

Overview of Offshore Wind Projects for the U.S. Department of Energy

Prepared for:



US Offshore Wind Collaborative®

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U.S. Offshore Wind Annual Market Assessment

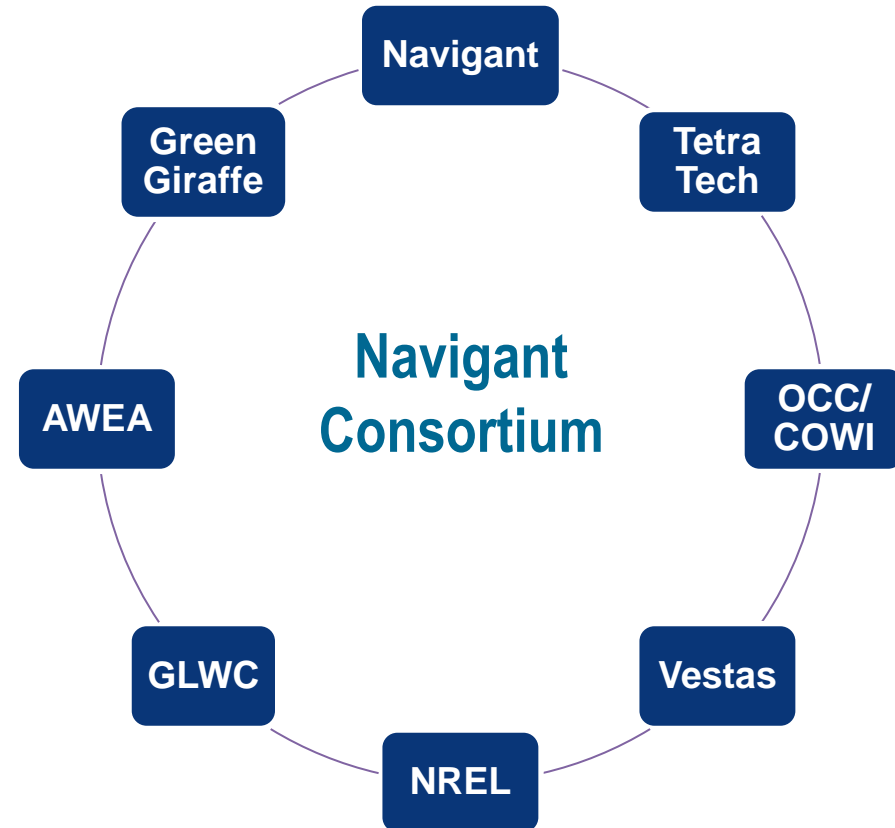
Primary Objectives

Develop and publish a comprehensive annual assessment of the U.S. offshore wind market, annually for a three year period.

1. *Global trends*
2. *Offshore wind projects*
3. *Policy developments*
4. *Technology developments*
5. *Economic impacts*
6. *Related sector developments*

Benefits to Industry

- » Provide stakeholders with a reliable and consistent data source
- » Jobs and economic development model for offshore wind
- » Serve as a road map for removing entry barriers and increasing U.S. competitiveness in the offshore wind market



Annual Offshore Wind Market Assessment	1	Global Trends	<ul style="list-style-type: none">• An examination of leading company and country trends across the supply chain, project financing and ownership, acquisitions and investments;• Efforts to remove market barriers such as transmission constraints and wind integration concerns.
	2	Offshore Wind Projects	<ul style="list-style-type: none">• Statistics, tables and charts of key aspects of the U.S. offshore wind industry;• Projects by location, capacity and stage of development;• Market segmentation by technology type, turbine size, foundation type;• Select developer interview summaries discussing key market barriers.
	3	Policy Developments	<ul style="list-style-type: none">• A comprehensive list of the supportive and prohibitive state and federal policies• A list of program objectives and potential barriers to meeting the objectives;• A short list of policy recommendations, with a corresponding implementation timeline.
	4	Technology Developments	<ul style="list-style-type: none">• Current and future positive developments (e.g., improvements in direct drives systems) and challenges;• Cost implications of these developments, current penetration levels new technologies, and the projected timing for larger-scale technology acceptance.
	5	Economic Impacts	<ul style="list-style-type: none">• Review of existing economic models for economic impacts of wind development;• Modification of existing models to accommodate offshore wind;• Cost breakdown of offshore wind plants;• Economic impacts of offshore wind as calculated using the new model.
	6	Related Sector Developments	<ul style="list-style-type: none">• A prioritized list of economic factors that could impact the supply and demand of offshore wind.

U.S. Offshore Wind Manufacturing and Supply Chain Development

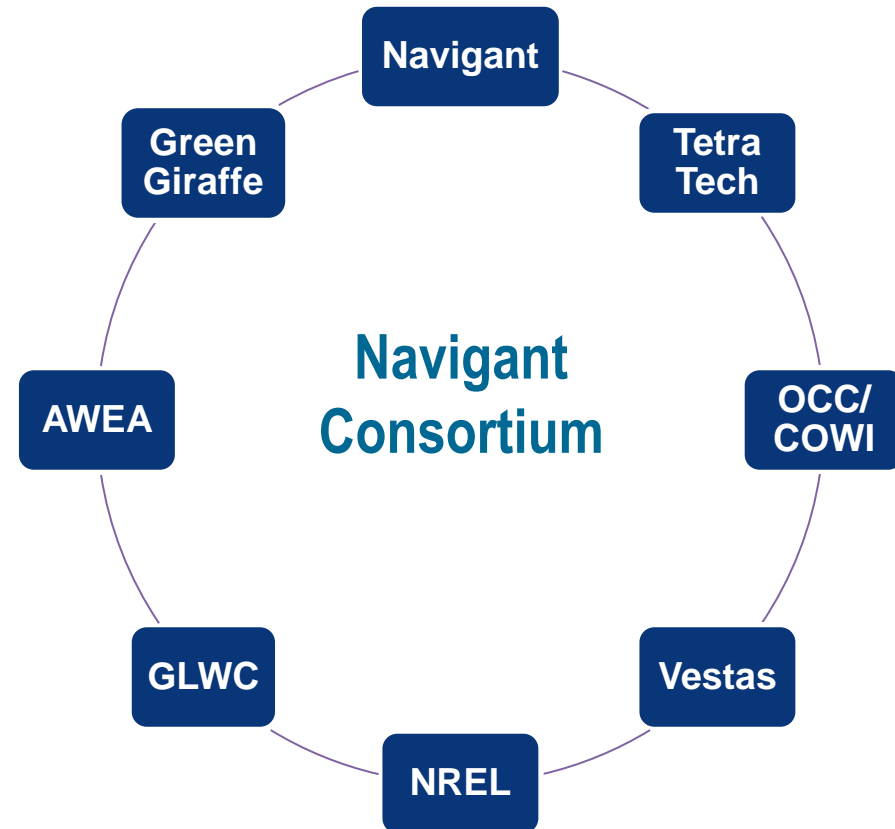
Primary Objectives

An assessment of the domestic supply chain and manufacturing infrastructure

1. *Current Domestic Infrastructure and Supply Chain*
2. *Industry Supplier Needs*
3. *Strategy for Future Development*
4. *Pathways for Market Entry*

Benefits to Industry

- » Identify market segments and sizes
- » Objective reference to help OEMs and suppliers make decisions
- » Stakeholder forums in March and June to disseminate information and develop policy recommendations



1 Current Domestic Infrastructure and Supply Chain

- Determine the cost breakdown of offshore wind plants
- Identify suppliers of offshore wind turbines and components with manufacturing facilities in the U.S.

2 Industry Supplier Needs

- Identify technical trends and anticipated advancements in offshore wind manufacturing and construction;
- Determine the most likely mix of plant locations, sizes, turbine types, and foundation types required to meet near-term and long-range needs;
- Determine the specific demand on the supply chain needed to meet near-term and long-range needs;
- Determine the investment and labor required by year for each manufacturing and infrastructure component type.

3 Strategy for Future Development

- Evaluate the gap or competitive advantage of adding manufacturing capacity in the U.S. vs. overseas, for each offshore wind turbine component;
- Research federal and state policies for promoting offshore wind growth;
- Recommend U.S. policy changes to close any competitive gaps (and removing entry barriers).

4 Pathways for Market Entry

- Identify current pathways to market
- Identify market barriers
- Assess likely future market entry pathways
- Make preliminary recommendations to remove the identified barriers.

Supply Chain Development » Proposed Deployment Scenarios

	54GW by 2030 High Growth Scenario	30GW by 2030 Moderate Growth with High Technology Adoption	30GW by 2030 Moderate Growth with Moderate Technology Adoption	10GW by 2030 - Low Growth Scenario
Gigawatts Deployed	Fast (2014 start)	Moderate (2017 start)	Moderate (2017 start)	Delayed (2020 start)
Adoption of Next-Generation Technologies (direct drive, floating platform, etc)	Rapid	High	Moderate	Delayed
Regional Diversification between Atlantic, Pacific, Great Lakes, and Gulf	High	High	Moderate	Low
Policy Support Mechanisms at Federal and/or State Level	High	Intermittent and/or Moderate	Intermittent and/or Moderate	Low

Supply Chain Development » Segmentation Scheme

Deployment Scenarios		54GW by 2030 High Growth Scenario		30GW by 2030 Moderate Growth with High Technology Adoption		30GW by 2030 Moderate Growth with Moderate Technology Adoption		10GW by 2030 - Low Growth Scenario	
		2020	2030	2020	2030	2020	2030	2020	2030
Total Capacity Deployed by Milestone Date	(in GW)	10	54	6	30	6	30	2	10
Regional Distribution	(as % of scenario)								
	Atlantic Coast	8	30	5.5	21	4	14	2	8
	Great Lakes	0.5	4	0	2	0.3	2	0	0
	Gulf Coast	1	5	0.5	4	1	4	0	1
	Pacific Coast	0.5	15	0	3	0.7	10	0	1
Key Configuration Assumptions									
	(as % of scenario)								
Category	Description								
1. Project size (MW)	< 100 MW	xx%	xx%						
	100 - 400 MW	xx%	xx%						
	> 400 MW	xx%	xx%						
2. Distance from shore	< 25 miles								
	25 - 75 miles								
	> 75 miles								
3. Platform type	Fixed Bottom								
	Floating								
4. Size of turbines (Rating in MW)	< 5 MW (nominal rotor dia <130m)								
	5 - 10 (nominal rotor dia <180m)								
	>10 (up to 220 m rotor dia)								
5. Configuration of turbines	HAWT, 3-bladed, geared								
	HAWT, 3-bladed, direct drive								
	HAWT 2-bladed, geared								
	HAWT, 2-bladed, direct drive								
	VAWT								
6. Max component weight (for single lift)	Up to 250 tons								
	Up to 400 tons								
	Up to 600 tons								
7. Max Nacelle Footprint (in transport)	Up to XXX sq ft								
	Up to XXX sq ft								
	Up to XXX sq ft								

Survey Plan

#	Question	Developers, Component or Turbine mfrs, or Others																																										
1	Name* _____ Title* _____ Company* _____ * these responses will be kept confidential (will be used to avoid duplication)	DCTO																																										
2a	How would you characterize your company's participation in offshore or onshore wind markets (select all that apply): <ul style="list-style-type: none"> • Component or Material Supplier • Wind Turbine OEM • Developer • EPC • O&M • Other _____ 	DCTO																																										
2b	[This question will be asked only if the first item is selected on question 2a] What components or materials does your company currently supply, or plan to supply in the future? (select all that apply)	CT																																										
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Survey Plan (cont.)

3	<p>How many full time U.S. employees do you currently have in each of these areas? What % of total labor hours in each area are designated exclusively to offshore wind? If you have employees dedicated to offshore wind, in what states are they located?</p> <table border="1"> <thead> <tr> <th></th> <th>Total FTE</th> <th>FTE dedicated to Offshore Wind</th> <th>Location by State of Offshore Wind Staff</th> </tr> </thead> <tbody> <tr> <td>Component or Subsystem Supplier</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Wind turbine OEM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Developer</td> <td></td> <td></td> <td></td> </tr> <tr> <td>EPC</td> <td></td> <td></td> <td></td> </tr> <tr> <td>O&M</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Other</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Total FTE	FTE dedicated to Offshore Wind	Location by State of Offshore Wind Staff	Component or Subsystem Supplier				Wind turbine OEM				Developer				EPC				O&M				Other				DCTO
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4a	<p>If you have done staffing plans/studies, how many people do you expect to employ for a given facility size?</p> <ul style="list-style-type: none"> • Offshore wind component to be manufactured _____ • Annual Production (please include units) _____ • Annual Employment (Full Time Equivalents) _____ 	CT																												
4b	<p>If you are involved in Engineering, Procurement and/or Construction and have done staffing plans/studies, how many people do you expect to employ for a given offshore wind project?</p> <ul style="list-style-type: none"> • Project Size (please include units) _____ • Description of your company's role in EPC _____ • Employment (in man-hours) _____ 	DCTO																												
4c	<p>What percentage of EPC staffing is likely to be procured from the nearest state to the project and to the U.S.?</p> <ul style="list-style-type: none"> • % expected to come from the U.S. _____ • % expected to come from the closest state to the project _____ 	DO																												
4d	<p>If you are going to be involved in Operation and Maintenance and have done staffing plans/studies, how many people do you expect to employ for a given offshore wind project?</p> <ul style="list-style-type: none"> • Project Size (please include units) _____ • Description of your company's role in O&M _____ • Annual Employment (in FTE's) _____ 	DCTO																												
4e	<p>Would you expect that O&M staff are likely to reside in communities local to the project In the U.S.?</p>	DCTO																												

Survey Plan (cont.)

5a	Have you been asked to supply bids or quotes for components or services for offshore wind projects? How many times and for what scope?	CT
5b	Have you responded to RFPs or RFQs for components or services for offshore wind projects? How many times and for what scope?	CT
5c	Have you provided any components or services for offshore wind projects? How many times and for what scope?	CT
6	<p>U.S.-Based Manufacturing Capacity</p> <ul style="list-style-type: none"> • How much demand would you need to see in the U.S. offshore wind market to justify building U.S.-based manufacturing capacity (for the offshore market)? • What would be the capital investment required for you to build manufacturing facilities in the U.S. to address the offshore wind market? What annual capacity are you assuming? (please specify units, MW or other) • How long would it take you to bring such a facility on line? • What ROI would you need to justify the investment? • What factors are likely to influence where you would site a potential manufacturing facility (e.g., cost of business, access to adequate ports, close proximity to sites being developed) • Would you expect to or desire to co-locate a potential manufacturing facility with a port designed to ship offshore wind components? 	CT
7a	<p>What is the cost for you to manufacture and deliver your component to a U.S.-based site on the East Coast having manufactured the component in:</p> <ul style="list-style-type: none"> • Europe/Asia • U.S. 	CT
7b	<p>What is the cost for you to manufacture and deliver your component to a U.S.-based site in the Great Lakes area having manufactured the component in:</p> <ul style="list-style-type: none"> • Europe/Asia • U.S. 	CT
7c	<p>What is the cost for you to manufacture and deliver your component to a U.S.-based site in the Gulf Coast area having manufactured the component in:</p> <ul style="list-style-type: none"> • Europe/Asia • U.S. 	CT
7d	<p>What is the cost for you to manufacture and deliver your component to a U.S.-based site in the West Coast area having manufactured the component in:</p>	CT

Survey Plan (cont.)

8	<p>Turbine breakdown: What are the cost, weight, materials usage, etc. of a typical offshore turbine? What is the approximate power rating (in MW) for the turbine you are assuming?</p> <table border="1"> <thead> <tr> <th rowspan="2">System</th> <th rowspan="2">Cost (\$/WTG)</th> <th colspan="4">Materials usage (lbs/WTG)</th> </tr> <tr> <th>Total Weight</th> <th>Steel</th> <th>Fibreglass</th> <th>Other (specify)</th> </tr> </thead> <tbody> <tr><td>Blades</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Gearbox</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Generator</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Bearings</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Power Converter</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Transformer</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Tower</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Pitch system</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Hub</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Drive Shaft</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Nacelle Frame</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Nacelle Shell</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Other</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Ground Transportation (Manufacturing Facility to Port)</td><td></td><td colspan="4">N/A</td></tr> <tr><td>Typical Warranty Provisions</td><td>Cost:</td><td colspan="4">Length (number of years):</td></tr> <tr><td>Totals</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	System	Cost (\$/WTG)	Materials usage (lbs/WTG)				Total Weight	Steel	Fibreglass	Other (specify)	Blades						Gearbox						Generator						Bearings						Power Converter						Transformer						Tower						Pitch system						Hub						Drive Shaft						Nacelle Frame						Nacelle Shell						Other						Ground Transportation (Manufacturing Facility to Port)		N/A				Typical Warranty Provisions	Cost:	Length (number of years):				Totals						T
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9	<p>How many offshore wind turbine models does your company offer? How many components and sub-assemblies are in the turbine, now and expected in the future? What is the driver (different configuration, more integrated designs, etc) for the expected reduction? Could each model be assembled at multiple plants within the U.S. or just one?</p> <table border="1"> <thead> <tr> <th>Model</th> <th># components (now)</th> <th># components (future)</th> <th>Expected Driver for component reduction</th> <th># U.S. plants (potential)</th> </tr> </thead> <tbody> <tr> <td>2 MW model</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Model	# components (now)	# components (future)	Expected Driver for component reduction	# U.S. plants (potential)	2 MW model					T																																																																																																
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Survey Plan (cont.)

10	<p>What % and type of turbine parts are fabricated by OEMs vs.tier 1/2/3 suppliers? (specify whether the data applies to onshore, offshore, or both)</p> <table border="1"> <thead> <tr> <th></th> <th>% by OEMs</th> <th>% by Tier 1</th> <th>% by Tier 2+</th> <th>Applies to onshore?</th> <th>Applies to offshore?</th> </tr> </thead> <tbody> <tr><td>Blades</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Gearbox</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Generator</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Bearings</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Power Converter</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Transformer</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Tower</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Pitch system</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Hub</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Drive Shaft</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Nacelle Frame</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Nacelle Shell</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Other_____</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Other</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		% by OEMs	% by Tier 1	% by Tier 2+	Applies to onshore?	Applies to offshore?	Blades						Gearbox						Generator						Bearings						Power Converter						Transformer						Tower						Pitch system						Hub						Drive Shaft						Nacelle Frame						Nacelle Shell						Other_____						Other						CT
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11	<p>For key components, what is your order to delivery timeline? What is your average delivery shipping distance? What percentage of materials are imported?(specify whether the data applies to onshore, offshore, or both)</p> <table border="1"> <thead> <tr> <th>System</th> <th>Lead time</th> <th>Average shipping distance</th> <th>% of materials imported</th> <th>Applies to onshore?</th> <th>Applies to offshore?</th> </tr> </thead> <tbody> <tr><td>Blades</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Gearbox</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Generator</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Bearings</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Power Converter</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Transformer</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Tower</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Pitch system</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Castings</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	System	Lead time	Average shipping distance	% of materials imported	Applies to onshore?	Applies to offshore?	Blades						Gearbox						Generator						Bearings						Power Converter						Transformer						Tower						Pitch system						Castings						CT																														
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Survey Plan (cont.)

12a	<p>Balance of Plant Cost and Procurement (responses should be based on values expected in the near-term (i.e., for the first GW of U.S. projects).</p> <ul style="list-style-type: none"> • What is the breakdown of non-turbine (BOP) costs by category? • For each BOP category, what % is likely to be sourced from the closest state, another U.S. state, and imported? <table border="1"> <thead> <tr> <th rowspan="2">BOP category</th> <th rowspan="2">% of total BOP</th> <th colspan="3">Source Location</th> </tr> <tr> <th>% from closest state</th> <th>% from another U.S. state</th> <th>% imported</th> </tr> </thead> <tbody> <tr> <td>Labor</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Basic construction materials (e.g., concrete, gravel, rebar)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Specialized material and equipment (e.g., monopole, jacketed support structure, transmission cabling)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Professional services (e.g., engineering, legal counsel and permitting, public relations, decommissioning, insurance during construction, AFUDC)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Balance of Plant</td> <td>100%</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	BOP category	% of total BOP	Source Location			% from closest state	% from another U.S. state	% imported	Labor					Basic construction materials (e.g., concrete, gravel, rebar)					Specialized material and equipment (e.g., monopole, jacketed support structure, transmission cabling)					Professional services (e.g., engineering, legal counsel and permitting, public relations, decommissioning, insurance during construction, AFUDC)					Total Balance of Plant	100%				DO
BOP category	% of total BOP			Source Location																															
		% from closest state	% from another U.S. state	% imported																															
Labor																																			
Basic construction materials (e.g., concrete, gravel, rebar)																																			
Specialized material and equipment (e.g., monopole, jacketed support structure, transmission cabling)																																			
Professional services (e.g., engineering, legal counsel and permitting, public relations, decommissioning, insurance during construction, AFUDC)																																			
Total Balance of Plant	100%																																		
12b	What is the MW rating of the largest turbine that you expect to use with a monopile foundation?	T																																	
13	What factors are currently expected to influence BOP cost trends in the near term 2-4 years and over the long-term 5-10 years?	DO																																	
14	<p>Annual Operations and Maintenance Expenditures (OpEx)</p> <ul style="list-style-type: none"> • What do you anticipate to be typical annual operations expenditures (Average OpEx \$/year)? • What % of annual OpEx are designated for labor? • What % of annual OpEx are designated for major component replacements (e.g., gearbox, blades, generators)? • What % of annual OpEx are designated for transportation (land, air, marine)? 	DTO																																	

Survey Plan (cont.)

14	<p>What percent of revenues does the wind division in your company put towards R&D:</p> <ul style="list-style-type: none"> • In the U.S.? • (If applicable) Outside the U.S.? 	CT
15a	What are the key technology trends in offshore wind?	DCTO
15b	In which areas do you see innovation likely to lead to lower costs?	DCTO
15c	Do you expect offshore turbines to diverge further from landbased turbines, in the next 5-10 years? In what way? What variables will shape this outcome?	DCTO
15d	What are the most significant impacts to the supply chain anticipated from future technology change/advancements?	DCTO
16	If you are a turbine OEM, what is your decision-making process for evaluating suppliers?	T
17a	What are the advantages of manufacturing offshore wind components for the U.S. market in Europe/Asia as compared to the U.S.?	CT
17b	What are the advantages of manufacturing offshore wind components for the U.S. market in the U.S. as compared to Europe/Asia?	CT
18a	<p>What are (or will be) the most significant barriers to entry for U.S. manufacturers to participate in the U.S. offshore wind industry?</p> <ul style="list-style-type: none"> • High capital requirements for facility investment • Development of dedicated offshore wind equipment • Uncertain lack of demand • Other (specify) 	CT

Survey Plan (cont.)

18b	<p>What are (or will be) the most significant barriers to entry for developers to participate in the U.S. offshore wind industry?</p> <ul style="list-style-type: none"> • Inability to obtain financing • Need for offshore-specific technology • Uncertain lack of demand • Other (specify) 	D
18c	<p>What are (or will be) the most significant barriers to entry for EPC contractors, operators, and other service providers to participate in the U.S. offshore wind industry?</p> <ul style="list-style-type: none"> • Lack of qualified labor • Need for offshore-specific technology • Other (specify) 	O
19	<p>What should be done to reduce or eliminate the barriers to entry and create pathways to market for U.S. companies?</p> <ul style="list-style-type: none"> • Educate U.S. companies on standards and requirements utilized by OEMs • Reduce regulatory and policy uncertainty • Provide incentives to stimulate demand • Other (specify) 	DCTO
20	<p>What types of policies are most appropriate to encourage growth of the U.S. offshore wind industry (and why)?</p> <ul style="list-style-type: none"> • State-level RPSs with offshore wind carve-out requirements • Feed-In Tariffs • Manufacturing incentives (specify type) • Financial incentives such as the PTC, ITC, or cash grants (specify type) • Other (specify type) 	DCTO

Workshops

	Great Lakes Area Workshop	East Coast Workshop
Co-located with	AWEA Regional Wind Energy Summit – Midwest	Windpower 2012
Location	Chicago – Fairmont Hotel	Atlanta
Date	March 5, 2012	Week of June 3-6, 2012
Lead organization	Great Lakes Wind Collaborative	AWEA

<i>Time</i>	<i>Subject</i>
1 hour	Developments and trends in the global offshore wind market <ul style="list-style-type: none"> • Market and technical trends • Introduction of the worldwide offshore wind projects data base
1 hour	Supply chain assessment (presentation of in-process findings) <ul style="list-style-type: none"> • Current situation (cost and materials usage per turbine and per plant, who currently provides components in U.S. and overseas) • Forecast scenarios (54 GW by 2030 plus 2-3 others). Present preliminary results of WTG sizes, component volumes, etc. needed to meet each scenario.
1 hour	Jobs and investment forecasts <ul style="list-style-type: none"> • Introduction of the offshore wind JEDI model • Labor and investment requirements for each scenario
1.5 hrs	Policy discussion – w/breakout groups <ul style="list-style-type: none"> • Existing policies: what has worked elsewhere? • Barriers to entry in the U.S. • Potential policies for advancing the U.S. offshore wind industry