



A Growing Green Economy: Opportunities of Tomorrow

**Supported by funding from the National Network of Sector Partners and
the City of Seattle Office of Economic Development**

**Seattle Jobs Initiative
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March 2009**

Support for the production of this report was provided by the National Network of Sector Partners and the City of Seattle Office of Economic Development. The author would also like to thank the following individuals for their input and insight into the production of this publication: Matt Houghton, Stan Price, Laurie Black, Barbara Hins-Turner, and David Kaz.

Seattle Jobs Initiative is a nonprofit organization that creates opportunities for people to support themselves and their families through living wage careers. All of our work is designed to eliminate barriers to good paying, long-term work. We creatively align support services - including housing, childcare, transportation and counseling - with job skills training and job placement assistance. Our policy work supports legislative changes that improve access to training and services for low-income individuals. Through partnerships and innovative approaches, we help people chart a path to economic self-sufficiency. For more information, visit <http://www.seattlejobsinitiative.com/>



Introduction

2008 was a particularly challenging year for the national economy and labor market. The combined impacts of rising energy prices, a housing market downturn, and the continuing credit crisis have created an economic environment characterized by decreased job growth and increased unemployment, the key indicators of a recession. At the same time, today's economy is in a state of transition that is driven in part by recognition that the need to be globally competitive and the need for practices and products that do not contribute to or stem the tide of global warming and environmental degradation are not at odds and can, in fact, be complementary. Interest in more efficient and sustainable practices and products continues to provide an opportunity for economic growth in these tough times. Evidence of this shift exists in a variety of forms – from green legislation and policy campaigns at all levels of government to programs preparing a workforce for the new 'green' economy.

The growing green economy is diverse, defined not only by jobs and products, but also by major public and private investments and government policies effecting change in the market. Many current and emergent sectors will be touched by new green innovations and policies, ranging from sustainable agriculture to energy efficiency and from green building to new and renewable energy resources.

The shift to a green economy necessitates understanding the potential labor market demand for jobs in the various industry sectors impacted by these changes—what are being defined as green and green collar jobs. This shift is taking place across a variety of areas – in policy and legislation, workforce and training initiatives, grass-roots campaigns, and within traditional industries – at national, state and regional levels. This report provides an overview of the current research on the green economy, including jobs, industries, and market outlook, with a particular focus on opportunities and obstacles in the Puget Sound region.

In addition, specific attention is placed on the Energy Efficiency sector within the growing green economy. The Energy Efficiency market is currently large, well established and growing.¹ The combination of a strong foundation with increased investment and entrepreneurial interest, and low relative cost to implement methods, make the Energy Efficiency industry a focal point for growing green jobs regionally. Our research identifies some of the green collar jobs associated with the Energy Efficiency sector, as well as the demand for these jobs in the Puget Sound region.

Finally, this work attempts to outline current and prospective opportunities for green job training programs, with attention paid to those programs aimed at helping low-income and low-skill populations onto career pathways in green sectors. The capacity of the local workforce system to meet the growing demand for skilled green labor is an essential component for a balanced, vital, and inclusive green economy. Through a greater understanding of the demands of this growing green economy, we can think about what is required from the available training system to make sure that there are opportunities to create pathways for low-income people out of poverty and into the good living-wage jobs of a clean energy economy.

Through this project, Seattle Jobs Initiative (SJI) aims to provide a foundation of knowledge about the growing green economy and its impact on jobs and career pathways. Specifically, this project continues work initiated by interest from the City of Seattle that examines local industries that are turning green and what this change means for local employers, workers, and available skills training. By broadening the scope of this research, as well as using Puget Sound efforts as examples of what's changing nationally, this report will contribute information to aid the development of other local and regional sector strategies in emerging green industries.

Interest in linking positive climate action legislation and policy to workforce and economic development efforts is growing at an accelerated pace. Efforts are underway at federal, state and local levels to spur the development of green economies and green jobs and training opportunities through advocacy and policy, with a particular eye towards green job creation and training pathways.

As part of the 2007 Energy Independence & Security Act, the U.S. House of Representatives included the groundbreaking Green Jobs Act of 2007, which proposed to direct \$125 million per year across the country to begin training 35,000 people annually for jobs in the clean energy sector.² Of this funding, \$25 million is earmarked for creating pathways out of poverty for low-income adults – targeted resources for those individuals who have the greatest need for training and career pathways in the green economy.

In addition to the Green Jobs Act, the Energy Bill of 2007 also includes Energy Efficiency & Conservation Block Grants, which distribute \$2 billion per year through competitive grants to cities and local governments for energy conservation, energy audits, fuel conservation programs, and the use of renewable energy.³ Though not specifically tied to job training, these programs will likely lead to an increased need for an appropriately trained workforce.

Recognition that both job training and green jobs are vital in efforts to bring the nation out of its current economic downturn is evident in the details of the American Recovery and Reinvestment Act of 2009. The Act invests an additional \$3.96 billion in Workforce Investment Act (WIA) programs that provide key training dollars for adult, dislocated worker, and youth programs, more than doubling the budget for these programs. This includes \$500 million for the Green Jobs Act of 2007 for research, labor exchange, and job training projects to prepare workers for careers in energy efficiency and renewable energy.

In addition, Energy Efficiency & Conservation Block Grants saw a boost through the stimulus package, with \$3.2 billion to be distributed to local governments and cities to assist in the development and implementation of energy efficiency and conservation strategies. Finally, \$5 billion has been appropriated for the Weatherization Assistance Program, sufficient to weatherize 1 million homes per year, while creating jobs in auditing and retrofitting industries.

Overall, analysis suggests that Washington State's share of the \$787 billion recovery package could potentially save or create 75,000 jobs, with significant funding going to infrastructure.⁴ For Washington, the American Recovery and Reinvestment Act includes over \$60 million to address its energy priorities, including the expansion of emerging renewable energy and energy efficiency technologies, and over \$60 million to help weatherize homes and businesses throughout the state, creating jobs, lowering energy bills, and reducing our dependence on foreign oil.

Washington State's Climate Action and Green Jobs bill has the potential to increase the number of green economy jobs to 25,000 by 2020.

At the state level, in 2008 Washington's legislature passed a first-in-the-nation Climate Action and Green Jobs bill that simultaneously aims to cut greenhouse gases emissions statewide and increase the number of green economy jobs to 25,000 by 2020 through investment in worker training.⁵ While this program has been authorized, and funding has been allocated to conduct the labor market study that will underpin any future training program, there was no funding allocated for the training program at the time. In the meantime, to meet the state's economic challenges during these tough times, Governor Gregoire has proposed a \$1.2 billion plan – Washington Jobs Now –

which, through immediate funding into infrastructure and construction projects, will potentially produce 20,000 jobs for Washingtonians over the next two years.⁶ Gregoire has also given specific attention to Green Jobs and Climate Action, with a plan that targets investments totaling \$455 million in transportation, renewable energy and energy efficiency projects that will support almost 3,000 jobs statewide through 2011.⁷ Also in the works in the Washington State Legislature is the Evergreen Jobs Act Initiative, introduced by Rep. Tim Probst, which aims to create 15,000 new green economy jobs by 2020, aligning with American Recovery and Reinvestment Act funds and targeting training for green jobs⁸.

Policy that encourages continued investment and labor market opportunities to support this economy exists at local levels as well. Recognizing the tremendous need for greenhouse gas emission reductions by increasing energy efficiency in residential and commercial buildings, Seattle Mayor Greg Nickels announced plans for a focused initiative to make Seattle the nation's Green Building Capital, putting a special emphasis on increasing the efficiency of Seattle's residential and commercial buildings. The three goals of this initiative, announced as part of the Mayor's 2008 State of the City Address are to: (1) improve the energy efficiency of residential and commercial buildings by 20% and increase energy efficiency in new buildings and major retrofits; (2) create job opportunities in the green economy; and (3) save Seattle residents and businesses money on energy costs.⁹ Next steps include implementing further policy that will encourage progress towards the Mayor's goals while at the same time creating opportunities for those residents most in need of pathways out of poverty.

Green Advocacy

As policy aims to direct the nation out of the economic recession, in part through investment and incentives in green industries, a movement exists to connect energy independence and sustainable practices with the populations most impacted by job loss and job shortages. Around the country, campaigns and initiatives are connecting the growing green economy with job training opportunities for low-income/low-skill individuals. These campaigns and initiatives have as their primary goal influencing current policy to encourage both environmentally friendly practices in the new economy and the simultaneous development of pathways out of poverty into green jobs. Key efforts around the nation include the following¹⁰:

- **Apollo Alliance** - A national coalition of business, labor, environmental, and community leaders working to promote policies and initiatives to speed investment in clean energy technology and energy efficiency, put millions of Americans to work in a new generation of well-paid, green collar jobs, and make America a global leader in clean energy products and services.
- **Green For All** - A national effort advocating for local, state and federal commitment to job training, job creation, and entrepreneurial opportunities in the emerging green economy, especially for people from disadvantaged communities.
- **Green Jobs for America** - Launched by the Sierra Club, the United Steelworkers, the Natural Resources Defense Council, and the Blue Green Alliance, this is a public education campaign currently concentrated in 12 states to encourage investment in and focus policies on energy independence and growing good green jobs.

In addition to campaigns aimed at promoting policies that nurture investment in a green market at the national level, many city and local grassroots movements are creating energy efficiency initiatives as part of their broader visions of becoming greener communities and are including green jobs development within these efforts. Organizations like the Green for All campaign are continually providing information on programs, campaigns, and initiatives in various stages of planning and implementation on the vanguard to prepare workforces for a new economy defined by energy efficiency and sustainable practice.¹¹ Combined, these initiatives illustrate increased efforts on the part of local governments to combine important climate action initiatives that are good for the earth, good for business, and good for workers and their families.

Campaigns and initiatives are connecting the growing green economy with job training opportunities for low-income/low-skill individuals.

Green Investment & Economic Development

As the economy struggles to stay afloat, investments from the federal government within the American Recovery and Reinvestment Act are key to supporting the stabilization and projected growth in green industries. Specifically, the final economic recovery package invests \$92 billion in clean technology, including nearly \$33 billion in clean energy and nearly \$27 billion in energy efficiency nationwide.¹² Such investments will support key innovation nationwide in these vital areas as well as create a variety of job opportunities in the new green economy.

All signs point to a sector growing most strongly where public policies build a market framework that encourages the adoption of new technologies.¹³ In the Northwest, "public policies to help emerging [green] businesses commercialize and market their products could help the region attain a 3.5% share of the global market, resulting in 32,000 jobs over the next 20 years".¹⁴ Green business in the state of Washington has been growing at roughly 5% annually during the past 3 years, and is coupled with increased job growth.¹⁵ Clean energy technology in the state is represented by more than 240 organizations, more than \$2.1 billion in 2004 revenues.¹⁶ Estimates predict that investments in the green economy in Washington state could quadruple the number of "green jobs" by 2020.¹⁷

Interest in green energy, technology and sustainability practices has boomed in the Puget Sound region in recent years, foreshadowing what some have called the next industrial revolution.¹⁸ The Clean Technology¹⁹ Industry in the Puget Sound Region is a \$330 million industry with a 4.6% compounded annual growth rate.²⁰ The Prosperity Partnership, a coalition of Puget Sound regional government, business, labor and community organizations dedicated to developing and implementing a common economic strategy, has selected clean technology as one of its five pilot clusters for research and strategic development. To target its efforts to support the clean technology cluster, the Prosperity Partnership formed a Clean Technology Cluster Strategy Development Working Group tasked with identifying specific action initiatives to be implemented by 2010.

All signs point to a sector growing most strongly where public policies build a market framework that encourages the adoption of new technologies.

In addition, as an outgrowth of the Prosperity Partnership’s efforts, the first-ever statewide clean technology industry association, the Washington Clean Technology Alliance, was formed in the spring of 2007. This organization provides networking and advocacy for the hundreds of clean technology companies and suppliers in the state, and helps to support the sustainable growth and accelerate the development of clean technology in the region.

Increased public and private investment in green innovations and demand for skilled labor to perform the jobs to fuel the market for these innovations together make for a growing green economic future. Much of the expansion will take place in traditional industries like construction and manufacturing. This translates into many opportunities for individuals with the appropriate skills to enter into jobs that provide livable wages and are good for the earth. In order to better understand the power of this growing green economy, one must first understand the scope of the industries going green and the jobs that will be impacted by this shift.



Green Industry Sectors

Greater investment and interest in clean energy and sustainable practices means economic development and market growth for a variety of industry sectors. While significant growth will take place in advancing technology and engineering, expansion will also occur in traditional industries like construction and manufacturing. This section takes a closer look at the industry sectors created by the growing green economy, as well as the kinds of jobs potentially required to support this growth. Particular attention is paid to the Energy Efficiency industry sector as it is a natural starting point for investment with significant achievable outcomes.

By synthesizing information from various sources on the green economy, SJI has categorized the growing green economy and its green jobs into eight sectors: Energy Efficiency, SmartGrid/Smart Energy, Renewable Energy, BioFuels, Green Building, Alternative Transportation, Recycling & Waste Management and Sustainable Agriculture. Appendix Table 1 attempts to categorize the requirements and potential occupations associated with these green industry sectors.

The following is a brief synopsis of the eight sectors:

- **Energy Efficiency** is the use of technology as well as operation and maintenance that requires less energy to perform the same function – getting more use out of the energy we already create. HVAC engineers, building control technicians, electricians, energy auditors, and insulation workers are only a few of the occupations defining this sector.
- **SmartGrid/Smart Energy** can be defined as the improvement of power delivery systems to be more efficient, reliable and safe. Occupations typically associated with this sector include power engineers and computer technicians to design, manufacture, and provide maintenance for these new systems.
- **Renewable Energy** is produced through resources such as sunlight, wind, rain, tides and geothermal heat which may be naturally replenished. Increases in the use of these technologies for energy production will require jobs in manufacturing (solar panels, wind turbines), as well as operators and maintenance technicians to keep these systems running properly and efficiently.
- **Biofuels/Biomass** refers to the creation and use of fuel sources from chemical or biological materials other than fossil fuels for the generation of power. This industry requires the cultivation of resources such as corn crops to produce ethanol, and therefore employs a host of different occupations – from farmers to process technicians in biodiesel companies.
- **Green Building** is the practice of increasing the efficiency with which buildings use resources — energy, water, and materials — while reducing building impacts on human health and the environment through better siting, design, construction, and removal. The green building sector employs architects versed in green design to plant operators creating green materials to laborers at green construction sites.
- **Alternative Transportation** encourages the creation of modes of transportation (electric cars, mass transit, bicycles) that are powered by sources other than depleting fuel sources. Occupations range from technology designers to hybrid automotive maintenance workers.
- **Recycling & Waste Management** is the collection, transport, processing, recycling or disposal of waste materials to reduce their effect on human health and the environment, and/or to recover resources from them. Waste treatment operators, technicians, and all types of handling positions are required to meet the functions of this sector.
- **Sustainable Agriculture & Horticulture** encourages practices in plant and animal production that are efficient and sustainable. This sector employs a variety of occupations – from organic farmers to urban agriculture land use planners to green roof designers.

As part of the Green Jobs and Climate Action Bill of 2008, the State of Washington tasked the Community, Trade and Economic Development Department to develop common definitions for the green economy including defining green industries, sectors and jobs, supported by extensive labor market research. In general, both the strategic framework and definitional list developed as a result of this research line up with the above definitions for sectors within green industries.²¹ Further, both efforts to create definitions admit that distinguishing green industries and the green jobs within these industries is not a precise exercise, and they will likely grow and evolve in tandem with industry growth. There is consensus, however, that the industry sectors created by the growing green economy are in large part modifications of many traditional industries – construction, manufacturing, utilities, agriculture, etc. In addition, these green industries and their corresponding occupations overlap one another, increasingly the difficulty of tracking green job creation. Similarly, green jobs aren't often identified as such, and can be found throughout companies of all sizes and sectors.²²

Sector Focus: Energy Efficiency

Of the many sectors created in the green economy, Energy Efficiency is considered a major new economic and employment driver—a dynamic economic sector rich in new jobs. As an area considered by many climate action, economic and workforce initiatives as 'low-hanging fruit', Energy Efficiency is one of the first areas to start when discussing how to promote a green economy that is both good for the people and good for the planet. Combined with the aforementioned increased investment and entrepreneurial interest, and low relative cost to implement methods, the Energy Efficiency industry has made itself a focal point for growing green jobs in the Puget Sound region.

As part of a group of sectors making up Clean Technology²³, Energy Efficiency is getting significant attention, both in terms of investment and entrepreneurial interest.^{24,25,26} It is already recognized as large, well established and growing.²⁷ Pacific Northwest Energy Efficiency industry companies report strong and continued business growth.²⁸ Energy Efficiency products and services are projected to bring in more than \$2 billion in annual sales through 2020 for the region.²⁹ Behind much of this attention is the fact that as a conservation effort, Energy Efficiency is the absolute cheapest source of new power.³⁰

Green Jobs

In addition to understanding the areas of industry sector growth, it is essential to understand what kinds of jobs will be created by investments and policies driving the green economy, and how workforce trends will impact the availability of skilled labor to perform those jobs.

The potential variety of occupations within the green industrial sectors is extensive. The current market demand and available workforce for green jobs is largely reflective of its traditional blue-collar counterparts. The majority of green jobs are the existing traditional skilled trades jobs, varied only by the possibility for specialization or material use. For instance, a traditional electrician and an electrician working on solar panels differ only in specialized knowledge and skills. In terms of training and wages the two are essentially equal. Further, an electrician contracted to work on a non-green or 'gray' project one week may move to a green building retrofit the following week.

Green jobs have a direct positive impact on the environment in the primary industries of a green economy that promote environmental protection and/or energy security.³¹ These jobs include a mix of skilled trades and professional jobs in the primary sectors of a clean-energy economy – energy efficiency, renewable energy, and alternative transportation and fuels.³² Other industries include green building and design, land use planning, sustainable agriculture, waste remediation and conservation.

Green collar jobs are a subset of all green jobs, as defined by the Green For All campaign, Apollo Alliance, and multiple other sources centered on job creation in the green economy. These jobs are traditionally blue-collar jobs, concentrated in industries such as construction and manufacturing, and specifically in those green businesses whose services and products directly improve environmental quality. While many will be new occupations, most green collar jobs are existing jobs that require new green economy skills. These jobs typically pay family-supporting wages and provide good benefits and healthy

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working conditions. They are often localized, making them harder to move offshore, providing a greater economic ripple effect in local communities.³³ They are typically obtainable middle-skill jobs, requiring some education and training beyond a high school diploma but less than a 4-year degree.³⁴ Most importantly, these are jobs that are accessible to low-income individuals and that have opportunities for advancement through available skills training and career pathways.

The new jobs of the green economy have the power to redirect our current path of environmental decline and create economic opportunity by rebuilding a strong middle class, providing pathways out of poverty, strengthening urban and rural communities alike, and providing individuals with skills and jobs that are good for them and good for the planet.³⁵ "These jobs create local economies and are strong enough to lift people out of poverty, all while rolling back pollution and creating healthier cities and more equitable livelihoods for all Americans."³⁶

Sector Focus: Energy Efficiency Sector Jobs

The sum of industry and policy momentum around the growing Energy Efficiency sector as a driver for economic development and climate action in the Puget Sound region has created an immediate need to understand the potential labor market demand for jobs and workers in the Energy Efficiency industry sector.

In 2006, the Energy Efficiency industry nationwide exceeded 8 million jobs (90% in private industry).³⁷ Modest projections forecast an additional 7 million jobs in energy efficiency nationwide by 2030. A national reduction in energy consumption levels of 35% over the next 30 years could result in creation of nearly 81,000 jobs divided nearly evenly between the commercial and residential sectors.³⁸ Energy efficiency accounts for over half of all green jobs in Washington State.³⁹ Construction-related industries and occupations account for 70 percent of employment in the Energy Efficiency area, followed by professional and technical services such as architecture and engineering. The Seattle-King County Workforce Development Area (WDA) accounts for the largest share of all green jobs across the state.⁴⁰ This estimate could increase by over 40,000 by 2038 given consistent investment in green policies and programs.⁴¹ Sixty-nine percent of all green jobs in the Seattle-King County WDA are in energy efficiency.

The Energy Efficiency sector generally focuses on retrofitting existing buildings that would have otherwise not been improved upon, which may include mechanical, electrical and plumbing upgrades. Retrofitting existing buildings to be more energy efficient includes a variety of skills and jobs, mainly including "manufacturing the construction materials and devices to make buildings more efficient, as well as construction jobs and high-skill auditing jobs".⁴²

Labor market research at state and local levels has begun to identify the occupations that make up this growing green economy sector. New sustainable job opportunities may require new skills and specializations within the Energy Efficiency sector – however, the majority of jobs within the sector will be in fields that presently exist. While there will continue to be a need for degreed engineers to design and understand new building systems, many of the jobs associated with energy efficiency retrofitting look a lot like traditional construction jobs – HVAC installers, installation workers, and sheet metal workers, to name a few.⁴³ Roughly two-thirds of the occupations in energy efficiency are green-collar jobs, requiring some post-secondary training but not a 4-year degree, and provide family-supporting wages and benefits.⁴⁴

Energy Efficiency's growth comes with substantial employment impact potential. The following table illustrates estimated job projections for selected middle-skill occupations in the Energy Efficiency sector, many of which are likely to be related to the building construction industry. Projections for these potential Energy Efficiency occupations forecast as many as 2,200 jobs to be added by 2016 in the Seattle-King County region. While these numbers total all jobs in the larger building construction industry – green or not – based on the large investment in energy efficiency both publically and privately to spur the market, the majority of these newly created openings will be touched in part or wholly by green skills, materials, and projects.

King County Energy Efficiency Job Projections*

Occupation	Estimated Employment in 2009**	Estimated Employment in 2011**	Avg. Annual Openings Due to Growth (2011-2016)**	Estimated Employment in 2016**	Median Wage March 2008***	Avg. Education/Training Nationally†
Carpenters	17,328	17,278	123	17,985	\$52,362	Long-term OJT
Construction Laborers	9,601	9,724	56	10,005	\$32,716	Moderate-term OJT
Electricians	5,266	5,451	59	5,747	\$58,538	Long-term OJT
Plumbers, Pipefitters, and Steamfitters	4,496	4,638	45	4,863	\$57,260	Long-term OJT
Sheet metal workers	2,277	2,298	23	2,415	\$65,026	Moderate-term OJT
Heating, AC, and Refrigeration Mechanics and Installers	1,594	1,659	19	1,753	\$57,075	Long-term OJT
Cement Masons and Concrete Finishers	1,188	1,189	10	1,239	\$59,298	Long-term OJT
Insulation workers, floor, ceiling and wall	111	107	1	113	\$31,910	Moderate-term OJT
Hazardous materials removal workers	636	644	4	666	\$44,300	Moderate-term OJT
Boliermakers	132	142	2	152	\$57,514	Long-term OJT

* Seattle-King County Workforce Development Area. Energy Efficiency occupations in this chart come from "Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy" March 2008. Sarah White & Jason Walsh. Center on Wisconsin Strategy, The Workforce Alliance, The Apollo Alliance: p. 16.

** Occupational Employment Projections, June 2008, Washington Employment Security Department, Labor Market and Economic Analysis Branch. Employment projection totals include both replacement and new job openings.

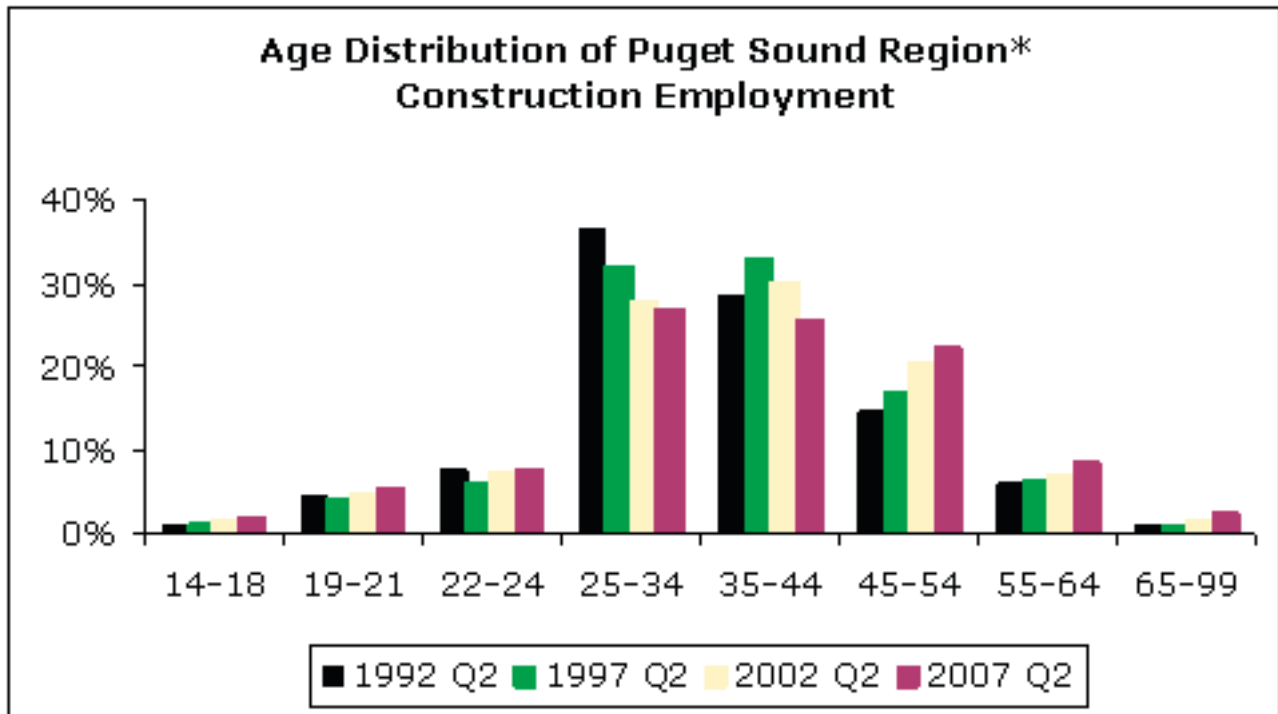
*** Wage Data from Bureau of Labor Statistics Occupational Employment Statistics Wage Survey – March 2008.

† OJT: On-the-job training. Moderate-term on-the-job training requires from one to twelve months of training, which typically occurs at the workplace. Long-term on-the-job training requires more than one year of on-the-job training, or combined work experience and classroom instruction, and may include apprenticeships of up to five years. Source: Bureau of Labor Statistics.

Green Labor Market Challenges

While demand is current and growing, the reality is that there is short supply of a ready skilled workforce to do the work. The industries which contain many of the blue-collar jobs going green – Construction, Manufacturing, Utilities – will feel much of the weight of producing the critical workforce needed for filling the demand of the green economy.

In terms of quantity, one major reason for the worker shortage is aging demographics within key trades industries. While Washington State has seen a 62% increase in registered apprentices over the last 2 years, the need to fill positions increasingly vacated by a retiring workforce presents a hurdle.⁴⁵ As the following chart shows, for example, the majority of the present construction workforce is over the age of 35, with a small supply of individuals aging in to fill those vacancies once these aging baby boomers retire. While short-term recession dynamics may stall the retirement of some individuals, the long-term reality means that these individuals will be leaving the workforce without adequately trained individuals to replace them. Another contributing factor to the skilled labor shortage is the lack of interest by young people in entering the trades. The shortage is exacerbated by the decline of vocational training and career education in schools.⁴⁶



* Seattle-Tacoma-Bellevue Metropolitan Development Area Source: U.S. Census Bureau, Local Employment Dynamics

Still, much of the shortage can be attributed to quality issues, specifically a lack of individuals with job-specific skills, including critical thinking and math. Washington employers continue to report difficulty finding qualified applicants to fill their openings, with the shortage being greatest in those positions requiring some form of post-secondary training.^{47,48} The lack of a skilled workforce is the largest non-technical barrier to the advancement of renewable energy and energy efficiency technologies, according to a 2006 study by the National Renewable Energy Laboratory (NREL).⁴⁹ Employers also continue to report a paucity of individuals properly trained in the basic skills necessary for work in the Energy Efficiency field and a lack of direct energy efficiency experience at all levels and all job positions.⁵⁰ This shortage of a skilled ready workforce has serious stalling potential for the advancement of renewable energy and energy efficiency technologies.⁵¹

The lack of a skilled workforce is the largest non-technical barrier to the advancement of renewable energy and energy efficiency technologies.

This 'perfect storm' of shortages in skills, numbers, interest and investment in training, especially with the projected growth in jobs impacted by a booming green economy, will mean a devastating shortfall of workers in just a decade or two.⁵² At the same time, the potential exists to promote policies that are both beneficial to the environment while creating opportunities for individuals to get on pathways towards living wage careers that this new green economy will demand. The development of workforce strategies that are comprehensive, collaborative, and have the potential for systemic and scalable application, and create opportunities to lift people out of poverty and onto pathways towards living wage jobs in a green economy are vital to the economic and environmental health of the Puget Sound region.

Green Workforce Preparation

The foundation has been set for a green economy that can positively impact the environmental future, economic development, and accessible jobs. The capacity of the local workforce system to meet the growing demand for skilled green labor is an essential component of a balanced, vital, and inclusive green economy. A significant determinant of the success of this economy will rest on the availability of a workforce that is trained for and ready to enter these good green opportunities. Investment in training efforts that prepare individuals for these jobs, particularly efforts that include populations that often are left behind by technological progress, is essential. Increasing interest in the jobs created by the green economy is matched by a growing focus on current and potential programs linking low-income residents with green jobs as a pathway out of poverty.

Efforts are underway to understand the needs of industry employers and workforce training opportunities as they ramp up for this growing green economy. The Northwest Energy Efficiency Taskforce (NEET) has brought together stakeholders from utilities, government, labor, industry leaders, environmental advocates and other representation vital to the growth of energy efficiency in the Northwest to propose action steps for the growth of this sector. In NEET's most recent report, the Energy Efficiency workforce pipeline is cited as a critical regional need.

Several factors present challenges that may impede the projected attainment of energy efficiency. Primary among these is the imminent retirement of 50% of the workforce in the coming five years. Magnifying the importance of this trend is a general decline in the working age cohorts of the population until 2030, and particularly declining numbers of workers in the skilled trades as well as graduates and enrollments in engineering programs.⁵³

Washington State is taking a lead role in these regional efforts, with Centralia College's Center of Excellence for Energy Technology providing NEET with strategic coordination of existing energy efficiency programs across the Pacific Northwest.

A significant determinant of the success of this economy will rest on the availability of a workforce that is trained for and ready to enter these good green opportunities.



In Washington, the Energy Technology Skills Panel, funded by the Workforce Training and Education Coordinating Board, is in its fourth year of establishing training standards for the energy industry. The Panel brings together key stakeholders in the energy industry to collaborate on identifying potential gaps in industry workforce and skills. Working with government, educators, labor, workforce and economic development professionals, the Panel identifies and implements strategies to close those gaps, develops skills standards and new trainings and strategies to grow enrollments for current training programs in the energy field. This coordinated effort provides valuable information to the utilities industry on how it can most effectively meet its workforce challenges. The Seattle-King County Workforce Development Council (WDC) is currently leading a similar Skills Panel, focused specifically on green construction, and chaired by David Allen, Executive Vice President of McKinstry Co., the leading mechanical construction and engineering firm in the Pacific Northwest.

In order to fill these high-demand jobs of the new green economy, it is essential that training programs, either retooled existing or newly developed programs, are coupled with appropriate supports for the low-income/low-skill workers who need them most. The creation of career pathways requires accessible and applicable training in the skills required for the work ahead. Efforts are developing to meet the demand of the local green economy by preparing workers, especially those with low-skills, to take advantage of emerging green job opportunities. Increasing interest in the jobs

created by the green economy is matched by a growing focus on current and potential local programs linking low-income residents with green jobs as a pathway out of poverty.

Training for those green jobs with foundations in the traditional industries has been around for decades. Apprenticeships for traditional tradeswork - including those many blue collar jobs getting a green lining - have for years incorporated new and innovative elements as the industries and nature of the work for which they provide training change. For instance, the electrical workers union apprenticeship has been training in solar for 30 years. Still, to brace for the larger changes forecasted for these traditional industries that will result from the growing green economy, the creation of green apprenticeships and other green trainings is now occurring. In some cases, this may mean rethinking the structure of some training, such as front-loading 'green' skills training in apprenticeships to attract more individuals to the greener trades of tomorrow, which can help alleviate the shortages felt by the trades apprenticeships.

In order to fill these high-demand jobs of the new green economy, it is essential that training programs are coupled with appropriate supports for the low-income/low-skill workers who need them most.

In addition to the traditional trades providing green skills training as part of their workforce preparation, emerging energy technologies and innovations in industry require many new skills and will require training programs to deliver them. There exist a handful of green job training programs currently operating that provide on-ramps to green economy jobs for at-risk populations.

In King County, a variety of opportunities exist for training in green industry sectors. Some examples of 'green job training' have existed locally for many years. EPA Brownfields grants to King County to provide training for low-income participants to work as environmental technicians in industrially contaminated parcels of land have been awarded since 1999.⁵⁴ In March 2008, King County Jobs Initiative was awarded \$200,000 to continue this targeted training. The funds will provide 72 South King County residents with 238 hours in environmental clean up and construction readiness credential training.⁵⁵

Efforts are also underway to connect young adults with the growing high demand jobs in a green economy. Opportunity Greenway, operated during Summer 2008 through King County Work Training Program, and with the involvement of other county departments as well as local community and technical colleges, provided classroom and on-the-job training in various "green" fields such as carpentry, weatherization, energy auditor, power utility worker, cement mason, heating and cooling installation, and energy efficient windows glazier to more than 40 youth ages 16 to 21. In addition, the Moontown Foundation, through the SWITCH project, in partnership with Seattle Housing Authority, Seattle City Light, and Seattle Public Utilities, is working to link economically disadvantaged and socially disconnected young adults to the new green economy through basic home weatherization and energy efficiency training.

Pre-apprenticeship training is available to provide opportunities for those individuals traditionally not represented in the trades – women and people of color – to work towards a career in construction. Though not required for placement in apprenticeships, they are often a good entry point for people in need of basic skills and on-the-job training. These programs aim to prepare people for the rigors of the job, leading in most cases to apprenticeship placement where they gain on-the-job hard skills applicable to their chosen trade. Pre-apprenticeship programs provide instruction on both the soft and hard skills necessary to gain access to apprenticeships and secure future employment in the construction industry.

More recently, efforts have been initiated to begin training the local workforce for the green jobs of the future. A variety of community and technical colleges in King County have begun to implement certificate and degree programs specifically geared towards the growing green economy. In general, currently available training programs trend towards workshops for the general public, with only a handful of articulated curricula aimed at preparing students for middle-skilled occupations in the growing green economy. Many programs, however, are still in the planning stages.

- **Seattle Central Community College** runs a Sustainable Building Advisor program intended primarily for building industry professionals (architects, engineers, developers) which meets on weekends over the course of 9-months.

A variety of community and technical colleges in King County have begun to implement certificate and degree programs specifically geared towards the growing green economy.

- **South Seattle Community College** conducts an 8-week Residential Energy Auditor Training course, designed to prepare students to take the national energy auditor certification exam upon completion.
- **South Seattle Community College** is planning to develop curricula to teach sustainable building management, focusing on maintenance, operations and energy efficiency.
- **South Seattle Community College** is also in the planning stages of a Green Jobs Training Program, consisting of 12-weeks of contextualized training, skills for greening trades, and additional remediation services.
- **Shoreline Community College** currently offers a Solar Energy Program, which includes short-term certificates in Energy Audit, Solar Energy Designer, and Zero Energy Building Practices. In addition, they are developing a Zero Energy Technology AAS degree program.
- **Cascadia Community College** offers an AAS-T degree in Environmental Technologies and Sustainable Practices to be used in commercial settings.
- **Cascadia Community College** also offers certificate programs – Energy Management Specialists and Solar PV System Specialist.
- **Lake Washington Technical College** operates an Environmental Horticulture program, with certificate and AAS options available.
- **Edmonds Community College** is currently developing an Energy Management program.
- **Green River Community College** offers certificate and AAS degree programs in Water Supply and Wastewater Technologies.

The above list is a snapshot of the efforts taking place in the local community college system to address the needs of a changing economic and workforce landscape. New programs are growing and changing every day, so this is by no means an exhaustive list of the possibilities locally. In addition, innovative collaborations and applications present new opportunities between community colleges, workforce training organizations and community based organizations to more effectively address the needs of these growing sectors and simultaneously ensure that this momentum is inclusive of all populations.

Innovative collaborations and applications present new opportunities... to more effectively address the needs of these growing sectors.



Sector Focus: Energy Efficiency Workforce Preparation

Spearheaded by Van Jones⁵⁶, momentum is increasing to connect people most in need of jobs with those jobs currently and increasingly in need of people, through green job training programs. These programs seek to provide workers, chiefly low-income residents, with the skills required to enter the green economy as a way out of poverty.

Increased efforts are underway to address the specific workforce needs of the Energy Efficiency sector. Centralia College's Center of Excellence for Energy Technology is coordinating many programs across the state in energy-related fields, serving as a resource hub for training demand, curriculum development and application in occupations related to the growing energy efficiency field. As part of this coordination effort, steps to address the growing needs for sustainable practices in the energy field are becoming a significant focus.

Most recently, Second Chance Washington, Seattle-King County's Workforce Funding Collaborative, proposed an innovative and collaborative effort to systematize energy efficiency career pathways, bring them to scale, and sustain them over time, through funding from Living Cities. The proposed 15-month project – NEW OP (Northwest Energy Efficiency Workforce Opportunities Project) includes the formation of a workforce intermediary for the Energy Efficiency cluster. Through cluster research on assets and initiatives, training programs' current curricula, capacity, entry points and needs, supply chain, core competencies and skills in both residential and commercial energy efficiency occupations, this project will design and implement a residential energy efficiency cohort-based pilot training program, research and pilot a commercial energy efficiency curriculum, and maintain the intermediary as a clearinghouse resource for continued efforts in the Puget Sound energy efficiency sector.

Recommendations for Green Sector Approaches

This report aims to provide a foundation for others interested in developing sector strategies targeted to the growing green economy. Using as examples current green sectoral efforts in the Puget Sound region – specifically those addressing the worker and skill needs in the growing Energy Efficiency sector – some broader recommendations can be posited to inform other regions and locales interested in moving forward with similar sectoral approaches.

A first step in advancing plans around green sector job growth strategies is seeking to understand the local impacts of relevant state and federal legislation on local job growth and training potential. Further, one should examine potential drivers at local levels, such as clean energy initiatives, that can have significant impacts on the needs for a trained skilled workforce in a given sector.

- Explore legislation at the federal and state level, including policies that focus on green initiatives or climate change, and examine what impact these policies might have on your local green economy and potential green workforce.
- Understand federal and state funding that may be directed towards growing green sectors. Find out how such funds – specifically the American Reinvestment and Recovery Act and Green Jobs Act funds – will be used, and through what entities, to potentially grow skills training opportunities for a green workforce.
- Communicate with state and local policy officials to gain an understanding of their strategies around aligning these drivers to efficiently bolster green sector growth.

Equally important to public policy-driven growth in the green economy is investment in economic development of particular sectors. Close examination of the activity taking place locally around green energy and clean technology, including business growth as well as economic development incentives for local businesses, is vital in understanding the business climate and potential employer needs in a growing green economy.

- Identify key economic development organizations and stakeholders in your region – trade groups, large employers, and business associations. Talk to these entities to find out about efforts to include green sectors in business development strategies, perceptions of the impact of policies and investments, business interest and venture capital in green sectors, projected business growth, future opportunities, and associated workforce needs in both the short- and long-term.

By understanding the combined impacts of policy and economic development investment, baseline evidence naturally emerges around what sectors are more immediate and viable in a region. This potential must be tempered by analysis of what's going on in local labor markets currently, and how potential shifts in workforce, based on availability of a skilled workforce, may impact this growth in the short- and long-term.

- Understand the present and future challenges of the broader workforce in your region. Demographics, educational attainment, and skills required are all vital information for forming sector approaches that provide opportunities for all.
- Investigate labor market projections in your region. Many states and regions have performed labor market studies that investigate business growth and workforce potential in the growing green economy.

While efforts are required to further understand the growing green market, local business and job growth potential, the research outlined in this document clearly points to a need to build the capacity of existing training pathways as a fundamental point of departure for skilled living wage trades work in energy efficiency. As is evident, many of the jobs associated with energy efficiency look a lot like traditional construction jobs.⁵⁷ Therefore, critical to creating opportunities for low-income, low-skill individuals to move into burgeoning green jobs is emphasizing training in existing opportunities.

- Inventory availability and capacity of existing training programs that are going green. This includes community colleges, workforce organizations, apprenticeship and pre-apprenticeship opportunities.
- Based on the foundation of information regarding policy, economic development, and labor market availability, examine what training is required to meet the demands of these combined influences.
- New efforts in program development are taking place at a rapid pace. Staying informed and communicative between workforce development organizations, regional training partners, unions, community colleges, and community-based training providers can create supportive partnerships that translate into broad-based successful sector initiatives that meet the demands of the growing green economy.

The growing green economy is changing every day. This growth is driven by multiple factors – the need to stay globally competitive, the need to shift towards products and practices that do not contribute to global warming and environmental degradation, and the need to be inclusive of all populations by providing pathways out of poverty in the growing green workforce. Sector strategies in this growing green economy can be most effective when they are supported by information about the policies, investments and labor market dynamics that will impact their potential.

Key Resources for this Report

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Appendix Table 1: Green Industries

Industry Sector	Definition	Requirements	Sample Occupations
GREEN BUILDING/ SUSTAINABLE/ INTEGRATED DESIGN <i>Traditional Industry Sectors: Manufacturing; Construction; Utilities</i>	the design and construction of environmentally sustainable and energy efficient buildings	Manufacturing building materials; planning, design and construction	Green architects; HVAC workers; Carpenters; Plumbers; Welders; Electricians; Sheet-metal workers; Cement masons; Skilled machine operators
ENERGY EFFICIENCY <i>Traditional Industry Sectors: Manufacturing; Construction; Utilities</i>	the retrofitting of existing building infrastructure using healthy and more resource-efficient models of construction, renovation, operation, maintenance, and demolition.	Auditing energy use in existing buildings; Manufacturing materials and devices; Installing efficient lighting and heating systems; Installing insulation, windows and appliances; Production of appropriate technologies (fluorescent lights, water filtration systems, permeable concretes, solar panels, etc.); Maintenance & operation	Electricians; Technicians; Insulation workers; Equipment and installation specialist (solar panel installation); Home weatherizing; Energy Auditors

Appendix Table 1: Green Industries (cont'd)

Industry Sector	Definition	Requirements	Sample Occupations
RENEWABLE ENERGY (SOLAR/PV, WIND ENERGY, GEOTHERMAL, HYDRO/MARINE) <i>Traditional Industry Sectors: Utilities</i>	the use of natural resources (other than Biomass) for energy which are naturally replenishable	Manufacturing parts; Assembly & installation of solar panels/ finished heating systems Constructing wind farms; Operating and maintaining wind turbines; repairing systems; Marketing and selling systems to consumers	Solar panel installer; Steelworkers
RECYCLING/ WASTE MANAGEMENT/REMOVAL <i>Traditional Industry Sectors: Manufacturing; Utilities; Technology</i>	the collection, treatment, and disposal or reuse of waste materials	Composting; Materials reuse and recycling; Pollution Control; Water Conservation & treatment; Components, Manufacturing & Distribution/ Enabling Technology; Environmental Consulting, Protection & Remediation	recycling technician;; Waste treatment operators Sustainability coordinator Bio-mimicry engineer Environmental science and protection technician
SMART GRID/SMART ENERGY <i>Traditional Industry Sectors: Manufacturing; Utilities</i>	auto-balancing, self-monitoring power grid that accepts any source of fuel and transforms it into a consumer's optimal renewable energy usage with minimal human intervention	Manufacturing & Installation, Distributing and marketing products	Field and control engineers Communication protocol program manager Managing consultant
BIOMASS/ BIOFUELS/ BIOSYNERGY/ ETHANOL/ FUEL CELLS/ HYDROGEN <i>Traditional Industry Sectors: Manufacturing; Construction; Agriculture; Transportation</i>	fuel creation from chemical/biological materials other than fossil fuels	Growing and harvesting crops for feedstock, collecting waste oils for feedstock, manufacturing parts for production facilities; construction, maintenance and operation of production facilities	Process technicians in biodiesel or ethanol companies
VEHICLE ELECTRIFICATION/ ALTERNATIVE TRANSPORTATION <i>Traditional Industry Sectors: Transportation</i>	A ground vehicle propelled by a motor powered by electrical energy from rechargeable batteries or other source onboard the vehicle, or from an external source in, on, or above the roadway	Public Transportation Bicycle repair & bike delivery services Transit line construction Emissions brokers Engine component manufacturing	Research and Development jobs Technology design jobs; Hybrid & Biodiesel vehicle conversion & repair jobs; Maintenance jobs; Automotive service technicians and mechanics
SUSTAINABLE AGRICULTURE/ GREEN SPACE <i>Traditional Industry Sectors: Agriculture</i>	an integrated system of plant and animal production practices that are efficient and sustainable	Production Marketing Processing Consumption	Sustainable/organic farming Local Food production/systems Forestry - sustainable forestry worker; Urban agriculture; Land use planning; Sustainable landscaping

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