieve comparable GHG reductions? Why would irreplaceable Atlantic Ocean maritime and aquatic assets that sustain endangered species such as the North Atlantic Right Whale be rezoned for "green" electricity production, when available technical options can make more power without harming this unique and precious geocapital, not to mention use far less geocapital overall? Why would states that cleaned up their airshed continue making this restored absorption capacity available for free to out-of-state emitters without earning emission credits for their existing clean generation? And perhaps the most basic question of all, can offshore wind turbines reliably supplant the electricity currently produced by cleaner fossil assets vital to economic sustainment? If not, what can?

The following data and information examines these public policy questions as they relate to historic capital investment choices, the reality of eastern seaboard electricity requirements, earned airshed value, and economic fallacies that are key to informed decisionmaking on the economic viability of offshore wind deployment in the Atlantic Seaboard region, and along the U.S. coastlines.

The Successful Energy Transition: Atlantic States Are Already Green

The chart below shows a representative sample of per capita greenhouse gas (GHG) emission among the states flanking the eastern seaboard and others nationwide. Not only are the eastern seaboard states currently the lowest emitters of GHGs, they were largely cleaner and greener regarding GHGs in 1970, at a time when the federal Clean Air Act (CAA) was only just passed.

Table 1: Per Capita Energy-related Carbon Dioxide Emissions* by State (1970–2021)

			Change (1970-2021)		Change (2020-2021)	
State	**1970**	**2021**	**Percent**	**Absolute**	**Percent**	**Absolute**
District of Columbia	18.0	3.8	-79.12%	-14.3	5.31%	0.2
New York	15.6	7.9	-49.61%	-7.7	10.18%	0.7
Massachusetts	17.5	8.0	-53.99%	-9.4	7.44%	0.6
Maryland	18.8	8.5	-54.81%	-10.3	9.29%	0.7
Vermont	12.4	8.6	-30.64%	-3.8	2.12%	0.2
New Jersey	18.0	9.6	-46.61%	-8.4	6.34%	0.6
New Hampshire	17.3	9.6	-44.61%	-7.7	5.98%	0.5
Rhode Island	13.8	9.7	-29.70%	-4.1	8.20%	0.7
Connecticut	15.7	10.1	-35.82%	-5.6	7.53%	0.7
Florida	15.2	10.4	-31.96%	-4.9	7.76%	0.7
Maine	16.9	10.5	-37.93%	-6.4	5.69%	0.6
North Carolina	19.1	10.9	-42.68%	-8.1	7.22%	0.7
Virginia	18.6	11.3	-39.14%	-7.3	-0.47%	-0.1
Georgia	16.0	11.5	-27.91%	-4.5	5.88%	0.6
Delaware	29.2	12.9	-55.77%	-16.3	2.58%	0.3
South Carolina	16.2	13.4	-17.81%	-2.9	7.80%	1.0
Pennsylvania	26.0	16.4	-36.80%	-9.6	10.32%	1.5
Texas	31.9	22.4	-29.73%	-9.5	5.03%	1.1
Indiana	33.1	24.4	-26.12%	-8.6	7.33%	1.7
Louisiana	39.5	40.8	3.29%	1.3	3.43%	1.3
West Virginia	44.0	49.5	12.61%	5.5	15.25%	6.5
North Dakota	23.8	72.7	205.43%	48.9	4.48%	3.1
Wyoming	55.7	94.3	69.38%	38.6	-2.02%	-1.9
Average all states	20.7	14.8	-28.67%	-5.9	6.72%	0.9

Source: U.S. Energy Information Administration,
State Energy Data System and EIA calculations made for this analysis.
***Metric tons of energy-related carbon dioxide per resident**

Since that 1970 baseline year, as Atlantic states got greener, multiple states have vastly increased their GHG output, both in absolute volume and relative to population. As a matter of national priority, its arguable that states with the highest GHG outputs have the first priority to recapitalize electricity portfolios and achieve the same reduction levels as the eastern region before those ratepayers are again asked to pay for new capital infrastructure.

The Sophistry of Energy Transition: Counting "Homes Alone"

Every time a wind farm is announced, it includes the inapt selling point as to how many "homes" the anticipated kilowattage will power. For the Atlantic offshore wind projects, the anticipated 30 gigawatts of installed capacity was touted as enough to power 10 million homes. Unfortunately, as Table 2 shows, the total US east coast households number well over four times that amount. New York and New Jersey alone have more households than this kilowattage could supply. According to the National Renewable Energy Laboratory, 30 gigawatts of installed offshore wind capacity will require 2,100 turbines. Meeting the needs of 45 million homes would therefore require almost 10,000 turbines be constructed in the irreplaceable maritime system of the Atlantic, arguably already zoned for much higher and better uses.

Table 2: Eastern Seaboard Homes

Eastern Seaboard States	"HOMES" (in millions)
ME	0.57
MA	2.71
RI	0.42
CT	1.39
NY	7.53
NJ	3.39
PA	5.14
DE	0.45
MD	2.29
VA	3.24
NC	4.01
SC	1.97
GA	3.88
FL	8.15
Total	**45.14**

Source: US Census Bureau

And this is *only* homes. Residences use only about one-third of the electricity needed to sustain the economic, health, and welfare requirements of daily life. Each state also needs billions of kilowatt hours for thousands of traffic lights, hundreds of hospitals and other medical care facilities, dozens of sewage treatment and drinking water purification plants, food preservation capacity, police and fire departments—all running 24/7 to literally sustain life. Then there are the thousands of schools and universities, the mass transit systems, banks, broadcasters, factories, offices, stadia, theatre and concert venues, restaurants, stores and shops, street lights, delivery companies, and warehouse and distribution centers, inter alia, that make up the market economy, as well as public sector enterprise systems like national defense, parks, courts, public authorities, post offices, and more, all needing constant kilowattage.

As Table 3 indicates, electric train service in the nine jurisdictions comprising the famed North East Corridor alone uses more than half of ***all*** the current wind electricity output in those states combined. Another East Coast industry requiring substantial 24/7 electricity supplies is data centers. Hyperscalers—companies like Microsoft, Meta, Google, Apple, and Amazon—are creating exponential growth in cloud computing and storage services that in turn drive major growth in electricity demand. In Virginia alone, planned data centers are expected to need more than 7 more gigawatts of power by 2035 on top of the 2.7 GW used by existing facilities in 2022 (an amount double the data center power demand in 2018).

While this substantial data industry growth proceeds apace, energy transition advocates also plan to add more electric vehicles and locomotives to the already burgeoning non-home demand, while also banning gas appliances and expanding in-home electricity requirements. The massive financial and geocapital expenditure to build 30 GW of intermittent power is of questionable economic viability if it can maybe meet 25% of residential demand and no load growth in transportation, industrial, or commercial enterprises.

Table 3: Wind Output and Mass Transit Electricity Requirements

NE Corridor State	Wind Output (BKwH)	Mass Transit System	Billion KWH Used
MA	0.215	MBTA	0.422
RI	0.209		
CT	0.013	CT*rail*	U/A
NY	4.568	NYMTA	0.300
NJ	0.022	NJT	2.800
PA	3.572	SEPTA	0.386
MD	0.498	MARC	U/A
DE	0.004		
DC	0.000	WMATA	0.500
Interstate		AMTRAK	0.636
Total	**9.100**		**5.044**

Source: US Energy Information Agency and Open Sources

The Equities of Energy Transition: What Happened to "Polluter Pays?"

The eastern seaboard states have been undertaking a green energy transition at least since Duquesne Power and Light invested $10 million in the Shippingport Nuclear Plant in western Pennsylvania in 1957. At the time, western Pennsylvania was still reeling from the 1948 Donora Fog, a catastrophic weather event that trapped deadly industrial gases over that town, hospitalizing 6,000 out of a population of 14,000 and killing 20 people outright. Three of these deadly weather inversions repeated in New York City in the1950s and 1960s, leading many states, especially in the East, to invest in hydroelectric and nuclear power facilities that have long since delivered needed clean electricity to areas with some of the highest population densities in the country.

The twentieth century electricity transition to cleaner alternatives that cut conventional and GHG emissions while maintaining critical kilowatt supply in eastern state portfolios has had two noteworthy economic results:

- *East coast electricity rates increased to pay for constructing the more technically advanced systems that required less airshed capacity to operate.*

  As Table 4 shows, only six of seventeen eastern states have electricity rates below the national average. Along with other cost drivers such as maintaining transmission and distribution systems to serve their large industrial, commercial, residential, and public enterprise requirements, prior infrastructure recapitalization not only made eastern electricity more expensive for all customers—industrial, commercial, residential, and public enterprise alike—but also meant businesses and jobs often sought locations with fossil portfolios that charged lower electricity rates.

- *Cleaned-up eastern airshed capacity was used (for free) by emitters in competing states.*

  As depicted in Table 1, even in 1970 (at the point when the modern CAA was first passed), the eastern seaboard states had already invested in cleaner generation, and in so doing, avoided using their finite and valuable airshed carrying capacity as a dumping ground for conventional pollutants and greenhouse gases. Unfortunately, competing states to the west continued producing dangerous conventional and greenhouse gas emissions that loaded into eastern airsheds, occupied the freed-up airshed capacity, caused acid rain and other harms, and paid nothing for that use. Non-paying polluters essentially expropriated East Coast ratepayers' return-on-investment (ROI) in the form of airshed supply earned from early adoption of green energy investment. Said another way, more westerly areas that continued burning coal were using the unacknowledged "emission credits" created by the eastern state utilities and ratepayers that transitioned their energy to systems to avoid emissions into the airshed. Ratepayers in the East that had

Table 4: Eastern State Retail Electricity Prices

State	Average retail price (cents/kWh)
Connecticut	21.08
Delaware	11.83
District of Columbia	14.94
Florida	12.51
Georgia	12.00
Maine	17.44
Maryland	13.32
Massachusetts	21.27
New Hampshire	21.07
New Jersey	14.80
New York	18.33
North Carolina	9.60
Pennsylvania	11.86
Rhode Island	19.30
South Carolina	10.74
Vermont	16.99
Virginia	10.75
U.S. Average	**12.36**

Source: DOE Energy Information Agency

underwritten hydro and nuclear facilities in this earlier transition (with corollary increases in electricity costs) effectively subsidized brown state economic growth for decades.

This historic airshed geocapital wealth transfer is not adequately considered by economists and leaders in clean eastern states whose hard-earned airshed ROI is still effectively given away. Further green transition in clean states will repeat this brown portfolio subsidization, this time spending publicly owned maritime assets and ratepayer monies to again underwrite areas and regions that have yet to meet the clean transition levels achieved in the last century.

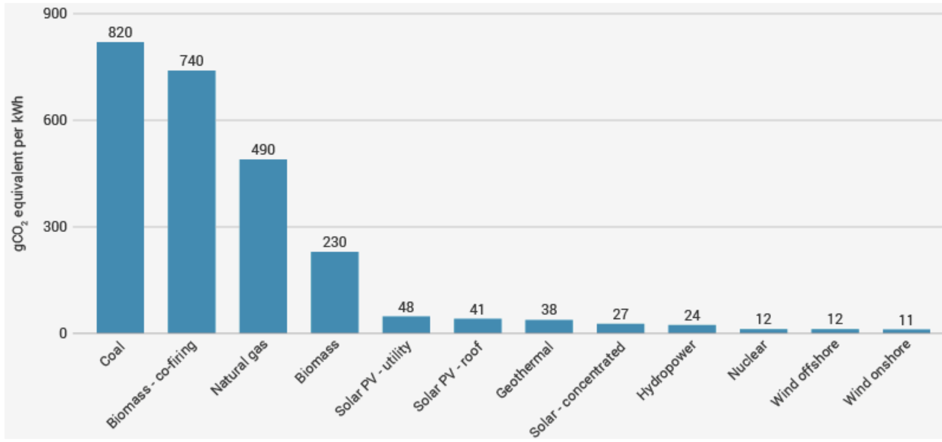
Even if states like New Jersey determine they must eliminate fossil fuel use ahead of competing states with dirtier portfolios, basic fiduciary duty would require it be done using technology that will actually produce the replacement/expanded electricity needed using the lowest geocapital outlay. Table 5 presents a comparative output of actual electricity generation from wind, natural gas, and nuclear facilities in a sampling

Table 5: Comparative MegawattHour Production by State and Fuel

State	Fuel Type	Installed MW	MwH Produced	MwH/MW
NJ	Wind	9.0	21,629	2,403
	Natural Gas	12,374	33,394,323	2,699
	Nuclear	3,631	28,318,800	7,800
NY	Wind	2,189.0	4,567,508	2,087
	Natural Gas	24,587	60,312,012	2,453
	Nuclear	3,398	26,812,164	7,890
RI	Wind	78.0	209,338	2,684
	Natural Gas	1,933	6,963,771	3,602
	Nuclear	0	0	0
CT	Wind	5.0	12,833	2,567
	Natural Gas	5,376	24,530,687	4,563
	Nuclear	2,163	16,464,167	7,612
MD	Wind	190.0	497,608	2,619
	Natural Gas	6,347	13,949,642	2,198
	Nuclear	1,850	14,810,684	8,004
KS	Wind	8,261.0	29,687,479	3,594
	Coal	4,886	20,229,360	4,141
	Nuclear	1,268	8,981,959	7,085
TX	Wind	39,334.0	114,786,903	2,918
	Coal	19,315	85,336,953	4,418
	Nuclear	5,139	41,606,955	8,097

of states. The data confirm that per megawatt installed, nuclear produces twice—and in some cases three or four times—the electricity needed to power growing demand using technology known to require minimal volumes of surface land or water, airspace, airshed, or water supply, while also avoiding interference with airwaves, species habitats, and property values. Lifecycle GHG emissions of nuclear facilities are as low as offshore wind with no requirement for large surface areas, critical habitat overzoning, airshed, or airspace.

Figure 1: Life-cycle Emissions of Electricity Options



Source: World Nuclear Association from IPCC Data

The Wise Energy Transition: Ask "Why?" and "Where"?

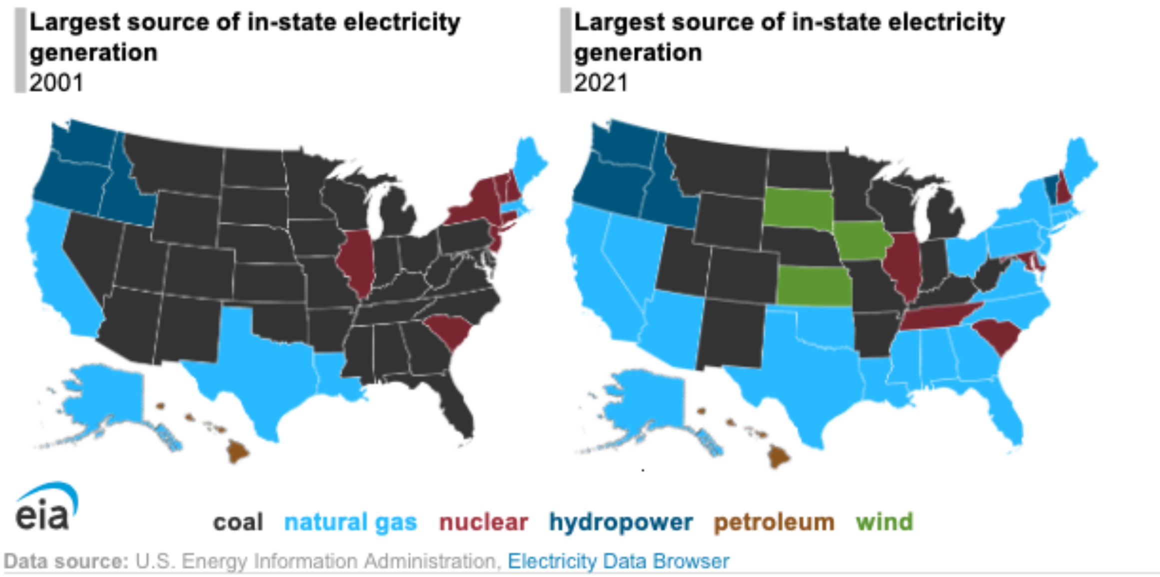
For eastern state residents, the accepted conventional wisdom on energy transition policies should prompt questions to be answered before electricity generation facilities are closed, replaced, or prematurely retired in favor of technologies that such wisdom deems clean and green despite antithetical requirements for unique and finite geocapital spending in their production chains, construction activities, and operations:

- Should ratepayers paying above the national average for electricity in states with already clean generation portfolios be forced to pay (again) to recapitalize electricity generation assets?
- Should states with clean electricity generation portfolios pay to become cleaner while competing states continue to operate facilities producing 831 billion kWh from coal plants as part of their generation portfolios? (Figure 2 depicts the 15 states that still make most of their electricity using coal.)
- Should maritime assets be rezoned for electricity production if higher and better uses are currently utilizing the geocapital capacity for valuable economic productivity?
- Should maritime assets be used for electricity production if alternative technologies can make the same or more kilowattage using a smaller geocapital supply that does not impinge on unique ocean assets?
- Should energy transition policies prioritize replacing coal facilities in states with the highest GHG outputs per capita (including advanced nuclear) before any state with a clean generation portfolio spends taxpayer and ratepayer dollars to retire fossil generation assets?
- Should states that invest in cleaner electricity generation facilities earn emission credits from states that continue to operate coal fossil plants that load GHG emissions into the limited supply of national airshed?

These questions illustrate how misapplied energy transition policy is potentially manifesting the Broken Windows Fallacy, which recognizes that destruction, and the money spent to recover from destruction (or, in this case, premature capital retirement), is not actually a net benefit to society. To avoid Bastiat's Broken Windows pitfall, the economic returns from constructing and operating new offshore generation (the "seen" in the Broken Windows parable) must be analyzed in conjunction with economic losses also generated by this planned elimination of existing infrastructure assets (the "unseen"). Such losses potentially include:

- Employment, tax base, and economic production value at closed/replaced generation facilities;

Figure 2: Coal Remains Largest Source of Electricity Generation in 15 States



- Employment, tax base, and economic production value when operational maritime geocapital used for fishing, transport, or other economic production is rezoned for energy production;
- Forfeited airshed capacity value (allowing dirty generation outside the eastern region to continue loading GHGs into the national airshed system);
- Economic activity relocation from the area (industrial and commercial) due to higher electricity prices; and,
- Lost "opportunity costs" of investing dedicated energy infrastructure funding in preferable electricity transition options, or even other, non-electricity systems.

In sum, the changing economic factors slowing the deployment of offshore wind farms present an opportunity to ask "why," "where," and then "whether" this aspect of energy transition should proceed without fully assessing its unseen economic effects. The offshore areas of the Atlantic Ocean are a valuable geocapital asset system comprised of air, water, and land of unique, scarce, and potentially finite supply and capacity; these assets sustain food production, transport, national security, recreation/health/tourism, aesthetics/views, as well as aquatic and avian habitat and migration. The potential for both direct and "lost opportunity" costs from rezoning ocean geocapital for relatively inefficient electricity production requires government leaders, stakeholders, and ratepayers reevaluate whether spending significant financial and geospheric capital to generate a limited amount of critically required electricity is a wise use of taxpayer assets given the factors described above.