

# How Green Technologies Impact Jobs and Training

March 17, 2010



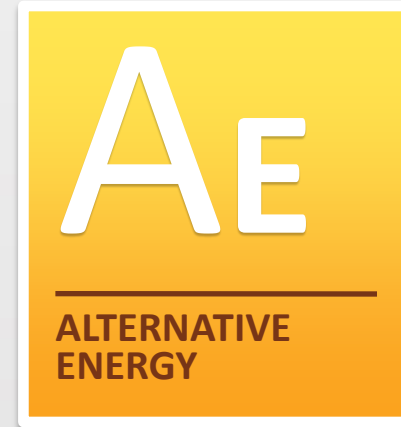
OXYGEN  
EDUCATION



# Oxygen Education

**develops high quality,  
interactive, online content  
for technical education and  
workforce development.**

# Subject Areas



# What does green mean?

**Green Economy** is the development and use of products and services that promote environmental protection, energy independence, and economic development.



**Green Jobs** are jobs in the primary industries of a green economy that promote environmental protection and energy independence.

Source:

McCarthy, M. (2008, February). Going from “Blue Collar” to “Green Collar” in Work Force Development.

# Why is green relevant?

*Environmentally  
Responsible*



*Demand for green  
products and technology*

**Decrease Company Costs**

**American Recovery and Reinvestment Act**

# Why is green relevant to jobs?

**Biomass employs 66,000  
with 200% growth capability**

(Source: O\*NET)

**Number of jobs in the  
clean energy  
economy grew 2.5  
times faster than the  
number of jobs  
overall between 1998  
and 2007** (Source: Pew Center)

**Wind and solar energy  
production offer 40% more jobs  
than coal-based production**

(Source: O\*NET)



# Green Case Studies

## New Jersey

Short Term Energy Training

## California

Los Angeles Infrastructure and Sustainable Jobs Collaborative



## Indiana

First and only U.S. domestic manufacturer of commercial-scale automotive-grade lithium-ion battery systems

# Green Job Sectors

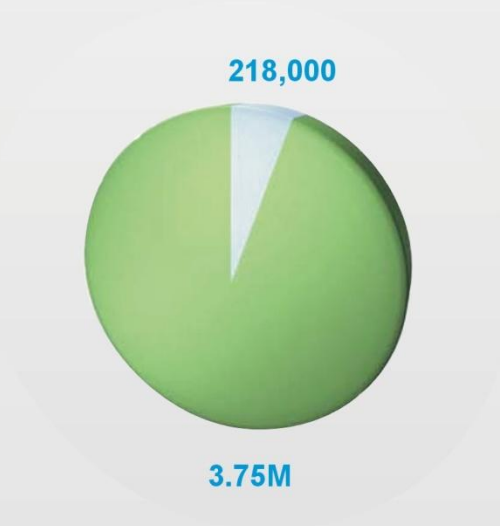
<b><i>Agriculture and Forestry</i></b>	<b><i>Manufacturing</i></b>
<b><i>Energy and Carbon Capture</i></b>	<b><i>Recycling and Waste Reduction</i></b>
<b><i>Energy Efficiency</i></b>	<b><i>Renewable Energy Generation</i></b>
<b><i>Energy Trading</i></b>	<b><i>Research, Design, and Consulting</i></b>
<b><i>Governmental and Regulatory Services</i></b>	<b><i>Environmental Protection</i></b>
<b><i>Green Construction</i></b>	<b><i>Transportation</i></b>

# High Impact Green Job Sectors

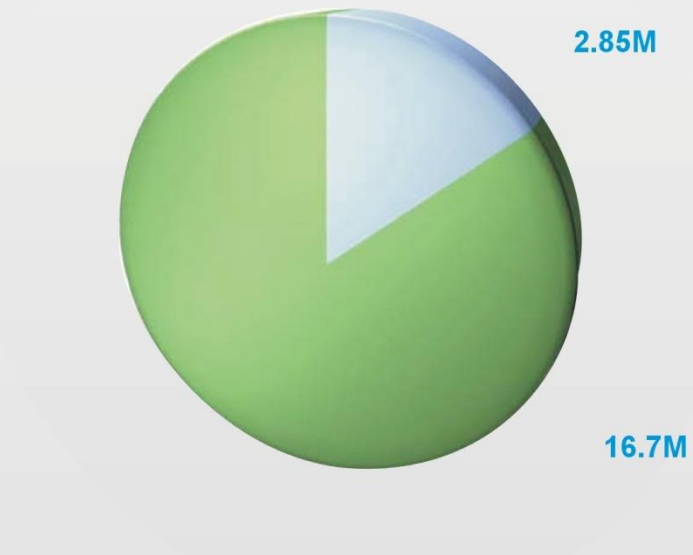
- ❖ **Energy Efficiency**
- ❖ **Renewable Energy Generation**
- ❖ **Green Construction**
- ❖ **Manufacturing**
- ❖ **Transportation**

# Green Jobs Now and Into the Future

U. S. Renewable Energy and Energy Efficiency Industries in 2007



U. S. Renewable Energy and Energy Efficiency Industries in 2030 (total jobs created in a moderate growth scenario)



Source: American Solar Energy Society and Management Information Services, Inc. 2009.

RE Jobs      EE Jobs

# Green Job Types

**Type 1: Increased Demand** – Existing occupations that are expected to be in greater demand due to the impact of green economy activities and technologies

**Type 2: Enhanced Skills** – Existing occupations whose requirements are expected to change significantly as a result of green economy activities and technologies

**Type 3: New and Emerging** – New occupations expected to be created as a result of green economy activities and technologies



# Type 1: Increased Demand Jobs

64 O\*NET-SOC occupations qualified as increased demand jobs.

<b>Sector</b>	<b>Representative Jobs</b>
<b>Energy Efficiency</b>	<b>Boiler Technicians, Electrical Power-Line Installers and Repairers, Insulation Installers, Refrigerator Engineers</b>
<b>Green Construction</b>	<b>Architecture Technicians, Electricians, Iron &amp; Steel Workers, Welders, Cutters, Solderers &amp; Brazers</b>
<b>Manufacturing</b>	<b>Chemical Plant System Operators, CNC Operators, Engine Assemblers, Plant Safety Engineers</b>
<b>Renewable Energy</b>	<b>Power System Operators</b>
<b>Transportation</b>	<b>Bus Drivers, Dispatchers, Industrial Truck Drivers</b>

Source: National Center for O\*NET Development

# Type 2: Green Enhanced Skills Jobs

60 O\*NET-SOC occupations qualified as enhanced skills jobs.

Sector	Representative Jobs
Energy Efficiency	Driver Retraining Instructors, Energy Efficiency Finance Managers, HVAC Operations and Maintenance Technicians, Smart Grid Engineers, Vehicle Inspectors
Green Construction	Biofuels Plant Construction Workers, Energy Efficient Site Foreman, Green Material Construction Trade Instructors, Green Plumbers, Environmental Construction Program Managers, Solar Installation Manager, Sustainable Communities Designers, Weatherization Operations Manager, Wind Farm Electrical Systems Designers
Manufacturing	Ethanol Maintenance Mechanics, Fuel-Efficient Aircraft Construction Workers, Hydro-electric Component Machinists, Solar Hot Water Heater Manufacturing Technicians, Solar Lab Technicians, Wind Turbine Sheet Metal Workers
Renewable Energy	Coal Gasification Technicians, Fuel Storage Technicians, Geo-thermal Heat Pump Machinists, Hydrogen Plant Operator and Managers
Transportation	Alternative Fuel Vehicle Maintenance Technician, Cryogenic Transport Truck Drivers, Electric Vehicle Electricians, Fuel Retrofitting Conversion Technicians

# Type 3: New and Emerging Jobs

90 O\*NET-SOC occupations qualified as new and emerging jobs.

<b>Sector</b>	<b>Representative Jobs</b>
<b>Energy Efficiency</b>	Energy Auditors, Energy Engineers, Weatherization Installers
<b>Green Construction</b>	Energy Engineers
<b>Manufacturing</b>	Nanotechnology Engineering Technicians, Photonics Technicians, Robotics Technicians, Validation Engineers
<b>Renewable Energy</b>	Biofuels Processing Technicians, Biomass Plant Technicians, Geothermal Production Managers, Hydroelectric Plant Technicians, Methane/Landfill Gas Collection System Operators, Solar Sales Representatives, Wind Energy Project Managers, Wind Turbine Service Technicians
<b>Transportation</b>	Automotive Engineers, Freight Forwarders, Fuel Cell Technicians, Logistics Analysts, Supply Chain Managers

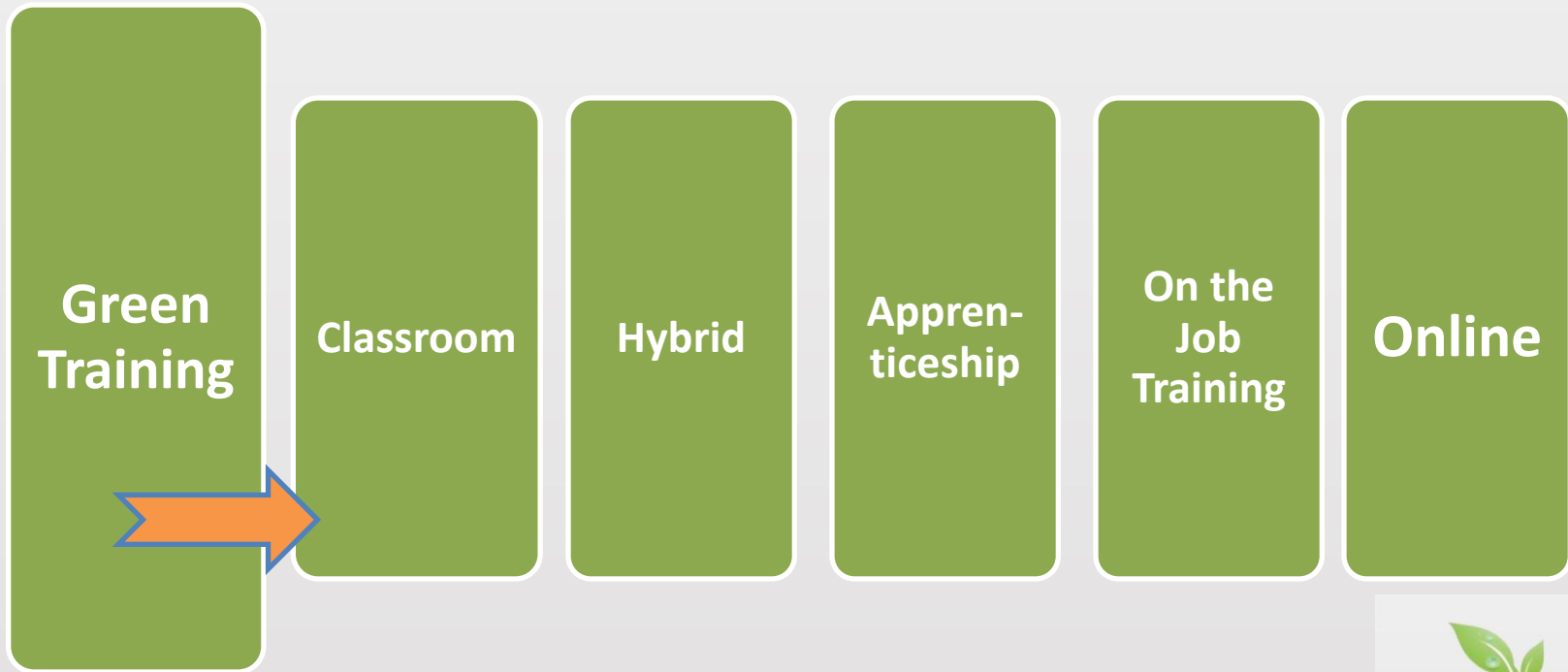
Source: National Center for O\*NET Development

# What are green skills?



*Source: John J. Heldrich Center for Workforce Development, 2009.*

# How can job seekers upgrade their skills?



# Green Generalist Training

Oxygen Education's Green Generalist online training examines key environmental issues and teaches learners ways to redesign business and manufacturing processes using environmentally friendly techniques. The understanding of green and sustainability issues the training provides increases worker employability.



**Black Gold Green** GLOSSARY 3 - Energy Management HOME LESSON TEST CLOSE

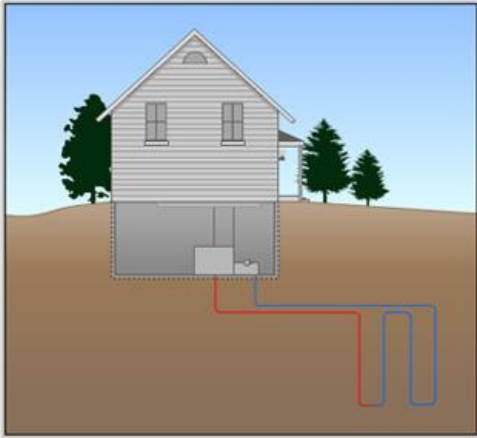
PROGRESS Page 12 of 21

**SUSTAINABLE ENERGY: GEOTHERMAL**

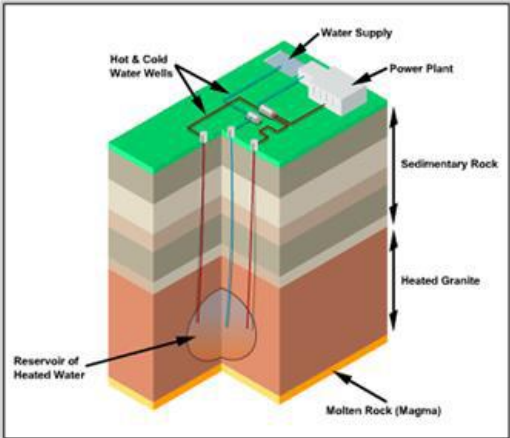
Geothermal energy is generated by heat stored in the earth. Sources range from shallow ground to hot water and rock several miles below the earth.

Geothermal energy is considered sustainable because the heat extracted is small in comparison to the size of the reservoir, and the heat is constantly replenished.

Additionally, the heat requires no fuel purchase, and emissions are minimal.



Geothermal Energy (Residential)



Geothermal Power Plant

VOLUME 12.29.09 PURDUE UNIVERSITY 08:51 am

The complex block represents a screenshot of an online training interface. At the top, there is a navigation bar with a logo on the left and buttons for 'HOME', 'LESSON', 'TEST', and 'CLOSE' on the right. Below the navigation bar, the page title '3 - Energy Management' and 'PROGRESS Page 12 of 21' are visible. The main content area is divided into three sections. On the left is a text box with a title 'SUSTAINABLE ENERGY: GEOTHERMAL' and three paragraphs of text. In the center is a diagram of a residential house with a geothermal system, showing a red line for the hot water loop and a blue line for the cold water loop. On the right is a diagram of a geothermal power plant, showing a cross-section of the earth with layers of 'Sedimentary Rock', 'Heated Granite', and 'Molten Rock (Magma)'. It also shows a 'Reservoir of Heated Water' and 'Hot & Cold Water Wells' connected to a 'Power Plant' and 'Water Supply'. At the bottom, there is a volume control slider, the date '12.29.09', the 'PURDUE UNIVERSITY' logo, and the time '08:51 am'.

# Engaging, Interactive Online Content

The Green Generalist Training and all of the more than 100 training modules in the Oxygen Education Library of ready-to-implement online training content for technical education and workforce development are developed by teams of instructional and graphic designers working closely with industry and subject matter experts to create unparalleled online learning experiences.

*Ability to easily review training vocabulary reinforces learning*

*Consistent navigation makes learners comfortable in the online environment*

*Ability to test at any time allows learners to move at their own paces*

*Learning content is both written and narrated to accommodate different learning styles*

*Highest quality vector graphics*

*Interactive content engages learners in active learning*

**Black Gold Green** GLOSSARY 4.1 - Chemical Waste/Green Chemistry HOME LESSON TEST CLOSE

PROGRESS Page 4 of 10

**GREEN CHEMISTRY PHILOSOPHY**

Historically, during Research & Development (R&D), consideration of a chemical ingredient's toxicity was not made until AFTER the finished product was manufactured.

Economics and the environment were thought of as trade-offs, you couldn't be cost effective AND safe.

Green chemistry seeks to change that equation, by preventing pollution at its source. It allows chemists to develop new ways to make the products that fuel our economy without damaging our environment.

**TYPES OF R + D**

- Traditional R+D
- Green R+D

Performance Availability Cost

Finished Product

**TOXIC!**

Please click on the toxic beaker to learn more.

VOLUME 12/29/09 PURDUE UNIVERSITY 09:02 am

# Content Creation Partners

At Oxygen Education we perfected our online content development processes working for some of the world's largest and most prestigious manufacturers. Today Oxygen online content:

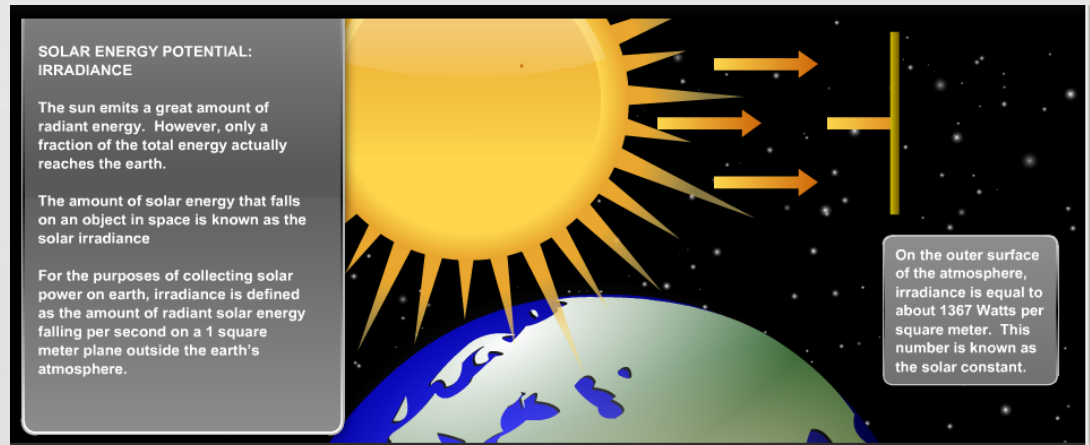
- Serves as the foundation of community college certificate and degree programs
- Builds worker job skills and addresses skill gaps in industries around the globe
- Trains and retrain workers for next generation jobs in areas including advanced manufacturing, lean techniques, and green technologies.



## Join Us!

We welcome partners to join us creating online learning content targeted for New and Emerging occupations in Alternative Energy fields – Solar, Battery, Biomass, Wind Power, Smart Grid, Hydroelectric.

Contact us to learn more: [sales@o2ed.com](mailto:sales@o2ed.com)



# Grant Writing Expertise

Oxygen Education can help you take advantage of available job training funds and impact your local economy:

- We partner with educational institutions and workforce development initiatives providing the content development expertise you need.
- We provide technical assistance to help you create compelling grant proposals.
- Contact Diana Del Castillo Levinson to learn more, [dlevinson@o2ed.com](mailto:dlevinson@o2ed.com).



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