



Photo: Nicholas Doherty

Ocean Justice: Strategies for an Equitable Implementation of North Carolina's Offshore Wind Industry

Julianna Schroeger

Dr. Pat Halpin, Advisor

2021

Master's project submitted in partial fulfillment of the requirements for the Master of Environmental Management degree in the Nicholas School of the Environment, Duke University

Duke | **NICHOLAS SCHOOL** of
the **ENVIRONMENT**

TABLE OF CONTENTS

1. INTRODUCTION	7
1.1 DEFINING DISADVANTAGED COMMUNITIES (DACs).....	7
1.2 ECONOMIC INEQUITIES.....	7
1.2.1 <i>Compounding Inequities</i>	8
1.3 JUST TRANSITION FRAMING	8
1.4 EQUITABLE ECONOMIC DEVELOPMENT.....	10
1.4.1 <i>What is Equitable Economic Development?</i>	10
1.4.2 <i>Equitable Development Practices</i>	11
1.5 NORTH CAROLINA’S CLIMATE AND CLEAN ENERGY LANDSCAPE.....	12
1.5.1 <i>Equity and Justice Provisions</i>	13
1.6 OFFSHORE WIND (OSW).....	14
1.6.1 <i>National Landscape</i>	14
1.6.2 <i>North Carolina OSW Landscape</i>	15
1.7 OBJECTIVE.....	16
2. METHODS & RESULTS	16
2.1 PROJECT OUTPUTS	17
2.2 CREATION OF A PUBLIC ENGAGEMENT TOOL.....	17
2.3 WORKFORCE DATA ANALYSIS	17
2.3.1 <i>Research Question</i>	17
2.3.2 <i>Data Sources and Methodology</i>	17
2.3.3 <i>Results</i>	18
2.3.4 <i>Summary of Data Analysis</i>	23
2.4 POLICY ANALYSIS	23
2.4.1 <i>Research Question</i>	23
2.4.2 <i>Methodology</i>	23
2.4.3 <i>Results</i>	24
2.4.4 <i>Summary of Policy Analysis</i>	27
3. DISCUSSION	28
3.1 NORTH CAROLINA CONTEXT.....	28
4. RECOMMENDATIONS.....	29
4.1 CRAFT STATE POLICIES BASED ON DISAGGREGATED DATA.....	30
4.2 ESTABLISH A DAC INVESTMENT MANDATE	30
4.3 REQUIRE EQUITY COMMITMENTS IN FUTURE BID SOLICITATIONS	31
4.4 ENGAGE UNDERREPRESENTED POPULATIONS IN WORKFORCE OPPORTUNITIES	32
4.5 ENCOURAGE MWBE PARTICIPATION IN OSW	32
4.6 BUILD A COALITION OF OFFSHORE WIND ADVOCATES	34
4.7 CREATE K-12 CURRICULA AND EDUCATOR NETWORKS	34
5. CONCLUSIONS.....	35
6. APPENDICES.....	36
APPENDIX 1: OFFSHORE WIND OCCUPATIONS, WDI REPORT.....	36

APPENDIX 2: WDI OCCUPATIONS CONSOLIDATED INTO BLS CATEGORIES38
APPENDIX 3: 10-HIGHEST AND 10-LOWEST PAYING OSW OCCUPATIONS41
APPENDIX 4: LIST OF IN-STATE ORGANIZATIONS.....42

ACKNOWLEDGMENTS

I'd like to thank my advisor, Dr. Pat Halpin, for his support, patience, and encouragement over the past two years; Katharine Kollins and the Southeastern Wind Coalition for welcoming me into their team, helping to refine this project, and fielding my questions along the way; and Kris Ohleth, Hayes Framme, and Jesse Cleary for the expertise they contributed to my Story Map. To my friends and peer advisors: your tenacity and humor made this all possible. And to the matriarchs of my family, who instilled strength and a love for the ocean. Thank you.

LIST OF ABBREVIATIONS

OSW	Offshore wind
DAC	Disadvantaged communities
CEP	Clean Energy Plan (North Carolina)
CEJA	Clean Energy Jobs Act (Maryland)
OWEA	Offshore Wind Energy Act (Maryland)
CLCPA	Climate Leadership and Community Protection Act (New York)
RGGI	Regional Greenhouse Gas Initiative
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
NEPA	National Environmental Policy Act
WDI	Workforce Development Institute (New York)
BLS	Bureau of Labor Statistics
CPS	Current Population Survey (BLS)
OES	Occupational Employment Statistics (BLS)
BOEM	Bureau of Ocean Energy Management
DOC	North Carolina Department of Commerce
DEQ	North Carolina Department of Environmental Quality
OEE	North Carolina Office of Environmental Education
DOT	North Carolina Department of Transportation
DOA	North Carolina Department of Administration
HUB Office	North Carolina Office of Historically Underutilized Businesses
LEAD	Labor and Economic Analysis Division (DOC)
NYSERDA	New York State Energy Research and Development Authority
MEA	Maryland Energy Administration
NJEDA	New Jersey Economic Development Authority
CSBDF	Carolina Small Business Development Fund
MWBE	Minority and women-owned business enterprise
DBE	Disadvantaged business enterprise
MBE	Minority business enterprise
WBE	Women business enterprise
SDBE	Small and disadvantaged business enterprise
VOSB	Veteran-owned small business
SDVOBE	Service-disabled Veteran-owned business enterprise
HUB	Historically underutilized business

EXECUTIVE SUMMARY

The United States currently faces a dual crisis of climate change and inequality. In North Carolina, A 2019 report by *Prosperity Now* ranked the state 41st in overall prosperity of residents with the 29th highest rate of racial disparity in the country.¹ Today's inequities, which stem from a history of slavery, discriminatory policies, and oppressive development practices, are compounded by climate impacts. In addition to North Carolina's history of environmental injustices, recurrent climate-related disasters have further entrenched the socioeconomic and racial divide, a trend seen across the nation.² As climate change accelerates and its impacts worsen, communities that are already economically disadvantaged and physically vulnerable are at risk of being further marginalized.³

In light of accelerating climate risks and the economic crisis spurred by the COVID-19 pandemic, calls have intensified for leveraging opportunities in the clean economy to address both climate change and socioeconomic disparities. Meanwhile, offshore wind is rapidly developing in the United States. With recent state and federal commitments, offshore wind is poised to become a major contributor to the United States' clean energy economy in the next decade and beyond. The establishment of this massive new industry means an influx of economic activity as a workforce and supply chain is created to meet the industry's needs. If fully developed along the east coast, offshore wind has the potential to create 83,000 jobs by 2030.⁴ If developed intentionally, this burgeoning industry could both mitigate climate change and provide meaningful economic benefits for disadvantaged communities (DACs) on a large scale. North Carolina's recent climate and equity goals, set forth in the 2019 Clean Energy Plan and 2020 Climate Risk Assessment Resiliency Plan, provide an opportunity to identify how equity can be integrated into the state's emerging offshore wind industry.

¹ Prosperity Now (2019) The Racial Wealth Gap [white paper] <https://prosperitynow.org/resources/racial-wealth-gap-2019>

² Howell, J. and Elliott, R. (2019) Damages done: The longitudinal impacts of natural hazards on wealth inequality in the United States. *Social Problems*: 1-20.

³ *Ibid.*

⁴ AWEA (2020) US Offshore wind power economic impact assessment [white paper] <https://www.awea.org/resources/news/2020/offshore-wind-poised-for-exponential-growth>

Through this Master's Project I recommend strategies that North Carolina can utilize to facilitate equitable outcomes through offshore wind development. In order to make these recommendations I employ a multi-pronged approach that answers the following questions:

- What is the current demographic breakdown of the industry workforce and where are the greatest needs for improvement?
- What strategies are other states employing to integrate equity considerations into their offshore wind plans?

First, I conducted a demographic analysis of the occupations that will comprise the national offshore wind workforce to identify racial disparities in access to wealth-creating jobs within the industry. Results show that, overall, the offshore wind workforce is predominantly white and male compared to the national workforce. Additionally, representation of Black and Latinx populations in the lowest paying jobs is double that of the highest paying jobs, reflecting systemic barriers in access to higher education and training opportunities.

Given these disparities, I then conducted an analysis of policies and programs that New York, New Jersey, and Maryland are rolling out to promote equitable development of offshore wind in their states. Each state has employed a number of strategies to ensure that the economic benefits from the industry are accessible to DACs. Strategies include statewide DAC investment mandates, set-aside mandates for minority and women-owned businesses (MWBs), and public investments in education, workforce development, and supply chain assets that specifically target DACs and MWBs.

As North Carolina moves to stake its claim in offshore wind, decision makers should take note of equitable development practices spearheaded by other states. With these practices in mind, policies, programs, and incentives guiding offshore wind development can be crafted to prioritize communities that have historically been left behind.

1. INTRODUCTION

1.1 Defining Disadvantaged Communities (DACs)

Metrics by which a community is defined as “disadvantaged” vary between contexts. The term is used widely, found throughout academic literature, state policies, and government agencies. For this study, I am referring to the interim definition from New York’s Climate Leadership and Community Protection Act (CLCPA), which defines disadvantaged communities as follows:

“i. areas burdened by cumulative environmental pollution and other hazards that can lead to negative public health effects; ii. areas with concentrations of people that are of low income, high unemployment, high rent burden, low levels of home ownership, low levels of educational attainment, or members of groups that have historically experienced discrimination on the basis of race or ethnicity; and iii. areas vulnerable to the impacts of climate change such as flooding, storm surges, and urban heat island effects.”⁵

State agencies may choose to define these communities by different criteria. Regardless, it is important to note that the socioeconomic, environmental, and health conditions that qualify a community as disadvantaged are the result of systemic racism and intentional policies that perpetuated injustices and led to disinvestment in these communities throughout history.

1.2 Economic Inequities

There is a well-documented racial wealth gap in the United States. As of 2016, the average net worth of white families was approximately ten times greater than that of Black families, and eight times greater than Hispanic/Latinx families.⁶ These patterns hold true in North Carolina, where Native American, Latinx, and Black populations experience disproportionate rates of poverty (26%, 22%, and 22%, respectively) compared to the state as a whole (14%).⁷ A 2019 report by *Prosperity Now* ranked North Carolina 41st out of the 50 states in overall prosperity of residents, with the 29th highest rate of racial disparity.⁸ Additionally,

⁵ Climate Leadership and Community Protection Act, Ny. Code Ann, S6599 § 75-0111 (2019)

⁶ Prosperity Now (2019) The Racial Wealth Gap [white paper] <https://prosperitynow.org/resources/racial-wealth-gap-2019>

⁷ NC Justice Center (2020) 2020 Poverty Report: Persistent poverty demands a just recovery for North Carolinians [white paper] <https://www.ncjustice.org/publications/2020-poverty-report-persistent-poverty-demands-a-just-recovery-for-north-carolinians/>

⁸ Prosperity Now *supra* note 6.

North Carolina has a legacy of environmental injustice. From the 1982 protests of a toxic waste landfill in Warren County that sparked the national environmental justice movement, to today's injustices related to industrial hog farming, coal ash spills, and the biomass industry, rural, low-income, and communities of color across the state have long been overburdened with environmental and public health hazards.⁹

1.2.1 Compounding Inequities

Today's inequities, which stem from a history of slavery, discriminatory policies, exclusionary resource allocation, and oppressive development practices, are compounded by more recent challenges brought on by climate change. Recurrent disasters have further entrenched the socioeconomic and racial divide, a trend seen across the nation.¹⁰ As climate change accelerates and its impacts worsen, communities that are already economically disadvantaged and environmentally vulnerable are at risk of being further marginalized.¹¹ Access to social and economic capital, salaried jobs, health care, and resources to navigate funding streams for both adaptation and recovery programs, impact the extent to which a community is able to plan for and respond to the effects of climate change.¹² As such, low-income communities and communities of color are often left the most vulnerable, and most impacted, in the face of climate-related hazards.¹³ In light of accelerating climate risks and the inequities exacerbated by the COVID-19 pandemic, North Carolina is well-poised to cultivate a more equitable economy through its emerging renewable energy industries.

1.3 Just Transition Framing

The concept of utilizing opportunities in the clean economy to mitigate climate change, alleviate industrial pollution, and create well-paying jobs for those most impacted by either the harmful side effects of extractive industries or the closure of such industries has longstanding roots in just transition theory.

⁹ NC Environmental Justice Network, Issues: <https://ncejn.org/issues/>

¹⁰ Howell, J. and Elliott, R. (2019) Damages done: The longitudinal impacts of natural hazards on wealth inequality in the United States. *Social Problems*: 1-20.

¹¹ *Ibid.*

¹² Hersher, R. (2019) How federal disaster money favors the rich. *National Public Radio*: <https://www.npr.org/2019/03/05/688786177/how-federal-disaster-money-favors-the-rich>

¹³ Howell, *supra* note 3.

A just transition was first conceptualized within the US labor movement of the 1970s in response to the passage of the National Environmental Policy Act in 1970, and later, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, both of which placed more stringent regulations on polluting industries and superfund sites.¹⁴ Labor unions within these industries who subsequently experienced widespread layoffs advocated for a “superfund for workers,” a term coined in 1993 by Tony Mazzocchi, a leader of the Oil, Chemical, and Atomic Workers union.¹⁵ The “superfund for workers” notion went beyond solely providing worker retraining for those displaced by stricter environmental policies to include efforts to create more environmentally friendly methods of industrial production.¹⁶

The just transition concept broadened as labor unions joined forces with environmental justice groups in the 1990s.¹⁷ With roots in the civil rights era and a recognition of the public health injustices experienced by those who worked in and lived adjacent to industrial facilities, the just transition framework took on broader themes of social justice, equity, and participatory decision making within environmental justice contexts.^{18 19}

Today, organizations such as the Climate Justice Alliance and the Just Transition Alliance make clear that “frontline workers and frontline communities” should guide the economic, labor, and environmental policy development around this economy-wide transition away from fossil fuels.^{20 21} These justice-centered perspectives frame a just transition as a full economic and societal restructuring from an extractive to a regenerative economy that not only transitions our energy system to renewable resources, but also draws economic and political control down to communities, prioritizes racial justice and social equity, and restores and values natural and cultural resources.²² Fulfilling this ambitious vision would require deep community participation to democratize systems of power and craft policies that meet local communities’ unique needs. This vision of a just transition, which reaches beyond renewable energy and job

¹⁴ Henry, M. S., Bazilian, M. D., & Markuson, C. (2020). Just transitions: Histories and futures in a post-COVID world. *Energy Research & Social Science*, 68, 101668. <https://doi.org/10.1016/j.erss.2020.101668>

¹⁵ Brecher, J. (2015). A Superfund for Workers: How to promote a just transition and break out of the jobs vs. environment trap. *Dollars & Sense*. 20-24.

¹⁶ Henry, *supra* note 13.

¹⁷ *Ibid.*

¹⁸ *Ibid.*

¹⁹ Just Transition Alliance. *Just Transition Principles*: <http://jtalliance.org/what-is-just-transition/>

²⁰ *Ibid.*

²¹ Climate Justice Alliance. *Analysis, Framework, and Strategy*: <https://climatejusticealliance.org/just-transition/>

²² *Ibid.*

creation, touches all aspects of society and has informed policies at the local, national, and international level.

Domestically, HR 109, otherwise known as the Green New Deal, and state-level policies such as New York’s CLCPA, Maryland’s Clean Energy Jobs Act, or Virginia’s Clean Economy Act, reflect just transition principles with the explicit goal of combating the climate crisis. These state policies are dictating how clean energy assets, including offshore wind, are implemented on the ground, and the ways in which local communities will both be impacted by these developments and be a part of climate solutions.

1.4 Equitable Economic Development

1.4.1 *What is Equitable Economic Development?*

Equitable economic development is a relatively new approach to traditional economic development, which focused primarily on metrics such as total jobs or GDP as an indicator of economic well-being.²³ The emergence of philosopher and economist Amartya Sen’s Capability Approach theory in the 1980s paved the way for future integration of equity considerations into economic development theory and practice.²⁴ Sen’s Capability Approach focused on metrics of well-being that considered individuals’ quality of life, rather than narrow economic metrics like GDP, which often shrouds the full picture of wealth inequality and race and gender disparities within the broader economy.^{25 26}

Equitable development seeks to reduce economic disparities and improve quality of life by expanding job, entrepreneurship, ownership, and wealth-building opportunities for disadvantaged communities and reduce the systemic barriers they face.²⁷ This kind of development requires intentional policy action that guides both public and private investments and business procurement incentives toward equitable outcomes.²⁸ This holistic view of economic development, which centers quality of life and redressing legacies of inequality, has

²³ Liu (2016) Remaking Economic Development. The Brookings Institution [white paper] https://www.brookings.edu/wp-content/uploads/2016/02/BMPP_RemakingEconomicDevelopment_Feb25LoRes-1.pdf

²⁴ Curren, R., Liu, N., Wilkins, E. G., Ahn, L., Galloway-Popotas, R., & Nelson, J. (n.d.). *Equitable Development as a Tool to Advance Racial Equity*. Local and Regional Government Alliance on Race & Equity [white paper] <https://www.racialequityalliance.org/resources/equitable-development-tool-advance-racial-equity/>

²⁵ Wells, T. (n.d.) Sen’s Capability Approach. *Internet Encyclopedia of Philosophy*. <https://iep.utm.edu/sen-cap/#H3>

²⁶ Curren et. al. *supra* note 22.

²⁷ PolicyLink (2017) Equitable Economic Development: The Why and How [presentation] www.lisc.org/media/filer_public/65/a6/65a6e5f3-cc78-4b3e-a90c-6a38b3153778/mary_lee_equitable_economic_development.pdf

²⁸ PolicyLink (2013) *Equity is the Superior Growth Model for an All-In Nation* [white paper]

emerged as not only a moral imperative, but an economic one, as research shows that inequality hampers overall economic growth, while economic inclusion advances it.²⁹

1.4.2 Equitable Development Practices

Frameworks and principles for equitable development vary slightly in different contexts; however, best practices remain largely the same across sectors and projects. The Alliance for Advancing Regional Equity outlines the following five characteristics of equitable development:

1. **Focuses project in the context of racial justice and undoing structural oppression:** Prioritizes low-wealth communities and communities of color. Takes an asset based approach to development by lifting up what is already working and emphasizing what is good about communities. Retains current residents, preserves, or creates additional affordable housing options.
2. **Generates new economic opportunities:** Supports ambitious goals towards equitable workforce development, hiring, DBE contracting, and entrepreneurial opportunities. Banks and financial institutions offer accessible and affordable savings and loan programs. Intentionally reinvests in the community. Supports livable wages and strong labor unions.
3. **Values organizing and community engagement:** Prioritizes community wisdom and expertise. Ensures that the people most impacted by a development proposal are able to meaningfully plan for and benefit from that project. Values creativity and culturally appropriate solutions.
4. **Recognizes the link between the built environment and the social determinants of health:** Leverages transit service, pedestrian, and bicycling infrastructure. Supports efforts to break the “disparities cycle” where one’s lifespan and health outcomes are determined by race and zip-code.
5. **Mitigates inequitable impacts of climate change:** Promotes environmental justice while building vibrant, prosperous, and resilient communities. Expands green spaces, cleans up polluted land, and utilizes clean, energy efficient technologies.³⁰

In the context of clean energy, the nonprofit Ceres, who creates market-based approaches to sustainability challenges, identifies five best practices for equitable development specific to renewable energy projects:

1. **Engage stakeholders** about environmental, workforce and community concerns throughout the clean energy development process;
2. **Protect and efficiently use environmental resources** by employing best practices for siting, wildlife protection, compensation and community involvement;
3. **Adopt responsible contracting policies** that provide a framework for ensuring a clean energy transition delivers on its promise of good jobs and economic opportunity for local workers and communities;

²⁹ *Ibid.*

³⁰ The Alliance (n.d.) Characteristics of Transformative Equitable Development: <http://thealliancetc.org/our-work/transformative-equitable-development-characteristics/>

4. **Provide meaningful local economic benefits** by investing in, helping develop or advocating workforce investment, with a focus on underserved communities and workers of color and just transitions for conventional energy workers being displaced by clean energy projects;
5. **Ensure compliance and monitoring** by evaluating developer commitment to provide long-term transparency for all project partners and stakeholders.³¹

Though different in nature, both of these frameworks highlight the need for intentional prioritization of disadvantaged communities, participatory community engagement processes, workforce and contracting policies that create economic opportunities for disadvantaged communities and businesses, and building upon local assets. Equitable development is inherently place-based, as the process by which a development project comes to life is equally as important as the final product. In other words, an inclusive, community-driven process will produce more equitable outcomes.

The Government Alliance on Race and Equity also emphasizes that understanding and tracking disaggregated data is crucial to fostering equitable outcomes. By having a clear picture of existing disparities as they relate to race, class, and other socioeconomic factors, policies and investments can be crafted to target those disparities more effectively.³² Disaggregated socioeconomic data offers a baseline for evaluating project performance, and continual evaluation is key in ensuring equity goals are met.³³

With these equitable development practices in mind, decision makers can help shape the clean energy transition in such a way that maximizes benefits to DACs and addresses legacies of systemic inequality. As Dr. Jennie Stephens writes in her book *Diversifying Power*, “The renewable energy revolution may continue to concentrate wealth and power, exacerbating racial and socioeconomic disparities. Alternatively, this revolution could be a mechanism for enhancing equity and repairing past injustices.”³⁴

1.5 North Carolina’s Climate and Clean Energy Landscape

In North Carolina, the 2007 Renewable Energy and Energy Efficiency Portfolio Standard required investor-owned utilities to derive 12.5%, and electric cooperatives to derive 10%, of

³¹ Spalding, K.S. (2020) Practices for Just, Equitable, and Sustainable Development of Clean Energy. Ceres. [white paper] <https://www.ceres.org/resources/reports/practices-just-sustainable-and-equitable-development-clean-energy>

³² Curren *supra* note 20.

³³ *Ibid.*

³⁴ Stephens, J.C. (2020) *Diversifying Power: why we need an antiracist, feminist leadership on climate and energy*. Island Press.

their electricity from renewable sources by 2021.³⁵ Utilities have essentially met that goal—primarily through solar—and the state has since enacted further emissions reduction targets that necessitate increased renewable energy production and energy efficiency measures.

Since 2018, North Carolina has made great strides in becoming a more climate-prepared state, thanks—in large part—to Governor Roy Cooper’s Executive Order 80: North Carolina’s Commitment to Address Climate Change and Transition to a Clean Energy Economy. EO 80 called for several climate-related actions, including a statewide 40% reduction of greenhouse gas emissions below 2005 levels by 2025, broad integration of climate resilience planning throughout all state agencies, and mandated the creation of the 2019 Clean Energy Plan (CEP) and the 2020 Climate Risk Assessment and Resiliency Plan (Resiliency Plan).³⁶

To meet the emissions reduction targets of EO 80, the CEP further recommends reducing emissions from the state’s electricity sector by 70% from 2005 levels by 2030 and achieving carbon neutrality by 2050. To do this, the state must develop policies to retire coal assets, spur innovation in clean energy development and deployment, and operationalize a number of energy efficiency and grid modernization measures.³⁷

1.5.1 Equity and Justice Provisions

Both the CEP and Resiliency Plan make recommendations to prioritize environmental justice and equity in climate adaptation and mitigation projects across the state.

Recommendation J of the CEP, “Foster a just transition to clean energy,” highlights the importance of including historically marginalized communities in energy decision-making processes, recommending that apprenticeship programs and dignified jobs be created for people in these communities and other workers who may be displaced by the energy transition.³⁸

Similarly, the Resiliency Plan has a large focus on climate and environmental justice, making equity recommendations to several state agencies. The plan directs issues of economic equity to the state Department of Commerce (DOC), recommending that they "set aside clear,

³⁵ Center for Climate and Energy Solutions. *US State Electricity Portfolio Standards*: <https://www.c2es.org/document/renewable-and-alternate-energy-portfolio-standards/>

³⁶ Executive Order 80: North Carolina’s commitment to address climate change and transition to a clean energy economy. 2018. files.nc.gov/ncdeq/climate-change/EO80--NC-s-Commitment-to-Address-Climate-Change--Transition-to-a-Clean-Energy-Economy.pdf

³⁷ NC DEQ (2019) North Carolina Clean Energy Plan: Transitioning to a 21st century electricity system https://files.nc.gov/governor/documents/files/NC_Clean_Energy_Plan_OCT_2019_.pdf

³⁸ *Ibid.*

numerical percentages for the number of newly established jobs/contracts/projects that should go to vulnerable communities..." and "Partner with the DOA [Department of Administration] Office of Historically Underutilized Businesses, NC Institute of Minority Economic Development and other entities to increase outreach efforts of bidding and contracting opportunities for marginalized communities."³⁹

These recommendations, in addition to the creation of the Department of Environmental Quality's (DEQ) Environmental Justice and Equity Board, indicate that North Carolina is prepared to approach the climate crisis from a justice and equity lens.

1.6 Offshore Wind (OSW)

1.6.1 National Landscape

A burgeoning industry in the United States, offshore wind has the potential to generate more than 2,000 gigawatts of renewable energy annually, nearly double the amount of electricity used in the US each year.⁴⁰ If fully developed along the east coast, the industry has the potential to create 83,000 jobs across 74 occupations by 2030.^{41 42} Currently, there are 14 projects in various stages of development from Massachusetts to North Carolina that will, together, deliver over 9,000 megawatts to the grid by 2026. States have, thus far, committed to procuring nearly 30,000 megawatts by 2035, enough to power over 10 million homes.^{43 44}

Since taking office, President Biden has made climate and clean energy advancement a priority of his administration. In March of 2021, the Biden Administration announced steps to ramp up domestic offshore wind and its associated economic benefits. The US Departments of Interior, Energy, and Commerce announced a collaborative effort to responsibly deploy 30,000 megawatts of offshore wind by 2030, which will spur \$12 billion in capital investments in coastal projects annually.⁴⁵ To meet this ambitious target, the Bureau of Ocean Energy

³⁹ NC DEQ (2020) North Carolina Climate Risk Assessment and Resiliency Plan. <https://files.nc.gov/ncdeq/climate-change/resilience-plan/2020-Climate-Risk-Assessment-and-Resilience-Plan.pdf>

⁴⁰ American Clean Power Association. *Offshore wind power facts*: <https://cleanpower.org/facts/offshore-wind/>

⁴¹ *Ibid.*

⁴² Gould, R. and Cresswell, E. (2017) New York State and the Jobs of Offshore Wind Energy. *Workforce Development Institute* [white paper] <https://wdiny.org/Services/Workforce-Development/Targeted-Sectors>

⁴³ American Clean Power Association *supra* note 36.

⁴⁴ The White House (2021) Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs: [Fact Sheet](#)

⁴⁵ *Ibid.*

Management (BOEM) will open up more “wind energy areas” for leasing, advance lease sales, and fast-track several Construction and Operations plans of offshore wind projects already in the works. These actions will stimulate investments along the offshore wind supply chain, including over \$500 million in upgrades to ports, a renewed demand for domestic steel, and multiple new factories to manufacture turbine components.⁴⁶ The Biden Administration estimates that these goals will lead to 110 gigawatts of offshore wind by 2050, which would generate over 100,000 jobs.⁴⁷

Building on these commitments, the Administration announced its American Jobs Plan, which aims to create millions of well-paying jobs through major infrastructure investments to both mitigate and adapt to climate change.⁴⁸ Additionally, in January 2021, President Biden’s “Executive Order 14008: Tackling the Climate Crisis at Home and Abroad,” established the Justice40 Initiative, which aims to allocate 40% of all federal climate investments to disadvantaged communities around the country.⁴⁹

1.6.2 North Carolina OSW Landscape

As of 2021, North Carolina has one offshore wind project in the works: Avangrid’s Kitty Hawk Offshore, which has the potential to produce 2,500 megawatts of clean energy and is expected to start delivering electricity in 2026.⁵⁰ This project is projected to generate 800 jobs and \$100 million in tax revenue between 2021 and 2030.⁵¹ Though Kitty Hawk is the first and only lease off of North Carolina to be approved by BOEM thus far, additional projects can be expected in the coming years as the industry gains momentum.

The state is already ramping up to take advantage of this massive opportunity for economic development, and the DOC has been leading the charge. Heeding the recommendations of the CEP, in October of 2020, North Carolina announced the Southeast and Mid-Atlantic Regional Transformative Partnership for Offshore Wind Energy Resources (SMART-POWER) with Maryland and Virginia to promote and expand offshore wind and its

⁴⁶ *Ibid.*

⁴⁷ *Ibid.*

⁴⁸ The White House (2021) American Jobs Plan: [Fact Sheet](#)

⁴⁹ Executive Order 14008: Tackling the Climate Crisis at Home and Abroad. (2021).

⁵⁰ Avangrid Renewables (n.d.) Kitty Hawk Offshore: www.kittyhawkoffshore.com

⁵¹ *Ibid.*

associated supply chain and workforce opportunities in the region.⁵² In March of 2021, the DOC published its first offshore wind supply chain and ports assessment, as recommended by the CEP, to identify local assets that can be leveraged to meet the needs of this growing industry. The report identified the state's strong manufacturing sector as an asset for serving the offshore wind supply chain for the entire east coast.⁵³ The report also identified two ports, in Morehead City and Wilmington, that the state could upgrade for offshore wind activities in the future.⁵⁴ DOC also created an offshore wind page on their website, which hosts a registration form for businesses who are interested in being added to the state's offshore wind supply chain database.⁵⁵

1.7 Objective

North Carolina's climate mitigation targets established by EO 80, and increasing interest in environmental justice and equity, provides an opportunity to identify how the emerging offshore wind industry can be leveraged to address the climate crisis while providing economic benefits for disadvantaged communities.

My research aims to inform decision makers of equitable development strategies surrounding offshore wind at a crucial moment in time. North Carolina was chosen as a focus area as the state's offshore wind industry is in its nascent stages. Northern states that are further along in offshore wind development are currently establishing policies and initiatives to maximize the benefits of the industry in their states with equity in mind. While North Carolina looks to stake its claim in offshore wind, there is much to be learned from initiatives rolling out in other states.

2. METHODS & RESULTS

⁵² DOC (2020) MOU among Maryland, North Carolina, and Virginia to create SMART-POWER: https://files.nc.gov/governor/documents/files/SMART-POWER-MOU_FINAL.pdf

⁵³ Blanch et. al. (2021) Building North Carolina's Offshore Wind Supply Chain: the roadmap for leveraging manufacturing and infrastructure advantages: <https://www.nccommerce.com/business/key-industries-north-carolina/energy/offshore-wind-industry>

⁵⁴ *Ibid.*

⁵⁵ DOC, OSW Supply Chain Registry Database: <https://www.nccommerce.com/business/key-industries-north-carolina/energy/offshore-wind-industry>

2.1 Project Outputs

Over the course of the year, this project took on many iterations, resulting in a multipronged approach with distinct deliverables. In completing this project, I produced a public engagement tool, conducted a workforce data analysis, and conducted a policy analysis across three states. The process for each deliverable is detailed in the following sections.

2.2 Creation of a Public Engagement Tool

In the summer of 2020, I created a public Story Map through ArcGIS Online. The Story Map, entitled “Offshore Wind in North Carolina: Opportunities for Energy Independence, Sustainability, and Economic Development,” offers a comprehensive overview of the ecological, economic, and policy considerations surrounding offshore wind, along with the State of North Carolina’s plans for development. It is hosted on the Southeastern Wind Coalition’s website (sewind.org), and, as of April 2021, has been viewed 1,491 times. This interactive tool is meant to be used by local NGOs, regulators, or developers to educate the public about the possibilities offshore wind holds for the state. The ecological data used in the Story Map is from the Marine-Life Data and Analysis Team (MDAT).⁵⁶

2.3 Workforce Data Analysis

2.3.1 Research Question

In order to recommend strategies that North Carolina can utilize to facilitate equitable outcomes through its burgeoning offshore wind industry, I started by investigating the following question:

- What is the current demographic breakdown of the offshore wind industry workforce and where are the greatest needs for improvement?

2.3.2 Data Sources and Methodology

A 2017 report by New York’s Workforce Development Institute (WDI) outlined 74 occupations, ranging from the trades to high-level management, that are expected to be created

⁵⁶ Curtice C., Cleary J., Shumchenia E., Halpin P.N. (2019) Marine-life Data and Analysis Team (MDAT) technical report on the methods and development of marine-life data to support regional ocean planning and management. seamap.env.duke.edu/models/MDAT/MDAT-Technical-Report.pdf

and/or utilized by the offshore wind industry.⁵⁷ These 74 occupations are widely cited in reports on offshore wind workforce development. The report provides education requirements and annual wages in New York State associated with each occupation, including the phase of development in which the jobs will be utilized (*Appendix 1*). For this study, the 74 occupations identified in the report were disaggregated by education requirement, gender, race/ethnicity, and wage, to reveal disparities in access to wealth-creating jobs and demographic differences between the current offshore wind industry and the overall US labor force. The Bureau of Labor Statistics' (BLS) Current Population Survey (CPS)⁵⁸ and Occupational Employment Statistics (OES)⁵⁹ were used to collect data on demographics and wages, respectively.

2.3.3 Results

First, occupations were summed by education requirements identified in the WDI report to determine the overall accessibility of jobs in offshore wind (*fig. 1*).

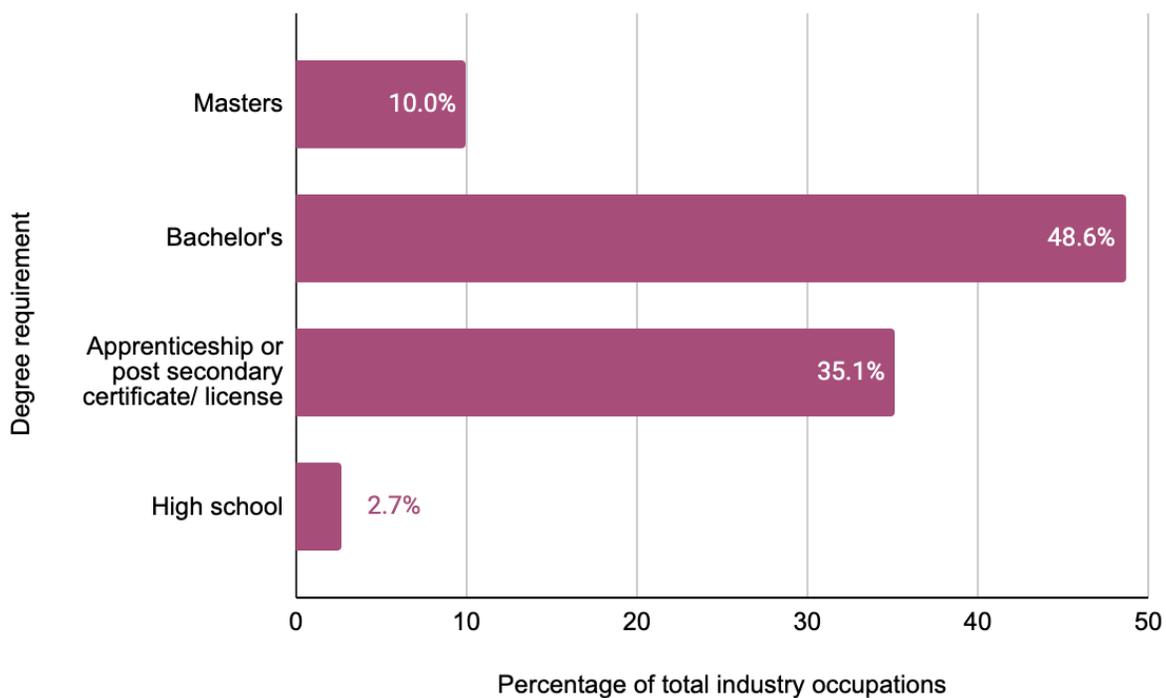


Fig. 1 Education requirements for offshore wind industry occupations

⁵⁷ Gould and Cresswell *supra* note 38.

⁵⁸ Bureau of Labor Statistics (2020) Current Population Statistics: <https://www.bls.gov/cps/demographics.htm>

⁵⁹ Bureau of Labor Statistics (2019) Occupational Employment Statistics: <https://www.bls.gov/oes/tables.htm>

Of the 74 occupations, 26 (35.1%) require an apprenticeship or post-secondary certificate, such as welders or ship and boat captains, while 36 (48.6%) require at least a bachelor's degree. Occupations requiring a master's degree made up only 10% of the total industry workforce, and were predominantly director and executive roles. Only two occupations (2.7%), bookkeepers and administrative staff, are considered accessible to those with high school degrees.

The 74 occupations of the WDI report were then compared to the BLS Current Population Survey (CPS),⁶⁰ which provides current gender, race, and ethnic breakdowns of detailed occupations nationally. If occupation names in the WDI report didn't exactly match occupation names of the CPS, occupations were consolidated, or closest estimates were used. For example, the WDI report divided electricians into "indoor" and "outdoor" electricians; however, BLS reports electricians as a single category. As such, the two electrician categories in the WDI report became one category for the purposes of this study, and BLS demographic data associated with the "electricians" category were used. Following this methodology, the 74 occupations of the WDI report were consolidated into 62 occupations under BLS terminology (*Appendix 2*).

Of these 62 occupations, 44 had demographic data available in the CPS. The demographic data from these 44 occupations were used to describe the gender, race, and wage breakdowns of the offshore wind industry. The gender breakdown of occupations in the offshore wind industry was compared to the gender breakdown of the national labor force (*fig. 2*).

⁶⁰ Bureau of Labor Statistics *supra* note 53.



Fig. 2 Gender breakdown of the offshore wind industry compared to the national labor force, CPS

Women make up 33.9% of the offshore wind workforce, compared to 47% of the national labor force, a difference of 13.1%.

The race/ethnicity breakdown of offshore wind occupations was then compared to that of the national labor force (*fig. 3*). The comparison reveals that white and Asian populations are overrepresented in offshore wind occupations, while Black and Hispanic/Latinx populations are underrepresented, compared to the national labor force. Black workers experience the greatest disparity between offshore wind and national labor force representation (a 4.5% difference), while Hispanic/Latinx workers experience a disparity of 2.7%.

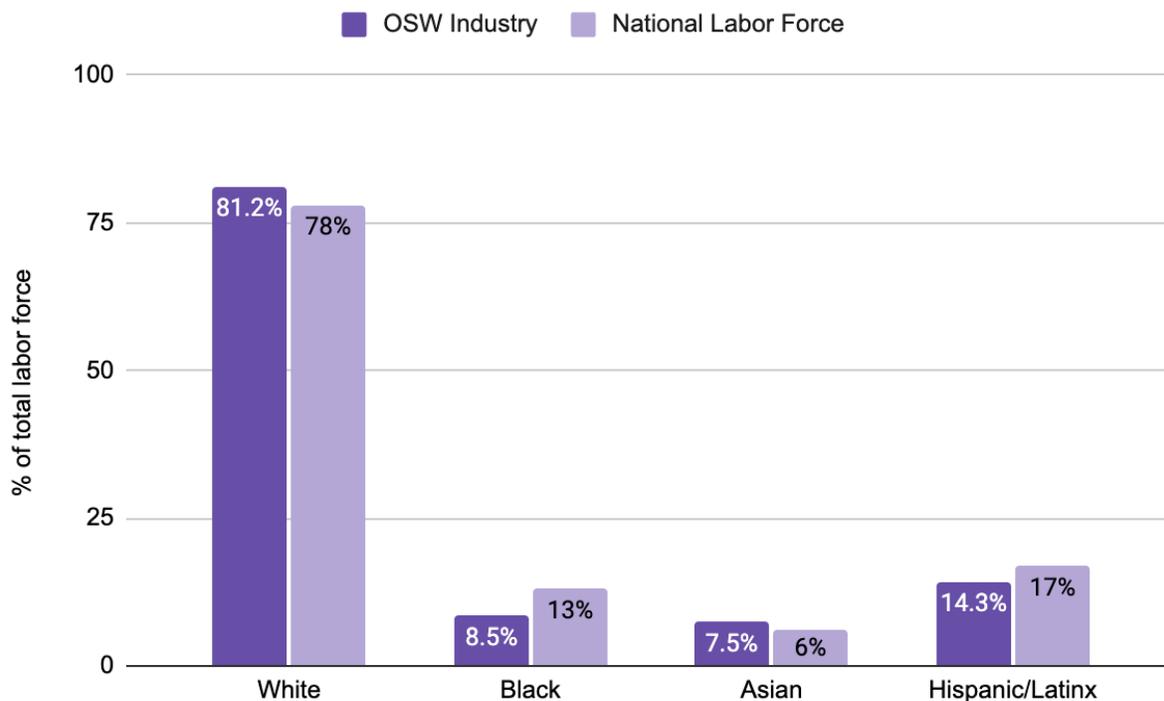


Fig. 3 Race/ethnicity breakdown of the offshore wind industry compared to the national labor force

However, when occupations are broken down by race/ethnicity and wage, a clearer picture emerges. The 10-highest and 10-lowest paying occupations for which there were available demographic data (*Appendix 3*) were combined and the demographic data were averaged for each category (*fig. 4*). Comparing the demographic data of the highest and lowest paying occupations reveals large disparities in access to wealth-creating jobs for Black and Hispanic/Latinx workers, whose representation in the lowest-paying jobs is approximately double that of the highest paying jobs.

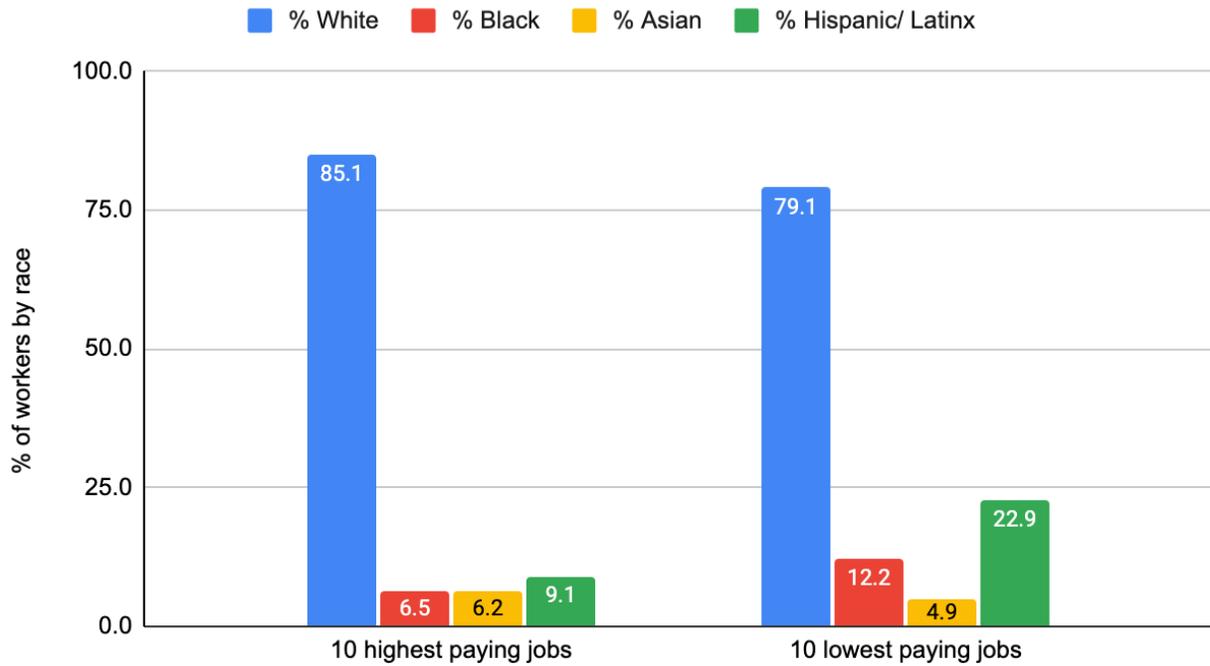


Fig. 4 Race/ethnicity breakdown of the 10-highest and 10-lowest paying occupations in the offshore wind industry

Finally, the average annual wages of the 10-highest and 10-lowest paying occupations were calculated based on BLS Occupational Employment Statistics (OES) data from May 2019, revealing that the annual salary of the highest paying occupations more than triples that of the lowest paying occupations within the industry (*fig. 5*).

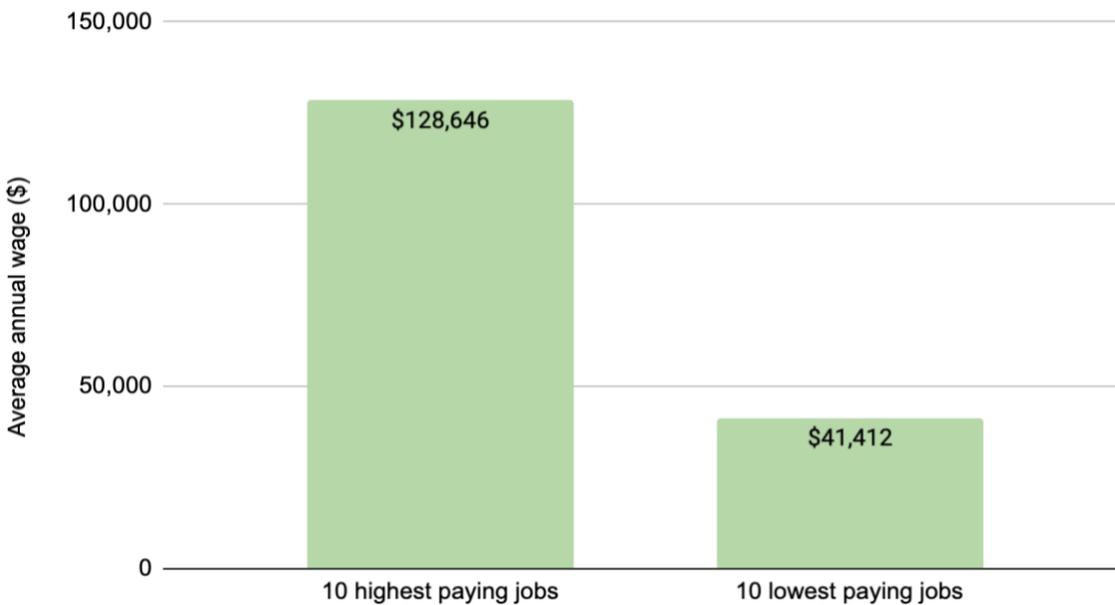


Fig. 5 Average annual salaries of the 10-highest and 10-lowest paying occupations in the OSW industry

2.3.4 Summary of Data Analysis

Results show that, overall, the offshore wind workforce is predominantly white and male compared to the national workforce. These findings are consistent with a 2019 Clean Energy Jobs report by the Brookings Institution that found that, “the clean energy economy workforce is older, dominated by male workers, and lacks racial diversity when compared to all occupations nationally.”⁶¹ According to Brookings, this lack of diversity “results in real economic consequences for the country’s households.”⁶² In terms of education requirements, offshore wind occupations reflect the broader clean energy economy in that many jobs do not require a four year degree (*fig. 1*). But despite this lower barrier-to-entry, the industry still falls short of national standards for labor market inclusion.⁶³ Additionally, the fact that representation of Black and Hispanic/Latinx populations in the lowest paying jobs is double that of the highest paying jobs (*fig. 4*), reflects systemic barriers in access to higher education and training opportunities.

2.4 Policy Analysis

2.4.1 Research Question

Given the disparities revealed in the workforce data analysis, I conducted an analysis of policies and initiatives across three states to answer my second research question:

- What strategies are other states employing to integrate equity considerations into their offshore wind plans?

2.4.2 Methodology

I reviewed state laws, policies, press releases, and offshore wind solicitations from New York, New Jersey, and Maryland, categorizing state actions as “top down,” such as laws and mandates, or “bottom up,” such as investments or programs to build local capacity for the offshore wind industry. Using an inductive approach, I chose to evaluate state actions on the following five criteria: (1) Commitments to DACs are codified in state law; (2) State has established engagement targets for minority and women-owned businesses (MWBEs); (3) Solicitations for offshore wind project bids require equity commitments from developers; (4)

⁶¹ Muro et. al. (2019) Advancing Inclusion Through Clean Energy Jobs. Brookings Institution [white paper] www.brookings.edu/wp-content/uploads/2019/04/2019.04_metro_Clean-Energy-Jobs_Report_Muro-Tomer-Shivaran-Kane.pdf

⁶² *Ibid.*

⁶³ *Ibid.*

Public investments in offshore wind education and training programs target DACs; (5) Public investments in infrastructure and supply chain assets prioritize DACs. The findings are summarized in a policy analysis matrix and evaluated on a red, yellow, or green scale: red meaning the state does not meet the criteria, yellow meaning the state partially meets the criteria, and green meaning the state meets or exceeds the criteria.

2.4.3 Results

Table 1. Analysis of equitable development policies and initiatives for offshore wind in three states

		New York	New Jersey	Maryland
Top-down Approaches <i>State laws, mandates</i>	Commitments to DACs are codified in state law	2019 Climate Leadership and Community Protection Act (CLCPA) commits to allocating 35% of all clean energy and climate investments to DACs	2020 Regional Greenhouse Gas Initiative Strategic Funding Plan established priorities for allocating state profits from the RGGI to EJ and low-income communities	2019 Clean Energy Jobs Act (CEJA) and 2013 OSW Energy Act (OWEA) statutorily require clean energy and OSW projects target DACs and MWBEs. <i>Investment target was introduced (HB 1206) in legislation in 2020 but died in committee</i>
	Established engagement targets for MWBEs	Statewide “set-aside mandate” for MWBE contracts: 30% NYSERDA requires their contractors to “document good faith efforts” to engage MWBEs as subcontractors and suppliers in awarded projects to meet the 30% state goal.	Statewide “set-aside mandate” for SBE contracts: 25% Although the state has a set-aside mandate for small businesses, there is no requirement that SBEs be minority or women owned. The state is not required to give special consideration to MWBE status in contracting.	Statewide MWBE target: 29% OWEA requires developers to meet the state MWBE target in OSW projects. Developers must work with the Governor’s Office of Minority Affairs (GOMA) to devise a plan for MWBE engagement for each project phase and report on their efforts. CEJA established funding specifically for MWBEs to enter the clean energy and OSW industries.
	OSW bid solicitations require equity commitments from developers	2020 Solicitation required developers to submit a community engagement plan, detailing benefits to DACs through job creation or environmental projects. The plan must also detail alignment with the CLCPA target.	2020 Solicitation required developers to submit a spending plan for jobs, training, or environmental projects in EJ communities, plus a diversity and inclusion plan for training and hiring.	Developers must show alignment with the equity requirements of the OWEA and CEJA in their bid proposals. CEJA additionally requires developers to provide Community Benefits Agreements.

Bottom-up Approaches <i>Capacity building efforts</i>	Public investments in OSW education and training programs target DACs	<p>\$20 million invested in Offshore Wind Training Institute (OWTI), a partnership between NYSERDA and SUNY, to train 2,500 local workers. \$3 million allocated for training organizations in DACs.</p> <p>NYSERDA is developing an OSW Youth Action Program (OWYA) to educate young people about forthcoming opportunities in OSW.</p>	<p>WIND Institute established in 2021 by NJEDA to coordinate OSW education and training in the state, focusing on equitable access to opportunities for women and minority workers.</p> <p>NJBPU's Clean Energy Program invested \$3 million to establish a GWO training center, partnering with NJEDA and OSHE, and \$4.5 million to NJEDA's OSW workforce development projects</p>	<p>Since 2018, MEA's OSW Workforce Training Program has provided grants for workforce development efforts. \$1.2 million allocated for FY 2021, prioritizing emerging and minority businesses that target DACs for training.</p>
	Public investments in infrastructure and supply chain assets prioritize DACs	<p>\$644 million public-private investment in five state ports, focusing on South Brooklyn Marine Terminal, which will be used for staging and O&M, and the Port of Albany, which will be upgraded to manufacture wind towers</p> <p>Both SBMT and Port of Albany are located within DACs and jobs will be directed to those communities.</p>	<p>\$250 million public-private investment to upgrade the Port of Paulsboro as a monopile manufacturing facility</p> <p>\$300-\$400 million public investment to construct the NJ Wind Port in Salem, NJ, which is considered an overburdened, low-income community of color by the state EJ Law terms.</p>	<p>\$200 million+ public-private investment to upgrade Baltimore's Tradeport Atlantic Port, revitalizing a former thriving manufacturing site.</p> <p>Since 2018, MEA's OSW Capital Expenditure Program has provided grants explicitly for emerging and minority businesses to enter the OSW supply chain. \$1.6 million allocated for FY 2021.</p>

2.4.4 Summary of Policy Analysis

New York, New Jersey, and Maryland have all taken intentional steps to promote equity within their offshore wind development processes. These states demonstrate different approaches to facilitate equitable development, through laws, policies, developer requirements, and investments in local workforce and supply chain assets. While all three states have made public commitments to prioritizing DACs in their climate and clean energy initiatives, only New York has an explicit investment percentage set aside for DACs established by their Climate Leadership and Community Protection Act (CLCPA). New Jersey's 2020 Regional Greenhouse Gas Initiative (RGGI) Strategic Funding Plan claims that the state will use profits from the RGGI to deploy clean energy assets and create high quality jobs for people in low-income areas and environmental justice communities.⁶⁴ In Maryland, the Clean Energy Jobs Act (CEJA) and Offshore Wind Energy Act (OWEA) both establish requirements for DAC and MWBE engagement. In March 2020, state legislation was introduced to establish a state DAC investment target for Maryland, but the bill (HB 1206) died in committee.⁶⁵

While each state has established either a set-aside mandate or statewide target for small, minority, or women-owned businesses, only New York and Maryland have explicit goals for MWBEs. New Jersey's set-aside for small businesses (SBEs) does not consider race or gender status. New York and Maryland regulators require offshore wind developers maintain the state MWBE target, devise a plan as to how they will do so, and report on their progress toward those targets throughout the development process.

Additionally, all three states have language within their most recent solicitations that require developers to make equity commitments in order to be awarded a project bid. New York and Maryland rely on their state laws to pressure developers into providing benefits for DACs and MWBEs, giving these solicitation requirements more enforceable "teeth." New Jersey's solicitation requires developers to submit a diversity and inclusion plan and detail their benefits to EJ communities, but these requirements are not backed by a state law or mandate.

Lastly, all three states are actively pursuing offshore wind capacity building efforts by investing in supply chain, education, and workforce development activities. Each state has

⁶⁴ NJEDA, NJBPU, NJDEP (2021) Regional Greenhouse Gas Initiative Strategic Funding Plan: <https://www.nj.gov/rggi/docs/rggi-strategic-funding-plan.pdf>

⁶⁵ Clean Energy and Energy Efficiency- Investment in Disadvantaged Communities, Md. Code Ann. HB 1206 (2020). <http://mgaleg.maryland.gov/mgawebsite/Legislation/Details/HB1206?ys=2020RS>

established workforce training programs that intend to target DACs for workforce opportunities. Aligned with CEJA’s requirements, the Maryland Energy Administration has established specific funding streams to encourage MWBEs to enter the offshore wind supply chain.⁶⁶

Each state has also made large investments in upgrading local ports and manufacturing facilities—matching private dollars—to ensure they receive the economic benefits of the industry. Each state is investing in at least one facility located in a DAC. The New York State Energy Research and Development Authority (NYSERDA) is the first agency to establish an “Offshore Wind Youth Action” program, geared toward middle and high school students, to encourage the next generation to participate in offshore wind.⁶⁷

3. DISCUSSION

By identifying existing gender and racial disparities in offshore wind-related occupations, along with strategies states are using to address those disparities and facilitate an inclusive industry, I sought to identify best practices of equitable development that are emerging as the industry evolves. States from Massachusetts to Virginia have committed to just transitions and are beginning to think strategically about what this means for offshore wind development. New York, New Jersey, and Maryland set prime examples for other states to consider. However, because the industry is just getting off the ground, the results of these policies and programs have yet to be seen. Therefore, it is crucial that future research is done to measure the effectiveness of these policies and programs once they are underway to ensure that equity commitments are being upheld. This is sure to be an iterative process, in which some strategies will prove to be more effective than others. Research that measures MWBE participation rates within the offshore wind supply chain and DAC participation within the workforce should be conducted regularly as the industry proliferates.

3.1 North Carolina Context

There are several context-specific limitations that make North Carolina unique from its northern counterparts. First, and importantly, North Carolina has yet to establish a statewide

⁶⁶ Clean Energy Jobs Act, Md. Code Ann. SB 516 (2019). <https://www.billtrack50.com/BillDetail/1053128>

⁶⁷ NYSERDA. Offshore Wind Youth Action Program: <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/Connecting-With-New-Yorkers/Offshore-Wind-Youth-Action-Program>

procurement target for offshore wind energy. New York has committed to procuring 9,000 megawatts of offshore wind by 2035, New Jersey has committed to 7,500 megawatts by 2035, and Maryland 1,500 megawatts by 2030. Establishing procurement targets stimulates offshore wind economic activity. The DOC Supply Chain report recommends that the state establish such a target to accelerate local offshore wind project development.⁶⁸

Also distinct is the fact that North Carolina, unlike states to the north, has no large population centers along its coast, posing extra challenges in transmitting electricity generated far offshore to regions with the highest demand. Additionally, the Kitty Hawk project will connect to the grid in Virginia and be serviced out of the Port of Virginia in Norfolk. While workers in northeastern North Carolina may still have access to workforce opportunities in the Norfolk area, it is likely that initially, most offshore wind-related jobs will be dispersed throughout North Carolina in different manufacturing sectors.⁶⁹ Recently, Southwire, a cable manufacturer in Huntersville, NC, was contracted to design, manufacture, and install onshore cables for the Vineyard Wind project in Massachusetts, representing the opportunity North Carolina's manufacturing sector has in providing materials to the offshore wind supply chain for the entire east coast.⁷⁰ When more lease areas are approved off of North Carolina's coast and a procurement target is set, there will likely be greater opportunity for maritime-based occupations and large infrastructure upgrades at select ports. But the state is years away from that phase of development. In the meantime, equitable development practices should be integrated at the state level through policy mandates, but also at the local level, surrounding the expansion or new development of supply chain assets.

4. RECOMMENDATIONS

Considering best practices of equitable development, the unique challenges facing North Carolina, and the many strategies other states are employing to equitably roll out their offshore wind industries, I've proposed the following recommendations for the state of North Carolina. Recommendations are high-level, as the industry is still in its nascency, but are intended to offer

⁶⁸ Blanch *supra* note 51.

⁶⁹ *Ibid.*

⁷⁰ Southwire (2021) Vineyard Wind Announces Southwire as Key Supplies for Nation's First Commercial Scale Offshore Wind Project: <https://www.southwire.com/blogs/vineyard-wind>

decision makers strategies to consider for future development. These recommendations are directed to the state agencies that have the most decision-making authority over each task. Additionally, I have attempted to recommend strategies that are supported by best practices of equitable development, reflective of policies elsewhere, and that build upon existing programs and initiatives.

4.1 Craft state policies and initiatives related to offshore wind based on the disaggregated data of workforce demographics in the state.

As noted by the Government Alliance on Race & Equity, equitable development practices are rooted in an understanding of existing disparities.⁷¹ Thus, state regulators and policy makers must pay attention to the disaggregated data on workforce demographics to ensure that opportunities created by offshore wind development are accessible to all—especially those from DACs. As mandated by EO 80, in 2019 the DOC published a Clean Energy and Clean Transportation Workforce Assessment, which identified that the state’s clean energy workforce was slightly older, less educated, and predominantly male—but similar in race/ethnicity—compared to the total workforce.⁷² Further studies within the state should be conducted specifically pertaining to offshore wind-related sectors, and further analysis should be done to identify racial disparities in access to well-paying jobs. Local-level policies and initiatives surrounding the expansion or development of specific supply chain assets should be guided by this disaggregated workforce data to adequately address racial disparities in access to new, offshore wind-related jobs.

4.2 Establish a “disadvantaged communities” investment mandate for climate and clean energy-related projects.

Building upon the Resiliency Plan’s recommendation that the DOC create set-aside targets for the amount of new jobs and contracts that are awarded to vulnerable communities and historically underutilized businesses (HUBs), the state should establish a disadvantaged communities investment mandate following the example of New York’s CLCPA and the Biden Administration’s Justice40 Initiative.

⁷¹ Curren *supra* note 20.

⁷² NC DOC (2019) Clean Energy and Clean Transportation Workforce Assessment: <https://www.nccommerce.com/documents/report-clean-energy-and-clean-transportation-north-carolina-workforce-assessment>

The Resiliency Plan does not explicitly state that jobs and contracts awarded to vulnerable communities should be climate-related; however, with EO 80's mandates, and the expected growth of offshore wind and other renewables, North Carolina will likely see an influx of activity in clean energy and offshore wind-related industries in the next decade. As such, the state should have an investment mandate in place to ensure that DACs are prioritized in the growing clean economy.

In order to meet this recommendation, DOC's Labor and Economic Analysis Division (LEAD), which conducts research on state demographics and economic activity, should first identify the appropriate percentage of new climate and clean energy investments that should go toward disadvantaged communities, following the methods employed in the creation of New York's CLCPA. While DOC does not necessarily have the authority to codify such a mandate into law, the LEAD has the resources and expertise to establish an appropriate percentage that can be used in future state legislation.

4.3 In future bid solicitations for offshore wind projects, require developers to include commitments to MWBEs and DACs.

In future offshore wind solicitations, North Carolina regulators should require developers to provide plans that detail their commitments to DACs or MWBEs throughout the development process, following the examples of New York, New Jersey, and Maryland. Developers can meet such requirements through a variety of strategies including direct hiring from DACs, contracting with MWBEs for supply chain and service needs, or establishing Community Benefits Agreements that directly support DACs. Community Benefits Agreements can also enable communities that don't have direct access to workforce opportunities to still reap benefits from offshore wind.⁷³ Requiring developers to make these commitments in order to be awarded offshore wind projects would help to operationalize the equity goals set forth by the CEP and Resiliency Plan and would signal to the industry that North Carolina—like its northern counterparts—is serious about prioritizing a just transition. Additionally, following the example of other states, regulators should require developers to regularly—and publicly—report on progress toward their equity commitments.

⁷³ Tyler, J.G., (2020) Offshore Wind and Community Benefits in Kitty Hawk, NC. *University of Rhode Island Digital Commons*.

4.4 Engage underrepresented populations in workforce opportunities through the state’s 23 workforce development boards and 58 community colleges.

Since initial offshore wind-related economic activity is likely to be along the supply chain, the state should leverage its existing workforce development infrastructure to promote these opportunities.⁷⁴ Given the gender and racial disparities within the clean energy and offshore wind industries, workforce programs should specifically target engagement of underrepresented populations. North Carolina’s robust community college system, which administers the ApprenticeshipNC program, can be leveraged to prepare workers for opportunities in the trades, manufacturing, or energy industries.

Interest in apprenticeships is already growing in the state. In the 2019-2020 fiscal year, ApprenticeshipNC served 37% more participants than the previous fiscal year.⁷⁵ 13% of these registered apprentices participated in advanced manufacturing apprenticeships, 18% participated in construction apprenticeships, and 14% participated in energy apprenticeships.⁷⁶ These fields will continue to see increasing opportunities throughout the clean energy transition. As such, community colleges and workforce development boards should bolster outreach and engagement efforts in DACs. ApprenticeshipNC is already taking steps to engage populations that have been historically underrepresented in apprenticeship opportunities, such as partnering with Black churches and hosting conversations with employers about successfully engaging with workers of color, women, immigrants, and workers with disabilities.⁷⁷ These efforts are a good start and should be expanded upon as more opportunities in clean energy-related industries open up.

4.5 Encourage MWBE participation in the offshore wind industry by streamlining the HUB/DBE certification process and building stronger relationships between DOC, DOA’s Office of Historically Underutilized Businesses, The Institute of Minority Economic Development, and the Carolina Small Business Development Fund.

Also in line with the Resiliency Plan’s recommendation, the DOC and other state entities who become involved in offshore wind should develop stronger partnerships with the DOA’s Office of Historically Underutilized Businesses (HUB Office), the Institute of Minority

⁷⁴ Blanch *supra* note 50.

⁷⁵ North Carolina Community College System (2020) *ApprenticeshipNC 2019-2020 Annual Report*. https://www.apprenticeshipnc.com/sites/default/files/news-files/annual_report_2019-2020_final_8-24-2020.pdf

⁷⁶ *Ibid.*

⁷⁷ Castellones, Kathryn (Director of ApprenticeshipNC) in discussion with Janie McDermott MPP, October 2020.

Economic Development (The Institute), and the Carolina Small Business Development Fund (CSBDF). DOC's offshore wind supply chain registry currently includes space for vendors to identify themselves as MBE, WBE, SDBE, SDVOBE, or VOSB certified.⁷⁸ Participation of these business enterprises is key to building wealth in underrepresented populations; however, the state has long faced disparities in the number of eligible businesses who pursue certifications.

Since 2006, North Carolina has had a goal of 10% of all state contracts going toward minority-owned businesses (certified as HUBs through HUB Office or as DBEs through NC DOT), but the state has continuously fallen short of that goal.⁷⁹ ⁸⁰ According to a disparity study conducted by the NC DOT in 2014, only 1.9% of eligible businesses within the state are certified as HUBs or DBEs, and minority-owned businesses only received 2.4% of all state contract dollars within the study period—well below the 10% goal.⁸¹ ⁸² With an economy-wide clean energy transition underway, and the arrival of a massive industry like offshore wind, the state has a unique opportunity to work toward its established 10% goal. As North Carolina anticipates an influx of manufacturing opportunities to support the offshore wind supply chain, DOC and HUB Office should collaborate to ensure that minority and women business owners are aware of forthcoming supply chain opportunities, understand the HUB/ DBE certification process, and have the resources to build capacity to enter the offshore wind supply chain.

In January of 2020, Governor Cooper enacted EO 143: Addressing the Disproportionate Impact of COVID-19 on Communities of Color, which included efforts to address economic disparities resulting from the disproportionate impact of the pandemic. The order called for the HUB Office to streamline its certification process to increase the number of eligible businesses who could receive pandemic recovery funding specifically allocated to HUBs/DBEs. Across states, MWBEs, DBEs, and SBEs often face barriers to certification due to arduous administrative processes and lack of information.⁸³ The HUB Office should continue to

⁷⁸ DOC, OSW Supply Chain Registry Database: <https://www.nccommerce.com/business/key-industries-north-carolina/energy/offshore-wind-industry>

⁷⁹ Executive Order 106: Historically Underutilized Businesses (2006)
<https://digital.ncdcr.gov/digital/collection/p16062coll5/id/295/rec/1>

⁸⁰ NC Justice Center (n.d.) Ahead NC Toolkits: HUB Certification [white paper]
http://aheadnc.org/uploads/1/1/8/3/118308969/equitable_development_toolkit_-_hub_draft_1.pdf

⁸¹ NCDOT (2014) Disparity Study: <https://www.ncdot.gov/about-us/board-offices/offices/civil-rights/Documents/2014-disparity-study.pdf>

⁸² NC Justice Center *supra* note 69.

⁸³ City & State NY (2020) Despite Progress, MWBEs say challenges remain:
<https://www.cityandstateny.com/articles/policy/diversity/despite-progress-mwbes-say-challenges-remain.html>

streamline its certification process after the pandemic and continue to work with The Institute and CSBDF to increase education and outreach to firms across North Carolina, especially regarding opportunities in the clean economy.

4.6 Build a coalition of offshore wind advocates by leveraging local environmental, environmental justice, and clean energy organizations for outreach and partnerships.

In other states, labor groups, environmental justice organizations, clean energy advocacy groups, and even faith communities have formed coalitions to advocate for offshore wind development, citing the economic, environmental, and public health benefits the industry will bring.⁸⁴ A coalition of advocates will help shape equitable policy and ignite economic activity within the state. The DEQ's Environmental Justice and Equity Board already has relationships with a number of these groups and leaders within North Carolina. The Board should build upon these relationships and lean on these groups, who are tied to local communities, to share information regarding offshore wind development and the opportunities it will bring.

The state should provide structural support for these groups to act as advisors as policies and initiatives are developed. For example, NYSERDA hosts several offshore wind technical working groups that bring leaders together from across the state to advise the agency on best practices related to development and engagement at the local level. Creating an advisory board gives local leaders and those from DACs a seat at the decision-making table, helping to build relationships and trust between government agencies and local communities.⁸⁵ Enabling people from impacted communities to guide policy development is crucial to an equitable and transparent process, and is likely to result in more equitable outcomes. This process requires intention, time, and sustained effort from all parties to work toward common goals.⁸⁶ A list of relevant organizations in North Carolina can be found in Appendix 4.

4.7 Raise awareness about opportunities in the clean economy by creating K-12 curricula and educator networks through the NC DEQ Office of Environmental Education.

Clean energy education is crucial to ensuring that young people are aware of—and have

⁸⁴ New York Renews: <https://www.nyrenews.org/>

⁸⁵ Zhao, Alicia; Cornish, Kyle; & Gonsenhauser, Rachel (2020). *Environmental Justice Analysis of Post-Hurricane Funding and Planning*. Master's project, Duke University. Retrieved from <https://hdl.handle.net/10161/20481>

⁸⁶ *Ibid.*

access to—opportunities of the future. Given the potential the clean economy holds for the next decade and beyond, education departments around the country should work to integrate clean energy learning into public school curricula so it is available to all young people. Following NYSERDA’s lead, The DEQ’s Office of Environmental Education (OEE) should coordinate educator networks to develop curricula on clean energy and offshore wind. The OEE serves as a repository for national and state environmental education resources. They host a database of environmental curricula, information on in-state environmental education centers, and run professional development training programs for teachers across the state. The OEE has partnerships with regional environmental education networks, including Environmental Educators of North Carolina, the NC Association of Environmental Education Centers, and the Southeast Environmental Education Alliance. The OEE also hosts public events and webinars in collaboration with museums and environmental groups around the state. With their widespread professional networks and expertise in environmental education, the OEE is well-poised to coordinate efforts to create clean energy and offshore wind curricula, events, and professional development programs. Special consideration should be given to integrating such curricula into state education standards so that it is accessible to all students.

5. CONCLUSIONS

Combating both the climate crisis and the inequality crisis has been, and will be, a continual process. A just clean energy transition is only one of many tools available to facilitate this crucial work. A just transition comes to life on the ground: in local communities, through individual training programs, and through the relentless work of advocates. It is actualized through each development project that intentionally prioritizes economic, social, and environmental justice.

Dr. Ayana Elizabeth Johnson defines “ocean justice” as the place where ocean conservation and social justice intersect. Through meaningful engagement of disadvantaged communities, integration of frontline leaders into decision making spaces, strategic investments in local assets, and policies that hold developers accountable, the emerging US offshore wind industry can be a catalyst for change—for our planet and for our communities.

6. APPENDICES

Appendix 1: Offshore Wind Occupations from the 2017 WDI Report (Gould & Cresswell).

MATRIX OF OFFSHORE WIND ENERGY JOBS BY PHASE

FUNCTIONAL AREA	OCCUPATION	MINIMUM / COMMON CREDENTIALS	ESTIMATED ANNUAL NYS WAGES	P&D	MFG	C&I	O&M	T,R&C
Accounting, Finance & Procurement	Accountant	Bachelor's Degree	\$91,630	*	*	*	*	*
	Bookkeeper	High school diploma or equivalent	\$42,740	*	*	*	*	*
	Buyer	Bachelor's Degree	\$67,890	*				
	Insurer and Underwriter	Bachelor's Degree	\$78,610	*	*	*		
	Power Marketer and Analyst	Bachelor's Degree	\$77,280	*	*	*	*	
Admin, Clerical & Back Office	Admin and Clerical Staff	High school diploma or equivalent	\$31,220 - \$52,490	*	*	*	*	*
	Human Resources Professional	Bachelor's Degree	\$72,380	*	*	*	*	*
	Information Technology Specialists	Bachelor's Degree	\$40,530 - \$111,170	*	*	*	*	*
	Public relations officer	Bachelor's Degree	\$158,100	*	*	*	*	*
Construction & Assembly Workers	Assemblers of Electrical and Electromechanical Equipment	Apprenticeship or post-secondary certificate / license	\$32,850 - \$37,110		*	*		
	Construction Laborer	Apprenticeship or post-secondary certificate / license	\$36,400 - \$47,370			*	*	
	Laborers and Freight, Stock, and Material Movers, Hand	Apprenticeship or post-secondary certificate / license	\$30,040		*	*	*	
Consultants & Researchers	Health and Safety Specialist	Apprenticeship or post-secondary certificate / license	\$71,910	*	*	*	*	*
	Operations Research Analyst	Bachelor's Degree	\$101,540				*	*
Development Technical Specialists	Regulatory & Permitting Expert	Bachelor's Degree	\$110,100	*				
Directors and Executives	Director of Business Development	Master's Degree or higher	\$186,940	*		*		
	Director of Finance	Master's Degree or higher	\$162,210	*	*	*	*	
	Director of Health, Safety, and Risk	Master's Degree or higher	\$55,420 - \$71,910	*	*	*	*	
	Director of Procurement	Master's Degree or higher	\$129,030	*	*	*	*	
	Director of Sales	Master's Degree or higher	\$183,610	*	*			
Engineers	Aerospace / Aeronautical Engineer	Bachelor's Degree	\$113,080		*			*
	Civil Engineer	Bachelor's Degree	\$91,110	*		*		*
	Composite Materials Engineer	Bachelor's Degree	\$87,930		*			*
	Control systems Engineer	Bachelor's Degree	\$55,490		*			
	Design Engineer	Bachelor's Degree	\$81,010	*	*			*
	Electrical Engineer	Bachelor's Degree	\$98,430	*	*	*	*	*
	Environmental Engineer	Bachelor's Degree	\$90,220		*			*
	Geotechnical, GIS, and geophysical engineer	Bachelor's Degree	\$51,590 - \$91,370	*	*			*
	Industrial Engineer	Bachelor's Degree	\$85,460		*			*
	Marine Engineer	Bachelor's Degree	\$91,660	*	*	*		*
	Mechanical Engineer	Bachelor's Degree	\$85,840	*	*	*	*	*
	Sales Engineer	Bachelor's Degree	\$107,010		*			
	Test Engineer	Bachelor's Degree	\$95,550	*	*	*		*
	Wind Energy Engineer	Bachelor's Degree		*	*	*	*	*
Legal	Attorneys	Law Degree	\$155,050	*	*	*	*	*
	Paralegal	Bachelor's Degree	\$57,920	*	*	*	*	*
Management and Supervisors	Commercial Site Manager	Apprenticeship or post-secondary certificate / license	\$79,460				*	
	Construction Project Manager	Apprenticeship or post-secondary certificate / license	\$114,330			*		
	Engineering Manager / Chief Engineer	Master's Degree or higher	\$151,740	*	*		*	
	Production Supervisor / Manager	Bachelor's Degree	\$64,520		*		*	
	Quality Manager	Master's Degree or higher	\$120,390		*	*		
	Site / Plant Manager or Operations Manager	Bachelor's Degree	\$79,460		*	*	*	
	Wind Project Manager	Bachelor's Degree	\$110,100				*	

KEY TO PHASE ABBREVIATIONS: **P&D**=Planning & Development; **MFG**=Manufacturing; **C&I**=Construction & Installation; **T,R&C**=Training, Research & Consulting.

MATRIX OF OFFSHORE WIND ENERGY JOBS BY PHASE

FUNCTIONAL AREA	OCCUPATION	MINIMUM / COMMON CREDENTIALS	ESTIMATED ANNUAL NYS WAGES	P&D	MFG	C&I	O&M	T,R&C
Maritime, Port & Terminal Professions	Divers	Apprenticeship or post-secondary certificate / license	\$84,940	*		*	*	*
	Stevadore / Longshoreman	Apprenticeship or post-secondary certificate / license	\$30,040 - \$46,530			*	*	
Scientists	Archaeologist	Bachelor's Degree	\$82,580	*				*
	Ecologist	Bachelor's Degree	\$70,640	*				*
	Environmental Scientists	Bachelor's Degree	\$75,780 - \$96,010	*				*
	Geoscientist / Geologist & Hydrologist	Bachelor's Degree	\$78,320 - \$87,030	*				*
	Marine & Wildlife Biologist	Bachelor's Degree	\$65,870 - \$77,430	*				*
Meteorologist	Bachelor's Degree	\$83,400	*		*		*	
Technicians	CAD Specialist / Technician	Bachelor's Degree	\$44,650 - \$70,630	*	*			
	Environmental Science Technician	Bachelor's Degree	\$48,560	*			*	
	Wind Turbine Technician	Apprenticeship or post-secondary certificate / license	\$53,000 (based on national data)				*	
Trade Workers	Cement Worker / Concrete Operative	Apprenticeship or post-secondary certificate / license	\$60,810			*	*	
	CNC Operator	Apprenticeship or post-secondary certificate / license	\$46,330		*			
	Crane Operator	Apprenticeship or post-secondary certificate / license	\$78,870			*	*	*
	Electrician: Inside	Apprenticeship or post-secondary certificate / license	\$72,540			*	*	
	Electrician: Outside	Apprenticeship or post-secondary certificate / license	\$77,070			*	*	
	Ironworker / Steelworker	Apprenticeship or post-secondary certificate / license	\$84,750			*	*	
	Machinists	Apprenticeship or post-secondary certificate / license	\$43,560		*			
	Operating Engineer	Apprenticeship or post-secondary certificate / license	\$72,610			*		
	Rigger	Apprenticeship or post-secondary certificate / license	\$45,870 - \$58,060			*	*	
	Rodbuster	Apprenticeship or post-secondary certificate / license	\$96,210			*	*	
	Welder	Apprenticeship or post-secondary certificate / license	\$43,310		*	*	*	
Trainers, Teachers & Professors	Professor	Master's Degree or higher	\$91,260 - \$110,280					*
	Technical Trainer / Instructor	Apprenticeship or post-secondary certificate / license	\$65,970					*
	Training & Development Manager	Master's Degree or higher	\$135,620					*
Transport & Logistics	Heavy-Load Truck Drivers	Apprenticeship or post-secondary certificate / license	\$47,500		*	*	*	
	Logistician	Bachelor's Degree	\$73,930	*	*	*	*	
	Transportation Worker	Apprenticeship or post-secondary certificate / license	\$38,760	*	*	*	*	
Vessels & Aircraft Workers	Commercial Aircraft Pilots	Apprenticeship or post-secondary certificate / license	\$94,840	*		*	*	*
	Deck Crew (Mates, Ship Boat and Barge)	Apprenticeship or post-secondary certificate / license	\$65,450	*		*	*	*
	Ship and Boat Captains	Apprenticeship or post-secondary certificate / license	\$73,130	*	*	*	*	*

It is important to note that the wage data presented in this report and in the table below is intended as a broad orientation for the occupations involved in offshore wind energy. It is not intended as a model to be emulated. A number of factors will determine actual wages for those who will work in the offshore wind energy industry in New York State. Since the offshore wind energy industry in the United States is so new, the data sources on which our wage figures are based do not yet account for the impact of this industry on national or state-level salary averages.

Wage data contained in this report reflects salary levels only. It does not take into account total compensation, which would likely be higher due to the costs of employee health care, retirement contributions, and other factors. Cost of living and labor market dynamics also influence wages from region to region and between industries.

Appendix 2: WDI occupations re-named and consolidated into BLS categories for analysis.

Job Type	Occupation- WDI Categories	Occupation- BLS Categories
Accounting, Finance, Procurement	Accountant	Accountants and auditors
	Bookkeeper	Bookkeeping, accounting and auditing clerks
	Buyer	Wholesale and retail buyers, except farm products
	Insurer & Underwriter	Insurance Underwriters
	Power Marketer and Analyst	Market research analysts
Admin, Clerical, Back office	Administrative and clerical staff	Office & administrative support occupations
	HR professionals	HR managers and HR workers
	IT specialists	Computer & information systems managers
	Public relations officer	PR specialists
Construction & Assembly Workers	Assemblers of electrical and electromechanical equipment	Electrical, electronics, and electromechanical assemblers
	Construction laborer	Construction laborer
	Laborers and freight, stock and material movers, hand	Laborers and freight, stock and material movers, hand
Consultants and Researchers	Health and safety specialist	occupational health and safety specialists and technicians
	Operations research analyst	operations research analyst
Development Technical Specialists	Regulatory & permitting expert	Regulatory & permitting expert
Directors & Executives	Director of Business Development	Sales Manager
	Director of Finance	Financial Managers
	Director of health, safety, and risk	Director of Business Development
	Director of Procurement	Director of health, safety, and risk
	Director of sales	Director of Procurement
Engineers	Aerospace/ Aeronautical engineers	Aerospace/ Aeronautical engineers
	Civil Engineer	Civil Engineer
	Composite Materials Engineer	Materials Engineer
	Electrical Engineer	Electrical Engineer

	Mechanical Engineer	Mechanical Engineer
	Industrial Engineer	Industrial Engineer
	Environmental Engineer	Engineers, all other
	Geotechnical, GIS, and geophysical Engineer	“
	Control systems Engineer	“
	Design Engineer	“
	Marine Engineer	“
	Sales Engineer	“
	Test Engineer	“
	Wind Energy Engineer	“
Legal	Attorneys	Lawyers
	Paralegal	Paralegals and legal assistants
Management and Supervisors	Commercial site manager	Construction project manager
	Construction project manager	architectural and engineering managers
	Engineering manager/ chief engineer	industrial production managers
	Production supervisor/ manager	operations manager
	Quality manager	Quality manager
	Site/plant manager or operations manager	Commercial site manager
	Wind project manager	Wind project manager
Maritime, Port and Terminal professions	Divers	Divers
	Stevedore/ Longshoreman	Stevedore/ Longshoreman
Scientists	Archaeologist	Biological Scientists and Physical Scientists
	Ecologist	“
	Environmental Scientists	“
	Geoscientist/ Geologist & Hydrologist	“
	Marine and Wildlife Biologist	“
	Meteorologist	“
Technicians	CAD Specialist/ Technicians	CAD Specialist/ Technicians
	Environmental science technician	Environmental science technician
	Wind turbine technician	Wind turbine technician

Trade Workers	Cement worker/ Concrete operative	cement masons, concrete finishers, and terrazzo workers
	CNC Operator	CNC Tool Operators and Programmers
	Crane Operator	Crane and Tower Operators
	machinists	Machinists
	Welder	welding, soldering, and brazing workers
	Ironworker/ steelworker	Ironworker/ steelworker
	operating engineer	operating engineer
	Rigger	Rigger
	Rodbuster	Rodbuster
	Electrician: inside	Electricians
	Electrician: outside	“
Trainers, teachers, professors	Professor	Post-secondary teachers
	Technical trainer/ instructor	Other teachers and instructors
	Training and development manager	Training and development manager
Transport & Logistics	Heavy-load truck drivers	Industrial truck and tractor operators
	Logistician	Logistician
	Transportation worker	Production, transportation, and material moving occupations
Vessels & aircraft workers	Commercial aircraft pilots	Aircraft pilots and flight engineers
	Deck crew (mates, ship boat and barge)	Deck crew (mates, ship boat and barge)
	Ship and boat captains	Ship and boat captains

Appendix 3: 10-highest and 10-lowest paying OSW occupations for which demographic data were available through BLS.

Occupation	National Mean Annual Wage (BLS)	% Women	% White	% Black	% Asian	% Hisp/Latinx
Laborers and freight, stock and material movers, hand	32,130	20.5	72.2	18.6	4	28
Assemblers of electrical and electromechanical equipment	37,010	42.2	59.5	12.4	18	17.2
Construction laborer	41,730	3.8	86.6	8	1.4	46
Transportation worker	37,920	23.7	74.6	16.7	4.8	23.8
Admin & clerical staff	41,040	72.7	77.4	14.3	4.7	17.4
Bookkeeper	42,960	87.3	86.5	7.7	4	14.2
Welder	45,190	3.8	86.9	7.4	2.7	23.1
machinists	46,120	5.8	91.7	4.1	3.1	13.2
CNC Operator	43,170	9	88.9	7.3	3.3	14.5
Heavy-load truck drivers	46,850	7	66.5	25.5	2.5	31.2
Average	41,412	27.58	79.08	12.2	4.85	22.86
Commercial Aircraft Pilot	102,870	5.6	94	3.4	2.2	5
Electrical Engineer	103,480	11.8	76.1	5.4	17.2	8.9
Aerospace/ Aeronautical engineers	119,220	11.6	83.3	6.8	9.1	10.5
Construction project manager	105,000	8.4	91.4	3.3	2.9	14.5
Training and development manager	123,470	55.8	85.4	9.2	0.2	10.1
Engineering manager/ chief engineer	152,930	9.5	84.2	3.4	9.5	4.7
Attorneys	145,300	37.4	86.5	6.8	5.2	5.8
Public relations officer	143,330	59.4	83.3	11	3.4	13.6
Director of Finance	147,530	52.6	79.4	9.7	8.2	9.9
Director of sales	143,330	30.9	87.6	5.8	4.2	7.6
Average	128,646	28.30	85.12	6.48	6.21	9.06

Appendix 4: List of in-state environmental, justice, energy, and labor organizations

Organization	About	Website
North Carolina Conservation Network	Network of 60+ environmental, community, EJ organizations in NC	https://www.ncconservationnetwork.org/
Environment North Carolina	Advocacy, renewable energy, conservation	https://environmentnorthcarolina.org/
Southeastern Wind Coalition	Advocacy, renewable energy	https://www.sewind.org/
NC WARN	Advocacy, energy, and climate justice	https://www.ncwarn.org/about-us/
NC Students for Climate Action	Youth climate action	http://ncsclimateaction.weebly.com/nc-environmental-organizations.html
Sunrise Movement, North Carolina	Youth climate action	https://actionnetwork.org/groups/sunrise-north-carolina
NC Climate Justice Collective	Advocacy, climate justice	https://www.ncclimatejustice.info/
Energy Justice NC	Advocacy, energy democracy, climate justice	https://energyjusticenc.org/about/
Appalachian Voices	Advocacy, clean energy, labor, energy democracy	https://appvoices.org/
North Carolina Environmental Justice Network	Advocacy, Environmental and health justice	https://ncejn.org/
EarthShare North Carolina	Conservation coalition 70+ NGOs	http://earthsharenc.org/about-us/
Environmental Educators of NC	Education, Professional development	https://eenc.wildapricot.org/
NC Association of Environmental Professionals	Education, research, law and policy	http://www.ncaep.org/
NC Clean Energy Technology Center	R&D, Clean energy, education	https://nccleantech.ncsu.edu/
NC Sustainable Energy Association	Clean energy advocacy, market development	https://energync.org/
Southern Alliance for Clean Energy	Advocacy, clean energy, economic development	https://cleanenergy.org/north-carolina/
Sierra Club NC	Advocacy, clean energy, climate action, conservation	https://www.sierraclub.org/north-carolina
Environmental Defense Fund NC	Advocacy, clean energy, climate action, conservation	https://www.edf.org/offices/raleigh-north-carolina
North Carolina AFL CIO	Largest associate of labor unions in NC	https://aflcionc.org/
North Carolina IBEW	Electricians' union	http://www.ibew553.org/labor/

Black Workers for Justice	Advocacy, labor, economic and racial justice	http://blackworkersforjustice.com/
Iron Workers Local 848	Ironworkers' union	https://ironworkers848.org/
North Carolina Interfaith Power & Light	Faith, climate action, program of NC Council of Churches	https://ncipl.org/overview/
Creation Care Alliance	Faith, climate action	https://creationcarealliance.org/
The Nature Conservancy NC	Advocacy, Conservation	https://www.nature.org/en-us/about-us/where-we-work/united-states/north-carolina/
NC League of Conservation Voters	Advocacy, clean energy, climate action, conservation	https://nclcv.org/
Golden LEAF Foundation	Rural economic development	https://www.goldenleaf.org/
NC MWBE Coordinators Network	Business advocacy, equitable procurement	http://mwbenetwork.org/