

## Job Estimates for Offshore Wind Support in the United States

Several recent reports from the DOE-NREL Wind Program examine employment likely to be needed to support the expected expansion of offshore wind. Together these reports cover most but not all of the nation's coastal area suitable for offshore wind development, including the Mid Atlantic, the Great Lakes, the Gulf of Mexico, the Southeast, and California. Not included are the Northeast and the Oregon-Washington coast. Estimates for the covered regions are summarized in a table below. Since several significant regions have not been addressed, estimates for the entire nation could be higher than the totals shown.

**Actual historical experience from Europe** provides both a backdrop and a reality check for the US estimates. The European Wind Energy Association reports that, as of the **end of 2014, slightly over 8,000 MW** of offshore wind had been installed [1]. By the end of 2016, cumulative European offshore wind installations had grown to 12,630 MW [2]. The International Renewable Energy Agency reported in early 2015 that, **at the end of 2014, European offshore wind employed 75,000 workers** [3].

The DOE-NREL studies [4,5] generally estimate jobs in three categories: project development and onsite labor, supply chain, and induced. The first two are directly associated with the construction of projects and the provision of the components, engineering and management needed. Those employed in these categories purchase goods and services such as living quarters, food and other retail sales, child-care, entertainment and leisure expenses. These purchases support jobs in those sectors of the economy – generally referred to as induced jobs. In the table below, induced jobs represent 35% to 40% of the job totals.

These studies also report jobs estimates in two other groupings: project construction, and operations and maintenance (O&M). In addition, they generally consider several prospective wind deployment scenarios – low, medium and high estimates. In the table below, aggregated estimates are shown, which include all of the above three categories as well as the two groupings combined together. A detailed breakout can easily be provided, but would likely be too detailed for the current purpose. The table shows medium-scenario estimates for the years 2020 and 2030.

The studies indicate a strong relationship between offshore wind installation rates and construction-job numbers – the greater the installation rate, the greater the number of jobs supported. Over the regions studied and the scenarios examined, construction jobs supported vary over a wide range from about 10 to about 40 jobs per MW. O&M jobs, however, are related to MW installed rather than under construction. Over the regions studied and scenarios examined, O&M jobs per MW installed ranged from 0.7 to 1.7, with a reasonable typical number of 1 job per MW installed. Again the table below combines these two job types into a single number for each region and year.

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Region	2020		2030	
	MW	Jobs	MW	Jobs
Mid Atlantic	1,912	8,380	7,832	31,630
Great Lakes	500	1,590	2,000	4,840
Gulf of Mexico	400	5,620	4,000	22,450
Southeast	252	4,638	4,027	26,800
California	0	1,370	1,500	4,640
<b>Totals</b>	<b>3,064</b>	<b>21,598</b>	<b>19,359</b>	<b>90,360</b>
Wind Vision	3,000	25,000	22,000	75,000-85,000

The table also shows the corresponding numbers from the DOE’s 2015 Wind Vision Scenario, which includes 3 GW of offshore wind installed by 2020 and 22 GW by 2030 [6]. As shown in the table, the Wind Vision jobs estimate is somewhat higher than the sum of mid-case regional totals for 2020, but is lower for 2030. Recognizing that the table shows only mid-case results, and that all of these numbers are only reasonable approximations, the degree of consistency is fairly good.

As mentioned above, the regional results presented here do not include several potentially important regions – most notably the Northeast. I believe a conservative guesstimate for that region would be about twice the level for California, suggesting an addition of about 10,000 jobs in 2030.

Integrating all of this information and applying some personal judgment, I recommend using a range for jobs in 2030 bound by the lower number in the Wind Vision analysis and the regional total above augmented by an estimate for the Northeast, yielding:

**2030                      75,000 to 100,000 jobs**

### Publications Referenced:

1. The European Offshore Wind Industry – key trends and statistics 2014; European Wind Energy Association (January 2015)
2. The European Offshore Wind Industry – key trends and statistics 2016; Wind Europe (January 2017)
3. Renewable Energy and Jobs – Annual Review 2015; International Renewable Energy Agency (2015)
4. Offshore Wind Jobs and Economic Development in the United States: Four Regional Scenarios; NREL/TP-5000-61315 (February 2015)
5. Floating Offshore Wind in California: Gross Potential for Jobs and Economic Impacts from Two Future Scenarios; BOEM-NREL Strategic Partnership Report NREL/TP-5000-65352 (April 2016)
6. Wind Vision: A New Era for Wind Power in the United States; DOE/GO-102015-4557 (April 2015)