

# Energy & Green Technology

An Educator's Guide



## CAREER PATHWAYS



# Career Pathways: Energy and Green Technology

## AN EDUCATOR'S GUIDE

Never before in American history has so much attention focused on energy. Whether it's conserving conventional energy sources or creating newer, cleaner sources from natural resources, it's clear that the importance of creating a culture of energy efficiency and renewable energy has taken center stage. The combination of global warming, the depletion of current energy resources, a growing concern over the impact of carbon emissions diminishing the quality of the environment, and dependence on foreign oil has spawned a greater urgency to change the way we use and create energy. Adding to the urgency is a utilities industry facing a wave of retirements. These challenges present an interesting side effect—the creation of millions of new jobs.

Many “green” jobs are not new. Construction workers, engineers, welders, and electricians are just a few of the workers who will be needed to support a more efficient and renewable energy economy. But what expertise will these workers need in addition to what they already know, and what jobs are there in this fast-growing field?

The *Career Pathways: Energy and Green Technology* teacher's guide and enclosed DVD address these questions. They have been designed to give middle and high school students a glimpse of the wide range of job opportunities in energy and the educational preparation required. The DVD contains short profiles of young professionals in a variety of energy-related careers while the teacher's guide gives students a broader understanding of energy and green technology career opportunities. Activities in the guide are aligned with state standards in content areas ranging from language arts to science, technology, and math.

For further information, please refer to the resource section of this guide or contact Mary deManbey, program manager for the CBIA Education Foundation, at [mary.demanbey@cbia.com](mailto:mary.demanbey@cbia.com).

Sincerely,



Judith K. Resnick  
Executive Director  
CBIA Education Foundation

## 2 Career Pathways: Energy and Green Technology

CBIA would like to thank the generous sponsors of the  
*Career Pathways: Energy and Green Technology* DVD and Teacher's Guide



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# Career Pathways: Energy and Green Technology

## AN EDUCATOR'S GUIDE

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### ANSWER KEY

**The Name Game: What's in a Word?** (page 14)

Alternative energy, Biodiesel, Biomass energy,  
Carbon footprint, Fossil fuel, Geothermal energy,  
Green job, Hydraulic power, Photovoltaic cell,  
Renewable energy, Smart grid, Solar thermal,  
Transmission lines, Wind power, Fuel cell

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## A Look at Energy and Green Technology Careers

# Educator's Overview

The energy industry is experiencing tremendous growing pains. During a time of political fragility and unrest, the push to reduce dependence on foreign oil is becoming stronger. Higher energy costs and growing concerns about global warming from carbon emissions have further underscored the importance of energy efficiency, conservation, and alternative/renewable sources—such as wind, solar, geothermal, and fuel cells.

In addition to political and environmental imperatives, the energy industry also faces a massive shortage of workers, as many of its most highly qualified people prepare to retire at the same time potentially millions of jobs are created. In fact, *The Greening of the World of Work*, a 2009 report by the National Center for O\*NET Development, estimates that renewable energy alone will be responsible for the creation of 650,000 jobs in the next 10 years and more than 1.4 million jobs by 2025.

In order to understand where the jobs in energy are, it's important to understand the differences among conventional, alternative, and renewable energy and the role that these energy sources play in our economy. In general:

- **Conventional energy**, in some cases known as fossil fuel, is derived from coal, natural gas, or oil formed from decaying plant and animal materials over hundreds of thousands of years. These carbon-based energy sources are nonrenewable, meaning that they will run out at some point. Nuclear power, which relies on splitting atoms to produce energy, is now widely considered conventional energy, although it is not a fossil fuel.
- **Renewable energy** is generated by renewable natural resources, such as the sun (solar), wind, the earth's heat (geothermal), water (hydroelectric), or recently living plant or animal matter, such as corn or wood chips (biomass). Renewable energies are also considered alternative energies.
- **Alternative energy** describes any sustainable energy outside the conventional category that neither depletes natural resources nor results in the negative environmental consequences produced by the fuels being replaced. Fuel cells, hydrogen, and all forms of renewable energy are considered alternative. Historically, as the supply or price of a dominant energy type has plummeted or soared, transitions to other forms of energy have occurred—which means that the definition of “alternative energy” has changed over the centuries: coal vs. wood, petroleum vs. whale oil, ethanol alcohol (e.g., from corn) vs. fossil fuels.

The following pages give information and exercises designed to encourage your students to learn more about this fast-growing industry. Through these activities, which supplement the enclosed DVD, students will gain a better grasp of the everyday experiences and skills associated with these high-demand occupations.



# Careers in Energy and Green Technology

## What is a “green” occupation?

Many experts have weighed in on the definition of a green job. Some would say if you’re installing a wind turbine, then you’re green. Still others would say that if you’re manufacturing the blade that goes into the wind turbine, or if you’re doing something as simple as weatherizing a home, you’re green as well.

Green jobs can be broadly defined as jobs that involve protecting wildlife or ecosystems, reducing pollution or waste, or reducing energy usage and lowering carbon emissions. Green jobs in America’s energy economy are concentrated in the energy efficiency sector, with growth also expected in the renewable energy sector.\* As part of the 2009 stimulus package passed by the U.S. Congress, more than \$60 billion in federal funding will be directed to clean energy projects, including \$600 million for green job training programs. In short, keeping our world green by using energy more efficiently and creating new and sustainable sources of energy is a high priority.

It’s important to note that not every green job will require new green skills or certification. However, green jobs that include certifications give workers the advantage of being more marketable. This is particularly true if there are financial incentives in place that require contractors to have specialized training.

## What are the green jobs?

### Top Fields

- Weatherization
- Building Energy Assessment
- Energy-Efficient Building Construction
- Building Operations and Maintenance
- Buying and Selling Energy-Related Products
- Project Engineering and Implementation
- Energy Transmission and Distribution
- Transportation Systems and Services

*Source: Advanced Technology Environmental and Energy Center*

### Emerging Jobs

- Power Purchaser and Carbon Trader
- Renewable Energy Site Assessor
- Geothermal Assessment Specialist
- Tradesperson and/or Supervisor for Energy Efficiency Construction
- Renewable Energy Systems Installer
- Building Automation Specialist
- Combined Heat and Power (CHP) Installer and Operator
- Biofuel Processing Technician
- Fuel Cell Technician
- Sustainability Coordinator

*Sources: The Institute for Sustainable Energy, Eastern Connecticut State University, Management Information Services, Inc., and U.S. Bureau of Labor*

\* John J. Heldrich Center for Workforce Development, 2-09



**TEACHER REPRODUCIBLE:** Use this exercise to help your students understand the energy industry and career opportunities within it.

Connecticut Education Standards: Language Arts, 3. Students produce written, oral and visual texts to express, develop, and substantiate ideas and experiences.

# What's Your Idea of a Career in Energy?



Show the "Overview" segment of the DVD.

Have you ever thought about what it might be like to climb a telephone pole and restore power during an electrical outage? Or design a wind turbine? Or help people weatherize their homes to be more energy-efficient? These are just a few examples of the many jobs that are in growing demand in the field of energy.

Whether it's working in more conventional forms of energy, like fossil fuels (coal, gas, and oil), being part of cutting-edge green technologies created from natural resources (solar, wind, geothermal), or helping people conserve energy in their homes and businesses, there are plenty of current and emerging jobs in the field. Many existing careers will require additional training and licensing to meet the standards of a new, cleaner energy world. Here are some examples of occupations that will continue to grow over the next several years:

## CONVENTIONAL ENERGY

*(coal, gas, oil, nuclear)*

- Power Line Installer and Repairer
- Nuclear Technician
- Transmission Planner
- Electrician
- Construction Worker
- Electrical Engineer
- Utility Plant Operator
- Welder
- Pipefitter
- Engineering Technician

## RENEWABLE ENERGY

*(wind, solar, geothermal, biomass, etc.)*

- Environmental Engineer
- Environmental Scientist
- Chemical Engineer
- Photovoltaic Electrician
- Machinist
- Plumber
- Team Assembler
- Installation/Operations Technician
- Electrical Engineer Technician

## ENERGY EFFICIENCY

*(building retrofitting, biodiesel, etc.)*

- Environmental Architect
- Environmental Engineer
- Computer Software Engineer
- HVAC Technician
- Insulation Worker
- Building Inspector
- Roofer
- Carpenter
- Auto Mechanic

## Student Activity

Pick any career in energy, and research it. Then choose one of these projects.

1. **Write a first-person account of a typical day on the job.** Incorporate information on the skills you would need, what you like about the job, what personal characteristics are helpful on the job, the history of the profession, salary and employment outlook, and how you prepared for your career.
2. **Interview a person who is working in energy.** Ask why he or she entered the field, what a typical day is like, what skills are needed, what is most rewarding about the work, and what training is needed. You may present a video of the interview or submit a written report that includes your reflection on the interview and what you learned.

Source: U.S. Bureau of Labor Statistics, 2007–2009

**TEACHER REPRODUCIBLE:** Use this page to give your students information on skills needed to succeed in energy occupations. The “play acting” exercise is designed to help students understand how these skills are applied.

Connecticut Education Standards: Language Arts, 4.2. Students speak and write using standard language structures and diction appropriate to audience and task. Technology: Enterprise, 10. Students will demonstrate the techniques of enterprise and how they relate to product and service production, economics, human and material resources, and technology.

# What Skills Will I Need?

Careers in energy cross into many different areas of expertise. Whether you like stretching your mind or your muscles (or both), being indoors or out, screen time or face time, solving problems, or selling solutions, there is a job in energy that would appeal to your personal strengths and preferences.

You might be a technician fixing downed wires, restoring power during an outage. You might work with architects and construction crews to design green buildings—or with homeowners to make their residences more energy-efficient. Strong computer skills could lead you to monitoring and troubleshooting electrical transmission sites. Scientific curiosity could lead you to developing more portable or economical fuel cell technologies.

Regardless of which arena of energy you go into (conventional, renewable, or energy efficiency), there are some basic skills, knowledge and characteristics you will need:

## The Basics

- ☑ Communication skills
- ☑ Problem-solving skills
- ☑ Math skills (trigonometry, algebra)
- ☑ Technical ability
- ☑ Knowledge of the industry
- ☑ Willingness to acquire new skills
- ☑ Adaptability and flexibility
- ☑ Workforce readiness skills (punctuality, professionalism, etc.)

## The Specifics (depending on the job)

- ☑ Ability to work with your hands
- ☑ Ability to read and follow instructions
- ☑ Ability to write reports
- ☑ Ability to read blueprints
- ☑ Customer service skills
- ☑ Scientific research ability
- ☑ Design knowledge
- ☑ Creativity
- ☑ Ability to meet certain physical demands (i.e., climbing, heavy lifting)

## Student Activity

Get into a small group consisting of sales managers and customers. Each sales manager will represent an energy company. It can be a fictional company or a Connecticut company you have researched. Sales managers will attempt to “sell” their company’s products and services to the customers, emphasizing not only the product but the people who work for the company and what they can do for the customer. The customers will determine whom they will contract with and why. Customers and sales managers will then reverse roles. As a group, discuss what you learned and then share your observations with the class.



**Teacher Reproducible:** This page refers to the professionals profiled in the DVD. The activity is designed to get students discussing the profiles and their own interpretation of what is required in these occupations.

Connecticut Education Standards: Technology, Career awareness, 3. Students will become aware of the world of work and its function in society, diversity, expectations, trends, and requirements.

# A Day in the Life



Show the profile segments of the DVD.

Careers in energy and green technology run the gamut. You could work as a welder fitting pipes for more efficient transmission lines for electricity. If you like the outdoors and don't mind heights, you might prefer installing solar panels on homes and commercial buildings. More the indoor type? Troubleshooting computer software may suit you better. The bottom line is, it's a good idea to research what a typical day might be like to see if it fits your personality style and skill set.

John Shider, profiled in the DVD, didn't know what he wanted to do with his life until he learned how he could help people increase the energy efficiency in their homes. Lincoln Vitalis is on a mission to make fuel cells more affordable by making hydrogen more efficiently.

**What would make you interested in a career working in energy?**



## Student Activity

BEFORE watching the DVD profiles, fill in the following job descriptions to the best of your ability. What do you think are the main functions of the job? After watching the DVD, discuss what you learned about each occupation. What skills and education are required? Edit your job descriptions accordingly.

**An environmental engineer...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**An electrician...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**An applications engineer...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**A building analyst...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**An HVAC technician...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**A transmission planner...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**A fuel cell technician...** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Get Energized, Get Started

Are you still not sure a career in energy and green technology is for you? Do some more exploring:

- Visit the Energy Exhibit at the Connecticut Science Center in Hartford.
- Participate in your school's science fairs. Devise a project that examines energy generation or efficiency.
- Start or expand a recycling program at your school.
- Conduct an energy audit at your school and determine ways you can save energy. Go to [www.greenovationnation.com](http://www.greenovationnation.com).
- Talk to your guidance counselor about job shadowing a person who works in the energy industry.

**TEACHER REPRODUCIBLE:** This page should be used when showing the DVD profiles. Students will need to listen carefully in order to do the exercise. You may wish to have them work with a partner.

Connecticut Education Standards: Technology, Career Awareness, 3. Students will become aware of the world of work and its function in society, diversity, expectations, trends and requirements.

# What's the Real Story? Beyond the Interview

The DVD *Career Pathways: Energy and Green Technology* profiles seven young professionals who explain what they do and why they like their work. Listen carefully to see if you can answer the following questions about each person interviewed.



Explain what kind of intern Catie was. \_\_\_\_\_

\_\_\_\_\_

What "amazing" opportunities did she have at Northeast Utilities? \_\_\_\_\_

\_\_\_\_\_

What does Catie like about her job? \_\_\_\_\_

\_\_\_\_\_



What's the number-one thing John loves about his job? \_\_\_\_\_

\_\_\_\_\_

Why do customers need John? \_\_\_\_\_

\_\_\_\_\_

What kind of certification does John have? \_\_\_\_\_

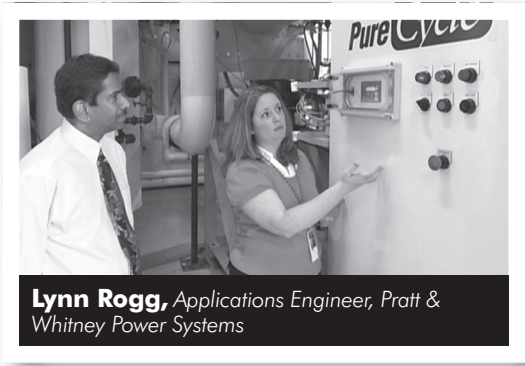
\_\_\_\_\_



How does Lincoln describe a fuel cell? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

How does Lincoln "leave his mark" on fuel cells? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What does Lincoln mean when he says, "We pave the road in front of us as we go"? \_\_\_\_\_  
 \_\_\_\_\_



How does Lynn describe geothermal energy? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What does Lynn do for her customers? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Why is Lynn's work important to her? \_\_\_\_\_  
 \_\_\_\_\_



What two things does Marty really like about his job? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

How does Marty explain what a solar thermal panel is and how it works? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What professional license does Marty have, and how did he get it? \_\_\_\_\_  
 \_\_\_\_\_

12 Career Pathways: Energy and Green Technology



**Paul Laferriere**, HVAC Technician, Custom Mechanical Services

Why did Paul become an HVAC technician? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Why do you think Paul's job is never boring to him? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What does Paul mean when he says, "You think you have to be a doctor or a lawyer to get respect, but doctors and lawyers call us all the time"? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Tim Sisk**, Environmental Engineer, NRG Energy

How does Tim's company make electricity? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

According to Tim, what is great about his career? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What is Tim working on with the state of Connecticut? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**TEACHER REPRODUCIBLE:** Use this page to help students understand career opportunities in the utilities industry.

Connecticut Education Standards: Technology, 2. Students will understand the impact that technology has on the societal, culture and environmental aspects of their lives.

# Careers in the Utility Industry

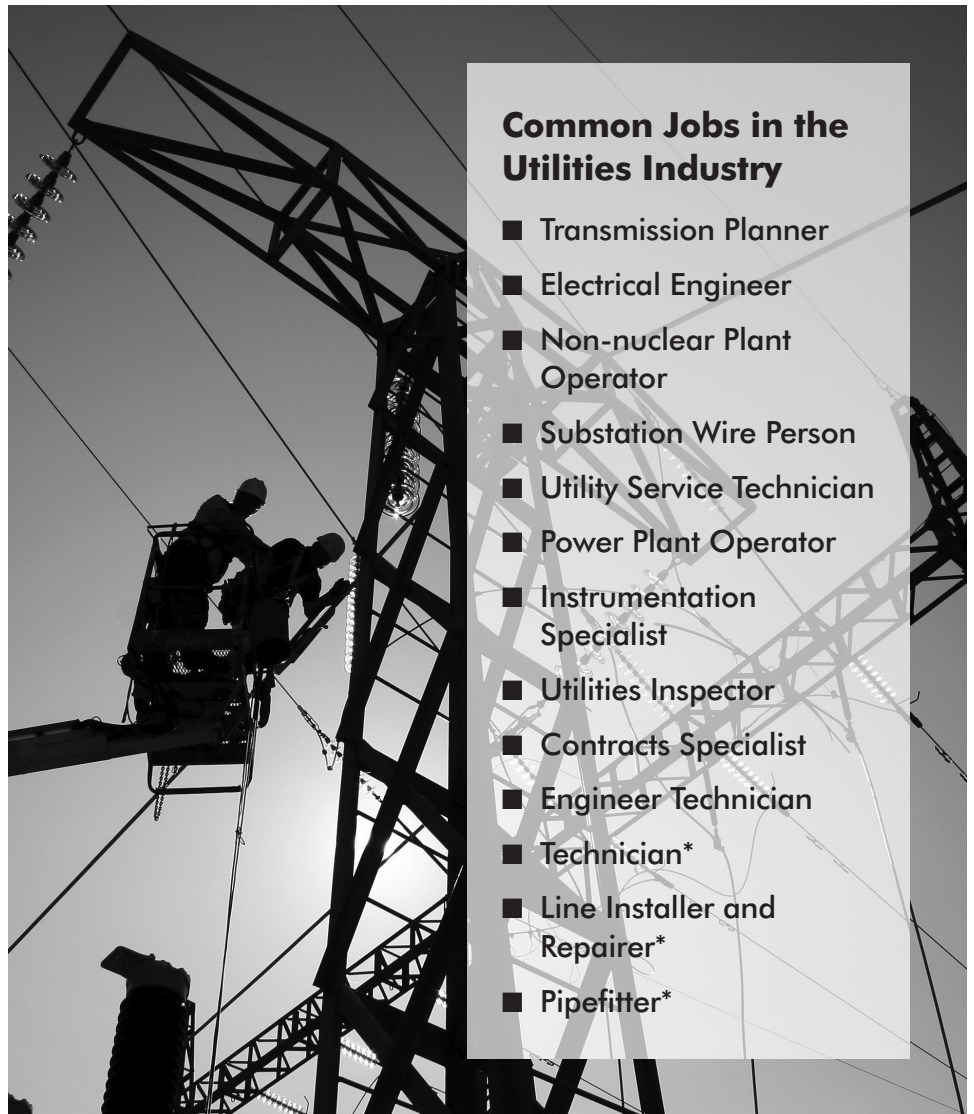
While much of the focus today is on occupations in renewable energy fields, such as solar, wind, and geothermal, there is also a great need to maintain and upgrade the conventional utility industry and infrastructure. A high percentage of the current workforce will be retiring in the near future. That trend, combined with over-utilized transmission systems in need of upgrading, has created a need for more skilled workers.

People who work in the utility industry need to be flexible, as sometimes they might work long hours or different shifts. Employees often work overtime, earning additional pay, to accommodate peaks in demand and repair. They typically undergo extensive training on working with hazardous materials and complying with safety regulations and procedures.

Listed to the right are some of the common jobs in the utilities industry. (Go to [www.ihireutilities.com](http://www.ihireutilities.com) to find out more about these jobs.)

## Student Activity

Imagine being at home on a typical Saturday and the electricity goes out. Think about what you can't do without power. List all the different ways in which your day has changed. Then research the different jobs it takes to keep your electricity running smoothly. (A great source of this information is [www.getintoenergy.com](http://www.getintoenergy.com).) Imagine what it feels like once the electricity is turned back on. Get into small groups and discuss with your classmates.



### Common Jobs in the Utilities Industry

- Transmission Planner
- Electrical Engineer
- Non-nuclear Plant Operator
- Substation Wire Person
- Utility Service Technician
- Power Plant Operator
- Instrumentation Specialist
- Utilities Inspector
- Contracts Specialist
- Engineer Technician
- Technician\*
- Line Installer and Repairer\*
- Pipefitter\*

Sources: U.S. Department of Labor, Bureau of Labor Statistics, 9/08; \* Jobs in Demand—Center for Energy Workforce Development, 2/09

**TEACHER REPRODUCIBLE:** This page introduces students to common energy terminology. It is helpful to watch the DVD first, as many of the terms are introduced and explained.

Connecticut Education Standards: Science, Global Interdependence 9.8, 9.9. Students will understand how various sources of energy are created and used, and how human populations affect the quality of the environment and the balance of the Earth’s systems.

# The Name Game: What’s in a Word?

You may be familiar with words associated with energy, like *green jobs*, *renewable*, *alternative*, *smart grid*. But do you really know what they mean? Because this is a fast-growing, popular industry, there have been lots of discussions about what certain energy terms mean. The following quiz will test your knowledge of common terms associated with energy and green technology.

## Student Activity

Match each word in the box below with the correct definition.  
Answer key, page 3.

Hydraulic power	Biomass energy
Green job	Alternative energy
Wind power	Biodiesel
Carbon footprint	Geothermal energy
Renewable energy	Photovoltaic cell
Solar thermal	Transmission lines
Fuel cell	Smart grid
Fossil fuel	

ANSWER

Hot water or steam taken from underground used to generate electricity

A job that protects the ecosystem, reducing pollution or energy usage and lowering carbon emissions

Electricity generated from the force of water moving turbines

A device that converts sunlight directly into electricity

Energy created from natural resources, such as wind and solar, that cannot be depleted

Digital technology that delivers electricity from suppliers directly to consumers

Power generated from the sun that heats water

Wires, coaxial cables, optical fibers and other lines that connect power-generating plants with industrial customers and substations

Energy generated from the conversion of moving air through the use of turbines, usually mounted on a tower

An electrochemical device that generates an electrical current by converting the chemical energy of a fuel, mainly hydrogen, directly into electrical energy

ANSWER

Energy that doesn’t deplete natural resources or negatively impact the environment

A fuel made from soybeans, canola, vegetable oils, or animal fats, combined with alcohol.

A renewable energy source made from organic materials such as wood chips

The measure of the amount of carbon dioxide produced by an individual, product, event, or group over a given time

Any source of energy made from decaying plants and animals



**TEACHER REPRODUCIBLE:** This activity gives students a historical perspective on the energy industry and the people who made major impacts.

Connecticut Education Standards: Social Studies, 3. Students will apply their understanding of historical periods, issues, and trends to examine such historical themes as ideas, beliefs and institutions, and science and technologies in order to understand how the world came to be the way it is.

# Energy Rock Stars Through the Ages

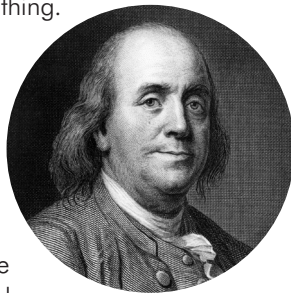
Benjamin Franklin flew a kite during an electrical storm to prove that static electricity and lightning were the same thing. But what effect did this discovery have on our ability to use electricity as an energy source? Albert Einstein's theory of relativity proved the connection between mass, energy, magnetism, electricity, and light, but do you know what effect his theory had on nuclear power?

The energy field has had leaders who, through their genius and innovation, have made major impacts on the way we use energy and how we create it. Their discoveries have had far-reaching consequences for our whole society.

## Student Activity

See if you can determine how the following energy superstars changed the way we use and view energy. Create a portfolio about one of the individuals below. Provide some historical background, describing the times in which this person lived. What were his or her major achievements? How did they impact the world then? Are these discoveries impacting our lives today? Create a timeline of the person's activities and the effect those activities had.

- In 1750, **Benjamin Franklin** discovered that static electricity and lightning were the same thing.



- In the 1850s, **Daniel Halladay** and **John Burnham** built and sold the Halladay windmill, which had an open tower design and thin wooden blades.

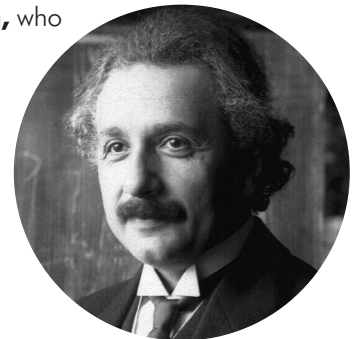
- In 1859, **Edwin Drake** drilled the first commercial well and hit oil and natural gas at 69 feet below the surface of the earth.

- In 1883, **Charles Fritts** built the first genuine solar cell. Its efficiency rate was 1-2 percent.

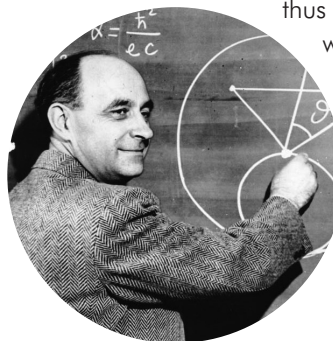
- In 1885, **Robert Bunsen** introduced a thermostat to a burner that allowed the temperature of the flame to be adjusted and monitored.

- In 1888, **Charles Brush** used the first large windmill to generate electricity in Cleveland, Ohio. In later years, General Electric acquired Brush's company.

- In 1905, **Albert Einstein**, who is considered the father of modern physics, wrote the theory of relativity ( $E=mass \times \text{speed of light}^2$ ), one of the most significant findings of the 20th century.



- In 1934, **Enrico Fermi** irradiated uranium with neutrons, thus splitting an atom and achieving the world's first nuclear fission.



- In 1998, **Subhendu Guha**, a scientist noted for his work in amorphous silicon, invented flexible solar shingles, a roofing material for converting sunlight into electricity on buildings.

**TEACHER REPRODUCIBLE:** Use this page to give your students information on salaries for energy jobs in demand.

# Show Me the Money

Professionals in energy and green occupations earn competitive wages. Because of the nature of the work, there are many opportunities for working overtime and making more than the standard wage. Here are median salaries for some of the more common careers found in energy and green technology.

Occupation	Low	High
Building Inspector	\$36,688	\$66,619
Carpenter	\$37,316	\$61,953
Computer Software Engineer	\$56,960	\$129,949
Construction Manager	\$62,133	\$106,877
Electrical Engineer	\$49,120	\$115,240
Electrical Engineer Technician	\$32,490	\$78,560
Electric Power Line Installer	\$34,751	\$75,391
Electrician	\$26,540	\$72,696
Environmental Architect	\$34,230	\$95,420
Environmental Engineer	\$41,942	\$106,628
Environmental Engineering Technician	\$35,045	\$74,706
Environmental Scientist (Hydrologist)	\$42,080	\$98,320
HVAC Technician	\$29,369	\$59,425
Insulation Worker	\$23,420	\$57,740
Industrial Engineer	\$44,370	\$98,887
Machinist	\$27,369	\$65,036
Nuclear Technician	\$40,310	\$93,350
Pipefitter	\$29,599	\$74,608
Plumber	\$28,595	\$65,121
Rofer	\$24,913	\$37,618
Welder	\$26,520	\$56,534

*Note: Salary ranges are based on national averages.*

Sources: salary.com, Occupational Handbook Outlook, 2008-2009, U.S. Bureau of Statistics (represents hourly wage, 40-hour-week), Management Information Services, Inc., 2008

TEACHER REPRODUCIBLE: Use this page to give your students information on educational requirements for energy occupations.

# Background Check: Energy and Green Technology

## Education and Licensing

 Show the "Pathways" segment of the DVD

Whether you have a high school diploma or a Ph.D., you will find many rewarding careers in the field of energy and green technology. Many energy workers, such as electricians, learn on the job through company-sponsored apprenticeships. You can increase your options, especially in the renewable and energy efficiency arenas, by getting special certifications through various professional associations or at one of Connecticut's community colleges. You can also take advantage of your local community college by transitioning from there into a bachelor's degree program in engineering or technology at select Connecticut universities.

The field is very broad, but here are some minimum requirements for various occupations in energy and green technology:



### High School Courses That Prepare You for Energy Careers

- Algebra
- Biology and Chemistry
- Earth or Environmental Sciences
- English/Language Arts
- Geometry
- History and Civics
- Physics
- Trigonometry

- **High school or technical high school diploma/ special certification** (up to 12 months of training after high school)—building analyst, electric power line installer, insulation worker (with blueprint training), construction laborer, welder
- **Apprenticeships** (high school diploma plus apprenticeship, length varies)—HVAC technician, energy audit specialist, refuse and recycling worker, electrician, plumber, pipefitter, roofer, lineworker, line repairer, carpenter
- **Associates degree or equivalent** (1-2 years)—biological, chemical, mechanical, or environmental technician; life, physical science, engineering technician; fuel cell technician; construction/building inspector; energy auditor; architectural technician
- **Bachelor's or equivalent** (4 years)—engineer (all, including chemical, mechanical, electrical, environmental, solar); conservation scientist; chemist; environmental manager; material scientist
- **Master's or above** (5-6+ years)—computer scientist, engineering manager, environmental architect, geoscientist, physicist, photovoltaic (PV) power systems engineer

Sources: Management Information Services, Inc., and U.S. Bureau of Labor Statistics Occupational Handbook 2008-2009, [www.getintoenergy.com](http://www.getintoenergy.com), [www.getreadyforcollege.org](http://www.getreadyforcollege.org)

# The Right Credentials



Review the "Pathways" segment of the DVD.

While many of the jobs in energy and green technology don't require special certification, some do. Having the right credentials will give you a competitive edge, as businesses are more likely to hire experts who have been validated in their fields. The following organizations offer energy and green occupation certificates. Ask your teacher for additional resources, and check out these websites to find out what certifications you will need.

## Where to Go for Licensing/Certification Information

For a career as a:	You will benefit from:	Go to:
Building Analyst	BPI certification	Building Performance Institute <a href="http://www.bpi.org">www.bpi.org</a>
Electrician*	To do electrical work in Connecticut, specific licensing applies	CT Department of Consumer Protection, <a href="http://www.ct.gov/dcp">www.ct.gov/dcp</a>
Energy Auditor	RESNET certification	Residential Energy Services Network <a href="http://www.natresnet.org">www.natresnet.org</a>
Geothermal Installer, Designer, Contractor	IGSHPA certification	International Ground Source Heat Pump Association <a href="http://www.igshpa.okstate.edu">www.igshpa.okstate.edu</a>
Green Building Engineer	GBE certification	Association of Energy Engineers <a href="http://www.aeecenter.org">www.aeecenter.org</a>
HVAC Technician*	ACCA certification	Air Conditioning Contractors of America (ACCA), <a href="http://www.acca.org">www.acca.org</a>
Lighting Efficiency Professional	Certified Lighting Efficiency Professional (CLEP) certification	Association of Energy Engineers <a href="http://www.aeecenter.org">www.aeecenter.org</a>
Plumber*	GPA certification	GreenPlumbers <a href="http://www.greenplumberusa.com">www.greenplumberusa.com</a>
Power Quality Professional	CPQ certification	Association of Energy Engineers <a href="http://www.aeecenter.org">www.aeecenter.org</a>
Solar Photovoltaic Electrician and Solar Panel Thermal Installer	NABCEP certification	North American Board of Certified Energy Practitioners, <a href="http://www.nabcep.org">www.nabcep.org</a>

\* Connecticut requires occupational and professional licensing for these trades. For more information visit the Connecticut Department of Consumer Protection, [www.ct.gov/dcp](http://www.ct.gov/dcp).

Sources: Growing Green Jobs, The Council for Adult & Experiential Learning, 4/09, The Institute for Sustainable Energy, Eastern Connecticut State University, Association of Energy Engineers

# Educational Resources

## Connecticut's Community Colleges

Connecticut's technical high schools provide excellent training in the basics for a career in energy. However, many energy jobs require licensure, apprenticeships, and additional training. Community colleges, in particular, are a good place to start, as they offer unique technician training programs along with specific programs geared toward energy and green technology certifications. You might want to investigate these programs to help you succeed, particularly in technician-level careers that can lead to higher-level engineering and technology management positions.

### College of Technology (COT)

Connecticut Community Colleges' College of Technology offers a unique technology and engineering training program that can prepare you for a technical-level engineering or manufacturing job in energy. Through the College of Technology, you can earn an A.S. degree in technological studies or engineering science at any one of the state's twelve community colleges. Specialized programs and certificates include:

- Electrical Utility Technology
- Integrator Technician A+
- Manufacturing Electronics
- Machine Technology
- Manufacturing Welding
- Plastics
- Fiber Optics (Photonics)
- Industrial Diagnostics
- Integrator Technician Networking
- Waste Management Option

Both programs (technological studies and engineering science) provide a seamless pathway to continue your program as a junior in engineering at the University of Connecticut, Central Connecticut State University, Fairfield University, University of Hartford, University of New Haven, or Charter Oak State College, or in engineering technology or industrial technology at Central Connecticut State University.

For more information, contact Karen Wosczyzna-Birch, Executive Director, College of Technology's Regional Center for Next Generation Manufacturing at [kwosczyzna-birch@commnet.edu](mailto:kwosczyzna-birch@commnet.edu). Visit [www.nextgenmfg.org](http://www.nextgenmfg.org) or [www.commnet.edu](http://www.commnet.edu).

## On the Web

**American Solar Energy Society**, [www.ases.org](http://www.ases.org)

**Building Connecticut Green**  
[www.buildingctgreen.com/Jobs](http://www.buildingctgreen.com/Jobs)

**Capital Workforce Partners**, [www.capitalworkforce.org](http://www.capitalworkforce.org)

**Center for Energy Workforce Development**  
[www.cewd.org](http://www.cewd.org)

**Connecticut Clean Energy Fund**—Learning for Clean Energy Innovation, solar energy education for 9th graders,  
[www.ctcleanenergy.com](http://www.ctcleanenergy.com)

**Connecticut Climate Change**—Speakers list,  
<http://ctclimatechange.com/documents/climatespeakerslisttable>

**Connecticut Community Colleges**, [www.commnet.edu](http://www.commnet.edu)

**Connecticut Science Center**, [www.ctsciencecenter.org](http://www.ctsciencecenter.org)

**Connecticut's Technical High School System**  
[www.cttech.org](http://www.cttech.org)

**Energy Careers**  
[www.iseek.org/industry/energy/careers/index.html](http://www.iseek.org/industry/energy/careers/index.html)

**Energy Star**, [www.energystar.gov](http://www.energystar.gov)

**Get Into Energy**, [www.getintoenergy.com](http://www.getintoenergy.com)

**Greenovation**—Online social network to empower students to use green innovation in their schools,  
[www.greenovationnation.com](http://www.greenovationnation.com)

**How Stuff Works**, [www.howstuffworks.com](http://www.howstuffworks.com)

**Regional Center for Next Generation Manufacturing**, [www.nextgenmfg.org](http://www.nextgenmfg.org)

**The Institute for Sustainable Energy at Eastern Connecticut State University**  
<http://nutmeg.easternct.edu/sustainenergy/>

**The National Energy Foundation**, [www.nef1.org](http://www.nef1.org)

**U.S. Department of Energy**, [www.energy.gov](http://www.energy.gov)

# Educational Resources (continued)

## SOAR Program

### Sustainable Operations: Alternative and Renewable Energy Initiative

The Connecticut Community College System recently received a grant from the U.S. Department of Labor designed to establish certificate programs to prepare students for jobs in energy and green technology. Two of the programs are currently available, and the remaining programs will be available by January, 2010. For information about these programs, contact Rochelle Jewell at Connecticut's Community Colleges, [RJewell@commnet.edu](mailto:RJewell@commnet.edu). Here is a listing of certificates to be offered:

Connecticut Community College	Certificates offered
Gateway Community College	Alternative Energy Transportation Certificate Solar Energy Technologies Certificate Clean Water Treatment Plant Class III Operator Certificate
Manchester Community College	Certificate in Sustainable Energy
Naugatuck Valley Community College	Alternative Energy Systems Technology Certificate
Norwalk Community College	Sustainable Building Efficiency Certificate
Three Rivers Community College	Certificate in Sustainable Facilities Management* Sustainable Landscape Ecology & Conservation Technician Certificate*

\*Certificates currently available

For more information on certificate and associates degree programs geared toward energy and green technology careers offered through Connecticut's Community Colleges, go to these websites:

**Three Rivers Community College (Norwich)**, [www.trcc.commnet.edu](http://www.trcc.commnet.edu)

**Northwestern Connecticut Community College (Winsted)**  
[www.nwcc.commnet.edu](http://www.nwcc.commnet.edu)

**Manchester Community College (Manchester)**, [www.mcc.commnet.edu](http://www.mcc.commnet.edu)

**Housatonic Community College (Bridgeport)**, [www.hcc.commnet.edu](http://www.hcc.commnet.edu)

**Capital Community College (Hartford)**, [www.ccc.commnet.edu](http://www.ccc.commnet.edu)

**Middlesex Community College (Middletown)**, [www.mxcc.commnet.edu](http://www.mxcc.commnet.edu)

**Naugatuck Valley Community College (Waterbury)**  
[www.nvcc.commnet.edu](http://www.nvcc.commnet.edu)

**Gateway Community College (New Haven)**, [www.gwcc.commnet.edu](http://www.gwcc.commnet.edu)

**Norwalk Community College (Norwalk)**, [www.ncc.commnet.edu](http://www.ncc.commnet.edu)

**Quinebaug Valley Community College (Danielson)**  
[www.qvcc.commnet.edu](http://www.qvcc.commnet.edu)

**Asnuntuck Community College (Enfield)**, [www.acc.commnet.edu](http://www.acc.commnet.edu)

**Tunxis Community College (Farmington)**, [www.txcc.commnet.edu](http://www.txcc.commnet.edu)



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