

ARIZONA GREEN OCCUPATIONAL PROFILES

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Occupational Profiles: Growth Jobs Requiring Green Skills

The following profile is one of several profiles created to provide background on emerging employment opportunities for key green occupations. Occupations were defined based on Standard Occupational Classification (SOC) code used to define occupations within the Occupational Employment Statistics program of the Bureau of Labor Statistics (<http://www.bls.gov/soc/home.htm>). The profiles can be useful to a variety of user groups, including job seekers, new graduates, new-to-career adults, career counselors and others as they seek to understand growing occupations that frequently support green activities or require green skills. For each occupation, wherever data are available, these profiles describe:

I. **What is the job?**

This section provides a description of the job, background on the activities involved, what types of green activities might be performed, and a list of comparable jobs.

II. **Where are the jobs currently?**

This section shows how many people were employed in this occupation (including those green and non-green jobs), how many green positions were available recently, and what industries typically employ workers in this occupation.

III. **What could workers earn in this occupation?**

This section shows the historical average wages associated with all jobs (green and non-green) in these occupations in different parts of the state, as well as the median green wage as advertised in recent online job postings.

IV. **What is the outlook for jobs in this occupation?**

This section shows the extent to which there is projected long-term demand for workers in these occupations. Recognizing that long-term projections data about jobs requiring green skills are not available, the projections include information about all jobs in the occupation.

V. **How do workers prepare for jobs in this occupation?**

This section provides details on the training, certifications, education and work experience required for these occupations. Whenever possible, certifications tied to green-related activities are highlighted.

Occupations profiled were selected using quantitative and qualitative data obtained through research efforts under the Arizona State Labor Market Information Improvement Grant Initiative. Various data sources were used in creating the occupational profiles as outlined below.

- Occupational Information Network (O*NET) data were used as a measure of the skills, knowledge, and abilities required for the occupations. Certification, training, and education related information was also obtained from O*NET (<http://www.onetonline.org/>)
- The Arizona Green Jobs Survey was used to identify and classify the components of the job that are green and common certifications held by green workers within an occupation (<http://azstats.gov/>)
- Employment and wage estimates are from the Occupational Employment Statistics (OES) program. These are estimates of the number of people employed in certain occupations, and estimates of the wages paid to them. Self-employed persons are not included in the estimates. These estimates are for the state, and for metropolitan and nonmetropolitan areas (<http://www.bls.gov/oes/>)
- Postings and wage estimates from advertised online jobs were provided by Burning Glass, a private company. It is to be noted that these are advertised positions and wages that reflect the vacancies

within the occupations and are not necessarily realized employment or earnings (<http://www.burning-glass.com/>)

- Data on the industries employing the workers within respective occupations were obtained from Economic Modeling Specialists Inc. (EMSI) (<http://www.emsinet.com/>)
- Long term employment projections were from the Office of Employment and Population Statistics (<http://azstats.gov/>)
- Focus groups with industry leaders and stakeholders
- Input from the Arizona Project Steering Committee and Green Economy Advisory Committee

Occupations included in these profiles were selected based on anticipated positive job growth. Efforts were made to include a diversity of job types to meet the needs of a variety of job seekers, employers, and trainers. Whenever unique information is available for green occupations, disaggregated data for both green and non-green occupations are provided. Where green data are not available, information provided is an aggregate of both green and non-green (with this data gap noted in the profile). The goal is to provide job seekers, employers, and trainers with the most complete picture available of the status of the occupation and related career opportunities.

General Table Note: Cases where fields are marked N/A indicate that no data were available for the occupation.

I. What is the job?

The focus of this section is to provide a description of the job; background on the activities involved; types of green activities that might be performed within this job; and a list of comparable jobs.

Job description:

Research, design, develop, and test electronic components and systems for commercial, industrial, military, or scientific use utilizing knowledge of electronic theory and materials properties. Design electronic circuits and components for use in fields such as telecommunications, aerospace guidance and propulsion control, acoustics, or instruments and controls.

Source: O*Net OnLine occupational database, <http://www.onetonline.org/>

What do these workers do?

Analyze system requirements, capacity, cost, and customer needs to determine feasibility of project and develop system plan.

Confer with engineers, customers, vendors or others to discuss existing and potential engineering projects or products.

Design electronic components, software, products or systems for commercial, industrial, medical, military, or scientific applications.

Determine material and equipment needs and order supplies.

Develop and perform operational, maintenance, and testing procedures for electronic products, components, equipment, and systems.

Direct and coordinate activities concerned with manufacture, construction, installation, maintenance, operation, and modification of electronic equipment, products, and systems.

Evaluate operational systems, prototypes and proposals and recommend repair or design modifications, based on factors such as environment, service, cost, and system capabilities.

Inspect electronic equipment, instruments, products, and systems to ensure conformance to specifications, safety standards, and applicable codes and regulations.

Operate computer-assisted engineering and design software and equipment to perform engineering tasks.

Plan and develop applications and modifications for electronic properties used in components, products, and systems, to improve technical performance.

Plan and implement research, methodology, and procedures to apply principles of electronic theory to engineering projects.

Prepare documentation containing information such as confidential descriptions and specifications of proprietary hardware and software, product development and introduction schedules, product costs, and information about product performance weaknesses.

Prepare engineering sketches and specifications for construction, relocation, and installation of equipment, facilities, products, and systems.

Prepare necessary criteria, procedures, reports, and plans for successful conduct of the project with consideration given to site preparation, facility validation, installation, quality assurance and testing.

Prepare, review, and maintain maintenance schedules, design documentation and operational reports and charts.

Provide technical support and instruction to staff or customers regarding equipment standards, assisting with specific, difficult in-service engineering.

Represent employer at conferences, meetings, boards, panels, committees, and working groups to present, explain, and defend findings and recommendations, negotiate compromises and agreements and exchange information.

Review and evaluate work of others, inside and outside the organization, to ensure effectiveness, technical adequacy and compatibility in the resolution of complex engineering problems.

Review or prepare budget and cost estimates for equipment, construction, and installation projects, and control expenditures.

Source: O*Net OnLine occupational database, <http://www.onetonline.org/>

How might this job be green?

Design alternative energy systems

Design energy efficient lighting and electrical systems

Design energy efficient air conditioning and refrigeration systems

Design solar and solar thermal components

Design waste heat recovery and electricity generators

Source: Arizona LMI Green Jobs Survey, <http://azstats.gov/>

What are the related occupations that offer jobs for these workers?
Aerospace Engineers
Electrical Engineers
Mechanical Engineers
Electronic Drafters
Industrial Engineering Technicians
Avionics Technicians
Electrical and Electronics Repairers, Commercial and Industrial Equipment
Model Makers, Metal and Plastic
Inspectors, Testers, Sorters, Samplers, and Weighers

Source: O*Net OnLine occupational database, <http://www.onetonline.org/>

II. Where are these jobs currently?

This section shows how many people were employed in this occupation (including both green and non-green jobs); how many green positions were available recently; and what industries typically employ workers in this occupation.

How many people do this job? (Data are not available for green jobs within the occupation so this total is based on data that include both green and non-green jobs. Employment numbers do not include self-employed and unpaid family members.)	
Area	Employment Total (May 2010)
Flagstaff, AZ	N/A
Lake Havasu City-Kingman, AZ	N/A
Phoenix-Mesa-Scottsdale, AZ	4,160
Prescott, AZ	N/A
Tucson, AZ	300
Yuma, AZ	N/A
Rest of Arizona	200

Source: OES Employment Estimates, Bureau of Labor Statistics, (May 2010), <http://www.bls.gov/oes/>

How many green jobs were advertised as available recently? (Based on online job advertisements, April 1 - June 30, 2011)		
MSA	All Job Postings	Green* Job Postings
Flagstaff, AZ	0	0
Lake Havasu City-Kingman, AZ	0	0
Phoenix-Mesa-Scottsdale, AZ	75	7
Prescott, AZ	1	0
Tucson, AZ	2	0
Yuma, AZ	2	0
Rest of Arizona	7	2

*Green jobs identified using green definitions from O*Net and refined using a combination of green skills, certifications, and keywords from the advertised job descriptions.

Source: Burning Glass, <http://www.burning-glass.com/>

Which industries employ workers in this job?
Semiconductor and Related Device Manufacturing
Federal government, civilian, except postal service
Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
Wired Telecommunications Carriers
Guided Missile and Space Vehicle Manufacturing
Engineering Services
Wireless Telecommunications Carriers (except Satellite)
Other Electronic Parts and Equipment Merchant Wholesalers
Aircraft Engine and Engine Parts Manufacturing
Corporate, Subsidiary, and Regional Managing Offices
Aircraft Manufacturing
Bare Printed Circuit Board Manufacturing
Other Electronic Component Manufacturing
Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
Administrative Management and General Management Consulting Services
Computer Systems Design Services
Wholesale Trade Agents and Brokers
Other Aircraft Parts and Auxiliary Equipment Manufacturing
Custom Computer Programming Services
Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers

Source: EMSI (Economic Modeling Specialists Inc.), <http://www.emsinet.com/>

III. What could workers earn in this occupation?

This section shows the average wages associated with this occupation in different areas of the state, as well as the median green wage as advertised in online job postings.

What are the wages paid to workers in this field? (Data are not available for green jobs within the occupation so this section is based on data that include both green and non-green jobs. Wage estimates do not include self-employed and unpaid family members.)						
MSA	10th Percentile	25th Percentile	Median	Mean	75th Percentile	90th Percentile
Flagstaff, AZ	N/A					
Lake Havasu City-Kingman, AZ	N/A					
Phoenix-Mesa-Scottsdale, AZ	\$63,190	\$76,410	\$94,940	\$94,690	\$114,310	\$134,610
Prescott, AZ	N/A					
Tucson, AZ	\$53,190	\$61,720	\$76,740	\$83,670	\$102,590	\$131,210
Yuma, AZ	N/A					
Rest of Arizona	\$56,370	\$80,040	\$100,920	\$92,890	\$106,360	\$119,560

Source: OES Employment Estimates, Bureau of Labor Statistics, (May 2010), <http://www.bls.gov/oes/>

What is the median wage advertised for green workers in this occupation? (Statewide median wages based on advertised salaries in online job postings between March 2010 and March 2011.)	
Median Advertised Wage for All Jobs	Median Advertised Wage for Green* Jobs
\$ 104,399	\$ 94,096

*Green jobs identified using green definitions from O*Net and refined using a combination of green skills, certifications, and keywords from the advertised job descriptions.

Source: Burning Glass, <http://www.burning-glass.com/>

IV. What is the outlook for jobs in this occupation?

This section shows the long-term projected outlook for this occupation.

What is the long term outlook for jobs in this occupation? (Data are not available for green jobs within the occupation so this section is based on data that include both green and non-green jobs. Employment numbers include self-employed and unpaid family members as well as wage and salary workers.)

2008 Employment (Estimated)	2018 Employment (Projected)	Change (2008-2018)	Estimated Replacement Needs (2008-2018)*	Estimated Total Openings (2008-2018)**
4,638	4,596	-42	+ 1,065	= 1,023

*Replacement jobs are estimated by applying a ratio of total national job changes anticipated over the next decade (derived by BLS) to the estimated Arizona 2008 employment

**Openings represent the sum of growth (change) and replacement

Source: Arizona Office of Employment and Population Statistics, <http://azstats.gov/>

V. How do workers prepare for jobs in this occupation?

Training, certification, education, and required work experience information for the occupation, based primarily upon survey results provided by the national O*Net OnLine occupational database.

What are the minimum education levels that employers expect for workers in this occupation? (Required level of education reported by current workers, including green and non-green, in this occupation)

Less than HS	HS Diploma/GED	Post-Secondary Certificate	Some College Courses	Associate's Degree	Bachelor's Degree	Post-Baccalaureate Certificate	Master's Degree	Post-Master's Certificate	Professional Degree	Doctoral Degree
0.0%	0.0%	10.1%	0.0%	3.4%	75.4%	0.0%	0.1%	5.5%	0.0%	5.5%

% represents the proportion of all workers in the occupation who have attained that education level

Source: O*Net OnLine occupational database, <http://www.onetonline.org/>

What green or other credentials might be expected? (Common certifications held by green workers in this occupation)

N/A

Source: Arizona LMI Green Jobs Survey, <http://azstats.gov/>

What experience levels are employers expecting? (Experience reported by current workers, including green and non-green, in this occupation)

None	<6 Months	6 Months - 1 Year	1 - 2 Years	3 - 4 Years	5 - 10 Years	> 10 Years
5.7%	1.4%	11.1%	0.1%	10.9%	48.4%	22.3%

% represents the proportion of all workers in the occupation who have attained that experience level

Source: O*Net OnLine occupational database, <http://www.onetonline.org/>

How much training will employers likely provide? (Training reported by current workers, including green and non-green, in this occupation)

None	<1 Month	1 - 3	3 - 6	6 Months - 1 Year	1 - 2 Years	3 - 4 Years	5 - 10 Years	> 10 Years
16.7%	24.5%	7.0%	5.6%	5.7%	5.5%	23.9%	11.1%	0.0%

% represents the proportion of all workers in the occupation who have attained that training level

Source: O*Net OnLine occupational database, <http://www.onetonline.org/>