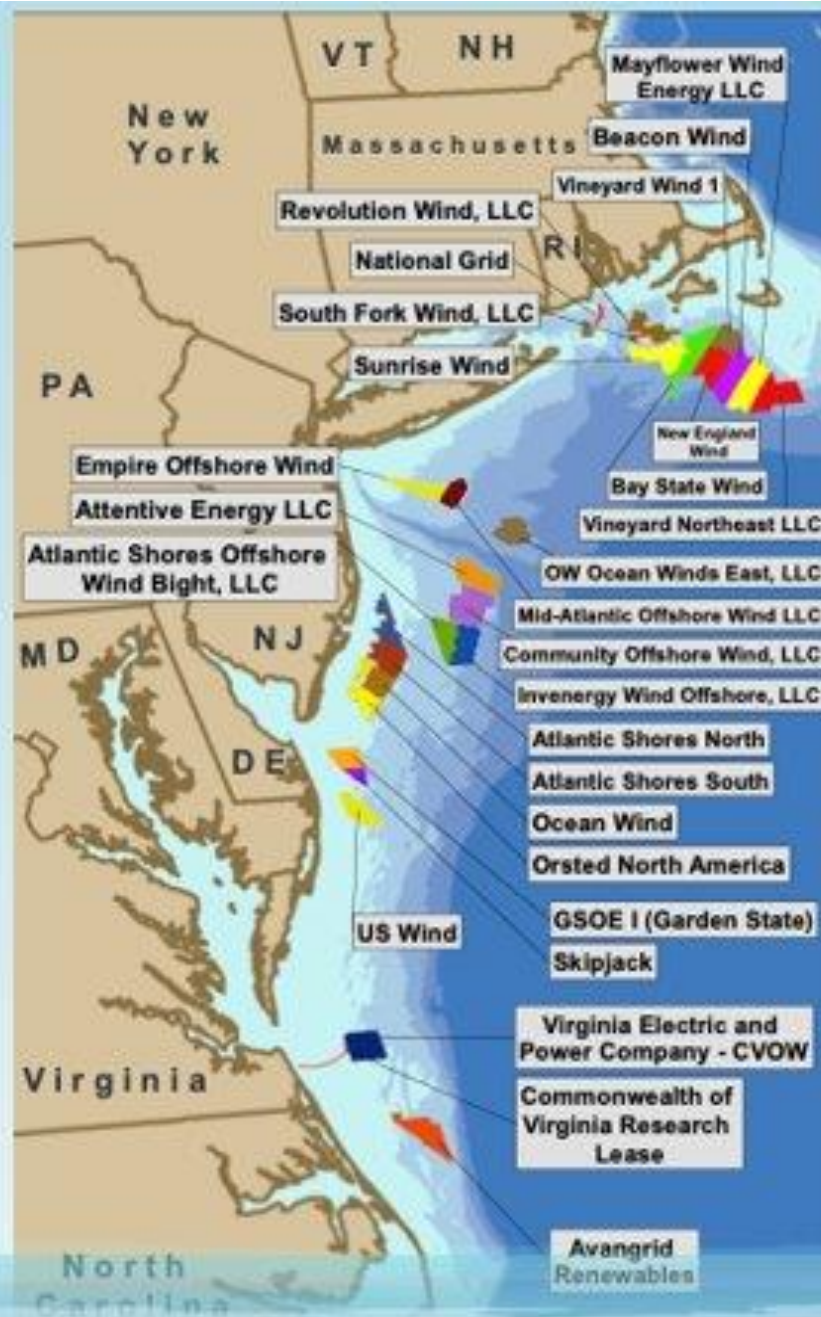
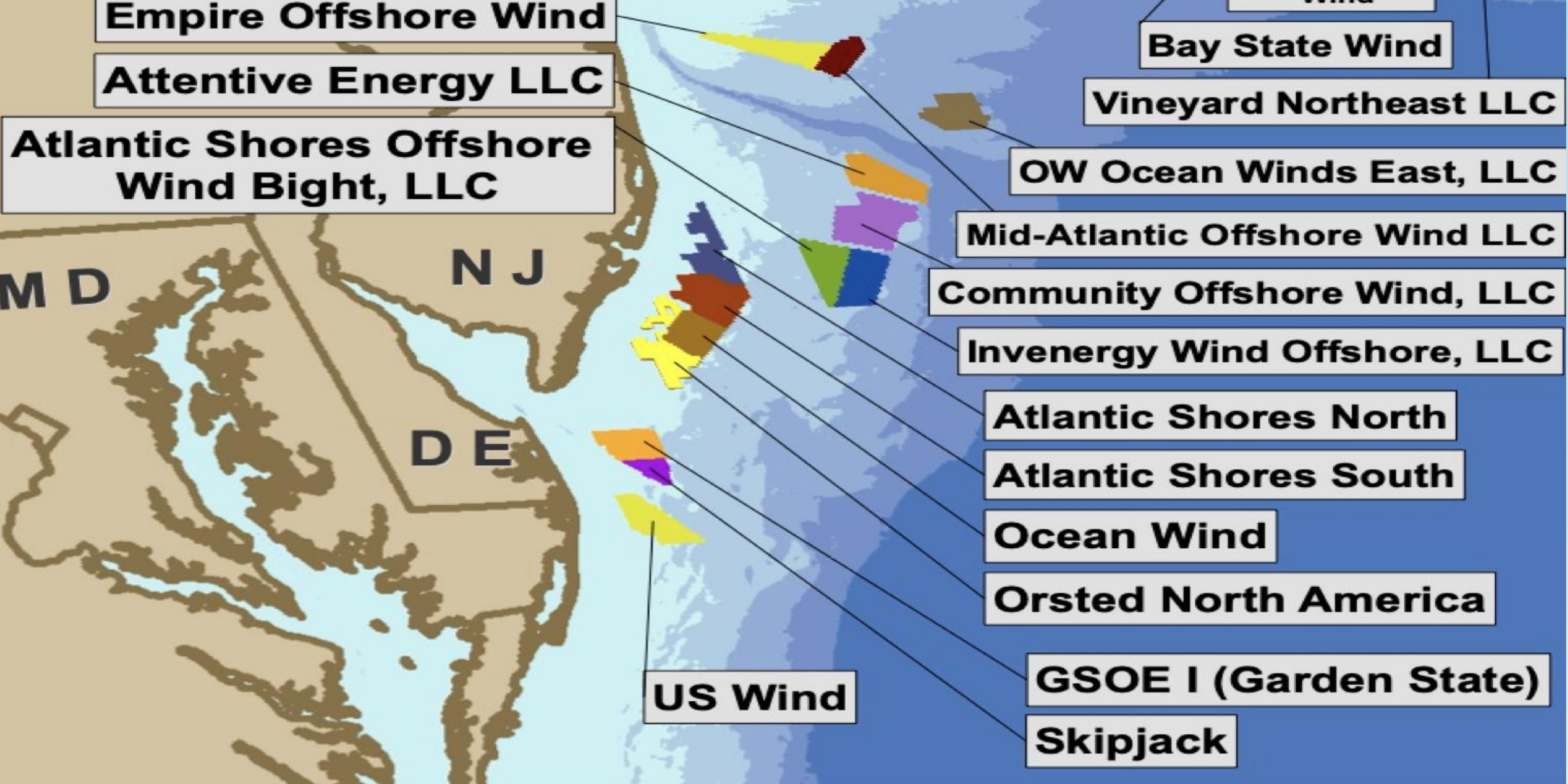


# Wind Farms

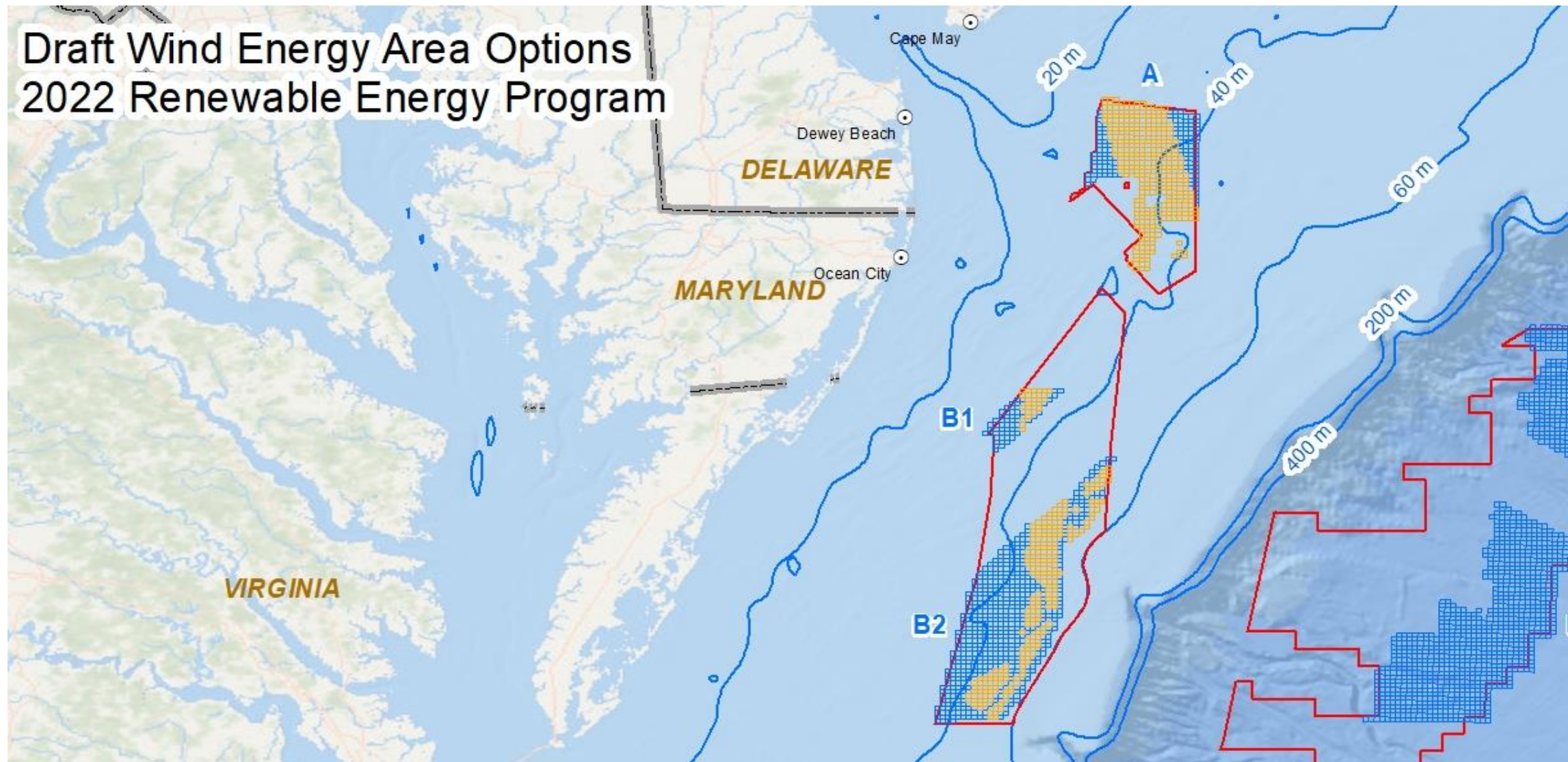
- Impressions
  - Hopes
  - Opinions
- Aspirations
- Predictions







# Draft Wind Energy Area Options 2022 Renewable Energy Program



DELAWARE

MARYLAND

VIRGINIA

NORTH CAROLINA

Ocean City

Virginia Beach

Kitty Hawk

B1

B2

C

D

F

E1

E2

60 m

200 m

400 m

Management



38°N

38°N

37°N

37°N

36°N

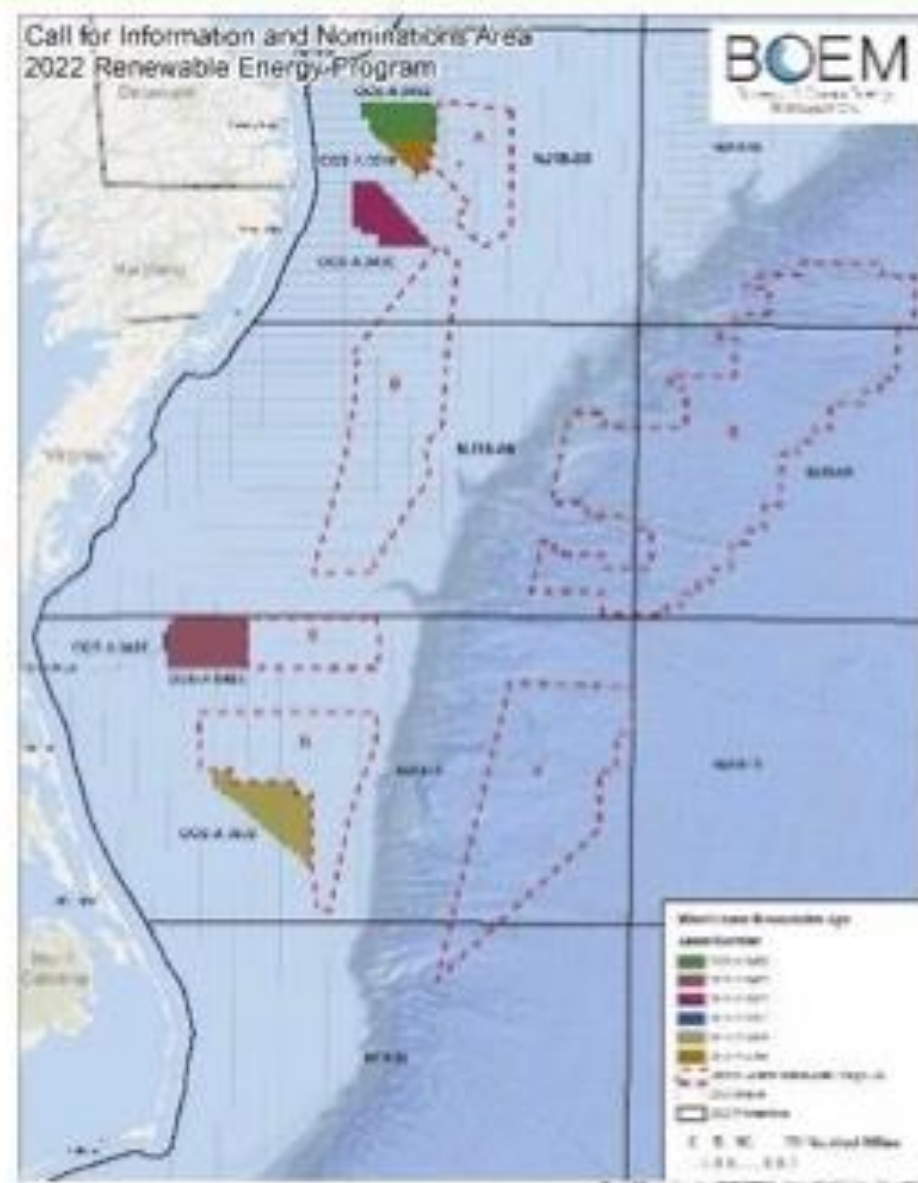
36°N



0 10 20 40 60 80

## Six New Call Areas Were Announced in the Central Atlantic on April 27, 2022

- **Four Call Areas** are in water depths suited for fixed-bottom technology and two are in ultra-deep water of about 2,600 meters (m).
- **Less than 60-m depth:**
  - Call Area A: 952 km<sup>2</sup>
  - Call Area B: 2,639 km<sup>2</sup>
  - Call Area C: 744 km<sup>2</sup>
  - Call Area D: 1,791 km<sup>2</sup>.
- **Deep Call Areas:**
  - Call Area E: Depth to 2,500-m and 2,600-m bathymetric contour; 6,556 km<sup>2</sup>
  - Call Area F: Depth to 2,600-m bathymetric contour; 3,090 km<sup>2</sup>.



Central Atlantic Call Areas

# Wind Farms

## Positive Impacts

1. Wind turbines produce inexpensive energy
2. Elimination of carbon dioxide emittance
3. Clean in all other respects
4. Provide employment

# Wind Turbines Produce Inexpensive Energy

Levelized Cost of Energy (LCOE)

Power Provision Agreement (PPA)

Internal Rate of Return (IRR)

LCOE calculated to Point of Interconnect (Average 3.4 cents kWh)

Floating Platforms not so economical





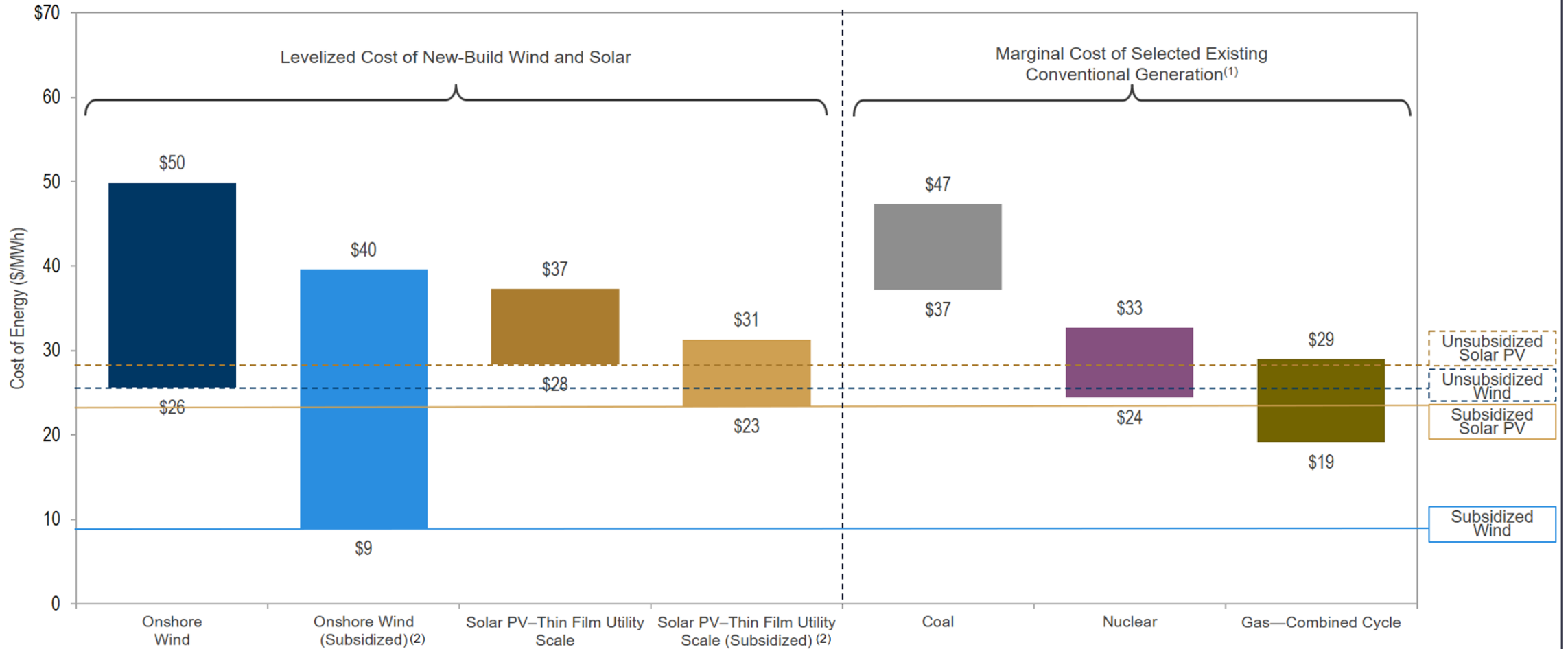


# 2021 Cost of Wind Energy Review

Tyler Stehly and Patrick Duffy  
National Renewable Energy Laboratory  
December 2022

# Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation

Certain renewable energy generation technologies have an LCOE that is competitive with the marginal cost of existing conventional generation

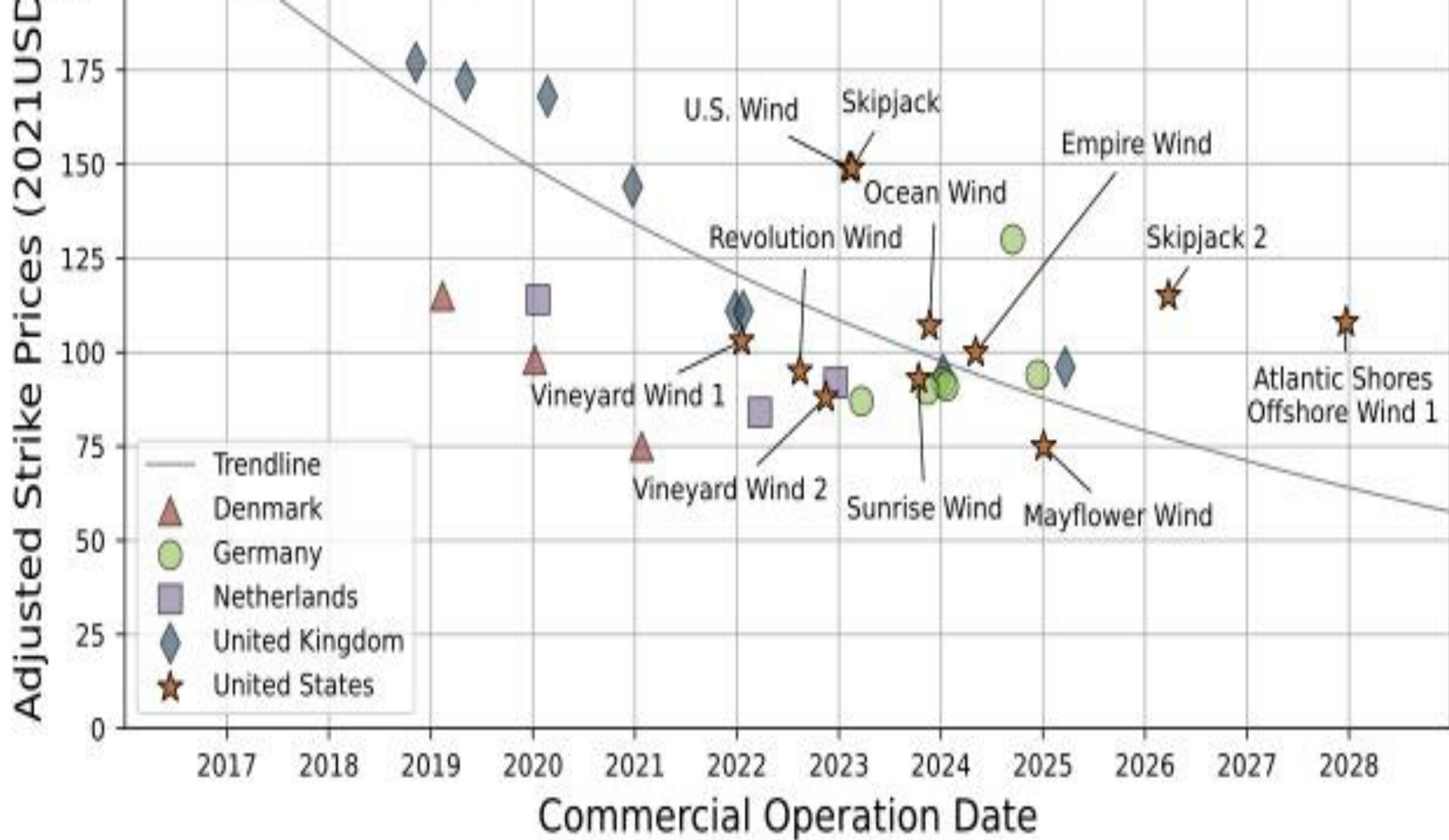


Source: Lazard estimates.

Note: Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page titled "Levelized Cost of Energy Comparison—Unsubsidized Analysis".

(1) Represents the marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper and lower quartile estimates derived from Lazard's research.

(2) The subsidized analysis includes sensitivities related to the TCJA and U.S. federal tax subsidies. Please see page titled "Levelized Cost of Energy Comparison—Sensitivity to U.S. Federal Tax Subsidies" for additional details.



# Rehoboth Beach KWH and Delivery Costs

Jay Lagree DMP Delivery (2022) 4 cents/kWh

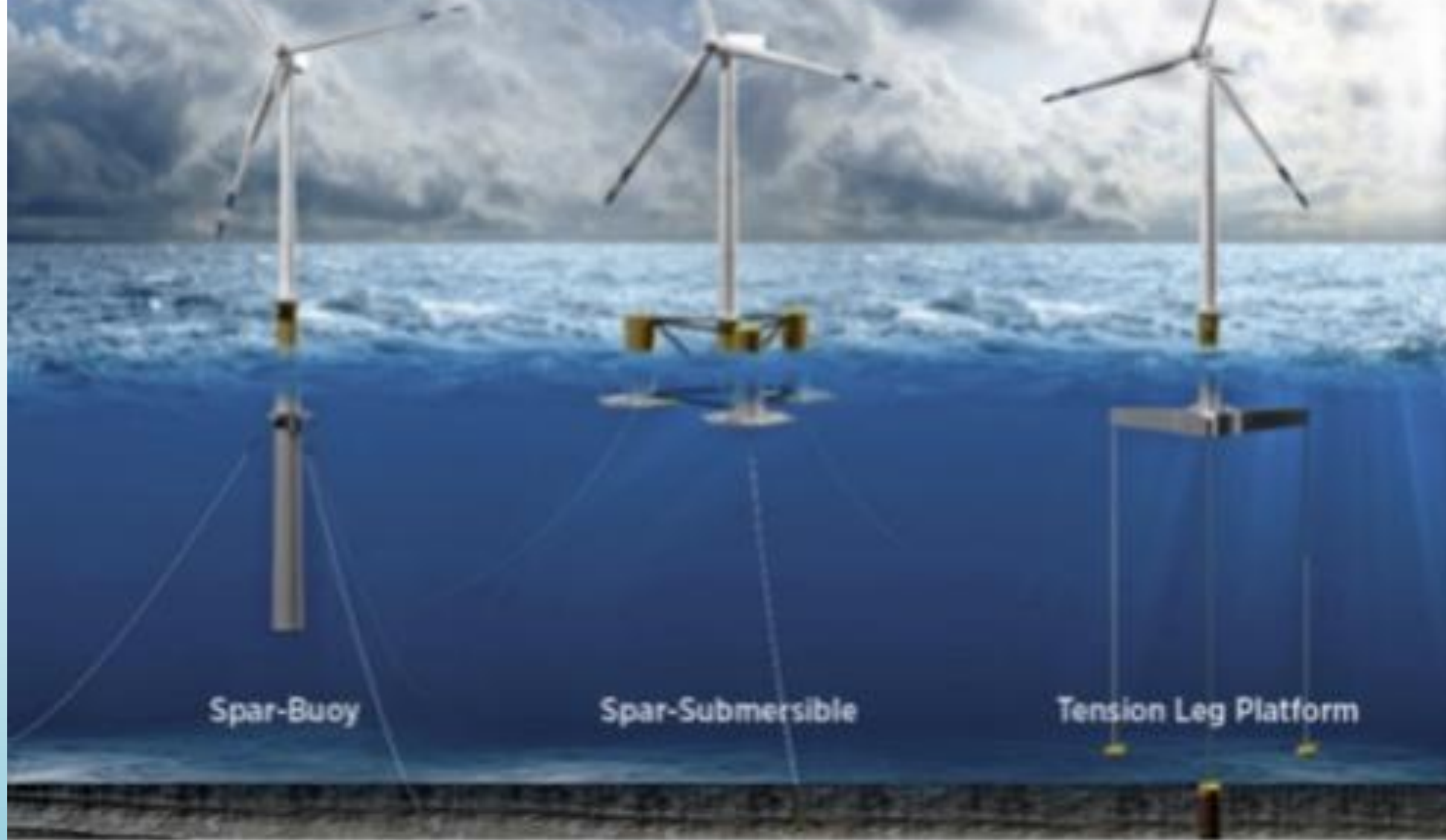
Jay Lagree DMP LCOE (2022)...6cents/kWh

DMP Add on charges (2022)...2 cents/kWh

Skipjack 1 PPA.....15 cents/kWh

Skipjack 2 PPA .....12 cents/kWh

Floating Windmills LCOE (guess)..15-18 cents/kWh



Spar-Buoy

Spar-Submersible

Tension Leg Platform

# Floating Platforms

## Challenges:

- Expensive to build in port
- Expensive to anchor in deep sea
- Expensive to connect power array
- Expensive to operate and maintain
- Distance from POI
- Twice as expensive as anchored windmills

## Cost reduction potential:

- Leveraged cost reductions from fixed-bottom systems
- Existing supply chains
- Optimization of floating structures
- Easier construction at sea.
- Higher wind speeds.

# Wind Energy Advantages

- Clean Energy
  - Wind turbines generate no greenhouse gases
    - Wind turbines generate minimal heat
  - Provide employment
- Local jobs available for turbine and tower maintenance.
  - Roscoe, TX has 675 windmills and 70 FT employees.
    - 2000 new jobs per year. Offshore: \$50/hr
      - Difficult and dangerous.



# Wind Energy Advantages:

## Elimination of carbon dioxide emittance

- Hydrocarbon electricity generators produce CO<sub>2</sub>
- Wind turbine electricity generators produce **no** CO<sub>2</sub>
- CO<sub>2</sub> is a greenhouse gas usually caused by human activity
- CO<sub>2</sub> in greenhouse gas causes warming of earth surface
- The CO<sub>2</sub> in greenhouse gas remains for hundreds of years



# Wind Farms

## Negative Impacts

Bureau of Ocean Energy Management recognizes:

1. Shipping commerce adversity
2. Fishing commerce adversity
3. Viewshed and site position caused adversity
4. Adverse Environmental Impact
5. Need backup when wind doesn't blow



# Shipping Commerce Adversity

- Adverse effects on safety of marine navigation near wind farms.
- Adverse effects on radar and communication near large windmills.
- Time and energy requirements required for ships transit extended.
- Scouring of seabed and change of currents impacts navigation
- Heavy increase in density of windfarm maintenance vessels for large windfarms



# Commercial fishing near windmills

	Construction	Operation	Decommissioning
Artificial Reef Effect		X	(X)
Fisheries Exclusion Effect	X	X	(X)
Fisheries Displacement Effect	X	X	(X)
Energy Landscape Effects*	X	X	X



# Adverse Artificial Reef Effect

- Windmills attract reef epifaunal (fouling) species
- Followed by mobile fauna e.g. crustaceans, mollusks, eventually finfish.
- Sets up a new environment that will eventually attract non-native species.



# Adverse Fisheries Exclusion Effect

- Windmill fishing prohibitions not yet standardized
- Insurance coverage of fishing vessels in a wind farm not standardized.
- Questions of safety of vessels among windmills in inclement weather
- Exclusion of bottom towed gear has adverse impact on commercial fishing.



# Adverse Fisheries Displacement Effect

- Reduction of fishing in a wind farm will cause a spatial displacement
- Competition causes adverse interactions with other sensitive habitats
- Widespread loss of fishing area from too many windfarms harms the industry (Europe). Loss of millions of acres USA offshore.



# Adverse Energy Effects Undersea

- Windmills change the sensory and physical energy of the undersea environment.
- Marine species are very sensitive to underwater sound, vibrations, and EMFs.
- Wind farms will almost certainly affect currents and marine species habitats
- Currents also affect larval dispersion of food fauna changing the food chain order.



# Adversity Caused by Wind Farm Siting

- View Shed from Historical Structures Adversity
- Transmission cables near historical shipwrecks
- Transmission cables near archeological geohazards
  
- Tourists want to get away from wind farms
- Europeans don't want to live looking at windmills.





# European Tourism and Offshore Wind



# Tourism and offshore wind

- Development of offshore wind energy in the Netherlands, far offshore (2023)
- Reducing capacity density in Marine Spatial Planning (MSP) for EU
- Visibility requirements to the MSP in Mecklenburg (Germany)
- National Seascape Character Assessment for England
- Italy, coexistence of uses: Aquaculture, Fishing, Shipping, Tourism



# Inflation Reduction Act

\$369 Billion for Renewable Energy

Mostly Credits and Incentives

For Domestic Research and Development

Foreign investors flocking to U.S.

Not much going into windfarm projects

Wall Street Journal

22 January 2023

Billions to invest but projects aren't being built



# Wall Street Journal

## 22 January 2023

"Investors plow into renewables but projects aren't getting built"

- Supply chain snags
- Long waits to connect to the grid
- Challenging regulatory rules and procedures
- Politics
- New installations fell 40% 2022 vs 2021
- New installations plunged 77.5%: Q3-2022 vs Q3-2021
- Lead times for high voltage equipment now 30 weeks

**Draft guidance for responding to proposals for offshore wind projects off the coast of Delaware, Maryland and new Jersey.**

What benefits do you see in having the projects built locally?

- Jobs?
  - Coastal resiliency?
  - Increased tourism?
  - Other?
- 
- If we can get something out of the projects, what would you want?
  - What bothers you about the proposed offshore wind projects specific to US Wind and Orsted?
  - What would make you feel better about the project?
  - What else do you think we should be doing to keep our community informed about offshore wind projects in our area?
  - What other thoughts do you want to share?

# Historical Structures

Vassar Square Condos Ventnor City



Riviera Apartments Atlantic City, NJ



# Ocean City Music Pier



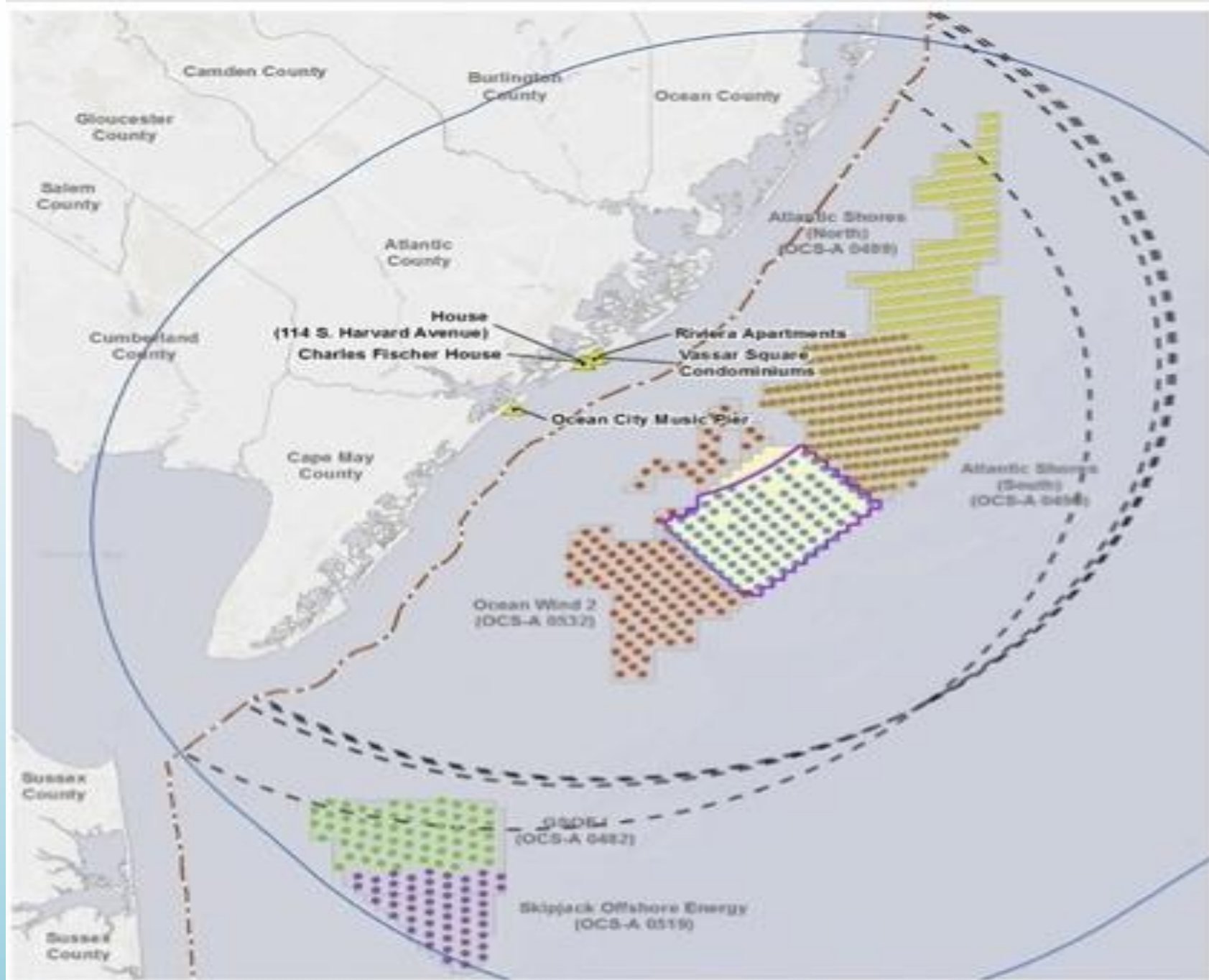


Harvard ST House



Charles Fischer House





As such, BOEM, in its review of the HRVEA, determined adverse effects from visual impacts on five historic properties:

- **Riviera Apartments**, 116 S. Raleigh Avenue, Atlantic City, New Jersey
- **Vassar Square Condominiums**, 4800 Boardwalk, Ventnor City, New Jersey
- **House, 114 S. Harvard Avenue**, Ventnor City, New Jersey
- **Charles Fischer House**, 115 S. Princeton Avenue, Ventnor City, New Jersey
- **Ocean City Music Pier**, 811 Boardwalk, Ocean City, New Jersey.

# Discussion

Pros and Cons of owning a historical structure

Shall we take our discussion to the Commissioners?

