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THE CAREER GUIDE TO GREEN JOBS

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Whether you're beginning your studies, entering the workforce, or transitioning to a new career, a green job could be your way of earning a good living while simultaneously having a long-term positive impact. It's always wise to pick a career path that promises longevity and growth.

Green jobs are found in nearly every industry, from renewable energy and water conservation to food manufacturing and property management. Though the term is rather broad, the single determining factor is that a green job benefits or supports conservation in some manner. For example, it's easy to understand how a wind turbine engineer's work benefits the renewable energy sector and therefore conservation. But how about a package designer who creates low-waste food packaging from recycled materials? Or a property manager who reduces a building's energy consumption by implementing and maintaining new energy-efficient measures? Because all of these positions adhere to environmentally friendly practices, they qualify as green jobs, as do many more across a broad spectrum of industries.



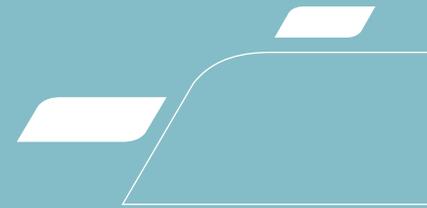
GREEN JOBS DEFINED

The *Bureau of Labor Statistics* defines green jobs as the following:

1. Jobs that produce goods or services that benefit the environment or conserve natural resources.
2. Jobs in which workers' primary duties involve the use of green technologies or practices that have a favorable impact on the environment.



WHY GREEN CAREERS ARE GOLDEN?



Why green jobs are on the rise?

Green jobs are vital to the health of our planet. The world's fossil fuel resources are finite, industrial consumption of water and other natural resources tax the ecosystem, while regulatory pressure and public interest seek to reduce greenhouse emissions.

In addition, a rapidly growing population will place further pressure on our planet. The global population currently totals more than 7 billion, and it's set to grow to more than 10 billion by the next century.¹

It's clear that efforts to preserve our environment seek to create a global, green infrastructure that places sustainability front and center. Increasingly more professions focus on reducing consumption of energy and other assets while simultaneously developing methods to reuse and recycle existing resources. And in order to meet these objectives, a green economy is being developed that stands on the shoulders of green jobs and promotes environmentally friendly practices.



¹ Report by Brookings: sizing the clean economy a national and regional green jobs assessment



Why choose a green career?

The number of green jobs is growing fast. Across the globe, strides are being made to invest in green policies by allocating funds and granting tax breaks for the purposes of green jobs training and education. Since 2011, when the United States committed itself to taking stronger measures to protect global resources, almost 250,000 clean energy jobs have been added in the U.S. alone, according to *Environment News Service*. Additionally, nations such as China, Japan, and the United Kingdom have also pledged to invest in a green economy. And with investment comes not only the opportunity for more business, but also for more training and education.

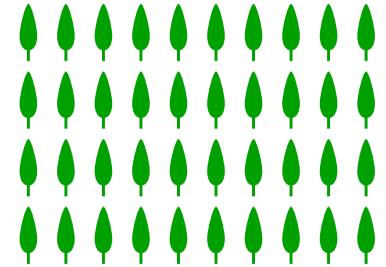
All of this comes at a time when Gen Y is poised to become the largest generation of workers. These young, digitally connected workers possess a strong social awareness and sense of responsibility. They understand the value of sustainability for the future, both as a business and an environmental interest. Workers today don't just want to work: they want to find meaning in their careers.²

**GREEN JOBS OFFER
PROFESSIONALS A
WAY TO PERFORM
MEANINGFUL WORK
WITH THE POTENTIAL
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Current demand and future growth potential

The number of green jobs worldwide runs into the tens of millions, according to estimates by the International Labor Organization. As the world adopts more green policies and invests more in sustainability, anywhere between 15 and 60 million green jobs will be added in the coming years. Job growth in the renewable energy sector alone has been increasing globally at a pace of 21% annually.³



**BETWEEN
15 AND
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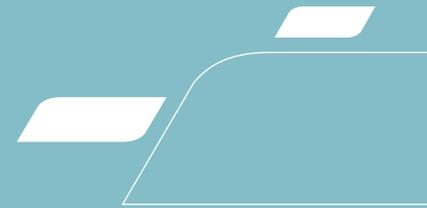
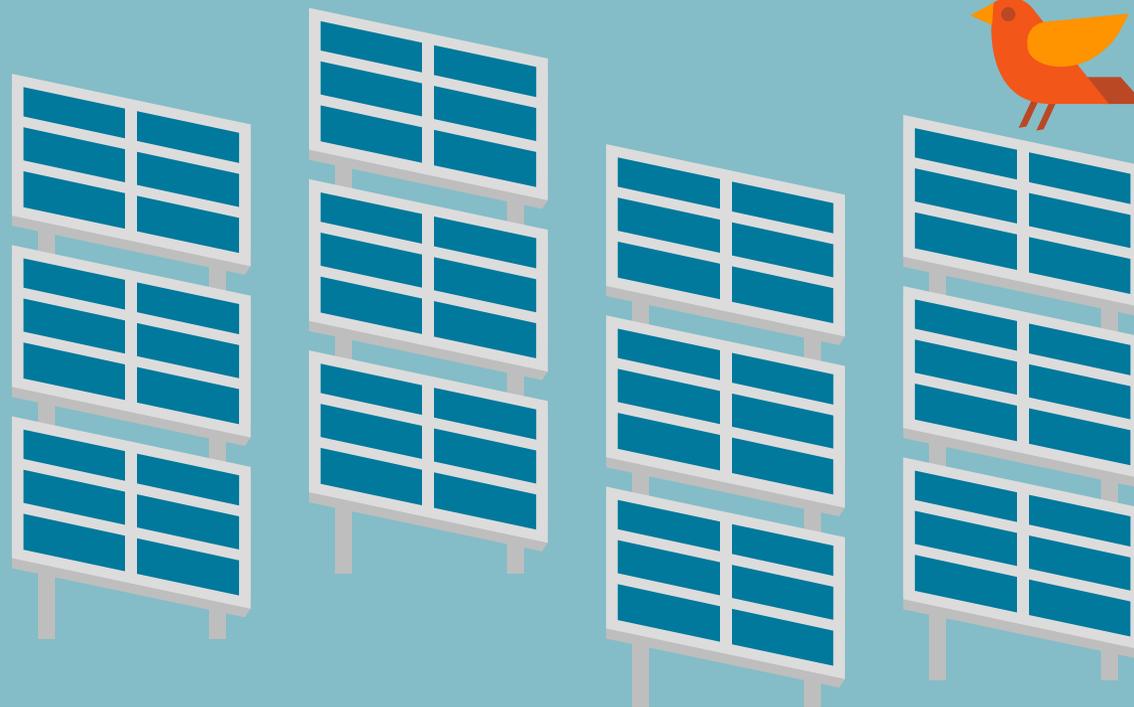
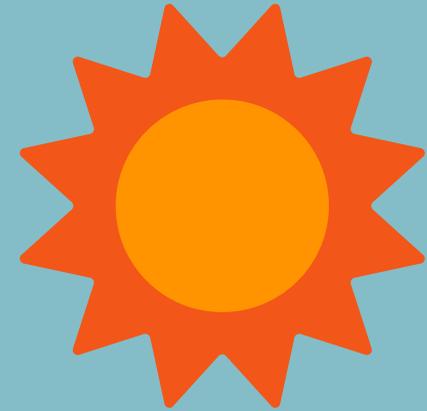
GREEN JOBS WILL
BE ADDED IN THE
COMING YEARS

³ <http://www.ilo.org/global/lang-en/index.htm>





EXPLORING GREEN INDUSTRIES



Green industries

Though green jobs can be found in many industries, renewable energy generation, resource efficiency, and the public sector are three top green industries to work in.⁴

Renewable energy generation is the development and usage of renewable energy sources such as biomass, geothermal, and hydro. This sector also includes wind, wave, and solar energy, which enjoyed the fastest relative job growth of all clean economy sectors between 2003 and 2010.⁵ This sector also includes the exploration and consumption of oil and natural gas.

Resource efficiency, conservation and waste reduction is the increase of usage efficiency and conservation of important resources such as water and energy by means of water savings technologies, smart grids, and other responsive technologies. In addition, this sector includes the management, reduction, and treatment of wastewater and solid waste, as well as the processing of recyclable materials such as paper, plastic, and glass.

The public sector includes activities related to pollution prevention, conservation, and the enforcement of regulations, as well as policy advocacy and analysis in government agencies. It also includes research activities in national laboratories.

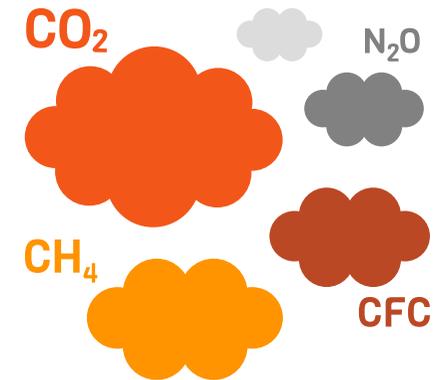
**THE WIND, WAVE, AND
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⁴ <http://www.onetcenter.org/green.html>

⁵ Sizing the Clean Economy: A National and Regional Green Jobs Assessment



In addition, green jobs can be found in other industries such as manufacturing; green construction; automotive; transportation; research, design, and consulting services; environment protection; and agriculture and forestry manufacturing. Interestingly, environmental science is quickly becoming the most popular field for biology and chemistry graduates due to the many opportunities in jobs related to human and environmental health matters.⁶ Other examples of popular green sectors include IT, especially for green hard- and software; sustainable urban planning; and climate policy analysis.⁷



⁶ <http://www.campusexplorer.com/college-advice-tips/F0E4877F/5-Most-Popular-Colleges-for-Environmental-Science-Majors>

⁷ <http://www.acespace.org/green-jobs/examples>



10 popular industry sectors

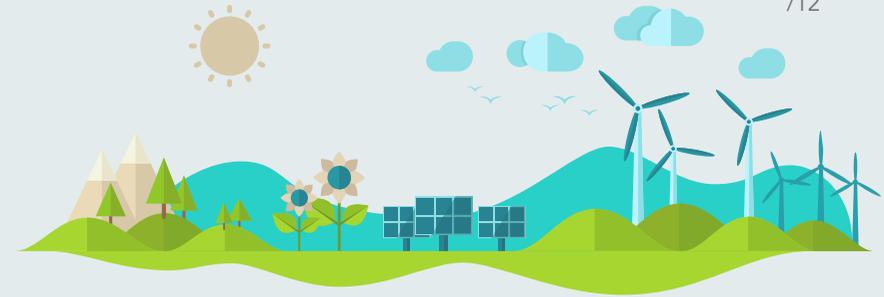
Based on previous growth trends, the following fields demonstrate high potential for job growth.⁸

1. **Conservation:** The preservation of the environment, including biodiversity and natural resources, by means of the development and implementation of relevant policies and practices.
2. **Energy Saving Building Material:** The development, production, and distribution of energy-efficient building materials such as high performance windows and weatherization materials that help reduce greenhouse emissions and contribute to meeting green building standards.
3. **Energy Services:** Services aimed at increasing energy efficiency and reducing operating costs for residential and commercial customers.
4. **Environmental Services:** A broad range of services that includes sanitation, noise abatement, refuse disposal, landscape protection, and emissions reductions. These services aim to reduce the impact of human activity on the environment.
5. **Green Architecture and Construction Services:** The design and construction of green buildings, or buildings designed with heightened energy efficiency and reduced environmental impact in mind.



6. **Public Mass Transits:** Public transportation, including commuter rail, buses, and trolleybuses. Mass transit plays an increasingly important role in reducing energy consumption and protecting the environment.
7. **Recycling and Reuse:** A range of services aimed at recycling and/or reusing materials that would otherwise fill landfills, thereby reducing the amount of waste and conserving energy and resources on the production of new packaging and goods.
8. **Regulation and Compliance:** Services aimed at ensuring manufacturers, retailers, and other businesses meet local, regional, and national environmental regulations.
9. **Remediation:** The removal and disposal of contaminants from structures, soil, surface water, and ground water in order to preserve the environment, prevent possible negative health impacts, and meet regulatory standards.
10. **Waste Management and Treatment:** The management and treatment of human-generated waste in order to reduce the impact of solid waste, wastewater, and hazardous waste on the environment.





Popular green occupations

- **Biofuels researchers:** Due to the United States' drive for energy independence, the need for biofuels as an alternative to fossil fuel is rising.
- **Climate scientists:** Climate scientists remain important to help us understand the impact of climate change on our natural surroundings.
- **Electrical engineers:** With increased reliance on electrical equipment and systems in commercial to industrial use, electrical engineers are called upon to design and develop necessary components.
- **Energy engineers:** As the world's population grows, so will the demand for energy engineers to produce energy from both non-renewable energy sources such as oil and natural gas and renewable energy sources such as solar and wind power.
- **Environmental scientists and specialists:** With increased awareness of pollution and the need for responsible waste management, employment of these scientists is poised for growth.
- **Green builders:** The call for these professionals will rise concurrent with the need for building energy-efficient homes and buildings construed from ecologically friendly and recycled materials for the world's growing population.
- **Green design professionals:** Whether they're architects, urban planners, or landscapers, green design professionals create new green spaces in the places where we work and live.
- **Marine scientists:** Marine scientists monitor the oceans and work with policy makers to protect ecosystems and humans from potential dangers such as pollution and natural disasters.
- **Materials engineers:** Materials engineers are responsible for the development and application of new, unique, or novel materials.
- **Next generation battery engineering and hybrid vehicle design:** The call for cars that run on clean or renewable energy is growing, as is the need for engineers to design these reduced emissions vehicles.
- **Plant/crop scientists:** Plant and crop scientists will play an important role in developing healthy crops to feed the world's growing population.
- **Plant engineers:** With energy and manufacturing both having high numbers of green jobs, this profession is likely to grow its ranks in the coming years.
- **Project managers:** As the concept of sustainability grows and spreads to all sectors of our economy, so will the need for project managers to oversee green projects across all segments of the economy.
- **Solar cell technicians:** The use of solar energy as a renewable, clean energy source is growing. Solar cell technicians manufacture and install solar panels, as well as build power plants based on solar energy.
- **Wave energy producers:** With fossil fuels in limited supply and energy demands continuing to rise, wave energy producers are set to play an important role in generating clean energy from one of our world's largest renewable energy sources—the ocean.
- **Wind energy workers:** Professionals who manufacture, install, and maintain wind turbines are increasingly in demand as we rely more and more on wind energy for electricity.

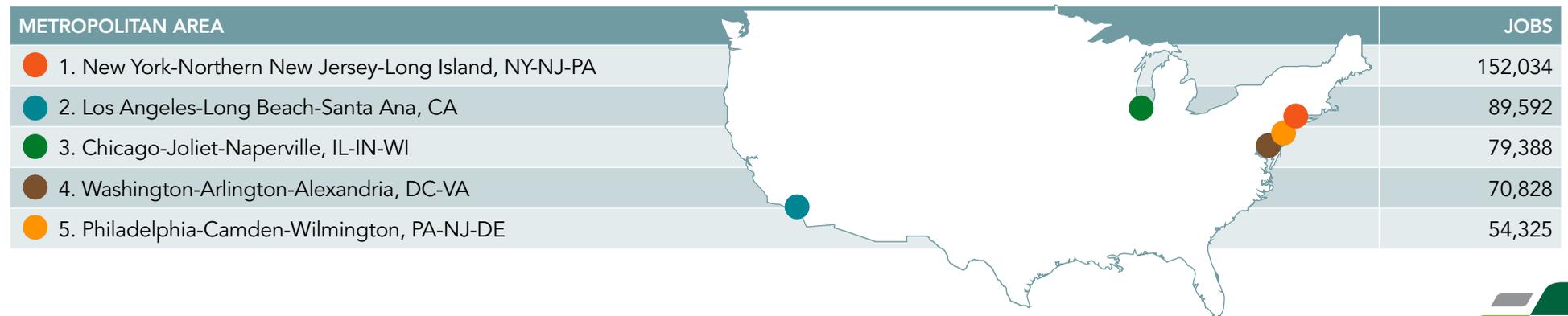


Global employment snapshot

China had the highest number of jobs in the renewable energy sector, with 2.64 million people employed in 2013, according to RenewableEnergyWorld.com. In the same year, Brazil boasted 894,000 renewable energy jobs, with the highest concentration in bioenergy. The 28 countries that make up the European Union supported an estimated 1.2 million renewable energy jobs. Member state Germany had the highest number of those jobs, with 371,000 indirect and direct jobs in the sector.⁹

Green jobs in the United States

In the United States, five metropolitan zones employed the highest total of green jobs¹⁰



⁹ <http://www.renewableenergyworld.com/rea/news/article/2015/01/fact-sheet-renewable-energy-job-numbers?page=2>

¹⁰ Report: Sizing the Clean Economy: A National and Regional Green Jobs Assessment



In addition to these areas, high concentrations of opportunities can be found in the following regions:

- 1. Biofuels:** The research and production of biofuels is concentrated in Houston and Northern California, close to the headquarters of established oil companies. The research of algae and related products primarily takes place in California and Florida.
- 2. Energy:** Many Eastern, Midwestern, and West Coast states are making a concentrated effort to enhance neighborhood energy efficiency and have many alternative and renewable energy jobs.
- 3. Environmental Science:** Many laboratories and consulting firms are located in the states of Washington, California, and Texas. There are also sampling sites across the country.
- 4. Plant and Crop Science:** Most opportunities in plant and crop science are in agricultural areas such as Illinois, Indiana, Northern California, Iowa, and Texas.
- 5. Wind and Solar Energy:** Top opportunity in this sector can be found at wind and solar power plants along the West Coast, where the sun is the brightest.



GOING GREEN



Earning potential

Earning potential varies significantly between sectors. In the field of architecture and engineering, those working in green jobs earn approximately \$105,670.¹¹ That's \$29,750 more than professionals in non-green positions in the same fields. The Association of Energy Engineers' survey of its members found that 29.1 percent of respondents earned between \$80,000 and \$100,000 per year. Those working green jobs in business and finance earn on average \$14,210 more per year than those in regular jobs in the same sectors.¹²

Degrees for green careers

Not every green job requires a degree. However, if you're studying or looking to retrain work in a green sector, a science or engineering degree can provide a starting point to a green career destination.

**MORE AND MORE
ORGANIZATIONS NEED
BUSINESS MANAGERS AND
LEADERS WHO POSSESS
AN UNDERSTANDING
OF GREEN PRACTICES
AND PRINCIPLES.**

11, 12 <http://www.chron.com/jobs/salary/article/How-Much-Money-Do-Green-Jobs-Really-Pay-4413587.php>



For science, a degree in biology is always a good starting point. As an undergraduate degree, this will serve as the springboard to graduate degrees that cater directly to a number of specialized green career options. Popular areas of study to consider are biofuels research, environmental science, plant and crop science, material science, and geology.

In the field of engineering, environmental, electrical, energy, mechanical, materials, industrial, and civil engineering are in demand degrees. Additionally, a degree in environmental chemistry or environmental engineering will pave the way for a career in conservation and green construction.

In addition to science and engineering, it's important to recognize the potential of business management. Business management might not be the obvious choice for a green career, but in a growing green economy, more and more organizations will need business managers and leaders who possess an understanding of green practices and principles.



Professional organizations for green careers

Networking with professionals in the industry you want to work in is an integral aspect of building and advancing any career. Joining a professional organization is a surefire way to network directly with professionals in a target green industry. Moreover, professional organizations often provide industry specific career resources for job seekers and can offer training and other valuable resources for those looking to advance to the next stage. What follows is a selection of professional organizations green science and engineering professionals may find useful.

Science professional societies:

- Algae Biomass Organization
- American Academy of Environmental Engineers and Scientists
- American Chemical Society
- American Society of Agronomy
- ASM International
- Association of Environmental & Engineering Geologists
- Crop Science Society of America
- Geological Society of America
- Materials Research Society
- Society for Biological Engineering

Engineering professional societies:

- American Academy of Environmental Engineers and Scientists
- American Society of Heating, Refrigerating and Air-Conditioning Engineers
- Association for Facilities Engineering
- Association of Energy Engineers
- Engineers for a Sustainable World
- Engineers for Change
- International Society of Sustainability Professionals
- U.S. Green Building Council



In addition, professionals in larger discipline-based engineering fields can find sustainability sections, interest groups, and committees in the following associations:

- American Society of Chemical Engineers
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- IEEE – Institute of Electrical and Electronics Engineers
- IIE – Institute of Industrial Engineers
- Society of Manufacturing Engineers





The Future is Bright for Green Jobs

Nations across the globe will continue to look for sustainable solutions to reduce the impact of human activity on the climate and the environment. For those looking for socially responsible and meaningful work, green jobs offer the promise of meeting the demands of a green economy while also employing the latest cutting-edge technologies, not just today, but well into the future. Going green is a great choice for any professional.



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He holds a Bachelor of Science degree in Chemistry from the University of Southern California and Master of Business Administration from Pepperdine University. In addition, Harvey is an active member of several scientific and professional organizations, including the American Chemical Society, the Southern California Biomedical Council, the American Association of Advancement of Science and holds advisory roles at the Claremont Keck Institute, Citrus College and Biocom.

JOSEPH LAMPINEN is the director of the Engineering Center of Excellence at Kelly Services®. He is a technical workforce strategist and solutionist, responsible for the strategic development and growth of engineering staffing, search and project services in the USA and Canada, with special interest in manufacturing engineering, plant/facilities engineering, sustainability and Lean Six Sigma.



Joe holds a Master of Science degree in Technology from Purdue University, a Graduate Certificate in Engineering Law from the University of Illinois at Chicago, as well as a Bachelor's degree from Western Illinois University. He is credentialed as a Certified Manufacturing Engineer, Project Management Professional and is a LEED® Accredited Professional. In addition, Joe is a member of several professional societies and associations, including the Society of Manufacturing Engineers, Project Management Institute, Engineers for a Sustainable World, US Green Building Council and the International Society of Sustainability Professionals.



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