2024 Land & Water Conservation Summit

Offshore Wind:

Discussing the Realities, Dispelling the Myths, & Creating a Path to Climate Justice

Introductions

Dr. Barbara K. Sullivan-Watts - Senior Marine Research Scientist, Emerita at Graduate School of Oceanography, URI

Nicole DiPaolo – Director of Energy Justice, Roots 2Empower

Steve Tadros – Community Outreach Coordinator & Interim Tribal Relations Manager, Avangrid

Agenda

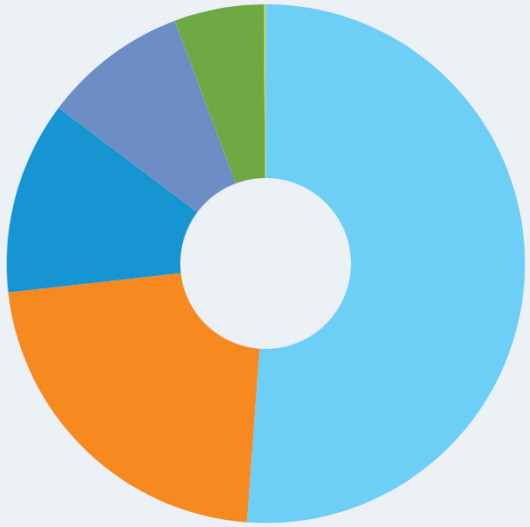
In this workshop, we will unpack all things offshore wind, including:

- What it is & why we need it
- Policies governing development
- Developer compliance with policies
- Impacts to marine life
- Achieving Climate Justice
- Benefits to disadvantaged communities

Offshore Wind Energy: What it is & why we need it.

vs

Current Energy Mix: ISO NE



51%	Natural gas
22%	Nuclear
12%	Hydro
9%	Net Imports
6%	Renewables
<1%	Other

System demand	15,541 MW
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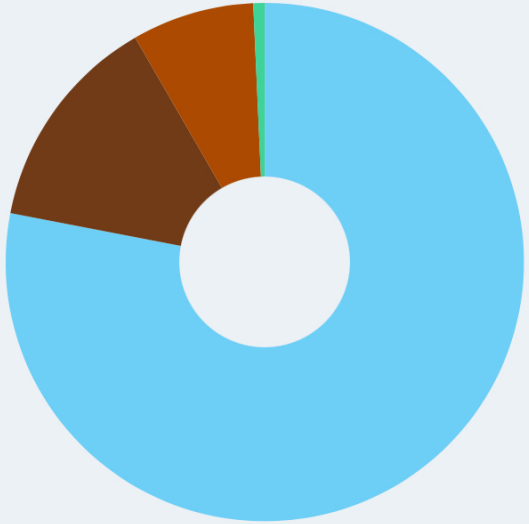

78%	Natural gas
14%	Refuse
8%	Wood
<1%	Landfill Gas

Total Estimated CO_2 Emissions	63.3 Metric Tons/Minute
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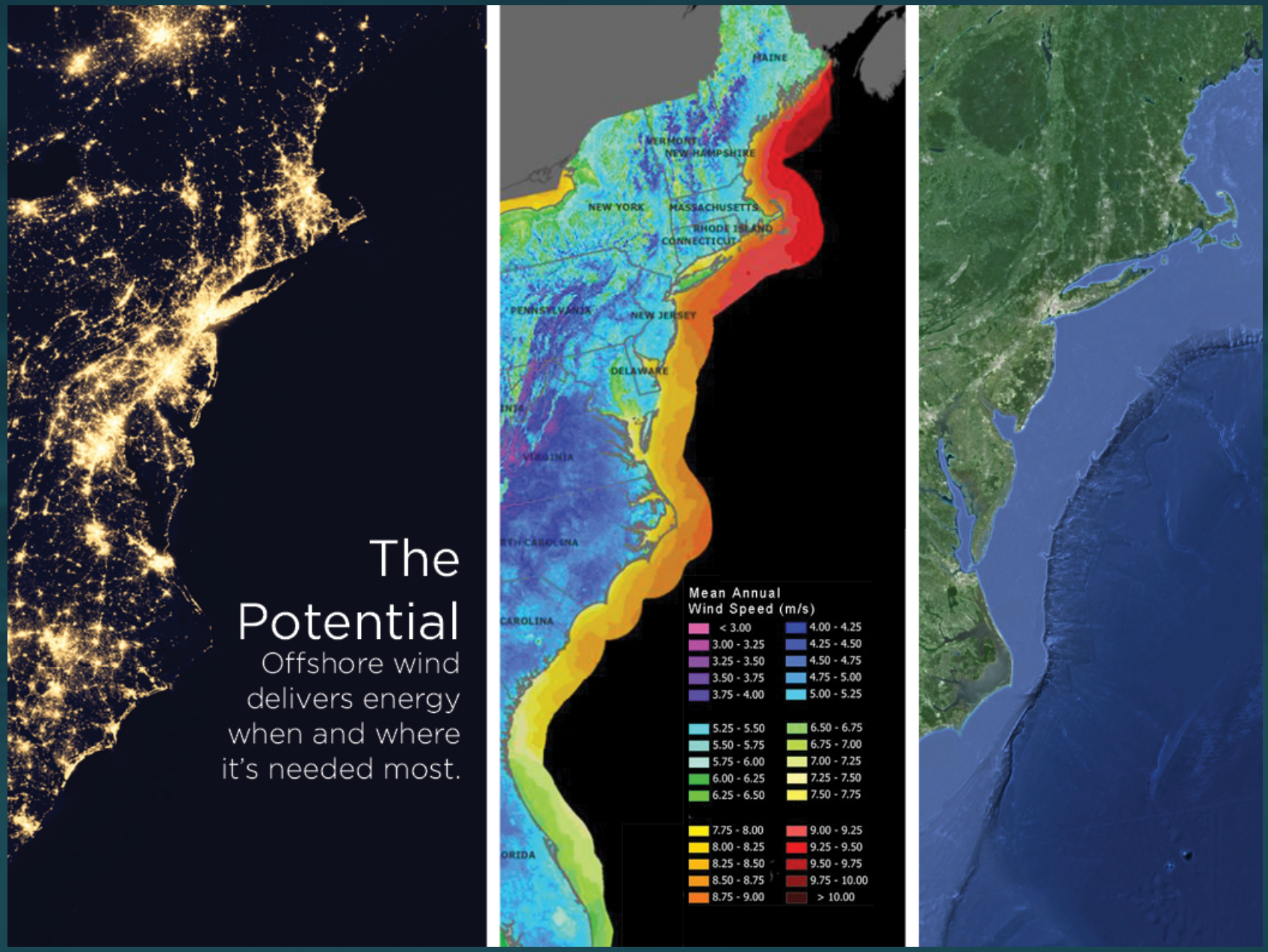
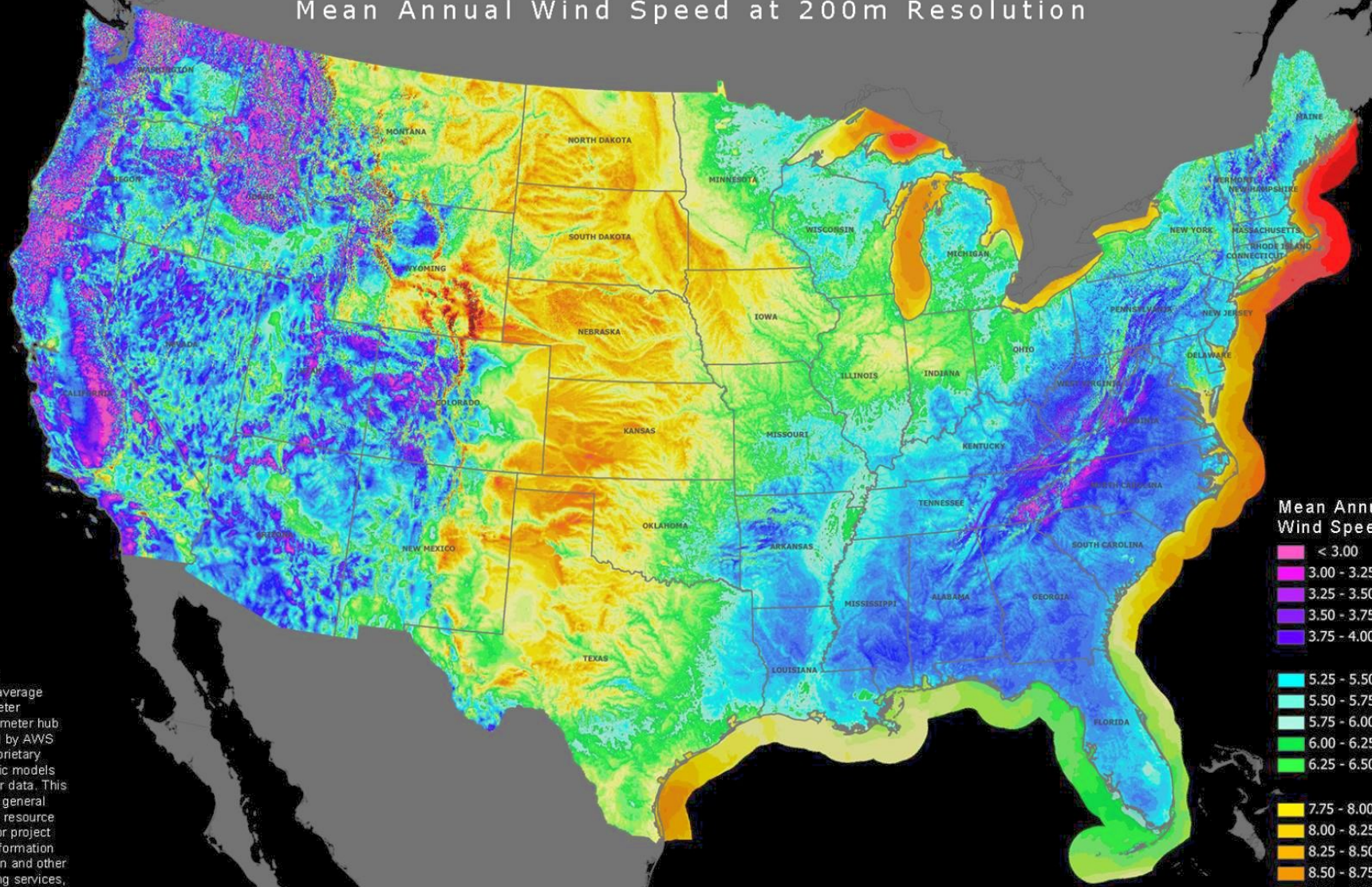


WIND RESOURCE OF THE UNITED STATES

Mean Annual Wind Speed at 200m Resolution



This map depicts the approximate annual average wind speed at 200 meter resolution and an 80 meter hub height. It was created by AWS Truepower using proprietary advanced atmospheric models and historical weather data. This map is provided as a general indication of the wind resource and is not intended for project design. For further information on wind project design and other wind energy consulting services, please contact AWS Truepower.

AWS Truepower®
www.awstruepower.com

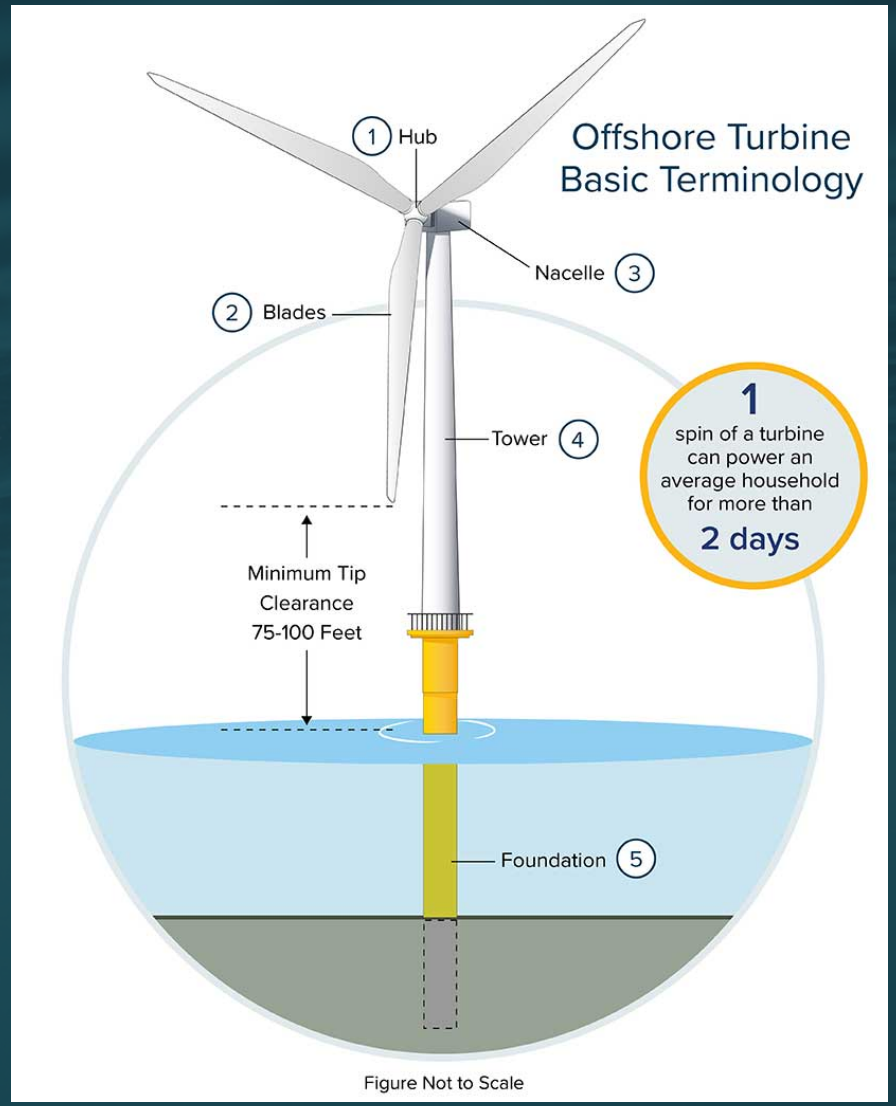
Offshore Wind Energy: An Overview

1.Hub. The hub supports the blades and houses the pitch system, which optimizes blade angle and rotation speed.

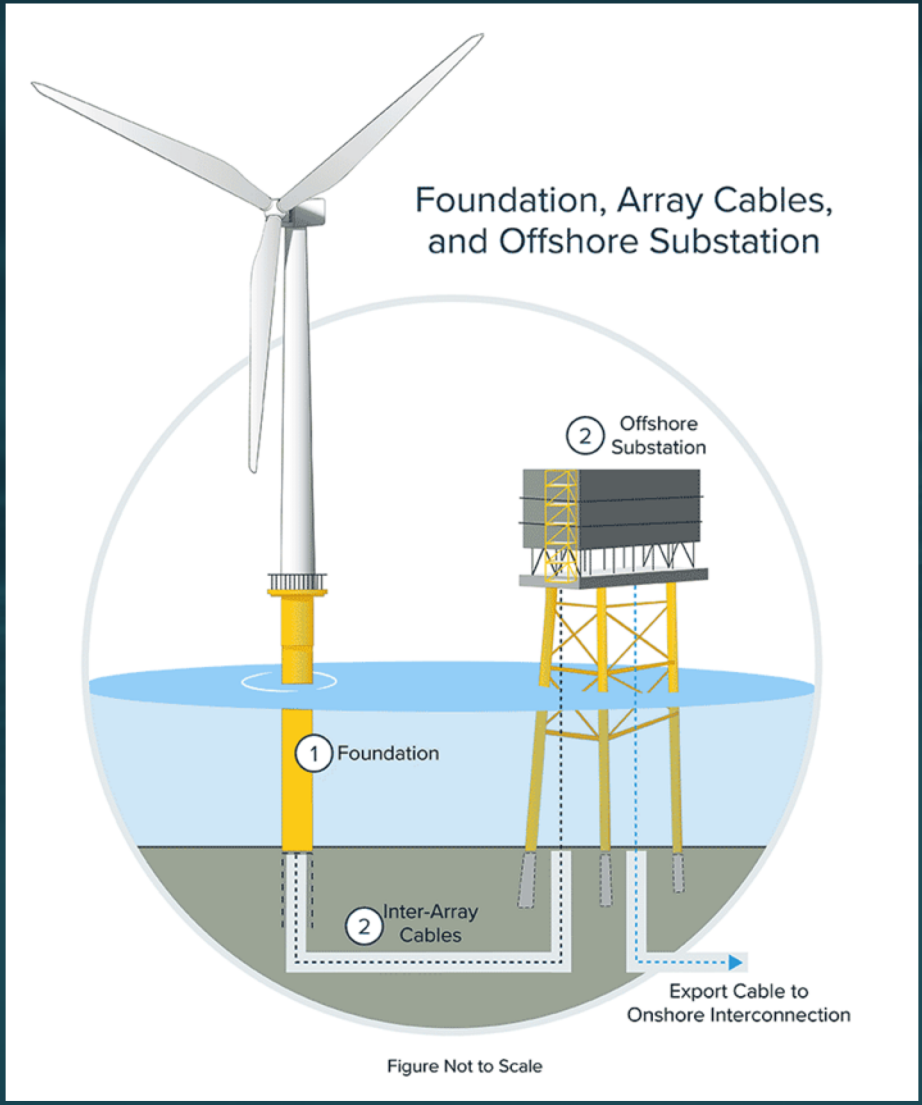
2.Blades. Blades capture the wind's energy and convert it into mechanical energy.

3.Nacelle. The nacelle houses the components that convert mechanical energy to electrical energy.

4.Tower. The tower supports the mass of the nacelle, hub, and blades.



Offshore Wind Energy: An Overview



1. Foundation. Foundations secure the tower and above-water turbine components to the sea floor. A variety of technologies are available, including jackets, monopiles, and gravity-based foundations.

2. Array Cables. A network of array cables link the wind turbines together and deliver power from the turbines to the offshore substation.

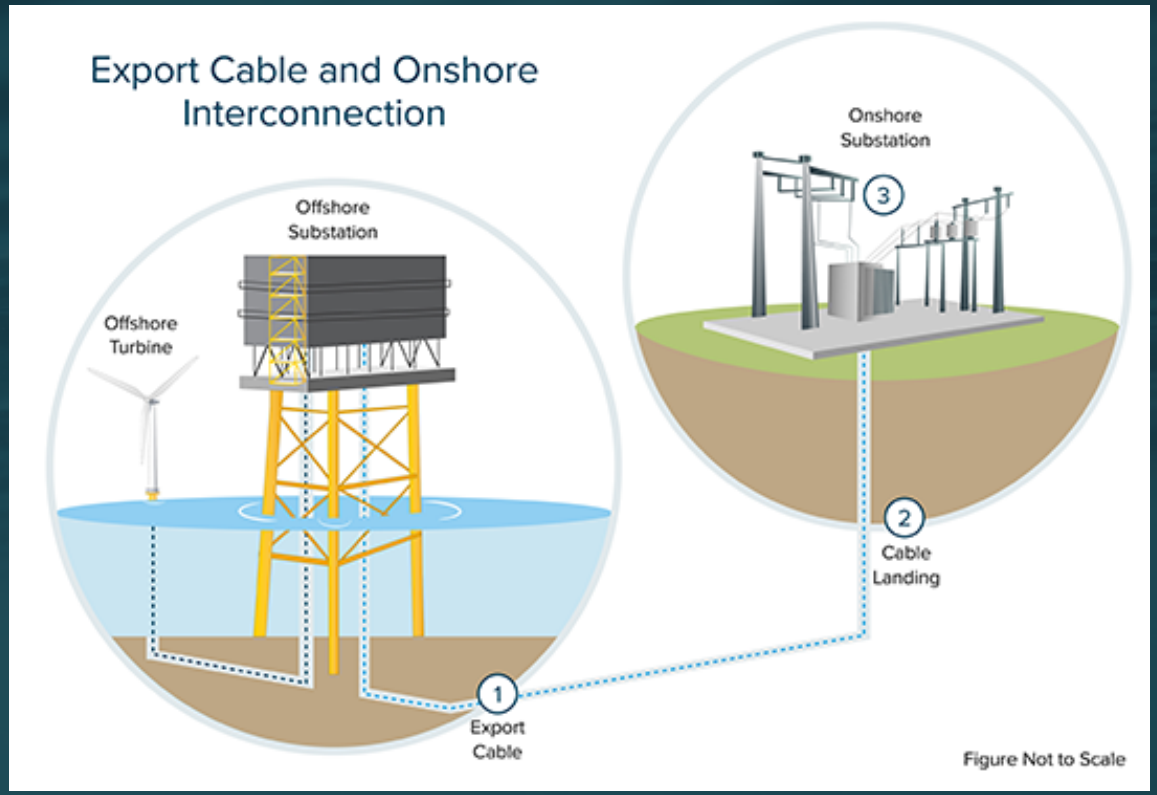
3. Offshore Substation. The offshore substation collects and stabilizes the power generated by the turbines, preparing it for transmission to shore.

Offshore Wind Energy: An Overview

1.Export Cable. The export cable is buried deep enough to avoid disturbing ocean users and wildlife, and it transmits power from the offshore substation to the onshore substation.

2.Cable Landing. Horizontal direction drilling, a common method for landing export transmission cables from offshore wind farms, minimizes environmental impacts and disruption to beaches and the shoreline.

3.Onshore Connection. Electricity is transferred to the existing transmission network.



Permitting Landscape & Industry Compliance

BOEM
Bureau of Ocean Energy Management

NOAA

EPA

U.S. Fish & Wildlife Service
Department of the Interior

US Army Corps of Engineers®

President of the United States

Department of the Interior

1 of 15 executive departments in the President's Cabinet

Bureau of Ocean Energy Management (BOEM)

1 of 11 technical bureaus in DOI

Identify ocean areas suitable for leasing

Hold lease auction & set terms of the lease

Oversee all site assessment activites

Coordinates with 6 other federal agencies & bureaus

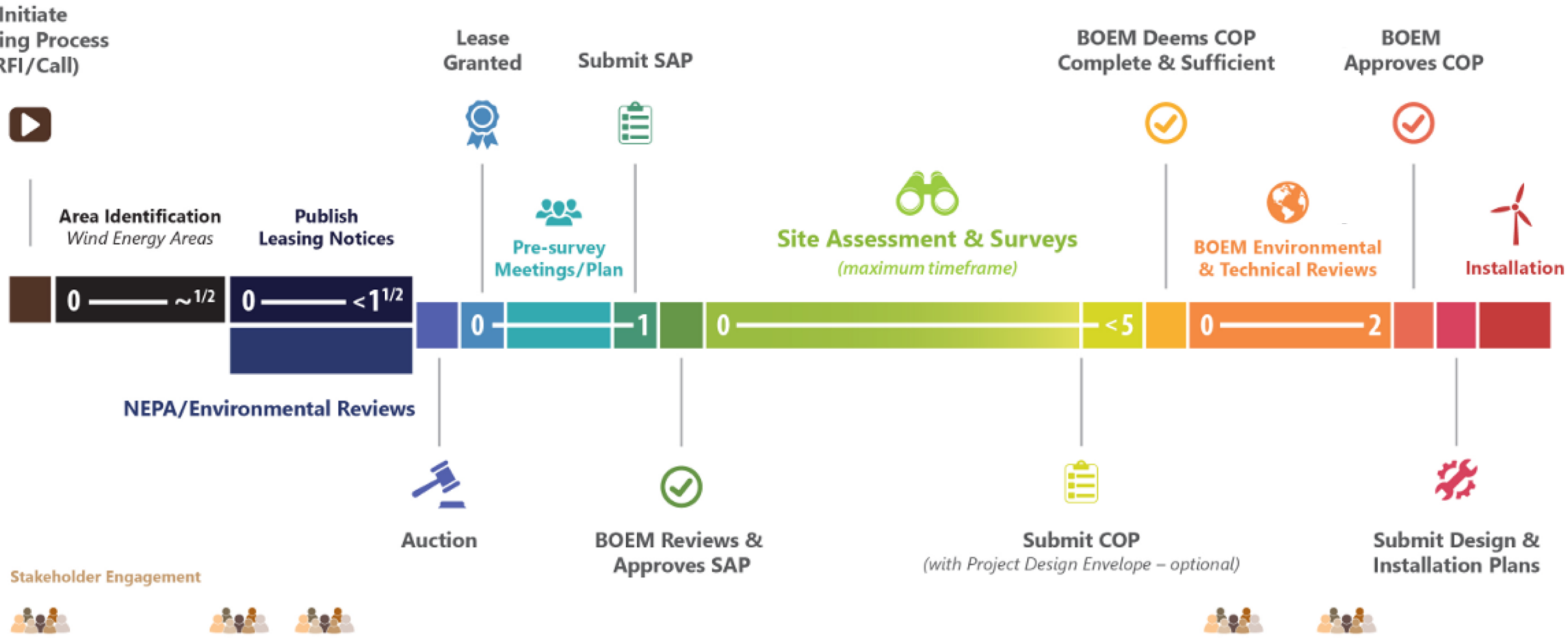
Facilitates stakeholder engagement & integrates input

Conducts robust environmental & socioeconomic review

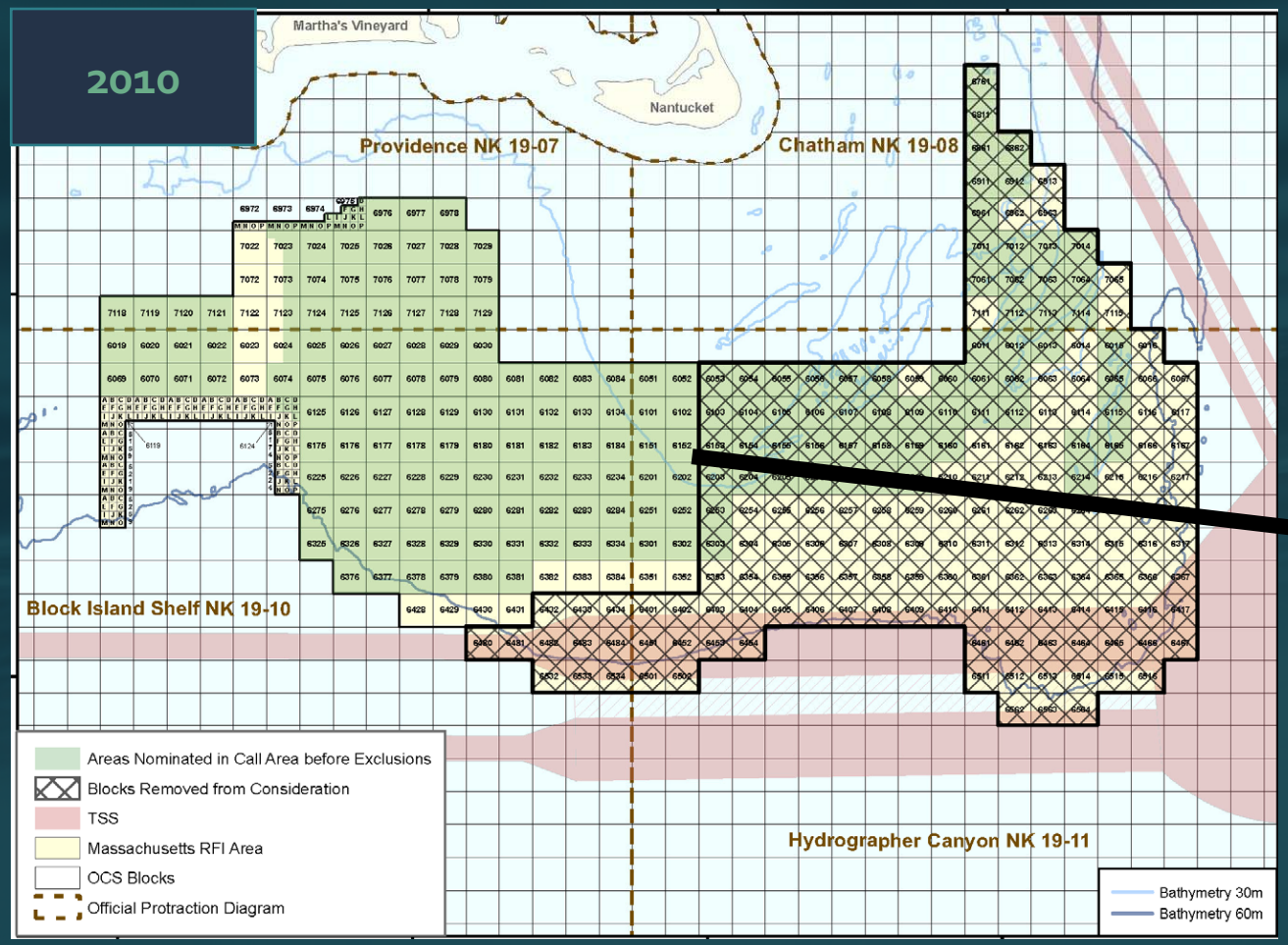
Approves or rejects Construction & Operations Plan

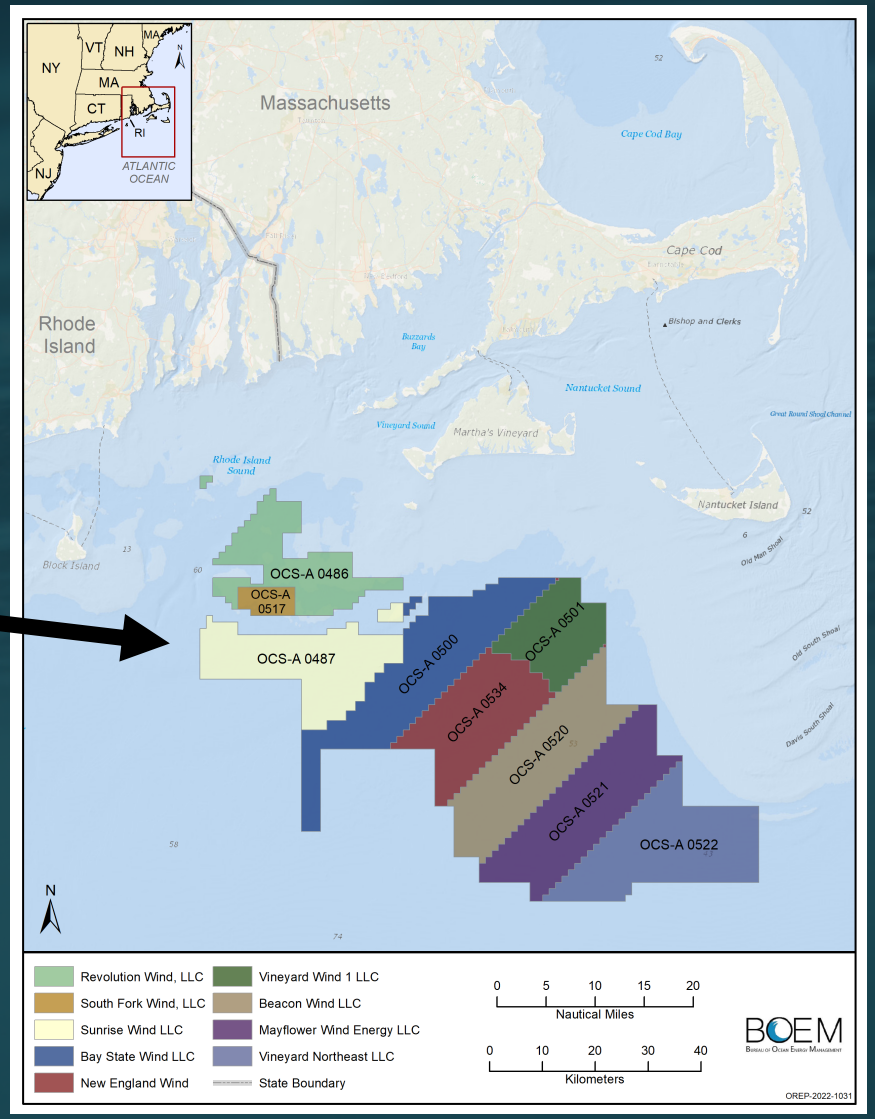
Oversees construction & operations

The Renewable Energy Process: Leasing to Operations



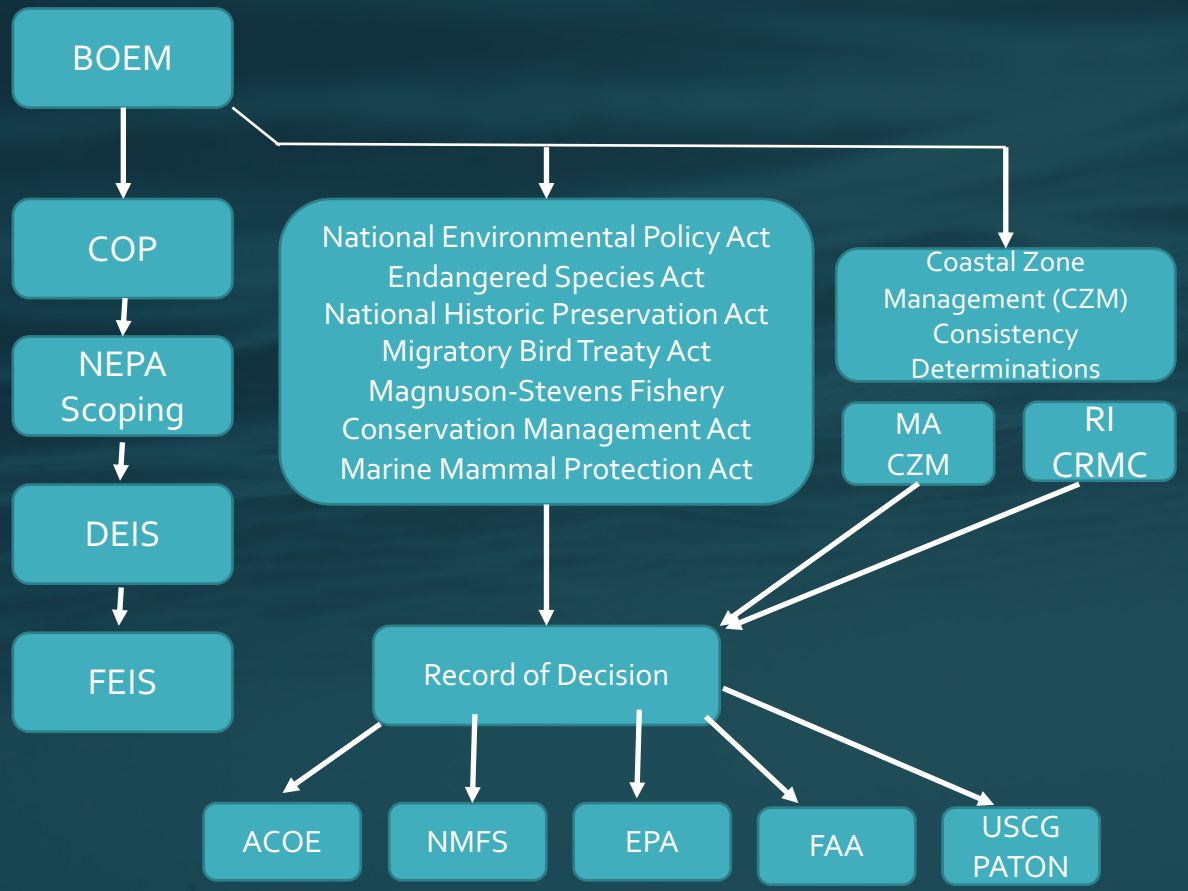
Designating Lease Areas



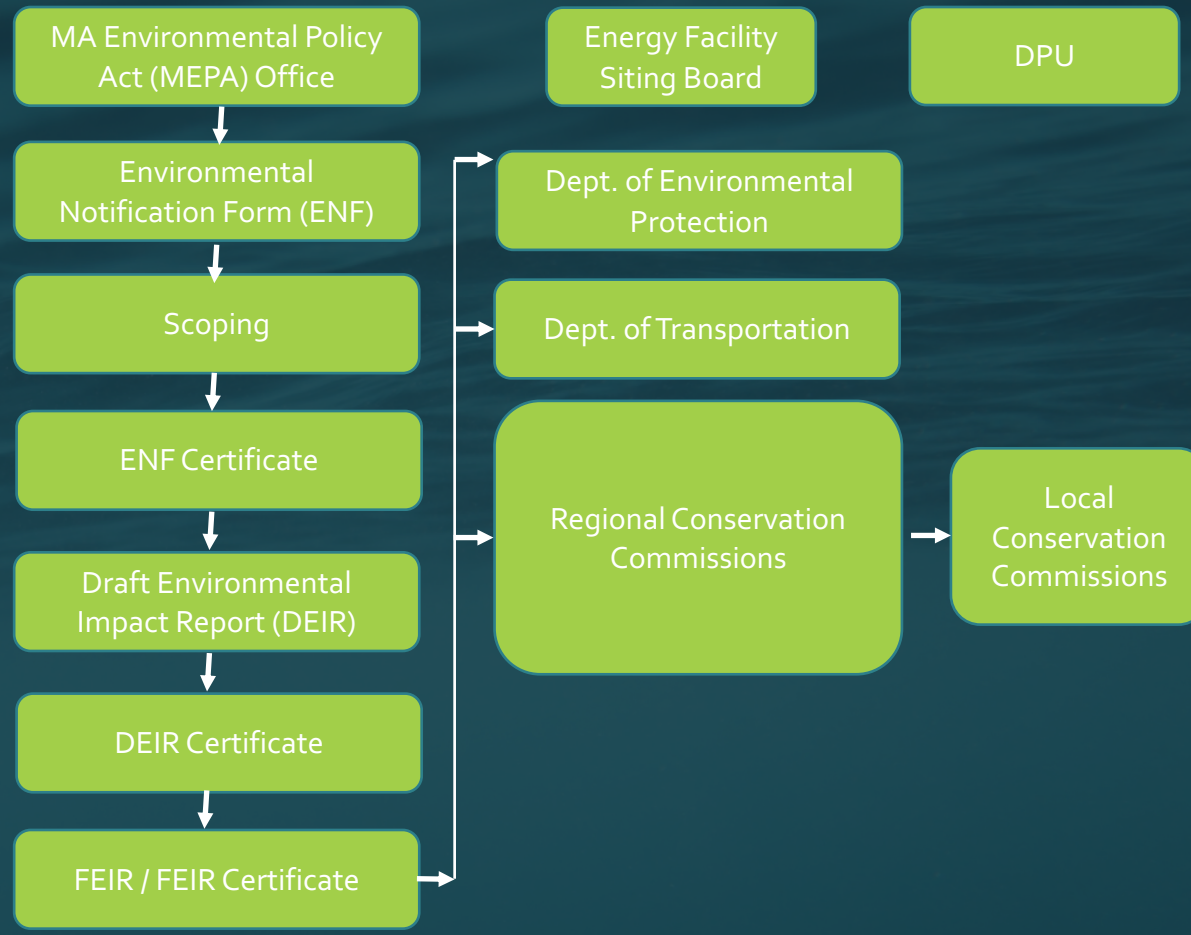


Example Permitting Overview

Federal



State & Local



Protected Species & Offshore Wind

Dispelling Myths

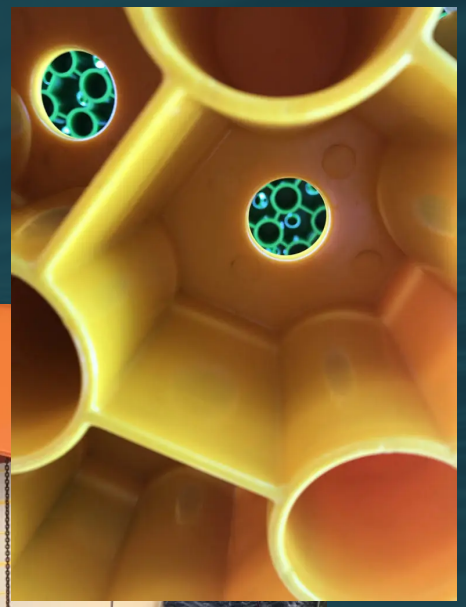
- Offshore wind survey (geophysical and geotechnical) sound sources are not at the magnitude and frequency to cause mortality to marine mammals
- At this point, there is no evidence between whale deaths and offshore wind activities, including surveys and construction
- Incidental Take Authorizations (IHAs) under the MMPA allows for unintentional "takes" of marine mammals and requires rigorous mitigation measures, monitoring, and reporting.

PSO (NOAA Fisheries, 2023)

Protected Species & Offshore Wind

Avoidance, Minimization, Mitigation

- **Protected Species Observers (PSOs)** on board survey and construction vessels
- PSOs monitor for protected species or animals protected under ESA or MMPA to help developers meet compliance needs
- **Agency-mandated protocols** for maintaining watch, slowing down/completely stopping vessels, and stopping all operations if there is potential to impact protected species
- Pile driving and other certain construction operations may have time of year / day restrictions
- Bubble curtains deployed during pile driving to mitigate sound impacts



AdBm Technologies

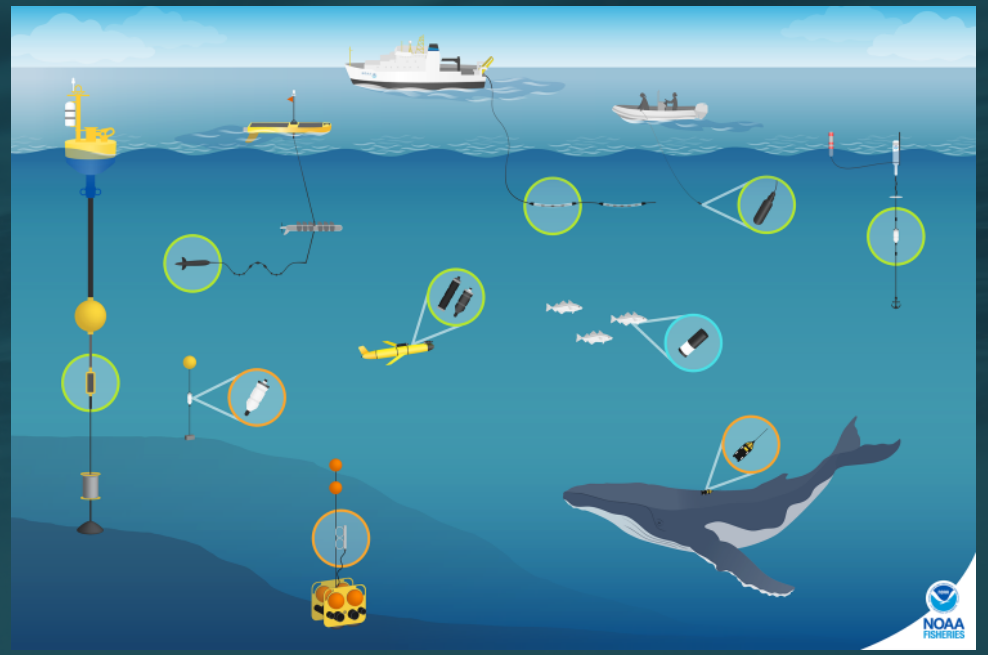
AdBm Technologies

Protected Species & Offshore Wind

Avoidance, Minimization, Mitigation

To protect Marine Mammals, developers:

- Must deploy moored or autonomous Passive Acoustic Monitoring devices to record ambient noise and marine mammal vocalizations in the wind development area a minimum of 30 days before construction, during all construction activities, and for at least 3 years of operations
- Ensure all crew members are trained on the identification of sea turtles and marine mammals, associated regulations, and best practices for avoiding vessel collisions
- Cannot undergo construction activities anywhere in the clearance zone when with low visibility conditions (e.g. darkness, rain, fog)



Passive acoustic recordings (orange), real-time acoustic data collection (green), and active acoustics (blue)

Protected Species & Offshore Wind

Avian Species

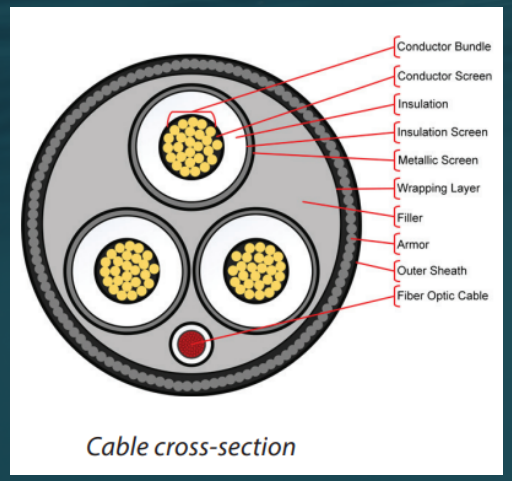
To protect avian species, developers:

- Install bird deterrent devices based on best management practices applicable to the operation location
- Submit and receive approval for protection plans for endangered species such as the Piping Plover
- Submit and receive approval for avian and bat monitoring programs including acoustic monitoring devices
- Provide annual monitoring reports after each full year of monitoring pre and post-construction as well as quarterly progress reports and annual bird mortality reports (if any)

Underground & Undersea Utility Cables

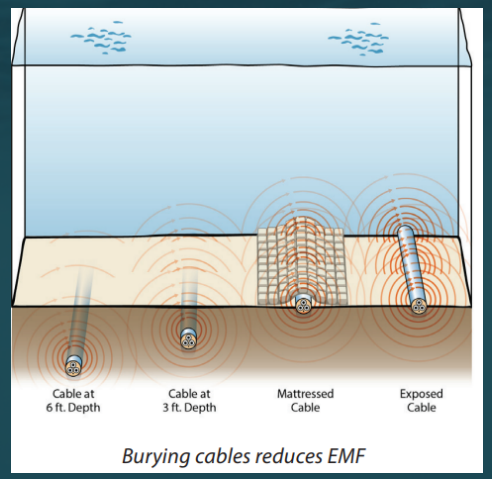
Dispelling Myths

- Underground & undersea transmission cables are a safe and proven technology
- Currently exist in New England & across the world
- Today, utility cables exist underneath our oceans, to get power to islands like Martha's Vineyard and Nantucket, & transatlantic cables from North America to Europe



Cable cross-section

BOEM, 2023

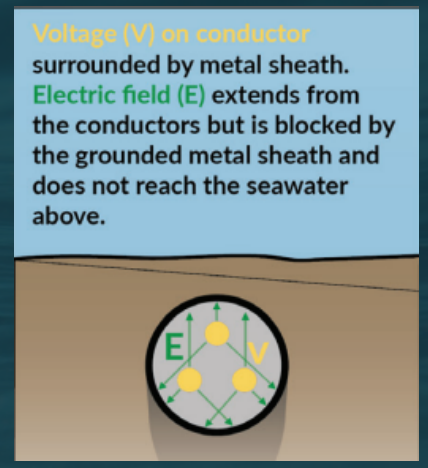


Burying cables reduces EMF

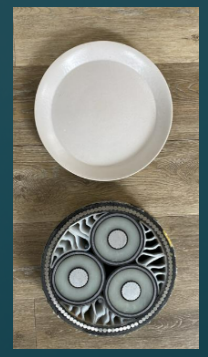
BOEM, 2023

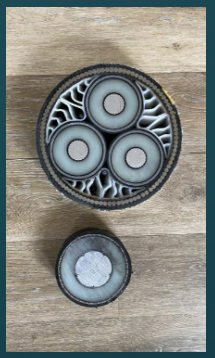
Electric & Magnetic Fields (EMF)

- Power cables do not produce an electric field (blocked by metal sheath around cable)
- There are magnetic fields associated with these cables, however, they are well below recommended threshold values for human exposure
- Common household items (TVs, hair dryers, electric drills) can emit magnetic fields similar or higher than power cables



BOEM, 2023





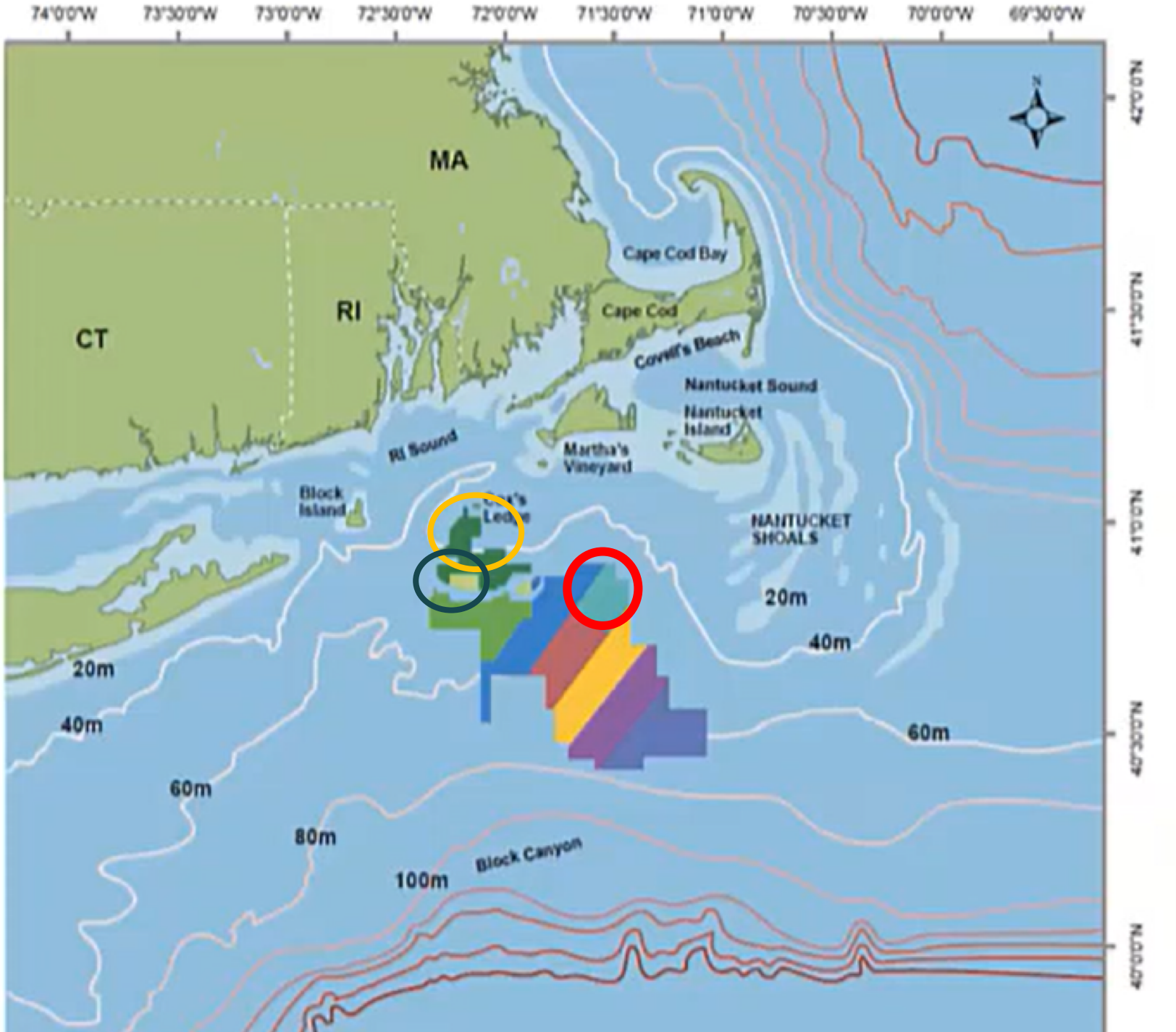
Marine Science & Offshore Wind Energy

Nantucket Shoals Region Offshore Wind Development

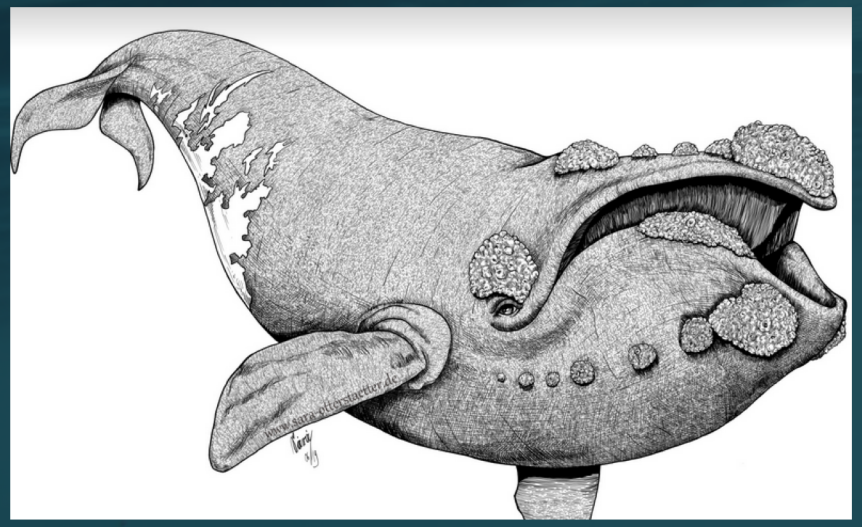
Vineyard Wind O
62 turbines
spaced 1 mile apart
Will power 400,000 homes

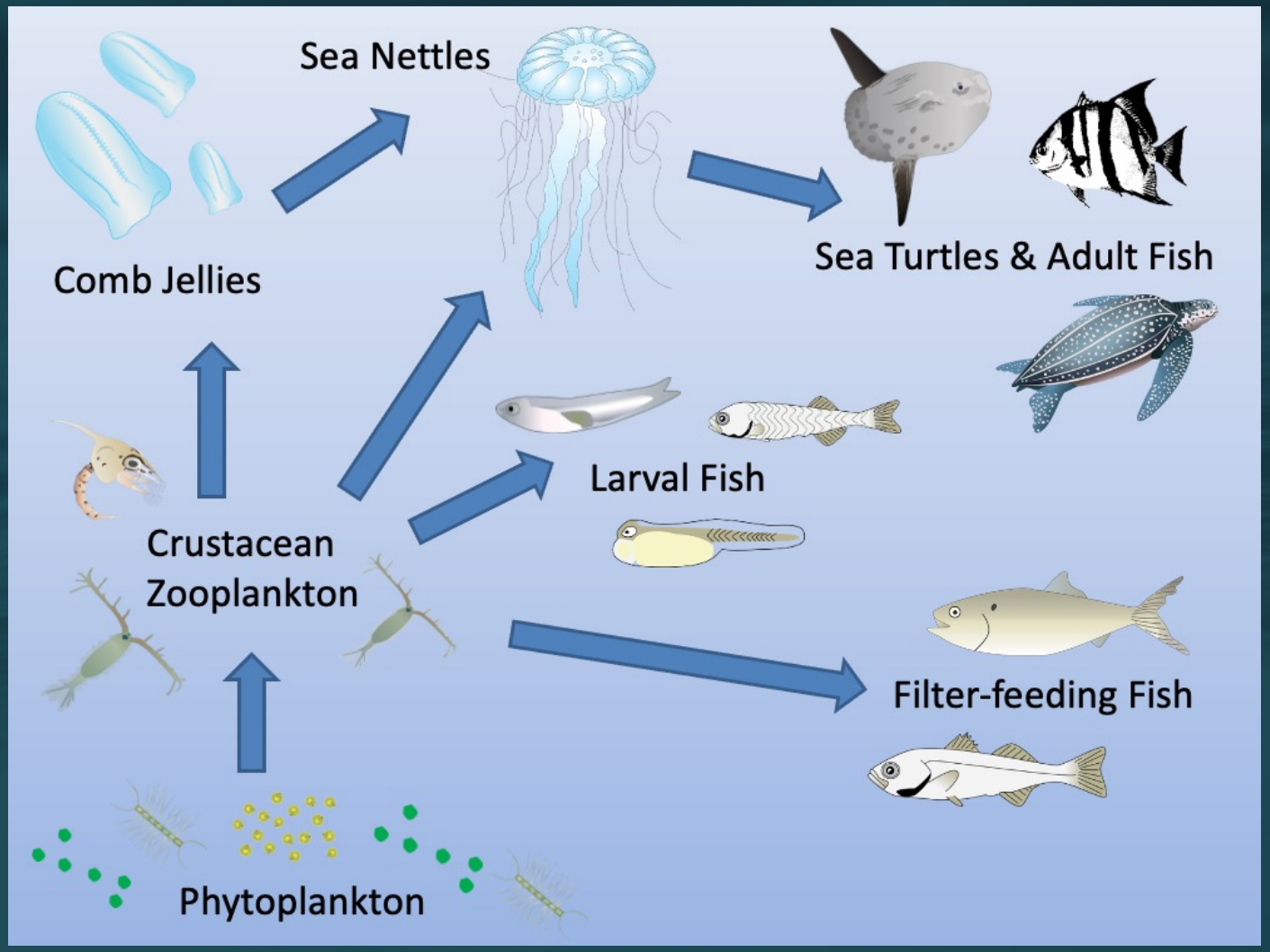
South Fork Wind O
14 turbines
1 mile apart
Will power 70,000 homes

Revolution Wind O
65 turbines
1 mile apart
Will power 350,000 homes

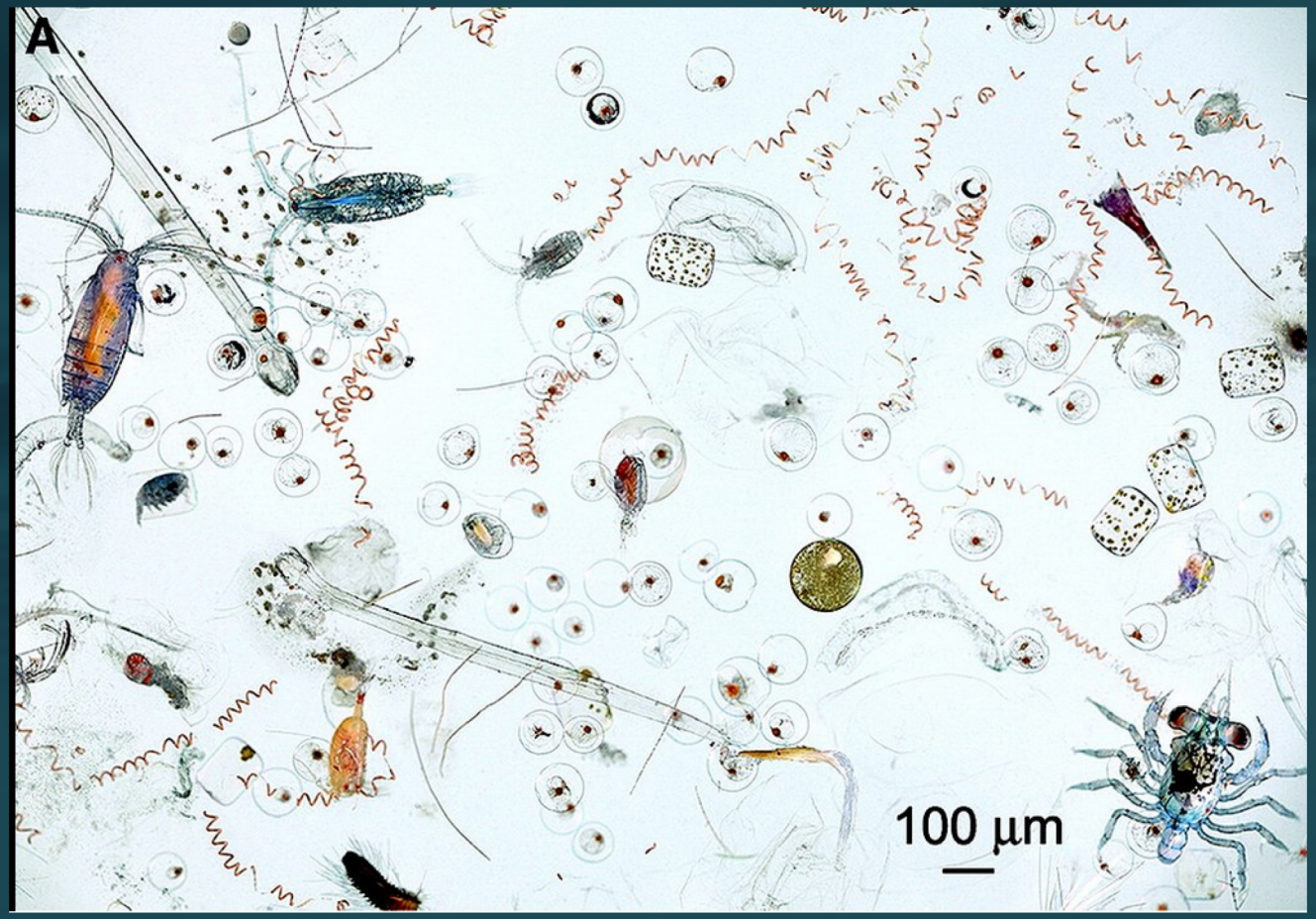


It all starts with Plankton on Nantucket Shoals



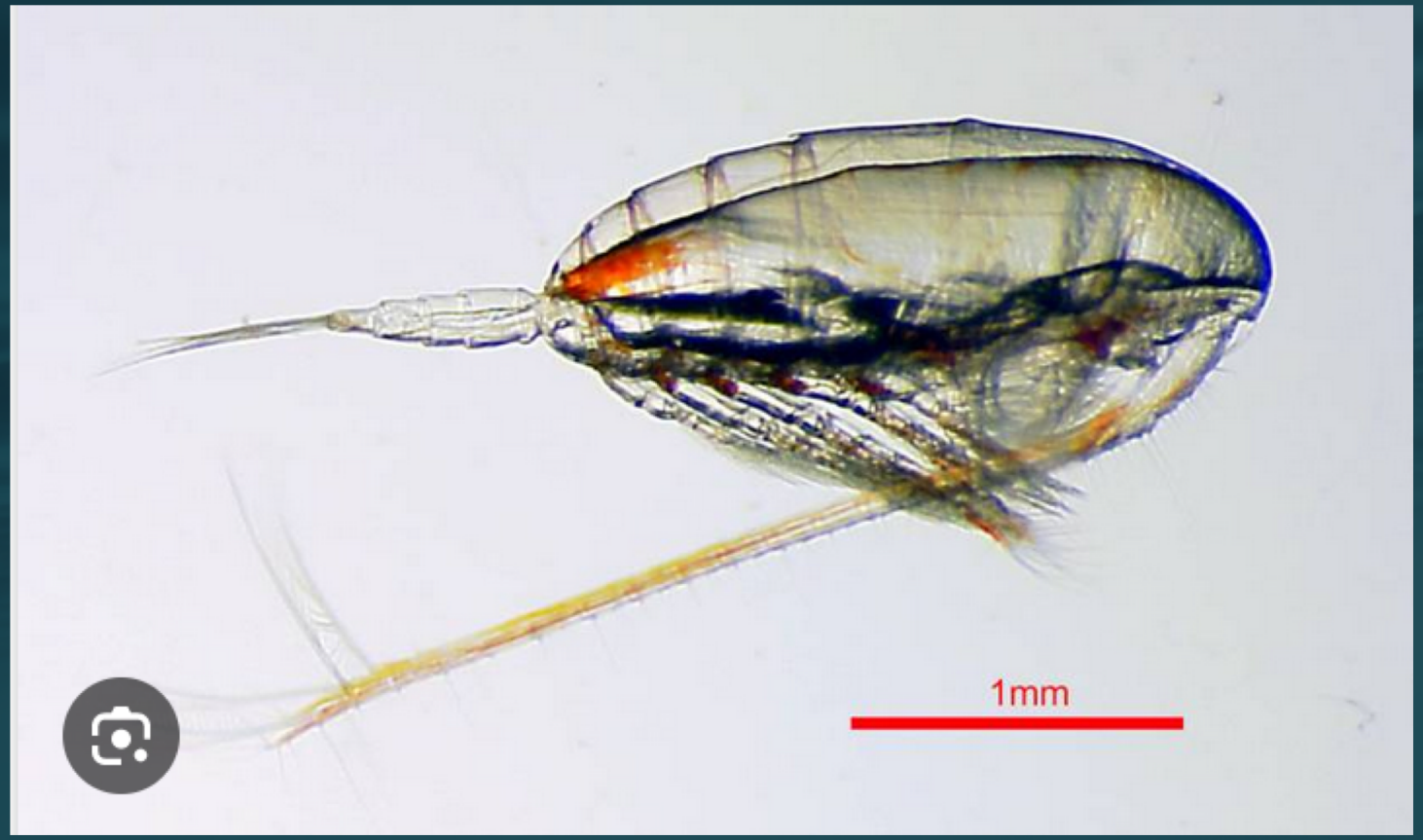


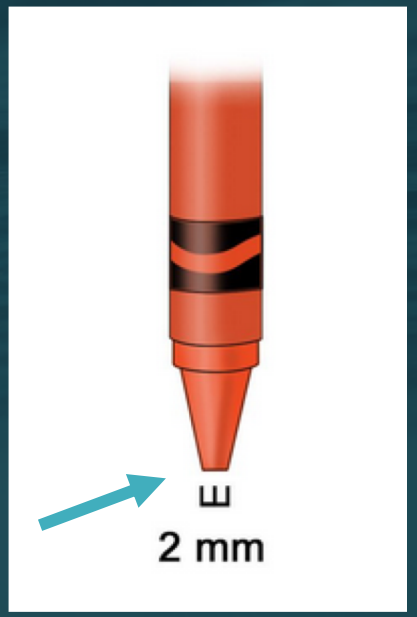
How many plankton in a liter of sea water?



150

Calanus finmarchicus fundamental prey for Right Whale



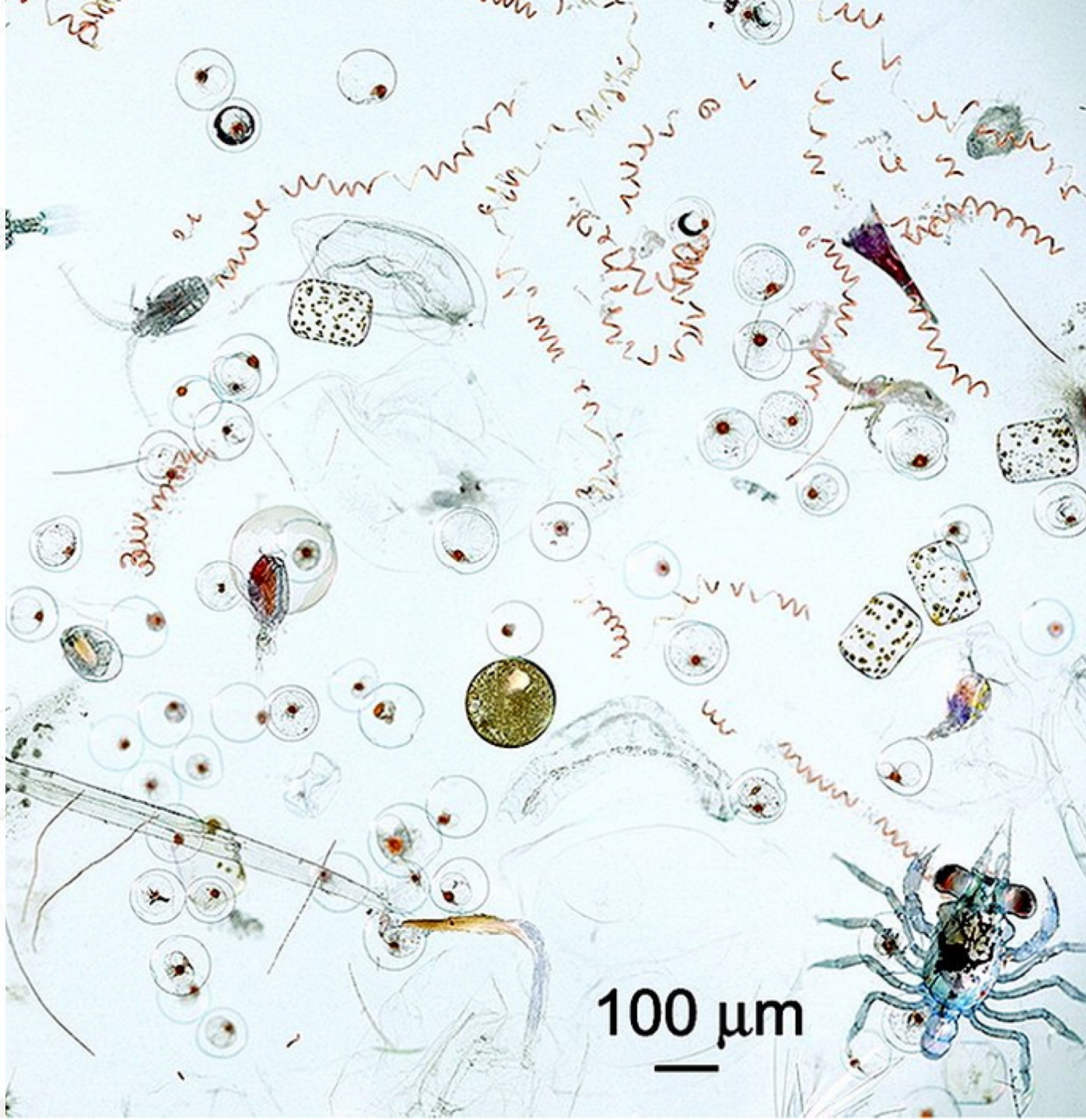


A Changing Ecosystem over the past 25 years

Warming of surface and bottom water led to changes in phytoplankton and zooplankton

- Small species increased = less nutritious (fewer large)
- Large and unpredictable shifts in where Calanus (large species) is abundant
- Right Whale changed where it feeds to waters with more vessels

"from the eastern Gulf of Maine to the Gulf of St.Lawrence in summer, resulting in unforeseen mortality due to entanglements and ship strikes"



Lessons from the Block Island Wind Farm

Fishing Report: Wind farm's a popular hangout for fish, study shows

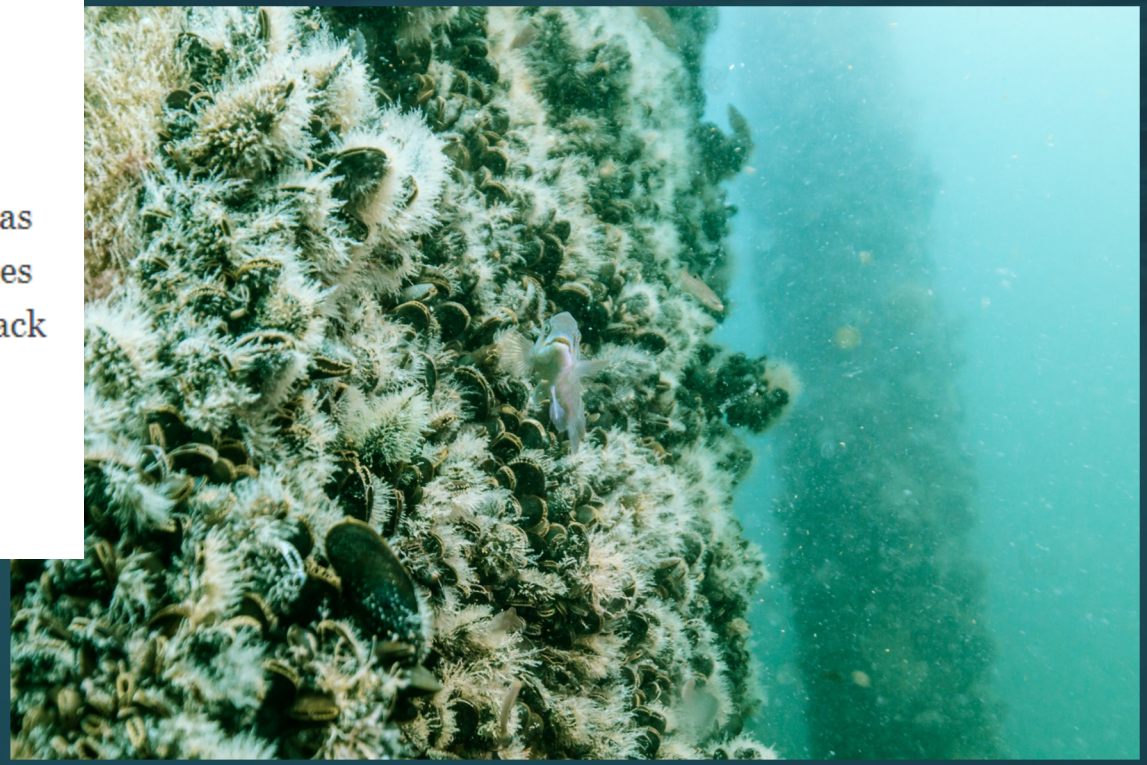
Dave Monti Special to The Providence Journal

Published 12:59 a.m. ET April 13, 2022

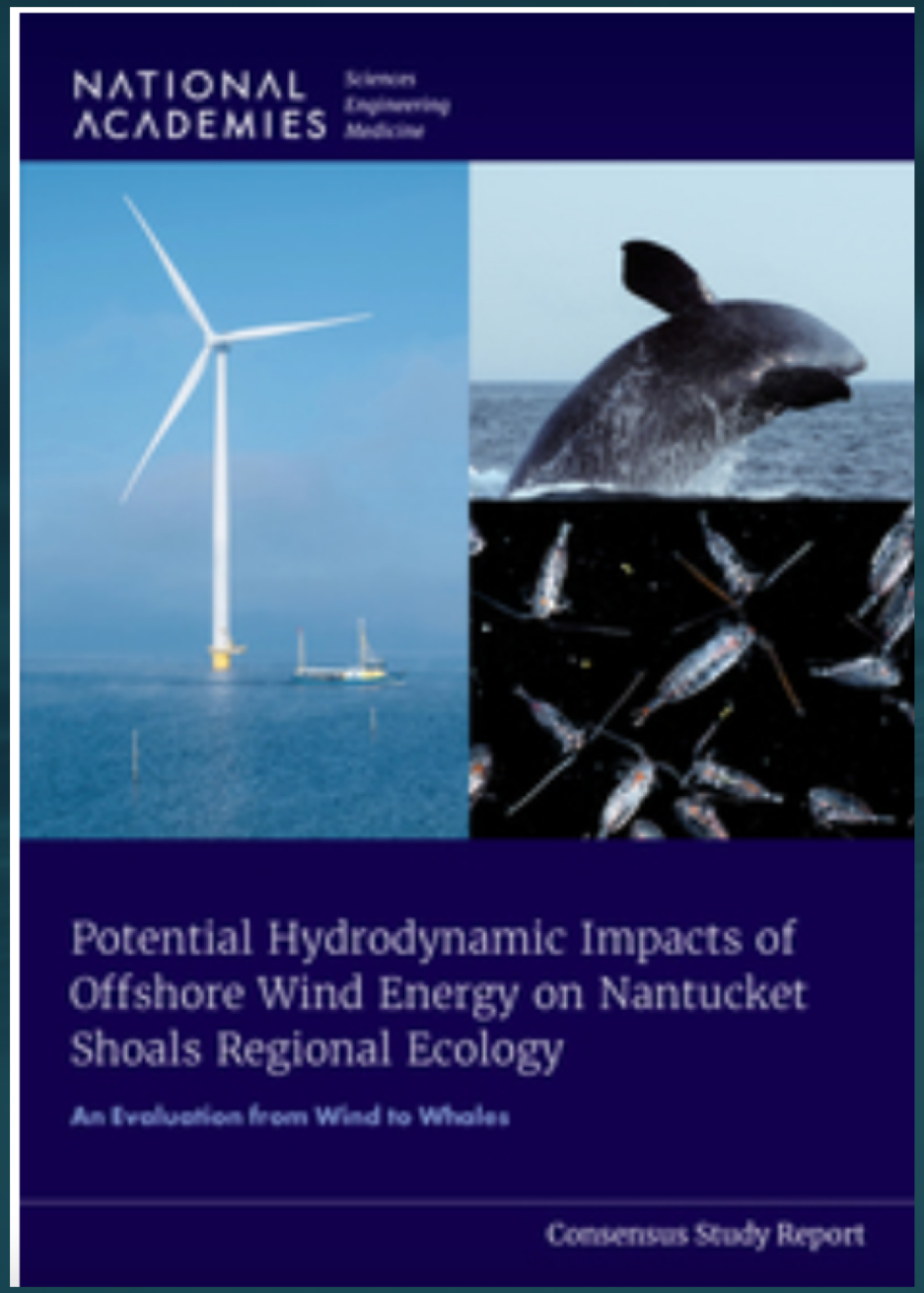
A seven-year study of fish near the Block Island Wind Farm and in control areas south and east of the wind farm shows no difference in the catch of most species because of the operation of the turbines. It also cites an increase in cod and black sea bass in the area.

The study conducted trawl surveys monthly before and during construction and operation of the turbines for seven years.

The above mentioned study was published March 29, 2022 in the ICES Journal of Marine Science.



Sea life on the Block Island Wind Farm foundations



National Academies Report

Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales (2023)
https://nap.nationalacademies.org/read/27154/chapter/1

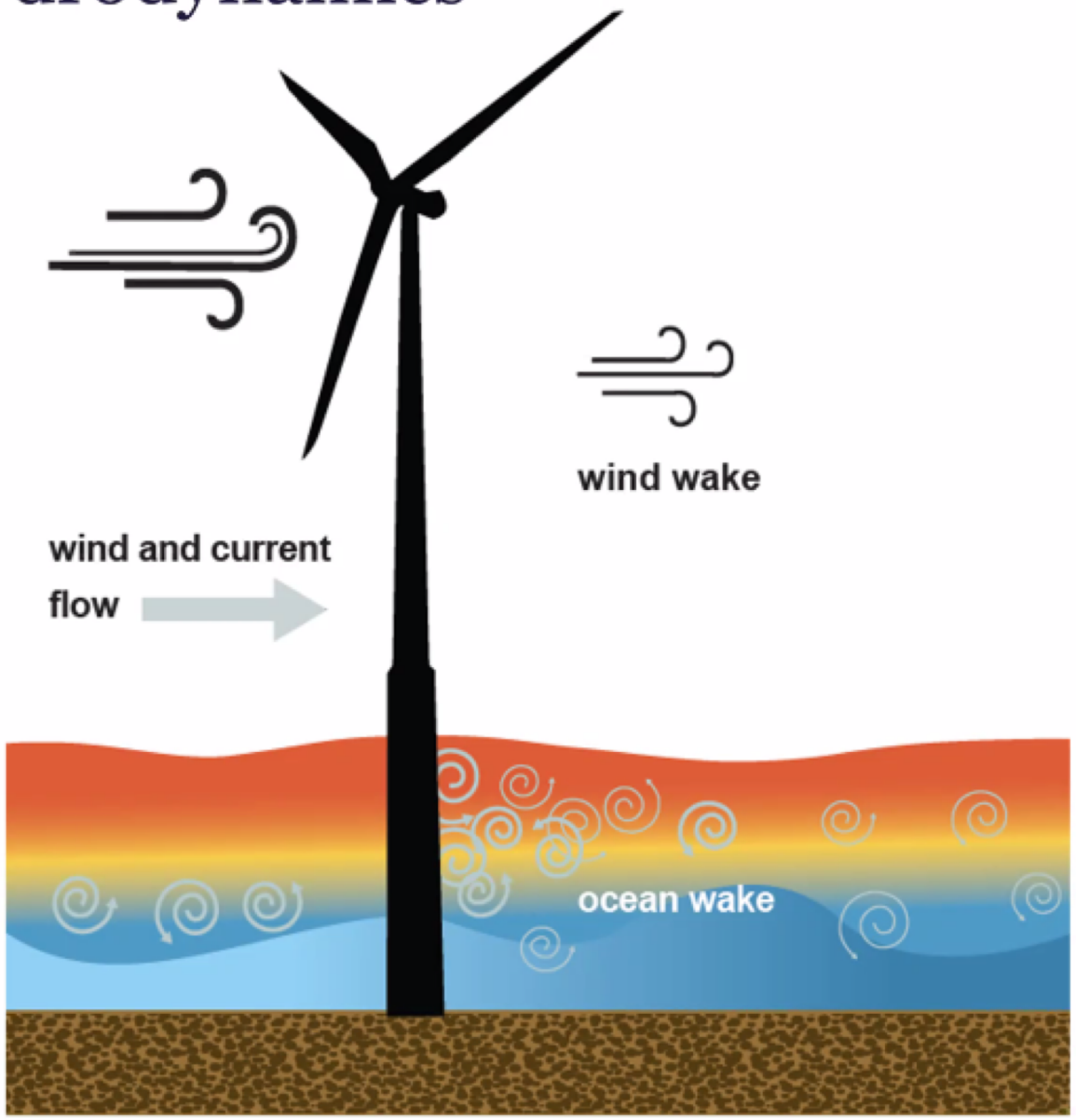
News Release:

"Impact of Nantucket Wind Projects on Right Whale Ecosystems Difficult to Distinguish from Effects of Climate Change and Other Influences"

Wind Turbine Effects on Hydrodynamics

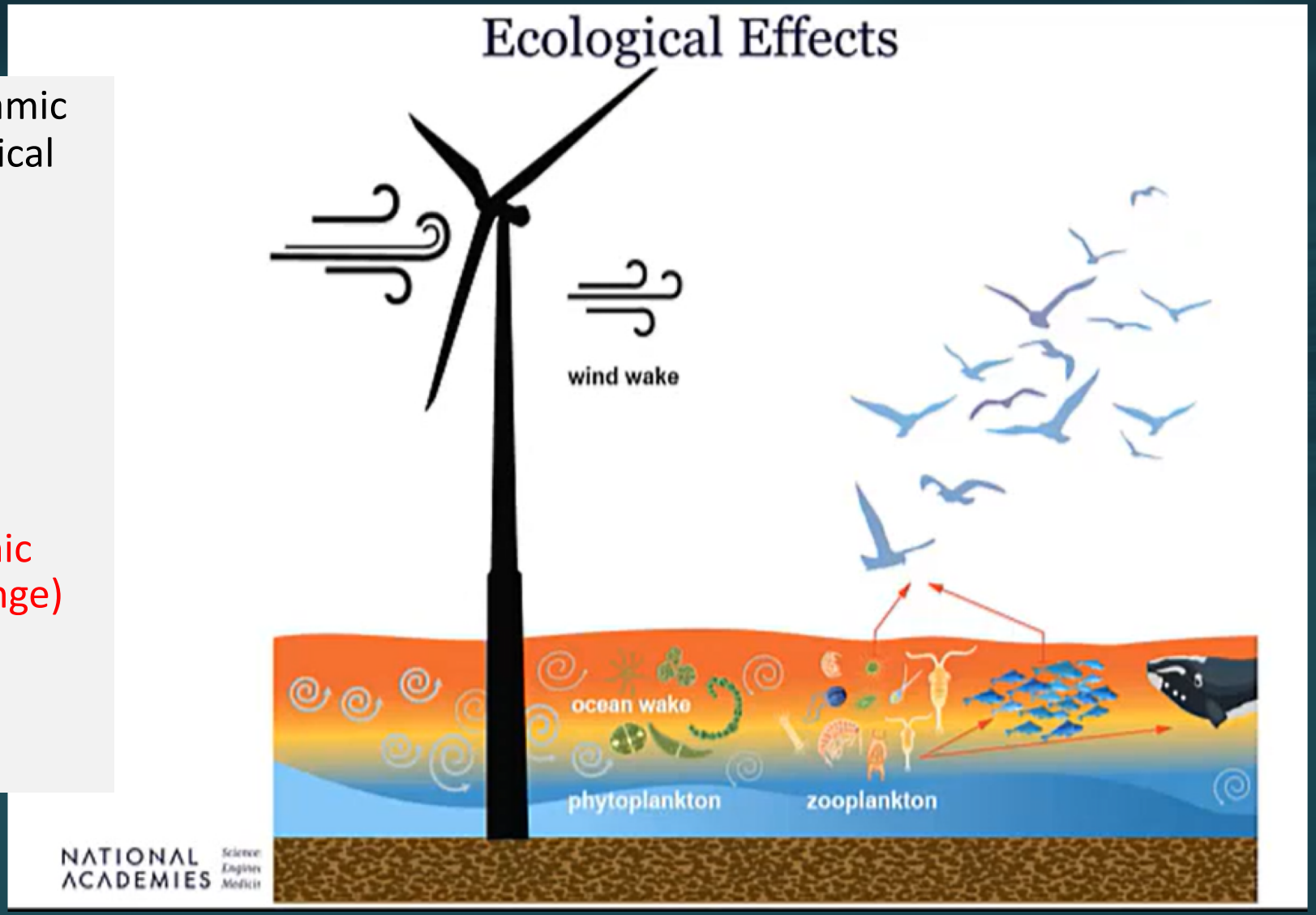
- Wind wake
  - Increased turbulence downwind of turbine
  - Decreased wind stress / effects on stratification
- Ocean wake
  - increased turbulence downflow of pile

"There are significant uncertainties in the hydrodynamic effects of turbines due to limitations of observations and modeling of existing turbines in Europe.

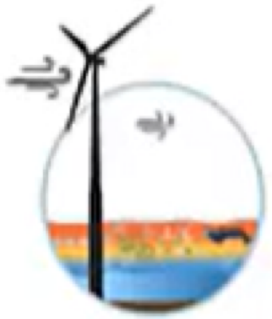


Hydrodynamics Affect Ecology

- Uncertainties about hydrodynamic impacts make potential ecological impacts of turbines difficult to predict and/or detect.
- "Impacts from offshore wind development in the region on zooplankton will be difficult to isolate from the much larger magnitude of variability from natural and other anthropogenic sources (including climate change) in this dynamic and evolving oceanographic and ecological system."



Ability to Estimate Perturbations



Turbine scale: few observations for verification of wake behavior.

Wind farm scale: changes in ocean current speeds, stratification, ocean surface wind speed, and deflection of the pycnocline.

Regional scale: difficult to quantify due to natural variability.

Research Advancement

Regional Wildlife Science Collaborative
Northeast Sea Grant Consortium (URI)

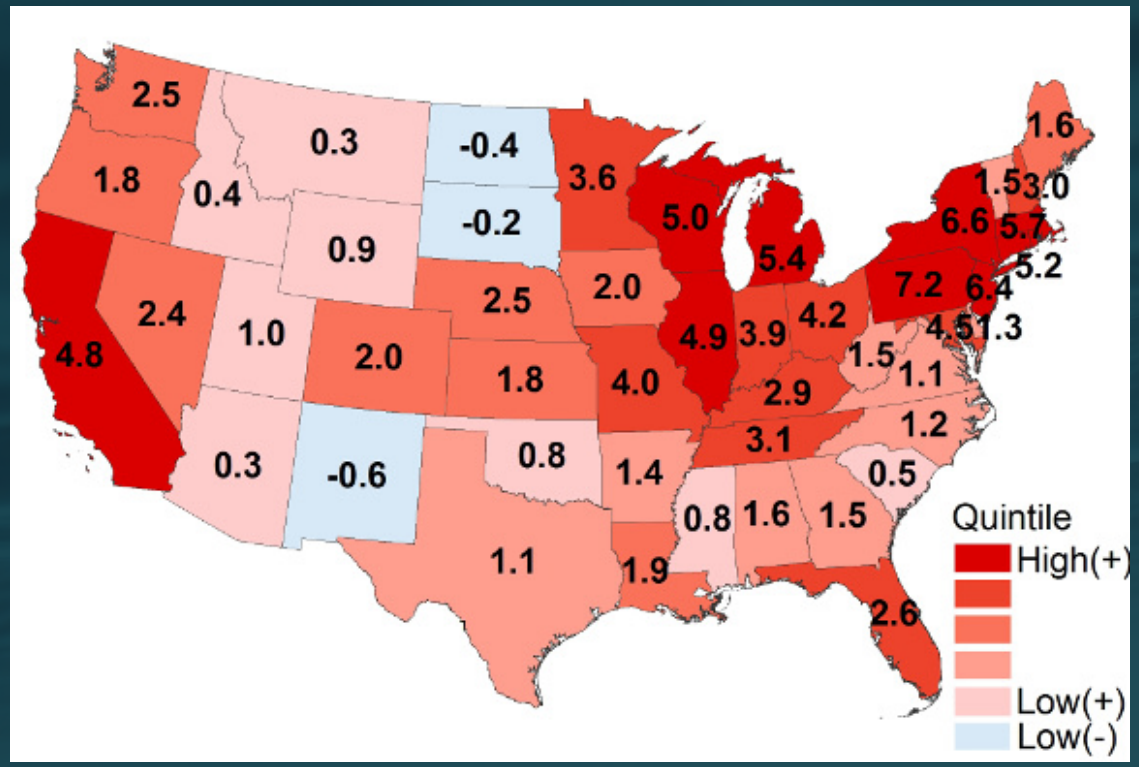
https://rwsc.org/ & https://offshorewind.env.duke.edu/

RWSC
Regional Wildlife Science Collaborative for Offshore Wind

Mission: To collaboratively and effectively conduct and coordinate relevant, credible, and efficient regional monitoring and research of wildlife and marine ecosystems that support the advancement of environmentally responsible and cost-efficient offshore wind power development activities in U.S. Atlantic waters.

Offshore Wind Energy & Climate Justice

Creating a Path to Climate Justice

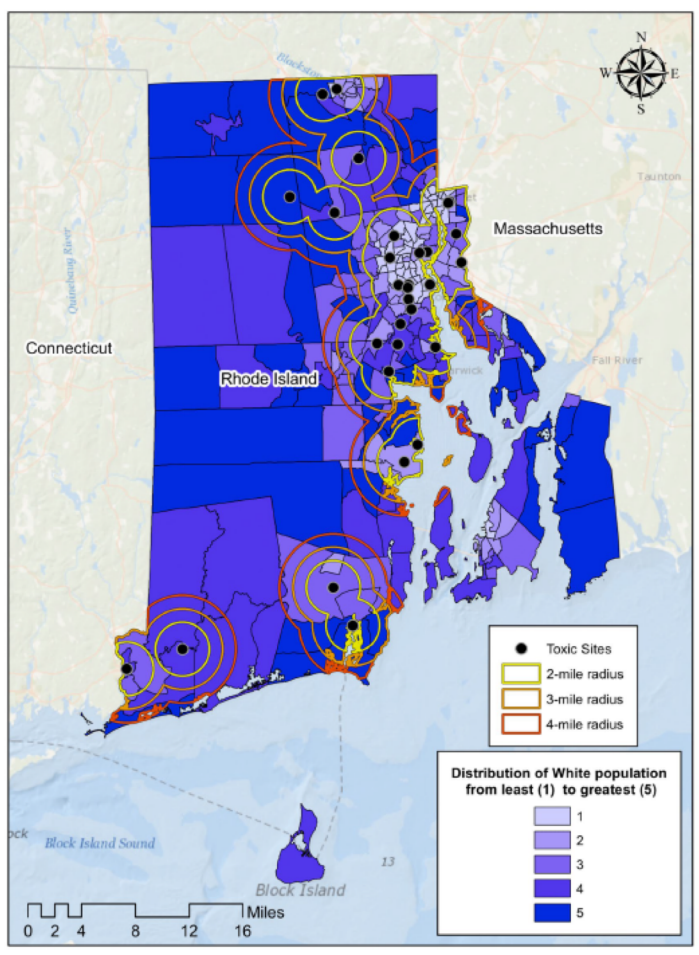


States with the highest inequality ratios (red) disproportionately expose communities of color to pollution from car exhausts and power plants.

According to a study by the University of Minnesota, Rhode Island has the 6th highest pollution gap between white people and people of color in the entire country.

Nationally, people of color experience 38% higher levels of one pollutant, nitrogen dioxide, compared to white people. Breathing in nitrogen dioxide day in and day out comes with a range of negative health impacts: Asthma, heart disease, and low birth weights are just a few.

Creating a Path to Climate Justice

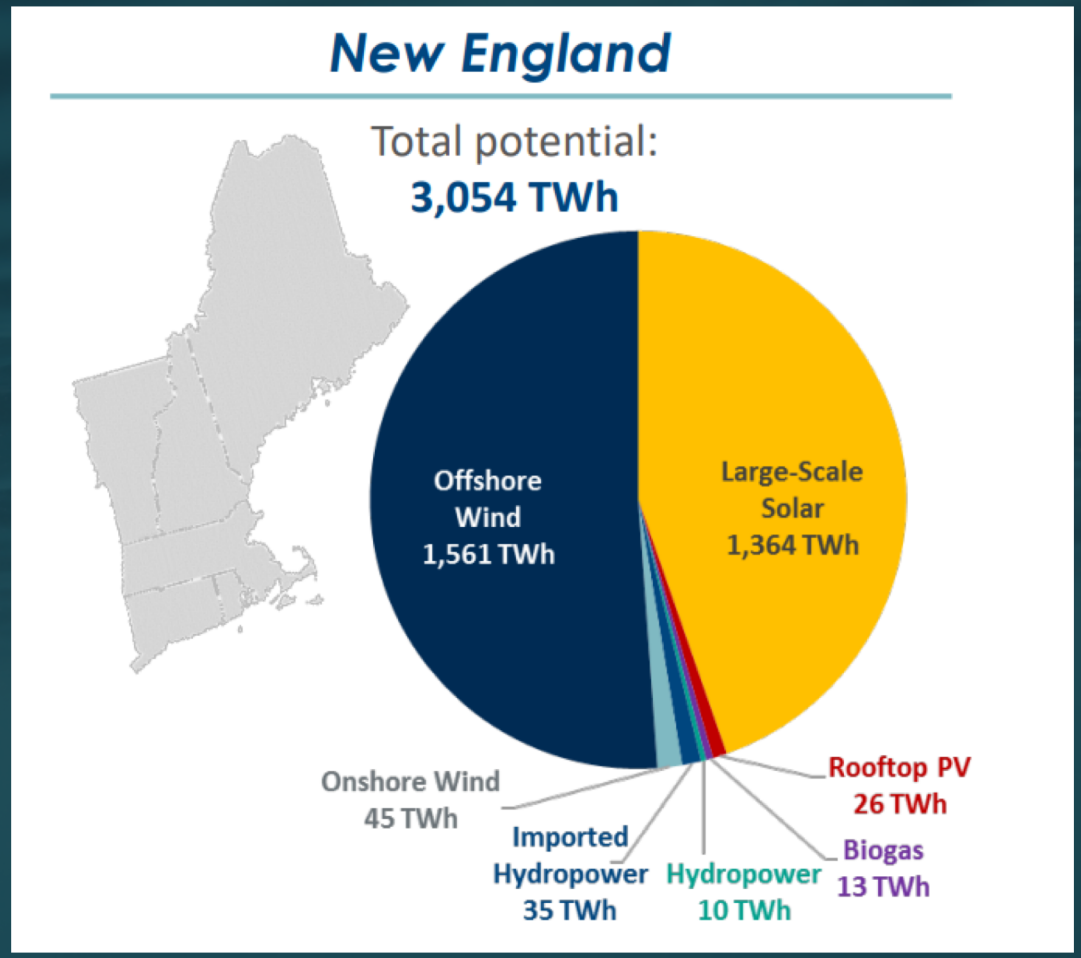


- The highest average annual rates of asthma claims prevalence in children ages 217 years old prevail in Rhode Island's core cities: **Central Falls, Pawtucket, Providence, and Woonsocket.**
- Asthma tends to be located in areas where there are high rates of poverty among children.
- Rhode Island's overall poverty rate in 2017 continued to be the highest in New England with more than one in nine (11.6⁰ ₀) Rhode Islanders struggling to afford basic necessities, according to new data released by the US Census Bureau
- The data also show that Rhode Island's communities of color were much more likely to live in poverty with poverty rates for Blacks and Latinos three times those of Whites

Creating a Path to Climate Justice

2021 Act on Climate

- Set economy-wide enforceable targets for greenhouse gas emissions reductions to achieve net-zero emissions by 2050
- Requires an equitable transition for environmental justice populations, redress past environmental and public health inequities, and involvement of EJ communities in the climate plan
- Support for workers & increased access for underrepresented populations



Creating a Path to Climate Justice

Emphasis in State RFPs for Offshore Wind Energy

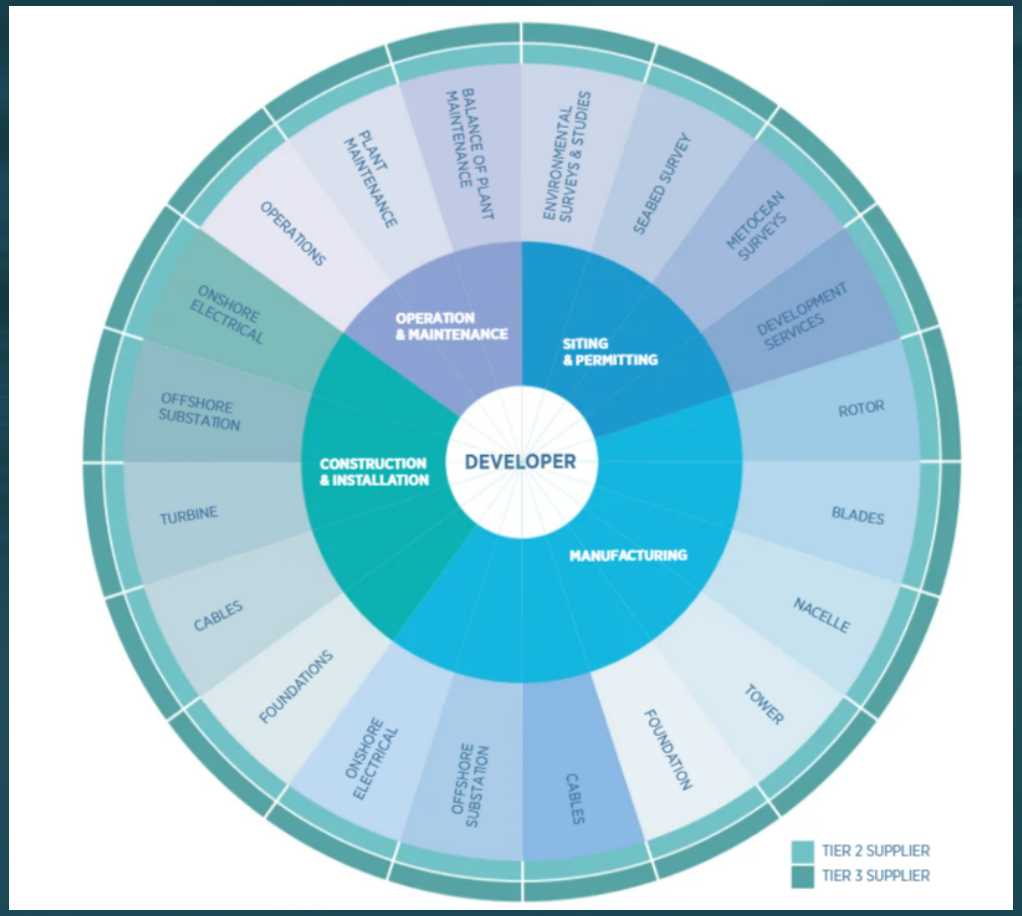
The DEI Stakeholder Engagement Plan considers how the bidder will engage with project stakeholders. It includes an identification of groups of stakeholders to be included (e.g. tribal communities, economically-disadvantaged communities, environmental justice advocates, and fishing communities), project impacts on each stakeholder and associated mitigation plans, and engagement goals and activities for each group. It also should include a description of community partnerships and evidence of past and current stakeholder engagement.

2.2.2.12 Benefits to Environmental Justice Populations and Low-Income Ratepayers in the Commonwealth

Section 83C requires that projects include benefits to environmental justice[27] populations and low-income ratepayers in the Commonwealth. The strengths of these benefits and robustness of the commitments shall be evaluated based on the criteria outlined in more detail in the Qualitative Evaluation section. Additionally, bidders will be required to negotiate and execute a Memorandum of Understanding ("MOU") with DOER based on the Form MOU provided in Appendix L to memorialize the commitments made in the bid package related to Environmental Justice and low-income ratepayer benefits.

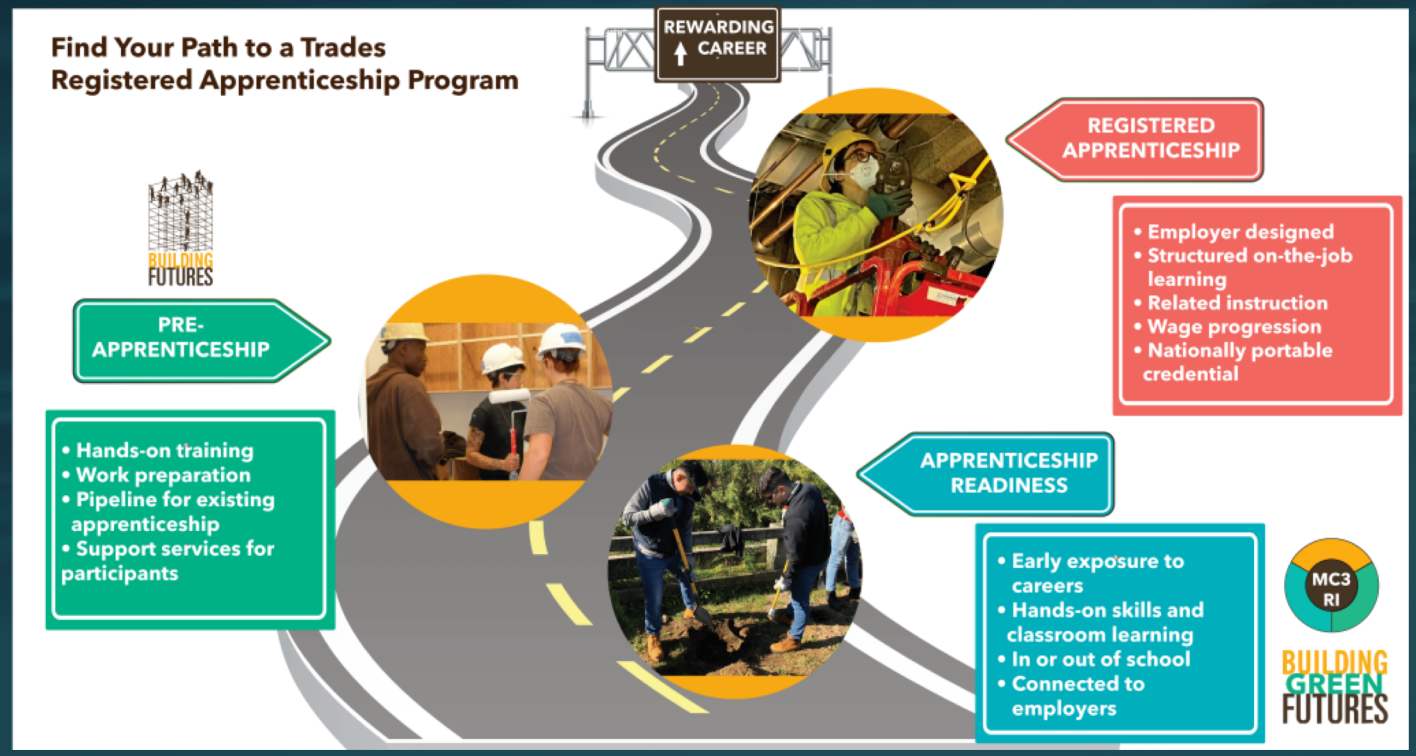
Creating a Path to Climate Justice

Diversity, equity, & inclusion in the supply chain



Creating a Path to Climate Justice

Diversity, equity, & inclusion in construction



Earn **$50-$90,000/yr** plus retirement & health beneftis

Get **paid** on-the-job education and training

Be part of **transforming** our highways, bridges, cities, and towns

Rhode Island needs skilled trades workers!
23,900 jobs projected by 2028

A website with answers to your questions

Click on any question below to read our responses....

Economics Questions

Does Offshore Wind Affect Property Values?

Does Offshore Wind Affect Tourism?

Climate Change Questions

How much can offshore wind in New England contribute to addressing climate change?

Does offshore wind actually help with addressing climate change/reduce emissions?

who we are

AN INDEPENDENT GROUP OF SCIENTISTS, PROFESSORS, AND EDUCATORS BRINGING TOGETHER RESEARCH AND INFORMATION.

OUR SITE IS DESIGNED TO BE A RESOURCE TO HELP PEOPLE UNDERSTAND OFFSHORE WIND AND ITS IMPACTS.

CHECK OUT OUR WEBSITE

REALOFFSHOREWIND.COM

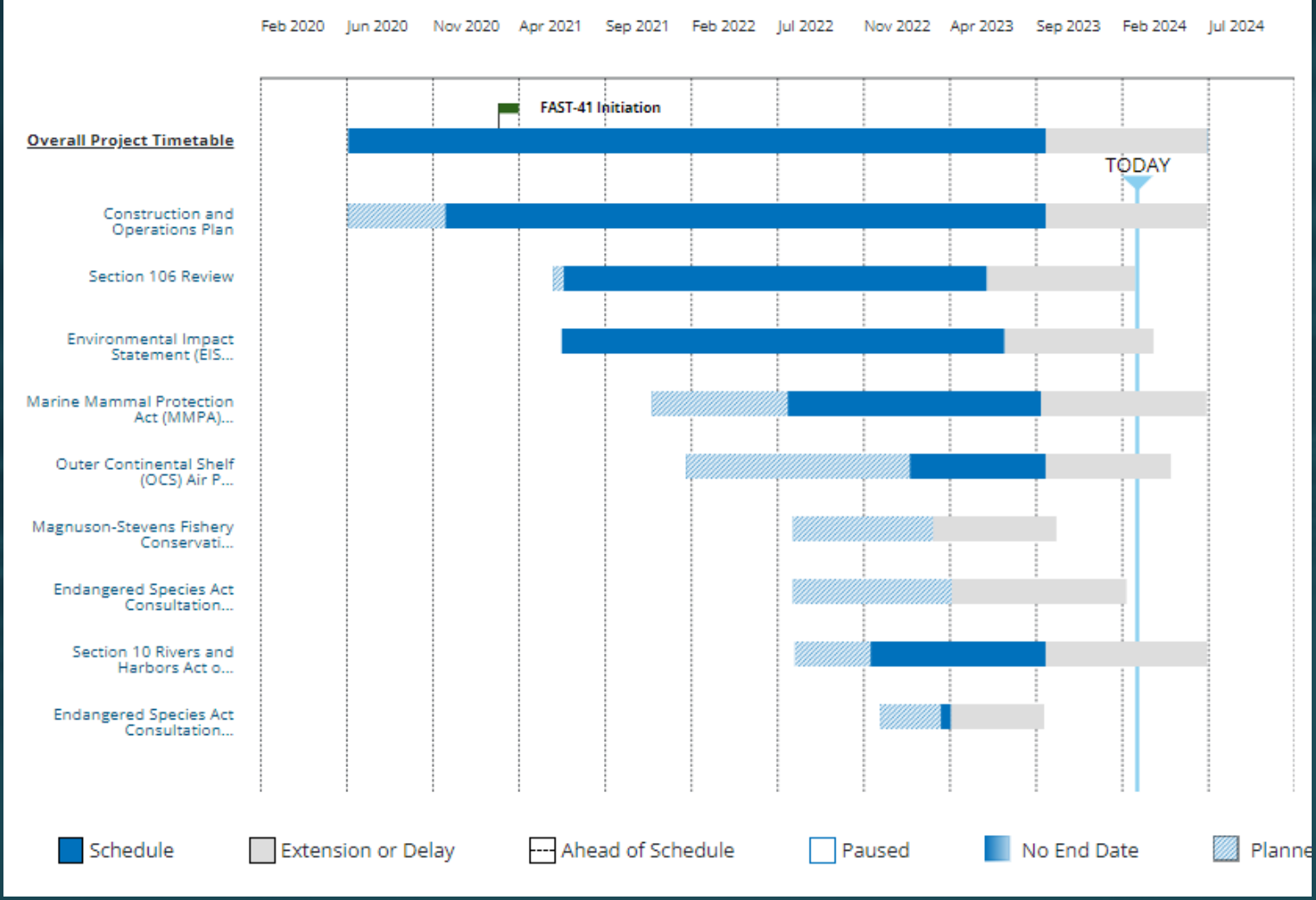
THANK YOU!

Contact us:

nicole@roots2empower.org
steven.tadros@avangrid.com
bsullivanwatts@gmail.com

EXTRA

Federal Permitting Timeline (FAST 41)



- Fixing America's Surface Transportation Act (FAST Act) created in 2015
- Title 41: establishes a new governance structure, set of procedures, and funding authorities to improve and make transparent the Federal review and permitting process for FAST-41 "covered" infrastructure projects on the Federal infrastructure Permitting Dashboard.
- Renewable energy production is a covered project

Offshore Wind Energy & Viewshed

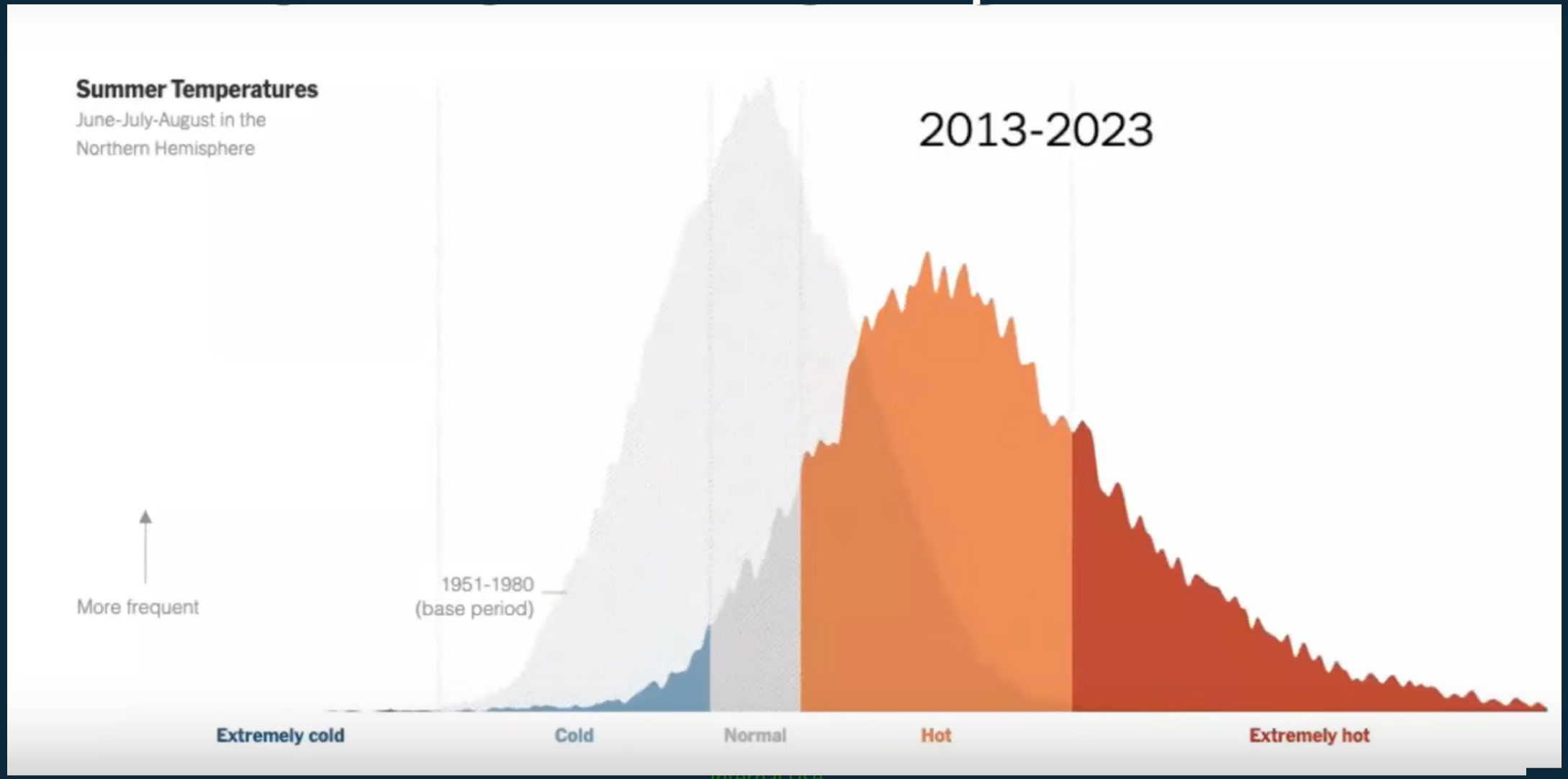
Bubble Curtains

Lessons from the Block Island Wind Farm

https://realoffshorewind.com/shoreview

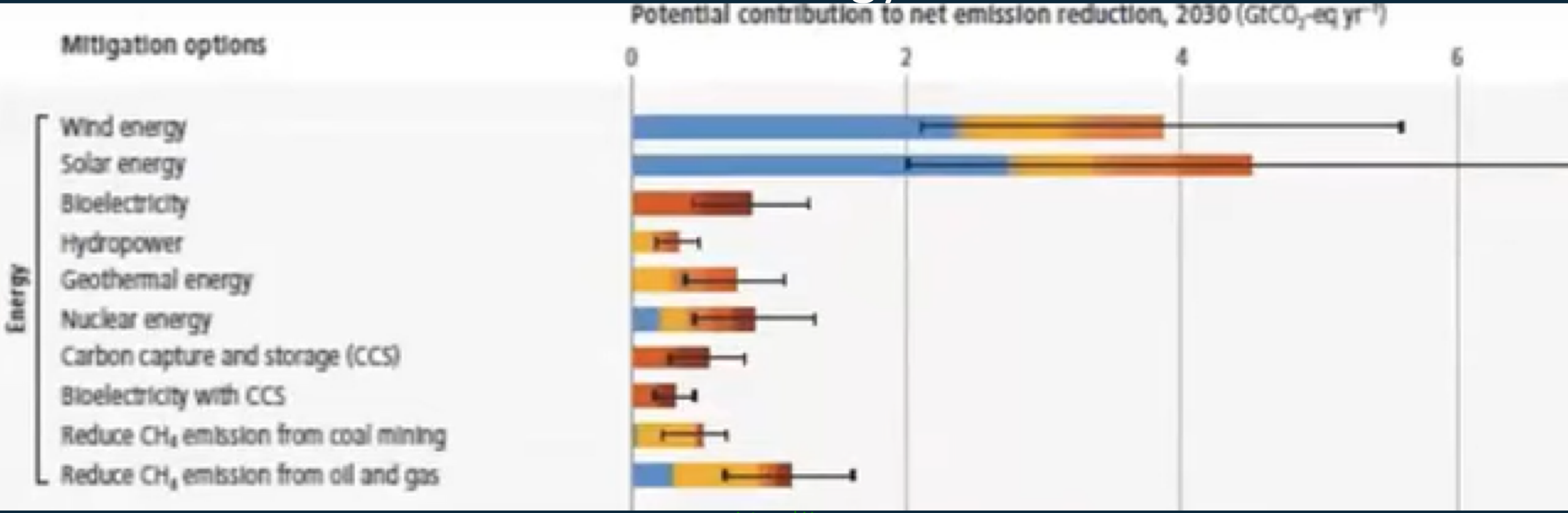
How do they look from shore?

Normal summer temperatures in the Northern Hemisphere



Heat trapping carbon emissions come from oil and gas use.

IPCC says **wind and solar have the most potential** to reduce energy use

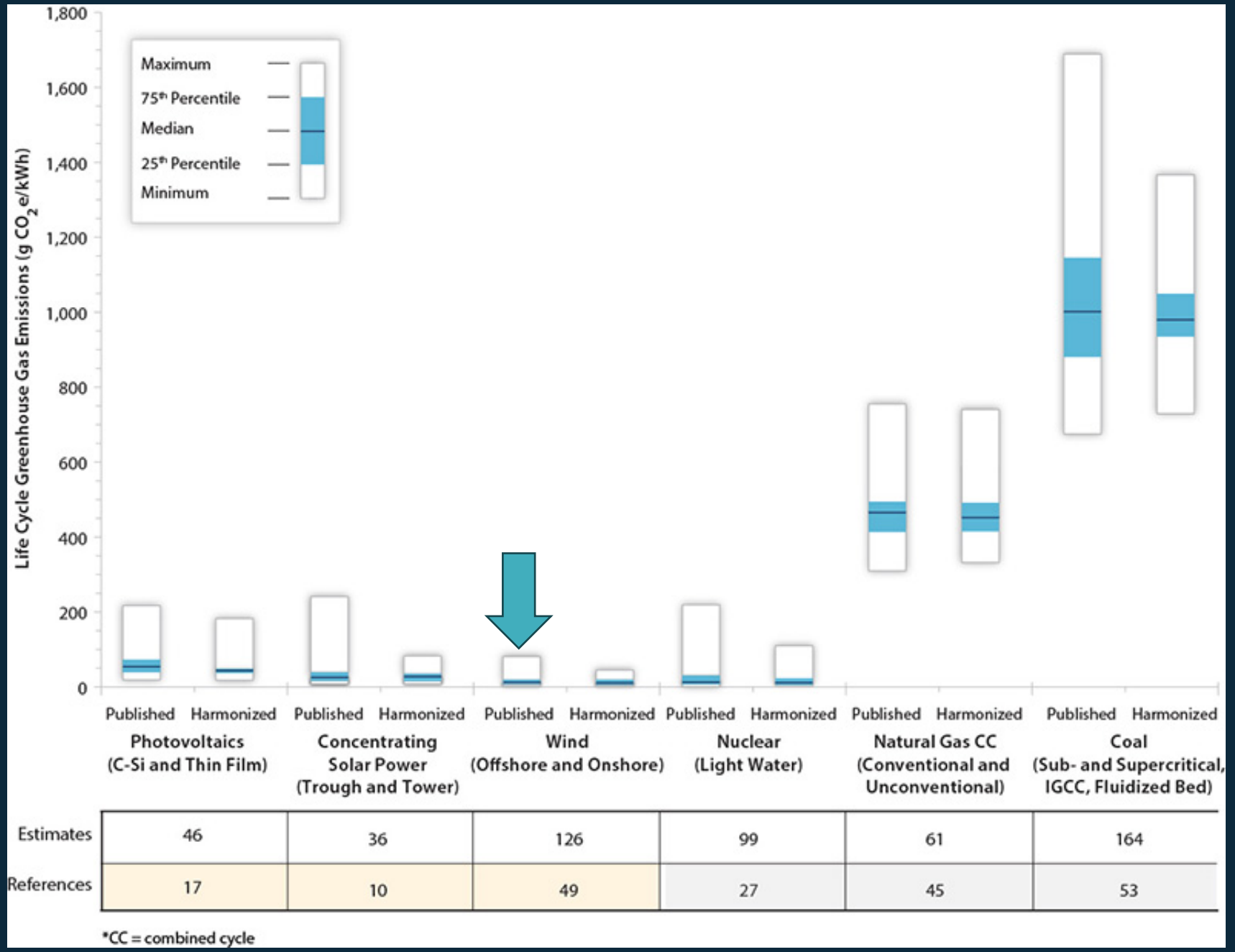


Life Cycle carbon emissions

Compare wind to gas and oil

wind:

carbon footprint erased in 6-1 months



	Photovoltaics (C-Si and Thin Film)	Concentrating Solar Power (Trough and Tower)	Wind (Offshore and Onshore)	Nuclear (Light Water)	Natural Gas CC (Conventional and Unconventional)	Coal (Sub- and Supercritical, IGCC, Fluidized Bed)
Estimates	46	36	126	99	61	164
References	17	10	49	27	45	53

*CC = combined cycle

How much waste?

Contents lists available at ScienceDirect

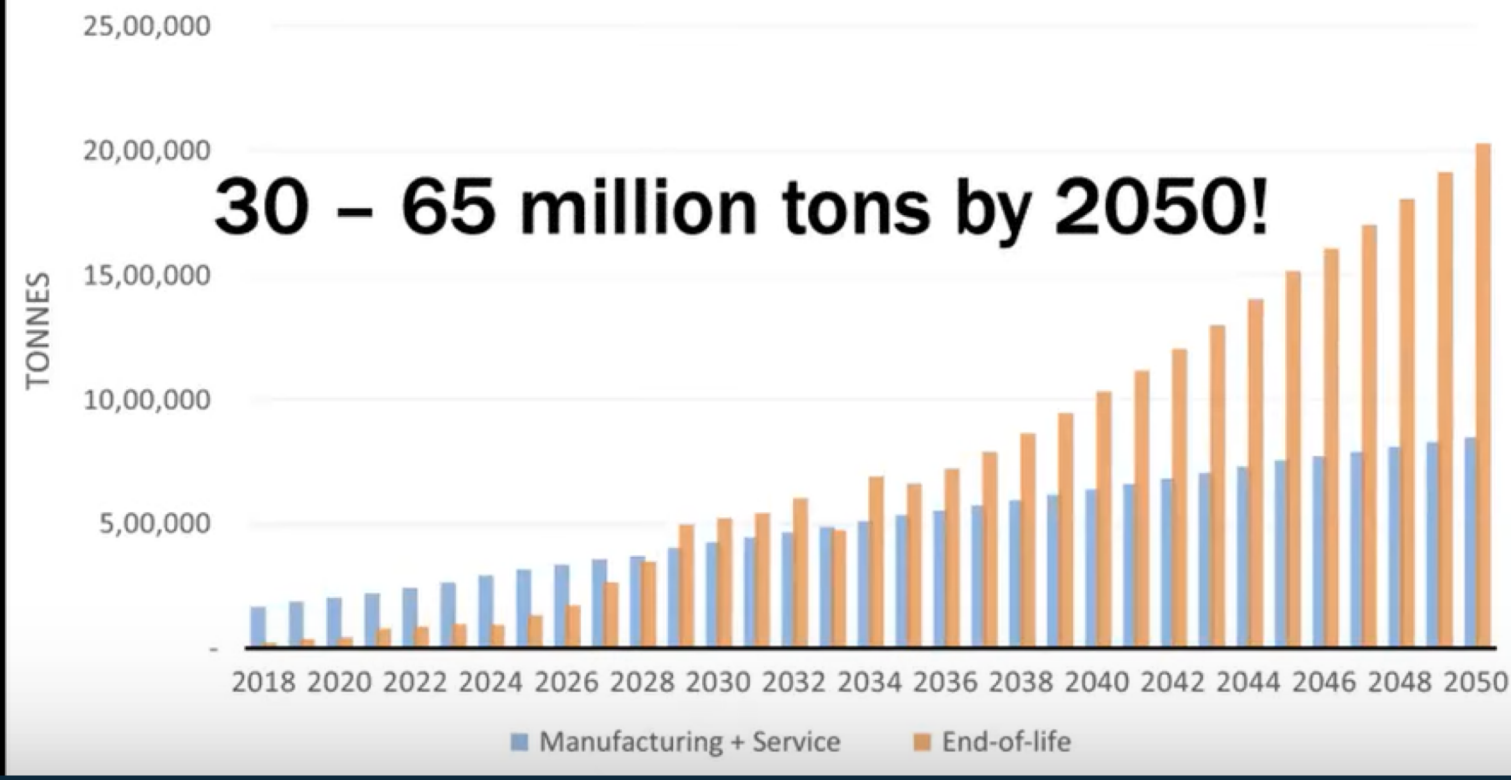
Waste Management

journal homepage: www.elsevier.com/locate/wasman

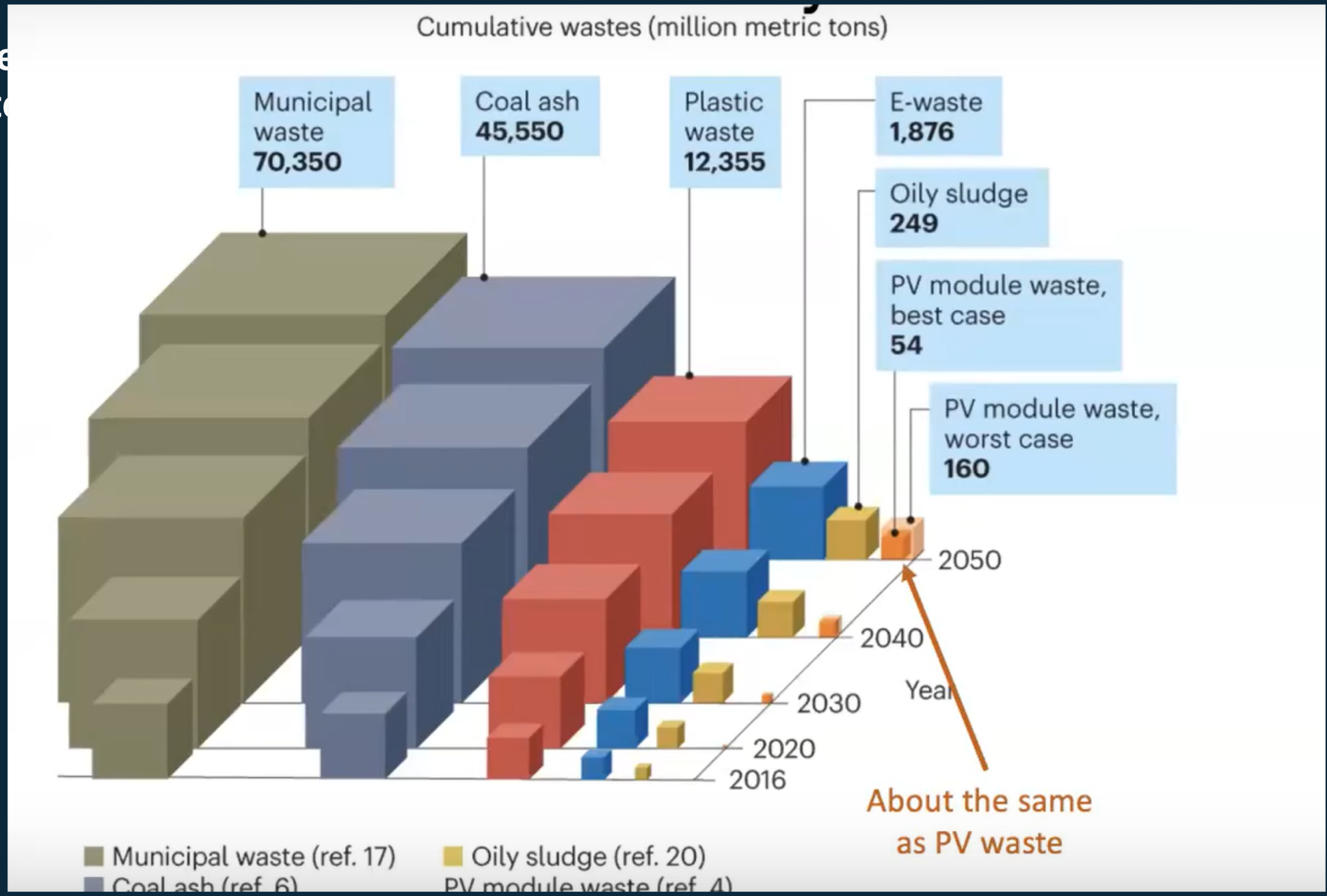
Wind turbine blade waste in 2050

Pu Liu, Claire Y. Barlow *

University of Cambridge Institute for Manufacturing, 17 Charles Babbage Road, Cambridge CB3 0FS, United Kingdom



Compared to othe
waste, wind waste
is trivial



Oil spills off New England

- The Argo Merchant ran aground on Nantucket Shoals off Massachusetts early on Dec. 15, 1976, and spilled nearly **8 million gallons of heavy fuel oil,** it became the worst marine oil spill the United States had seen. It also led to the eventual creation of the Office of Response and Restoration (OR&R).

- **More than 800,000 gallons of home heating oil spilled near Narragansett Bay**. No lives were lost, but the impact on marine life, birds and the environment from the spill on Jan. 19, 1996, was significant. An environmental disaster was unfolding 27 years ago Thursday when the tug Scandia and the tank barge North Cape ran aground near Moonstone Beach in South Kingstown in rough weather.
- About 250 square miles of Block Island Sound waters were immediately closed to commercial fishing, impacting every aspect of the industry.
- Twelve million lobsters, 1 billion crustaceans, and fish were killed. Two-thousand federally protected piping plovers died as the oil seeped into the 800-acre Trustom Pond.
- State and federal agencies spent more than $100 million on cleanup and restoration.

in 1996, the tank barge North Cape and the tugboat Sandia grounded off the coast of Rhode Island resulting in the worst oil spill in the state's history.

Dead lobsters collected on Rhode Island beaches after the spill. (Photo: Rhode Island Department of Environmental Management)

Argo Merchant – Nantucket shoals

Brayton Point Coal Fired Power Station