Q3 2014

CLEAN ENERGY WORKS FOR US:
Q3 2014 JOBS REPORT

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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 E2 press secretary Jeff Benzak at jeff@e2.org.

INTRODUCTION: STRONG NUMBERS — BUT WHAT WILL CONGRESS DO?

More than 18,000 clean energy and clean transportation jobs were announced in 23 states during the third quarter of 2014. This represents an uptick relative to Q2. This quarter's numbers are also higher than the corresponding quarter a year ago.

Despite the strong quarter, future clean energy job growth is anything but assured, especially given the uncertainty surrounding the political changes that came with the Nov. 4 election. It will be up to the new Republican-led Congress to decide whether to continue the job-creating clean energy policies that have been crucial to driving clean energy development and employment in every state in the country.

Both Republican and Democratic congressional districts benefited almost equally from clean energy job announcements — indicating that clean energy knows no political boundaries, according to E2's analysis. At least 9,095 jobs were announced in Republican congressional districts, compared with 7,690 jobs announced in Democratic districts. About 1,250 job announcements spanned both Republican and Democratic districts.

Another reason this quarter's results are not as rosy as they may initially appear is that utilities seeking maximum return on investment rushed to install solar projects ahead of the scheduled expiration of the Investment Tax Credit (ITC) for solar power. The current ITC stipulates that projects must be completed by the end of 2016 in order to qualify for the 30-percent tax credit. Should the lame-duck or new 114th Congress fail to extend or reinstate tax credits for solar, wind, and energy efficiency, it would remove some of the market certainty clean energy businesses need to hire more workers. This would continue to tilt the playing field in the favor of a fossil fuel industry heavily supported by subsidies, potentially slowing momentum of clean energy job announcements in multiple sectors in upcoming quarters.

The wind industry offers a grim example of what happens to growing industries when Congress prematurely removes or fails to renew incentives. After the wind energy Production Tax Credit (PTC) expired in 2012, industry group American Wind Energy Association (AWEA) reported 32,000 industry jobs were lost the following year.[1] Since the PTC expired at the end of last year, wind announcements once again are declining drastically: by Q3 2014, E2 has tracked just over 5,000 jobs — less than half as many as this time in 2012.

SECTOR	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
Renewable Energy	**6,094**	**25**
Generation (Biomass)	45	1
Generation (Solar)	4,602	13
Generation (Wind)	598	5
Biofuel	849	6
Manufacturing	**9,892**	**7**
Electric and Hybrid Vehicles	6,000	1
Energy Storage/Fuel Cells	222	2
Solar	2,350	2
Wind	1,320	2
Other[i]	**1,800**	**1**
Recycling	**243**	**7**
Building Efficiency	**6**	**1**
TOTAL	**18,035**	**41**

[i] Other references a laboratory which will focus on advancing renewable technology.

RANK[i]	STATE	NUMBER OF JOBS ANNOUNCED	NUMBER OF ANNOUNCEMENTS
1	NV	6,556	3
2	NY	3,822	3
3	CA	2,070	5
4	CO	1,333	2
5	NC	876	4
6	MI	569	3
7	CT	275	2
8	LA	225	2
9	TX	203	1
10 (tie)	IL	150	1
10 (tie)	MD	150	1

[i] States have been ranked by the total number of jobs announced in media reports and company press releases between July–September 2014.

STATE RANKINGS INFLUENCED BY CLEAN ENERGY MANUFACTURING'S RECORD QUARTER

The top 10 states for clean energy job announcements in Q3 2014 were Nevada, New York, California, Colorado, North Carolina, Michigan, Connecticut, Louisiana, Texas, and Illinois and Maryland, which tied for tenth.

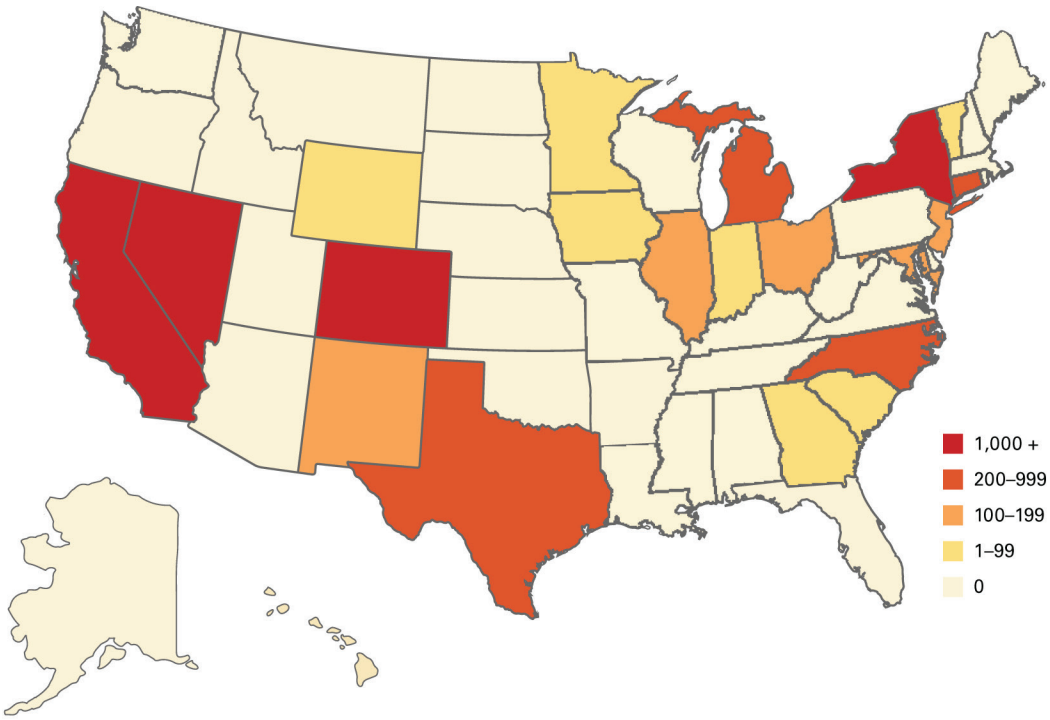
The very top of that list — Nevada and New York — were lifted by good news in the clean energy and clean transportation manufacturing sectors, which announced more than 9,800 jobs nationwide — the highest number in that sector since E2 began tracking job announcements three years ago. The vast majority of those jobs — 8,000 — came from a pair of announcements.

In top-ranked Nevada, innovative automaker Tesla selected Reno as the future home for an electric car battery factory. With electric vehicle sales recently topping 100,000 in California alone, the company expects to hire 6,500 workers at its "gigafactory." (See case study on Page 5.)

Meanwhile, in New York, which ranked second, SolarCity announced it's expanding its solar panel manufacturing facility in Buffalo. This announcement is representative of the national growth in rooftop solar PV, expected to meet 10 percent of U.S. electricity demand by 2026.[2]

Another major manufacturing announcement came from wind turbine manufacturer Vestas, which will hire and train as many as 60 workers each week through the end of the year to match demand from projects that qualified under the now-expired PTC.[3] If Congress fails to renew the wind PTC, these types of skilled manufacturing jobs could disappear. Such Congressional inaction would deliver a bruising blow to an American manufacturing base that's been revitalizing Rust Belt cities like Buffalo thanks in part to the growth of clean energy.

50-STATE BREAKDOWN: WHERE WERE THE ANNOUNCEMENTS?



WWW.CEW4US.ORG<HTTP://WWW.CEW4US.ORG>

These data cover job announcements from July 2014 through September 2014 media reports, official announcements, and other sources and are not an exhaustive tally of job creation in the clean economy.

IN FOCUS: SOLAR AND ADVANCED BIOFUELS

Solar generation accounted for 4,600 announced jobs — three quarters of clean power generation's total. All the announcements came from companies with operations in states that have strong public policies designed to expand solar power generation, including California, North Carolina, New Jersey, and Maryland. For example, nearly 2,000 announced solar construction jobs came from California's Imperial, Merced and Madera counties. These projects are expected to add to the grid 592 MW of clean energy capacity. Meanwhile, in North Carolina, whose strong state-level renewable portfolio standard has been a proven job creator, Duke Energy expects to complete three utility-scale solar PV projects next year, bringing 800 construction jobs to Bladen, Duplin, and Wilson counties.

With approximately 850 jobs announced this quarter, the advanced biofuels industry had its second-highest quarterly performance since E2 began tracking jobs in 2011. The largest single announcement came from Fulcrum Sierra Biofuels, which will build a facility in McCarran, Nevada, expected to produce 10 million gallons of advanced biofuel a year, creating 450 construction and 50 full-time jobs by 2016. The project is supported by Department of Defense (DoD) grants intended to scale up production of alternative sources of jet fuel, a move that over the long run is expected to shield DoD — and taxpayers — from costly swings in the price of oil.

CLEAN ENERGY ON MILITARY BASES

The Nevada biofuels project is among a steadily growing number of military-related clean energy and energy efficiency projects. To document when projects like these occur on military installations like Army posts, Navy stations, and Air Force bases, E2 is launching a new web page – www.cleanenergyworksforus.org/military.

The page is a resource showcasing about 40 clean energy and energy efficiency projects. These projects populate an interactive map that highlight what projects are happening where and, when available, how much taxpayer savings these projects generate. While this map only scratches the surface of what's happening on America's military installations, it shows how DoD investments are scaling up innovative technologies, bolstering energy security by increasing energy independence, shielding DoD's budget from energy price volatility, and creating good, local, private-sector job opportunities in communities where soldiers, sailors, and airmen live and work.

For example, in mid-October at the Army's Fort Pickett, the Virginia National Guard broke ground on a $2.2 million solar array. By partnering with Schneider Electric and the utility Pepco, the Virginia National Guard expects the 488-killowatt, 2,000-panel array to lead to a minimum $2.6 million return on investment over the next 25 years.

PHOTO BY STAFF SGT. TERRA C. GATTI, VIRGINIA GUARD PUBLIC AFFAIRS

The Virginia National Guard recently broke ground on a new solar array at Fort Pickett. The project has a guaranteed return of investment exceeding $2.6 million over 25 years.

The military Web page includes links to dozens of recent news stories on clean energy in the military; 7-10 in-depth written profiles and/or videos of what the military's clean energy investments look like on the installation level; and resources like links to major reports and all the main service branch installation offices.

Meanwhile, at a National Guard post in the upper Midwest at Michigan's Camp Grayling, the Army's Net-Zero initiatives are taking root. The motivating factors for becoming energy independent there go beyond national security — they're economic as well.

E2 is now tracking clean energy projects on military installations at www.cleanenergyworksforus.org/military.

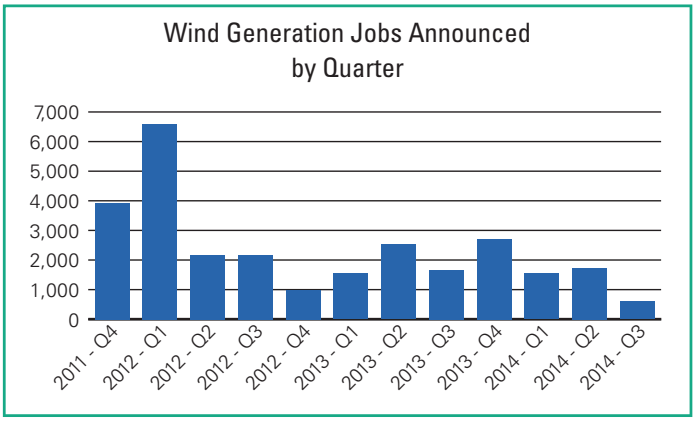
A LOOK BACK: HOW HAS THE INDUSTRY CHANGED SINCE 2011?

E2 began tracking job announcements in September of 2011. A three-year retrospective sheds light on recent industry changes, and offers a glimpse of the future:

Wind

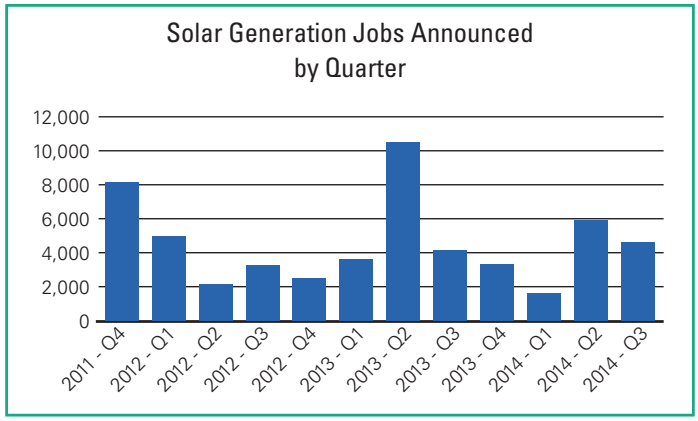
Inconsistency around the federal PTC has caused heavy turbulence in the wind industry.

Expanded in 2009 with the American Recovery and Reinvestment Act of 2009 (ARRA), the PTC provided a per-kilowatt-hour incentive to developers of wind, geothermal and certain types of biomass power. The tax credit spurred the wind industry's rapid growth, with cumulative U.S. wind power generation capacity expanding from 35 GW in 2009 to 61 GW in 2013.[4] Advancements in turbine design, coupled with manufacturing efficiencies, have lowered wind energy's levelized cost 58 percent since 2009. A September 2014 Lazard analysis suggests wind power costs have in certain parts of the country already reached grid parity.[5]



But by repeatedly allowing one-year extensions of the PTC to expire, Congress has perpetuated an inefficient boom-bust cycle hobbling industry growth. For example, when the PTC expired at the end of 2012, wind turbine manufacturers and installers laid off 32,000 workers the following year.[6] Congress then extended the credit for another year, which led to rehiring and a spate of additional wind projects. But once again, the tax credit has expired.

While Congress has been inconsistent in its policies, developers have been steady in their message: Market certainty can be achieved through long-term extension of the PTC, leading to industry expansion and job growth.



Solar

Thanks to declining costs and innovative financing models, the solar industry has over the past three years become more distributed and more accessible for American homeowners, businesses, municipalities, schools, military bases, and others.

Since 2011, solar energy's hardware costs have declined rapidly, with the global price of solar modules plummeting 53 percent.[7] As the market has grown, and as companies have consolidated, soft costs like customer acquisition have become more economical. According to the National Renewable Energy Laboratory, the per-watt price of installed residential solar systems has in just two years dropped 23 percent — from $6 to $4.60.

Meanwhile, third-party financing of residential solar panels have grown more popular, with solar leases allowing more American homeowners to install no-money-down rooftop solar arrays. According to GTM Research, third-party ownership of solar panels accounted for 68 percent of the residential market in 2014 — up from an estimated 42 percent in 2011.

A rooftop solar PV array at Fort Bragg in North Carolina.

PHOTO COURTESY OF FORT BRAGG'S DIRECTORATE OF PUBLIC WORKS

Energy Efficiency

Since 2011, E2 has tracked more than 25,000 announced jobs in the building and appliance efficiency sectors. Utilities as well as federal, state, and local governments are generally the source of these announcements, often contingent on legislative priorities, regulatory proceedings, and/or availability of public funds. These announcements include jobs retrofitting or weatherizing residential and commercial buildings; designing and manufacturing energy-efficient appliances; and making energy-efficient upgrades to industrial facilities.

The federal Clean Power Plan, announced toward the end of Q2, incentivizes states to reduce emissions via energy efficiency. An analysis by the Natural Resources Defense Council (NRDC) found strong, state-level implementation of the federal plan could create 274,000 direct efficiency jobs nationwide by 2020, saving American businesses and homeowners $37.4 billion annually.[8]

Some of our nation's most aggressive and effective energy efficiency measures are taking place on military bases. At Fort Bragg, N.C., which by population is the biggest Army post in the country, officials are retrofitting buildings and installing software to reduce the $50 million annual electricity bill (see case study on Page 6).

Public Transportation

Unlike other clean energy and clean transportation announcements, public transportation projects like light rail depend heavily on public investment. For example, after the financial crisis ARRA drove job growth in major public transportation projects. But federal budget cutbacks and Congress have undermined the advancement of sustainable transportation projects, with the number of job announcements dropping sharply.

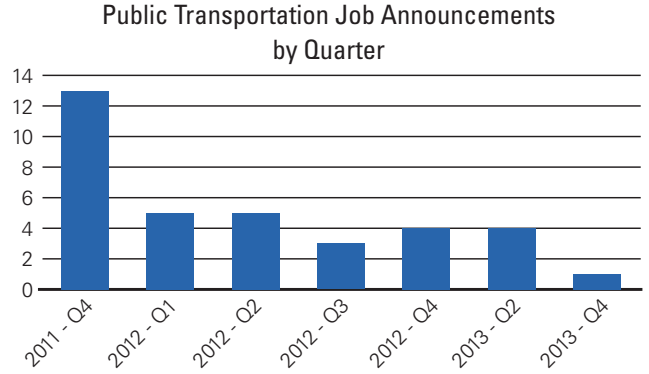


PHOTO COURTESY OF TESLA

Tesla will hire thousands of workers at its new "Gigafactory" in Nevada to produce lithium-ion batteries for its electric cars.

CASE STUDY: TESLA MOTORS REVS UP 'GIGFACTORY'

Tesla Motors recently chose Reno, Nevada, as the site of a $5 billion "Gigafactory" that could employ 6,500 workers. Expected to be completed in 2020, it will produce 50 GWh per year of lithium-ion battery packs — more than the entire global production in 2013 and enough for 500,000 electric cars annually. Once the factory is in full operation, it could help lower costs of packs by 30 percent in 2017 and by 50 percent in 2020.

Tesla expects to create 3,000 construction jobs and 6,500 permanent jobs upon completion, generating $100 billion in economic activity over the next 20 years. The company's vice president of human resources also aims for Tesla to be the nation's leading employer of veterans. The company said service members share Tesla's sense of mission, and their valuable mechanical and technical expertise makes them well-suited to advance the electric vehicle sector. VetJobs CEO Ted Daywalt noted the company has "risen to the top" among companies known for creating veteran-friendly workplaces.[9]

Tesla anticipates growing demand for electric vehicles. Carmakers have sold more than 40,000 fully electric cars this year, up 35 percent from just a year ago, a number that is expected to grow as automakers aim to meet new fuel efficiency standards.

Elon Musk, Tesla's chairman and CEO, said the plant would be a "self-contained factory" in that it would produce its own energy through a combination of geothermal, wind, and solar sources. He noted the Gigafactory "is an important step in advancing the cause of sustainable transportation and will enable the mass production of compelling electric vehicles for decades to come."

— Environmental Entrepreneurs

The Next Three Years: EV, Energy Storage, and Fuel Cell Growth?

Tesla's "Gigafactory" (see Page 5) illustrates the importance of energy storage technologies and the potential of the electric vehicle industry. But Tesla is not the only company on the cutting edge. This quarter, two companies — Doosan Fuel Cell America and General Electric — announced they're hiring hundreds of workers to manufacture fuel cells. By innovating alternatives to fossil fuel combustion, these businesses are integrating cleaner, more energy-efficient technologies into electric cars and our buildings. If technologies like Tesla's lithium-ion batteries and Doosan's and GE's fuel cells gain market share, they could have additional benefits like reducing strain on an aging electric grid.

CONCLUSION: IT'S UP TO NEW CONGRESS TO DECIDE WHETHER JOB GROWTH CONTINUES

Thanks in part to major investments from companies like Tesla and SolarCity, successful policies in states like California and North Carolina, and DoD leveraging clean energy and energy efficiency to improve operational effectiveness, clean energy and clean transportation's Q3 job numbers were relatively strong. Manufacturing jobs were particularly robust, with our analysis highlighting how clean energy can lift long-dormant sectors like manufacturing in regions like the Rust Belt. And our state rankings showed that from California to Connecticut, there's a broad geographic distribution of states expanding economies with clean energy.

But as our retrospective shows, Congress has the power to keep clean energy jobs growing — or to cast a cloud over future growth of an industry that's creating thousands of jobs each and every quarter in both Republican and Democratic districts. It's a critical time in the clean energy industry, which is on an uneven playing field with fossil fuels heavily supported by indirect subsidies. Businesses, investors, and workers at clean energy companies all across America have their eyes fixed on both parties in Washington.

PHOTO COURTESY OF FORT BRAGG'S DIRECTORATE OF PUBLIC WORKS

The solar wall at Fort Bragg's "rigger shed" uses a solar wall that helps circulate warm air through the tall structure, helping to dry parachutes used by the 82nd Airborne.

CASE STUDY: FOR ARMY, ENERGY EFFICIENCY SOMETHING TO BRAGG ABOUT

Home to the 82nd Airborne, North Carolina's Fort Bragg is one of the Army's largest installations. Most of the electricity is generated from three offsite power plants that run on coal, nuclear, and natural gas.

The electric bill is the largest bill on the base. To reduce that high cost of electricity — some $50 million annually, a cost we all pay as taxpayers — the Army is working alongside the private sector to improve energy efficiency and install renewable energy capacity.

From a green rooftop that uses the naturally insulating properties of plants to lower cooling costs in a new $10 million mission-critical building, to sophisticated, post-wide meter monitoring software installed by Johnson Controls, innovative companies are growing — and profiting — from their military partnerships.

Often, these benefits cut across a national supply chain. For instance, Fort Bragg's green roof was manufactured in Michigan, sold by a nursery based in Virginia, and installed by Baker Roofing, a Raleigh-based company that sent a crew of workers to Fort Bragg to install the green roof.

Another unique Fort Bragg project developed in partnership with the private sector is a "solar wall" installed by SEI, an Alabama-based engineering firm.

Designed to help dry parachutes, the south-facing solar wall's black metal sheeting is mounted about three inches from the exterior of a structural wall at a silo near the 82nd Airborne's barracks. After paratroopers conduct training jumps, their parachutes are taken to the silo, hung in rows from rafters, and heat absorbed from the solar wall is blown into the silo with fans. This heat is distributed through conventional ductwork, increasing temperatures by as much as 40 degrees and shortening the amount of time it takes to dry the parachutes.

— Environmental Entrepreneurs

Endnotes

1 http://emp.lbl.gov/sites/all/files/2013_Wind_Technologies_Market_Report_Final3.pdf
2 http://http://bnef.folioshack.com/document/v71ve0nkrs8e0/106y4o
3 http://www.researchcolorado.com/article/20140731/NEWS/140739988/0/NEWS
4 http://awea.files.cms-plus.com/1Q%202014%20Bar%20Chart.png
5 http://www.lazard.com/PDF/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf
6 http://emp.lbl.gov/sites/all/files/2013_Wind_Technologies_Market_Report_Final3.pdf
7 http://www.nrel.gov/docs/fy14osti/62558.pdf
8 http://www.nrdc.org/air/pollution-standards/files/national-cps-bills-jobs-FS.pdf
9 http://www.mercurynews.com/business/ci_26086136/tesla-motors-mission-hire-american-veterans

CASE STUDY: MICHIGAN'S CAMP GRAYLING — FIRST NET-ZERO MILITARY BASE?

Camp Grayling aims to become the first net-zero military base in the United States.

Michigan's Camp Grayling encompasses almost 150,000 acres in the northern part of the state's lower peninsula. The training site for about 10,000 soldiers annually, it's here and on Army posts across the country that the military's energy culture shift is taking root.

Michigan's National Guard has set an ambitious goal — to make Camp Grayling the nation's first military facility to achieve net-zero status. Net-zero is a closed-loop system where all water is reused or returned clean to the water table, all waste is recycled or composted, and all energy requirements are met with renewable energy sources or on-site power generation.

"We're planning to get there by no later than 2017, and we're hoping to do it in 2016," Col. Stephen Ward, director of installations for the Michigan Army National Guard, said in spring 2014.

For a post with 425 buildings, 70 helicopter pads and two runways capable of handling large military cargo planes, different approaches will be necessary to achieve net-zero energy use.

The post has a small array of solar panels. Two large wind turbines are in the planning stage, as is a biomass generation plant that will use wood, switchgrass and other materials from the forestland that covers most of Camp Grayling. The facility has untapped natural gas deposits, which could be used to generate power on-site.

"It sounds like we're hugging trees, but everything we're doing makes good business sense," said Brig. Gen. Stone, who served in Iraq. "It makes good business sense to be energy independent."

— Environmental Entrepreneurs

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

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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.**