ALASKA green jobs REPORT

JUNE 2011

ALASKA DEPARTMENT OF LABOR and WORKFORCE DEVELOPMENT

ALASKA

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June 2011

ALASKA green jobs REPORT

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On the cover: A wind turbine generator, towering more than 110 feet and with blades each 44 feet long, is installed at the Tin City Long Range Radar Station near Tin City, Alaska. The generator will augment the existing diesel-fueled power system at the site. Photo courtesy of the U.S. Air Force.

Images in this report, except where otherwise noted, are courtesy of the Alaska Department of Commerce, Community, and Economic Development; Division of Community and Business Development.

Printed in June 2011 at a cost of $3.93 per copy.

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executive summary

This report was funded as part of a United States Department of Labor state labor market information improvement grant. The scope of this grant is to promote economic growth by quantifying jobs and skill sets associated with green jobs throughout Alaska.

Methodology

The Alaska Department of Labor and Workforce Development Research and Analysis Section conducted a survey of 4,826 private and local government firms during the fourth quarter of 2010. R&A received a response from 2,979 of these firms, with 375 reporting they employed at least one worker in a green job. R&A defined a green job as one where workers provided a good or service in at least one of seven categories:

- Renewable energy
- Energy efficiency
- Greenhouse gas reduction
- Pollution prevention, reduction, and cleanup
- Recycling and waste reduction
- Agricultural and natural resources conservation
- Education, compliance, public awareness, and training

How Many Green Jobs are there?

Research and Analysis identified 145 individual green occupations with reported employment in Alaska. Total green employment was estimated at 4,973 green jobs[1] among 1,552 employers during 2010, with green work representing 1.7 percent of Alaska's private and local government employment.

[1] Except where otherwise noted, all employment references in this report only reflect private and local government employment.

The results are consistent with existing research that suggests green jobs do not represent an industry of their own; rather, they are spread across all industries where employers pursue more environmentally sustainable concepts.

Industries and Occupations

Research and Analysis found the largest concentrations of green jobs in local government, at 1,033 jobs (20.8 percent); and in professional, scientific, and technical service organizations, at 1,013 jobs (20.4 percent). Tour guides as an occupation had the largest green employment.

The Seven Categories

The following is a summary of jobs by category:

Renewable energy accounted for 13 percent (639) of all positions.[2] These jobs were found primarily among employers in utilities and local government.

Energy efficiency accounted for 39 percent (1,954) of all positions. These jobs were found primarily in construction.

Greenhouse gas reduction accounted for 9 percent (466) of all positions. These jobs were found primarily within the utilities industry and mostly focused on occupations that were helping the transition to power sources with less carbon pollution.

Pollution prevention, reduction, and cleanup accounted for 33 percent (1,620) of all positions. These jobs were found primarily in waste management and remediation.

Recycling and waste reduction accounted for 32 percent (1,611) of all positions. These jobs were found primarily within waste management and local government, but this category spanned the largest cross-section of industries.

[2] An employer can classify workers in more than one category. The sum will exceed the total number of green jobs.

Agricultural and natural resources conservation accounted for 26 percent (1,313) of all positions. These jobs were found primarily in agriculture, and in professional and scientific services.

Education, compliance, public awareness, and training accounted for 35 percent (1,740) of all positions. These jobs were found primarily in professional and scientific services.

Shades of Green

Most workers in green jobs don't spend 100 percent of their time producing a green product or service. Survey data support the idea of "shades of green." Many workers have accepted new "environmentally conscious" roles that supplement their primary workload. In other cases, workers have found themselves in essentially new occupations where the green work differs significantly from that of their nongreen counterparts.

By taking the average percentage of time workers in an occupation spend performing green work, R&A estimated the various shades of green among industries and occupations. The section found that 8 percent of green occupations spent greater than or equal to 50 percent of their time on average performing work in one of the green categories.

Training

About half of all green jobs required extensive on-the-job training, certification, or special licensing. The Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) was the most common required certificate. Leader in Energy Efficient Design (LEED) also showed up frequently in engineering, where firms are seeing a greater market demand for energy efficiency.

Public Sector Employment

The centralized administration of state and federal divisions made it difficult to survey public employees. The resulting state and federal employment numbers reflected reported values from a nonstatistical sampling of state workers.

R&A used the State of Alaska e-mail system to directly contact employees in a division that was likely to have green jobs. Although statistically reliable employment estimates were not possible, the survey did show that green work in the public sector was overwhelmingly in education, compliance, public awareness, and training; as well as in agriculture and natural resource conservation.

Icons Key

- **Renewable energy**
- **Energy efficiency**
- **Greenhouse gas reduction**
- **Pollution prevention, reduction, and cleanup**
- **Recycling and waste reduction**
- **Agricultural and natural resource conservation**
- **Education, compliance, public awareness, and training**

summary of data

ONE Green Employers by Industry

Employer data

Green employers provided business and occupation information that showed how they've adapted to changes in the market for green products and services.

An estimated 9.4 percent of employers in the state have at least one worker performing green tasks. Professional and scientific services, specialty trade contractors, and local governments represented the largest concentrations of green employers among industries, respectively.

Around 22 percent of these employers reported they had added additional workers because of an increased demand for green goods or services, and the professional and scientific services industry reported the largest increase in workers. Occupations and firms within this industry are diversified across all seven green categories. These data support a picture of Alaska's employers identifying challenges, available resources, and viable alternatives.

Industry	Employers: Green	Employers: Total	Reported categories*
Agriculture, Forestry, Fishing, and Hunting[1]	39	138	
Mining, Quarrying, Oil and Gas	26	164	
Utilities	20	77	
Construction of Buildings	161	678	
Heavy and Civil Engineering Construction	16	215	
Specialty Trade Contractors	222	1,310	
Manufacturing	62	499	
Wholesale Trade	65	622	
Retail Trade	49	1,834	
Transportation and Warehousing	36	800	
Information	0	244	N/A
Financial Activities	67	1,049	
Professional, Scientific, and Technical Services	344	1,800	
Administrative and Support Services	44	883	
Waste Management and Remediation Services	50	123	
Educational Services, Private	25	222	
Health Care and Social Assistance, Private	27	1,614	
Leisure and Hospitality	34	2,152	
Other Services (Except Government)	86	1,453	
Local Government	179	636	
TOTAL	1,552	16,513	

*See page 5 for icon key.

[1] Excludes the self-employed and most commercial fishermen and agricultural workers.
Source: Department of Labor and Workforce Development, Research and Analysis Section

New occupations in local government and specialty trade contracting increased the most because of rising demand for green products and services. Professional, scientific, and technical services are expanding to support increased green activities, and industries that implement that research are creating new positions and training to support them.

Around 14 percent of firms surveyed across all industries said they were adding jobs in response to green demand. Another 36 percent reported sending workers for additional green jobs training, which ranged from Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) training to wind turbine maintenance and Leader in Energy Efficient Design (LEED) certification. Local government and specialty trade contractors most

frequently reported sending workers for extra training.

Industries

Local and tribal governments as an industry have the largest number of green jobs. In a rural community, people often wear many hats in addition to their regular jobs. It is not unusual to find seemingly unlikely combinations, such as cooks who also run the community compost program.

The Environmental Protection Agency's Indian General Assistance Program had a big impact in Alaska by providing funds for tribal governments to address solid and hazardous waste management, recycling, and renewable energy.

Professional and scientific services came in a close second for number of green jobs. Work in this industry is broad and instrumental in development of renewable energy, energy efficiency, and sustainability education.

The highest concentration of green jobs is found in the waste management and remediation industry. Its percentage of statewide employment is one of the smallest, but occupations in this sector are critical to supporting the state's environmental health. Many of this industry's jobs are fundamentally green because they deal overwhelmingly with handling waste and mitigating the effects of pollution.

Green jobs are found across almost all industries, but as expected, this survey did not uncover any in the information industry, and found few in health care and administrative support. These results are in line with other states' research.

Occupations

Research and Analysis asked employers to identify occupations that fell into at least one of the seven green categories. Those who responded reported:

- The total number of workers in these jobs
- How many performed green work
- The percentage of time each employee spent doing green work
- Green categories

R&A used this set of questions to build a database of 145 green occupations within the Standard Occupation Classification (SOC) coding system.

TWO **Green Employment by Industry**

Industry	Estimated green jobs	As % of all green jobs	3rd qtr 2010 employment	As % of industry employment
Agriculture, Forestry, Fishing, and Hunting[1]	205	4.1%	1,208	17.0%
Mining, Quarrying, Oil and Gas	125	2.5%	16,156	0.8%
Utilities	110	2.2%	2,233	4.9%
Construction of Buildings	278	5.6%	5,698	4.9%
Heavy and Civil Engineering Construction	58	1.2%	4,540	1.3%
Specialty Trade Contractors	481	9.7%	9,341	5.1%
Manufacturing	305	6.1%	19,040	1.6%
Wholesale Trade	91	1.8%	6,666	1.4%
Retail Trade	225	4.5%	36,898	0.6%
Transportation and Warehousing	53	1.1%	21,414	0.2%
Information	0	0.0%	6,483	0.0%
Financial Activities	91	1.8%	15,385	0.6%
Professional, Scientific, and Technical Services	1,013	20.4%	14,209	7.1%
Administrative and Support Services	17	0.3%	10,713	0.2%
Waste Management and Remediation Services	367	7.4%	1,626	22.6%
Educational Services, Private	37	0.7%	2,065	1.8%
Health Care and Social Assistance, Private	5	0.1%	39,891	0.0%
Leisure and Hospitality	321	6.5%	37,399	0.9%
Other Services (Except Government)	158	3.2%	12,174	1.3%
Local Government	1,033	20.8%	30,996	3.3%
TOTAL	4,973	100.0%	294,135	

[1] Excludes the self-employed and most commercial fishermen and agricultural workers.
Note: All numbers exclude state and federal employment. Percentages won't sum due to rounding.
Source: Department of Labor and Workforce Development, Research and Analysis Section

Green jobs can be quantified several ways. In most cases, green work is a subset of all work performed in an existing occupation. For example, some engineers seek LEED certification, which allows them to perform additional work. However, even a LEED-certified engineer will design buildings that do not meet LEED standards, when requested.

By employment numbers, the top 25 green occupations represent 66 percent of green employment in the state. Tour guides and escorts are the largest occupation by green employment. Alaska has a highly seasonal tourism industry that depends on the state's natural beauty and resources. The survey shows that slightly less than 38 percent of tour guides and escorts educate the public on sustainable practices and increase public awareness of sustainability concepts.

As a major occupational group, construction and extraction occupations have the largest total employment and include eight of the top 25 occupations. This result matches other states' data, and reflects a subset of the construction industry that focuses on home weatherization and energy efficiency upgrades.

The green occupations with the highest employment fall primarily into the energy efficiency category, which is followed closely by education.

An occupation's green score is the weighted average of the percentage of time spent on green activities within a given occupation. The numbers are rounded up and indexed between 1 and 10, with 10 representing 100 percent of work qualifying as green, 9 representing 90 percent, and so on.

Thirty-five green occupations scored greater than 2. Occupations with the most time spent on green activities (e.g., wind turbine technicians) often have the lowest total

Top Green Occupations by Employment

THREE

Occupation	Estimated green jobs	3rd qtr 2010 employment	% of all green jobs	Categories of work*
Tour Guides and Escorts	440	1,133	8.9%	
Carpenters	275	3343	5.5%	
Fishers and Related Fishing Workers[1]	266	605	5.4%	
Environmental Scientists and Specialists, Including Health	254	401	5.1%	
Retail Salespersons	247	11,520	5.0%	
Construction Laborers	212	5461	4.3%	
Zoologists and Wildlife Biologists	166	254	3.3%	
Environmental Science and Protection Technicians, Including Health	158	158	3.2%	
Geological and Petroleum Technicians	144	649	2.9%	
General and Operations Managers	139	3,780	2.8%	
Roofers	111	324	2.2%	
Environmental Engineering Technicians	93	253	1.9%	
Ship Engineers	93	208	1.9%	
Service Unit Operators, Oil, Gas, and Mining	63	660	1.3%	
Environmental Engineers	60	177	1.2%	
Hazardous Materials Removal Workers	58	327	1.2%	
First-Line Supervisors/Managers of Construction Trades and Extraction Workers	52	1,134	1.1%	
First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	52	125	1.1%	
Office Clerks, General	51	6,236	1.0%	
Power Plant Operators	49	441	1.0%	

[1] Excludes most commercial fishermen

Source: Department of Labor and Workforce Development, Research and Analysis Section

*See page 5 for icon key.

employment. It is also important to look at an occupation's green employment percentage to assess whether green is prevalent throughout the group or in just a fraction, represented by a few companies producing a specific green product.

This distinction is useful for determining how to discuss and target green occupations in the state. Carpenters and construction laborers are two occupations ranking high in green employment and low on percentage of time spent in green activities. Both are large occupation groups doing important work in the home weatherization industry; however, targeting all of these positions for training might not be the best approach. It might make more sense to focus specifically on businesses employing carpenters or construction laborers whose primary purpose is a green product or service.

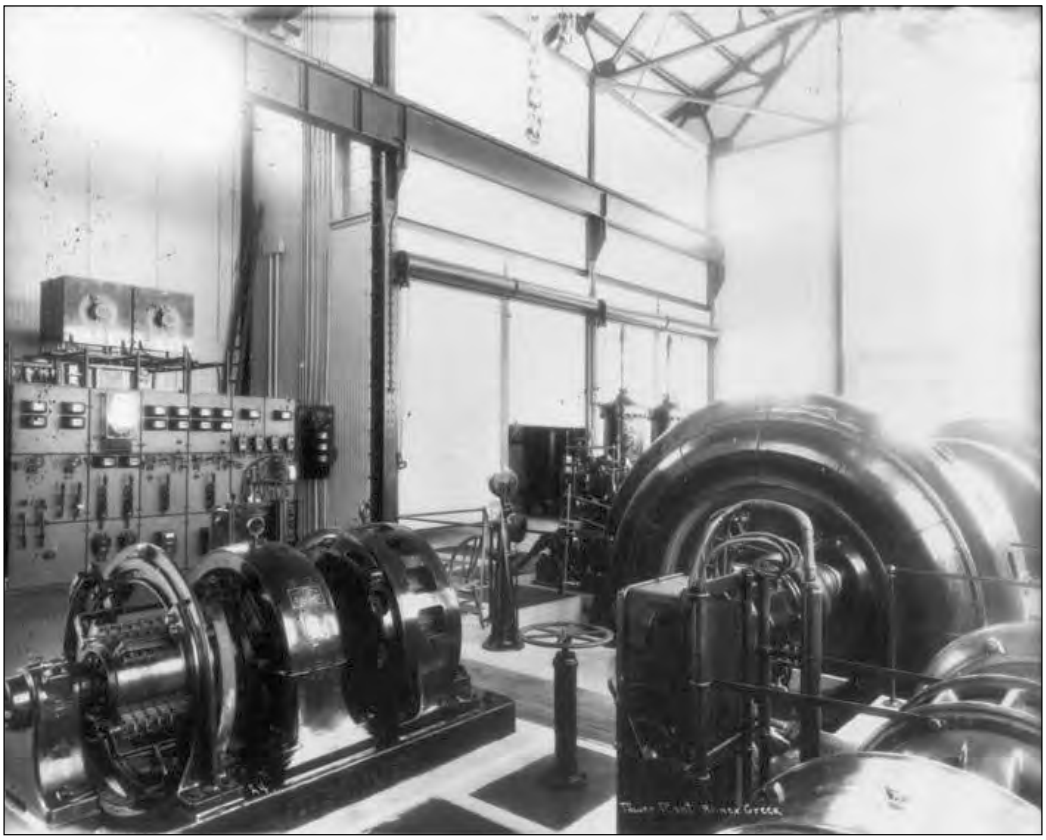
On the other end of the spectrum, a wind turbine service technician's work is 100 percent green. Even though employment in this occupation is extremely low, any training would go directly toward producing green goods and services. When grouped by green score, occupations are primarily performing work in the agriculture and

Historically Green

Alaska's history is rich in areas that are now considered green technology. At the turn of the 20th century, hyydroelectric power fueled economic growth in Southeast Alaska by providing reliable electric power to gold mining operations.

Today, hydroelectric accounts for 25 percent of statewide electrical power, and it continues to be a critical component of our energy infrastructure.

Cold winters and high transportation costs necessitate making more with less, and the history of Alaska is one of using scarce energy resources as efficiently as possible. Thus, energy efficiency in housing design has played a critical role, from Native communities along our windy coasts to the frigid winters of the Interior.



Above, the Annex Creek Hydro Power Plant in the late 1800s or early 1900s. Photo courtesy of the Alaska State Library Historical Collections.

Top Green Occupations by Green Score

FOUR

Occupation	Estimated green jobs	3rd qtr 2010 employment	Green score	Categories of work**
Environmental Science Teachers, Postsecondary	*	*	10	
Wind Turbine Service Technicians	*	*	10	
Materials Scientists	*	*	9	
Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	*	*	8	
Environmental Science and Protection Technicians, Including Health	158	158	8	
Zoologists and Wildlife Biologists	166	254	7	
Boilermakers	30	44	5	
Conservation Scientists	23	28	5	
Foresters	*	*	5	
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	14	30	5	
Power Distributors and Dispatchers	17	34	5	
Ship Engineers	93	208	5	
Chemical Engineers	40	48	4	
Environmental Scientists and Specialists, Including Health	254	401	4	
Fishers and Related Fishing Workers[1]	266	605	4	
Environmental Engineers	60	177	3	
Farm and Home Management Advisors	*	*	3	
First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	52	125	3	
Geological and Petroleum Technicians	144	649	3	
Natural Sciences Managers	17	28	3	
Sales Engineers	20	45	3	
Tour Guides and Escorts	440	1,133	3	
Travel Guides	*	*	3	
Biological Technicians	7	59	2	
Economists	*	*	2	
Environmental Engineering Technicians	93	253	2	
First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers	13	65	2	
Logging Equipment Operators	11	50	2	
Roofers	111	324	2	
Soil and Plant Scientists	*	*	2	
Training and Development Specialists	32	156	2	

[1] Excludes most commercial fishermen

An asterisk (*) means the data are suppressed due to confidentiality and/or reliability reasons.

**See page 5 for icon key.

Source: Department of Labor and Workforce Development, Research and Analysis Section

natural resources category, followed closely by pollution reduction, then education.

Finally, examining the occupations by the percentage of green jobs illuminates the structure of the work within the occupation. There is significant overlap between the highest concentrations of green jobs and the table of jobs by green score.

Chemical engineers are an example of an occupation with a high percentage of green employment (83 percent) but a relatively low green score (4). A large percentage of chemical engineers perform green work, but only as a minor part of their overall workload.

Taken together, the employment estimates and green scores provide a more robust look at the effects of green work in Alaska. Jobs with high employment and low green activity, as well as jobs with low employment and high activity, are both critical to the development of the state's green infrastructure. Understanding their differences will increase the efficacy of developments targeting these two groups and any combination.

Top Green Occupations by Percent Green

FIVE

Occupation	Estimated green jobs	3rd qtr 2010 employment	% green by occupation	Categories of work**
Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	*	*	100.0%	
Environmental Science and Protection Technicians, Including Health	158	158	100.0%	
Wind Turbine Service Technicians	*	*	100.0%	
Environmental Science Teachers, Postsecondary	*	*	92.3%	
Materials Scientists	*	*	85.7%	
Chemical Engineers	40	48	83.3%	
Conservation Scientists	23	28	82.1%	
Economists	*	*	75.0%	
Boilermakers	30	44	68.2%	
Zoologists and Wildlife Biologists	166	254	65.4%	
Soil and Plant Scientists	*	*	64.3%	
Environmental Scientists and Specialists, Including Health	254	401	63.3%	
Natural Sciences Managers	17	28	60.7%	
Logging Workers, All Other	20	33	60.6%	
Foresters	*	*	50.0%	
Power Distributors and Dispatchers	17	34	50.0%	
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	14	30	46.7%	
Ship Engineers	93	208	44.7%	
Sales Engineers	20	45	44.4%	
Fishers and Related Fishing Workers[1]	266	605	44.0%	
First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	52	125	41.6%	
Tour Guides and Escorts	440	1,133	38.8%	
Environmental Engineering Technicians	93	253	36.8%	
Roofers	111	324	34.3%	
Environmental Engineers	60	177	33.9%	

[1] Excludes most commercial fishermen. An asterisk (*) means the data are suppressed due to confidentiality and/or reliability reasons.

Source: Department of Labor and Workforce Development, Research and Analysis Section

**See page 5 for icon key.

Renewable Energy in Alaska

Power generation from renewable sources has a long history in Alaska. The Eklutna hydroelectric power plant was responsible for the electrification of Anchorage in 1929, which fueled the growth of the small railroad outpost. Since then, Alaska has experimented with various power sources and of those, natural gas meets the largest portion of our energy demands.

Above, the Yukon River Hydrokinetic Turbine Project. Photo by Mark McCready, Alaska Power and Telephone.

Because of the rising environmental and economic costs of petroleum products, rural communities favor multipronged approaches to power generation. Wind-diesel hybrids use wind power in favorable conditions and utilize diesel as a backup. Kotzebue and Wales are examples of small-scale hybrid projects designed to offset diesel use. Kodiak Island uses wind and hydro facilities to provide 90 percent of the community's energy needs, with the remaining 10 percent powered by diesel. The two projects generate power at less than half the cost of diesel per kilowatt hour.

In the city of Eagle, a remote village on the Yukon River, damming the river for power is expensive and has serious environmental considerations. Alaska Power and Telephone instituted a low-impact hydrokinetic river turbine in 2010 to help meet the city's power needs during ice-free months on the river. A barge platform containing the turbine is anchored in the river near the community, where electrical lines transmit energy from the platform to the existing power grid. The entire platform is removed from the river during winter, when the town returns to diesel power.

Multiple approaches are likely to continue as the future of power generation in Alaska. In 2010, the 26th Legislature passed House Bill 306 to establish an energy policy for the state. The bill sets a goal for Alaska to generate 50 percent of its electricity through renewable resources by 2025. That same year, the Legislature passed the Alaska Sustainable Energy Act to direct investments in Alaska's energy resources. Also in 2010, the Alaska Division of Business Partnerships received an Energy Sector Partnership grant to train 700 workers to support the state's emerging renewable energy and energy efficient infrastructure.

occupational highlights

Skills or Certifications

Employers reported that 46 percent of green occupations require special skills, certificates, or licenses to perform the work. This survey did not ascertain if these requirements were a condition of hire.

Three percent of green jobs required renewable energy certification or training, and these requirements were primarily in the utilities and local government industries. Employers reported that 5 percent of green jobs required an equipment operator or commercial driver's license. A CDL was often paired with a Hazardous Materials Endorsement.

By far the most prevalent certification reported was the Hazardous Waste Operations and Emergency Response Standard (HAZWOPER). Cleanup and abatement certification was required by 15.5 percent of green occupations, with the HAZWOPER certification accounting for approximately half of the responses within the category. Energy efficient construction and LEED certification was the largest specific requirement reported, at 16 percent of all occupations.

Other certifications at 10 percent and prior experience or on-the-job training at 18 percent captured a wide breadth of requirements that did not contain enough responses to stand on their own. Other certifications included occupations requiring a bachelor's degree specific to green-related work. Table Six provides examples of reported requirements.

Recruiting Green Workers

Recruiting and retaining green workers is not currently an issue for 80 percent of all green jobs. Employers who have had difficulty cite a lack of workers in Alaska (6 percent), a lack of required green skills (4 percent), and other reasons (4 percent).

The recruitment table (Table Seven) contains occupations with the highest reported difficulty recruiting or retaining workers. Six of the 11 occupations require more

SIX Green Occupations with Special Requirements by Training Category

Training Category	% reported	Examples
Renewable Energy Certification	3.2%	Wind Turbine Operation and Maintenance (O&M), Calibrating solar panels
Cleanup and Abatement Certification	15.5%	HAZWOPER Oil Spill Response Training
Equipment Operators License/CDL	4.9%	Class A CDL Hazardous Materials Endorsement (HME)
Energy Efficient Construction/LEED (Weatherization)	16.4%	LEED Certified Building Energy Efficiency Standard (BEES)
Other Certification	10.4%	Certified Erosion and Sediment Control Lead (CESCL), Certified Forester
Prior Experience/On-the-Job Training	17.8%	Organic Farming Techniques, Knowledge of Regulations

Source: Department of Labor and Workforce Development, Research and Analysis Section

Difficulty Recruiting or Retaining Workers, by Occupation

SEVEN

Occupation	Have you had difficulty recruiting or retaining workers in green-related activities? No	Yes, lack of Alaska workers	Yes, lack of req. skills	Yes, other reasons	Nonresident hire	Training level (see notes)
Construction and Related Workers, All Other	83%	17%	17%	0%	39.4%	MTOJT
Service Unit Operators, Oil, Gas, and Mining	0%	0%	0%	100%	32.3%	MTOJT
Helpers, Construction Trades, All Other	57%	14%	0%	14%	21.8%	STOJT
Construction Laborers	70%	10%	10%	10%	18.0%	MTOJT
Carpenters	67%	10%	5%	5%	17.8%	LTOJT
Laborers and Freight, Stock, and Material Movers, Hand	50%	17%	17%	0%	17.2%	STOJT
Mining and Geological Engineers, Including Mining Safety Engineers	33%	67%	0%	0%	16.1%	B.A.
Environmental Science and Protection Technicians, Including Health	64%	7%	14%	21%	12.7%	A.A.
Environmental Engineers	60%	10%	10%	0%	11.2%	B.A.
General and Operations Managers	78%	7%	4%	0%	9.1%	B.A.+
Power Plant Operators	75%	0%	13%	13%	6.0%	LTOJT
All Green Occupations	80%	6%	4%	4%	16.0%	

STOJT: Short Term On-the-Job Training, typically requiring less than one month of training to attain average job performance.

MTOJT: Moderate Term On-the-Job Training, typically requiring between one and 12 months of combined on-the-job experience and informal training.

LTOJT: Long Term On-the-Job Training, typically requiring more than 12 months of on-the-job training or combined work experience and formal classroom instruction for workers to develop the necessary skills to attain average job performance.

A.A.: Associate degree, requiring completion of a degree program of at least two years of full-time equivalent academic work, is required to attain average job performance.

B.A.: Bachelor's degree, requiring completion of a degree program of at least four years but no more than five years of full-time equivalent academic work, is required to attain average job performance.

B.A.+: Bachelor's degree plus some combination of additional work experience or continued education beyond the bachelor's degree is required to attain average job performance in these occupations.

Source: Department of Labor and Workforce Development, Research and Analysis Section

than a year of training, either on the job or through a degree program.

As a group, green occupations have a nonresident hire rate of 16 percent, compared to 20 percent across all private and local government employment. Occupations with the most difficulty recruiting due to lack of workers in Alaska usually reported nonresident hire rates above the rate for all green occupations.

These data continue to support the conclusion that green jobs are an emerging component across all industries and occupations. In some cases, workers have been doing green work without that previous classification, and their industries are well established. In other cases, occupations such as power plant operators integrate investments in renewable resources while supporting existing traditional power generation infrastructure.

Retooling the Workforce

The state plans to focus on helping future job seekers and providers target the skills necessary for green employment, for example, by expanding the ALEXsys system and training 700 workers through the State Energy Sector Partnership grant. Tools such as O*NET, the Occupation Information Network, provide detailed information on necessary knowledge, skills, and abilities. This database also compiles information on a job's expected tasks.

KNOWLEDGE

... Is a body of information applied directly to the performance of a function.

SKILL

... Is an observable, learned competence to perform an act.

ABILITY

... Is the natural capacity to perform an observable behavior that results in an observable product.

Using this information, it is possible to identify existing members of the nongreen workforce who have skills that match green occupations in need of workers. For example, if one wanted to find workers qualified to be environmental engineers, an employer could look at the attributes of an environmental engineer and find other occupations that share those qualities.

An environmental engineer is responsible for designing systems to prevent, control, and remediate environmental health hazards. Like all occupations, their duties are numerous; for example, to "analyze engineering design problems" or "use land surveying techniques." These activities are important, but they aren't necessarily what make this a green occupation.

Above, a bear catches salmon at McNeil River Falls in Katmai National Park. Photo by Rex Melton; Alaska Department of Commerce, Community, and Economic Development; Division of Tourism

Table Eight lists 10 activities that contribute to an

EIGHT GREEN JOB: Environmental Engineer

Environmental engineer's level compared to related occupations	Civil engineers	Mining and geological engineers*	Environmental engineering technicians
Overall KSA** similarity	very high	very high	very high
Overall Level difference	about the same	about the same	much higher
Wage level	about the same	about the same	at least 25% higher
Overall KSA level	slightly lower	slightly higher	moderately higher
Knowledge level	moderately lower	moderately higher	much higher
Skill level	slightly lower	about the same	slightly higher
Abilities level	about the same	slightly higher	slightly higher
Green-related activities			
Supervise pollution control workers	✗	✓	✗
Design waste recovery methods	✗	✓	✗
Test air quality, noise, temperature, or radiation	✗	✗	✗
Use hazardous disposal techniques	✗	✗	✓
Judge soil conditions	✓	✗	✗
Analyze ecosystem data	✓	✓	✗
Use building or land use regulations	✓	✗	✓
Use pollution control techniques	✓	✓	✓
Follow safe waste disposal procedures	✗	✓	✓
Use hazardous materials information	✗	✓	✓

*Includes mining safety engineers ** Knowledge, skill, and ability

Source: Department of Labor and Workforce Development, Research and Analysis Section

Alaska Training Clearinghouse

The Alaska Training Clearinghouse (live.laborstats.alaska.gov/atc/) identifies training available in Alaska, searchable by providers, programs, and occupations.

The Research and Analysis Section has begun collecting information on green training programs in Alaska. So far, R&A has identified 34 programs through eight training providers. For example, Alaska Technical Center in Kotzebue has reported that their "Advanced Commercial Construction" program is green.

To view green programs and their providers on the Web site listed above, click on the "Green related occupations, training, or industries" filter on the programs and providers list pages. Below is our current list of green programs:

ABC of Alaska	Carpentry
ABC of Alaska	Construction Craft Laborer
ABC of Alaska	Electrician
ABC of Alaska	HVAC
ABC of Alaska	Painting/Painter and Wall Covering
ABC of Alaska	Plumber/Pipefitter
ABC of Alaska	Sheet Metal Worker
ABC of Alaska	Sprinkler Fitter
Alaska Ironworkers	Ironwork
Alaska Joint Electrical Apprenticeship and Training Trust	Wireman
Alaska Technical Center	Advanced Commercial Construction
Alaska Technical Center	Construction Site Development
Alaska Technical Center	Construction Trades
Alaska Technical Center	Electrical Installation
Alaska Technical Center	Electrical Orientation
Alaska Technical Center	Electrical Systems
Alaska Technical Center	Electrical Systems/Heating Systems
Alaska Technical Center	Electrical Systems/Heating Systems/Plumbing Systems
Alaska Technical Center	Heating Systems
Alaska Technical Center	Plumbing Drain, Waste & Dev
Alaska Technical Center	Plumbing Orientation
Alaska Technical Center	Plumbing Supply Systems/pipe
Arctic Safety Training and Consulting	Bridge Class, 40-Hour
Arctic Safety Training and Consulting	CITS-Cook Inlet Training Standards
Arctic Safety Training and Consulting	HAZWOPER 24-Hour
Arctic Safety Training and Consulting	HAZWOPER 40-Hour
Arctic Safety Training and Consulting	HAZWOPER Refresher
Arctic Safety Training and Consulting	North Slope Training Cooperative
Arctic Safety Training and Consulting	Petrochemical Health and Safety
Fairbanks Area Plumber and Pipefitters	Plumbing and Pipefitting
Sheet Metal Workers Local Union #23	Journeyman Service Worker
Sheet Metal Workers Local Union #23	Journeyman Sheet Metal Worker
Southwest Alaska Vocational and Education Center	HAZWOPER, 40-Hour
Southwest Alaska Vocational and Education Center	HAZWOPER, 8-Hour Refresher

At left, Angoon residents install a solar power panel on a home as part of the Sustain Angoon Project. Photo courtesy of Central Council, Tlingit and Haida Tribes of Alaska.

environmental engineer's green workload. The table also lists three similar occupations and what activities they share as well as how their knowledge, skill, and ability compare to environmental engineers.

For example, working as an environmental engineering technician can be a predecessor to a career as an environmental engineer. These technicians assist in the development of pollution remediation technology under the direction of an environmental engineer. The engineer has a much higher level of knowledge; however, the skills and abilities of the engineer are only slightly higher. As the technician gains more experience on the job and attains additional education, that worker could advance into the role of an engineer.

Mining and geological engineers also have many similarities to environmental engineers, including similar backgrounds in education, work experience, and wages. However, an environmental engineer's level of knowledge is slightly higher in most of the areas important to both occupations. While the skills for both occupations are roughly similar, a mining and geological engineer would need additional knowledge in chemistry to transition to environmental engineering.

The civil engineer has higher knowledge and skills than the environmental engineer, and Alaska's civil engineering labor pool is four times larger. This plus the fact that they earn similar wages makes them well qualified if the demand for environmental engineers were to grow. If a number of civil engineers were to lose their jobs due to a downturn in a particular industry, some could retrain to become environmental engineers.

Cold-Climate Weatherization

The construction industry plays a major role in the development of green infrastructure in Alaska. Home weatherization and energy efficient construction building practices are becoming popular with both new construction projects and retrofitting existing structures.

Above, a blower door and building diagnostics at the Public Works building in Kotzebue. Photo courtesy of Renewable Energy Alaska Project.

Poorly insulated homes lead to significant increases in heating costs in the winter. A push to weatherize homes has come from homeowners and public entities who find that energy-efficient upgrades are an economical way to counteract rising energy costs. As a result, carpenters and construction laborers are adding new techniques to their existing skills to meet these challenges. Mechanical engineers and architects are becoming LEED-certified to design structures that provide energy savings, water efficiency, greenhouse gas emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

The Alaska Housing Finance Corporation received $200 million in state funding for the Weatherization Program and $160 million for a Home Energy Rebate Program. In 2009, the American Recovery and Reinvestment Act provided an additional $18.1 million for the weatherization program. These programs offset consumers' capital costs and may create new jobs in industries that provide weatherization.

Organizations such as Tlingit-Haida Regional Housing Authority provide home weatherization training for people to take back to their communities. Like renewable energy, not all energy efficiency methods are appropriate for all areas. Trainees learn about appropriate air sealing materials, installation techniques, and insulation types and applications for their regions. For example, blower door testing finds buildings' air leaks and measures the effectiveness of an air-sealing project after it is complete.

The Fairbanks-based Cold Climate Housing Research Center is a nonprofit organization that promotes knowledge of energy efficient building techniques in the circumpolar region. In addition to providing policy analysis for programs such as the Building Energy Efficient Standard, they are also a vital experimental testing bed for new building practices in Alaska.

Green occupations in Alaska's weatherization industry are numerous, from research to implementation. Training in this area was Alaska's highest reported green certification requirement and will remain an important component of the state's construction industry.

state employees

The centralized administration of state and federal divisions makes surveying public sector workers challenging. It's difficult to identify someone with knowledge about workers' duties. Consequently, the results of a separate survey reflect reported values from a nonstatistical sampling of state workers.

State government employment makes up 8 percent of the total nonfarm workforce in Alaska, and public-sector green occupations are similar to their private-sector counterparts. Zoologists and wildlife biologists was the highest reported green occupation, and numerous science positions also topped the list of the highest reported occupations.

These reported occupations reflect a common goal of the public sector, to improve management of public resources. The largest green category among public employees was education, compliance, public awareness, and training (47 percent), followed closely by agriculture and natural resource conservation (45 percent), and pollution prevention at 32 percent. (For a list of green jobs in state government, see Appendix Four.)

The state plays a critical role in the management of public goods in general, and common-pool resources in particular. From an economic standpoint, goods and services are deemed public if their consumption is nonrivalrous, nonexcludable, or both. Examples of pure public goods include clean air and water, and the establishment and maintenance of state parks.

Because of the collective ownership of mineral and land rights in Alaska, common-pool resources managed by the state include renewable resources such as timber harvesting and sustainably managed fisheries, and nonrenewable mining resources.

By nature, common-pool resources are nonexcludable as a result of collective ownership, so must be regulated to ensure long term viability. Without sustainably managed extraction, common-pool resources can be rendered nonrenewable through overharvesting. Public sector green workers act as stewards of resources that are not privately owned.

The Seafood Industry

Until Alaska became a state in 1959 and assumed control of its fisheries, salmon harvests were in decline.

The constitution charges the state and Legislature with ensuring common use and sustainable yield of all its renewable resources. In 1973, the Legislature enacted a limited entry law to create transferable permits to limit seafood harvesting to economically healthy and sustainable levels.

Fish harvesting accounted for 29,981 jobs in 2009, with another 23,661 jobs in seafood processing. The industry brought in a harvest valued at $1.2 billion that same year.

All commercial salmon fisheries in Alaska are under limited entry, and therefore considered a regulated sustainable industry. However, it is beyond the scope of this report to quantify green jobs within the seafood harvesting industry.

From left, Reynolds Skan Jr., Andrey Seledkov, and Leo Ortega sort salmon fresh off the boat last August at Alaska Glacier Seafoods in Juneau. Photo by Kim Andree, Alaska Department of Labor and Workforce Development.

NINE Public Sector Employment, State

Occupation	Reported green employment	Total reported employment	Percent green	Categories of work*
Zoologists and Wildlife Biologists	132	147	90%	
Environmental Scientists and Specialists, Including Health	91	104	88%	
Civil Engineers	52	130	40%	
Conservation Scientists	46	64	72%	
Natural Sciences Managers	37	45	82%	
Biological Technicians	21	24	88%	
Environmental Engineers	16	22	73%	
Foresters	15	16	94%	
General and Operations Managers	14	26	54%	
Urban and Regional Planners	14	20	70%	
Social Science Research Assistants	12	25	48%	
Maintenance and Repair Workers, General	9	9	100%	
Forest and Conservation Technicians	8	16	50%	
Environmental Science and Protection Technicians, Including Health	7	8	88%	
Economists	6	11	55%	
Farmworkers, Farm and Ranch Animals	6	9	67%	
Statisticians	5	9	56%	
Lawyers	5	12	42%	
Engineering Managers	3	4	75%	

Source: Department of Labor and Workforce Development, Research and Analysis Section

*See page 5 for icon key.

APPENDIX ONE

Methodology

The Alaska Department of Labor and Workforce Development mailed the Alaska Green Jobs Survey to selected firms in August 2010. The survey asked employers to answer questions about occupations with employment during the pay period that included Aug. 12. The survey deadline was Sept. 15, with submission via mail, FAX, phone, e-mail, or online through MyAlaska.

The survey universe contained 16,513 private-sector and local government establishments within Alaska that had at least one employee covered by the Alaska Unemployment Insurance Program. The Research and Analysis Section stratified the universe into 20 industry groups and two employment size groups, and drew the stratified random sample with probability proportionate to firm size.

Following the Sept. 15 deadline, R&A surveyed the nonresponders in underreported industries through a secondary mailout. This survey contained only the green category definitions and the question, "Do you employ any workers who provide goods or services in any of the green-related categories listed below?" R&A contacted employers who responded "yes" by phone or e-mail to request that they fill out the remainder of the survey. This resulted in a significant increase in the overall survey response rate, which was 61.7 percent. All industry groups' response rates were greater than 50 percent.

Responses were weighted and benchmarked to preliminary Quarterly Census of Employment and Wages data for the third quarter of 2010. A staffing pattern generated for each industry, derived from the Alaska Occupational Database, provided a breakdown of each occupation's share of the total industry employment. R&A applied these survey results to this data set to generate estimated employment counts across 145 occupations with reported green employment.

The survey collected data on wages, but Research and Analysis omitted these results. Respondents frequently skipped this question, so the data were unreliable.

R&A also targeted state departments that might contain green jobs, and contacted 6,134 state employees using their State of Alaska e-mail addresses on Jan. 20, 2011. The e-mail explained the purpose of the survey and provided a link to complete the survey online. Those who said their occupation was green were asked about the percentage of time they spent on green activities, in which category they performed green work, and what special green skills their occupations required.

The response rate among state employees was 19 percent. Of those who responded, 57 percent said they performed work in one of the green categories.

R&A attempted to survey federal agencies, but the centralized administration of the federal government made it difficult to contact people who knew about federal employees' green activities. The accuracy of the small amount of data was questionable, so it was omitted from the report.

Sample summary	Number of establishments
Population of establishments	16,513
Original sample draw	5,110
Number of firms in sample	4,826
Contacted in sample	3,033
Not reached in sample*	1,793

Reason code	Number of establishments	In/out of sample
Response	2,979	in
Refusal	54	in
Undeliverable	249	out
Out of business	15	out
Other	19	out

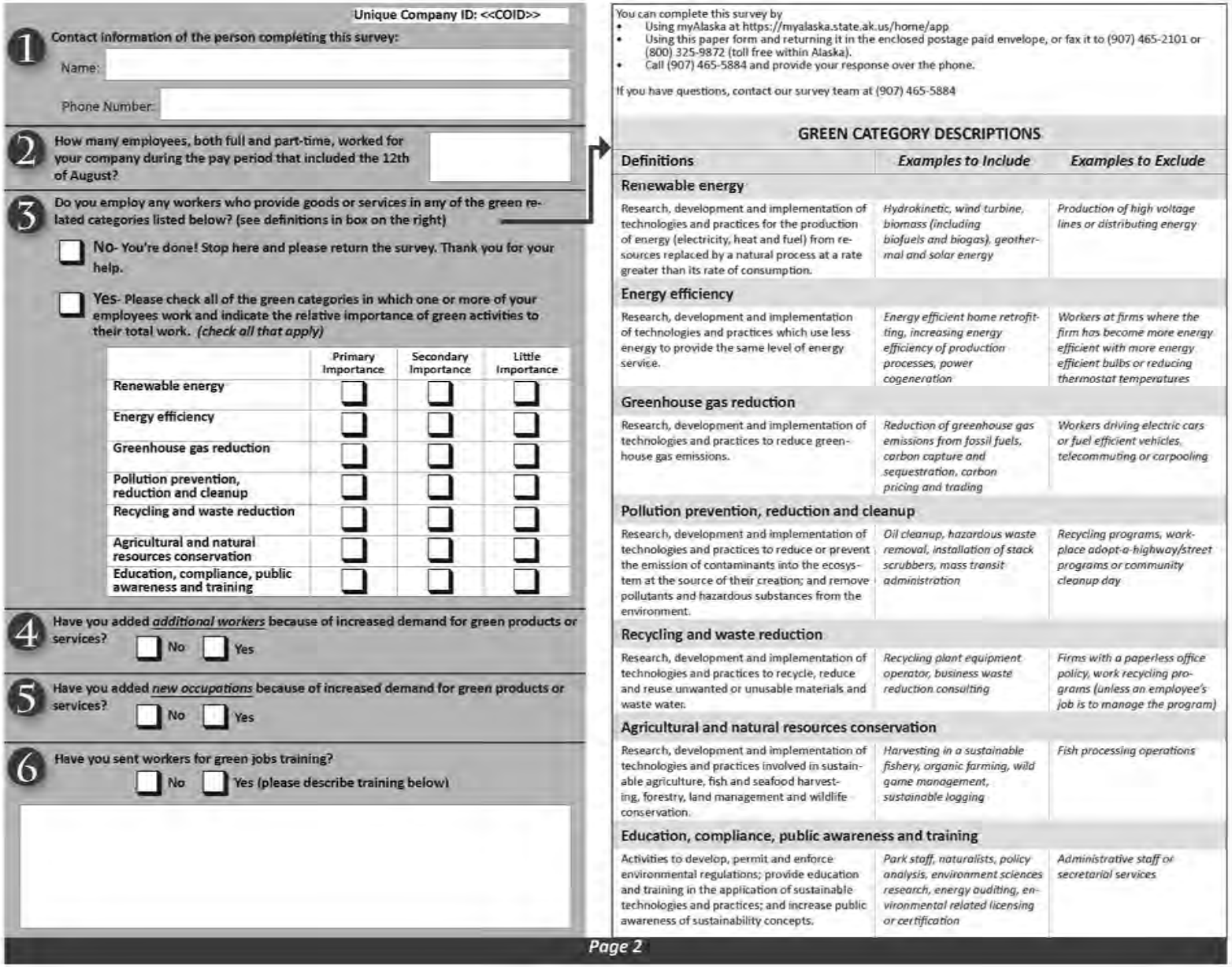
Response rate

Number of firms in sample	4,826
Total response	2,979
Response rate	61.7%
Response "yes"	375

*Represents employers who received a survey but didn't respond despite repeated attempts to contact them.

APPENDIX TWO

Survey Instrument



Unique Company ID: <<COID>>

1 Contact information of the person completing this survey:

Name:

Phone Number:

2 How many employees, both full and part-time, worked for your company during the pay period that included the 12th of August?

3 Do you employ any workers who provide goods or services in any of the green related categories listed below? (see definitions in box on the right)

☐ No- You're done! Stop here and please return the survey. Thank you for your help.

☐ Yes- Please check all of the green categories in which one or more of your employees work and indicate the relative importance of green activities to their total work. *(check all that apply)*

	Primary Importance	Secondary Importance	Little Importance
Renewable energy	☐	☐	☐
Energy efficiency	☐	☐	☐
Greenhouse gas reduction	☐	☐	☐
Pollution prevention, reduction and cleanup	☐	☐	☐
Recycling and waste reduction	☐	☐	☐
Agricultural and natural resources conservation	☐	☐	☐
Education, compliance, public awareness and training	☐	☐	☐

4 Have you added *additional workers* because of increased demand for green products or services? ☐ No ☐ Yes

5 Have you added *new occupations* because of increased demand for green products or services? ☐ No ☐ Yes

6 Have you sent workers for green jobs training?

☐ No ☐ Yes (please describe training below)

You can complete this survey by
- Using myAlaska at https://myalaska.state.ak.us/home/app
- Using this paper form and returning it in the enclosed postage paid envelope, or fax it to (907) 465-2101 or (800) 325-9872 (toll free within Alaska).
- Call (907) 465-5884 and provide your response over the phone.

If you have questions, contact our survey team at (907) 465-5884

GREEN CATEGORY DESCRIPTIONS

Definitions	*Examples to Include*	*Examples to Exclude*
Renewable energy		
Research, development and implementation of technologies and practices for the production of energy (electricity, heat and fuel) from resources replaced by a natural process at a rate greater than its rate of consumption.	*Hydrokinetic, wind turbine, biomass (including biofuels and biogas), geothermal and solar energy*	*Production of high voltage lines or distributing energy*
Energy efficiency		
Research, development and implementation of technologies and practices which use less energy to provide the same level of energy service.	*Energy efficient home retrofitting, increasing energy efficiency of production processes, power cogeneration*	*Workers at firms where the firm has become more energy efficient with more energy efficient bulbs or reducing thermostat temperatures*
Greenhouse gas reduction		
Research, development and implementation of technologies and practices to reduce greenhouse gas emissions.	*Reduction of greenhouse gas emissions from fossil fuels, carbon capture and sequestration, carbon pricing and trading*	*Workers driving electric cars or fuel efficient vehicles, telecommuting or carpooling*
Pollution prevention, reduction and cleanup		
Research, development and implementation of technologies and practices to reduce or prevent the emission of contaminants into the ecosystem at the source of their creation; and remove pollutants and hazardous substances from the environment.	*Oil cleanup, hazardous waste removal, installation of stack scrubbers, mass transit administration*	*Recycling programs, workplace adopt-a-highway/street programs or community cleanup day*
Recycling and waste reduction		
Research, development and implementation of technologies and practices to recycle, reduce and reuse unwanted or unusable materials and waste water.	*Recycling plant equipment operator, business waste reduction consulting*	*Firms with a paperless office policy, work recycling programs (unless an employee's job is to manage the program)*
Agricultural and natural resources conservation		
Research, development and implementation of technologies and practices involved in sustainable agriculture, fish and seafood harvesting, forestry, land management and wildlife conservation.	*Harvesting in a sustainable fishery, organic farming, wild game management, sustainable logging*	*Fish processing operations*
Education, compliance, public awareness and training		
Activities to develop, permit and enforce environmental regulations; provide education and training in the application of sustainable technologies and practices; and increase public awareness of sustainability concepts.	*Park staff, naturalists, policy analysis, environment sciences research, energy auditing, environmental related licensing or certification*	*Administrative staff or secretarial services*

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PLEASE PROVIDE EMPLOYMENT DATA FOR THE PAY PERIOD INCLUDING AUGUST 12, 2010

Please return completed survey by September 15, 2010

If you have questions contact our survey team at (907) 465-5884

Unique Company ID: <<COID>>

Preprinted occupations below were reported to the Department of Labor and Workforce Development in 2009. *Please use blank lines to add any other occupations involved in green activities.*	*Count each employee only once*		*We understand that workers may not spend all of their time doing green activities. Please estimate the percent of time spent doing green work for the pay period including the 12th of August.*	Which categories apply to the workers in this occupation?							Consider only the workers involved in green activities for the questions below:		
	How many workers do you have in this occupation?	Of the workers you reported, how many work in green activities?	Of the workers involved in green activities, how many spent:	Renewable energy	Energy efficiency	Greenhouse gas reduction	Pollution prevention, reduction and cleanup	Recycling and waste reduction	Agricultural and natural resources conservation	Education, compliance, public awareness and training	Have you had difficulty recruiting or retaining workers involved in green activities? *(check all that apply)*	Do you pay higher wages to recruit or retain workers doing green activities?	Are any special skills, certificates or licenses required to perform green-related work in this occupation?
EXAMPLE: Mechanical Engineer	15	6	1 to 25% of their time doing green activities? 1 26 to 50%? 0 51 to 75%? 3 76% to 100%? 2	☐	✓	☐	☐	✓	☐	☐	☐ No ✓ Yes, due to lack of workers **in Alaska** ✓ Yes, due to lack of required **green skills** ☐ Yes, other reasons	✓ No ☐ Yes	☐ No ✓ Yes List special skills, certificates or licenses below: Calibrating solar panels, LEED certification
	☐	☐	1 to 25% of their time doing green activities? ☐ 26 to 50%? ☐ 51 to 75%? ☐ 76% to 100%? ☐	☐	☐	☐	☐	☐	☐	☐	☐ No ☐ Yes, due to lack of workers **in Alaska** ☐ Yes, due to lack of required **green skills** ☐ Yes, other reasons	☐ No ☐ Yes	☐ No ☐ Yes List special skills, certificates or licenses below
	☐	☐	1 to 25% of their time doing green activities? ☐ 26 to 50%? ☐ 51 to 75%? ☐ 76% to 100%? ☐	☐	☐	☐	☐	☐	☐	☐	☐ No ☐ Yes, due to lack of workers **in Alaska** ☐ Yes, due to lack of required **green skills** ☐ Yes, other reasons	☐ No ☐ Yes	☐ No ☐ Yes List special skills, certificates or licenses below
	☐	☐	1 to 25% of their time doing green activities? ☐ 26 to 50%? ☐ 51 to 75%? ☐ 76% to 100%? ☐	☐	☐	☐	☐	☐	☐	☐	☐ No ☐ Yes, due to lack of workers **in Alaska** ☐ Yes, due to lack of required **green skills** ☐ Yes, other reasons	☐ No ☐ Yes	☐ No ☐ Yes List special skills, certificates or licenses below
	☐	☐	1 to 25% of their time doing green activities? ☐ 26 to 50%? ☐ 51 to 75%? ☐ 76% to 100%? ☐	☐	☐	☐	☐	☐	☐	☐	☐ No ☐ Yes, due to lack of workers **in Alaska** ☐ Yes, due to lack of required **green skills** ☐ Yes, other reasons	☐ No ☐ Yes	☐ No ☐ Yes List special skills, certificates or licenses below

CONTINUED ON BACK

THANK YOU FOR COMPLETING THIS SURVEY

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APPENDIX THREE

Alaska's Green Occupations

SOC(2000)[1]	SOC(2010)	SOC title	Estimated green employment[2]	Estimated employment[3]	Green score 1-10[4]
		TOTAL (occupations with green employment)	4,973	140,172	
111011	111011	Chief Executives	34	1,685	1
111021	111021	General and Operations Managers	139	3,780	1
112021	112021	Marketing Managers	3	290	1
112031	112031	Public Relations Managers	7	152	1
113011	113011	Administrative Services Managers	29	1,397	1
113031	113031	Financial Managers	4	1,090	1
113049	113121	Human Resources Managers, All Other	4	215	1
119021	119021	Construction Managers	27	971	1
119041	119041	Engineering Managers	8	345	1
119051	119051	Food Service Managers	6	463	1
119121	119121	Natural Sciences Managers	17	28	3
119151	119151	Social and Community Service Managers	7	343	1
119199	119199	Managers, All Other	40	2,358	1
131023	131023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	3	266	1
131051	131051	Cost Estimators	3	144	1
131073	131151	Training and Development Specialists	32	156	2
131199	131199	Business Operations Specialists, All Other	1	492	1
132011	132011	Accountants and Auditors	13	1,438	1
132072	132072	Loan Officers	2	358	1
171011	171011	Architects, Except Landscape and Naval	12	188	1
171021	171021	Cartographers and Photogrammetrists	5	57	1
172041	172041	Chemical Engineers	40	48	4
172051	172051	Civil Engineers	28	573	1
172071	172071	Electrical Engineers	32	299	1
172081	172081	Environmental Engineers	60	177	3
172111	172111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	21	233	1
172141	172141	Mechanical Engineers	45	303	1
172151	172151	Mining and Geological Engineers, Including Mining Safety Engineers	41	154	1
172199	172199	Engineers, All Other	65	1,059	1
173019	173019	Drafters, All Other	11	157	1
173023	173023	Electrical and Electronic Engineering Technicians	3	216	1
173025	173025	Environmental Engineering Technicians	93	253	2
173027	173027	Mechanical Engineering Technicians	8	45	1
191013	191013	Soil and Plant Scientists	*	*	2
191023	191023	Zoologists and Wildlife Biologists	166	254	7
191029	191029	Biological Scientists, All Other	13	84	2
191031	191031	Conservation Scientists	23	28	5
191032	191032	Foresters	*	*	5
192031	192031	Chemists	2	43	1
192032	192032	Materials Scientists	*	*	9
192041	192041	Environmental Scientists and Specialists, Including Health	254	401	4
192042	192042	Geoscientists, Except Hydrologists and Geographers	3	279	1
193011	193011	Economists	*	*	2
193051	193051	Urban and Regional Planners	5	167	1
194021	194021	Biological Technicians	7	59	2
194041	194041	Geological and Petroleum Technicians	144	649	3
194091	194091	Environmental Science and Protection Technicians, Including Health	158	158	8
211021	211021	Child, Family, and School Social Workers	2	559	1
211093	211093	Social and Human Service Assistants	2	581	1
211099	211099	Community and Social Service Specialists, All Other	3	417	1
231011	231011	Lawyers	21	442	1

APPENDIX THREE

Alaska's Green Occupations, cont.

SOC(2000)[1]	SOC(2010)	SOC title	Estimated green employment[2]	Estimated employment[3]	Green score 1-10[4]
232011	232011	Paralegals and Legal Assistants	14	295	1
251053	251053	Environmental Science Teachers, Postsecondary	*	*	10
259021	259021	Farm and Home Management Advisors	*	*	3
259031	259031	Instructional Coordinators	2	273	1
271025	271025	Interior Designers	12	37	1
352012	352012	Cooks, Institution and Cafeteria	6	686	1
352014	352014	Cooks, Restaurant	4	2,185	1
371012	371012	First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers	13	65	2
372011	372011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	7	5,230	1
372012	372012	Maids and Housekeeping Cleaners	14	3,610	1
373011	373011	Landscaping and Groundskeeping Workers	7	801	1
373019	373019	Grounds Maintenance Workers, All Other	36	703	1
396021	397011	Tour Guides and Escorts	440	1,133	3
396022	397012	Travel Guides	*	*	3
411011	411011	First-Line Supervisors/Managers of Retail Sales Workers	10	1,878	1
412031	412031	Retail Salespersons	247	11,520	1
413099	413099	Sales Representatives, Services, All Other	14	1,267	1
414011	414011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	33	304	1
414012	414012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	5	1,012	1
419031	419031	Sales Engineers	20	45	3
419099	419099	Sales and Related Workers, All Other	5	2,108	1
431011	431011	First-Line Supervisors/Managers of Office and Administrative Support Workers	3	1,845	1
433031	433031	Bookkeeping, Accounting, and Auditing Clerks	10	4,109	1
433061	433061	Procurement Clerks	1	126	1
434051	434051	Customer Service Representatives	13	2,630	1
434171	434171	Receptionists and Information Clerks	6	3,156	1
435061	435061	Production, Planning, and Expediting Clerks	4	381	1
435081	435081	Stock Clerks and Order Fillers	10	2,565	1
436011	436011	Executive Secretaries and Administrative Assistants	12	3,736	1
439061	439061	Office Clerks, General	51	6,236	1
439199	439199	Office and Administrative Support Workers, All Other	52	4,604	1
451011	451011	First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	52	125	3
452092	452092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	29	411	1
452099	452099	Agricultural Workers, All Other	58	246	2
453011	453011	Fishers and Related Fishing Workers[5]	266	605	4
454011	454011	Forest and Conservation Workers	5	47	1
454021	454021	Fallers	18	106	1
454022	454022	Logging Equipment Operators	11	50	2
454029	454029	Logging Workers, All Other	20	33	2
471011	471011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	52	1,134	1
472011	472011	Boilermakers	30	44	5
472031	472031	Carpenters	275	3,343	1
472061	472061	Construction Laborers	212	5,461	1
472073	472073	Operating Engineers and Other Construction Equipment Operators	26	3,147	1
472081	472081	Drywall and Ceiling Tile Installers	9	202	1
472111	472111	Electricians	5	2,362	1
472131	472131	Insulation Workers, Floor, Ceiling, and Wall	44	194	1
472152	472152	Plumbers, Pipefitters, and Steamfitters	20	1,762	1
472181	472181	Roofers	111	324	2

APPENDIX THREE

Alaska's Green Occupations, cont.

SOC(2000)[1]	SOC(2010)	SOC title	Estimated green employment[2]	Estimated employment[3]	Green score 1-10[4]
472211	472211	Sheet Metal Workers	3	424	1
473012	473012	Helpers, Carpenters	17	357	1
473013	473013	Helpers, Electricians	3	121	1
473019	473019	Helpers, Construction Trades, All Other	80	500	2
474041	474041	Hazardous Materials Removal Workers	58	327	1
474051	474051	Highway Maintenance Workers	5	106	1
474099	474099	Construction and Related Workers, All Other	56	729	1
475013	475013	Service Unit Operators, Oil, Gas, and Mining	63	660	1
475021	475021	Earth Drillers, Except Oil and Gas	2	148	1
475071	475071	Roustabouts, Oil and Gas	12	1,668	1
491011	491011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	2	634	1
492022	492022	Telecommunications Equipment Installers and Repairers, Except Line Installers	3	774	1
492094	492094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	11	201	1
492095	492095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	2	108	1
493023	493023	Automotive Service Technicians and Mechanics	5	1,610	1
493092	493092	Recreational Vehicle Service Technicians	12	48	1
499021	499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	23	308	1
499041	499041	Industrial Machinery Mechanics	7	220	1
499051	499051	Electrical Power Line Installers and Repairers	14	400	1
499042	499071	Maintenance and Repair Workers, General	47	2,309	1
N/A	499081	Wind Turbine Service Technicians	*	*	10
499098	499098	Helpers, Installation, Maintenance, and Repair Workers	13	781	1
499099	499099	Installation, Maintenance, and Repair Workers, All Other	41	1,483	1
511011	511011	First-Line Supervisors/Managers of Production and Operating Workers	39	747	1
513022	513022	Meat, Poultry, and Fish Cutters and Trimmers	15	7,943	1
514072	514072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	14	30	5
514121	514121	Welders, Cutters, Solderers, and Brazers	9	765	1
518012	518012	Power Distributors and Dispatchers	17	34	5
518013	518013	Power Plant Operators	49	441	1
518031	518031	Water and Liquid Waste Treatment Plant and System Operators	22	568	1
518099	518099	Plant and System Operators, All Other	12	233	1
519032	519032	Cutting and Slicing Machine Setters, Operators, and Tenders	7	71	1
519192	519192	Cleaning, Washing, and Metal Pickling Equipment Operators/Tenders	*	*	8
519198	519198	Helpers--Production Workers	6	105	1
519199	519199	Production Workers, All Other	24	1,293	1
531031	531031	First-Line Supervisors/Managers of Transportation and Material-Moving Machine and Vehicle Operators	2	325	1
533031	533031	Driver/Sales Workers	8	1,063	1
535021	535021	Captains, Mates, and Pilots of Water Vessels	12	531	1
535031	535031	Ship Engineers	93	208	5
537021	537021	Crane and Tower Operators	2	136	1
537032	537032	Excavating and Loading Machine and Dragline Operators	3	251	1
537051	537051	Industrial Truck and Tractor Operators	43	421	1
537062	537062	Laborers and Freight, Stock, and Material Movers, Hand	34	4,459	1
537081	537081	Refuse and Recyclable Material Collectors	26	321	1
537121	537121	Tank Car, Truck, and Ship Loaders	22	206	1

[1] The Standard Occupational Classification (SOC) system is used by federal and state statistical agencies to classify workers and jobs into occupational categories for collecting, calculating, analyzing, or disseminating data.
[2] Employment is an August 2010 estimate.
[3] Employment is a third quarter 2010 estimate.
[4] The green score for an occupation is generated by taking a weighted average of time spent on green activities within a given occupation. The numbers are indexed between 1 and 10, with 10 representing that 100 percent of the occupation's work is within a green category, 9 representing 90 percent, and so on.
[5] Excludes most commercial fishermen
Note: All numbers exclude state and federal employment.
An asterisk (*) means data are suppressed due to confidentiality and/or reliability reasons.

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

APPENDIX FOUR

Alaska's Green Occupations, State Government

SOC(2000)[1]	SOC(2010)	SOC title	Reported green employment[2]	Reported nongreen[3]
111011	111011	Chief Executives	1	2
111021	111021	General and Operations Managers	14	12
111031	111031	Legislators	1	1
112021	112021	Marketing Managers	1	0
113011	113011	Administrative Services Managers	3	15
113031	113031	Financial Managers	2	1
113051	113051	Industrial Production Managers	1	0
113071	113071	Transportation, Storage, and Distribution Managers	1	6
119041	119041	Engineering Managers	3	1
119121	119121	Natural Sciences Managers	37	8
119141	119141	Property, Real Estate, and Community Association Managers	1	0
119151	119151	Social and Community Service Managers	1	2
119199	119199	Managers, All Other	5	1
131023	131023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	2	5
131041	131041	Compliance Officers, Except Agriculture, Construction, Health and Safety, and Transportation	2	14
131061	119161	Emergency Management Directors	1	0
131199	131121	Business Operations Specialists, All Other	3	3
132031	132031	Budget Analysts	1	3
132051	132051	Financial Analysts	3	1
132072	132072	Loan Officers	1	0
132099	132099	Financial Specialists, All Other	2	0
151021	151131	Computer Programmers	9	5
151041	151151	Computer Support Specialists	1	2
151071	151142	Network and Computer Systems Administrators	1	3
152031	152031	Operations Research Analysts	3	2
152041	152041	Statisticians	5	4
171021	171021	Cartographers and Photogrammetrists	3	2
171022	171022	Surveyors	1	7
172051	172051	Civil Engineers	52	78
172081	172081	Environmental Engineers	16	6
172121	172121	Marine Engineers and Naval Architects	1	3
172151	172151	Mining and Geological Engineers, Including Mining Safety Engineers	1	0
172171	172171	Petroleum Engineers	3	1
173011	173011	Architectural and Civil Drafters	2	7
173022	173022	Civil Engineering Technicians	1	1
173025	173025	Environmental Engineering Technicians	2	5
173029	173029	Engineering Technicians, Except Drafters, All Other	1	4
191011	191011	Animal Scientists	2	0
191013	191013	Soil and Plant Scientists	3	0
191021	191021	Biochemists and Biophysicists	1	0
191022	191022	Microbiologists	1	1
191023	191023	Zoologists and Wildlife Biologists	132	15
191031	191031	Conservation Scientists	46	18
191032	191032	Foresters	15	1
192031	192031	Chemists	2	1
192041	192041	Environmental Scientists and Specialists, Including Health	91	13
192042	192042	Geoscientists, Except Hydrologists and Geographers	4	12
192043	192043	Hydrologists	2	0
193011	193011	Economists	6	5
193021	131161	Market Research Analysts	3	1
193051	193051	Urban and Regional Planners	14	6
193091	193091	Anthropologists and Archeologists	2	2
193093	193093	Historians	1	2

APPENDIX FOUR

Alaska's Green Occupations, State Government, cont.

SOC(2000)[1]	SOC(2010)	SOC title	Reported green employment[2]	Reported nongreen[3]
193093	193093	Historians	1	2
194021	194021	Biological Technicians	21	3
194041	194041	Geological and Petroleum Technicians	2	1
194061	194061	Social Science Research Assistants	12	13
194091	194091	Environmental Science and Protection Technicians, Including Health	7	1
194093	194093	Forest and Conservation Technicians	8	8
231011	231011	Lawyers	5	7
231021	231021	Administrative Law Judges, Adjudicators, and Hearing Officers	1	1
232011	232011	Paralegals and Legal Assistants	1	6
251031	251031	Architecture Teachers, Postsecondary	1	0
251081	251081	Education Teachers, Postsecondary	1	0
251194	251194	Vocational Education Teachers, Postsecondary	3	2
259041	259041	Teacher Assistants	3	1
273031	131161	Market Research Analysts and Marketing Specialists	1	1
273031	273031	Public Relations Specialists	1	1
273041	273041	Editors	4	5
291131	291131	Veterinarians	2	0
299011	299011	Occupational Health and Safety Specialists	2	6
311011	311011	Home Health Aides	1	0
331021	331021	First-Line Supervisors/Managers of Fire Fighting and Prevention Workers	1	0
332022	332022	Forest Fire Inspectors and Prevention Specialists	1	0
339092	339092	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	1	0
419021	419021	Real Estate Brokers	4	3
419022	419022	Real Estate Sales Agents	2	20
431011	431011	First-Line Supervisors/Managers of Office and Administrative Support Workers	3	1
433031	433031	Bookkeeping, Accounting, and Auditing Clerks	5	23
433061	433061	Procurement Clerks	1	1
434171	434171	Receptionists and Information Clerks	5	5
435031	435031	Police, Fire, and Ambulance Dispatchers	2	1
435081	435081	Stock Clerks and Order Fillers	3	1
436011	436011	Executive Secretaries and Administrative Assistants	7	30
436012	436012	Legal Secretaries	1	4
439061	439061	Office Clerks, General	11	32
439111	439111	Statistical Assistants	1	5
439199	433099	Office and Administrative Support Workers, All Other	6	3
452011	452011	Agricultural Inspectors	1	2
452093	452093	Farmworkers, Farm and Ranch Animals	6	3
472073	472073	Operating Engineers and Other Construction Equipment Operators	3	19
472152	472152	Plumbers, Pipefitters, and Steamfitters	1	0
474051	474051	Highway Maintenance Workers	2	3
499042	499071	Maintenance and Repair Workers, General	9	0
531031	531031	First-Line Supervisors/Managers of Transportation and Material-Moving Machine and Vehicle Operators	1	0
535021	535021	Captains, Mates, and Pilots of Water Vessels	1	2

[1] The Standard Occupational Classification (SOC) system is used by federal and state statistical agencies to classify workers and jobs into occupational categories for collecting, calculating, analyzing, or disseminating data.
[2] Number of respondents who said they performed work in at least one of the green categories
[3] Number of respondents who said they did not perform green work

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section