



# NOW HIRING: THE GROWTH OF AMERICA'S CLEAN ENERGY & SUSTAINABILITY JOBS

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Award #1600934



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# **NOW HIRING: THE GROWTH OF AMERICA'S CLEAN ENERGY & SUSTAINABILITY JOBS**



CLIMATE CORPS



# Agenda

» **Introduction**

» **Sector Profiles**

» **Key Takeaways**

› Renewable Energy

› Energy Efficiency

› Public Sector

› Private Sector

› Advanced Vehicles

# Agenda

## » Introduction

## » Sector Profiles

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## **Introduction:** The U.S. is transitioning into a more sustainable economy, leading to millions of jobs across the nation

- » United States has been **transitioning into a more environmentally sustainable and energy efficient economy** over the past four decades, resulting in millions of sustainability jobs.

### **Sustainability Jobs<sup>1</sup>**

- Jobs in sectors that produce goods and services that benefit the environment
- Jobs in which employees focus on making processes more environmentally friendly and resource efficient
- Jobs focused on improving and communicating an organization's environmental and social impacts



*Photo Credit: Fotolia*

# Key Highlights: Sustainability jobs are growing rapidly



Sustainability jobs represent a large and growing portion of the U.S. workforce across multiple sectors.



Due to the on-site nature of many renewable energy and energy efficiency jobs, these jobs cannot be outsourced and can pay above average wages.



Clean energy and sustainability jobs are present in every state in America.

## 4 MILLION JOBS



Icons Credit: The Noun Project

Graphic Credit: EDF & MCG, 2017

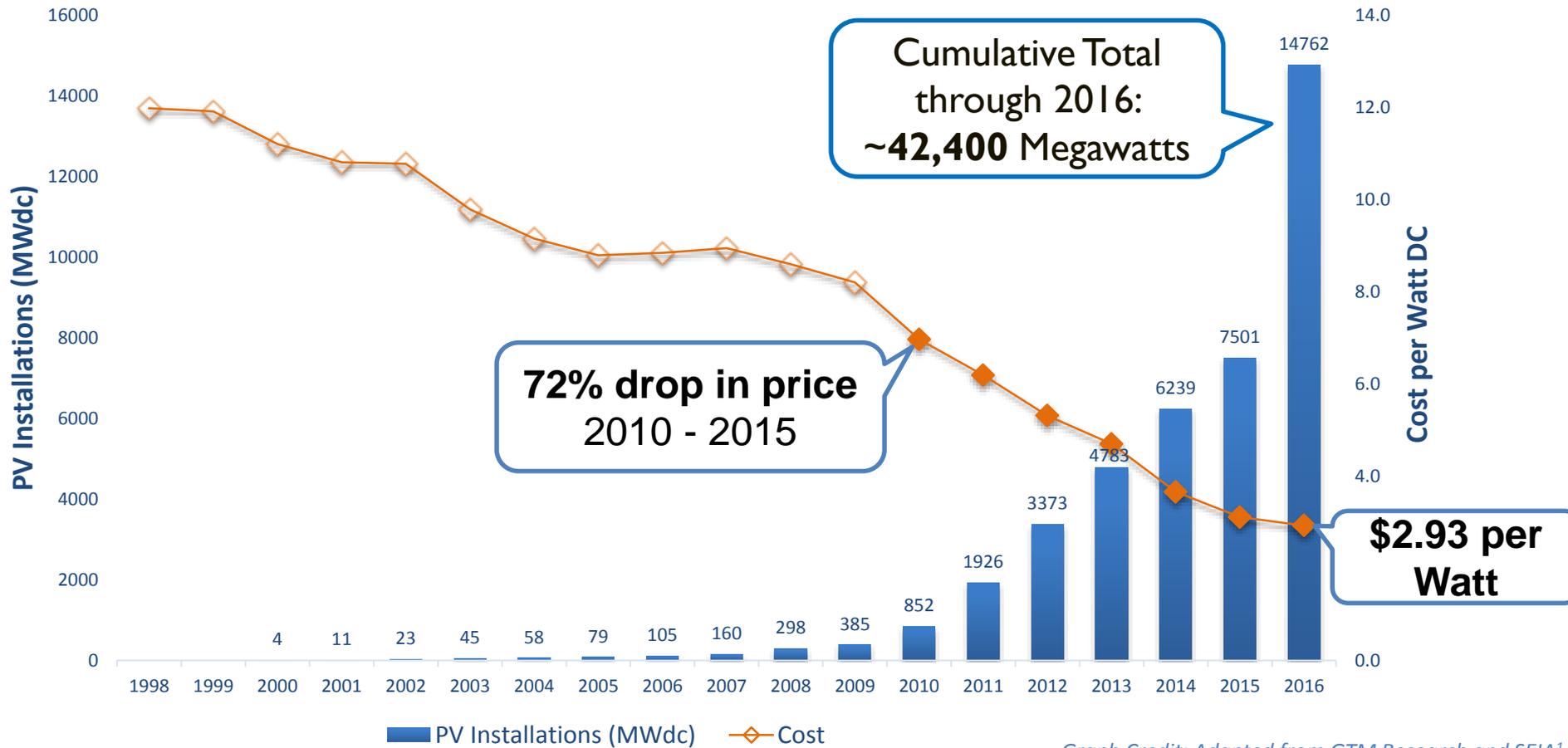
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- » Introduction
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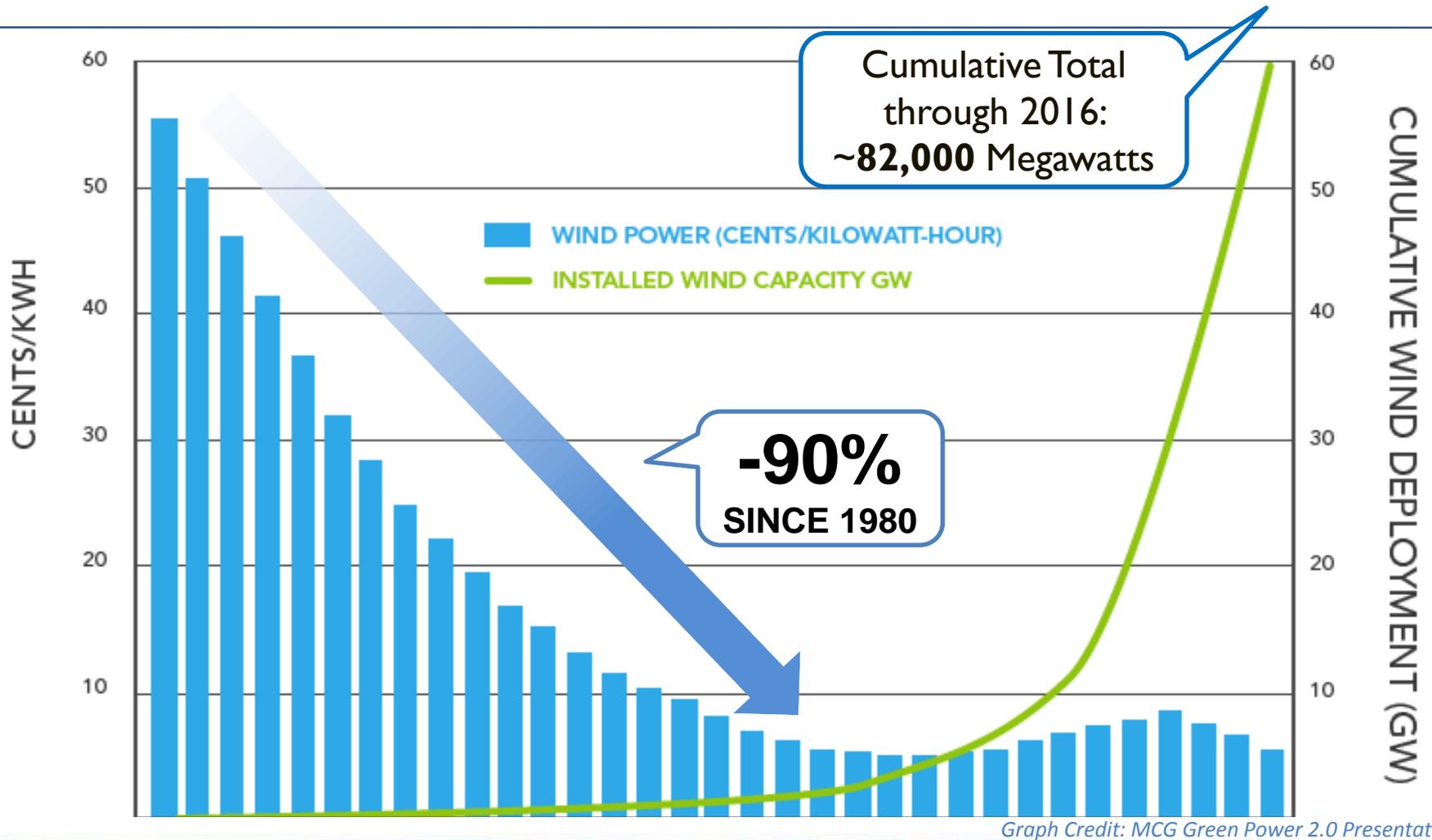
# Renewable Energy: Renewable energy deployment is growing rapidly

## U.S. Annual Solar Installations and Residential Installed Costs



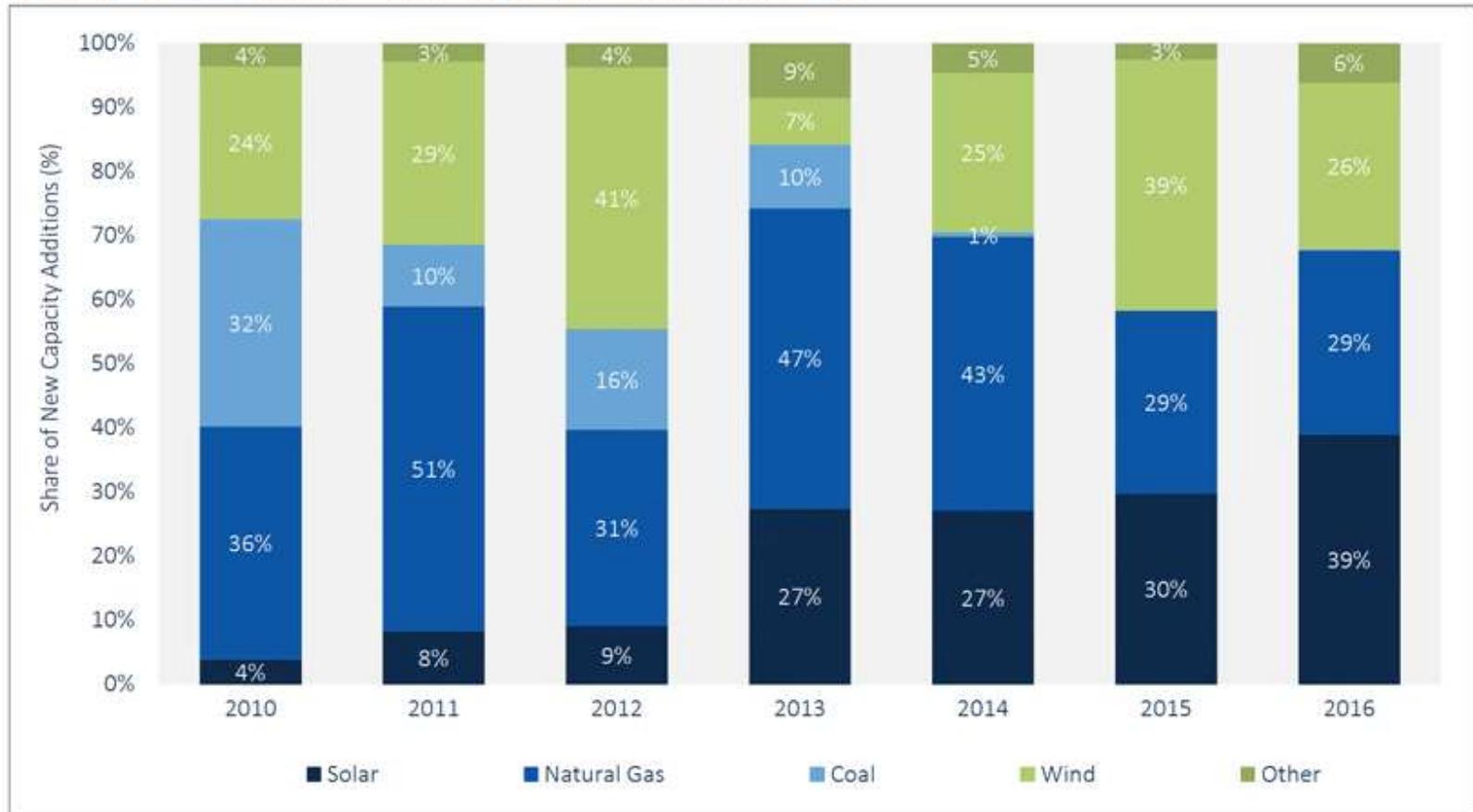
Graph Credit: Adapted from GTM Research and SEIA<sup>1</sup>

# Renewable Energy: Renewable energy deployment is growing rapidly



# Renewable Energy: Wind and solar accounted for 65% of new electricity generation capacity installed in the U.S. in 2016

Figure 1.2 New U.S. Electricity Generating Capacity Additions, 2010-2016



Graph Credit: GTM Research (solar) FERC (All other technologies)<sup>2</sup>

## Renewable Energy: Growth in generation capacity has tracked closely to growth in employment

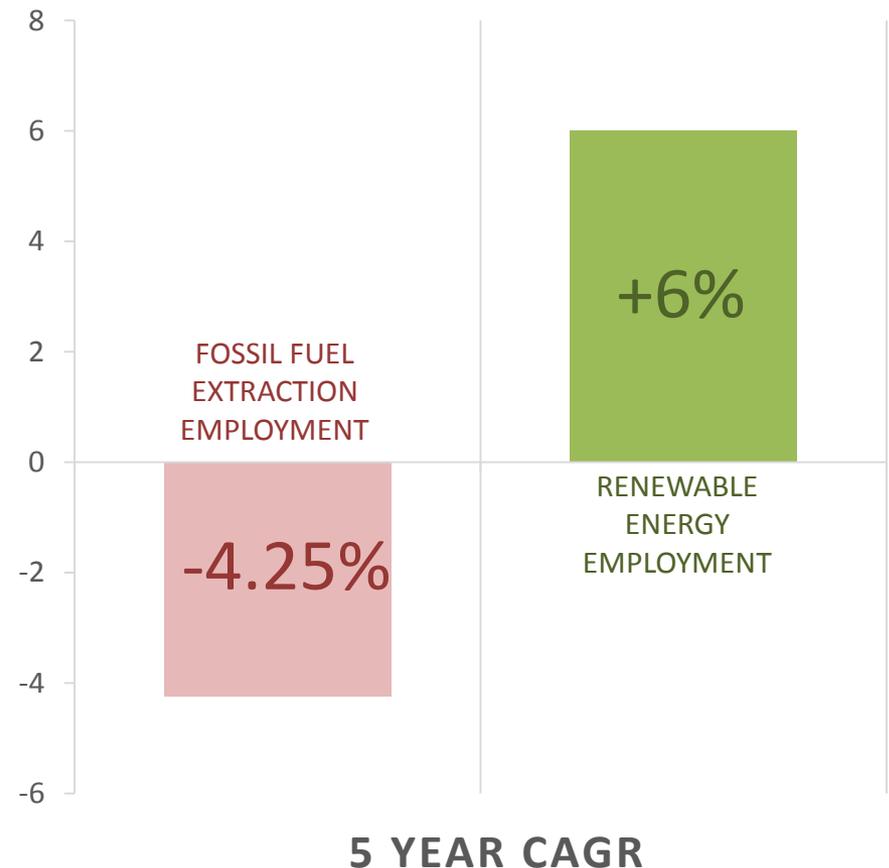
- » Solar employment **increased by 25%** in 2016, and has exceeded 20% growth **in each of the last 4 years**<sup>3</sup>
  - › This job creation rate is roughly **12 times faster** than the rest of the economy<sup>3</sup>
- » Wind employment **increased by 32%** in 2016<sup>4</sup>



*Photo Credit: Fotolia*

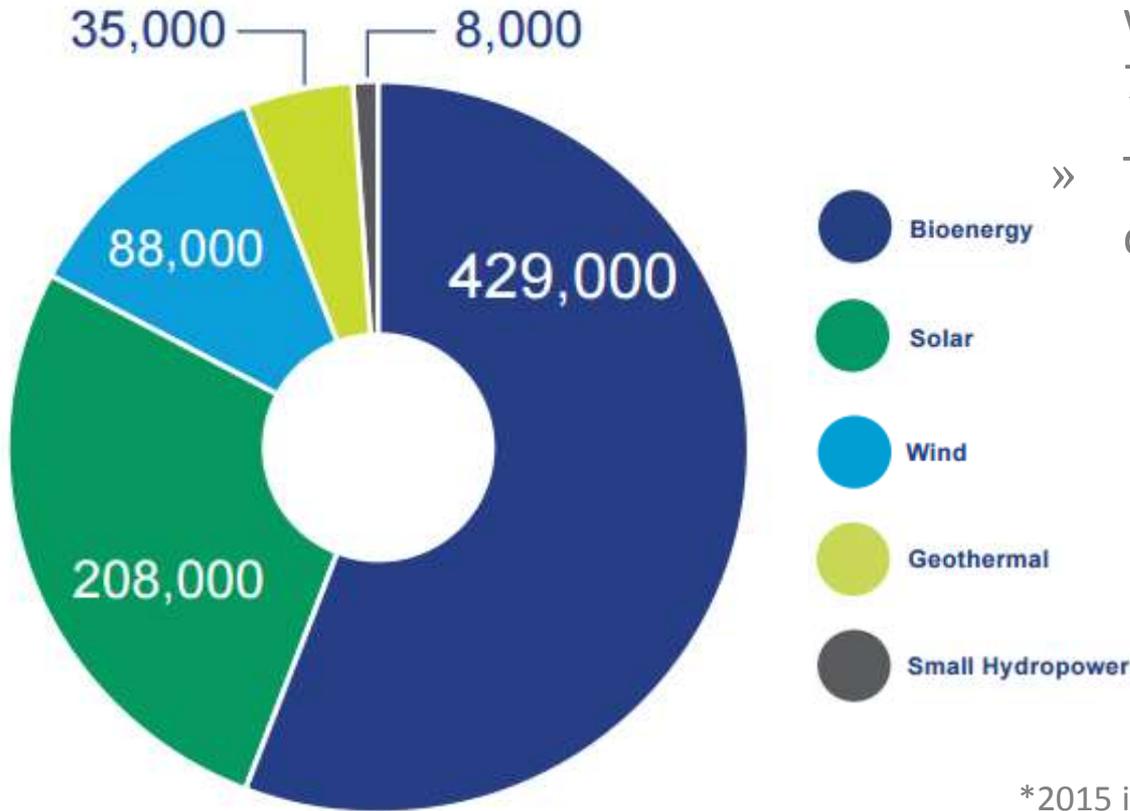
## Renewable Energy: Renewable energy job growth is in stark contrast to the boom-and-bust cycles characteristic of employment in fossil fuel industries

- » In aggregate renewable energy jobs have seen a compound annual growth rate (CAGR) of 6% since 2012<sup>5, 6</sup>
- » Over the same period, employment in fossil fuel extraction industries has declined, with a CAGR of -4.25%<sup>7</sup>
- » Studies show investments in renewable energy generate 3X more jobs than comparable investments in fossil fuels<sup>8</sup>



# Renewable Energy: The renewable energy job market is approaching 1 million workers in the U.S.

RENEWABLE ENERGY JOBS BREAKDOWN BY GENERATION TECHNOLOGY (2015)



- » The total renewable energy workforce reached about 770,000 by late 2015\*<sup>9</sup>
- » These jobs are well paying and diverse
  - › Median solar sector wage in 2016 was **\$26 per hour**<sup>10</sup>
  - › Median wage for wind turbine technicians – the fastest growing job in the US in 2016 – **was about \$25.50**<sup>11</sup>

\*2015 is the most recent year for which there is consistent historic data across each technology type

Graphic Credit: EDF & MCG, 2017

# Renewable Energy: Renewable energy jobs are diverse and span a variety of job types



## Solar

80% of jobs are demand-side services (e.g. installation, sales, etc.)  
Most of these are inherently local jobs that cannot be outsourced<sup>12</sup>



## Wind

Wind industry jobs are more evenly divided between manufacturing (23%); project development, transportation, and installation (43%); and operations and maintenance (32%)<sup>13</sup>



## Bioenergy

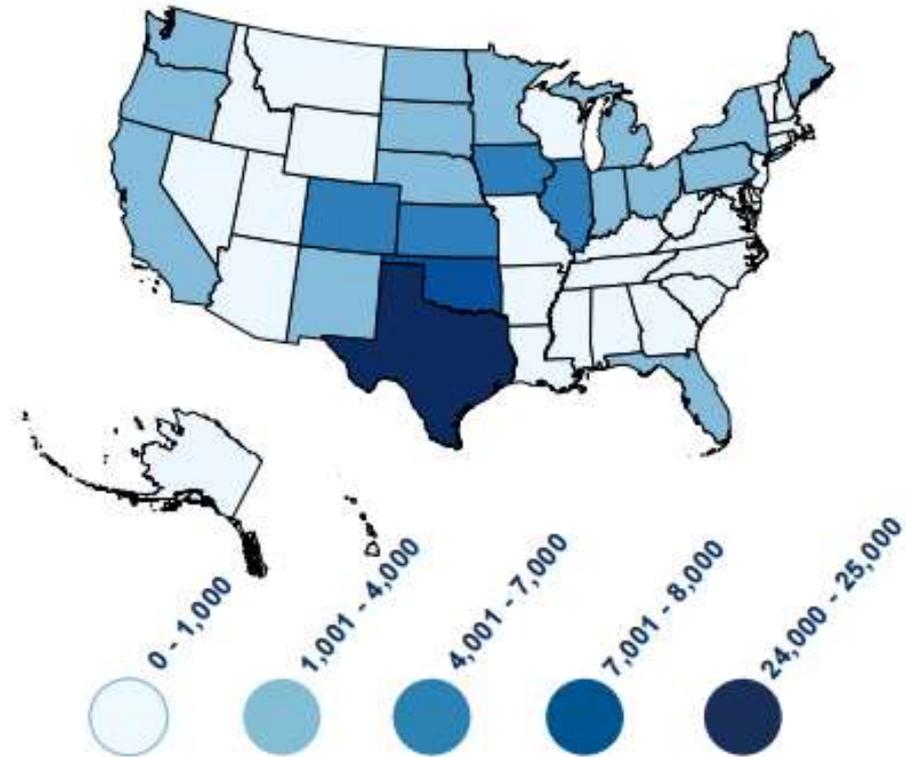
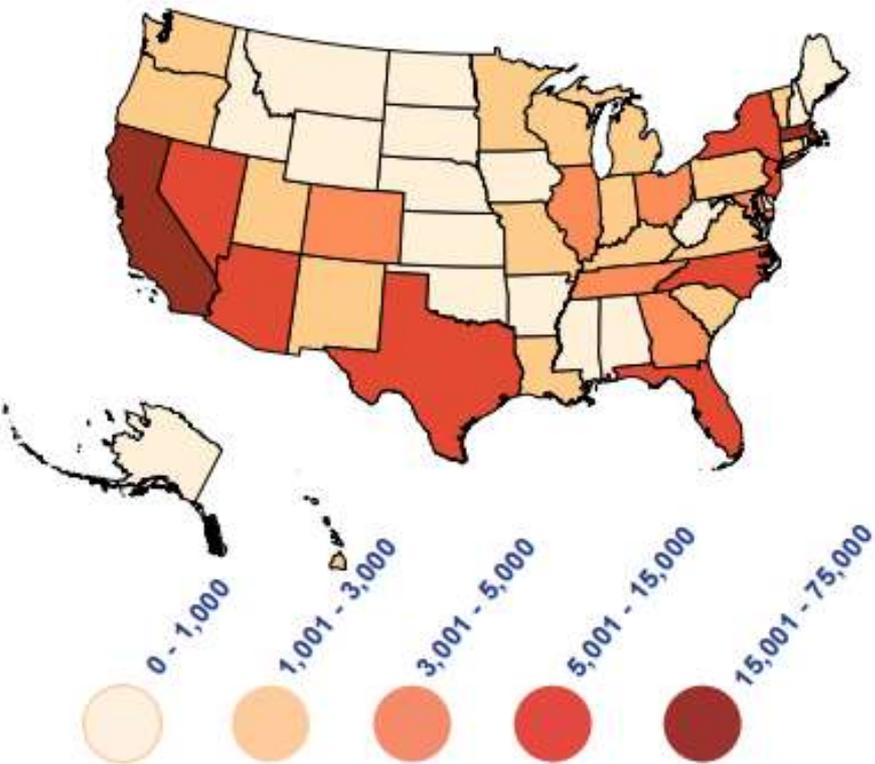
Bioenergy jobs are primarily centered on the production of raw agricultural materials, and refining, processing and distribution of those materials<sup>14</sup>

*Photo Credit: Fotolia*

# Renewable Energy: Renewable energy jobs are distributed throughout all 50 states

## SOLAR JOBS DISTRIBUTION BY STATE

## WIND JOBS DISTRIBUTION BY STATE



Graphic Credit: Adapted from The Solar Foundation's Solar Jobs Census, and the American Wind Energy Association

## Renewable Energy: Solar sector jobs are most diverse at mid-career level, and most abundant at entry level

- » Solar, for example, **has job opportunities with entry level, mid-level, and advanced degree requirements**<sup>15</sup>
  - › Entry level include jobs such as solar site assessors, solar assemblers, and computer numerical control (CNC) operators
  - › Mid-level include solar PV installers, sales representatives, engineering technicians, and process control technicians
  - › Advanced include materials scientists, software engineers, project developers, and installation contractors



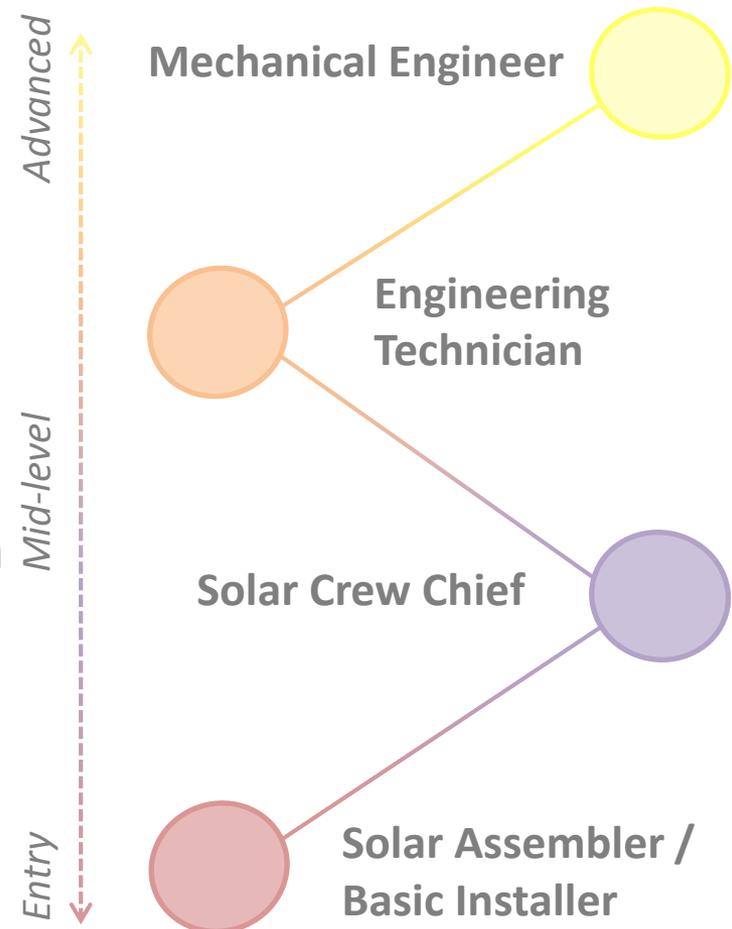
*Photo Credit: Fotolia*

## Renewable Energy: The renewable energy sector have logical career development opportunities

- » In addition to numerous entry points, the solar industry also **has logical advancement opportunities**
- » The Interstate Renewable Energy Council (IREC), recently developed a Solar Careers Map to categorize the diversifying universe of solar energy occupations<sup>16</sup>
- » This map collects and categorizes details on solar jobs types, and **identifies frequent and logical 'advancement routes'** for individuals at different points in their career

<http://irecsolarcareermap.org/>

<https://energy.gov/eere/wind/wind-career-map>



Graphic Credit: Inspired by the Solar Career Map

## Renewable Energy: Growth in generation capacity and jobs is projected to remain high for the foreseeable future

- » Wind and solar are both projected to see significant growth in the coming decades, largely due to continued cost reductions
  - › Fixed-bottom off-shore wind is expected to see a 41% drop in the levelized cost of energy (LCOE) by 2050<sup>17</sup>
  - › At the global scale, solar is predicted to emerge as the **most cost-effective generating technology** in most countries by 2030, and account for over \$3 trillion in new investment<sup>18</sup>
- » These cost reductions lead to capacity additions and new investments, which will necessitate continued rapid job growth, both within the U.S. and internationally



*Photo Credit: Fotolia*

# Agenda

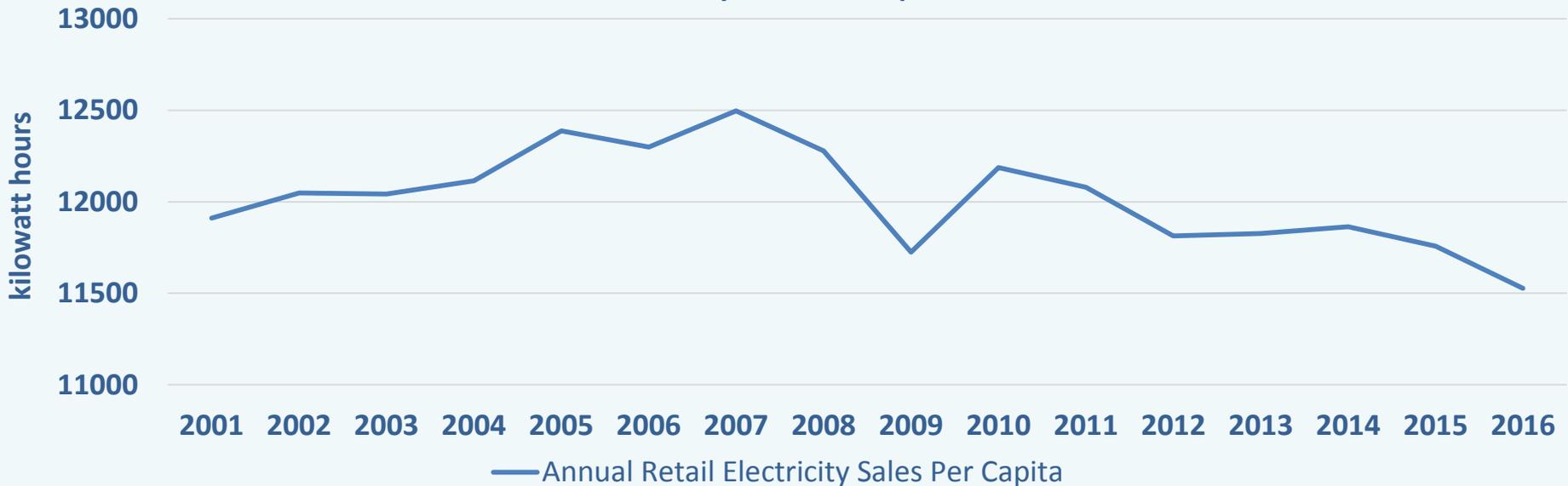
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# Energy Efficiency: U.S. electricity consumption has been declining largely due to energy efficiency standards and programs

- » The U.S. has seen a significant decline in energy consumption per real gross domestic product over the past four decades.
  - › Electricity consumption (kWh per capita) in the residential, commercial and industrial sectors has been **declining since 2007**.<sup>1</sup>
- » Research shows that **energy efficiency standards and utility energy efficiency programs** are the largest causes of the decline in electricity use.<sup>2</sup>

Annual Retail Electricity Sales Per Capita in the U.S.<sup>3</sup>

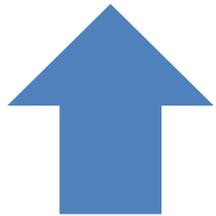


## Energy Efficiency: Investment in energy efficiency reduces utility bills and contributes to local development and jobs creation

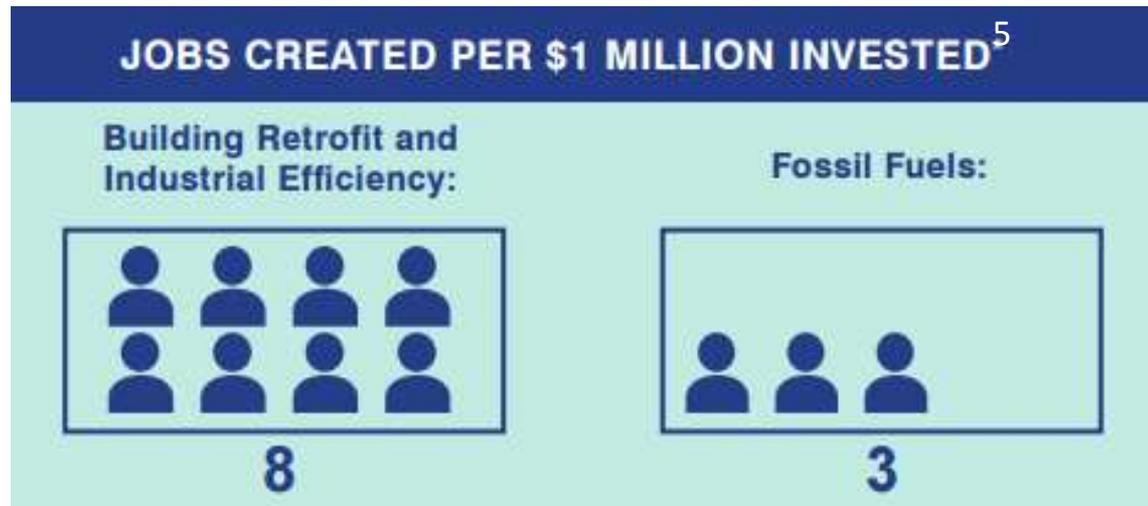
- » Investments in energy efficiency go far beyond reducing utility bills for consumers and contribute significantly to local economic development and job creation.

**2.2 MILLION**<sup>4</sup>

Employees as of 2016



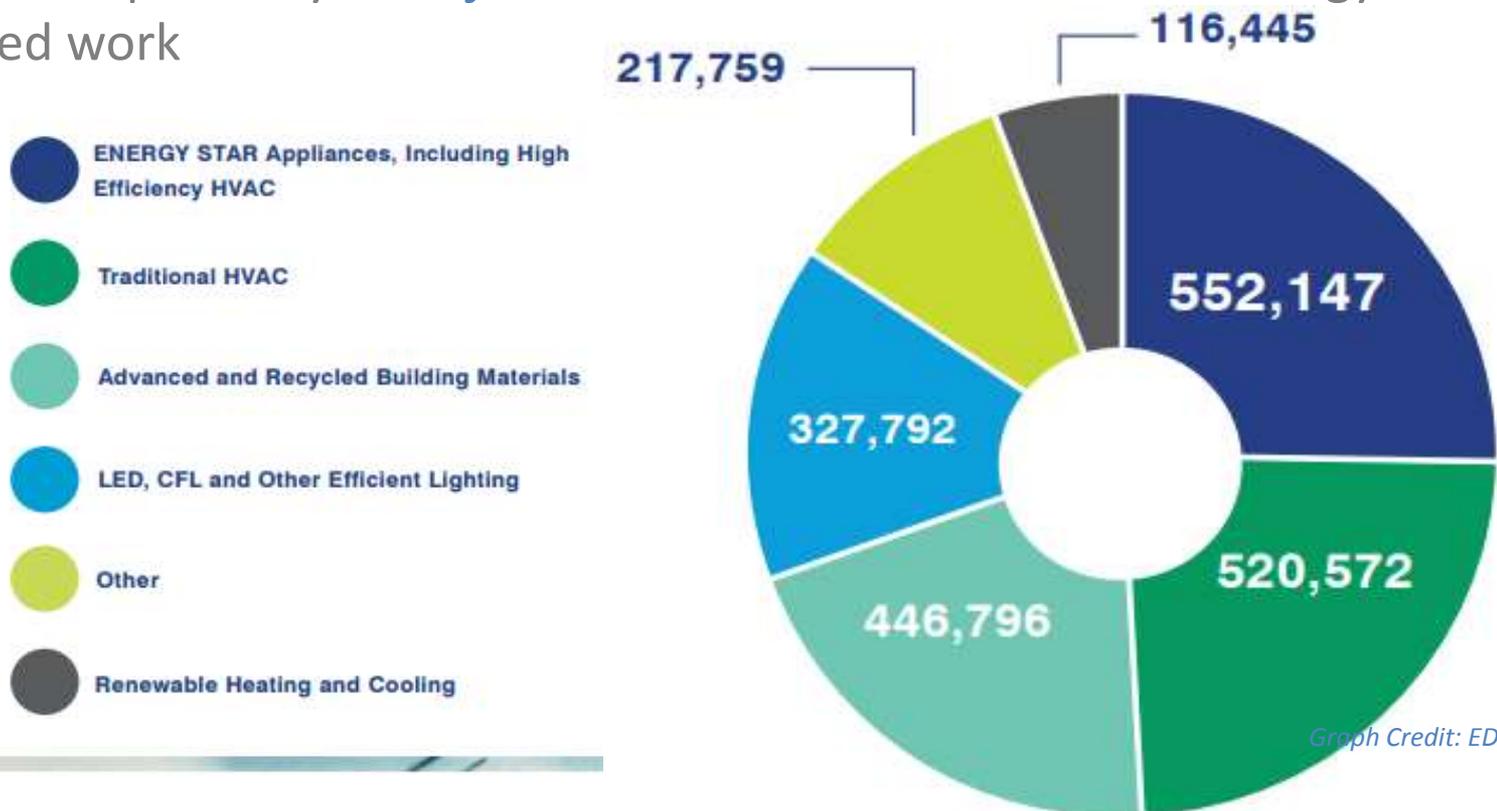
7% from 2015



Graphic Credit: EDF & MCG, 2017

## Energy Efficiency: Energy efficiency jobs are primarily local jobs, with most employees engaged in construction and installation

- » About **1.6 million (63%)** of energy efficiency employees work in construction firms and firms installing building control equipment
- » These are primarily **local jobs** due to the on-site nature of energy efficiency-related work



Graph Credit: EDF & MCG, 2017

# Energy Efficiency: Key job features

» Key features of energy efficiency jobs include:



» Energy efficiency jobs generally **pay higher than average wages**

› Average wages are almost \$5,000 above the national median<sup>6</sup>



» Energy efficiency jobs are **available to workers without college or advanced degrees**

› Nearly half of energy efficiency jobs are currently held by employees with a high school diploma, or less<sup>7</sup>



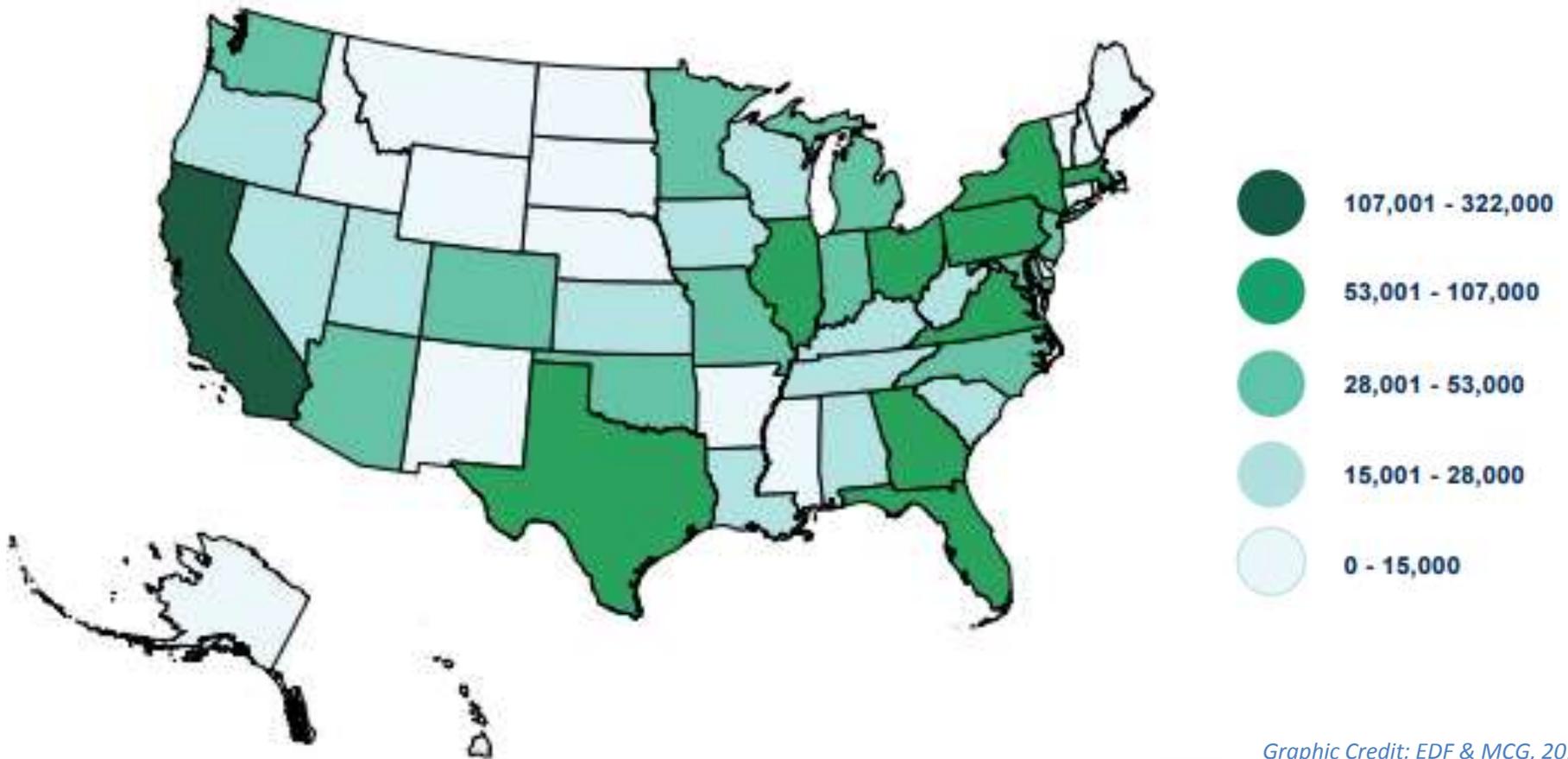
» Majority of energy efficiency **employees in the U.S. work for small businesses**

› About 70% work for companies with 10 employees or less<sup>8</sup>

Icons Credit: The Noun Project

# Energy Efficiency: Energy efficiency jobs are found across the country

## Energy Efficiency Jobs Distribution by State (2016)<sup>9</sup>



Graphic Credit: EDF & MCG, 2017

## Energy Efficiency: Investment in energy efficiency is expected to continue, resulting in significant job increases throughout the whole economy

- » **Investment in energy efficiency** lighting, heating, cooling and ventilation systems **is expected to continue** in the coming years with increasingly stringent building codes and standards.
  - › Energy intensity in the commercial sector is expected to **decrease by an average of 0.5% per year** from 2015-2040.<sup>10</sup>
- » Overall energy bill savings from energy efficiency measures are expected to result in significant job increases throughout the whole economy.

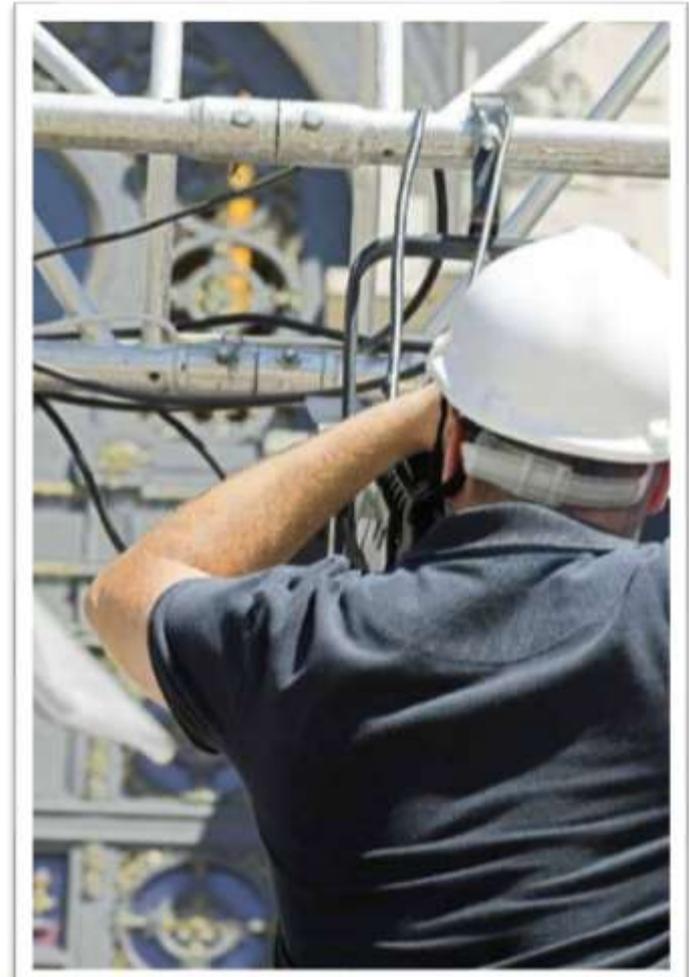


Photo Credit: Fotolia

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## Public Sector: Sustainability commitments and activities at the city and state level have been growing in recent years

- » More and more states are adopting renewable portfolio standards (RPS).
  - › 28 states have set RPS and 8 states have set goals related to renewable energy development.<sup>1</sup>
- » Multiple cities and states are adopting policies and targets related to greenhouse gas emissions reductions, renewable energy, and sustainable transportation.



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## Public Sector: The public sector employs significant number of sustainability-focused staff

- » In 2011, there were 424,000 green jobs at the local government level, 249,000 at the state level and 213,000 at the federal level.<sup>2</sup>
- » Cities are hiring new staff to fill new positions designated specifically for sustainability
  - › Chief Resilience Officer
  - › Sustainability Director/Coordinator
  - › Greenovate Fellow (Foundation funded position - City of Boston)<sup>3</sup>



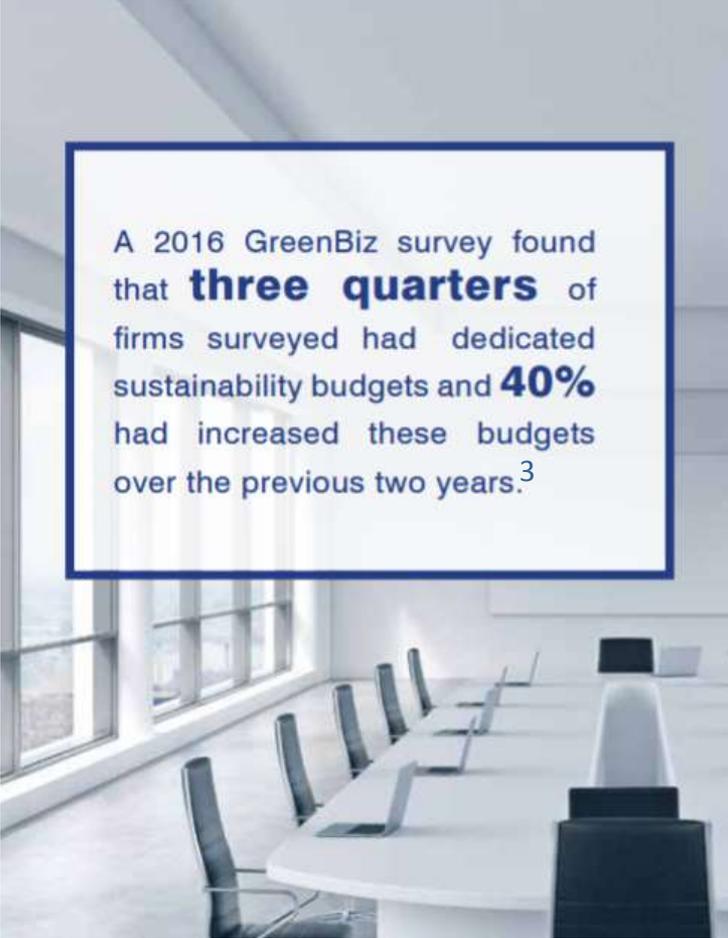
*Photo Credit: Fotolia*

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# Private Sector: Companies are increasingly investing in sustainability initiatives



- » Companies are **increasingly investing in sustainability departments and initiatives**, hiring more sustainability staff and **integrating sustainability function across their firm**.
- » Driven by **demand from customers**, companies are also increasing investments in sustainable product development and new business lines.<sup>1</sup>
- » Increasingly, top companies are reporting on their sustainability actions
  - › 92% of the largest global 250 companies report on their sustainability efforts.<sup>2</sup>

## Private Sector: Companies are increasingly investing in sustainability initiatives

- » Private sector sustainability jobs generally focus on:
  - › Meeting market demand for sustainable product and service offerings (**green goods and services**)
  - › Improving the environmental and social performance of the company (**corporate sustainability**)
- » Corporate sustainability includes jobs and functions in:
  - › Research and development
  - › Renewable energy procurement
  - › Facilities management
  - › Communications and marketing
  - › Corporate giving

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## Advanced Vehicles: Employment in advanced vehicles is growing rapidly



Photo Credit: Fotolia

- » Advanced vehicles – including hybrid-electric, full electric, and fuel cell – **represent another rapidly growing sector in the U.S.**
  - › Electric vehicle sales alone have grown at a **32% CAGR** over the past four years<sup>1</sup>
- » As of 2016, this sector **employed over 174,000 workers across the nation**<sup>2</sup>
- » Growth is driven in part by new state and local government regulations pushing for clean-fuel vehicles

## Advanced Vehicles: There are a wide variety of jobs in the advanced vehicles sector

- » Advanced vehicle jobs range from electrical and mechanical engineers, to factory workers and assemblers, to automotive repair technicians
- » Sales growth has led to increased job opportunities, particularly at the manufacturing end of the supply chain
- » In 2016, employment in the hybrid-electric and full electric industries alone **grew by 46.7%**<sup>3</sup>



*Photo Credit: Think City electric car plant in Indiana*

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## Key Report Takeaways

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- » Growing investments in clean energy and sustainability are translating to **tangible economic impacts throughout the U.S. economy**
- » Renewable energy and energy efficiency **together employ almost 3 million people** and continue to grow steadily
- » Clean energy markets are providing the next generation of energy jobs that are **high-paying, widely available across the U.S., and frequently impactful and rewarding**
- » With diverse job types and entry points, **high-school and technical college educators are essential to continued growth and industry prosperity**

## Key Takeaways for Educators

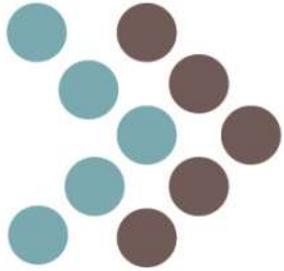
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- » Continued growth in renewable energy and energy efficiency markets is expected to generate thousands of jobs in the near future.
  - › Public and private training providers need to continue their efforts to meet the market demand, especially for **installation-related jobs**.
- » Emerging technologies like offshore wind, energy storage, and renewable heating and cooling are also expected to generate additional jobs in the coming decades.
  - › These sectors will require **new curriculum and skill development** provided by vocational trainers (e.g. trainings could target skills like installations, communications and marketing, system sizing and performance).

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For additional information on webinars,  
workshops and the CREATE Center, join  
our mailing list at:

[www.CreateEnergy.org](http://www.CreateEnergy.org)



THANK YOU!

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<sup>6</sup>CAGR estimate is based on annual renewable energy and jobs report numbers released by the International Renewable Energy Agency. Current and historical reports can be accessed here:

<http://www.irena.org/menu/index.aspx?CatID=141&PriMenuID=36&SubcatID=2729&mnu=Subcat>

<sup>7</sup>CAGR estimate is based on U.S. Bureau of Labor Statistics (BLS) datasets for NAICS codes 21, 211, 212, 2121, and 213112. Estimate of -4.25% is based on Oil and Gas Extraction and Coal Mining data, and support services. For raw BLS data and descriptions, see

<https://www.bls.gov/iag/tgs/iag21.htm>. Coal-specific data can be accessed here: <http://www.eia.gov/coal/annual/>

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