

Report on the Study of Workforce Development Training Needs for the
Clean Energy Industry

Maryland Department of Labor, Licensing and Regulation

In Consultation with the:

Governor's Office of Minority Affairs

Maryland Department of Budget and Management

Maryland Department of Commerce

Maryland Energy Administration

Maryland Clean Energy Center

July 2017

Contents

Introduction 3

Clean Energy Jobs in Maryland 3

Investing in Maryland’s Clean Energy Workforce 6

 The EARN Maryland Program’s Green Initiative 6

Baltimore Green Strategic Industry Partnership 7

Clean Energy Training Partnership 8

 Registered Apprenticeships 8

Reaching Individuals 10

Barriers to Entry into the Clean Energy Industry 11

Funding Sources 11

Appendix A 13

 Clean Energy Industry Sub-Clusters 13

Introduction

Chapter 1 of the Acts of 2017 requires the Department of Labor, Licensing and Regulation to study the workforce development training needs for the clean energy industry in the State. In conducting the study, the Department is to seek input from state agencies and appropriate stakeholders. Specifically, the legislation requests that the Department report on:

- (1) Existing programs that could help address the clean energy workforce needs;
- (2) Any new program that could be developed to provide workforce development training for the clean energy workforce; and
- (3) Ways to advance clean energy job training and employment opportunities for individuals from economically distressed areas and disadvantaged workers who have barriers to entry into the labor force.

The report is to also include barriers to entry for small, minority-owned, and women-owned businesses in the clean energy industry. Finally, the report is to include funding recommendations for clean energy workforce development.

Clean Energy Jobs in Maryland

In 2016, Senate Bill 921/House Bill 1106 *Clean Energy Jobs - Renewable Energy Portfolio Standard Revisions* defined clean energy jobs as employment opportunities in the creation of “Tier 1 renewable energy sources.” As defined by Maryland law, Tier 1 renewable energy sources include solar, wind, qualifying biomass, methane from a landfill or wastewater treatment plant, geothermal, ocean, fuel cells that produce electricity from a Tier 1 source, hydroelectric power plants of less than 30 MW capacity, poultry litter-to-energy, waste-to-energy, and refuse-derived fuel.

Many of these jobs are not new occupations however, specialized training and certifications can help provide additional workforce opportunities to workers. In fact, many industry sectors already support the creation of Tier 1 renewable energy sources. Construction and other skilled trades have already contributed greatly to Maryland’s green economy. For example, wind turbines on the mountains of Western Maryland and the investments in solar arrays, made every day by Maryland’s businesses and homeowners alike, have led to training and career opportunities for many Marylanders.

An examination of wage data and labor market information indicates growth in Maryland’s green industry sector. Annual averages from the Quarterly Census of Employment and Wages for 2011 – 2016 show a strong trend of growth in the Clean Energy Cluster. 2015 represents the highest level of employment during this time period, followed closely by 2016.

As noted in Chart A, 54,000 Marylanders were employed by the Clean Energy Industry in 2016. This includes careers in solar power electric generation, wind electric generation, and residential

and non-residential roofing contractors. A complete listing of the energy production sub-cluster of Clean Energy Cluster is provided in Appendix A. Wages in Clean Energy have also been consistently higher than total private wages. Since 2011, wages in Clean Energy have been an average of approximately 1.4 times higher than total private wages in Maryland. The future outlook for Clean Energy jobs is also positive.

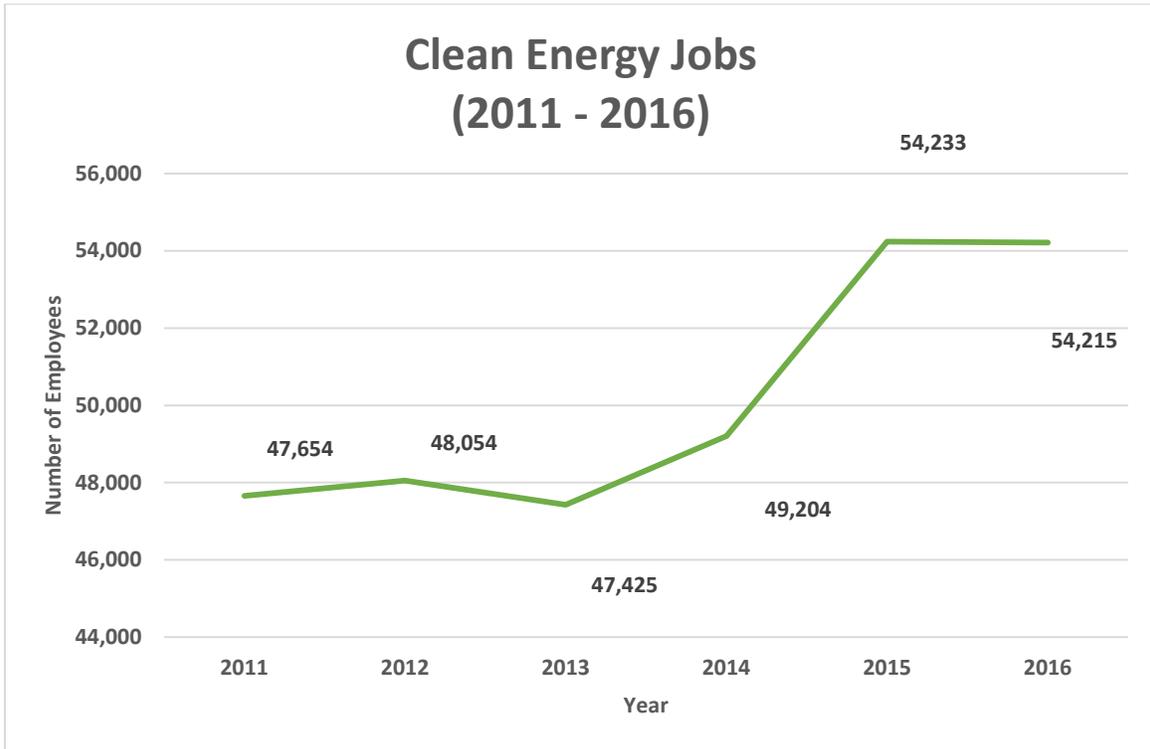


Chart A – Clean Energy Jobs (2011 – 2016)

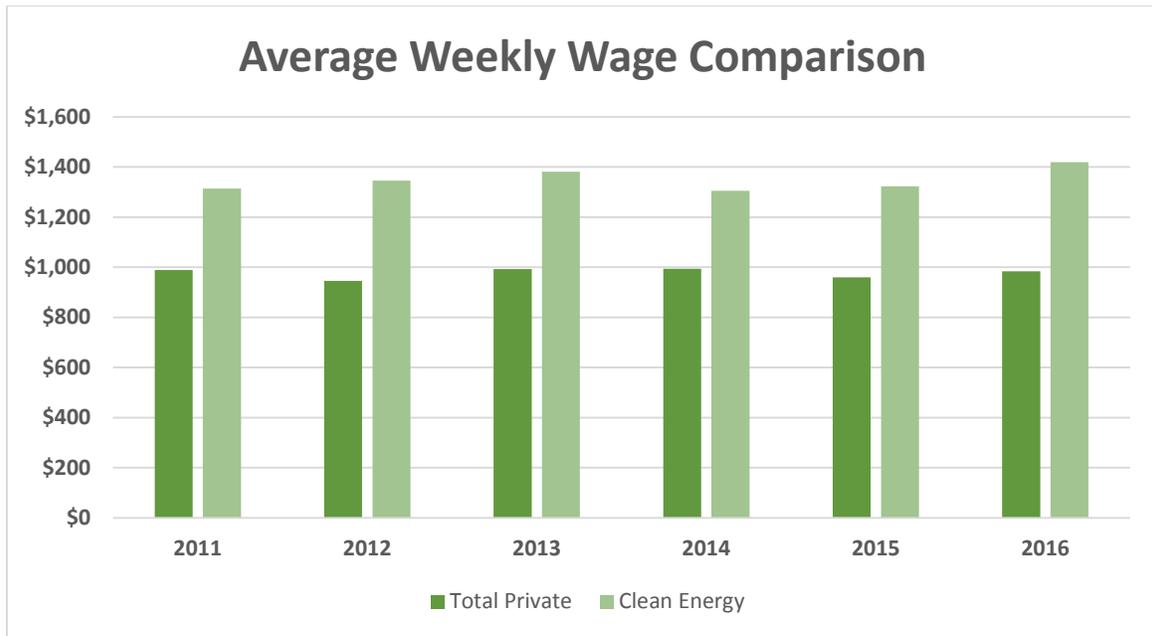


Chart B – Average Weekly Wage Comparison (2011 – 2016)

Similarly, occupations in Maryland’s green economy are expected to grow. Long-Term Occupational Projections for Maryland’s labor market from 2014 to 2024 show a projected growth of 15.1 percent in the clean energy industry’s occupations. This equates to approximately 94,093 newly created job positions. When the 133,701 jobs available due to replacement (death, retirement, and finding new employment) are factored in, the Department projects that a total of 228,208 jobs will be available by 2024.

Long-Term Occupations Projections

Clean Occupations	New Job Creation				Change	
	2014	2024	Difference	Difference%	Replacement	Total
Total	621,390	715,483	94,093	15.1%	133,701	228,208

Chart C – Long-Term Occupations Projections



Chart D – Annual Clean Job Postings

Likewise, real time labor market information gathered from job postings on the Maryland Workforce Exchange from 2011 – 2016 reveals a 64 percent increase in green job related postings during the timeframe.

Investing in Maryland’s Clean Energy Workforce

The EARN Maryland Program’s Green Initiative

Governor Larry Hogan released his environmental package in January 2017. The effort was comprised of four initiatives designed to protect Maryland’s natural resources while fostering economic and job growth.

Central to Governor Hogan’s \$65 million environmental package was a \$41 million investment in Tier 1 renewable projects through the Strategic Energy Investment Fund. The funds were a part of the \$44 million that Exelon paid in liquidated damages to the State of Maryland. Of this fund, \$3 million will be invested in Maryland’s Employment Advancement Right Now (EARN) Program to train workers for jobs in the solar, wind, hydroelectric, and other green industries. The Maryland Department of Labor, Licensing and Regulation is partnering with the Maryland Energy Administration on this initiative.

Established in 2014, EARN Maryland is the State’s nationally recognized competitive workforce program. EARN Maryland is industry-led and designed with the flexibility to ensure that

Maryland's businesses have the talent they need to compete and grow. The program provides targeted education and skills training to Maryland jobseekers, including support for individuals with specific barriers to employment and career advancement strategies for incumbent workers.

The program focuses on three important subsets: the unemployed, the underemployed, and the incumbent worker in need of training. As of October 2016, 3,024 incumbent workers have received training, obtaining new credentials, certifications, and/or skills. As a direct result, employer partners report improved productivity, cost savings, wages, and job retention. Also, as of October 2016, 1,740 EARN Maryland participants completed entry level training programs. Of those, 1,425 (82 percent) obtained employment.

EARN Maryland continues to be a national leader in sector-based programs and a model for other states looking to implement similar initiatives. After being recognized in 2015 as a best practice by the National Skills Coalition, EARN Maryland received similar accolades in 2016 from the Urban Institute.

The secret to EARN's success is its emphasis on business engagement. EARN places businesses and workforce intermediaries at the center of the identification of workforce needs, the development of curriculum, the design of trainings, and the placement of successful participants. While traditional workforce programs look to training entities or higher education to fill this role, EARN Maryland looks to employer and industry partners to drive this process. Partnerships are encouraged to continually engage new employers to participate in the program. As word has spread, regarding the caliber of training programs and the participants who complete, the employer base within EARN has grown. At program inception, 206 employers were committed to EARN. As of this report, over 700 employers have participated in the program, representing an increase of over 200 percent. The rapid growth of employer representation is a testament to the effectiveness of this truly industry-led model.

While EARN has already invested in clean energy workforce development programs, Governor Hogan's added investment will increase the program's focus on this industry, ensuring that employers have the talented workforce necessary to meet growth and compete in today's economy. The following section provides information on the existing green partnerships funded by EARN Maryland.

Baltimore Green Strategic Industry Partnership

Led by Civic Works, the Baltimore Green Strategic Industry Partnership (BGSIP) has provided training to 49 unemployed workers with barriers to employment. Participants receive 40 hours of essential skills training followed by 80 hours of technical training, resulting in industry-recognized certifications. Trainees also complete 320 hours of on-the-job training, reinforcing their employability and skills learned during the classroom and hands-on components of training.

To date, BGSIP has placed 93 percent of completers into full-time employment at an average wage of \$14.50 per hour. BGSIP has also provided training to 30 incumbent workers seeking

career advancement, leading to promotions and significant wage increases. Over the last year, BGSIP has almost doubled in size, increasing the number of employers participating in the partnership to 16. The Partnership recently received additional funding to continue its work.

Industry partners in this initiative include: Efficiency First Maryland, DeVere Insulation Home Performance, Elysian Energy, Green & Healthy Homes Initiative, greeNEWIT, Hawkeye Construction, Home Energy Loss Professionals, EcoMize USA, Minnick's, ZeroDraft Maryland Advanced Green Home Solutions, Efficient Home, Energy Services Group, Lewis Construction, American Home Energy Corporation, and USA Energy Company. Baltimore City Community College, Baltimore City Mayor's Office of Employment Development, Baltimore Development Corporation's Small Business Resource Center, the Abell Foundation, Episcopal Community Services of Maryland also serve as partners in the services provided to participants.

Clean Energy Training Partnership

The Clean Energy Training Partnership led by the Living Classrooms Foundation is the first initiative funded under the FY 2018 green EARN initiative. The partnership will develop and implement a needs-based employment training program that prepares unemployed and underemployed individuals for sustainable employment in the renewable energy industry. The comprehensive program combines classroom training and eight weeks of hands-on-experience, where participants will have the opportunity to apply the technical and job-readiness skills learned in the classroom.

This exciting new initiative brings together a diverse group of industry partners including Power52, Bith Energy, Pivotal Power Solutions, Haynes Solar, Suncatch Energy, Baltimore Gas and Electric, American Microgrid Solutions, Constellation Energy, and the Mayor's Office of Employment Development.

Registered Apprenticeships

During the 2016 legislative session, the Hogan Administration submitted legislation transferring the State's Apprenticeship programming to Department of Labor, Licensing and Regulation's Division of Workforce Development and Adult Learning. The transfer of the program, on October 1, 2016, bolstered the alignment of Apprenticeship initiatives with the State's workforce system. This legislative enactment, approved unanimously by the Assembly and signed into law by Governor Hogan, provides key resources for the growth and expansion of Registered Apprenticeships. Since then, the states of Pennsylvania and Delaware have taken similar legislative action.

Registered Apprenticeships combine supervised, structured, on-the-job learning, and related technical instruction to teach apprentices the skills necessary to succeed in a specific occupation. The apprentice works full-time and receives training from the sponsoring organization. Typically, apprentices are hired at a percentage of a journeyperson's salary. As the apprentice completes training and demonstrates skills mastery, the percentage of a journeyperson's wage

received increases until the apprentice makes journeyperson's wages upon completing the program.

Registered Apprenticeships are designed to meet the workforce needs of the sponsors and the businesses participating with the sponsor. Because of the need for highly skilled workers, sponsors use Registered Apprenticeship as a method to train employees in the knowledge necessary to become a highly skilled worker. This also means the number of available Registered Apprenticeship opportunities is dependent on the current training and employment needs of the industry. In Maryland, there are over 230 registered occupations and over 9,000 Registered Apprentices.

In October 2016, the Maryland Department of Labor, Licensing and Regulation was awarded \$2.2 million from the United States Department of Labor for the acceleration and expansion of Registered Apprenticeship opportunities in the State. Both the ApprenticeshipUSA Accelerator Grant and the ApprenticeshipUSA State Expansion Grant invest in the State's Registered Apprenticeship programming. The funds provided under these grants are vitally important to address the pressing workforce needs of Maryland's businesses.

DLLR established an "Apprenticeship Innovation Fund" to invest in programs that support and enhance Registered Apprenticeship expansion strategies, particularly for vulnerable populations, youth, and dislocated workers. In early 2017, the Department committed \$621,000 to award competitive grants to applicants via this fund. The fund is meant to seed and incentivize the implementation of new and promising ideas or adapt proven strategies, at the systems or service delivery level, to expand the reach of Registered Apprenticeship programs in Maryland. Registered Apprenticeship programs in the skilled trades, such as electrical, plumbing and other construction trades, can play a key role in building a sustainable pipeline of available workers for green jobs.

Currently, the Joint Apprenticeship and Training Council (JATC) for the Electrical Industry of Baltimore has training for its five year electrical occupation for Photovoltaics. This training course is a comprehensive guide to design, installation, and evaluation of residential and commercial photovoltaic (PV) systems, also known as solar systems. This course includes the specified electrical requirements in accordance with the 2017 edition of the National Electric Code. Journeypersons and Registered Apprentices from this program, employed with one of the signatory contractors, recently completed the solar panel installation project at all three of the campuses for the Community College of Baltimore County (CCBC).

Another Registered Apprenticeship Sponsor, the Associated Builders and Contractors, is also seeking to increase training opportunities in the solar energy field. The ABC Chesapeake Shores is currently looking to expand their current training to meet the needs of their member companies. This will include looking at incorporating solar photovoltaic systems for the electrical occupation and green topics for the HVAC occupation along with other green topics.

In the past, the ABC Metro Washington has offered CORE and Your Role in the Green Environment in its partnership with Goodwill of Greater Washington. ABC Chesapeake Shores is currently in partnership with the Anne Arundel Workforce Development Corporation (AAWDC) and will be offering the CORE and Your Role in the Green Environment course in the near future.

In addition to solar power, there are Registered Apprenticeship Programs who currently work with businesses/industries in other Green Energy Sectors. In particular, the Baltimore, Philadelphia, D.C., and the Northeast Regional Council of Carpenters Registered Apprenticeship Program perform work within the offshore wind industry. The Journeypersons and Registered Apprentices in this program work to install the offshore wind turbines up and down the Eastern Seaboard. Based in Baltimore, this Registered Apprenticeship Program is beginning pre-apprenticeship training in an attempt to help qualify more applicants for successful entry into their occupation. This pre-apprenticeship program helps to remove barriers to employment from applicants and works with hard to serve and underrepresented populations. Additionally this sponsor is a sub grantee of the previously mentioned Apprenticeship Innovation Fund and is conducting an additional pre-apprenticeship training for women interested in a career within the industry. Currently they have 200 Registered Apprentices in two separate state of the art training centers located in Maryland. In addition to these Maryland based training centers, Journeypersons and Registered Apprentices also have access to a world class dive training center located in Philadelphia, Pennsylvania. This is a critical training component for the occupations of piledriver and millwright, as they perform all key aspects of the installation of wind turbines in offshore locations.

Reaching Individuals

Both the EARN Maryland program and Registered Apprenticeship provide career pathways for individuals from disadvantaged communities and those with barriers to employment. EARN Maryland also stipulates that at least two diverse entities participate, that is any organization other than employer partners. These organizations are typically non-profit or community-based groups who are equipped to remove any barriers that may prohibit a participant from being successful in the workplace. The participation of these entities has been integral to ensuring that participants not only succeed in training programs but are successful in retaining employment upon training completion.

Of the EARN Maryland partnerships providing entry-level training opportunities, many are targeting underserved populations, including returning citizens, veterans, disconnected youth and individuals from economically or educationally disadvantaged backgrounds. These individuals often have significant barriers that must be overcome to ensure success in the workplace, including lack of transportation, criminal backgrounds, homelessness, addiction, childcare needs and disadvantaged backgrounds.

Under the federal Workforce Innovation and Opportunity Act (WIOA), all Registered Apprenticeship programs have the option of being added to Maryland's Eligible Training Provider List. As a result, Apprenticeship sponsors are eligible to receive federal workforce training funds. This expands opportunities for job seekers eligible for WIOA funds for related instruction and other Apprenticeship costs. The State has been adding Registered Apprenticeship sponsors to the State's Eligible Training Provider List and working with the local workforce organizations to ensure that federal workforce funds are used.

Barriers to Entry into the Clean Energy Industry

Chapter 1 of the Act of 2017 required the Department to comment on barriers to entry for small, minority, and women-owned businesses in the clean energy industry. Maryland is home to over 570,000 small businesses. Over 60 percent of those small businesses are owned by women and minorities. In 2010, the Women's Bureau within the United States Department of Labor (USDOL), in a brief entitled, "A Woman's Guide to Green Jobs" outlined the challenges and solutions for women entrepreneurs in the "green" or clean energy sector.¹ These challenges, as noted by USDOL, are as follows:

- Family Obligations
- Managing Multiple Needs
- Networking
- Financing
- Marketing and Self-Promotion

The brief also points to various trainings and organizations that could potentially assist small, minority and women-owned businesses succeed in this growing space. Specifically, the brief points to various resources at the state and local level. Namely, entrepreneurship training programs at community colleges, small business organizations, economic development agencies at the state level, and business incubators provide systematic options for individuals seeking to create opportunities in this space. In Maryland, the Governor's Office of Small, Minority and Women Business Affairs, formerly the Governor's Office of Minority Affairs, has been reorganized with a greater emphasis on connecting the small business community to greater economic opportunities in the public and private sectors.

Funding Sources

Beginning in the FY 2018 budget, Governor Larry Hogan pledged \$1 million over the next 3 years for a total of \$3 million to invest in the State's clean energy workforce through the EARN Maryland program. The purpose of these funds is to leverage the nationally-recognized EARN Maryland program to grow these critical industries. More than 1,700 unemployed or underemployed workers have received training through the EARN program, and this specific EARN grant for industries such as solar, wind, and other Tier 1 renewable energy solutions will

¹ https://www.dol.gov/wb/media/Tconf_GrWomen_factsheet.pdf

address skills gaps in growing industries to provide the qualified workforce needed to continue growing Maryland's economy. EARN Maryland is designed to:

- Address business workforce needs by focusing on industry sector strategies that seek long-term solutions to sustained skills gaps and personnel shortages;
- Address the needs of workers by creating formal career paths to good jobs, and sustaining or growing middle class jobs;
- Encourage mobility for Maryland's most hard-to-serve jobseekers through targeted job readiness training; and,
- Foster better coordination between the public, private, and non-profit sectors and the workforce, economic development, and education partners around the State.

In utilizing this proven workforce model, Maryland is attempting through this solicitation to foster the growth of Maryland's green industries, while simultaneously bridging the skills gap between the skills Maryland's jobseekers have and the ones Maryland's employers need.

Additionally, utilizing Registered Apprenticeship programs in clean energy will further provide sustainable funding for clean energy workforce development. Changes to the federal workforce law through the Workforce Innovation and Opportunity Act provide opportunities for low-income individuals to apply and receive funding to off-set the cost of the related instruction for Registered Apprenticeship programs. Maryland has become a national leader in fostering the growth of Registered Apprenticeship programs, and this time-tested model can be used to foster growth in the clean energy sector.

Appendix A

Clean Energy Industry Sub-Clusters

Biofuels sub-cluster of Clean Energy Cluster

NAICS	Label
111110	Soybean farming
111120	Oilseed, except soybean, farming
111150	Corn farming
221117	Biomass electric power generation
221117	Biomass electric power generation
324199	All Other Petroleum and Coal Products Manufacturing
325199	All other basic organic chemical mfg.

Energy Production sub-cluster of Clean Energy Cluster

NAICS	Label
221113	Nuclear electric power generation
221111	Hydroelectric power generation
221114	Solar electric power generation
221115	Wind Electric Power Generation
221116	Geothermal Electric Power Generation
221121	Electric bulk power transmission and control
221122	Electric power distribution
237130	Power and communication system construction
238161	Residential roofing contractors
238162	Nonresidential roofing contractors
333414	Heating equipment, except warm air furnaces
334413	Semiconductors and related device mfg.
334519	Other measuring and controlling device mfg.
335121	Residential electric lighting fixture mfg.
335122	Nonresidential electric lighting fixture mfg.
336412	Aircraft engine and engine parts mfg.
423330	Roofing and siding merchant wholesalers
423610	Elec. equip. and wiring merchant wholesalers
423690	Other electronic parts merchant wholesalers
423720	Plumbing and heating equip. merch. whls.
926130	Utility regulation and administration

Clean energy cluster is based on a mapping of NAICS targeting alternative energy industries.

Green Jobs Occupations

Green Jobs Occupation Definition	
Aerospace Engineers	Electrical Engineering Technicians
Agricultural Inspectors	Electrical Engineers
Agricultural Technicians	Electrical Power-Line Installers and Repairers
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	Electricians
Arbitrators, Mediators, and Conciliators	Electro-Mechanical Technicians
Architects, Except Landscape and Naval	Electronics Engineers, Except Computer
Architectural Drafters	Energy Auditors
Atmospheric and Space Scientists	Energy Brokers
Automotive Engineering Technicians	Engine and Other Machine Assemblers
Automotive Specialty Technicians	Environmental Economists
Biofuels Processing Technicians	Environmental Engineering Technicians
Biofuels/Biodiesel Technology and Product Development Managers	Environmental Engineers
Boilermakers	Environmental Science and Protection Technicians, Including Health
Bus and Truck Mechanics and Diesel Engine Specialists	Farm and Home Management Advisors
Bus Drivers, Transit and Intercity	Farm and Ranch Managers
Buyers and Purchasing Agents, Farm Products	Financial Analysts
Cement Masons and Concrete Finishers	Financial Quantitative Analysts
Chemical Engineers	First-Line Supervisors of Agricultural Crop and Horticultural Workers
Chemical Equipment Operators and Tenders	First-Line Supervisors of Mechanics, Installers, and Repairers
Chemical Plant and System Operators	First-Line Supervisors of Production and Operating Workers
Chemical Technicians	Fish and Game Wardens
Chemists	Forest and Conservation Technicians
Chief Sustainability Officers	Forest and Conservation Workers
Climate Change Analysts	Freight Forwarders
Commercial and Industrial Designers	Fuel Cell Engineers
Computer-Controlled Machine Tool Operators, Metal and Plastic	Fuel Cell Technicians
Construction and Building Inspectors	General and Operations Managers
Construction Carpenters	Geophysical Data Technicians
Construction Laborers	Geoscientists, Except Hydrologists and Geographers
Construction Managers	Geospatial Information Scientists and Technologists
Continuous Mining Machine Operators	Geothermal Production Managers
Customer Service Representatives	Geothermal Technicians
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	Green Marketers
Dispatchers, Except Police, Fire, and Ambulance	Hazardous Materials Removal Workers
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	Heating and Air Conditioning Mechanics and Installers
Electrical and Electronic Equipment Assemblers	Heavy and Tractor-Trailer Truck Drivers
Electrical and Electronics Repairers, Commercial and Industrial Equipment	

Green Jobs Occupation Definition Continued

Helpers--Carpenters	Recycling and Reclamation Workers
Helpers--Installation, Maintenance, and Repair Workers	Recycling Coordinators
Hydrologists	Refuse and Recyclable Material Collectors
Industrial Engineering Technicians	Regulatory Affairs Specialists
Industrial Engineers	Remote Sensing Scientists and Technologists
Industrial Machinery Mechanics	Reporters and Correspondents
Industrial Safety and Health Engineers	Roofers
Industrial Truck and Tractor Operators	Securities and Commodities Traders
Inspectors, Testers, Sorters, Samplers, and Weighers	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders
Insulation Workers, Floor, Ceiling, and Wall	Service Unit Operators, Oil, Gas, and Mining
Laborers and Freight, Stock, and Material Movers, Hand	Sheet Metal Workers
Landscape Architects	Shipping, Receiving, and Traffic Clerks
Locomotive Engineers	Software Developers, Systems Software
Logistics Analysts	Soil and Plant Scientists
Machinists	Soil and Water Conservationists
Maintenance and Repair Workers, General	Solar Energy Installation Managers
Marketing Managers	Solar Energy Systems Engineers
Materials Scientists	Solar Sales Representatives and Assessors
Millwrights	Solar Thermal Installers and Technicians
Mixing and Blending Machine Setters, Operators, and Tenders	Stationary Engineers and Boiler Operators
Nuclear Engineers	Structural Iron and Steel Workers
Nuclear Equipment Operation Technicians	Structural Metal Fabricators and Fitters
Nuclear Power Reactor Operators	Team Assemblers
Occupational Health and Safety Specialists	Training and Development Specialists
Occupational Health and Safety Technicians	Transportation Engineers
Operating Engineers and Other Construction Equipment Operators	Transportation Managers
Personal Financial Advisors	Transportation Planners
Pipe Fitters and Steamfitters	Transportation Vehicle, Equipment and Systems Inspectors, Except Aviation
Power Distributors and Dispatchers	Urban and Regional Planners
Power Plant Operators	Water Resource Specialists
Precision Agriculture Technicians	Welders, Cutters, and Welder Fitters
Production, Planning, and Expediting Clerks	Wholesale and Retail Buyers, Except Farm Products
Public Relations Specialists	Wind Energy Operations Managers
Railroad Conductors and Yardmasters	Wind Turbine Service Technicians
Rail-Track Laying and Maintenance Equipment Operators	Zoologists and Wildlife Biologists