



Idaho Green Jobs Interviews 2011

IDAHO
DEPARTMENT OF LABOR
C.L. "BUTCH" OTTER, GOVERNOR
ROGER B. MADSEN, DIRECTOR

Idaho Green Jobs Interviews

2011



Communications and Research
Georgia Smith, Deputy Director

Estimates and report prepared by Andrew Townsend, Research Analyst

Acknowledgements:

Bob Uhlenkott, Chief Research Officer; Sara Scudder, Principal Research Analyst; Cheryl Foster, Senior Research Analyst; Polly Lorenz, Eileen Geddings and Margaret Havey, Research Analysts; Bob Fick, Communications Manager; Jean Cullen, Public Information Specialist and
Idaho Department of Labor Regional Labor Economists

Region 1 - Northern - Alivia Body

Region 2 - North Central - Kathryn Tacke

Region 3 - Southwestern - Andrew Townsend, Cheryl Foster

Region 4 - Central - Jan Roeser

Region 5 - Southeastern - Dan Cravens

Region 6 - East Central - Will Jenson

This publication is available online at <http://lmi.idaho.gov/>.

For more information, contact Andrew Townsend at (208) 332-3570 ext. 3455 or andrew.townsend@labor.idaho.gov.

This work force solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor.

The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use by an organization and/or personal use by an individual for non-commercial purposes is permissible.

All other uses require the prior authorization of the copyright owner.

The Idaho Department of Labor is an Equal Opportunity Employer and Service Provider.
We are committed to providing employment services and programs and will not discriminate on the basis of race, color, national origin, religion, political affiliation or belief, sex, age or disability.

Introduction

Through the American Recovery and Reinvestment Act of 2009, the Idaho Department of Labor received a competitively awarded State Labor Market Information Improvement grant to develop data on the green economy – industries and careers that clean and improve the environment. This information is to be disseminated so workers can prepare for careers in those occupations and industries. In compiling the data, a survey was distributed from June 18 to Sept. 10, 2010, to identify industries and occupations as green and provide quantitative data on green jobs. To supplement the survey data, in-depth interviews and focus groups were conducted with workers and employers from a cross section of identified green occupations. The interviews and focus groups provided an opportunity to collect qualitative information from individuals in each field. This report is based entirely on those interviews and focus groups.

Executive Summary

The highlighted occupations represent a wide range of opportunities for current and future Idaho workers. The variety of skills, educational backgrounds, certifications and interests presents opportunities for most anyone.

Pervasive for these occupations are communication and computer skills that are sometimes hard to find.

Communication, both written and oral, was singled out as crucial for these green jobs. Those doing the hiring want workers proficient in conveying ideas, explaining products and detailing services to both coworkers and customers – skills that can be transferred to any of the highlighted jobs.

Computer skills are important for several occupations today and will be even more important in the future. Even primarily outdoor occupations rely on computers to improve and organize work. Developing computer skills and keeping them up to date not only gets workers a job today but prepares them for future jobs and promotions.

While formal education is not required for every one of these occupations, experience is generally a deciding factor in filling these jobs. Several occupations put in-field experience ahead of education even when a degree is considered a must. Managers see experience related to the work of the occupation, regardless of the source, as showing a commitment and interest in the field – something they highly value.

Certifications are another matter. When certification is required by law, hiring managers expect it. But if certification is optional, then it can be used to distinguish among job applicants. The time, commitment and interest required to get optional certifications is a quality managers look for in hires although not to the degree that in-field experience is sought.

Communication, both written and oral, was singled out as crucial for these green jobs.

Northern and North Central Regions

FORESTERS AND FOREST TECHNICIANS

Idaho is rife with forests, especially in the northern regions of the state, which fosters a large forestry industry. While portions of this industry are declining at sawmills and paper mills, the Bureau of Labor Statistics still projects some growth by 2018. While not staggering, it is estimated as high as 2.5 percent,¹ and any growth is positive, especially when the industry's products depend on a delicate resource. In northern and north central Idaho, the focus was on foresters and forestry technicians, occupations that involve a multitude of activities surrounding the management of both public and private forests.

FORESTERS

The Bureau of Labor Statistics² defines foresters as workers who “manage public and private forested lands for economic, recreational and conservation purposes. May inventory the type, amount and location of standing timber, appraise the timber's worth, negotiate the purchase and draw up contracts for procurement. May determine how to conserve wild-life habitats, creek beds, water quality and soil stability and how best to comply with environmental regulations. May devise plans for planting and growing new trees, monitor trees for healthy growth and determine optimal harvesting schedules.” By itself, this definition contains several activities that fall under the Idaho Department of Labor's Green Job Definition. The Green Job Survey confirmed this and foresters are classified in the highest green category.

Differences between private and public foresters were discussed during the interviews. Typically, private foresters have to fulfill many different responsibilities for their companies while public foresters can be more specialized in areas like ecology, biology and hydrology. On the other hand, private foresters need a broader understanding of forestry and are expected to be knowledgeable in all the pertinent life and physical sciences.

Interviewees discussed two different private foresters, consulting and industry. Consulting foresters work directly with private landowners while industry foresters work for employers in the wood products industry. Consultants offer a wide range of independent natural resource management services to promote healthy, growing, diverse forests. They provide information and advice to the landowners on the proper species for a specific site, what management options are available and how to tailor activities to suit their personal goals. Consultants are hired by a landowner on a fee basis and work directly for the individual landowner. Consultants can usually provide more in-depth and comprehensive services than natural resource professionals employed by public agencies.

The skills required of a private forester are diverse and evolving with the industry. As landowners' needs and goals have changed over the past few years, completely new ideas and training have developed. Foresters today not only need to know how to grow a highly productive forest but how to manage various wildlife species, aesthetics, old growth and water quality. Important for foresters are computer knowledge, communication, work ethic, agricultural knowledge and firefighting skills.

¹National Employment Matrix, <http://www.bls.gov/data/>.

²Standard Occupational Classification, <http://www.bls.gov/soc/2010/soc191032.htm>.

Very valuable are computer skills, particularly in geographic information systems, an advanced program used for mapping. One interviewee said mapping skills could tip the balance in hiring decisions. Other software experience in database programs and growth simulators is also beneficial.

Along with computer skills, workers with backgrounds in agriculture or firefighting tended to have more connection to the outdoors and possessed skills that let them work well in wilderness environments, survival skills for example.

The private sector puts a lot of stock in actual in-field experience, which is usually obtained through public agencies employment. Forestry technician is one of the more common occupations that can provide experience in this field.

Skills like a strong work ethic and communication were emphasized by every interviewee. They said the work of consulting foresters involves more salesmanship than more traditional foresters since they must convince land owners of the benefit of their services. This aspect of a forester's occupation underscores the value of good communication skills.

While education is important in becoming a forester, hands-on experience is even more valuable. Most interviewees said they looked for college degrees in hiring foresters along with the professional certifications a forester can receive. The University of Montana's forestry program gets high praise from the industry because it has the most applied experience.

Interviewees did not require certifications, but they said possessing one makes foresters more employable and demonstrates their dedication. That is especially true for the Certified Forester certification from the Society of American Foresters.³ This certificate requires a four-year degree, experience in the field and an examination along with continuing education to maintain certification.

While not a certification for foresters, interviewees discussed the importance the Sustainable Forest Initiative certification⁴ because clients are demanding it. This certification is for organizations and has many requirements, and the foresters working for these organizations have to be in compliance with the standards, which involve continuing education classes, seminars and conferences.

According to the Idaho Department of Labor's 2008-2018 Long-Term Projections, the number of foresters will decline slightly over the next several years, and few annual openings are projected for this occupation. Those interviewed had a more positive outlook, however, mentioning that demand for wood remains despite a decline in the number of mills. Today's mills tend to be larger and consume more timber than the older ones. Feeding these mills is an ever-increasing number of private landowners. The needs of those landowners will maintain the demand for foresters with the right temperament, personality and training.

³Society of American Foresters website, <http://www.safnet.org/>.

⁴Sustainable Forest Initiative certification, <http://www.sfiprogram.org/>.

Two interviewees believe there will be an emerging market for foresters in carbon sequestration.* One said his organization has been involved with carbon sequestration for almost a decade. Selling carbon credits on the market as an offset for companies burning fossil fuels lets organizations generate money more quickly. Usually an organization waits decades for the harvest to see a return on its investment. Sequestration offers a much swifter return, and foresters who are experts in this field will be in high demand when legislation dealing with carbon markets becomes law or treaties like the Kyoto Protocol are enforced.

**Terrestrial carbon sequestration is the process through which carbon dioxide from the atmosphere is absorbed by trees, plants and crops through photosynthesis and stored as carbon in the biomass of tree trunks, branches, foliage and roots and soils as described on the web at <http://www.epa.gov/sequestration/faq.html>. The term "sinks" is also used to refer to forests, croplands and grazing lands and their ability to sequester carbon. Agriculture and forestry activities can also release CO₂ into the atmosphere. A carbon sink occurs when carbon sequestration is greater than carbon releases over time.*

FOREST TECHNICIAN



Forest technician is a broad occupational title for employees who fight fires, plant trees, build trails and perform many technical tasks for government and privately owned forests. For example, the Forest Service identifies technicians as Helitack workers, smokejumpers, fire engine operators, dispatchers, technician supervisors, timber sale preparers and administrators, air tanker base crewmen, lookouts, fire prevention specialists, recreationists and crewmen working on trails and timber stand improvement.

Becoming a technician is the most common way to gain the experience required to compete for professional-level jobs such as forester, both public and private. This hands-on experience is highly desired because it demonstrates familiarity and training the industry needs in its workers. However, not all forest technician jobs are entry level. The timber sale preparation and administration occupations can require significant knowledge of harvesting methods as well as many years of experience.

Most seasonal hires are forest technicians. Although several year-round jobs are classified as forest technicians, the majority are temporary. Since many are filled by students, the seasonal nature of the jobs is a benefit rather than a detriment. Year-round technicians usually are higher level, more experienced workers who help with budgets, conduct training and do planning, supply ordering and other preparations for the next summer. These technicians also may be involved in prescribed burning and other environmental projects.

Technicians are the backbone of several forest companies. Many technician jobs do not require a college degree and they present wide-ranging combinations of challenging and interesting work. Forest hiring needs for technicians are largely determined by the natural resource problems of the geographic area and the types of access needed.

Technician support is vital to programs that include firefighting and prevention, improving roads and building trails, insect and disease control and reforestation and habitat improvement. Technicians assist professional foresters, engineers, biologists, contractors and landowners on projects important to managing the forest for renewable resources and natural values. Technicians can also apply their knowledge of techniques and procedures in instrumentation, data collection for environmental impact studies to meet federal environmental requirements, for compliance inspections or timber sales.

Technicians perform numerous duties in preventing and fighting forest fires. Activities such as thinning and other fire load reduction efforts are used to improve and protect forests. Another technique called under-burning has also been employed in recent years. Under-burning requires a higher level of training than entry-level technicians have so these jobs represent the potential for upper mobility. The thinning process produces a fair amount of woody biomass. One interviewee mentioned that there is no market for biomass right now so a lot of it is chipped and left in the woods. If there was a biomass market, there would be more thinning activity, which is critical in maintaining the health of the forests.

In silvaculture, forestry technicians are involved in timber sales preparation including timber cruising, GIS mapping and inventory examinations; timber harvest activities like timber appraisal, controlling log quality and timber procurement; stand management and reforestation activities.

Many forestry technicians work in reforestation on both public and private land. They plant trees on land that has been logged or destroyed by fire or industrial use. They take charge of the work crews that plant trees or assist foresters who check for evidence of harmful insects and tree diseases. They also plant grass or groundcover crops to prevent soil erosion.

Forest technician jobs are physically demanding. They require stamina and the ability to hike while carrying equipment over steep terrain. Good eyesight is vital, especially for firefighters and lookout workers. Technician jobs often require skilled use of forestry instruments, electronic devices and field data recorders. Increasingly, they require knowledge of geographic information systems and global positioning systems.

Several avenues of job growth exist for forest technicians, but competition is particularly steep for professional-level jobs. In some national forests, people spend 30 years or more as temporary employees. Specialized experience is often the deciding factor in moving to different occupations along with a willingness to move geographically to get the varied experience managers value.

The outlook for forest and conservation technicians is varied. The Bureau of Labor Statistics projects employment nationally to grow about 9 percent by 2018. Most of the growth is expected on state and local government payrolls. The Idaho Department of Labor projects forest and conservation technicians in Idaho will decline 2.4 percent from 2,427 in 2008 to 2,370 in 2018. But even with that decline, there should be more than 100 job openings a year in Idaho to replace technicians who have retired or moved on.

Southwestern Region

ZOOLOGISTS AND WILDLIFE BIOLOGISTS

Along with ample forests, Idaho has an abundance of wildlife. Zoologists and biologists are involved in studying and protecting this natural resource. The Bureau of Labor Statistics defines zoologists and wildlife biologists as those who “study the origins, behavior, diseases, genetics and life processes of animals and wildlife. May specialize in wildlife research and management. May collect and analyze biological data to determine the environmental effects of present and potential use of land and water habitats.”⁵ This is work that fits well into the Idaho Department of Labor’s Green Job Definition under Sustainable Agriculture and Natural Resource Conservation. But wildlife biologists maintained their jobs involved in all four of the defined green areas.

Participants stated that wildlife biologists perform work essential to all four core areas – impact studies, education and implementation of processes or technologies that lessen the impact on wildlife. One example is an impact study looking at the effect of proposed wind farms on birds and other animals. Another is educating biofuel producers on technologies and processes that can prevent ecological damage.



Skills important to wildlife biologists are fairly diverse. Some are shared with other targeted occupations. In addition to the needed foundation in wildlife biology, participants cited as important skills communication, counting, observation, field craft, safety awareness, critical thinking and decision making and project and financial management along with a passion for the outdoors.

...Wildlife biologists perform work essential to all four core areas...

But communication is at the top of the list as the most used and hardest to find skill. Communication and negotiating skills, written and oral, are critical for wildlife biologists. “By nature, most biologists are introverts,” one participant said, “so we do great studies and we do great papers and we know all kinds of things, and then we hide in our cubicle never speaking to anybody and nothing ever gets done.”

Critical thinking, decision making and project and financial management skills are linked directly to effective problem solving and important for wildlife biologists, who spend much of their time working on their own. They must be able to make wise choices based on available facts in determining the best way to use limited resources. Managing a project within budget constraints is “not as sexy as going out and collecting the information about wildlife, but that’s part of the job,” one participant said.

As with foresters and forestry technicians, field craft and safety awareness foster confidence in working in the wilderness and other remote locations around the state. These skills can be taught on the job, but participants preferred seeing activities in an applicant’s background that imply some knowledge to begin with. Hunting, fishing and skiing backgrounds tend to attract people with field craft and wilderness safety skills, and some universities are now offering semester-long field courses to provide students with these skills.

⁵Standard Occupational Classification, <http://www.bls.gov/soc/2010/soc191023.htm>.

While not a skill in the normal sense, love of the outdoors is seen as a must for wildlife biology aspirants. “This is a passion field,” a participant said. “I didn’t get into this for the money, and it’s paid off exactly that way.” Others contended that because of the lower salary and the rarity of permanent, full-time jobs people without a passion for wildlife and the outdoors leave early in their careers to pursue other avenues, leaving the field to a very dedicated group of individuals.

Observation and counting skills underpin a biologist’s work since they enable him to look beyond the surface, to “see something and tie it into what it is,” as one participant said, and then accurately quantify the event. While sounding very simple and of little importance, “counting is a lot harder than it seems when you have to count 30,000 ducks that are flying over your head,” a participant said. “There’s actually some skill involved. It’s like sticking your head in a beehive and trying to count the bees; it’s difficult. Being able to estimate large numbers is really a skill that gets overlooked.”

A bachelor’s degree is the bare minimum educational requirement for this field, and a master’s degree is a ticket to work. One participant said over two-thirds of his department staff had master’s degrees or doctorates. Managers also liked to see degrees in specific subjects like zoology or ecology rather than boarder disciplines like environmental science. Several participants had high praise for the programs offered by the University of Idaho, but found the curriculums for all the wildlife biology degrees at Idaho universities provided a solid biological foundation. One improvement they would like to see though is more communication and legal classes to enhance the skills of prospective hires.

Experience is also mandatory for a job in this field, but participants said it could be gained many ways. Internships, university based field work, volunteer work and traditional paid experience all qualify. The deciding factor in hiring is often how much experience since commitment to and passion for the work is measured by the time applicants spend getting experience in their fields.

Certifications, on the other hand, play a minor role in hiring. Managers do not require them. Among the certifications mentioned were the Certified Wildlife Biologist from The Wildlife Society,⁶ Fisheries Professional from the American Fisheries Society⁷ and Certified Professional in Rangeland Management from the Society of Range Management.⁸

According to the Bureau of Labor Statistics,⁹ the majority of zoologists and wildlife biologists work for state or federal governments. The rest work in management, scientific and technical consulting services. More government jobs depend on the political climate, but participants believed that looming conservation legislation should increase demand for zoologists and wildlife biologists. The Bureau of Labor Statistics, however, projects that over 70 percent of the 2.5 percent increase in wildlife biology jobs by 2018 will be in private industry, not state and federal governments.

⁶The Wildlife Society website, <http://joomla.wildlife.org>.

⁷American Fisheries Society website, <http://www.fisheries.org>.

⁸Society of Range Management website, <http://www.rangelands.org>.

⁹National Employment Matrix, <http://www.bls.gov/data/>.

The Idaho Department of Labor forecasts an almost 4 percent increase. Participants tempered their outlook, believing that while there will be growth the real job opportunities will be in replacing retirees. One participant said 25 people retired in his multistate region in 2010 alone.



HEATING, AIR CONDITIONING AND REFRIGERATION MECHANICS AND INSTALLERS

This occupation fits neatly into the Idaho Department of Labor's Green Job Definition under energy efficiency. Heating, air conditioning and refrigeration mechanics and installers are described by the Bureau of Labor Statistics¹⁰ as "those who install or repair heating, central air conditioning or refrigeration systems including oil burners, hot-air furnaces and heating stoves." The HVAC industry as a whole is heavily involved in conserving energy with high-efficiency products. Only one company of 11 contacted during recruitment said none of the four core green areas applied to its work. Participants said equipment restrictions mandate a certain level of efficiency from heating and cooling units.

According to the Environmental Protection Agency's Energy Star program,¹¹ as much as half of the energy used in a home can be traced to heating and cooling so significant savings are possible by improving these systems. There remains disagreement over the true benefit from these improvements because Idaho's comparatively low energy rates extend the pay-back period on high-end equipment – up to 50 years by one estimate.

Participants also cited the possibility that the costs of the increased natural resources required to manufacture the larger coils used in high-efficiency equipment might outweigh the benefits.

As with other occupations, HVAC skills are diverse. "What other industry is there where we expect our people to have construction skills, electrical, controls, refrigeration, plumbing and computers. I mean it's an awesome industry because there are so many facets to it, but I can't think of another industry out there where you are expecting people to know all that."

Among the most prized were skills in electricity, computers, refrigeration and refrigerants, plumbing, welding, construction, layout, energy flows along with technical knowledge of the equipment from specific manufacturers.

... **H**VAC skills are diverse. "What other industry is there where we expect our people to have construction skills, electrical, controls, refrigeration, plumbing and computers. I mean, it's an awesome industry. . ."

Electrical knowledge, especially about low voltage wiring, was specifically singled out. Managers want knowledge of wiring and ladder diagrams and the ability to diagnose and repair electrical problems in HVAC setups. It is not uncommon for workers in this field to have a Specialty Electricians License or even a Journeyman's Electrician License in addition to an HVAC license.

¹⁰Standard Occupational Classification, <http://www.bls.gov/soc/2010/soc499021.htm>.

¹¹Environmental Protection Agency's Energy Star program website, http://www.energystar.gov/index.cfm?c=heat_cool.pr_hvac.

Computer proficiency is becoming crucial for the future. Most systems can now be diagnosed with a computer, and some even require computers for startup and controls. Participants called computer proficiency an important portable skill that can be transferred to similar industries or specializations within the HVAC industry.

Technical skills like the ability to read and follow complex procedures outlined in manuals and other documents are becoming increasingly important. The increased complexity of new systems leaves little room for error in installation and startup. Incorrect startup can decrease both the efficiency and life span of new equipment.

Residential work requires knowledge of construction, knowing how buildings are built and how to use basic tools. Since most HVAC work is done after the walls and flooring are in place, installers and mechanics must know how things are put together, and employers give weight to that kind of background.

The HVAC Journeyman's License program¹² is still in its infancy in Idaho, and participants had some negative reactions. The law grandfathered in some under-qualified HVAC contractors, and competing against people willing to cut important corners in a price-sensitive industry is difficult. Additionally, the licensing test is based solely on the law, leaving out practical skills. The four-year apprenticeship that should address practical skills is viewed as inadequate because it is not specific. Most participants believed an HVAC Journeyman's License does not mean the holder can do the work.

Environmental Protection Agency certification for refrigerant handling was generally required since most HVAC work requires handling refrigerant. But it is possible to be a HVAC mechanic or installer and not work with refrigerant.

On-the-job training was stressed continually by participants as integral to becoming an HVAC journeyman. Regardless of the quality of the training program, a new journeyman needs a lot of hands-on experience to be proficient.

Manufacturers' training classes and some specialized certifications such as those in air balance, combustion efficiency and carbon monoxide detection and avoidance are not typically required, but managers typically want their employees to earn these certifications and learn to perform more advanced services. In the past, the manufacturers would offer regional classes where HVAC workers could get additional education and certification on a particular piece of equipment. But now businesses have to send employees out of town for this training, and paying travel, room and board on top of salary and the class fees is a real barrier for employers.

¹²Idaho Division of Building Safety website, <http://dbs.idaho.gov>.



There were divided opinions on certifications from North American Technician Excellence Inc. and the Refrigeration Service Engineers Society. No one requires them, and while some participants felt these certificates could help choose among applicants, others pointed out that they are hard to obtain and not even available in some areas.

Participants blamed their inability to find qualified installers and mechanics on general disinterest in the trade itself and a lack of quality training locally although there was some disagreement on that point.

The participants also were split over the value of some college-level training programs in the region. While one required the training and rewarded workers with raises as they progressed through it, another said he had had little success with the training and preferred to do it internally.

While most are open shops, the group gave local unions high marks for their training, but there was confusion caused by the fact that both the United Association of Pipefitters and the Sheet Metal Workers International Association represent HVAC workers. Most participants did not know which union offered what training. But one gave raises to employees as they progressed through the union training.

Several participants said they had trouble getting employees interested in training when they offered it, and most believe that the trades in general have been discouraged in high schools as viable occupations in favor of pushing students to go to college. Several maintained that new HVAC installers and mechanics are selecting the career not because they have an interest or pride in the trade but because there is nothing better for them. The industry is being hurt by a stigma that HVAC work is degrading, and they support any initiative that shows students the benefits of a career in the trades.

The industries employing HVAC mechanics and installers run the gamut. Most are plumbing, heating and air conditioning contractors, but other industries employ them¹³ because of their reliance on internal climate control.

The job outlook for HVAC mechanics and installers is very good. The Bureau of Labor Statistics projects much faster than average job growth nationally for HVAC journeymen. The Idaho Department of Labor's 2008-2018 Long-Term Projections show a 14 percent increase in HVAC mechanics and installers. One participant was hiring 10 entry level employees himself.

HVAC mechanics and installers also have several avenues for career progression. Installers can train to become service technicians or go into sales or management. Managers are constantly looking for employees who want leadership responsibilities whether it is with training, sales or project managers. Project manager, estimator and instructor are good examples of 'next steps' for the HVAC journeyman.

¹³Occupational Outlook Handbook, <http://www.bls.gov/oco/ocos192.htm>.



ELECTRICIANS

Electricians do not fit completely into the Idaho Department of Labor's Green Job Definition. A separation exists between standard electrical work and green electrical work. The Bureau of Labor Statistics defines electricians as those who "install, maintain and repair electrical wiring, equipment and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems or electrical control systems."¹⁴ During recruitment, less than 60 percent of contacted electrical companies said they had green jobs on their payroll. The companies that responded positively had electricians working on projects that improved energy efficiency or installed or maintained renewable energy systems.

Energy efficiency is seen as an important industry, and the market for energy efficiency and conservation has been significant since the oil crisis in the 1970s. Since then all market segments from industrial to residential have been looking for ways to conserve energy. Driving energy efficiency is a favorable payoff horizon. Participants said that energy efficient upgrades such as lighting improvements or energy management systems can pay from themselves in as little as two months but typically no more than two years factoring in subsidies.

Renewable energy is not as common as energy efficiency but is gaining traction. Projects in solar, wind and methane power generation exist but are not common, primarily because renewable energy projects have trouble being financially viable. Because Idaho has low electricity costs, the payoff point for solar projects can take as long as 20 years. Participants anticipate this will change as coal power plants provide an ever increasing amount of Idaho's power. Currently most renewable energy projects involve public buildings and are being financed with federal stimulus money from the American Recovery and Reinvestment Act. Participants were optimistic that more private companies will begin taking advantage of renewable energy opportunities.

Mathematics is a crucial skill for electricians, whose work involves algebraic formulas and even some trigonometry, and because most work for service-based companies, communication skills are important as they deal with people in their homes.

As union shops under the International Brotherhood of Electrical Workers, most participants gave good marks to their system of finding skilled employees. Supplied with electricians from the union's rotating pool, these employers said the overwhelming majority of electricians they have hired over the years have been well qualified, crediting the five-year apprenticeship and continuing education for creating a talented labor pool. The training programs are kept up to date on new green technologies, and in the last two years, solar has been added to an apprentice's training.

A Journeyman Electrician's License issued by the state Division of Building Safety is the only credential required. Four years of experience and four years of approved apprenticeship education are needed to obtain a license, and renewals require 24 hours of continuing

... *e*nergy efficient upgrades such as lighting improvements or energy management systems can pay from themselves in as little as two months but typically no more than two years factoring in subsidies.

¹⁴Standard Occupational Classifications, <http://www.bls.gov/soc/2010/soc472111.htm>.

education during the three years the license is valid. The National Joint Apprenticeship and Training Committee, which handles the apprenticeship programs for the International Brotherhood of Electrical Workers and the National Electrical Contractors Association, has a five-year apprenticeship program compared to Idaho's four.

Participants said the North American Board of Certified Energy Practitioners'¹⁵ Photo-Voltaic Installers Certification is also beneficial for those working with solar energy. Certification, however, requires two qualified installations that have been monitored and inspected, and consumers want certified installers to begin with so there are no projects on which electricians can get their qualifying work. The board's website states there are only seven certified installers in Idaho.

As with the HVAC participants, these employers also expressed concern the trades are generally perceived as an inferior career when they should be viewed equally with college programs, providing good wages and benefits. "Our guys are professionals," a participant said. "You've got to think of it as doctors, accountants or anything else. They go to school and are trained specifically in this program for five years. This isn't an industry that you can just walk in off the street and be proficient at. It takes a lot of education, a lot of training to learn to do what we do."

Most electricians work for electrical contractors, but according to the Bureau of Labor Statistics,¹⁶ almost 9 percent are self-employed. The bureau projects that electrical contractors will increase employment by as much as 23 percent by 2018, and a majority of those jobs will be for electricians. There will also be job growth for helper-electricians and first-line supervisors.

Participants believe the job outlook for electricians is very good, and one repeated a projection that electricians might become more important than general contractors because upgrading the nation's existing electrical infrastructure will be extensive and needed very soon. They believe the best opportunities will go to electricians with the widest range of skills. The Idaho Department of Labor projects a decline in electricians through 2018, but the occupation is near the top in demand based on annual openings, reflecting the large number of older workers in this occupation.

Electricians have several options for career advancement. Journeymen can become a foremen, who run an entire project instead of just a crew. That could lead to general foremen, who run even larger projects. Estimating and project management would follow, and eventually electricians can become superintendents overseeing multiple jobs or go into business for themselves as electrical contractors. One of the participants actually took that path from journeyman to superintendent before branching out and starting his own company.

"This isn't an industry that you can just walk in off the street and be proficient at. It takes a lot of education, a lot of training to learn to do what we do."

¹⁵North American Board of Certified Energy Practitioners website, <http://www.nabcep.org/>.

¹⁶Occupational Outlook Handbook, <http://www.bls.gov/oco/ocos206.htm>.

South Central Region

POWER PLANT OPERATOR

In order for an electrician to have something to work with, electricity must be generated. Under the Idaho Department of Labor's Green Job Definition power generation using renewable resources or alternative fuels is classified as green. In Idaho, there is an abundance of electricity generated by renewable resources. Geothermal has a presence in the south central region of Idaho.

Naturally heated brine pumped from the Earth heats a chemical, changing it from liquid to gas to turn a turbine and generate electricity. After the brine has given off its heat, it is injected back into the ground, having never come into direct contact with the chemical that is driving the turbines. Nothing is used up. Only heat energy is transferred.

The occupation responsible for the smooth operation and maintenance of geothermal power plants is a power plant operator. The Bureau of Labor Statistics defines power plant operators as those who "control, operate or maintain machinery to generate electric power."¹⁷ While not all are classified as green, those working in one of the renewable or alternative power generation fields are.

Many skills are required of a power plant operator – multi-tasking in areas from chemical testing and troubleshooting equipment to safety and maintenance. Hiring lower skilled workers leads to a steep learning curve. An average of three years is needed to become competent.

Operators need skills in instrumentation and control, electrical, mechanical, millwright, advanced welding and computers. But these are broader industry skills rather than those specific to green jobs. "This is a process plant and we want process skills, industry level process skills are what we are looking for," a participant explained. "The fact that we happen to be green is incidental to what we are doing. It is certainly primary to us in the marketplace that we operate, but for the person coming in what I am looking for is a skill set that fits the operation of a power generation plant."

Geothermal power generation based on an industrial level process, allows for cross utilization of skill sets from the many other industries such as food processing plants, drilling, mining and exploration, utilities and the military, which has its own power plants and deals with thermodynamics. Participants said individuals with trade backgrounds like electricians and welder/fabricators are also sought for their skills.

While participants believed the level of training in the region was adequate, they cited some problems in finding people with appropriate computer skills such as knowledge of database software like Access and of spreadsheet programs.

"...What I am looking for is a skill set that fits the operation of a power generation plant."

¹⁷Standard Occupational Classification, <http://www.bls.gov/soc/2010/soc518013.htm>.

For the most part, power plant operators fall into the electric power generation, transmission and distribution industry.¹⁸ The Bureau of Labor Statistics projects a national decline of 15 percent in this industry by 2018 because of advancing technology. As the technology for power generation develops, fewer workers are needed. “We can operate this 1,800 acre facility, patch worked over six square miles, with one guy and a laptop computer in the truck which is networked” into the plant’s Supervisory Control and Data Acquisition system, which monitors and controls the plant, one participant said. “And we can literally operate the plant from five miles in any direction. That is how we compress it. It is not to just eliminate positions. It is to optimize the skill set of that individual so that he can be where the problem is.” So even though the need for electricity and power generation will most certainly increase in the future as population rises, staff to operate the plants will not. That makes a high level of skill mandatory to get one of these jobs.

The Bureau of Labor Statistics projects a slight decline in the number of power plant operators nationally by 2018. For Idaho however, Idaho Department of Labor forecasts a 16 percent increase over the same period. While green energy will most likely grow through tax incentives and public demand, the real job opportunities will come as the aging work force retires. The last big growth spurt occurred during the 1970s and 1980s when a lot of exploratory operations were financed. With high wages and stability, there has been minimal turnover in the intervening decades. But now the time has come for those workers to retire, opening opportunities for a new generation.



PLANT AND SYSTEMS OPERATORS, ALL OTHER

A second source of renewable energy is biomass. The most common biomass power generation comes from burning organic material to heat the turbine. But in south central Idaho power is being generated by converting refuse or manure from dairies into methane gas, using bacteria in an oxygen-free environment to break down waste material. The bacteria produce methane gas as a byproduct, and the power plant captures the methane and uses it to fuel engines that generate electricity.

Operators of this plant fall into the Bureau of Labor Statistics’ occupation labeled plant and systems operators, all other because it does not fit in any of the other occupational groups.

As with power plant operators, employers are looking for highly skilled individuals. The ideal candidate for methane biomass plant operator should have an understanding of hydrology, biology and wastewater chemistry and knowledge of the gas elements of the process. Most of the current operators have a background in food processing plant maintenance. All operators are trained on the job, learning the components of the process from power generation to the use of the equipment that separates manure solids and dries them for a secondary market. Computer skills are needed for documentation and reporting, but operators must have logic, the ability to troubleshoot, initiative and flexibility. They should have a

¹⁸ National Employment Matrix, <http://www.bls.gov/data/>.

strong disposition for accepting the physical and dirty demands of the job, which involves occasions where the operator must physically enter the manure canal to ensure the process is free flowing.

There are few educational opportunities locally targeted at this particular occupation. Food processing workers are a good starting point, but they need additional training to work as a biomass plant operator. One participant cited Michigan State University's training opportunities, but the industry would prefer a local program to further these skills, emphasizing processes, sciences and systems related to the methane biomass industry versus the maintenance and repair of plants.

The Bureau of Labor Statistics projects a decline nationally in this occupation through 2018. But the Idaho Department of Labor anticipates growth in the state. The number of operators is small, and the growth is only 17, but these are high-paying jobs. Government requirements for larger percentages of power from renewable resources could boost the prospects in this occupation.



The Raft River geothermal power plant near Malta, Idaho. Photo: U.S. Geothermal Inc.

Southeastern Region

FARMERS, RANCHERS AND OTHER AGRICULTURAL MANAGERS

Farmers, ranchers and other agricultural managers are defined by the Bureau of Labor Statistics as those who “plan, direct or coordinate the management or operation of farms, ranches, greenhouses, aquacultural operations, nurseries, timber tracts or other agricultural establishments. May hire, train and supervise farm workers or contract for services to carry out the day-to-day activities of the managed operation. May engage in or supervise planting, cultivating, harvesting and financial and marketing activities.”¹⁹

While farming is not a green occupation as a whole, farming that is linked to sustainable agricultural practices, natural resource conservation and organic farming would be included in the Idaho Department of Labor’s Green Job Definition.

Interviews with eastern Idaho organic farmers using a mix of agricultural business models found a deep concern for maintaining their land in a sustainable fashion to pass on to other generations. They eschewed pesticides and herbicides and embraced water conservation and the view that green practices bring the best quality product to consumers.

At the same time they were realistic about pure organic farming. “Organic is great, but here in eastern Idaho, at this time, it is not financially feasible to run an entire farm that way,” one acknowledged. To be competitive, organic practices need to be mixed with conventional agriculture. While avoiding chemical pesticides and herbicides is an essential business practice, several farmers agreed that non-organic fertilizers were more effective than organic fertilizers, and used in limited amounts that have the least impact on soil and water they were necessary for good yields and to sustain their businesses. Those not using non-organic fertilizers reported lower crop yields. All avoided pesticides and herbicides in response to consumer preference, and each reported being questioned by consumers on this issue, but none had fielded questions about non-organic fertilizers.

The desire to work hard and an interest in agriculture are paramount in organic farming, but operators also benefit from knowledge of accounting, marketing, agricultural economics, sales, plant biology, chemistry, soil science, and weeds and other pests which reduce crop yields. This diversity provides a glimpse of a farm manager’s many responsibilities.

Marketing, however, stood out as a very desirable skill that promotes profitability.

All (interviewees) avoided pesticides and herbicides in response to consumer preference, and each reported being questioned by consumers on this issue.



¹⁹Standard Occupational Classification, <http://www.bls.gov/soc/2010/soc119013.htm>.

Rather than formal postsecondary education, an informal mentoring process is the major method of training new green farmers. Several interviewees described their introduction to organic farming as an informal internship of several months with already established organic farmers. The University of Idaho Extension programs are also very useful, providing valuable training and information on organic farming practices.

Resources offered by the Idaho Department of Agriculture were seen as less helpful. Programs like the Certified Organic Program are viewed as geared more towards large scale producers, and some Idaho farmers have considered seeking organic certification from Montana, which is viewed more favorably even though the Idaho Department of Agriculture's certification process is the same as Montana's.

Access to suitable land is a real barrier to new organic operations even as demand for organic products rises beyond the ability of existing operators to meet it.

Most farmers, ranchers and other agricultural managers are employed in the animal and crop production industry.²⁰ The Bureau of Labor Statistics projects a slight employment decline in animal production and a 5 percent decline in crop production by 2018. But the contraction is in the occupations supporting agricultural managers, reflecting a more streamlined and consolidated sector.



Idaho photo : U.S. Department of Agriculture.



Idaho photo: U.S. Department of Agriculture.

Focus group participants see growth and a bright future for the occupation despite existing barriers. The Idaho Department of Labor's 2008-2018 Long-Term Occupation Projections forecast the number of farm, ranch and other agricultural managers to grow almost 28 percent by 2018 with more than 200 annual opening as workers leave the field or retire. This projection puts farm, ranch and other agricultural managers in the top 5 percent of in-demand occupations in Idaho.

²⁰ National Employment Matrix, <http://www.bls.gov/data/>.

East Central Region

BIOLOGICAL SCIENTISTS, ALL OTHER

Biotechnology scientists and engineers are considered green under the Idaho Department of Labor's Green Job Definition because it uses microbial and enzymatic systems to enhance renewable energy production, petroleum substitution and bioremediation. Bioremediation uses microorganisms, fungi, green plants or their enzymes to remove contaminants.

The Bureau of Labor Statistics does not have a specific job description for biotechnology scientists and engineers. These occupations end up falling into the residual occupation category called biological scientists, all other.

Some of the most important skills required for biotechnology scientists and engineers are also the most difficult to find – proficiency in bioinformatics, proteomics and biochemistry – because the fields are changing and advancing at a very rapid pace. To a lesser degree, however, some of these skills can be obtained on the job. Biochemistry is more commonly recognized than proteomics or bioinformatics. Proteomics focuses on the structure and function of proteins. Bioinformatics applies statistics and computer science to molecular biology to understand the biological process. Gaining familiarity with these subjects is primarily obtained in college while pursuing bachelor's, master's and doctoral degrees in a relevant field.

No specific certifications are required, and while not as important as education, experience is always desirable because it signals increased versatility.

The majority of workers in the biological scientists, all other occupation are employed by the federal government. The next highest concentration is in educational services, according to the Bureau of Labor Statistics.²¹ The bureau projects jobs in both sectors will increase 10 percent nationally by 2018.

The next step in the career pathway for biotechnology scientists and engineers is to add personnel management and business development responsibilities. Participants said leadership skills will be required in this growing field to organize workloads so research is performed efficiently. Job growth is a result of new and cost-effective applications being found for scientific advances. Since this occupation fits into a residual classification, an exact growth projection is not possible, but the Idaho Department of Labor 2008-2018 Long-Term Occupational Projections forecasts 1 percent growth by 2018 in the category of biological scientists, all other.

Some of the most important skills required for biotechnology scientists and engineers are also the most difficult to find . . . because the fields are changing and advancing at a very rapid pace.

²¹National Employment Matrix, <http://www.bls.gov/data/>.



ENVIRONMENTAL ENGINEERS

Environmental engineers earn their green designation by using environmental systems and regulatory expertise to minimize and mitigate environmental consequences of potentially harmful projects. Environmental engineers are described by the Bureau of Labor Statistics as those who “research, design, plan or perform engineering duties in the prevention, control and remediation of environmental hazards using various engineering disciplines. Work may include waste treatment, site remediation or pollution control technology.”²² Their expertise is vital in incorporating sustainable practices into current and future operations.

Environmental engineers need a diverse skill set that has evolved in response to new sustainability requirements established in 2007. These requirements cover engineering and industrial process and energy; waste reduction and elimination; greenhouse gas analysis, inventory and reduction; and environmental requirements analysis and implementation. But because environmental engineering now covers such an expanse of activity, few people possess the skills needed in all areas. Required of environmental engineers, however, is knowledge of industrial operations and systems, environmental systems and ecology. They also need expert knowledge of environmental regulations and their potential impact.

Education is paramount in this field. Those hired for this occupation usually come from engineering or environmental science backgrounds and often have experience in energy management, environmental compliance and impact analysis.

The development of sustainable practices and impacts is generating the demand for new skills, but they can typically be learned on the job if the person already has basic engineering and science skills. Many government and non-profit organizations provide training in this area, and quite a bit of the training can be done through Internet resources. Besides web-based self-learning classes, traditional classroom training is available with certification examinations.

Although certifications are available for work in this area, they are not required by government employers although they tend to demonstrate certain skill levels. These certifications include a Professional Engineer license, Certified Energy Manager qualification, LEED Professional certification and Registered Environmental Professional designation.



Environmental engineering students on assignment. Photo: University of Montana.

²²Standard Occupational Classification, <http://www.bls.gov/soc/2010/soc172081.htm>.

The U.S. Department of Energy currently provides in-house certification for Certified Energy Manager. Certifications for LEED Professional and Registered Environmental Professional can be obtained through third-party private organizations. The Environmental Protection Agency and private vendors provide many options for environmental regulatory or impact analysis training.



The Environmental Protection Agency and private vendors provide many options for environmental regulatory or impact analysis training.

According to the Bureau of Labor Statistics,²³ environmental engineers are mostly employed by management, scientific and technical consulting services and by federal, state and local governments. The bureau forecasts 83 percent growth for management, scientific and technical consulting services, and while environmental engineers make up only a small part of this sector's employment, the forecasted growth bodes well for this occupation.

With expanding environmental requirements, an increased understanding of sustainability and short- and long-term effects of greenhouse gasses, participants agreed that environmental engineering has a solid future. The Idaho Department of Labor's 2008-2018 Long-Term Occupational Projections estimated environmental engineers will grow more than 35 percent by 2018.



The next step in the career pathway of an environmental engineer tends to be based on successful leadership capabilities. Project management offers an advancement opportunity. Continued superior performance can also lead to organizational management positions.

Top: Workers install solar photovoltaic panels. *Photo: University of California San Diego.*

Bottom: Idaho National Laboratory professionals help K-12 teachers learn more about STEM concepts — science, technology, engineering and mathematics. *Photo: Idaho National Laboratory.*

²³National Employment Matrix, <http://www.bls.gov/data/>.

Methodology

Teams in the six Idaho Department of Labor Workforce Investment Act areas chose occupations or industries for analysis. In each area, the regional labor economist and a business solutions specialist or other department staff used regional employment and secondary information on green jobs to pick the targeted occupations and industries. Employers were then screened to identify those with the targeted green jobs as defined by the Idaho Department of Labor.* Workers in those occupations and hiring managers were then recruited for interviews or focus groups to provide more detailed information about what makes the occupation green, what core green area did their work take place in, skills, education, certifications, problems in the field, ideas for improvement and outlook for the future.

***Idaho Department of Labor's Green Job Definition**

A green job is one in which the work is essential to products or services in any of these core green areas:

- Renewable Energy and Alternative Fuels
- Energy Efficiency and Conservation
- Sustainable Agriculture and Natural Resource Conservation
- Pollution and Waste Prevention, Reduction and Management and Environmental Cleanup