The World's Leading Experts Opine on Future Wind Energy Costs and Cost Drivers

PO.365

Volker Berkhout (1), Roberto Lacal-Arantegui (2), Ryan Wiser(3), Joachim Seel (3), Maureen Hand (4), Karen Jenni (5), Eric Lantz(4), Aaron Smith(4) Erin Baker(6)

(1) Fraunhofer IWES, (2) EC Joint Research Centre, (3) Lawrence Berkeley National Laboratory
(4) National Renewable Energy Laboratory, (5) Insight Decisions, LLC, (6) University of Massachusetts—Amherst

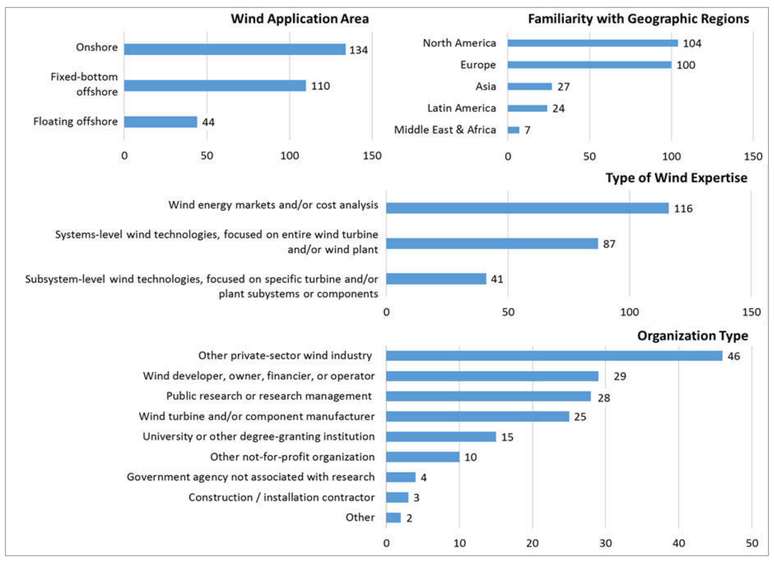
iea wind

About the Survey

This poster presents the results of an expert elicitation survey of 163 of the world's foremost wind energy experts, aimed at better understanding future wind energy costs and technology advancement possibilities.

The survey, which may be the largest single elicitation ever performed on an energy technology in terms of expert participation, was conducted as part of IEAwind Task 26 on the Cost of Wind Eenergy and led by Ryan Wiser from Lawrence Berkeley Laboratory.

Survey participants

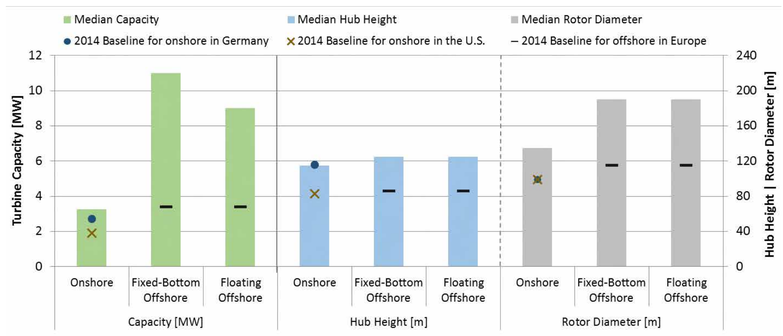


A total of 163 responses came from a broad cross-section of the wind sector.

Respondents were able to identify multiple wind applications, geographies, and types of expertise.

The median respondent dedicated 49 minutes to completing the survey, with the 25th-to-75th percentile range from 29 to 99 minutes.

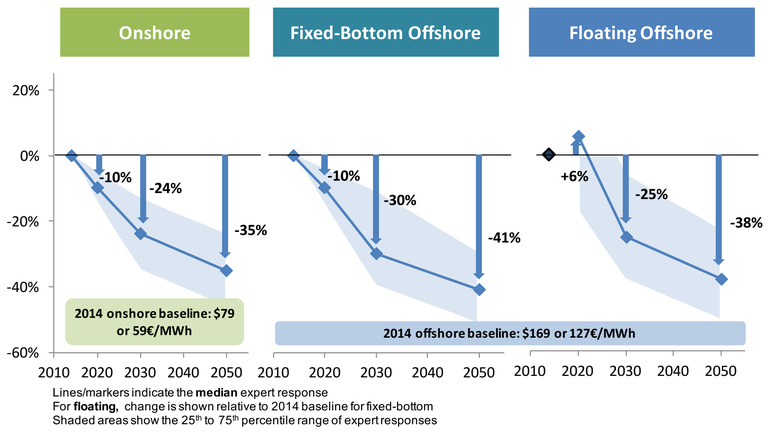
Median Turbine Stats in 2030



Experts predict greater scaling in rotor swept area than in turbine capacity leading to a reduction in specific power, at least globally, also yielding higher capacity factors.

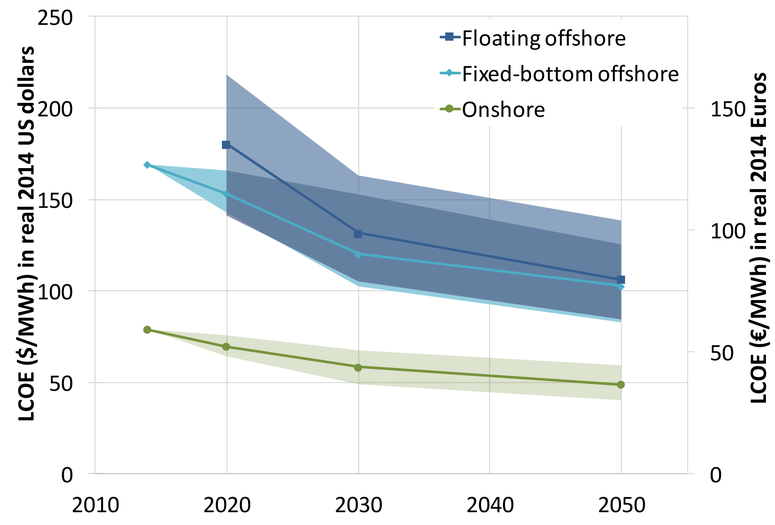
For fixed-bottom offshore wind expected turbine capacity ratings and hub heights grow significantly in order to minimize CapEx, but specific power is expected to remain roughly at recent levels.

Main Results - Significant LCOE Reduction expected



Expert survey results show an expectation of continued reductions in the levelized cost of wind energy (LCOE). Across all three wind applications, the LCOE is anticipated to decline by 24%–30% in 2030 and by 35%–41% in 2050, relative to 2014 baseline values in the "best guess" scenario, focusing on the median value of expert responses.

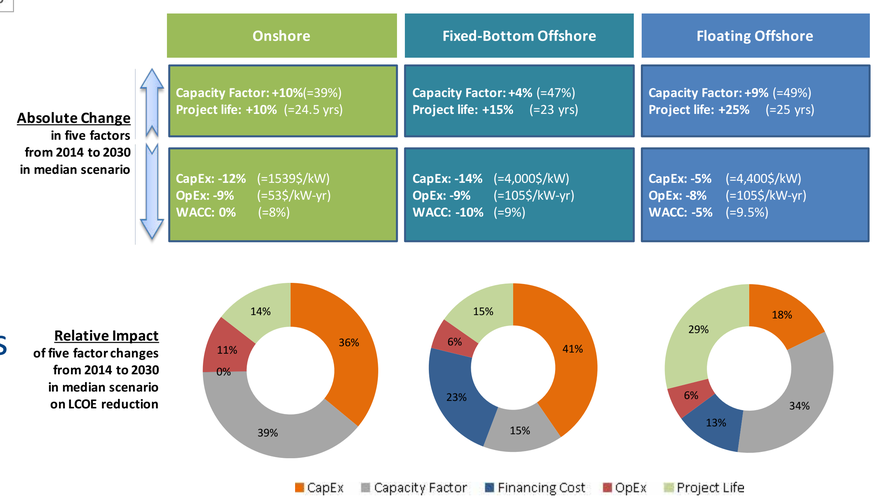
Equipment manufacturers sometimes expect less LCOE reduction, especially in near term for fixed-bottom offshore; respondents who only expressed knowledge of offshore wind (not also onshore) tend to be more aggressive on LCOE reduction



Onshore wind is expected to remain less expensive than offshore—and fixed-bottom offshore less expensive than floating.

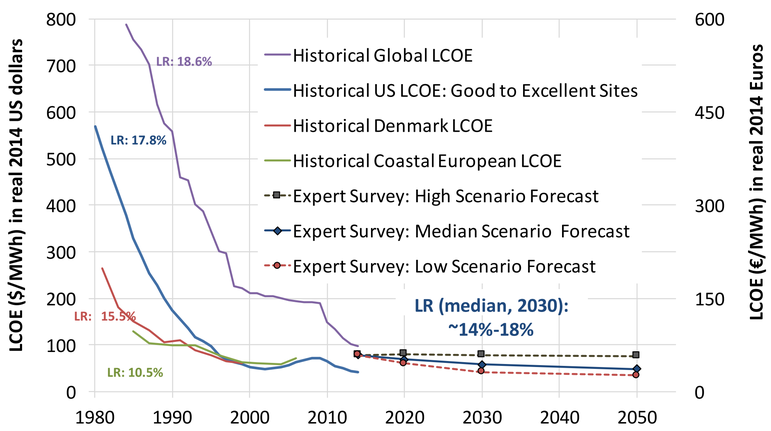
However, there are greater absolute reductions and more uncertainty in the LCOE of offshore wind compared with onshore wind, and a narrowing gap between fixed-bottom and floating offshore, with especially sizable anticipated reductions in the LCOE of floating offshore wind between 2020 and 2030.

Main drivers of Cost Reduction



The largest cost reduction drivers are CapEx and capacity factors improvements for onshore wind and CapEx and financing cost improvements for fixed-bottom offshore while reductions in floating are expected to be driven by higher capacity factors.

The median-scenario LCOE forecast has an implicit learning rate of 14%–18% which is consistent with longterm single factor learning rates from other research studies.



So it's not just turbine size that drives LCOE reduction. The survey asked about expected impact of 28 different technology, market, and other changes on LCOE reductions by 2030. Responses show that rotor-related advancements are viewed as especially important for onshore; upscaling, foundations, lower financing costs are the main issues in fixed-bottom and support structures, and more efficient installation processes are the cost reduction priorities for floating offshore technology.

The table shows top 5 responses for each turbine application:

	Wind technology, market, or other change	% of Experts rating "Large expected impact"	Rating Distribution (3- large impact, 2- medium impact, 1- small impact, 0- no impact)
Onshore	Increased rotor diameter such that specific power declines	58%	
	Rotor design advancements	45%	
	Increased tower height	33%	
	Reduced financing costs and project contingencies	32%	
	Improved component durability and reliability	31%	
Fixed-Bottom Offshore	Increased turbine capacity and rotor diameter (thereby maintaining specific power)	55%	
	Foundation and support structure design advancements	53%	
	Reduced financing costs and project contingencies	49%	
	Economies of scale through increased project size	48%	
	Improved component durability and reliability	48%	
Floating Offshore	Foundation and support structure design advancements	80%	
	Installation process efficiencies	78%	
	Foundation/support structure manufacturing standardization, efficiencies, and volume	68%	
	Economies of scale through increased project size	65%	
	Installation and transportation equipment advancements	63%	

Further Reading

The full report on the expert survey and complementary material including a webinar is available online:

https://emp.lbl.gov/publications/forecasting-wind-energy-costs-and