

2014

CLEAN ENERGY WORKS FOR US: Q4 ^{AND YEAR-END} 2014 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.

2014 YEAR IN REVIEW

Nearly 47,000 clean energy and clean transportation jobs were announced at more than 170 projects across the country in 2014, according to jobs tracking analysis by Environmental Entrepreneurs (E2).

Nevada, California, and New York led the nation in new job announcements last year, followed by Michigan, Arizona, Texas, Colorado, North Carolina, Utah, and New Mexico.

Despite the continued growth, ongoing uncertainty over public policy at both the federal and state levels, coupled with the expiration of beneficial tax policies, continued to cast a cloud over clean energy industries, resulting

in fewer announcements than in the past. In 2013, for instance, more than 78,000 new clean energy and clean transportation jobs were announced at 260 projects.

In 2014, the solar industry led all sectors in clean energy, thanks to declining materials prices and favorable public policies, including the federal Investment Tax Credit and state Renewable Portfolio Standards. More than 20,000 solar-related jobs were announced at 60-plus projects.

The advanced vehicle sector also had a strong year, with more than 9,000 jobs announced. Tesla Motors' announcement of a 6,500-employee "Gigafactory" helped make Nevada the No. 1 state for clean energy jobs in the country. In Michigan, General Motors announced plans to hire 1,400 workers for its electric vehicles division.

2014 SECTOR BREAKDOWN		
SECTOR	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
Renewable Energy	23,625	112
Biofuel	813	8
Generation (Biogas)	125	4
Generation (Biomass)	399	7
Generation (Geothermal)	1,010	3
Generation (Solar)	15,867	60
Generation (Wind)	5,411	30
Manufacturing	16,015	27
Advanced Vehicles	9,020	7
Energy Storage/Fuel Cells	222	2
Public Transportation	266	2
Solar	5,109	10
Wind	1,398	6
Other	2,266	3
Combined Heat and Power	20	1
Public Transportation	2,000	1
Recycling	1,932	30
Building Efficiency	925	3
TOTAL	46,783	177

FOURTH QUARTER 2014 AT A GLANCE

In the fourth quarter 2014, more than 10,800 clean energy and clean transportation jobs were announced at 50-plus projects. That was down from 13,000 jobs announced in the comparable quarter a year earlier.

California ranked No. 1 in clean energy job announcements in the quarter. Michigan was second, mainly the result of construction jobs generated by Detroit's new "M-1" light rail line that's expected to create 2,000 jobs, and GM's plans to add workers to further production of its Chevy Volt and other electric vehicles.

Following California and Michigan in Q4 job announcements were Nevada, Texas, Missouri, Wisconsin, New Mexico, Iowa, Indiana, and Minnesota.

In Nevada, SolarCity reported several hundred more hires at local offices, while electric vehicle manufacturer Cenntro opened a factory that will employ 300 workers in Sparks.

In California, the nation's leader in clean energy policies, utilities announced plans in Q4 to hire nearly 1,000 workers to begin construction of large-scale solar projects. In addition, to meet growing demand for solar, residential installer NRG Home Solar plans to hire 100 workers in Merced and San Diego.

SOLAR SHINES BRIGHT

The solar industry was the leading creator of clean energy jobs in both the fourth quarter and the full year.

Major solar announcements in 2014 included Solar City's plans for a manufacturing facility that could employ 5,000 workers in

A CLOSER LOOK AT 2014'S TOP TEN STATES

1. Nevada (8,591; 6 Announcements): In September, the Silver State got the gold when Tesla Motors chose Reno as the site of its "Gigafactory," a \$5 billion, 500-plus acre lithium ion battery manufacturing facility to support the production of Tesla's electric vehicles. The Gigafactory aims to employ 6,500 full-time workers. Nevada also became a prime market for solar providers: SolarCity quadrupled its projected hires in the state, attributing growth to Gov. Sandoval and the state legislature's efforts to bolster Nevada's SolarGenerations program.¹

2. California (7,323; 23 Announcements): E2 tracked more than 4,400 job announcements from California's solar sector, as residential installers opened new offices and utilities announced large-scale projects. California has a suite of policies and programs to bolster clean energy, including the California Global Warming Solutions Act of 2006 (AB 32); an ambitious Renewables Portfolio Standard and numerous municipal financing programs to advance energy efficiency, solar, biofuel and wind generation. Aiming to maintain its position as a leader in these sectors, Gov. Brown in January 2015 proposed the state set policies to generate 50 percent of electricity from renewables by 2030.²

3. New York (7,175; 12 Announcements): In 2014, New York demonstrated strong commitment to both clean energy generation and manufacturing. SolarCity announced plans to build an advanced solar cell manufacturing facility in Buffalo that could employ 5,000, and the SUNY College of Nanoscale Science and Engineering in Albany is constructing a laboratory to house more than 1,000 staff focusing on clean tech research. Meanwhile, New York aims to further clean energy generation and grid efficiency through its NY-SUN Initiative and Reforming Energy Vision (REV) proceedings.



4. Michigan (3,628; 6 Announcements): Michigan capitalized on its manufacturing prowess to meet projected demand for solar and advanced vehicles throughout the next decade. General Motors reported it aims to hire 1,400 workers to expand EV production and development, and solar cell manufacturers SolarBos and Suniva will employ at least 125 workers at new factories in Walker and Saginaw. In Detroit, the city is constructing a light-rail line to transform public transit; developers estimate the project will create 2,000 construction jobs.

5. Arizona (3,402 jobs; 8 Announcements): With ample sun, solar energy provides a key economic opportunity for Arizona. OneRoof Energy and Vivint announced plans to hire 210 full-time employees to provide residential and commercial solar installation services. Two Air Force bases, Davis-Monthan and Luke, reported creating 342 jobs through the construction of solar arrays.

6. Texas (1,789 jobs, 14 Announcements): In 2012 and 2013, the Lone Star State reported at least 1,400 jobs in the wind sector, yet as PTC uncertainty continued through 2014, E2 tracked just 880 job announcements. However, the state remains in the top ten in 2014 as the solar industry looks to grow, with 552 jobs announced from utility scale PV projects.

7. Colorado (1,583 jobs; 5 Announcements): The PTC's 2013 expiration resulted in a spike in demand for turbines in 2014; manufacturer Vestas announced 1,500 new jobs through the year in its facilities in Brighton, Pueblo, and Windsor. Some have raised concerns over the longevity of these jobs, especially since the company was forced to lay off hundreds of workers following a previous expiration of the PTC.³

8. North Carolina (1,420 jobs, 11 Announcements): The Tar Heel State is fourth in the nation in solar capacity; E2 tracked 1,290 job announcements from the sector in 2014.⁴ Industry officials note the state's RPS, coupled with net metering provisions and tax incentives, have spurred investment. Yet new projects may wane as state tax credits expire at the end of 2015. Meanwhile, in Concord, Alevo announced the construction of a lithium ion storage module facility that will employ 500 workers, with hopes to hiring 2,500 in three years.

9. Utah (1,210 jobs; 2 Announcements): Utah's solar industry is beginning to take off, as the state installed about half its cumulative capacity last year. As module prices decline, solar is increasingly cost effective with low water resources and high solar irradiance. For example, First Wind signed PPAs with utility Rocky Mountain Power for 320 MW in solar projects at or below the price of new gas capacity.⁵

10. New Mexico (1,148 jobs; 5 Announcements): Like its neighbors, New Mexico's geographic resources make it a prime market for solar, with 400 jobs announced. Two wind projects qualified for the 2013 PTC, creating 600 construction jobs and 40 permanent operational positions. Cryq Energy announced the construction of New Mexico's first utility scale geothermal plant, hiring 100 construction workers and 8 permanent staff in Animas.

Endnotes

¹ <http://www.solarcity.com/newsroom/press/solarcity-opens-first-nevada-operations-center-henderson>

² <http://www.greentechmedia.com/articles/read/calif.-gov.-jerry-brown-calls-for-50-renewables-by-2030>

³ <http://kdvr.com/2012/10/09/vestas-continues-layoffs-in-brighton-as-tax-credit-lingers/>

⁴ <http://www.seia.org/research-resources/solar-industry-data>

⁵ <http://www.greentechmedia.com/articles/read/Solar-at-Grid-Parity-in-Utah-a-Coal-State-With-No-RPS>

Buffalo, NY, and more than 4,400 solar jobs announced at utilities and installation companies in California.

In the fourth quarter, domestic solar equipment manufacturers such as SolarWorld, Monolith, and First Solar reported plans to expand operations, adding nearly 400 jobs at plants in Oregon, New York, and Ohio.

Widespread photovoltaic development is especially evident in the Southwest: every Southwestern state ranked among the top 10 for clean energy and clean transportation jobs, with almost all reporting a significant number of job announcements in the solar sector. Price declines and increasing economies of scale prompted residential installers to open new offices in the region, while favorable net metering policies empowered homeowners to sell their energy back to the grid.

Solar is increasingly popular with both homeowners and businesses, with the levelized cost of energy from utility scale solar dropping 78 percent over the past five years, prompting many utilities in the Southwest to enter into power purchase agreements (PPA) with solar developers.¹

However, with the ITC for solar projects currently set to expire at the end of 2016, it is important to note solar job growth regionally could be inconsistent.

Q4 SECTOR BREAKDOWN		
SECTOR	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
Renewable Energy	6,746	28
Biofuel	86	1
Generation (Biogas)	80	2
Generation (Biomass)	8	1
Generation (Solar)	5,785	18
Generation (Wind)	787	6
Manufacturing	1,082	8
Advanced Vehicles	400	2
Public Transportation	266	2
Solar	396	3
Wind	20	1
Public Transportation	2,000	1
Recycling	1,037	15
TOTAL	10,865	52

In fact, a recent survey found over 60 percent of solar installers indicated they would lay off staff should the ITC expire, but there may also be a short-term job boost as developers rush to complete projects before the tax credit falls to 10 percent.²

ELECTRIC VEHICLES CHARGE FORWARD

The electric vehicle sector announced more than 9,000 jobs, the second-highest of any sector in 2014. As automakers streamline electric vehicle production, they're making advanced vehicles more affordable and more accessible to more consumers.

General Motors and Tesla reported major investments in advanced battery technology and production, announcing 8,500 jobs in three states.

GM indicated that the strength of the overall economy, coupled with the return of younger buyers to the market, suggests greater demand for advanced vehicles in 2015.³

In 2014, approximately 119,000 EVs were sold in the U.S., a 128-percent increase since 2012.⁴

PUBLIC POLICY UNCERTAINTY CONTINUES TO THREATEN GROWTH

Despite the continued job growth in clean energy and clean transportation in 2014, ongoing uncertainty and attacks on public policies threaten future job creation, just as many of these industries are beginning to hit their stride.

On the federal level, Congress has failed to act to ensure the availability of federal tax credits for wind, solar, energy efficiency and other clean sources of energy, resulting in a chilling effect on the investment climate surrounding these technologies.

On the state level, fossil fuel-backed lobby groups have convinced lawmakers in more than a dozen states to introduce legislation to roll back or weaken renewable energy and energy efficiency standards.

In numerous states, so-called "net-metering" programs that provide financial incentives for consumers to install solar panels on their roofs also are under attack.

If state legislatures halt these beneficial clean energy policies – despite their proven effectiveness – it would force consumers to pay higher prices for clean energy and discourage growth of solar, wind and other renewable technologies.

NEW POLICIES HOLD POTENTIAL

Two major federal policies could provide a major boost to clean energy jobs in the future.

The federal Clean Power Plan calls on states to develop their own programs to reduce carbon pollution from existing power plants by 30 percent by 2030. To do so, states can increase the amount of renewable energy they generate, and also improve energy efficiency in buildings such as offices, schools and homes. Both options will create jobs and drive economic growth. A recent study by E2

affiliate the Natural Resources Defense Council (NRDC) estimated that efficiency measures under the Clean Power Plan can create up to 274,000 jobs in the energy efficiency sector alone.⁵

Congress this year also must pass a new authorization bill for the country's transportation programs. This new bill provides the opportunity for Congress to improve our transportation system by providing more public transit, better incentives for cleaner vehicles and other options that can create jobs.



Wind farms like this one employ workers who construct, install and maintain the turbines.

(Photo courtesy of EverPower)

CASE STUDY: PITTSBURGH WIND COMPANY'S FOUR KEYSTONE STATE PROJECTS HAVE CREATED 400-PLUS JOBS

"We moved our headquarters to Pittsburgh because it was a great place to do business," recalls Jim Spencer, CEO at EverPower Wind Holdings. Founded in 2002 in New York, the firm began placing employees in Pennsylvania in 2008 when it began operating projects along the wind-rich Allegheny ridge in the Southwest part of the state. Now, EverPower employs 36 people in its Pittsburgh headquarters and is the largest owner operator of wind farms in the Keystone State, with 307 MW in operation. The firm's four Pennsylvania projects have created more than 400 construction jobs, 24 permanent jobs and more than \$1 million in revenue to Pennsylvania towns, counties and schools each year.

"Community engagement is central to wind development," explains Kevin Sheen, Senior Director of Development and Public Relations. Before developing a wind farm, EverPower staff will attend town hall meetings, hold information sessions, and other events to engage the local community on the project. Schools can be big beneficiaries of wind farms; for example EverPower's 139.4 MW Twin Ridges Farm in Somerset County brought \$223,000 in annual payments to local townships; \$93,000 of which was directed to the surrounding school districts. But it's not just local schools that see the values of wind.

While landowner payments can vary – landowners at EverPower's PA wind farms can earn \$15,000-\$20,000 per year by housing a turbine on their property. Small farms often operate on the margin, with revenue varying each year based on economic forces and commodity prices. Despite annual variability, one thing remains certain: the wind will blow, and these farmers will earn income as a result. For small farmers this revenue represents an important component of their annual revenue and has helped many to upgrade equipment or even keep their farms. State level policies like the Alternative Energy Portfolio Standard provide important incentives to develop wind energy projects in Pennsylvania. The federal Production Tax Credit (PTC) provided a per-kilowatt-hour incentive to developers of wind power, helped spur the initial growth of the industry. However, its expiration in 2013, and uncertain future, created boom-and-bust cycles for the industry. Moving forward, EverPower hopes to grow under stable, long-term federal policy, so it can continue to provide clean energy jobs to Pennsylvanians.

— *Environmental Entrepreneurs*

Note: This case study originally appeared in the Nov. 2014 E2 report www.CleanJobsPA.com.

WIND, PUBLIC TRANSPORTATION SECTORS ALREADY IN DECLINE

What happens when lawmakers don't act on beneficial policies was evident in the wind industry in 2014. The expiration of the wind industry's most important federal policy, the Production Tax Credit (PTC) was a major setback for wind, and continues to hamper its growth.

The number of wind industry jobs announced in 2014 shrunk to 6,800 from 9,700, following the 2013 expiration of the PTC for wind.

The number of new construction, manufacturing and other jobs in the mass transit industry also declined notably in 2014, mainly because most states and municipalities have not commissioned new light rail or expanded public transit projects with the end of the funding tied to the 2009 American Recovery and Reinvestment Act.

CONCLUSION

Non-hydro renewable energy accounted for 46 percent of added energy capacity in 2014, and clean energy now reliably meets at least one-fifth of the electricity needs of five separate states.⁶

Reaching such impressive milestones is not easy. It requires a skilled and robust workforce, as well as smart policies at the state and federal levels.

In order to build upon clean energy's successes, it's up to federal and state policymakers to provide businesses with regulatory certainty and the strong market signals they need to expand operations and create jobs.

Policymakers can start by strongly implementing the federal Clean Power Plan, strengthening state-level Renewable Portfolio Standards, and extending tax credits for wind, solar, and energy efficiency.

NEW E2 SURVEY: CLEAN ENERGY BUSINESSES SUPPORT TAX CREDITS

To better understand the effects of clean energy policies on American businesses and workers, E2 recently commissioned a sampling of hundreds of clean energy and energy efficiency businesses in all 50 states. Businesses sampled include some of the most established in the entire industry – with almost half in operation for more than a decade and almost half employing 10-200 workers.

The results showed that an overwhelming majority of these businesses are making investments themselves to drive growth in the clean energy industry and create economic opportunities. More than two-thirds of these companies said they have made significant investments in renewables or energy efficiency in the past year alone.

Yet clearly, uncertainty over federal tax incentives holds back economic growth for renewable energy companies operating in sectors like wind and solar, and for energy efficiency companies in sectors like lighting and HVAC.

- **58 percent** of renewable energy companies/**55 percent** of energy efficiency companies said extension of federal production tax credits would probably result in their making new investments.
- **49 percent** of renewable energy companies/**42 percent** of energy efficiency companies said elimination of federal tax credits would discourage companies from making new investments.
- **33 percent** of renewable energy companies/**38 percent** of energy efficiency companies said uncertainty over the federal extension of production tax credits either completely discouraged companies from making new investments or caused them to scale back and/or slow down investment rates.
- **50 percent** of the responding companies said the federal Clean Power Plan - which would increase renewable energy and energy efficiency and set the first-ever limits on carbon pollution in America – would spur investments in their companies.

Of the more than 200 companies responding to the questionnaire, solar, wind, and woody/non-woody bioenergy were the top renewable industries represented, while lighting, HVAC, and weatherization were the top energy efficiency industries.

Almost a quarter of the businesses have invested at least \$1 million in manufacturing, producing or distributing new renewable energy or energy efficiency in the past two years.

— *Environmental Entrepreneurs*

Endnotes

¹ <http://www.lazard.com/PDF/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf>

² <http://tsfoundation.wpengine.com/wp-content/uploads/2015/01/Factsheet-National-Solar-Jobs-Census-2014.pdf>

³ <http://fleetowner.com/blog/what-will-keep-light-vehicle-sales-booming>

⁴ <http://fortune.com/2015/01/08/electric-vehicle-sales-2014/>

⁵ <http://www.nrdc.org/air/pollution-standards/state-benefits.asp>

⁶ <https://www.snl.com/InteractiveX/Article.aspx?cdid=A-30383350-12597>



Q4 TOP 10 STATES			
RANK ⁱ	STATE	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
1	CA	3,276	7
2	MI	2,100	2
3	NV	1,081	3
4	TX	661	6
5	MO	600	1
6	WI	313	3
7	NM	300	1
8	IA	296	2
9	IN	275	3
10	MN	253	2

ⁱ States have been ranked by the total number of jobs announced in media reports and company press releases between October–December 2014.



CASE STUDY: GROWING FLORIDA LIGHTING COMPANY NOW EMPLOYS 30 WORKERS



About three-quarters of Florida’s 130,000 clean energy workers are in the energy efficiency sector. (Photo courtesy of LumaStream)

In 2009, sculptor Eric Higgs designed a lighting installation that filled an entire block of downtown Tampa Bay with light. The abstract public art piece was intended to

artistically enhance a parking structure, and was part of the city’s beautification efforts. Higgs was an environmentalist in addition to being a sculptor, and recognized that the 20,000 watts required to power the sculpture was a waste of energy. He decided to search for a more energy-efficient lighting solution. Finding none, Higgs recognized the opportunity to create one himself, and partnered with leading lighting innovators to design LED fixtures that cut his sculpture’s power consumption down to 890 watts. Higgs found the quality and efficiency of the lighting to be greater than any market alternative, and LumaStream was born.

LumaStream began with residential customers and the outdoor lighting for the Museum of Fine Arts in St. Petersburg. As the company grew, it focused on a unique, all-digital approach to LED lighting. While this innovative approach brought its share of challenges, it also brought opportunities, and today LumaStream provides one of the most energy efficient, controllable, safe, and reliable LED solutions on the market. Jennifer Andrews, LumaStream’s marketing manager, notes that “the patented power distribution technology improves “the performance, reliability, energy efficiency, and controllability of LED lighting,” in addition to reducing maintenance requirements. But viewers are most impressed by the “virtually unlimited number of displays of colors and programmable lighting scenes.”

As more customers became aware of the quality and efficiency of LumaStream’s products, the company began designing lighting for restaurant chains and hotels. Today, it has completed hundreds of projects, has offices in Washington and Virginia, and employs more than 30 engineers, lighting specialists, sales representatives, and other staff. When asked about the company’s expansion goals, Andrews laughed and said, “It seems like we are hiring someone new every week.”

— *Environmental Entrepreneurs*

Note: This case study originally appeared in the Oct. 2014 E2 report www.CleanJobsFlorida.com.



Duke Energy, Wanzek Construction and Siemens employees assemble beneath Tower 90 at Duke Energy's Top of the World Windpower Project near Casper, Wyoming. (Creative Commons, Flickr user Duke Energy)

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.

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®

Environmental Entrepreneurs (E2) is a national non-partisan group of business leaders, investors and others who promote smart environmental policies that drive economic growth. Our members, active in nearly every state in the country, have built or financed more than 1,700 companies that have created more than 570,000 jobs, and manage more than \$100 billion in venture and private equity capital. For more information, see www.e2.org.