

GREEN CERTIFICATIONS AND TRAINING



mtc

June 2010

ACKNOWLEDGEMENTS

The Institute is very grateful to Marty Kenison, Director, Career & Technical Training , whose insight and contributions made this report stronger.

The institute would also like to thank:

Arlene Garcia, CTT Manager, Inland Empire Job Corps Center

Daniel Gargaro, CTE Manager, Construction and Manufacturing, Gary Job Corps Center

Dorothy Mitchell, Southeast Regional Operations Director

John Pedersen, Sr. Vice President Training Programs

Lydia Stevenson, Director Social Development

Matt Waltman, CTST Supervisor, Keystone Job Corps Center

Vicki Wesley, Data integrity Administrator, Atlanta Job Corps Center

Green Certification and Training

Published by MTC Institute. Copyright © June 2010.

Principal Authors: Stephen MacDonald, and Carl Nink

Comments are appreciated and should be directed to Carl Nink, Executive Director at:

MTC Institute

500 North Marketplace Drive · P.O. Box 10 ·

Centerville, UT 84014

(801) 693-2870

Fax: (801) 693-2900

carl.nink@mtctrains.com

www.mtcinstitute.com

Management & Training Corporation (MTC) is an international corporation dedicated to helping people realize their learning potential. MTC creates nurturing environments in which education is encouraged and recognized. MTC manages and operates 24 Job Corps centers in 19 states for the U.S. Department of Labor, preparing disadvantaged youth for meaningful careers. MTC also operates 16 contracted correctional facilities across the country with approximately 19,000 beds under contract. In addition, MTC has expanded their education and vocational expertise into the international arena, working in countries such as Iraq, Sudan, Tunisia, China, and Mongolia. The MTC Institute is the research division of MTC, which is dedicated to promoting innovations, exemplary practices, and projecting trends that are relevant to job training and corrections. The work of the Institute is geared towards a broad audience including policy makers, educators, researchers, practitioners, state and federal officials, workforce development entities, correctional agencies and Job Corps centers.

INTRODUCTION

What does the economy need to help it recover? The answer: An educated and well trained workforce. The answer is a simple one. Green jobs and the changes taking place in existing jobs nationwide have a common focus: More Education. The U.S. economy needs everyone to become part of the skilled workforce, particularly those youth who do not have a high school diploma, especially in light of the fact that by the year 2014, 78% of all jobs will require a post-secondary education.¹ With curriculum and training programs still being developed, most available green information is still in it's infancy. There are new credentials being promoted on a daily basis with community colleges being funded to provide training and other programs such as Job Corps working to incorporate green principles into the training that is being provided as well as searching for green certifications that will provide career opportunities for students across America.

The green economy, specifically, businesses and jobs associated with the green economy are growing.² This perspective is not uniformly shared. There are those who believe this growth is real and sustainable, while others think it is nothing more than refinements or additional training resulting in adjustments to existing jobs. One thing is for sure that the green economy is here to stay. But the green economy is difficult to understand with many scratching their heads trying to figure out what it all means.

Sector	Annual Growth (# Jobs)	National Average Median Hourly Earnings
Building Retrofitting	71,400	\$18.37
Smart Grid	43,370	\$23.13
Wind Power	8,290	\$23.05
Solar Power	59,660	\$21.68

Businesses, especially those interested in the green economy, are extremely challenged to meet the rising demand for a skilled green workforce with a diminishing U.S. workforce. "America faces a future in which we have too few workers and especially, too few skilled workers."³ According to the Bureau of Labor Statistics, total employment is expected to increase by 15.3 million, from 150.9 million in 2008 to 166.2 million in 2018.⁴ Yet the 0.8% annual growth rate in the workforce needed to fill the jobs is lower than the 1.2% annual growth rate registered during the previous 10-year period; the civilian labor force is projected to increase only by about 13 million, reaching 164.2 million in 2016.⁵

New technology is making the green economy thrive. However, many of the green jobs associated with the new technology are actually jobs that have been made green. Though there are a few jobs that have been created because of the green economy (i.e. wind turbine repair) many are existing jobs that require more training to be green. Whether this means learning to use less material or revamping skills to work on green technology, they are all considered green jobs.



“The Core Green Economy provides the products and services that enable the transformation toward a cleaner, more efficient and more competitive economy.”¹

The Bottom Line: With the current and impending retirement of many Baby Boomers, combined with a civilian labor force growth that is not adequate to keep up with the projected growth of jobs in the US by 2016, employers will be significantly challenged to find and keep a talented workforce.

This report provides an overview of green jobs and certificates which are available to guide training and certification for those who are seeking to become a green collar worker.

Green Building Facts

- It was estimated that in 2009, 80% of corporate America was engaged in green at least 16% of the time and the remaining 20% was engaged in green 60% of the time.
- The value of green building construction is projected to increase to \$60 billion by the end of 2010.
- The green building products market is projected to be worth \$30 - \$40 billion annually by the end of 2010.
- By the end of 2010, approximately 10% of commercial construction starts are expected to be green.

Sources: NCCER Construction Education Newsline and the U.S. Green Building Council (<http://www.usgbc.com/>)

IMPACT OF GREEN JOBS

It has only been recently that the green economy has had an impact on the economy. Evidence of the probable impact is the push by the Obama administration for green jobs, even hiring the first White House green advisor. Furthermore, the Bureau of Labor Statistics created a set of preliminary definitions and will begin tracking green jobs as part of their role in providing labor market information.⁶

Several studies have shown that investments in the green initiatives will have great impact on the economy overall. For example, by expanding overall clean-energy investments by both the public and private sectors by a total of about \$150 billion per year, 2.5 million new jobs can be created.⁷ Even by reducing the number of jobs lost in the fossil fuel sector, 1.7 million net new jobs would be created,⁸ resulting in clean-energy investments generating about 16.7 jobs per \$1 million in spending.⁹

Despite its recession-induced woes, the clean energy sector is on the rise. The domestic market for solar panels, wind turbines, fuel cells, and other clean energy solutions are projected to reach \$325 billion annually by 2019.¹⁰ Demand for solar and wind power will continue to expand over the next 20 years, and between 70 and 80% of the new jobs created in those industries will be in the manufacturing sector.¹¹

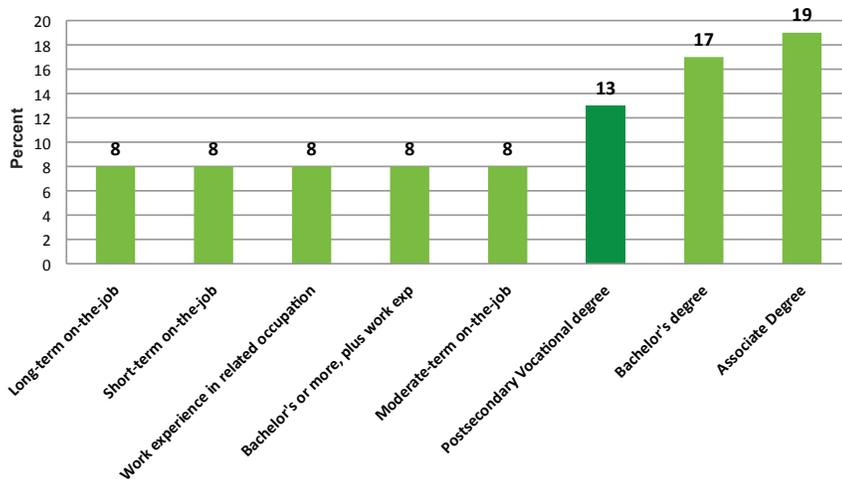
The green building sector is estimated to be worth \$30 billion annually, and approximately 10% of commercial construction is projected to be green. With 20,000 LEED (Leadership in Energy and Environmental Design) projects registered for certification, sustainability in the building industry is becoming less the fad and more of a growing 'norm.'¹²

Data from the Renewable Energy Policy Project and the Energy Information Administration indicate that by adding enough new wind, solar, and other green energy solutions to the power grid to produce 25% of our electricity, the U.S. could generate approximately one million jobs in the manufacturing sector alone, 2.5 million indirect jobs in related industries, and industry revenues of over \$400 billion.¹³

THE NEED FOR CERTIFICATION

The value of industry-recognized certifications should not be underestimated. In a study conducted by the Information Technology Association of America, vendor or industry certification was found to be as important as a bachelor's degree to information technology (IT) companies, while non-IT companies placed certification only just below a bachelor's degree.¹⁴ Certification is important economically and psychologically. Industry-recognized certifications have become so important that the National Association of Manufacturers has created a certification process that contains multiple layers. The more certifications, the more college credit earned until all certifications are complete and work is done to complete a college degree in the specific industry.¹⁵ This type of credential is referred to as a "stackable

Percent change in employment,
by education or training category, 2008-18 (projected)



credential” because every new industry certification gained is based on what was gained previously, building to more and more education and knowledge. This type of certification allows for a variety of start and stop locations in gaining new knowledge in a field, and not just the typical two to four year program that needs to be completed to gain a degree.

As the demand for skilled labor continues to outpace supply, community colleges have emerged as a major partner in economic development by providing postsecondary education and training, offering an increasing number of short-term technical job training programs with portable certificates. Increasing student success begins with programs that train according to skill standards in industries and occupations in demand. Students must be provided with essential knowledge and skills to enable them to pass the certification exams in key, high-growth technical areas.

Industry-recognized certification offers the public a high degree of protection because practitioners have to meet standards or qualifications and pass an exam. Over a thousand certification programs exist in the U.S., qualifying professionals from crane operators to energy efficiency experts, from financial planners to automobile technicians.¹⁶

Industry certification programs accomplish three important goals:

- They provide a measure of protection to the public by giving them a credential for judging the competency of practitioners;
- They provide practitioners with a way to distinguish themselves from their competition; and
- By potentially improving quality, they improve the public perception of the given occupation, helping increase the industry’s prominence.

Due to the volatility in the development of many different certifications, the demand for green certifications is only now growing. While some industries have created one green certification that the entire industry recognizes, this is not the case for all industries.

Certifications have become so important that the National Association of Manufacturers has created a certification process that contains multiple layers. The more certifications, the more college credit earned until all certifications are complete and work is done to complete a college degree in the specific industry.

CONCLUSION

The green economy is offering new employment opportunities to those who possess the education and skills demanded by employers. While some say that the definition of what a green job may be is still undefined, others believe that “Green-Jobs will include construction workers, cost estimators, financial analysts, computer technicians, accountants, manufacturing workers, truck drives, salespersons, scientists, engineers and many others – as long as their jobs have something to do with energy conservation or increasing the supply of renewable energy sources.”¹⁷ While these points are being debated, a number of organizations are developing green standards, curriculum, and certifications.

The development of “green” certifications is in a volatile period. Those candidates for jobs in the various industry sectors at the forefront of this movement who are interested in careers will need to remain vigilant as to the nature of certifications and recognize that industries capitalizing on the opportunities will be seeking those with certifications from industry-recognized providers, such as those certifications identified herein.

While the growth in the various industries has been slowly expanding, it is inevitable that people across the world will need to reduce, reuse and recycle. This activity will demand much more involvement by those trained and certified in the methods, practices and business of energy conservation.

There is no widely accepted definition; however, it is generally agreed that jobs which preserve or restore the environment are considered green.

Source: Bureau of Labor Statistics

APPENDIX A - GREEN CREDENTIALS

Career	Exam	Education*	Work and Training Requirements	Certifier	Web site
Construction					
Home Energy Rating Services	Y	NR	Understanding of carpentry	Residential Energy Services Network (RESNET)	http://www.resnet.us/rater/hers-certification-requirements
Rater Field Inspector	Y	NR	Understanding of carpentry	RESNET	http://www.resnet.us/rater/certified
Building Analyst Professional	Y	NR	NR	Building Performance Institute (BPI)	http://72.16.229.170/documents/BPI%20Small%20Home%20Certification%20Policies%20and%20Procedures%20v.2009.02.pdf
Envelope Professional	Y	NR	NR	Building Performance Institute (BPI)	http://72.16.229.170/documents/BPI%20Small%20Home%20Certification%20Policies%20and%20Procedures%20v.2009.02.pdf
Manufactured Housing Professional	Y	NR	NR	Building Performance Institute (BPI)	http://72.16.229.170/documents/BPI%20Small%20Home%20Certification%20Policies%20and%20Procedures%20v.2009.02.pdf
Heating Professional	Y	NR	NR	Building Performance Institute (BPI)	http://72.16.229.170/documents/BPI%20Small%20Home%20Certification%20Policies%20and%20Procedures%20v.2009.02.pdf
A/C or Heat Pump Professional	Y	NR	NR	Building Performance Institute (BPI)	http://72.16.229.170/documents/BPI%20Small%20Home%20Certification%20Policies%20and%20Procedures%20v.2009.02.pdf
Home Construction	Y	High School Diploma or GED	NR	National Center for Construction Education and Research (NCCER)	http://www.nccer.org/green.aspx
Leadership in Energy and Environmental Design (LEED) Green Associate	Y	NR	Education program that addresses green building principles	National Center for Construction Education and Research (NCCER)	http://www.gbci.org/main-nav/professional-credentials/credentials.aspx#
Building Operations	Y	High School Diploma or GED	From 1 to 2 years experience depending on education	Northwest Energy Efficiency Council	http://www.theboc.info/requirements.html
HVAC					
Installation Technician	Y	NR	NR	North America Technician Excellence (NATE)	http://www.nate.org/HVAC_HVACR/cert_kates.html
Service Technician	Y	NR	NR	North America Technician Excellence (NATE)	http://www.nate.org/HVAC_HVACR/cert_kates.html
Solar Energy					
Entry Level PV Installer Certification	Y	NR	NR	North American Board of Certified Energy Practitioners (NABCEP)	http://www.nabcep.org/certification/pv-installer-certification
Solar Thermal Installer Certification	Y	NR	NR	North American Board of Certified Energy Practitioners (NABCEP)	http://www.nabcep.org/certification/solar-thermal-installer-certification
Automotive					
CNG and LPG Certification	Y	HS Diploma/GED suggested	NR	National Automotive Technician Education Foundation (NATEF)	http://www.natef.org/program_standards/fuel/policies_1.cfm http://www.afdc.energy.gov/afdc/vehicles/conversions.html
Health					
Electronic Health Records	Y	HS Diploma/GED required	NHA training in the last year or 1 year work experience	National Healthcare Association	http://www.nhanow.com/certification/exam_sublinks/administrative.html
Water					
Water Treatment	Y	HS Diploma/GED suggested	NR	American Water Works Association	http://www.awwa.org/Conferences/Learning.cfm?ItemNumber=51924

*Though many of the certifications do not require education there is a need to have at least a High School Diploma or GED for success in the training field. Hybrid Electric Vehicle (HEV) certifications are offered specific manufacturers and there does not now exist an industry standard (i.e. NATEF) certification. The American Wind Energy Association (AWEA) sets standards that all programs must adhere to gain approval from AWEA. However, it is the prerogative of the Community Colleges to set the actual requirements and curricula for any wind related program.

APPENDIX B - GREEN CREDENTIAL COMPLETION REQUIREMENTS

RESIDENTIAL ENERGY SERVICES NETWORK (RESNET)

HOME ENERGY RATER SERVICES (HERS) CERTIFIED RATER¹⁸ - Candidates need to complete:

- To have a passing score on the RESNET National Rater Test (80%); AND
- Two mandatory Supervised Ratings under the guidance of a RESNET accredited Rater Training Provider; AND
- Contract with a RESNET accredited Rating Provider; AND
- To perform mandatory Probationary Ratings.

RATER FIELD INSPECTOR¹⁹ - Candidates need to complete:

- Rating Field Inspector training by a RESNET accredited Rater Training Provider; AND
- Passing the RESNET National Field Inspector Test; AND
- Completion of three additional probation tests under the direct supervision of a certified rater.

BUILDING PERFORMANCE INSTITUTE²⁰

The below list of certifications are all pieces to weatherization of a home. Though not a weatherization certificate, a student who obtains all certifications below will be qualified to be a weatherization professional.

BUILDING ANALYST PROFESSIONAL - Candidates need to complete:

- 100-question written examination and field examination.
- master BPI's Knowledge Essential Task List (KETL) — a comprehensive list of related knowledge, skills, and tasks, from building science to professional ethics; OR
- HERS Certification (see RESNET); AND
- BPI Building Analyst Professional 50-question written examination; AND
- BPI Building Analyst Professional field examination.

ENVELOPE PROFESSIONAL - Candidates need to complete:

- 100-question written examination and field examination; OR
- Any other BPI Certification; AND
- BPI Envelope Professional 50-question written examination; AND
- BPI Envelope Professional field examination.

MANUFACTURED HOUSING PROFESSIONAL - Candidates need to complete:

- 100-question written examination and field examination; OR
- Any other BPI Certification: AND
- BPI Manufactured Housing Professional 50-question written examination; AND
- BPI Manufactured Housing Professional field examination.

HEATING PROFESSIONAL - Candidates need to complete:

- 100-question written examination and field examination; OR
- Any other BPI Certification; AND
- BPI Heating Professional 50-question written examination; AND
- BPI Heating Professional field examination; OR
- NATE Heating Service Certification (See NATE); AND
- BPI Heating Professional 50-question written examination; AND
- BPI Heating Professional field examination.

A/C OR HEAT PUMP PROFESSIONAL - Candidates need to complete:

- 40 CFR Section 608 Type II or Universal; AND
- BPI A/C or Heat Pump Professional 50-question written examination; AND
- NATE AC Service or NATE Heat Pump Service (See NATE) 100-question written examination; AND
- BPI A/C or Heat Pump Professional field examination.

NCCER GENERAL CONSTRUCTION – YOUR ROLE IN THE GREEN ENVIRONMENT²¹

This course prepares students to successfully participate in the Green Advantage®²² Commercial/Resident Certification Exam. It brings together the expertise of industry and higher education in defining green building. Geared to entry-level craft workers or to anyone wishing to learn more about green building, this course provides fundamental instruction in the green environment, green construction practices, and green building rating systems.

“Presented in easy-to-understand terms and illustrations, Your Role in the Green Environment will better equip learners to make decisions regarding their personal impacts on the environment and will make them more aware of how to lessen their impacts in the built environment.”

LEED GREEN ASSOCIATE²³ - Candidates need to complete:

- Green Associate exam; AND
- Documented involvement on a LEED-registered project; OR
- Passing the Green Associate exam; AND
- Employment (or previous employment) in a sustainable field of work; OR
- Passing the Green Associate exam; AND
- Engagement in (or completion of) an education program that addresses green building principles.

BUILDING OPERATORS CERTIFICATION²⁴

For certification, candidates need only demonstrate a knowledge and ability to apply the essentials of effective and energy efficient operations and maintenance. This is demonstrated through successful completion of training in a BOC Level I and/or Level II course series, class exams, and on-the-job application projects.

To be awarded BOC certification, candidates must meet the eligibility criteria:

- A high school diploma or GED; AND Two or more years of experience working in operations and maintenance of a commercial or institutional facility; OR
- A high school diploma or GED; AND A minimum of one year of experience working in operations and maintenance of a commercial or institutional facility; AND
- One year of technical college level education in facilities engineering related program; OR
- A high school diploma or GED; AND Two or more years of experience in energy management of facilities with a focus on operations and maintenance.

HEATING VENTILATION AND AIR CONDITIONING²⁵

INSTALLATION TECHNICIAN - Candidates need to complete:

- Core installation exam; AND
- One specialty exam; AND
- No formal pre-requisites, though NATE suggests some technical training and one year of experience to pass tests, which are based on applied knowledge.

SERVICE TECHNICIAN - Candidates need to complete:

- Core service exam; AND
- One specialty exam; AND
- No formal pre-requisites, though NATE suggests some technical training and two years of experience to pass tests, which are based on applied knowledge.

NABCEP PHOTOVOLTAIC (PV) ENTRY LEVEL PROGRAM

Upon successful completion of coursework offered by a registered NABCEP PV Entry Level Exam Provider, a student is eligible to sit for the PV Entry Level Exam.

SOLAR PV INSTALLER CERTIFICATION EXAM²⁶ - To become certified and maintain certification, the applicant must minimally:

- Be at least 18 years of age
- Meet prerequisites of related experience (2 years minimum) and/or education Complete an application form documenting requirements
- Sign and agree to uphold a code of ethics
- Pay application and exam fee
- Pass a written exam

SOLAR THERMAL INSTALLER CERTIFICATION²⁷ - To become certified and maintain certification, the applicant must minimally:

- Be at least 18 years of age
- Meet prerequisites of related experience (2 years minimum) and/or education Complete an application form documenting requirements
- Sign and agree to uphold a code of ethics
- Pay application and exam fee
- Pass a written exam

COMPRESSED NATURAL GAS (CNG) AND LIQUEFIED PETROLEUM GAS (LPG) TECHNICIAN CERTIFICATION²⁸

Program providing instruction in all of the CNG/LPG areas must have a minimum total of 730 hours of combined laboratory/shop (co-op) and classroom instruction. Tasks related to the CNG/LPG areas may be taught at different times during the course of study. Therefore, the hours for an individual area would be the sum total of all the hours of instruction related to the tasks. Individual areas must have a minimum of the following hours:

- Electrical/Electronic Systems 200
- Engine Performance 260
- LPG Diagnosis and Repair 70
- CNG Diagnosis and Repair 70
- LPG Maintenance 25
- CNG Maintenance 25
- LPG Conversion/Installation 40
- CNG Conversion/Installation 40

ELECTRONIC HEALTH RECORDS²⁹

Electronic health records (EHR) specialist's duties will vary with size and specialty of the facility in which they may work. Many can specialize in varying areas or one aspect of the EHR such as entry level coders, encoding within a hospital setting, abstractors and or coding specialist, HIPAA Compliance Officers or HIM (Health Information Managers) and be over entire departments within larger healthcare facilities.

- You must have either a High School Diploma, or equivalency; and you must have successfully completed an NHA approved training program within the past year.

OR

- You must have either a High School Diploma, or equivalency; and must have worked within the last year in the field of certification for a minimum of 1 year.

AMERICAN WATER WORKS ASSOCIATION³⁰

Water Treatment Operator Level 1 – Certificate Program

This is a class that is facilitated by an instructor, and it's paced over the course of 10 weeks. Students are expected to complete 6 hours of online learning activities each week. Activities include presentations, videos, interactions, quizzes, discussion boards, weekly tests, homework assignments, and a live meeting. These activities can be accomplished by the student at his or her most convenient time during the week.

APPENDIX C³¹ - GREEN INDUSTRY SECTOR DESCRIPTIONS

Sector	Description
Energy Generation	<ul style="list-style-type: none"> • Renewable energy generation (all forms of solar, wind, geothermal, biomass, hydro, marine & tidal, hydrogen, co-generation) • Associated equipment, controls, and other management software and services • Renewable energy consulting services • Research & testing in renewable energy
Energy Efficiency	<ul style="list-style-type: none"> • Energy conservation consulting and engineering services • Building efficiency products and services • Alternative energy appliances (solar heating, lighting, etc.) • Energy efficiency research • Energy efficiency meters & measuring devices
Transportation	<ul style="list-style-type: none"> • Alternative fuels (biodiesel), hydrogen, algae and biowaste-based ethanol and feedstock-neutral infrastructure) • Motor vehicles & equipment (electric, hybrid, and natural gas vehicles, diesel technology)
Energy Storage	<ul style="list-style-type: none"> • Advanced batteries (Li-Ion, NiMH) • Battery components & accessories • Fuel cells
Air & Environment	<ul style="list-style-type: none"> • Emissions monitoring & control • Environmental consulting (environmental engineering, sustainable business consulting) • Environmental remediation
Recycling & Waste	<ul style="list-style-type: none"> • Consulting services • Recycling (paper, metal, plastics, rubber, bottles, automotive, electronic waste and scrap) • Recycling machinery manufacturing • Waste treatment
Water & Wastewater	<ul style="list-style-type: none"> • Water conservation (control systems, meters & measuring devices) • Development and manufacturing of pump technology • Research and testing • Consulting services • Water treatment and purification products and services
Agriculture	<ul style="list-style-type: none"> • Sustainable land management and business consulting services • Sustainable supplies and materials • Sustainable aquaculture
Research & Advocacy	<ul style="list-style-type: none"> • Organizations and research institutes focused on advancing science and public education in the areas of: renewable energy and alternative fuels and transportation.
Business Services	<ul style="list-style-type: none"> • Environmental law/legal services • Green business portals • Green staffing services • Green marketing and public relations
Finance & Investment	<ul style="list-style-type: none"> • Emission trading and offsets • Venture capital and private equity investment • Project financing (e.g. solar installations, biomass facilities, etc.)
Advanced Materials	<ul style="list-style-type: none"> • Bioplastics and others • New materials for improving energy efficiency
Green Building	<ul style="list-style-type: none"> • Design & construction • Building materials • Site management • Green real estate & development
Manufacturing & Industrial	<ul style="list-style-type: none"> • Advanced packaging • Process management • Industrial surface cleaning
Energy Infrastructure	<ul style="list-style-type: none"> • Consulting and management services • Cable & equipment

APPENDIX D³² - BUREAU OF LABOR STATISTICS - PROJECTED JOB CORPS GROWTH / EARNINGS

Building Retrofitting

SOC Code	Description	National 2008	National 2018	Annual Growth (# Jobs)	National Median Hourly Earnings
47-2031	carpenters	1,284,900	1,450,300	16,540	\$18.72
47-2051	cement masons	201,000	226,800	2,580	\$16.87
47-2061	construction laborers	1,248,700	1,504,600	25,590	\$13.71
47-2111	electricians	694,900	777,900	8,300	\$22.32
47-2131	insulation workers	27,600	31,700	410	\$15.34
47-2152	plumbers	494,700	570,500	7,580	\$21.94
47-2211	sheet metal workers	170,700	181,800	1,110	\$19.37
47-4041	hazardous materials removal workers	42,500	48,800	630	\$17.94
49-5021	HVAC mechanic and installer	308,200	394,800	8,660	\$19.08
TOTAL		4,473,200	5,187,200	71,400	

Smart Grid

SOC Code	Description	National 2008	National 2018	Annual Growth (# Jobs)	National Median Hourly Earnings
15-1031	computer software engineers	514,800	689,900	17,510	\$41.07
17-2071	electrical engineers	157,800	160,500	270	\$39.50
17-3023	electronic technicians	164,000	160,400	-360	\$25.60
47-2061	construction laborers	1,248,700	1,504,600	25,590	\$13.71
47-2073	construction equipment operators	404,500	453,200	4,870	\$18.88
49-9051	power-line installers and repairers	113,900	119,000	510	\$26.49
51-2022	equipment assemblers	213,300	182,000	-3,130	\$13.22
51-2092	team assemblers	1,112,300	1,112,700	40	\$12.32
51-4041	machinists	421,500	402,200	-1,930	\$17.41
TOTAL		4,350,800	4,784,500	43,370	

Wind Power

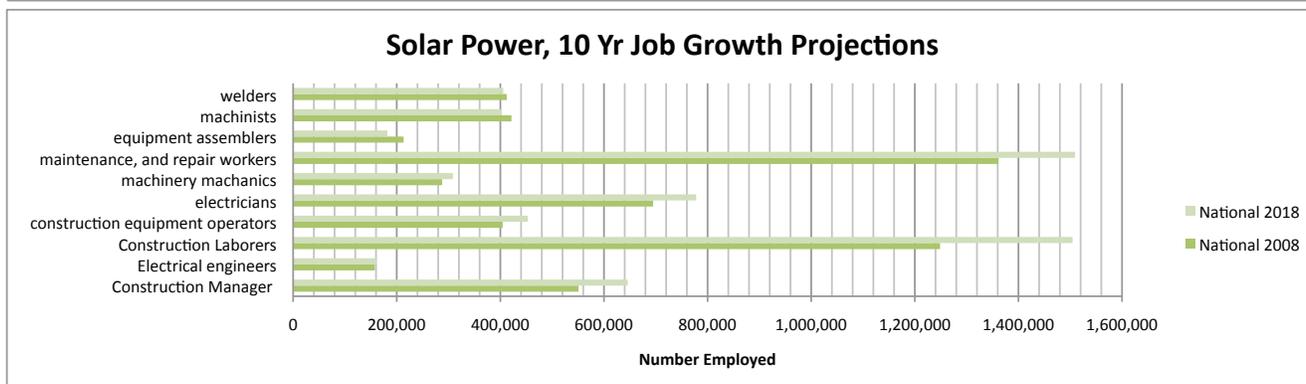
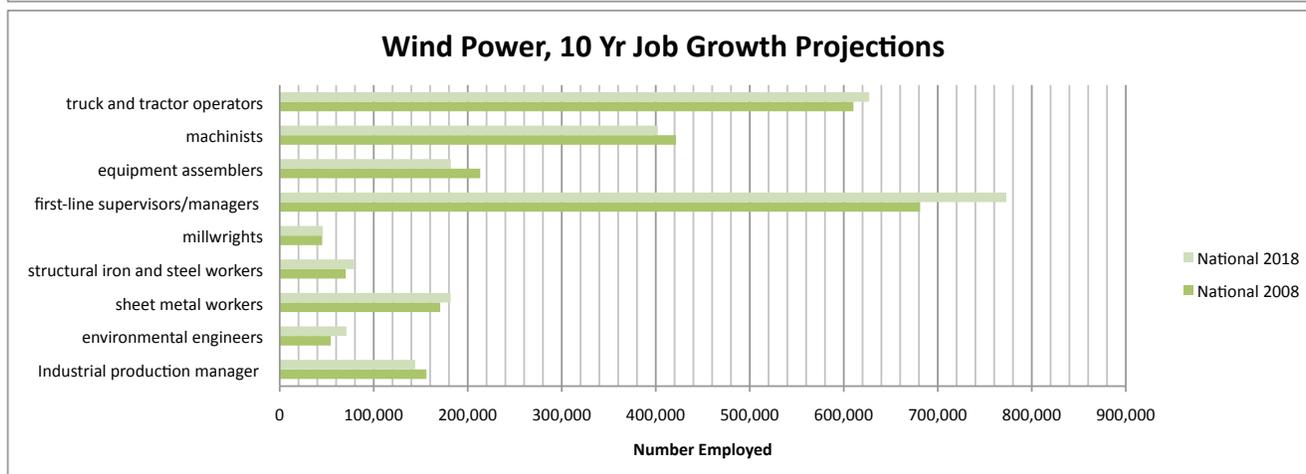
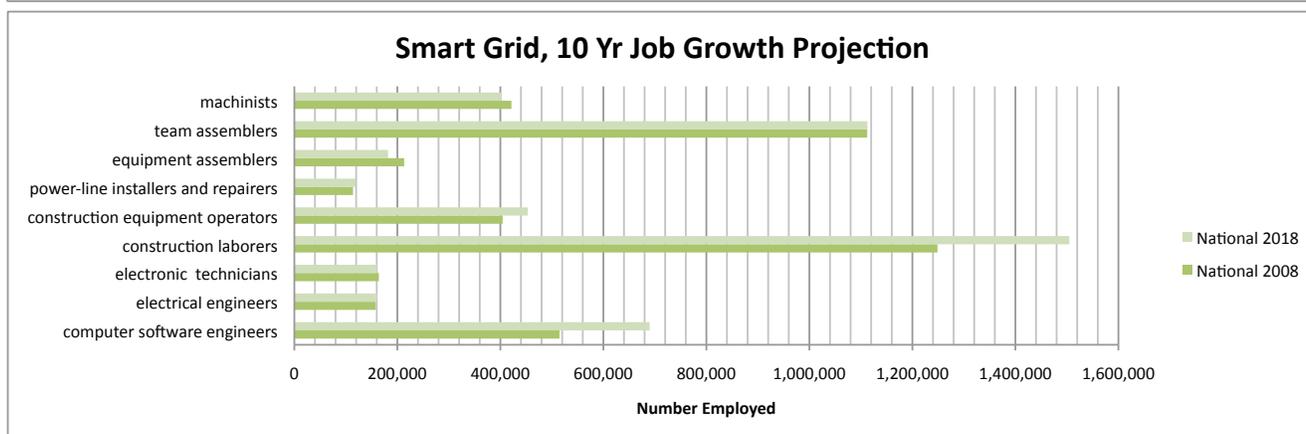
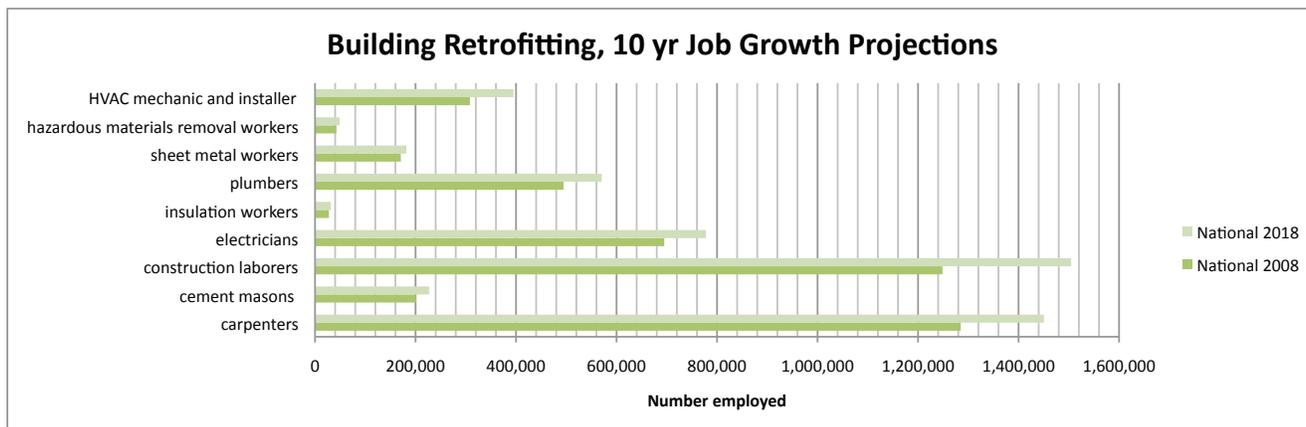
SOC Code	Description	National 2008	National 2018	Annual Growth (# Jobs)	National Median Hourly Earnings
11-3051	Industrial production manager	156,100	144,100	-1,200	\$40.04
17-2081	environmental engineers	54,300	70,900	1,660	\$35.59
47-2211	sheet metal workers	170,700	181,800	1,110	\$19.37
47-2221	structural iron and steel workers	70,200	78,900	870	\$20.68
49-9044	millwrights	45,200	45,900	70	\$22.87
51-1011	first-line supervisors/managers	681,200	772,900	9,170	\$24.25
51-2022	equipment assemblers	213,300	182,000	-3,130	\$13.22
51-4041	machinists	421,500	402,200	-1,930	\$17.41
53-7051	truck and tractor operators	610,300	627,000	1,670	\$13.98
TOTAL		2,422,800	2,505,700	8,290	

Solar Power

SOC Code	Description	National 2008	National 2018	Annual Growth (# Jobs)	National Median Hourly Earnings
11-9021	Construction Manager	551,000	645,800	9,480	\$38.39
17-2071	Electrical engineers	157,800	160,500	270	\$39.50
47-2061	Construction Laborers	1,248,700	1,504,600	25,590	\$13.71
47-2073	construction equipment operators	404,500	453,200	4,870	\$18.88
47-2111	electricians	694,900	777,900	8,300	\$22.32
49-9041	machinery mechanics	287,700	308,600	2,090	\$20.99
49-9042	maintenance, and repair workers	1,361,300	1,509,200	14,790	\$16.21
51-2022	equipment assemblers	213,300	182,000	-3,130	\$13.22
51-4041	machinists	421,500	402,200	-1,930	\$17.41
51-4121	welders	412,300	405,600	-670	\$16.13
TOTAL		5,753,000	6,349,600	59,660	

Miscellaneous

SOC Code	Description	National 2008	National 2018	Annual Growth (# Jobs)	National Median Hourly Earnings
49-3023	Automotive service technicians and mechanics	763,700	799,600	3,590	\$16.88
49-3031	Bus and truck mechanics and diesel engine specialists	263,100	278,000	1,490	\$18.94
51-8031	Water and liquid waste treatment plant and system operators	113,400	135,900	2,250	\$18.48
TOTAL		1,140,200	1,213,500	7,330	



ENDNOTES

1. Council on Competitiveness (2008). Thrive. Retrieved 1/6/2009 from <http://www.compete.org/images/uploads/File/PDF%20Files/Thrive.%20The%20Skills%20Imperative%20-%20FINAL%20PDF.PDF>
2. Perry, F. N., Henry, S., Perry, M. E., & Biddiah, S.(2009). Many Shades of Green: Diversity and Distribution of California's Green Jobs. Next 10. Retrieved May 4, 2010 from http://www.next10.org/next10/pdf/Many_Shades_of_Green_1209.pdf
3. Gunderson, S., Jones, R., & Scanland, K. (2004). The jobs revolution: Changing how America works. Washington, DC: Copywriters, Inc.
4. Bartsch, K. J. (2009). The Employment Projections for 2008 – 18. Bureau of Labor Statistics (Nov. 2009). Retrieved December 14, 2009 from <http://www.bls.gov/opub/mlr/2009/11/art1full.pdf>.
5. Toossi, M. (2007). Labor force projections to 2016: more workers in their golden years. Retrieved 5/19/2008, from <http://www.bls.gov/opub/mlr/2007/11/art3exc.htm>.
6. Federal Register / Vol. 75, No. 50 / Tuesday, March 16, 2010 / Notices Retrieved 4/30/2010 from <http://edocket.access.gpo.gov/2010/pdf/2010-5705.pdf>
7. Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst. How Clean-Energy Policies Can Fight Poverty and Raise Living Standards in the United States. Retrieved 4/23/10 from http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/green_prosperity/Green_Proprosperity.pdf
8. Ibid
9. Ibid
10. Ron Pernick, Clean Energy Trends. Clean Edge. Retrieved 4/27/2010 from <http://www.cleaneedge.com/reports/reports-trends2010.php>
11. Make it in America the Apollo Green Manufacturing Action Plan. Apollo Alliance. Retrieved 4/26/2010 from http://apolloalliance.org/wp-content/uploads/2009/03/greenmap_proposal031109.pdf
12. http://ptgmedia.pearsoncmg.com/imprint_downloads/nccer/pdfs/2010%20NCCER%20Cat%204%20Web%202-11-10.pdf (page 32)
13. Make it in America the Apollo Green Manufacturing Action Plan. Apollo Alliance. Retrieved 4/26/2010 from http://apolloalliance.org/wp-content/uploads/2009/03/greenmap_proposal031109.pdf
14. Information Technology Association of America. (2001). When can you start? Building better information and technology skills and careers. Arlington, VA: Author.
15. National Association of Manufactures. Retrieved 4/30/2010 from <http://www.nam.org/Communications/Articles/2009/05/ManufacturingInstituteGatesFoundation.aspx>
16. North American Board of Certified Energy Practitioners. Retrieved 4/30/2010 from <http://www.nabcep.org/certification/the-need-for-certification>
17. Schoeff, M. (2009). Critics Take Less than Rosy View of Push for Green Jobs. Reported in Workforce Management May 18, 2009 pg. 6 from a research brief for John J. Heldrich Center for Workforce Development at Rutgers University by Cleary, C. & Kopicki, A.
18. Residential Services Network. Retrieved 4/30/2010 from <http://www.resnet.us/rater/hers-certification-requirements>
19. Residential Services Network. Retrieved 4/30/2010 from <http://www.resnet.us/rater/certified>
20. Building Performance Institute. Retrieved 4/30/2010 from <http://72.16.229.170/documents/BPI%20Small%20Homes%20Certification%20Policies%20and%20Procedures%20v.2009.02.pdf>
21. National Center for Construction Education and Research. Retrieved 4/30/2010 from http://ptgmedia.pearsoncmg.com/imprint_downloads/nccer/pdfs/2010%20NCCER%20Cat%204%20Web%202-11-10.pdf (page 32)
22. Green Advantage. Retrieved 4/30/2010 from <http://www.greenadvantage.org/GAExamOverview.php>
23. Green Building Certification Institute. Retrieved 4/30/2010 from <http://www.gbci.org/main-nav/professional-credentials/credentials.aspx#>
24. Building Operators Certification. Retrieved May 4, 2010 <http://www.theboc.info/requirements.html>
25. North America Technician Excellence. Retrieved 4/30/2010 from http://www.natex.org/HVAC_HVACR/cert_kates.html
26. North American Board of Certified Energy Practitioners. Retrieved 4/30/2010 from <http://www.nabcep.org/certification/pv-installer-certification>
27. North American Board of Certified Energy Practitioners. Retrieved 4/30/2010 from <http://www.nabcep.org/certification/solar-thermal-installer-certification>
28. Alternative Fuel Vehicles. Retrieved 4/30/2010 from both http://www.natef.org/program_standards/fuel/policies_1.cfm and <http://www.afdc.energy.gov/afdc/vehicles/conversions.html>
28. National Healthcare Association. Retrieved 5/7/2010 from http://www.nhanow.com/certification/exam_sublinks/administrative.html
29. American Water Works Association. Retrieved 4/30/2010 from <http://www.awwa.org/Conferences/learning.cfm?ItemNumber=51924>
30. Perry, F. N., Henry, S., Perry, M. E., & Biddiah, S.(2009). Many Shades of Green: Diversity and Distribution of California's Green Jobs. Next 10. Retrieved May 4, 2010 from http://www.next10.org/next10/pdf/Many_Shades_of_Green_1209.pdf
31. Bureau of Labor Statistics. Retrieved 5/4/2010 from <http://www.bls.gov/oco/oco2003.htm>



Green Certifications and Training

500 North Marketplace Drive
P.O. Box 10, Centerville, UT 84014
(801) 693-2870 Fax (801) 693-2900

carl.nink@mtctrains.com
www.mtctrains.com/institute