



EERE's Workforce Development and Education Program

June 26, 2012

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Chief Strategist for Education & Workforce
US Department of Energy

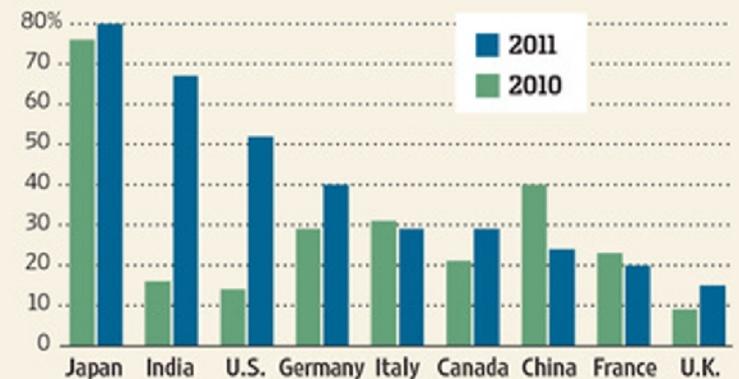
Workforce Challenge

- Many firms in energy efficiency and renewable energy are finding that they are not able to find people with skills matched to their new requirements. Retirements of skilled workers adds to the problem.
- President's Jobs Council: "Lack of alignment between what employers need and what skills are taught and delivered is becoming a critical problem for business and the nation." [2011 Year End Report, p. 13]
- The nation's education system is not producing people with the needed skills and systems for retraining the existing workforce are inadequate.
- Between 2000 and 2006, the number of countries scoring higher than the United States on the **Program for International Student Assessment** rose from 6 to 12

<http://www.nsf.gov/statistics/seind10/c2/c2h.htm>

Where Jobs Go Wanting

Percentage of employers reporting difficulty filling positions by country, 2010 vs. 2011



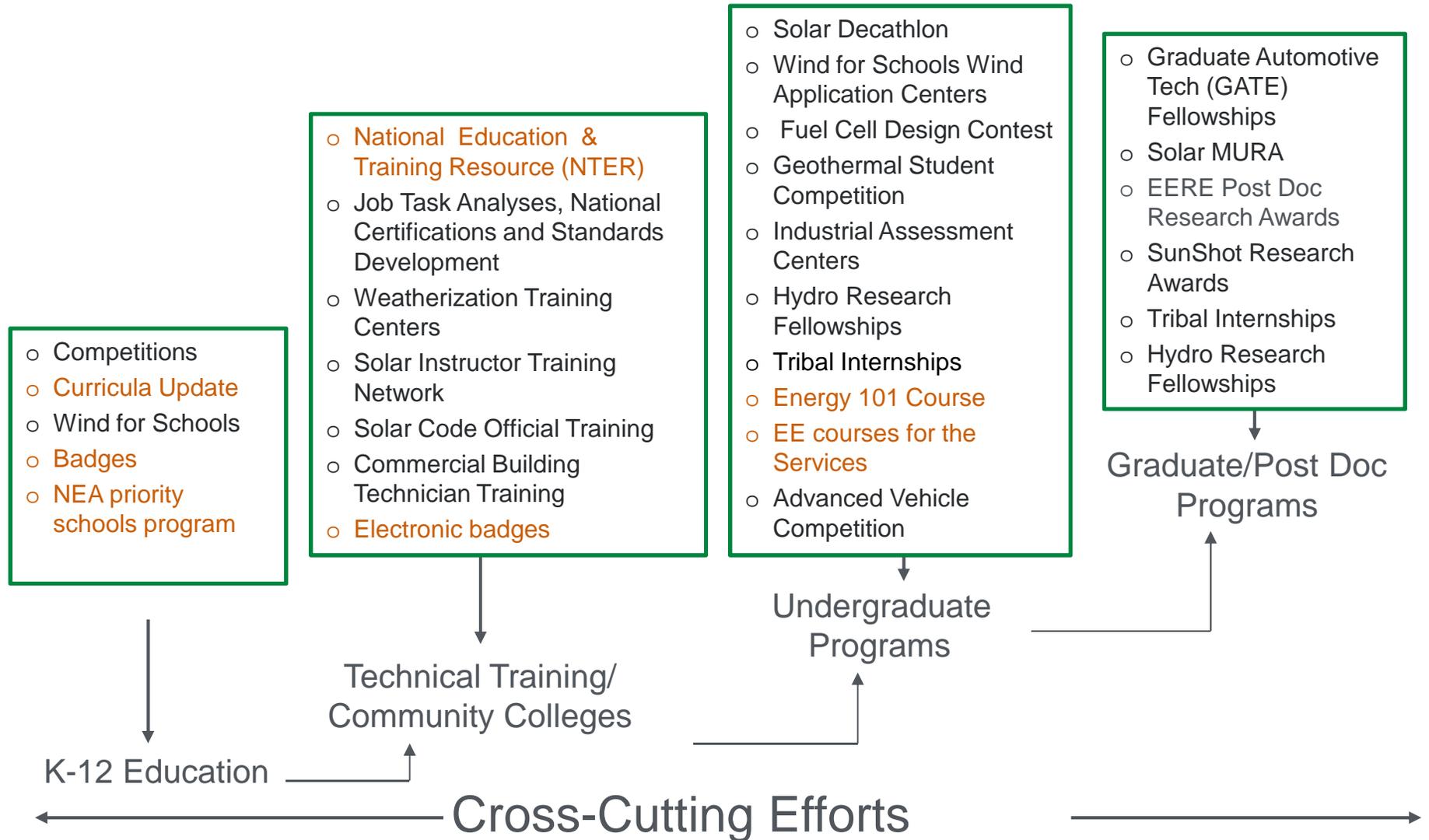
The Help That's Most Wanted

Hardest jobs for U.S. employers to fill

2011		2006	
1	Skilled trades	1	Sales representatives
2	Sales representatives	2	Engineers
3	Engineers	3	Nurses
4	Drivers	4	Technicians
5	Accounting & finance staff	5	Accountants
6	IT staff	6	Administrative assistants /personal assistants
7	Management/executives	7	Drivers
8	Teachers	8	Call-center operators
9	Secretaries/administrative assistants	9	Machinists
10	Machinists/machine operators	10	Management/executives

Source: ManpowerGroup

EERE Activities



Web Site - Career Maps - Interagency Coordination - Strategic Partnerships - Outreach - Evaluation

NGOs, Philanthropies and Corporations

Mozilla, KQED, PBS, National Education Association, Center for Energy Workforce Development; Center for Adult Experiential Learning, National Association of Manufacturers, Ford, MAGMA, SRI, NIBS, NEED, Gates, Foundation, MacArthur Foundation, Lumina Foundation, Heat and Frost Insulators Union, Lockheed Martin, AAAS, National Academies, Association of Public Land Grant Colleges, xpand, LLC, America Association of Community Colleges

Other Federal Agencies:

ED, DOL, DOD, DOI, NSF, DVA, OSTP, FCC, USDA, NOAA, GSA, NASA

Colleges, Universities & Training Centers:

Duke, Penn State, MIT, Johns Hopkins, Lake County Community College, Lane Community College, 6 Weatherization Centers

Undergraduate Programs

Dissemination

EERE

Energy Technology Programs (Solar, Vehicles, Advanced Manufacturing, Industrial Technologies, Federal Energy Management Programs), Tribal Energy

Other DOE Offices:

Health, Safety and Security, Office of Electricity, Office of Science, NNSA, ED

National Labs:

LBL, NREL, PNNL, INL

Workforce Pipeline

Federal & Private Energy Workforce

Support the growth of a capable and flexible workforce by providing quality education and training easily and efficiently through the advances of information technology and recommendations of learning science.

- Support infrastructure for all programs to leverage
- Provide subject matter expertise
- Offer forum for briefings and discussions on critical topics
- Integrate with existing online projects and standards to amplify individual efforts



- **Use advanced information technology** to deliver modern learning experience; increase efficiency of training; and ensure the rapid upskilling of the workforce to meet labor market demand
- **Form partnerships** with other agencies, corporations and NGOs to advance DOE mission
- **Undertake evaluation** and provide tools to create continuous improvement of education and training materials
- **Identify education and training materials** collaborate with authors as appropriate to create shared ecosystem and reduce duplication
- Build **visualization tools for career advancements** in EERE technology areas (bridging job banks and training opportunities)
- **Build awareness** through talks, meetings, interagency work and symposia
- **Cost savings** through shared services (NTER and Energy Literacy)

Energy Literacy

Energy Literacy

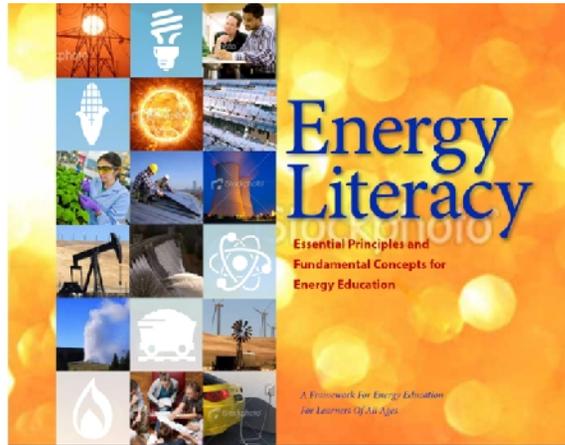
Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education

Part of the DOE-wide push to improve public energy literacy. See the [DOE, May 2011 Strategic Plan](#), page 21.

An effort to define what it means to be energy literate and to identify the essential understandings that underlie this literacy.

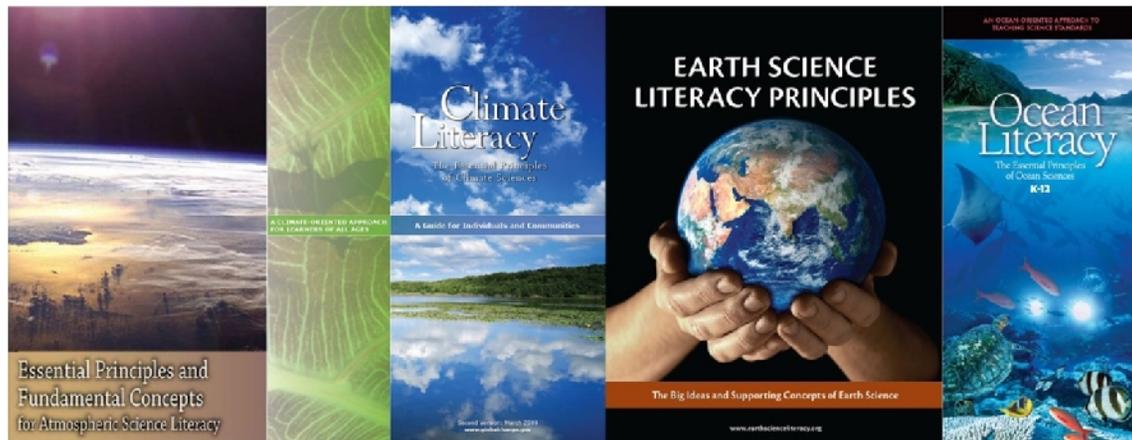
An effort to promote public energy literacy based on the above definition and understandings.

Centerpiece – A guiding document that provides context, background and definitions, along with identifying the Essential Principles and Fundamental Concepts that underlie Energy Literacy.



Two Initial Phases to this Energy Literacy Effort

Phase 1 - Develop and publish the guiding document.
Phase 2 – Publicize and promote the guiding document. Assembly and dissemination of supporting educational materials, trainings, professional development and other energy education resources and opportunities.



Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education, is building off of, and improving on, a model established previous literacy projects.

The Essential Principles of Energy Education:

1 Energy is a physical quantity that follows precise natural laws.



2 Physical processes on Earth are the result of energy flow through the Earth system.



3 Biological processes depend on energy flow through the Earth system.



4 Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination.



5 Energy decisions are influenced by economic, political, environmental, and social factors.



6 The amount of energy used by human society depends on many factors.



7 The quality of life of individuals and societies is affected by energy choices.



Essential Principle 6:

6 The amount of energy used by human society depends on many factors.



6.1 Conservation of energy has two very different meanings. There is the physical law of conservation of energy. This law says that the total amount of energy in the universe is constant. Conserving energy is also commonly used to mean the decreased use of societal energy resources. When speaking of people conserving energy, this second meaning is always intended.

6.2 One way to manage energy resources is through conservation. Conservation includes reducing wasteful energy use, using energy for a given purpose more

efficiently, making strategic choices as to sources of energy, and reducing energy use altogether.

6.3 Human demand for energy is increasing. Population growth, industrialization, and socioeconomic development result in increased demand for energy. Societies have choices with regard to how they respond to this increase. Each of these choices has consequences.

6.4 Earth has limited energy resources. Increasing human energy consumption places stress on the natural processes that renew some energy resources and it depletes those that cannot be renewed.

individuals and society can take to conserve energy. These actions might come in the form of changes in behavior or in changes to the design of technology and infrastructure. Some of these actions have more impact than others.

6.7 Products and services carry with them embedded energy. The energy needed for the entire lifecycle of a product or service is called the "embedded" or "embodied" energy. An accounting of the embedded energy in a product or service, along with knowledge of the source(s) of the energy, is essential when calculating the amount of energy used and in assessing impacts and consequences.

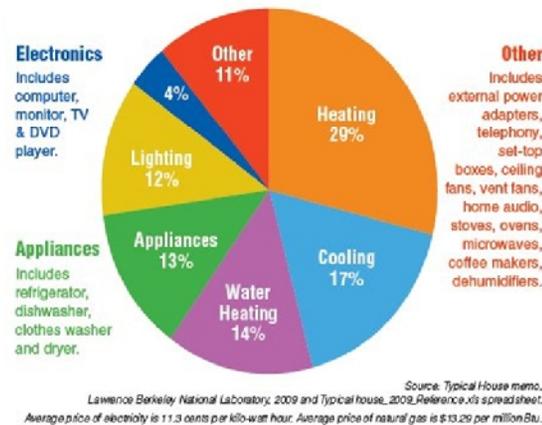
6.8 Amount of energy used can be calculated and monitored. An individual, organization, or government can monitor, measure, and control energy use in many ways. Understanding utility costs, knowing where consumer goods and food come from, and understanding energy efficiency as it relates to home, work, and transportation are essential to this process.

6.5 Social and technological innovation affects the amount of energy used by human society. The amount of energy society uses per capita or in total can be decreased. Decreases can happen as a result of technological or social innovation and change. Decreased use of energy does not necessarily equate to decreased quality of life. In many cases it will be associated with increased quality of life in the form of increased economic and national security, reduced environmental risks, and monetary savings.

6.6 Behavior and design affect the amount of energy used by human society. There are actions

Where Does My Money Go?

Annual Energy Bill for a typical U.S. Single Family Home is approximately \$2,200.



The Energy Star program is run jointly by the U.S. Department of Energy and the Environmental Protection Agency. The Energy Star logo designates products as highly energy efficient.



Energy Literacy

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Back Cover:

U.S. Global Change Research Program Partner Agencies:

- Department of Agriculture
- Department of Commerce
- Department of Defense
- Department of Energy
- Department of Health and Human Services
- Department of the Interior
- Department of State
- Department of Transportation
- Environmental Protection Agency
- National Aeronautics and Space Administration
- National Science Foundation
- The Smithsonian Institution
- US Agency for International Development



Education Partners:

- Alliance to Save Energy
- American Association for the Advancement of Science Project 2061
- American Association of Blacks in Energy
- The American Nuclear Society
- Association of Public and Land-Grant Universities
- Center of Science and Mathematics in Context, University of Massachusetts, Boston
- Chabot Space & Science Center
- Climate Literacy and Energy Awareness Network
- Cooperative Institute for Research in the Environmental Sciences, University of CO at Boulder
- Energy Bridge
- National Center for Science Education
- National Council for Science and the Environment
- National Energy Education Development Project
- National Energy Foundation
- National Science Teachers Association
- Other Lab
- Science Museum of Minnesota
- TERC
- WestEd
- Wisconsin K-12 Energy Education Program
- Women Impacting Public Policy

U.S. Global Change Research Program
1717 Pennsylvania Avenue, NW Suite 250
Washington DC 20006 USA
+1.202.223.6262 (Voice) + 1.202.223.3065 (Fax)
<http://www.globalchange.gov>



Version: 1.0: February 2012

Energy 101

Energy 101

Creating a nationally recognized interdisciplinary general education energy course for community colleges and universities

- DOE EERE providing support for the development of a interdisciplinary energy course that can be used to meet different general education requirements across the country
- Energy 101 will also leverage the use of the National Training and Education Resource (NTER) as an open source tool for authoring and sharing course content using the latest web-based technology and interactivity
- Using NTER allows for the easy modification and customization of course to fit the needs of individual college or university



The Starting Point

- On May 25th the Association of Public Land Grant Universities (APLU) held a public listening session on the topic of Energy 101
 - 32 schools participated in the session with another 58 schools on the mailing list
- Overwhelming support for an Energy 101 course
- Identify potential pathways for adoption of a nationwide Energy 101 course

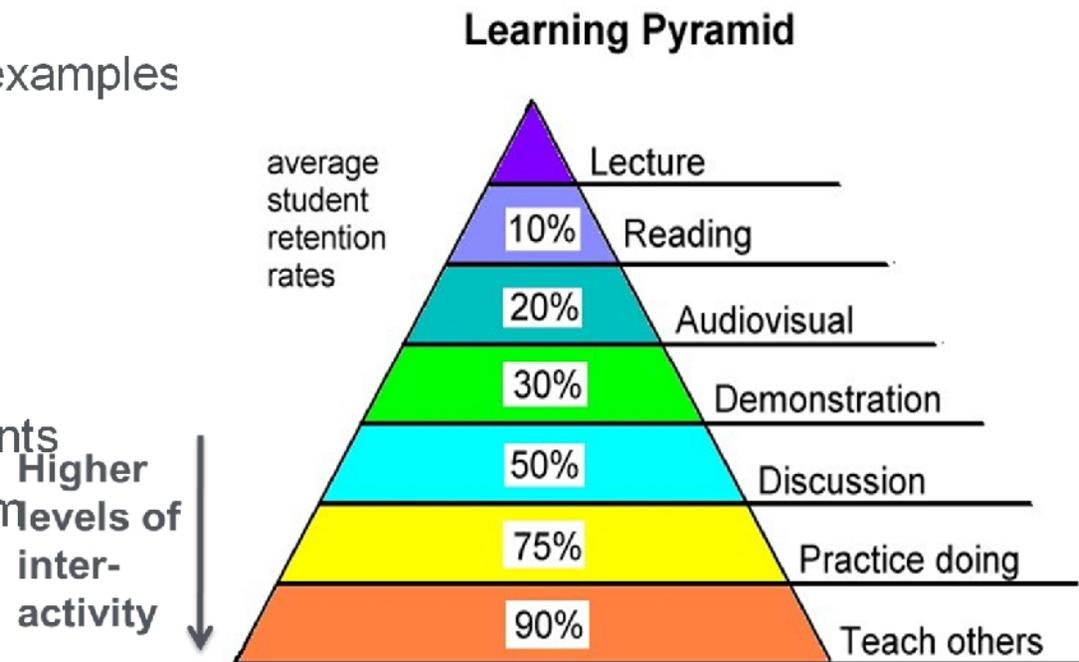
Work in Progress

- Preliminary analysis of university and community college energy related course offerings and curriculum review of over 50 community colleges & universities
 - Identify potential core components to a general Energy 101 course; **physical, societal, environmental, and economic** aspects
- Development and drafting of Energy 101 core components
 - Feedback from educators and other experts
 - Develop proposed list of modules for Energy 101
- Create example Energy 101 course modules for demonstration using the National Training and Educational Resource (NTER) platform
 - Gather feedback and reviews

ENTER

How to train and educate better

- New Learning Tools make possible:
 - Highly interactive environments
 - Inquiry-based learning
 - Bridge theory to practice (explore, operate equipment without the consequences of failure)
 - Varied and Contrasting examples
 - Demonstration
 - Access to expertise
 - Feedback
 - Continuous assessment
 - Collaborative environments
 - Endlessly patient medium



Source: National Training Laboratories, Bethel, Maine

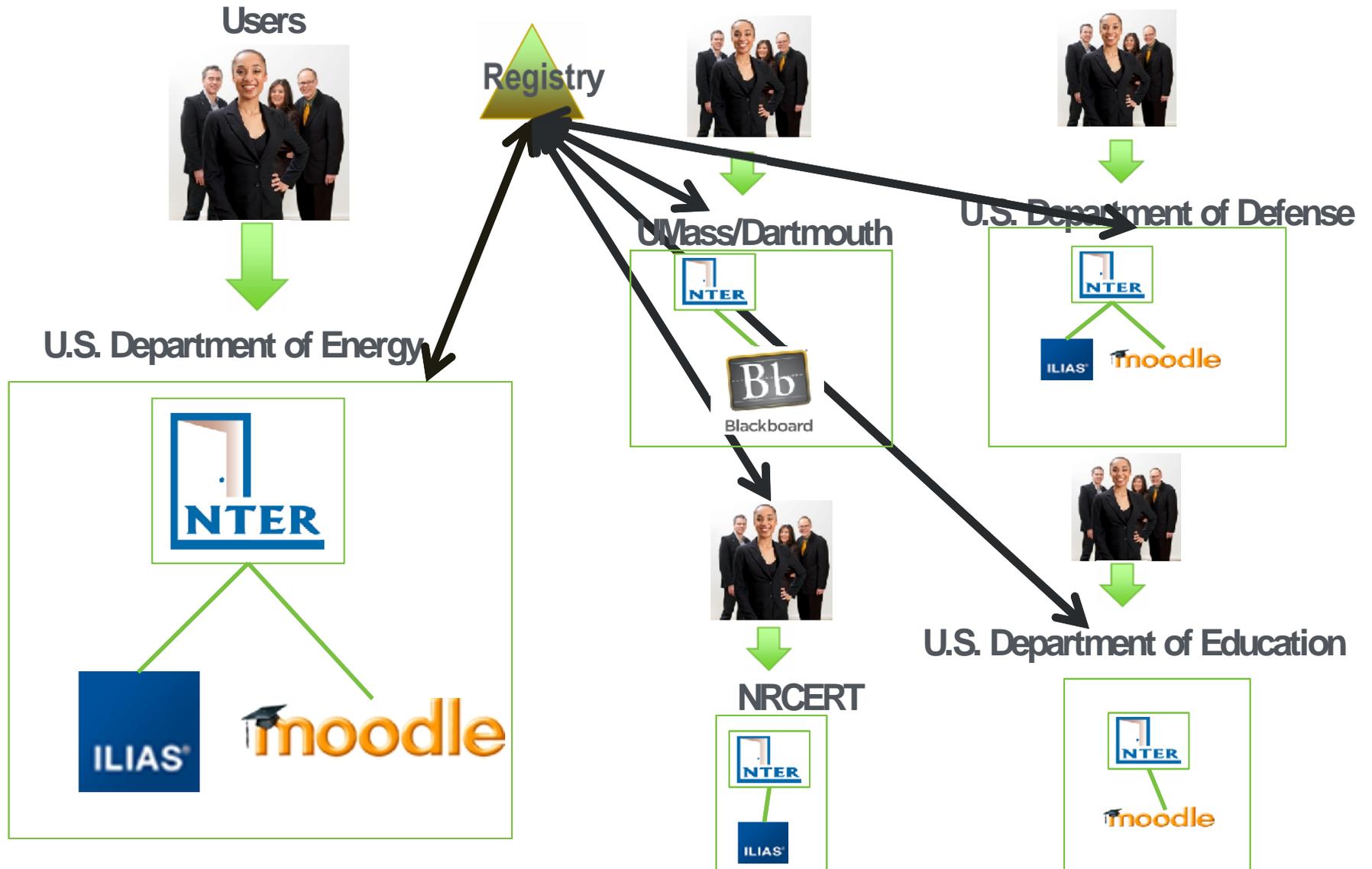
- Use **learning science and information technology** effectively to support the creation of a well-educated talent pool
- Develop **easy-to-use tools** for anyone to develop engaging content
- Support **existing online projects** through open standards to amplify individual efforts
- Use the flexibility of **open source licensing** to grow and develop the platform and tools

- What is Open Source?
 - The underlying code behind the software is publically available to all
 - Analogous to a “recipe”
- Advantages of Open Source
 - “Recipe” allows for modification and improvements
 - Enhanced Reliability and Quality
 - Open Source Communities Find and Fix Bugs More Quickly
 - The open source model builds open standards and achieves a high degree of interoperability
 - Endorsed by NSA



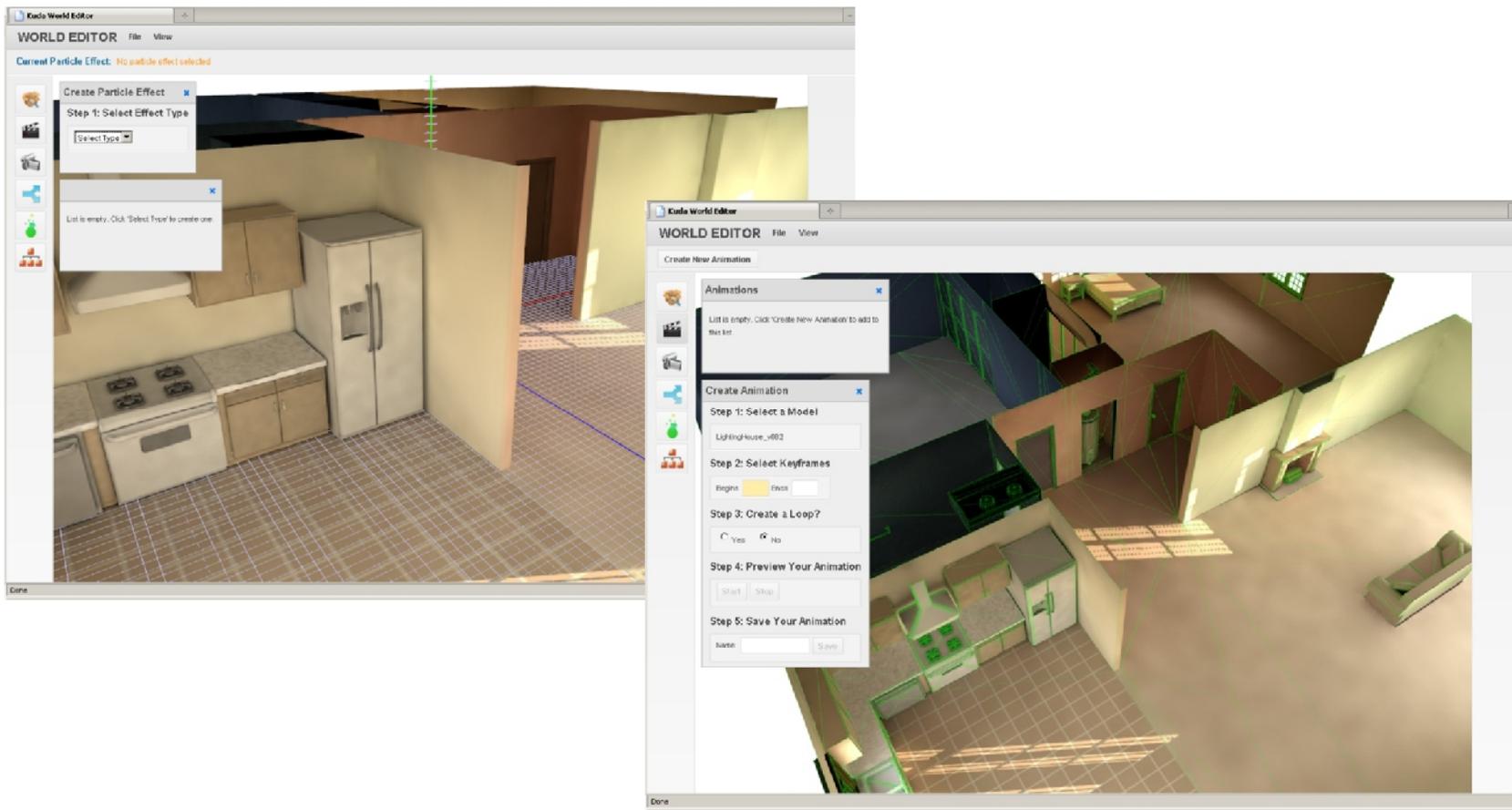
- Leveraged \$600-800 million of open source software with a \$19 million investment
- Contributions from Cisco, Google, Yahoo!, DoD, Apache, and Oracle
- Federal and philanthropic investments are continuing to expand capabilities and offerings

What does NTER do?



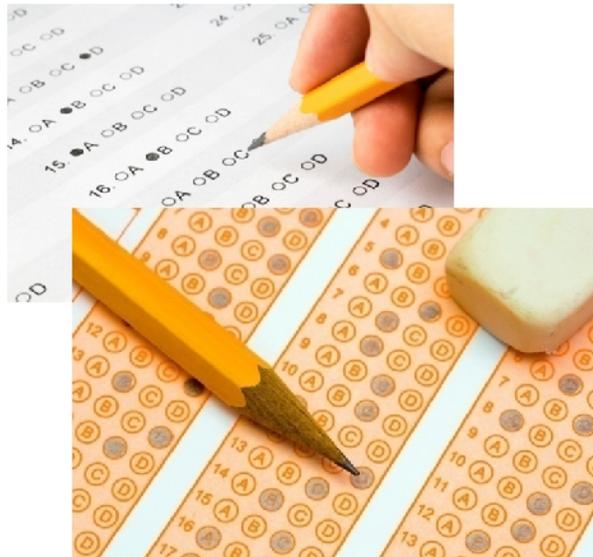
Authoring tool for 3D content creation

- Build 3D simulations without programming
- Runs in browser; no heavy downloads



Performance-based testing

Trading this....



Leaky, recessed light fixtures can cause:

- Electrical problems
- Ice dams
- Furnace malfunction
- All of the above
- Poor light quality

Submit Answers

For meaningful, performance-based assessment



Correctly install the proper type of wall joint to complete the structure.

Screenshot of Available Courses

The screenshot shows the NTER National Training & Education Resource website. The page features a navigation bar with links for Home, Courses, About, Authors, and Forum. A search bar is located on the right side of the navigation bar. The main content area is titled "All Courses" and includes sub-links for All, Featured, New, and Popular. Below this, there is a grid of 18 course cards, each with a thumbnail image, a title, a star rating, and a URL. The courses are:

- No Fear Act**: The National and Federal Emergency Evacuation and Relocation Act of 2002. Rating: 5 stars. URL: nwtp.nterlearning.org
- Home Energy Scoring Tool - Qualified Assessor Training**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- Steam End User Training**: BestPractices Steam End User Training. Rating: 5 stars. URL: nwtp.nterlearning.org
- Information Systems Security Awareness Training**: Rating: 5 stars. URL: nwtp.nterlearning.org
- Building Science Animations**: Rating: 5 stars. URL: nwtp.nterlearning.org
- House as a System Learning Exercise in 3D - Demo**: Rating: 4 stars. URL: nwtp.nterlearning.org
- Hazards and Response - Demo**: Rating: 5 stars. URL: nwtp.nterlearning.org
- Appropriations Law**: Rating: 5 stars. URL: nwtp.nterlearning.org
- Drivers Overview Training**: Rating: 5 stars. URL: nwtp.nterlearning.org
- UMass Dartmouth Energy Auditing Auditor's Toolbox**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- 3D assets for re-use - Blower Door Basics**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- Blower Door Basics - Beta**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- Welcome to NTER Authoring Training**: Rating: 5 stars. URL: nwtp.nterlearning.org
- Attic Air Sealing Beta Version Desktop**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- Steam Tool Suite Training**: An Introduction. Rating: 5 stars. URL: nwtp.nterlearning.org
- Mechanical Insulation Education & Awareness - Alpha**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- Weatherization Courses by Pulaski Technical College**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org
- Building Science Basics**: Rating: 5 stars. URL: weatherization-nwtp.nterlearning.org

NTER in the News

the WHITE HOUSE PRESIDENT BARACK OBAMA

BLOG PHOTOS & VIDEO BRIEFING ROOM ISSUES the ADMINISTRATI

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The White House
Office of the Press Secretary

For Immediate Release June 24, 2011

President Obama Launches Advanced Manufacturing Partnership

Today, at Carnegie Mellon University, President Obama launched the Advanced Manufacturing Partnership (AMP), a national effort bringing together industry, universities, and the federal government to invest in the emerging technologies that will create high quality manufacturing jobs and enhance our global competitiveness. Investing in technologies, such as information technology, biotechnology, and nanotechnology, will support the improve quality, and accelerate product

Department of Energy

Customer Service Plan

U.S. DEPARTMENT OF **ENERGY** | Energy Efficiency & Renewable Energy

ENERGY EFFICIENCY RENEWABLE ENERGY RESEARCH & DEPLOYMENT

DOE Announces New Partnerships to Support Manufacturing Job Training

U.S. Secretary of Energy Steven Chu announced a series of new manufacturing job training partnerships using the Department of Energy's National Training and Education Resource.

View story.

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Kids
Energy Savers Blog > How is a Renewable Energy Lover's Paradise
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June 29, 2011

Department of Energy Announces New Partnerships to Job Training

National Training and Education Resource (NTER) Offers Tools to Train Workers

Washington, D.C. - To complement the Obama Administration's launch last week of the U.S. Secretary of Energy Steven Chu today announced a series of new manufacturing job training partnerships using the Department of Energy's National Training and Education Resource (NTER). DOE will be p

DOE Digital Archive
RSS Feed
Video Archive

NTER Awards

- AFFIRM
- NIBS
- Chief Learning Officer
- Secretary's Achievement

2011 AFFIRM Leadership Award Recipients

AFFIRM's Leadership Awards are presented to an individual or group of individuals who have made significant leadership contributions to activities that have an impact beyond their agency or organization and provide efficiencies and effectiveness in an outstanding manner.

Join us to honor the 2011 AFFIRM Leadership Awards winners.

Executive Leadership in Information Resources Management-Civilian Government Executive:

Vivek Kundra, US Chief Information Officer, Office of Management & Budget (OMB), Executive Office of the President (EOP)

Presented for outstanding executive leadership in government-wide Information Resources Management. The AFFIRM Executive Leadership Award has been presented annually since 1979 and is the highest and most prestigious AFFIRM award. Unquestionable and evident leadership at the Government-wide level.

Upcoming Events

Tuesday, February 14, 2012 - 11:30am - 1:30pm

February Monthly Luncheon
Spotlight on GSA: Leading Government's Policy Think-Tank
[Read More and Register](#)

Thursday, March 15, 2012 - 7:30am - 11:30am

March Monthly Education Program
AFFIRM & GITEC present
Accelerating Government at the

Dec 19 2011 TAGS

Each year, the National Institute of Building Sciences recognizes individuals and organizations that have provided outstanding service to the Institute, the building community and the nation. This year, at its Annual Awards Reception and Dinner, the Institute honored Michelle Fox, PhD, Oct W. Moy, PhD, PE, and Mike Kennell. More than a hundred Institute members and supporters attended the event.

The 2011 Institute Honor Award Goes to...

The Institute Honor Award goes to someone who has made an exceptional contribution to the nation and the building community. Institute Chairman Jim W. Sealy, FAIA, presented the 2011 Honor Award to Michelle Fox, PhD, Chief Strategist for Education and Workforce Development for the Office of Energy Efficiency and Renewable Energy (EERE) within the U.S. Department of Energy (DOE).



- DOE's Energy Technology Programs (Solar, Vehicles, Advanced Manufacturing, Industrial Technologies, Federal energy Management Programs)
- Other DOE Offices: Health, Safety and Security, Office of Electricity.
- National Labs: LBL, NREL, PNNL, INL
- The Center for Energy Workforce Development
- Advanced Manufacturing Initiative: National Association of Manufacturer's Manufacturing Institute; Ford's Partnership for Advanced Studies; MAGMA (representing the big 3 automakers); Macomb Community College
- A significant number of the winning applicants in the Department of Labor's Trade Adjustment Act (\$500million solicitation)
- Department of Defense (SPAWARS, ADL)
- 6 Weatherization Centers
- Universities, colleges, corporate training facilities
- Under consideration by 4 other cabinet level agencies and emergency response training center

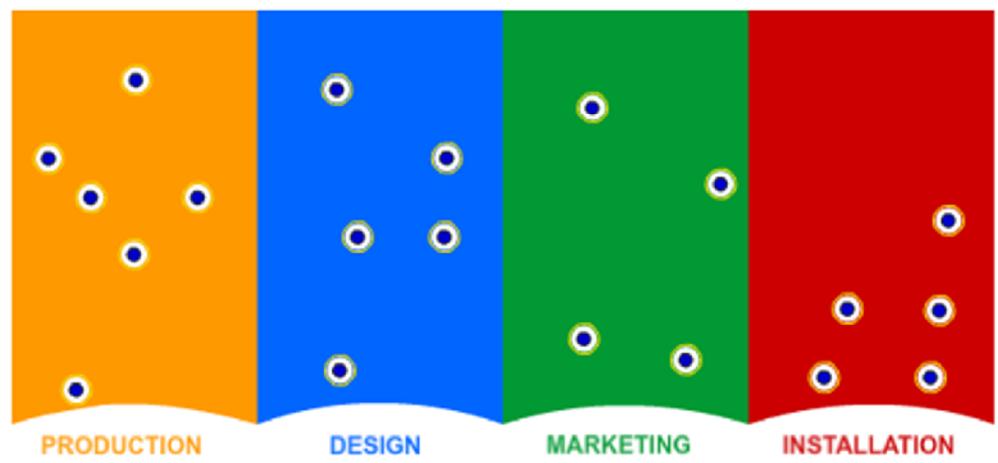
Career Mapping Tools

- Home
- Multimedia
- Meetings & Workshops
- Solar Innovation Timeline
- Solar Career Map

Solar Career Map

This solar career map explores an expanding universe of solar-energy occupations, describing diverse jobs across the industry, charting possible progression between them, and identifying the high-quality training necessary to do them well.

Solar Career Map



EXPLORE The Solar Career Lattice

Feedback

SunShot Initiative: Solar Career Map - Mozilla Firefox

http://www1.eere.energy.gov/solar/careermap/

U.S. DEPARTMENT OF **ENERGY**

SunShot Initiative

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Solar Innovation Timeline
Solar Career Map
Glossary

Solar Career Map

This solar career map explores an expanding universe of solar-energy occupations, describing diverse jobs across the industry, charting possible progression between them, and identifying the high-quality training necessary to do them well.

Solar PV Installer (residential/small commercial)
 Assemble, install and maintain solar PV systems on roofs or other structures in compliance with site assessment and schematics. Perform electrical work such as current checks and wiring.

Advanced-Level				Solar Installation Contractor
Mid-Level	Utility Interconnection Engineer	Residential PV System Designer	Solar PV Technician	Solar PV Installer (residential/small commercial)
Entry-Level				
	COMPONENT PRODUCTION	SYSTEM DESIGN	MARKETING, SALES & PERMITTING	INSTALLATION & OPERATIONS

Key: Multi-Sector - - - - - Advancement ——— Job Title ●

Reset
 Job Details Routes to Advancement
 FAQ Competencies

Transferring data from www1.eere.energy.gov...

Job Details

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Engineering Technician

Alternate Title(s): Civil Engineering Technician; Electrical Engineering Technician; Mechanical Engineering Technician; Environmental Engineering Technician

Job Type: System Design

Education & Training Level: Post-Secondary Credential

High school level trigonometry, geometry, and algebra are essential; Associates degree in engineering technology is strongly preferred. Education paths vary depending on type of engineering; technicians usually need a 4-year degree to advance as technologists or applied engineers.

Preferred:
Associate's Degree; Certification <http://recosta.org/rec-programs/workforce-development/certification-organizations/>

Work Experience: 3-5 years

Median Pay:
\$48,760.00/year
\$22.48/hour

Engineering Technician Profile:

Work with engineers in applying the theory and principles of engineering to plan, design, evaluate, and improve the performance of solar energy-related equipment, processes, and facilities.



PHOTO COURTESY OF DOE/NREL

Engineering technicians use the principles of science, engineering, and mathematics to solve technical problems across all sectors of the solar industry. Their work is more narrowly focused and application-oriented than that of the scientists and engineers they assist. Civil engineering technicians, for example, might design layouts for solar-related projects to ensure compliance with profile and component specifications, square footage, and material quantities; review solar-related project blueprints and structural specifications to determine dimensions and material requirements of a solar structure or system; and develop plans and cost estimates for system installation, facility use, or construction.

Skills:
Mathematics; Computer skills, including computer-aided design and drafting; Active listening; Critical thinking; Complex problem solving; Coordination; Active learning; Data monitoring and assessment

Requirements:
Able to work in a team and communicate clearly with supervisor; Some specialties may require drivers license.

Job Responsibilities:
Estimating the quantifiable characteristics or products, events or information; Evaluating information to determine compliance with standards; Communicating with supervisors, peers, or subordinates; Interacting with Computers; Documenting/recording information; Inspecting equipment, structures or materials; Identifying design or performance problems

Interests:
Working with a team; Mathematics; Technology design; Problem-solving; Working in a clean energy economy

Did You Know?
Civil Engineering Technician jobs are projected to grow 14%-19% between 2008 and 2018.

U.S. DEPARTMENT OF ENERGY

SunShot Initiative

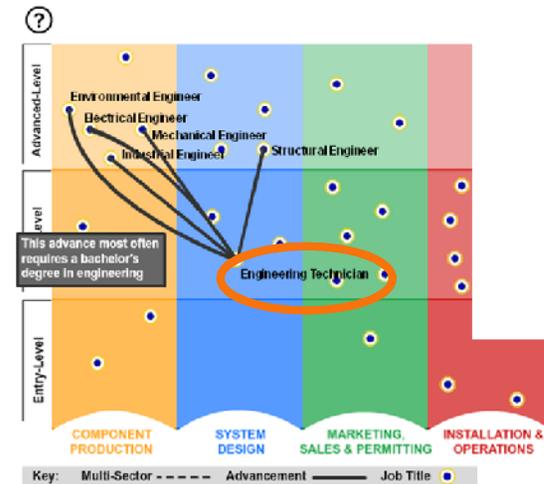
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 - Routes to Advancement
 - FAQ
 - Competencies

Thank you!

Contact information

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