

**Statement by
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**Presented at the
U.S. House of Representatives Committee on Natural Resources
Subcommittee on Energy and Mineral Resources
Hearing on “*Building a 21st Century American Offshore Wind Workforce*”
June 11, 2019**

Introduction

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to appear today to present testimony regarding “Building a 21st Century American Offshore Wind Workforce.”

My name is Stephanie McClellan, and I am Director of the Special Initiative on Offshore Wind (SIOW). SIOW is an independent project at the University of Delaware’s College of Earth, Ocean and Environment that supports the advancement of offshore wind power as part of a comprehensive solution to meet our nation's most pressing energy challenges. SIOW provides expertise, analysis, information sharing and strategic partnership with advocacy, government and industry stakeholders to build understanding and drive deployment of offshore wind energy. SIOW was established in 2013 and receives funding exclusively from private foundations.

As the Subcommittee deliberates on the growing offshore wind industry in the United States and its workforce needs, SIOW offers the following key data points for consideration:

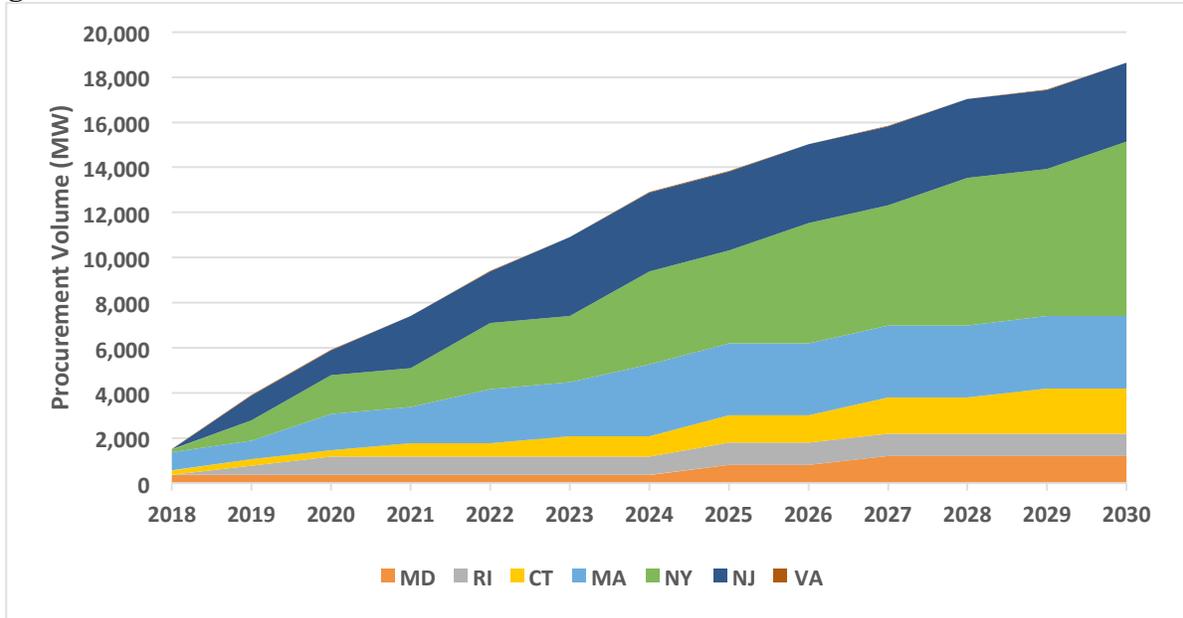
1. Seven states on the Atlantic Seaboard have collectively committed to procuring close to 20 gigawatts (GW) of clean, cost-effective offshore wind power by 2030.
2. Manufacturing and installation of this new capacity presents a nearly \$70 billion CAPEX revenue opportunity to businesses in the U.S. offshore wind power supply chain over the next decade.
3. That includes building more than 1,700 offshore wind turbine generators, towers and blades to be installed in U.S. coastal waters. More than 5,000 miles of cable will be manufactured and installed to connect offshore wind farms and bring the power they generate to major U.S. population centers. More than 60 onshore and offshore substations will be manufactured and installed, along with 1,750 subsea foundations on which turbines and offshore substations are mounted.
4. The U.S. offshore wind supply chain will leverage the offshore expertise of the U.S. oil & gas sector, which has a manufacturing base that stretches from the East Coast into central U.S. and the Gulf of Mexico. America's new offshore wind industry will also leverage synergies with the nation's onshore wind industry, stretching across the U.S.
5. America's new offshore wind power industry will put tens of thousands of Americans to work and present business opportunities to companies throughout the U.S.

Background

The U.S. offshore wind power sector is well underway. In 2016, the nation’s first offshore wind farm was commissioned off Block Island, Rhode Island, generating 30 megawatts (MW). Today, offshore wind farms totaling 2 GW capacity are contracted to supply electricity in Massachusetts (800 MW), Connecticut (300 MW), Rhode Island (400 MW), New York (130 MW), Maryland (368 MW) and Virginia (12 MW). Additional offshore wind power contracts are expected to be signed in 2019 in New Jersey (up to 1,100 MW) and New York (up to 800 MW), bringing to seven the total number of states where offshore wind power will soon be providing electricity.

This is just the tip of the iceberg. Many of the same states have even greater offshore wind power commitments stretching to 2030 and beyond. In addition to the 2 GW of offshore wind farms already contracted to supply power, contracts are expected to be signed for more than 16 GW of further projects to meet state commitments during the period 2020-2030. This brings the total forecasted amount of contracted offshore wind power between 2020 and 2030 to 18.6 GW.

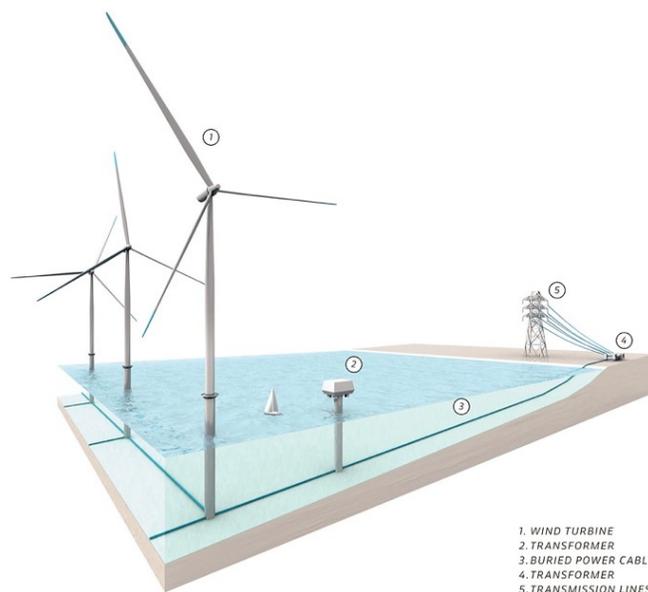
Figure 1. Offshore Wind Power Contracts Forecast 2018 – 2030



What makes an offshore wind farm?

The figure below depicts the components of an offshore wind farm. The wind turbine itself includes a nacelle, blades, hub and tower. Not illustrated is the subsea foundation on which the turbine is mounted. Wind turbines are linked by array cables that connect each turbine and transport power to an offshore transformer where the electricity is converted to high voltage for export to shore via buried power cables. Once brought ashore, the power is delivered to a land-based transformer, which connects to the high-voltage transmission line.

Figure 2. Offshore Wind Farm Layout



*Credit:
New York Times*

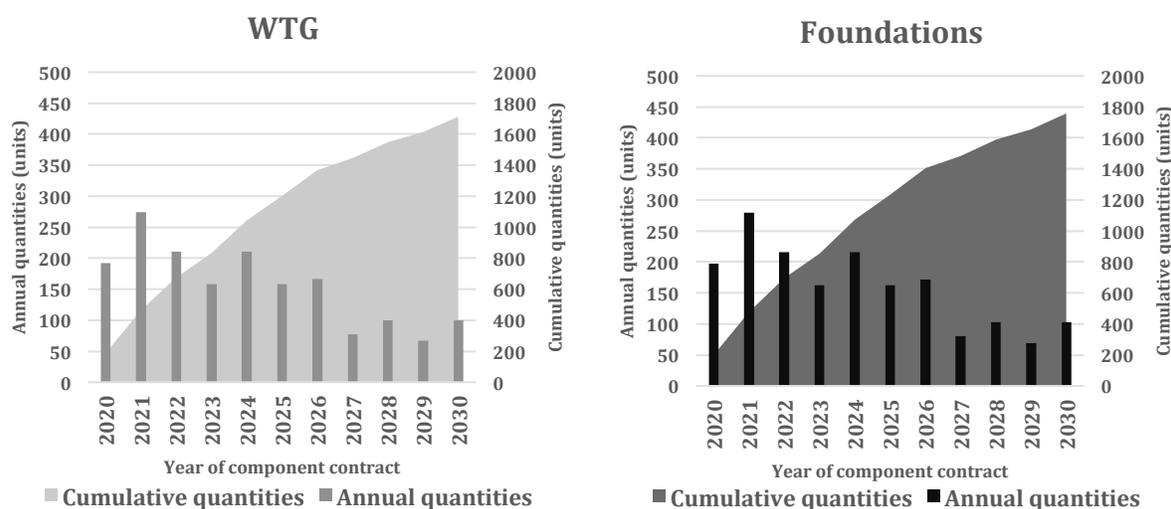
Nearly \$70 billion spend for thousands of components

SIOW and The Renewables Consulting Group (RCG) recently quantified for the offshore wind supply chain what the build out of 18.6 GW of offshore wind will mean for suppliers, answering the questions “how many components will need to be built? By when? And how much money offshore wind developers will expend on them?”¹ The following figures, all from the SIOW report, illustrate the quantities of each of the major components that will be procured and then manufactured or fabricated, and installed.

Figure 3. CAPEX for offshore wind components: now through 2030

Component	Cumulative CAPEX by 2030
Onshore substation EPCI	\$2.1 bn
Upland cable EPCI	\$0.7 bn
Offshore substation EPCI	\$4.7 bn
Export cable EPCI	\$5.5 bn
Array cable EPCI	\$4.1 bn
Foundation EPCI	\$16.2 bn
WTG EPCI	\$29.6 bn
Other (insurance, marine support, PM)	\$5.3 bn
Total	\$68.2 bn

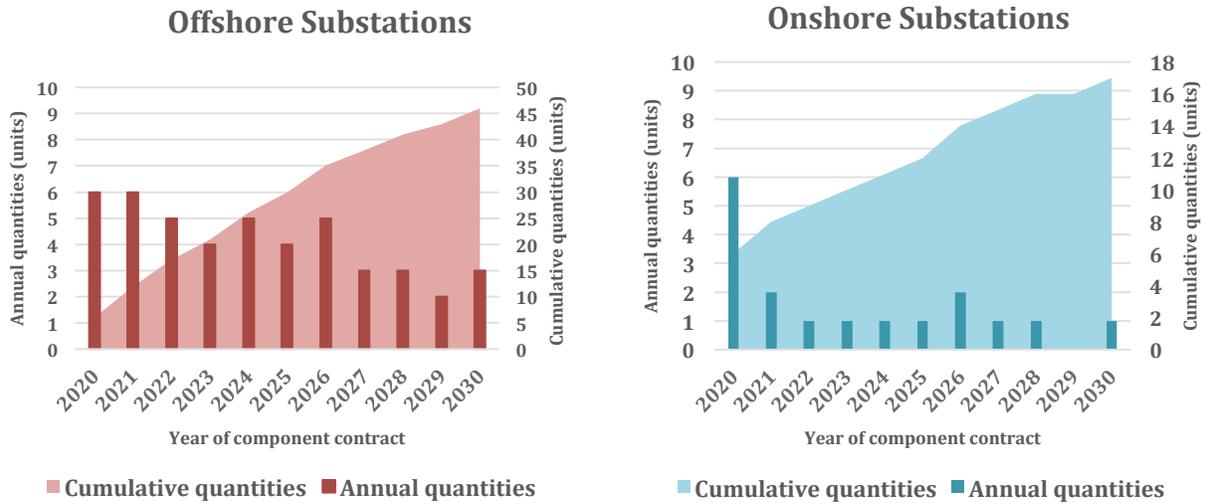
Figure 4. Annual & cumulative quantities: Wind turbine generators & foundations



From now through 2030, more than 1,700 wind turbine generators will be procured, manufactured and installed. More than 1,750 subsea foundations will be manufactured and installed. The slightly higher number of foundations represents the need for foundations on which offshore substations are mounted. As shown, there will be a fairly steady demand for wind turbine generators and foundations, with a fairly fast ramp up in demand in the next two years.

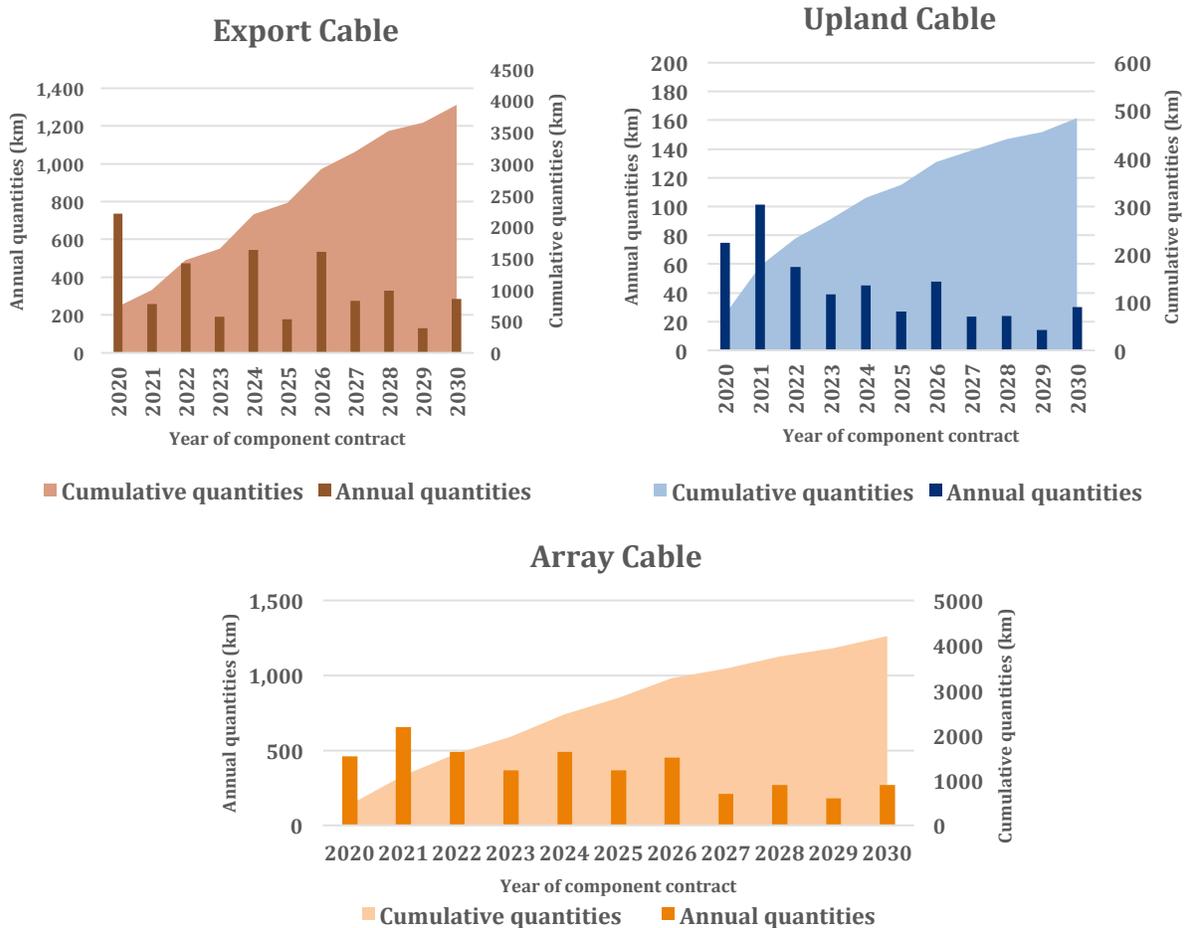
¹ McClellan, Stephanie A. (2019). “Supply Chain Contracting Forecast for U.S. Offshore Wind Power,” a Special Initiative on Offshore Wind White Paper, published by the University of Delaware. <https://www.ceoe.udel.edu/File%20Library/About/SIOW/SIOW-White-Paper---Supply-Chain-Contracting-Forecast-for-US-Offshore-Wind-Power-FINAL.pdf>

Figure 5. Annual and cumulative quantities of substations



Forty-five offshore substations will be needed for the number of offshore wind farms that will be built. We forecast that from now through 2030, 16 onshore substations will be needed to shore up the facilities that will deliver the offshore wind generated power to the transmission system.

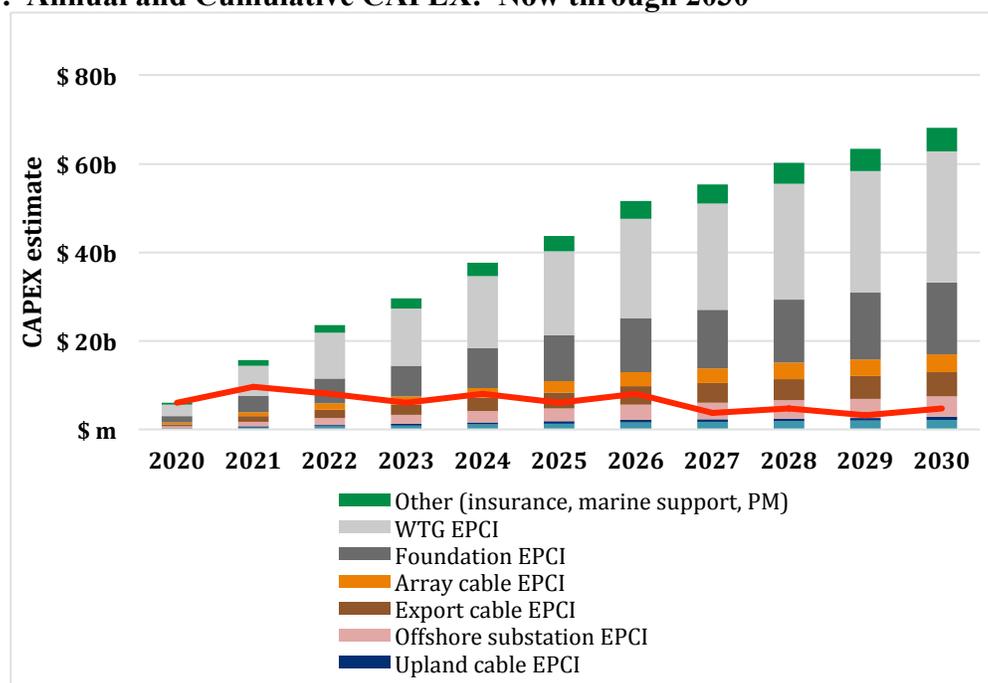
Figure 6. Annual and cumulative quantities: Cabling



Together, more than 5,000 miles (8,000 kilometers) of cable will be procured, manufactured and installed. The vast majority of this will be subsea cabling, either connecting wind turbines within a wind farm or exporting the electricity to shore. Additional cabling will be manufactured and installed onshore to deliver electricity to the onshore substation.

Once the volume and timing of needed components was established, SIOW and RCG quantified the cost of those components and thus the cumulative capital expenditures that will be made on them from now through 2030. The table below details those estimates.

Figure 7. Annual and Cumulative CAPEX: Now through 2030



Job creation

A 2017 bipartisan study of offshore wind job opportunities commissioned by three states (Massachusetts, Rhode Island and New York) quantified the enormous number of U.S. FTE job years associated with a large-scale offshore wind industry. Note, in 2017 large scale was seen as 8 GW, not the nearly 20 GW committed to just two years later. This jobs study found that building just 8 GW of offshore wind over the next decade will create or support almost 40,000 full-time U.S. jobs by 2028 - 19,840 FTE years of employment. To operate and maintain these new offshore wind farms over their 25-year lifetime will create or support as many as 500,000 U.S. FTE job years in this industry.²

Another point of comparison is the direct employment in the onshore wind industry in U.S. states with comparable wind capacity installed. For example, at nearly 20 GW, the emerging Atlantic seaboard offshore wind power build out is most comparable to Texas, which has an estimated 22 – 25 GW of installed capacity and 25,000 people working in direct wind industry jobs.³ Iowa's installed capacity, which is about half of what's coming on the Atlantic seaboard, has generated 10,000 direct wind industry jobs.⁴

² BVG Associates (2017). "U.S. Job Creation in Offshore Wind: A Report for the Roadmap Project for Multi-State Cooperation on Offshore Wind."

³ <https://www.awea.org/resources/fact-sheets/state-facts-sheets>

⁴ <https://www.awea.org/resources/fact-sheets/state-facts-sheets>

Conclusion

The U.S. offshore wind industry is taking off – with statehouse support and market momentum that won't quit. Oil and gas majors have paid record high prices to purchase the rights to install offshore wind farms in U.S. waters. Their market entry, together with steep and rapid reductions in the cost of producing offshore wind energy, are ensuring that this will be a quickly established, cost-effective and successful energy industry.

There are a growing number of global offshore wind suppliers, U.S. offshore energy and U.S. onshore wind suppliers preparing to enter the industry. A competent, well-trained workforce will smooth this transition and generate significant benefits for U.S. suppliers and American workers.

We want the jobs in this new industry to be American jobs. To achieve and ensure that, U.S. worker preparation and training needs to begin now.

APPENDIX

Industry reactions to:

“Supply Chain Contracting Forecast for U.S. Offshore Wind Power”

Special Initiative on Offshore Wind White Paper

“This report provides a roadmap for companies that will create new jobs and generate competition, which means better prices for producers and better electricity rates for consumers in the future,” said [Randall Luthi](#), President of the National Ocean Industries Association. “NOIA has long advocated for all-of-the-above energy and new offshore energy growth in America. Our members look forward to participating in the massive opportunity presented by offshore wind. The report identifies significant opportunities for the supply chain that will build, supply and support the U.S. offshore wind sector.

By putting in clear terms the anticipated demand for foundations, towers, cable and services, America’s energy supply and service companies can begin planning to enter this growing market. We’re watching a new industry grow right here off our shores and NOIA’s members are excited to be a part of this energy future.”

“Gulf Island Fabrication constructed the foundations for the five turbines at Block Island, RI – so we know the power and value of offshore wind,” said [Bill Blanchard](#), Senior Vice President, Business Development, at the Texas-based firm. “This new study shows there's a lot more where that came from. Five foundations down, 1,750 more to go. That's the kind of business opportunity the offshore energy industry can get excited about.”

“In quantifying the industrialization of offshore wind in the U.S., this white paper illustrates just how much potential there is in the sector, top to bottom,” said [Jason Folsom](#), Boston-based U.S. National Sales Director for MHI Vestas Offshore Wind. “It presents an exceptionally compelling case on the emergence of offshore wind as an engine for U.S. energy transition.”

“America’s land-based wind industry already supports over 105,000 U.S. jobs and more than 500 facilities,” said [Tom Kiernan](#), CEO of the American Wind Energy Association (AWEA). “This paper lays out the \$70 billion opportunity to further grow jobs and manufacturing as development heats up to harness our nation’s world-class offshore wind potential.