

2015

CLEAN ENERGY WORKS FOR US: Q4 AND YEAR-END 2015 JOBS REPORT

PRESENTED BY



Environmental Entrepreneurs

Clean energy and clean transportation continue to create American jobs and drive economic growth. By tracking job announcements from companies; federal, state and local programs and initiatives; the media; and other sources, Environmental Entrepreneurs' (E2's) jobs reports show how and where clean energy and clean transportation works in the United States. For more details, including state-by-state breakdowns and more clean energy jobs stories, visit www.cleanenergyworksforus.org or contact Jeff Benzak at jeff@e2.org.

**Good for the Economy.
Good for the Environment.**

2015 YEAR IN REVIEW

2015 was a big year for clean energy policy, with the finalization of the federal Clean Power Plan, which sets the first-ever limits on carbon pollution from power plants; an international agreement at the UN climate talks near Paris; extension of key federal tax incentives for wind and solar electricity; and major investments in clean energy by business leaders including Microsoft founder Bill Gates and Amazon founder Jeff Bezos, among many others.

While policies put in place in 2015 lay a strong foundation for future job growth, the uncertainty that had been surrounding those policies before they were announced late in the year likely contributed to the relatively flat number of clean energy and clean transportation jobs announced in 2015.

Throughout the year, more than 41,000 jobs were announced at 143 projects across the country, according to jobs tracking analysis by E2 that tends to just track larger announcements. This compares to 47,000 jobs announced in 2014.

California, Texas, and Utah led the nation in new job announcements last year, followed by Georgia, Colorado, Nevada, Virginia, and Michigan.

Looking at specific industries, solar continued its sharp growth last year, with companies in the sector announcing more than 23,000 new jobs at 73 new electricity generation projects. Solar

manufacturing announcements added 3,000 more jobs at 11 projects. Last year's combined total of 26,000 power generation and manufacturing jobs is about 19 percent higher than the previous year. Wind also had a strong year, with nearly 7,500 jobs announced at 29 wind farms and eight manufacturing facilities across the country.

Led by Tesla Motors, the electric vehicle industry is also growing. California-based Tesla announced plans in December to hire 4,500 new employees over the next four years. The electric vehicle company, which has grown 14-fold since 2010, is enhancing efforts to build an autonomous vehicle that would compete with self-driving cars being developed by Google and Apple.

With the potentially game-changing policies announced late in 2015, we can expect 2016 to be a year of more rapid growth in clean energy jobs.

2015 TOP 10 STATES			
RANK	STATE	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
1	California	8,976	21
2	Texas	5,211	16
3	Utah	4,050	7
4	Georgia	3,708	7
5	Colorado	2,650	7
6	Nevada	2,460	5
7	Virginia	1,815	6
8	Michigan	1,282	7
9	New York	1,275	5
10	Kansas	848	4

2015 SECTOR BREAKDOWN		
SECTOR	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
Renewable Energy	29,801	110
Biofuel	138	1
Generation (Biofuel)	193	2
Generation (Biogas)	120	2
Generation (Biomass)	619	3
Generation (Solar)	23,290	73
Generation (Wind)	5,441	29
Manufacturing	10,378	27
Advanced Vehicles	3,825	3
Energy Efficiency	400	2
Energy Storage/Fuel Cells	1,175	3
Solar	3,048	11
Wind	1,930	8
Other	1,080	6
Recycling	1,010	5
Smart Grid/Transmission	70	1
TOTAL	41,259	143

CASE STUDY

OFFSHORE WIND 'HUGE' OPPORTUNITY FOR EAST COAST BUSINESSES

About 12 miles off the coast of Rhode Island, the nation's first commercial-scale offshore wind farm will begin to take shape this next spring.

The \$290-million, 30-megawatt wind farm is expected to create 200 local construction jobs as well as longer-term maintenance jobs.

But one of the big challenges facing project developer Deepwater Wind is how on earth will technicians and laborers get to work — especially when the worksite is a patch of deep blue sea far from the shore in the Atlantic Ocean?

Charles A. Donadio Jr. is a Rhode Island native with experience moving people and cargo over the ocean.

Donadio got his start in the water transportation business back in the 1990s, when he purchased a sightseeing tour boat company. He then founded Island Hi-Speed Ferry from the mainland to Block Island, and went on to start Rhode Island Fast Ferry as well, which provides passenger ferry service from Rhode Island to the Massachusetts summer resort island of Martha's Vineyard.

Last March, after Deepwater had successfully gained approval from 11 different state and federal entities to build the wind farm, Donadio had an idea for a new business: ferrying workers to offshore wind construction sites.

He approached Deepwater with a proposal to provide work crew transport service for its Block Island project. Deepwater agreed.

To learn the specifics of this highly specialized commute, Donadio traveled to the Isle of Wight and Great Yarmouth in the United Kingdom to see how crews were transported to and from offshore wind farm sites there.

He toured the SouthBoats and Alicat shipyards, boarded a crew transfer vessel and sailed to the Scroby Sands Offshore Wind Farm, and observed how the vessel docked to one of the turbines.

"I had the opportunity see the industry first-hand along with meeting with some of the top crew transfer operators in Europe today," Donadio said.

Donadio's Atlantic Wind Transfers, a subsidiary of Rhode Island Fast Ferry, now has a 20-year contract to provide transportation service to the wind farm site.

Maritime trade resurgence

Like Donadio, boat builder Marcia Blount of Blount Boats of Warren, R.I., has in recent years been monitoring offshore wind farm proposals like the Cape Wind project and Deepwater Wind's Block Island farm.

Blount also traveled to the U.K. to learn about the offshore wind farm industry.

In the process, she secured the only U.S. license to reproduce a proven boat design that allows for the bow of the catamaran — with its two pontoons lined with thick rubber — to "hug" the leg of a turbine platform.

Atlantic Wind Transfers has since contracted with Blount to build an approximately \$4 million, 69-foot catamaran that will transport the wind farm workers to Deepwater's site.

Blount will employ up to 70 people to help build the vessel — a combination of permanent employees, contractors and sub-contractors. Most of the jobs building the vessel are high-wage positions. The vessel is expected to be launched in the next spring.



A 21-meter motor vessel similar to the one that will be used to transport technicians to the Deepwater Wind offshore wind farm in Rhode Island docks to a worksite.

In keeping with the low-carbon technologies being deployed throughout the Deepwater Wind project, the vessel will be powered by modern engines that meet the Environmental Protection Agency's toughest emission standards.

During wind farm construction, the vessel will ferry workers to the site every day at speeds up to 28 knots.

The specialized work boat will also be cross-certified, meaning that when it isn't carrying up to 16 techs out to the wind farm construction site, it could take up to 49 paying customers on sight-seeing tours of the farm.

A huge opportunity

Donadio's vessel operations are headquartered in Quonset Point, where he's leased 5.5 waterfront acres and 600 feet of dockage close to where Deepwater maintains its manufacturing operations.

This Narragansett Bay location could also potentially provide services to the larger offshore wind projects taking shape in federal waters between Block Island and Martha's Vineyard.

Three particular leases in that area — held by Deepwater, Dong Energy of Denmark, and Offshore MW — could lead to the development of 500 additional offshore turbines. (Deepwater Wind's new Block Island farm will only have five turbines.)

Even more opportunities lie off the Mid-Atlantic coast.

As offshore wind takes hold, Donadio is confident Atlantic Wind Transfers will lead the industry nationwide.

"This is a tremendous opportunity for a company like mine that will have the experience and knowledge needed to lead this sector," he said.

"The potential is huge."

—Environmental Entrepreneurs

PHOTO COURTESY OF ATLANTIC WIND TRANSFERS

FOURTH QUARTER 2015 AT A GLANCE

In Q4 2015, there were 33 project announcements that could cumulatively create nearly 11,000. This is slightly higher than results from the fourth quarter of 2014.

Thanks to Tesla's major announcement to add more than 4,500 employees to its workforce and a handful of solar projects announced by other businesses, California was the No. 1 state for clean job creation in the fourth quarter.¹

Virginia and New York were ranked second and third for job-creation, respectively. Dominion announced investment in solar projects around the Commonwealth of Virginia that could create up to 960 jobs, and a wind farm near Roanoke could add another 130 jobs.

In New York, major solar manufacturing announcements from Solar City in Buffalo and 1366 Technologies in Batavia could cumulatively add 1,050 jobs in the next three years.

Colorado also cracked the top 10, ranking fourth this quarter, thanks to a major announcement from Sunrun to add 800 jobs to its Denver office.

TAX CREDIT EXTENSION WILL HELP SOLAR SHINE

For the fifth consecutive quarter, solar led the charge on job creation. Companies in 13 different states announced the creation of up to 4,800 jobs at 19 generation projects. An additional 1,000 jobs could be created at two different solar manufacturing plants in Upstate New York.

The strong performance in the fourth quarter cements 2015 as one of solar's strongest years yet. Solar provided more than 5 percent of the nation's electricity for the first time in 2015, created more than 23,000 jobs, and continued to drive economic growth.²

While the industry performed well throughout the year, the expected expiration of the federal Investment Tax Credit (ITC) cast doubt over the industry for much of 2015. Many observers and analysts predicted a major slowdown in industry growth following the tax credit's expiration. Fortunately, in December 2015 as part of a larger tax package, Congress passed an extension for the ITC and the major tax credit for wind, the Production Tax Credit (PTC).

The ITC was extended at its current level of 30 percent of project costs through 2019. After that, it will be phased down to 26 percent in 2020 and 22 percent in 2021, and will then drop to 10

percent permanently. Importantly, solar projects are allowed to qualify when they begin construction, meaning that this extension will be driving commercial-scale projects through 2023.

The renewed ITC will make more projects feasible and we can expect continued growth in solar. Analysis from the Solar Energy Industry Association (SEIA) finds that 25 additional GW of solar (for reference, there's currently approximately 25 GW of installed solar capacity in the U.S.) will come online in the next 5 years thanks to the extension of the tax credit. As a result, more than 220,000 new solar jobs will be created.³

PRODUCTION TAX CREDIT

Along with the ITC for solar, the PTC, a 2.3-cents-per-kWh credit for wind generation, was renewed by Congress in the waning days of 2015. Wind in 2015 saw a year similar to 2014 with more than 5,000 jobs announced at 29 power generation projects nationwide, and nearly 2,000 additional manufacturing jobs.

Q4 SECTOR BREAKDOWN		
SECTOR	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
Renewable Energy	5,532	24
Biofuel	138	1
Generation (Solar)	4,807	19
Generation (Wind)	587	4
Manufacturing	5,050	6
Advanced Vehicles	3,375	1
Energy Efficiency	200	1
Energy Storage/ Fuel Cells	325	1
Solar	1,050	2
Wind	100	1
Other	360	3
Recycling	360	3
TOTAL	10,942	33

This compares to 2013 — the last full year of the PTC being in place — which saw the creation of nearly 10,000 jobs in wind generation and manufacturing. With the return of the PTC, the industry may see growth similar to 2013's higher levels. Additional opportunities lie in offshore wind (see Page 3).

PARIS CLIMATE AGREEMENT

In December, leaders from nearly 200 nations gathered in Paris to negotiate the most ambitious global agreement in history to fight climate change.

The deal requires countries to peak their emissions as soon as possible, and continue reducing their emissions throughout the century. It will also unlock trillions of dollars in investment in clean energy resources like wind and solar by sending what's been labeled "the mother of all market signals."

During the negotiations, in a tremendous groundswell of action, cities, organizations, businesses, and major investors made commitments of their own to fight climate change and build a clean energy future. One of the most notable was from a group of business leaders including tech titans Gates and Bezos, among others, who pledged to invest more than \$2 billion in private capital in clean energy research-and-development.

The Paris agreement designates new private-sector funding sources for clean energy research; massive new renewable energy initiatives by nations, states and cities; and builds unprecedented momentum for action on climate change.

CLEAN POWER PLAN

The federal Clean Power Plan, finalized by the Environmental Protection Agency in the summer, also cannot be overlooked in importance in driving clean energy job growth. It sets the first-ever carbon pollution limits on domestic power plants across the U.S., and it will help reduce power-sector carbon emissions 32 percent from 2005 levels by 2030. The CPP is sending a strong, clear market signal to the private sector to increase job-creating investments in renewables and energy efficiency.

To continue clean energy job growth, federal and state policymakers must provide businesses with the regulatory certainty and strong market signals they need to make new investments and expand operations. Implementing the Clean Power Plan is one of the most important steps policymakers can take, right now, to ensure the industry achieves its potential.

Q4 TOP 10 STATES			
RANK	STATE	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
1	California	3,975	4
2	Virginia	1,090	2
3	New York	1,050	2
4	Colorado	1,000	2
5	Texas	650	2
6	Connecticut	425	2
7	Mississippi	400	1
8	Michigan	366	3
9	Florida	302	2
10	Minnesota	300	1

CONCLUSION

2015 was a strong year for clean energy job growth, and especially for laying the policy framework that will spur additional rapid deployment of renewable energy into the future. As we look ahead, the U.S. clean energy economy is well-positioned for growth thanks to the Clean Power Plan, global commitments in Paris, and the renewed tax credits for wind and solar.

While these recent policy gains are critical in driving the industry forward, there is much more work to be done to grow our clean energy economy. Designing strong Clean Power Plan state implementation plans that prioritize renewables and efficiency as core compliance strategies is one big way to ensure clean energy meets its growth potential in 2016.

Doing so will continue the growth of clean, renewable energy businesses and create more good, high-paying jobs for workers across our nation.

E2 JOB TRACKING METHODOLOGY

OVERVIEW: E2 primarily draws job announcement figures from articles that run in local and national news outlets. The media stories E2 tracks mention specific projects and specific job-hiring data in the renewable energy, energy efficiency, and public transportation sectors. Since E2 began tracking job announcements in 2011, this method of job announcement tracking has been used about 95 percent of the time. For the roughly 5 percent of occasions when an article mentions a project — but no other job numbers are found — E2 at our own discretion may use job estimates cited on developer Web sites or in publicly available permits.

JOB TYPE: Only direct jobs are counted; E2 does not count indirect or induced jobs. If an article includes indirect or induced job numbers, E2 determines direct job creation estimates.

ESTIMATES: Some announcements are rough estimates, as developers are inclined to make statements like “few hundred,” “couple hundred,” or “thousands.” In each of these instances we count the minimum — such as 200 or 2,000. If more specific numbers, either higher or lower, are released, E2 updates databases accordingly.

SECTORS INCLUDED: Wind, solar, advanced biofuels, geothermal, energy-efficient appliance manufacturing, building retrofits, rail systems, public transportation infrastructure, smart meters,

transmission improvements, combined heat and power, clean-tech education centers, recycling facilities, etc.

TIMEFRAME: Job numbers are assigned to quarters based on publication dates of news articles. Also pegged to publication dates is a four-year total timeframe that determines whether announced jobs can be counted. This timeframe includes jobs created one year prior to the announcement, and it also includes jobs expected to be created at any point within the three years immediately following the announcement.

STATUS: E2 qualifies jobs within three categories:

- **Announced:** Project received permits/approval, but construction not yet commenced.
- **Under Construction:** Project in physical development. Construction workers employed, permanent jobs not yet created.
- **Operational:** This category contains two types of announcements:
 - Project built, permanent jobs being created, construction workers no longer on site.
 - All jobs created. Project developer retroactively examining employment numbers.

Endnotes

¹ Note: E2 only counts jobs that will be created in the next 3 years. Since Tesla's announcement to hire 4,500 employees over 4 years goes beyond that timeframe, only 3,375 workers $((4,500/4)*3)$ were counted toward California's job total for Q4 2015.

² Note: The Solar Foundation released its 2015 Solar Jobs Census in January 2016, which found that 35,052 solar jobs were created in 2015. Because the Solar Foundation employs a different methodology, surveying employers rather than gathering media announcements, this number may be more accurate. E2's methodology typically returns a more conservative estimate of jobs created.

³ <http://www.seia.org/research-resources/impacts-solar-investment-tax-credit-extension>

For more details, including a state-by-state breakdown and stories that show what's happening in the clean economy near you, check out www.cleanenergyworksforus.org



Environmental Entrepreneurs (E2) is a national, nonpartisan group of business leaders, investors, and professionals from every sector of the economy who advocate for smart policies that are good for the economy and good for the environment. Our members have founded or funded more than 2,500 companies, created more than 600,000 jobs, and manage more than \$100 billion in venture and private equity capital. For more information, see www.e2.org or follow us on Twitter at @e2org.