GREEN JOBS GROWTH PLAN 2011 TO 2019

AN EIGHT-YEAR MAP TO A GREEN ECONOMY IN OREGON

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A report by 3EStrategies

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Executive Summary

In 2009, the Oregon Legislature passed House Bill 3300, calling for the creation of, "a plan for a green jobs growth initiative to promote the development of emerging technologies and innovations that lead to, create or sustain family wage green jobs." HB 3300 requires:

- The Oregon Workforce Investment Board (OWIB) to develop a plan for a green jobs growth initiative that creates or sustains family wage green jobs.

- The Oregon Business Development Department (OBDD) to develop criteria for existing investments and new or expanded financial incentives, and comprehensive strategies to recruit, retain, and expand green economy industries and small businesses, and to make recommendations for new or expanded financial incentives and comprehensive strategies to stimulate research and development of green technology and innovation.

To develop the Green Jobs Growth Plan, Governor Kulongoski convened a Green Jobs Council and the State hired 3EStrategies, LLC, to work closely with OWIB and OBDD to develop the Plan.

The *Oregon Green Jobs Growth Plan 2011 to 2019: an Eight Year Map to a Green Economy* was completed in October 2010. Based on an unprecedented amount of research into labor market, wages and economic impacts data, the plan lays out an ambitious set of recommendations designed to accelerate Oregon's movement toward an economy that promotes environmental protection and restoration, energy security, and provides economic opportunities for people across educational levels and the income spectrum.

The Oregon Green Jobs Growth Plan was designed to meet the following objectives:

- Generate job creation in green sectors quickly, while simultaneously identifying career pathways and opportunities for developing job stability and family wages longer term in each of these sectors;

- Provide strategic green knowledge and skill sets to the existing workforce across industry sectors;

- Take steps to assure that workers are fairly compensated for having developed new skills that lead to employment;

- Establish the foundation for creation of a strong workforce for targeted emerging green industries; and

- Lay out effective strategies for integrating workforce development and economic development seamlessly.

Intended quantifiable outcomes of the recommendations in this plan include:

- Grow jobs in the four top-priority targeted industry sectors (Energy Efficiency, Renewable Energy Production/ Generation, Green Manufacturing, and Energy Transmission and Storage) by 30% cumulatively over the eight-year span.

- Grow jobs in the second-tier targeted industry sectors (Green Building and Development, Transportation, Agriculture/ Sustainable Forestry, Environmental Technologies and Services) by 13% cumulatively over the eight-year span.
- Add or significantly expand at least 80 green businesses.
- Increase total dollar output from the eight targeted industry sectors by 30%.
- Strengthen Oregon's position as a leader in green economic activity in a manner that creates a more diverse, resilient, innovative and sustainable overall economy.

At the heart of the Oregon Green Jobs Growth Plan is the development of a sectoral approach for industry sectors that have the greatest potential for green jobs growth including:

- Energy Efficiency
- Renewable Energy Production/ Generation
- Green Manufacturing
- Energy Transmission, Distribution and Storage
- Green Building and Development
- Transportation
- Agriculture/ Sustainable Forestry
- Environmental Technologies and Services

The plan includes profiles of each sector and a description of the comprehensive criteria used to select them.

Strategies and action recommendations are laid out in three phases to strategically address current and projected conditions impacting the Oregon economy. The twenty-five strategies outlined in the plan are supported with over 100 specific recommended action items (only a sample of which are shown in the tables on the following pages).

PHASE 1: JANUARY 2011 THROUGH DECEMBER 2013

During this period of time the State will be dealing with an intense recession and the need for immediate job creation. At the same time, state resources will be limited due to a projected $3 billion budget shortfall. On a positive note, there may be some remaining opportunities to secure additional federal funds. Phase 1 focuses on near-term job creation strategies and positioning to seize near-term emerging opportunities.

	Phase 1 Strategies: Jan. 2011–Dec. 2013	Sample Recommended Actions
1	Restructure the Green Jobs Council to function as a Green Jobs Intensive Action Team.	Design to be flexible, able to identify and act upon emerging opportunities, trends, changing conditions and collaborative opportunities.
2	Invest resources in developing sector strategies for Top Priority Sectors: Energy Efficiency, Renewable Energy Production / Generation, Green Manufacturing and Energy Transmission, Distribution and Storage sectors.	• Convene four top-tier sectors. Begin development of coordinated sector strategies. • Reduce up-front cost barriers to residential energy retrofits by expanding on-bill financing and other pilot programs. • Implement a public schools energy efficiency retrofit initiative. • Boost commercial and industrial energy efficiency retrofit activities through a variety of identified specific actions. • Redefine eligibility requirements for renewable energy tax credits.
3	Establish economic development and access to capital tools to support the targeted industry sectors.	• Consider tools such as a Certified Capital Company (CAPCO) and using a portion of the Oregon Growth Account to establish a Clean Energy Fund. • Consider establishing a green category in the BOOST small business financing program. • Support local government and community green jobs initiatives.
4	As capacity allows, implement policies to support the four second-priority industry sectors.	• Continue active support of electric vehicle and battery businesses. • Create incentives to encourage use of Oregon sustainable timber products in green building projects. • Support training programs that allow construction workers to develop green building competencies.
5	Provide marketing assistance to industries in targeted sectors.	Develop tools to communicate Oregon's green jobs success stories.
6	Develop, enhance and coordinate green jobs training and career pathway opportunities.	• Increase sustainability literacy of each student exiting the K-12 system. • Develop better standardization between various energy efficiency/ auditor training programs. • Develop a green jobs skills bank.
7	Measure outcomes, evaluate results, adapt.	Establish baseline data for the four top-tier industry sectors (number of companies and jobs, wage levels, total economic output).
8	Support the implementation of this Green Jobs Growth Plan with leadership and greater interagency coordination and resources.	• OWIB will establish a clear structure and responsible party for implementation oversight. • Convene regular working sessions with all relevant agencies and organizations to catalyze collaboration. • Develop a culture of wrap around services that results in agencies working together to meet business needs.
9	Monitor energy and climate legislative developments likely to impact green jobs and develop strategies and policies to capitalize on emerging opportunities.	Includes changes to BETC/ RETC, changes to Renewable Energy Standard, Western Climate Initiative.

PHASE 2: JANUARY 2014 THROUGH DECEMBER 2016

The State will likely still be facing budget restrictions, though of a smaller magnitude than in Phase 1. Given ongoing fiscal challenges and a new gubernatorial administration, it is likely that state agencies and services will be in the process of significant restructuring, consolidating and streamlining. The recession will hopefully have eased and some industry sectors will be expanding. However, construction will likely still be suppressed. It is possible during this time to see significant activity in the development of regional or federal carbon pricing and market expansion. The recommendations put forth for Phase 2 are designed to catalyze vigilant evaluation of changing market conditions and creative options for financing economic incentives and workforce services. This phase requires a dual focus on immediate and long-term opportunities and trends.

	Phase 2 Strategies: Jan. 2014 – Dec. 2016	Sample Recommended Actions
1	Evaluate progress to date and efficacy of action recommendations implemented in Phase 1.	Measure progress against baseline metrics established in Phase 1 for top-tier sectors.
2	Evaluate efficacy of Green Jobs Intensive Action Team and whether that body should continue as structured, restructure or dissolve.	Led by OWIB and Governor's Office.
3	Assess efficacy of the Implementation Leadership and make adjustments as necessary.	Led by OWIB and Governor's Office.
4	Evaluate efficacy of initial sector strategies implemented including progress against the baseline metrics established for the four top-priority targeted industry sectors. Based on this evaluation and updated labor market data, implement sector strategies for the next four targeted industry sectors.	Likely sectors include Green Building and Development, Transportation, Agriculture/ Sustainable Forestry, and Environmental Technologies and Services.
5	Continue to adapt and improve economic development, access to capital, and workforce development policies and tools.	• Provide assistance establishing community scale energy projects. • Establish a pilot project worker owned green business co-op for low-income residents/ communities.
6	Convene a Green Jobs / Green Economy Summit to share results of Green Jobs Growth Plan and sector strategies evaluations and collect ideas for improvements and new opportunities.	Collaborate with Oregon Business Plan and annual Leadership Summit.
7	Expand marketing assistance to industries in targeted sectors.	• Market and promote the Oregon Workforce System and Sector Strategies resources so that green employers have better understanding of available resources. • Create a New Economy website that links green job openings, training programs and incentives.
8	Expand Oregon's involvement in regional green economic development approaches.	Provide leadership in the Pacific West Coast collaborative and the Pacific Northwest Economic Region (PNWER)
9	Expand development and coordination of green jobs training and career pathway opportunities.	Resource development of new/ expanded training programs as identified by green sector strategies. Expand career pathways for targeted green occupations.
10	Measure outcomes, evaluate results, adapt.	Establish baseline metrics for four second-tier targeted industry sectors.

PHASE 3 RUNS FROM JANUARY 2017 THROUGH DECEMBER 2018

By this time, the state economy hopefully will have strengthened and most green industry sectors will be expanding. However, support from the federal level will likely be reduced as the federal government takes actions to reduce massive debt issues. This phase will require evaluation of overall success of the Green Jobs Growth Plan and preparations for the next stages of green jobs development in Oregon, based on evolving political and economic conditions, technological developments and updated labor market and economic impact data.

	Phase 3 Strategies: Jan. 2017 – Dec. 2018
1	Evaluate overall effectiveness of Green Jobs Growth Plan to date.
2	Evaluate efficacy of all sector strategies implemented. Measure progress against the baseline metrics established for the eight targeted industry sectors.
3	Convene a second Green Jobs / Green Economy Summit building upon the first Summit and accomplishments of the Green Jobs Growth Plan to date.
4	Analyze current labor market and economic impact data to identify additional green industry sectors for which strategic sector strategies should be implemented.
5	Expand State and private investment in Oregon's workforce system so as to enable maximum flexibility and innovation and reduce the limitations associated with federal funding streams.
6	Aggressively promote and market Oregon green jobs success stories.

Most of the actions will not require additional funding from the state. However, full development of the four top-tier targeted industry sector strategies will cost approximately one million dollars [2]. The Green Jobs Council believes this investment is necessary to take full advantage of near term green jobs growth potential.

In addition to the recommended strategies and actions, the Oregon Green Jobs Growth Plan includes a wealth of background information on labor market trends, green jobs training programs, and green jobs related economic development incentives. In fact, the Oregon Green Jobs Growth Plan is one of the most thoroughly researched and detailed green jobs plan yet developed by any state in the nation.

Introduction

It is not by accident that Oregon is one of only three states in which green jobs are both a relatively large and a fast growing segment of the economy [1]. Although Oregon has not had, until now, a comprehensive green jobs growth plan, it has had several decades of leadership and innovation in energy efficiency, sustainable business products and practices, and environmental services driven, in part, by a broadly held commitment to protecting Oregon's rich natural environment.

This early leadership has positioned Oregon to make great advancements in the development of green jobs at a time when the federal government is directing significant emphasis and resources towards green jobs and green industries.

Recognizing this opportunity, the Oregon Legislature passed House Bill 3300 which requires the Oregon Workforce Investment Board, working with the Oregon Business Development Department, to develop "a plan for a green jobs growth initiative to promote the development of emerging technologies and innovations that lead to, create or sustain family wage jobs." The Governor convened a Green Jobs Council to oversee development of the plan. The Oregon Workforce Investment Board staffed the Council. Consulting firm, 3EStrategies, LLC was contracted to complete development of the plan.

HB 3300 Requirements:

HB 3300 requires direct action from two state organizations:

1. **The Oregon Workforce Investment Board** is required to develop a plan for a green jobs growth initiative that creates or sustains family wage green jobs. The plan is required to include the following:

- Identify high demand green industries based on current and projected creation of family wage green jobs and the potential for career pathways created for such jobs.

- Use the needs of identified high demand green industries as the basis for the planning of workforce development activities that promote the development of emerging green technologies and innovations. These activities include, but are not limited to, such efforts undertaken by community colleges, the institutions of the Oregon University System, designated signature research centers, registered apprenticeship programs and other private sector training programs.

- Leverage and align existing public workforce development programs and other public and private resources to the goal of recruiting, supporting, educating and training targeted populations of workers.

- Require the board to work collaboratively with stakeholders from business, labor and low income advocacy groups in the regional economy to develop and implement the initiative.

- Link adult basic and remedial education programs with job training for skills necessary for green jobs.

- Require the board to collaborate with employers and labor organizations to identify skills and competencies necessary for green job career pathways.

- Ensure that support services are integrated with education and training for green jobs and that such services are provided by organizations with direct access to and experience with targeted populations, including:

    - Entry level workers in high demand green occupations;
    - Dislocated workers in declining industries;
    - Dislocated workers in timber, agricultural, or energy sectors;
    - Veterans who are residents of Oregon or in the National Guard;
    - Members of disadvantaged groups.

2. **The Oregon Business Development Department** (formerly Economic and Community Development Department) is required to:

- Develop criteria for existing investments and new or expanded financial incentives and comprehensive strategies to recruit, retain, and expand green economy industries and small businesses, and;

- Make recommendations for new or expanded financial incentives and comprehensive strategies to stimulate research and development of green technology and innovation.

To develop the Green Jobs Growth Plan, Governor Kulongoski convened a Green Jobs Growth Council consisting of representatives from diverse sectors related to green jobs. (See Appendix G for a list of Green Jobs Council members.)

Green Jobs / Green Economy Definition:

HB 3300 sets forth the operational definition of a "green job" as a job that provides a service or produces a product that:

1. Increases energy efficiency;

2. Produces renewable energy;

3. Prevents, reduces or mitigates environmental degradation;

4. Cleans up and restores the natural environment; or

5. Provides education, consultation, policy promotion, accreditation, trading and offsets, or similar supporting services for any of the activities in categories 1 through 4.

(The full text of HB 3300 is included as Appendix F.)

The Green Jobs Council identifies a green economy as an economy that promotes environmental protection and restoration, energy security and provides economic opportunities for people across the income spectrum. It includes the dual opportunities of developing new, emerging green industries and integrating green measures and practices into existing conventional industries in ways that provide them with competitive advantage in the marketplace.

Objectives and Intended Outcomes

The intent of the Oregon Green Jobs Growth Plan is to get people trained *and employed*. Therefore it places heavy emphasis on job creation and economic development strategies. The recommendations set forth are intended to address five key choke points to job creation:

Lack of access to capital for businesses: The current economic climate has reduced options for businesses to access capital. Lending institutions have become much more conservative in their lending practices. Start-up and gap financing is particularly limited.

Lack of economic development incentives for existing businesses: Existing businesses usually require funding in excess of $1 million to undertake expansion or relocation. Oregon does not have an economic development tool of that scale. In addition, historically, Oregon's economic development tools have been geared toward capital and special projects and have relied on tax credits rather than cash incentives.

Inadequate skill levels across the workforce: There are nearly 300,000 Oregonians of working age without a high school diploma. Employers say that many students leaving high school are not adequately prepared for college and/or employment, especially in technical fields. Some technical positions, even in the currently challenging economic climate, go unfilled or are filled by out-of-state applicants because Oregonians do not have the requisite skills. Increasing skill requirements for 21st century jobs are outpacing the skills of the current workforce. After Oregon's decades-long disinvestment in education at all levels, experts now say that the coming generation may be the first in Oregon's history to be less educated than the last.

Regulatory barriers: State and federal regulations are often duplicative and non-complementary. This can delay building, clean energy and brownfield redevelopment projects to the point of making them fiscally unviable. Much of the state's historical focus has been on looking for ways to streamline permitting for projects impacting wetlands or waterways. These efforts have been driven by a combination of business, legislative, and executive branch concerns with status quo processes. While several good reports have been issued and numerous improvements made to state permitting processes, the scale of the collective changes, when considered in the context of the overall regulatory system, is arguably modest; the changes have not altered the fundamental systems. There are still multiple state agencies involved in the permitting process. The State has not significantly changed how we fund these state permitting programs and continue to have limited staffing and associated permit backlogs in some programs. Coordination with federal agencies remains a challenge, as those agencies are not beholden to what the state may view as high priority projects or appropriate balancing of environmental and economic outcomes. Projects that involve endangered species issues or that trigger federal NEPA review can still take substantial time to get through permitting processes, and the state has limited ability to ensure holistic streamlining in these cases.

Inadequate coordination among relevant state agencies and institutions: Oregon's economic development and workforce development agencies and educational institutions have made strides in collaborating. However, much more remains to be done. In addition, several key agencies including the Departments of Energy, Housing and Community Services, and Transportation need to be better integrated into green jobs development efforts.

To address these barriers, the Oregon Green Jobs Council sets forth the following objectives for the Green Jobs Growth Plan:

- Generate job creation in green sectors quickly, while simultaneously identifying career pathways and opportunities for developing job stability and family wages longer term in each of these sectors;
- Provide strategic green knowledge and skill sets to the existing workforce across industry sectors;
- Take steps to assure that workers are fairly compensated for the development of new skills that lead to employment;
- Establish the foundation for creation of a strong workforce for targeted emerging green industries; and
- Lay out effective strategies for integrating workforce development and economic development seamlessly.

Intended quantifiable outcomes of the recommendations in this plan include:

- Grow jobs in the four top-priority targeted industry sectors (Energy Efficiency, Renewable Energy Production/ Generation, Green Manufacturing, and Energy Transmission, Distribution and Storage) by 30% cumulatively over the eight-year span.
- Grow jobs in the second-tier targeted industry sectors (Green Building and Development, Transportation, Agriculture/Sustainable Forestry, Environmental Technologies and Services) by 13% cumulatively over the eight-year span.
- Add or significantly expand at least 80 green businesses.
- Increase total dollar output from the eight targeted industry sectors by 30%.
- Strengthen Oregon's position as a leader in green economic activity in a manner that creates a more diverse, resilient, innovative and sustainable overall economy.

Sector Strategies as a Foundation:

At the heart of the Green Jobs Growth Plan is the development of a sectoral approach for industry sectors that have the greatest potential for green jobs growth. Effective sector strategies involve strong private/public partnerships that provide the following services:

Convening of industry, government, education, labor and others to identify industry needs, opportunities and barriers to growth.

- Aggregating industry needs to get the best use out of resources.
- Identifying what is currently available to address those needs, and modifying current approaches/developing new ones to fill the gaps.
- Implementing programs/strategies.
- Connecting sector partners with other resources such as financing, loans, special programs, training on how to access federal funds/contracts, etc.
- Evaluating results and making adjustments.
- Establishing adequate reporting and accountability measures for programs and incentives that receive public resources.

Based on labor market and economic impact analysis, the Green Jobs Council recommends that the State invest in a Green Jobs sectoral approach for the following targeted industry sectors:

- Energy Efficiency
- Renewable Energy Production/ Generation
- Green Manufacturing
- Energy Transmission, Distribution and Storage
- Green Building and Development
- Transportation
- Agriculture/ Sustainable Forestry
- Environmental Technologies and Services

A profile of each of these sectors is provided in the Targeted Industry Sector Profiles section beginning on page 39.

Most of the actions recommended in this plan will not require additional funding from the State. However, full development of the four top-tier targeted industry sector strategies will cost approximately one million dollars [2].

Although Oregon's projected budget shortfall will make resourcing this effort more difficult, the Green Jobs Council strongly recommends investment in sector strategy development due to its likelihood to generate job growth. Oregon's current sector strategies are limited by the fact that they are funded primarily by Workforce Investment Act resources and therefore focus on workforce development to a much greater degree than other industry needs. There is mounting evidence that sectoral approaches are proving highly effective in connecting workers to high demand jobs. One recent study reported 18 to 29 percent higher wages for workers who had participated in sector strategy generated training programs. To develop sector strategies that generate jobs growth, the State needs to invest resources into convening and coordinating these sectors.

In years 2011 – 2013, the focus should be on developing effective sector strategies for the following sectors: Energy Efficiency, Renewable Energy Production/Generation, Green Manufacturing, and Energy Transmission, Distribution and Storage. As explained in the Industry Sector Selection Criteria and Rationale are provided in the section beginning on page 52, these four sectors show the most promise for near-term job creation. In subsequent years, resources should be invested in developing sector strategies for the remaining industry sectors based on an analysis of current and expected labor market and economic impacts data.

Family Wages:

HB 3300 specifically calls for plans that "lead to, create or sustain family wage green jobs" in Oregon. This is significant given the ongoing erosion of real wages in Oregon. According to the 2009 Oregon Business Plan, in 1976 working Oregonians earned 102% of the national average. By 1995 Oregonians earned 95% of the national average, and by 2007 they were down to 90% of the national average. Today, Oregon workers on average earn $9400 a year less than their Washington counterparts. Research by the Oregon Employment Department shows that green jobs pay slightly higher wages than comparable non-green jobs.

The Green Jobs Council has identified a range of definitions of "family wage" in state, county and city policy documents and statutes (see Appendix D). Rather than attempting to recreate a definition, we present instead a consensus on the factors or principles that ought to be taken into account by the legislature when tying family wage requirements to specific legislation and/or incentives. We recommend the following criteria:

- Define family wage such that it allows families to be self-sufficient, and its use increases the state's prosperity/economic independence.

- A family wage should cover basic expenses for a family, including health care, food, housing, childcare, transportation, taxes, education expenses and retirement. There are tools already in use in Oregon that use these or similar factors to calculate family wages.

- Recognize that non-cost-of-living based measures have been used to define family wages (e.g., measures tied to average county income or to the state minimum wage), and we acknowledge that these measures have the advantage of simplicity and ease of calculation. However, these measures in no way indicate how much money it takes for a family to be able to sustain itself. In addition, tying the concept of family wage to existing wage levels may lock in inadequate wages in certain, mostly rural, parts of the state.

- Geographical variations should be considered in family wage calculations.

- Industry/occupational variations should be taken into account in family wage considerations.

- Should the legislature decide to allow exceptions to the family wage requirement in order to allow for entry-level green jobs, those exceptions should be tied to requirements for the identification of specific career pathways and training opportunities for entry-level workers.

Oregon Green Jobs Status, Assets and Challenges

National-Level Information

Great variations exist between the most widely accepted and cited reports addressing, defining, and framing green jobs within the American economy. Although classifications and definitions vary across these best practice reports, the State of Oregon frequently stands out as a leader.

A 2009 study conducted by the Pew Charitable Trusts revealed that even during the current economic recession green jobs have grown at a faster rate than U.S. jobs overall [1]. And these same green jobs are poised for even greater growth, driven by increasing consumer demand, growing venture capital infusions, and policy reforms by federal and state lawmakers seeking to spur America's fiscal recovery, reduce our dependence on foreign oil and protect the environment.

The study found that in 2007, 65 percent – 501,551 – of all green jobs nationally were in the category of Conservation and Pollution Mitigation. This reflects the growing recognition among the public, policy makers and business leaders of the need to recycle waste, conserve water and take steps to mitigate emissions of greenhouse gases and other pollutants.

While the Conservation and Pollution Mitigation sector contains the majority of today's green jobs and businesses, Pew's research indicates that three different categories represent the green jobs of tomorrow:

- Clean Energy
- Energy Efficiency
- Environmentally Friendly Production

Nationally, these three categories make up more than one in four jobs in today's emerging green economy and they are growing at a fast rate. Approximately 80 percent of venture capital investments in 2008 were in the categories of clean energy and energy efficiency. Unfortunately, in the less than two-month period since the U.S. Senate failed to act on a comprehensive climate and energy bill, the U.S. has fallen more than $11 billion behind China and other leading nations in clean energy investments [5].

Oregon-Specific Information

The Pew study, cited above, reported that only three states - Oregon, Colorado and Tennessee - have both large and fast-growing clean energy economies. In 2007, each of these states exceeded the national averages for both the number of jobs in the green energy economy and the average annual growth rate for those jobs.

Oregon's large and fast growing green economy has eclipsed the growth of overall jobs in the state, expanding by an average of 4.8 percent compared with an average of less than 1 percent annually.

Clean Edge Research, in their report *Carbon-Free Prosperity 2025* [6] pairs Oregon and Washington together in their analyses, forecasts and projections and highlights how the Pacific Northwest can collaboratively create green jobs, deliver energy security, and thrive in the global clean-technology marketplace. This report identifies the following industries as having the best opportunities for Oregon and Washington to take the lead in clean-energy capital and job creation:

- Solar Photovoltaic Manufacturing
- Wind-power Development
- Green-building Design Services
- Sustainable Bioenergy
- Smart-grid Technologies

These five sectors offer significant job growth opportunities for the region. It is projected that in a "medium-growth scenario" (Table 1), more than 41,000 jobs could be realized in Washington and Oregon by 2025 from these five sectors alone – and in an "accelerated growth scenario" (Table 2), more than 63,000 jobs in the region by 2025. As these estimates are only focused on five narrowly defined sectors, the potential for green job creation in the region is arguably much broader.

In June of 2009 The Oregon Employment Department (OED) released *The Greening of Oregon's Workforce* [4], an in-depth labor market analysis of the green jobs that existed in Oregon in 2008. The report revealed that green jobs are spread across many industries and occupations; wages paid to green jobs tend to be slightly higher than the average for all jobs in the state; and businesses in the state expect the number of green jobs to grow faster than the overall economy.

The survey estimates there were 51,402 green jobs in Oregon in 2008, spread across 5,025 different employers. Oregon's green workforce comprised roughly three percent of the state's 1,686,524 total private, state, and local government jobs during the year. This is approximately the same as the number of employees working in Oregon's private hospitals.

TABLE 1: MEDIUM JOB GROWTH PROJECTIONS FOR OR AND WA STATES COMBINED

Year	Solar photovoltaic manufacturing	Wind-power development	Green-building design services	Bioenergy	Smart-grid	TOTALS
Current	800	2,217	3,826	3,207	1,280	11,330
2010	1,863	3,043	4,284	3,224	1,491	13,905
2015	3,677	2,650	6,899	4,100	1,715	19,041
2020	9,260	3,408	10,137	5,688	2,209	30,702
2025	14,182	4,507	12,937	6,946	2,669	41,241

TABLE 2: ACCELERATED JOB GROWTH PROJECTIONS FOR OR AND WA STATES COMBINED

Year	Solar photovoltaic manufacturing	Wind-power development	Green-building design services	Bioenergy	Smart-grid	TOTALS
Current	800	2,217	3,826	3,207	1,280	11,330
2010	1,912	3,749	4,284	4,030	1,935	15,910
2015	4,643	3,861	7,719	6,151	2,781	25,155
2020	13,080	4,541	12,432	8,533	4,478	43,064
2025	22,560	6,083	16,834	10,419	7,212	63,107

Oregon's green jobs are distributed across every major industry group and more than 220 occupations, but tended to be more concentrated in industries and occupations related to construction, production, natural resources, and transportation. Five occupational groups account for 89 percent of the expected green job gains: farming, fishing, and forestry (2,122); transportation and material moving (1,770); production (1,113); architecture and engineering (883); and construction and extraction (696).

The Greening of Oregon's Workforce report has aided in identifying industries associated with green jobs in Oregon. Green jobs are not limited to a small, specialized sect of industries or occupations, nor are they geographically limited. Rather, they are spread broadly across all industry occupational groups. Specific green occupational groups and employer projections are outlined in Table 3.

The 2008 Global Insights report [6], commissioned by The United States Conference of Mayors, reported the existing and potential growth projections for Oregon green jobs, broken down by metropolitan area. While much work remains to be done in evaluating the geographic distribution of green jobs across the state, this study portrays compelling growth potentials (Table 4).

Job Skills Required

Based on the OED survey, minimum education requirements for green jobs closely mirrored requirements for all jobs statewide. Nearly one-third of green jobs required a special license or certificate. The most common special requirements were specific to occupations, such as an electrician's license. Other

TABLE 3: OREGON EMPLOYER PROJECTIONS OF GREEN JOBS BY OCCUPATION

Occupational Group	Total Workers 2008	Projected Workers 2010	Percent Change
Production	6,512	7,625	+17%
Architecture and Engineering	4,360	5,243	+20%
Construction and Extraction	10,381	11,077	+7%
Life, Physical and Social Science	4,125	4,338	+5%
Installation, Maintenance and Repair	2,233	2,402	+8%
Management	1,639	1,791	+9%
Computer and Mathematical	244	301	+23%

TABLE 4: OREGON GREEN JOB GROWTH BY METROPOLITAN AREA

Location	Existing in 2006	Potential New through 2008
Bend, OR	642	5,080
Corvallis, OR	783	6,198
Eugene-Springfield, OR	993	7,853
Medford, OR	1,109	8,775
Portland-Vancouver-Beaverton, OR-WA	6,714	53,122
Salem, OR	1,815	14,360

In this study, green jobs included jobs in Renewable Power Generation, Residential and Commercial Retrofitting, Renewable Transportation Fuels, and related Engineering, Legal, Research and Consulting.

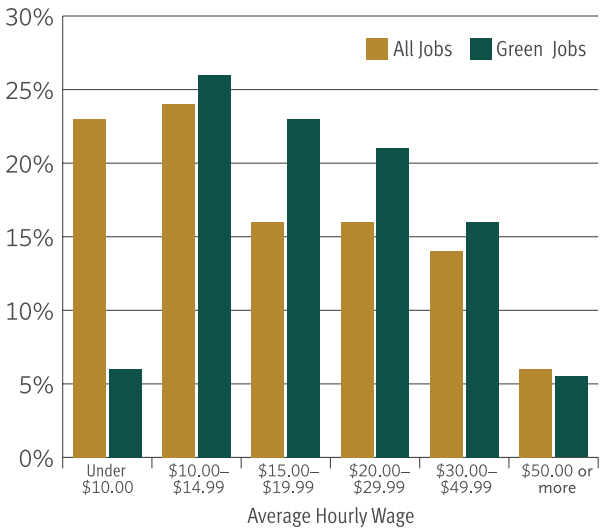
common requirements were environmental cleanup or abatement certifications, equipment operator licenses and commercial driver's licenses, and prior on-the-job experience.

Many green jobs require no education beyond high school. Of those green jobs where an education requirement was reported, 32 percent had no minimum education required to obtain the position and 33 percent reported that a high school or equivalent education was necessary. That is significant. Two-thirds of Oregon's green jobs currently require no education beyond high school.

Wages Associated with Green Occupations

Although research is still needed, some generalized wage information has become available. Green jobs wage levels are spread across a wide spectrum, just like wages of all occupations and jobs. However, based on current information, few green jobs pay low wages and on average, green jobs tend toward slightly higher wages than jobs across the entire economy (Figure 1). The estimated average wage paid for a green job in 2008 was $22.61 per hour [4]. Although not strictly comparable, the average (mean) wage for all jobs in Oregon in 2008 was $19.92 [8].

FIGURE 1: PERCENT OF GREEN JOBS AND ALL JOBS BY WAGE GROUP



Based on these early numbers, nearly two-thirds (32,746) of Oregon's green jobs meet the state's criteria for "high-wage". In fact OED has identified 190 high-wage green occupations. In these, at least half of the green jobs paid $15 or more per hour. These occupations accounted for 94 percent of the green jobs requiring education beyond high school. Twenty-three percent of the jobs in high-wage green occupations required a bachelor's degree or higher (compared to 2 percent of the jobs in low-wage green occupations). Nonetheless, this means that 77 percent of Oregon's high-wage green jobs require less than a Bachelor's degree (Table 5).

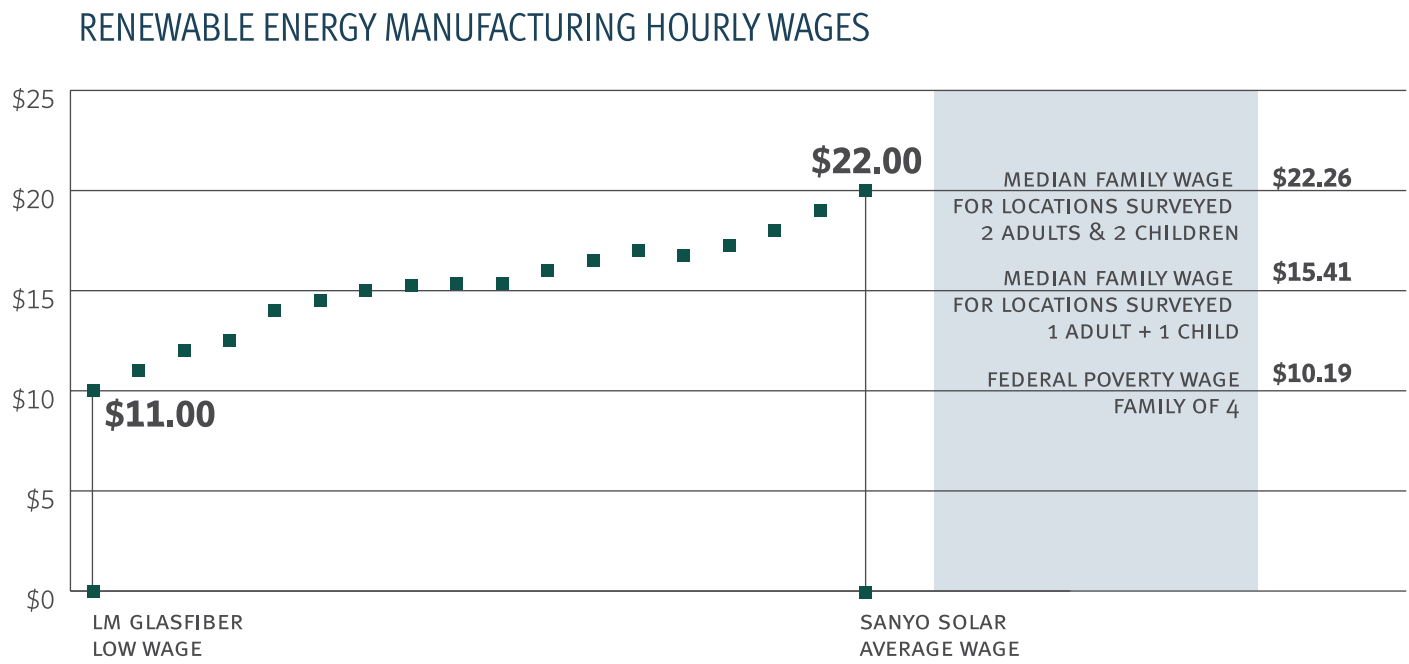
An early 2009 report by Good Jobs First authored in concert with the Apollo Alliance [9] focuses on the quality (labor conditions, wages) of green jobs in three industry sectors: manufacturing of components for wind and solar energy, green construction and recycling.

Oregon performs well in case study examples. The pay rate at Sanyo Solar's plant in Salem, Oregon (the highest solar manufacturing pay rate found) is based on a requirement linked to the company's receipt of Business Energy Tax Credit (BETC) and enterprise zone benefits (Figure 2). Sanyo is required to meet a compensation package that is at least 150 percent of the county average annual wage, which comes out to about $45,000 (roughly $22 an hour) [9]. In addition to the high hourly wage paid, Sanyo also agreed to spend an average of at least $50,000 per worker on wages and benefits combined. Like Sanyo, many of the companies in the green economy benefit directly or indirectly from taxpayer dollars in the form of economic development incentives and other local, state and federal subsidies. These public expenditures provide opportunities to ensure that more green employers provide good wages and high quality jobs; a large number of local and state governments, including Oregon, already apply job quality standards to their business and economic development programs and subsidies.

TABLE 5: TOP TEN HIGH WAGE GREEN OCCUPATIONS

Occupation Title	Green Jobs	Average Hourly Wage	Some College, 2-year Degree, or Other	Bachelor's Degree or Higher	Some Jobs Have Special Requirements
Carpenters	4,025	$22.64	1%	4%	x
Truck Drivers, Heavy and Tractor-Trailer	2,338	$34.08	16%	0%	x
Hazardous Materials Removal Workers	2,123	$15.50	0%	0%	x
Civil Engineers	1,889	$32.70	3%	97%	x
Production Workers, All Other	1,728	$38.46	0%	0%	
Biological Technicians	1,115	$16.59	59%	2%	
General and Operations Managers	913	$40.85	48%	32%	x
Architects, Except Landscape and Naval	882	$33.85	0%	100%	x
Water and Liquid Waste Treatment Plant and System Operators	712	$25.61	2%	0%	x
Wholesale and Manufacturing Sales Representatives; Technical and Scientific	690	$23.34	0%	0%	

FIGURE 2: SANYO SOLAR PAY RATE COMPARISON



The chart shows how average hourly wages at wind and solar energy manufacturing facilities profiled in this report measure up against two benchmarks: the hourly pay of a full-time worker with a family of four with an income at the federal poverty level; and the median wage required for a full-time worker to meet basic family needs among the renewable manufacturing locations cited in the report. Estimates of basic family needs budgets were provided by the Economic Policy Institute

Green Jobs Strategies and Actions: Phases 1, 2 and 3

This Oregon Green Jobs Growth Plan covers the timeframe January 2011 through December 2018. Recommendations are laid out in three phases to strategically address current and projected conditions impacting the Oregon economy. Although the phased approach is useful from an organizational and prioritization perspective, it is important to note that implementation of these recommendations will not be a perfectly linear process. For example, while we prioritize activities to support four top-priority targeted industry sectors, the State will continue a number of activities to effectively support the second-tier sectors as well.

Phase 1: January 2011 through December 2013: During this period of time the State will be dealing with an intense recession and the need for immediate job creation. At the same time, state resources will be limited due to a projected $3 billion budget shortfall. On a positive note, there may be some remaining opportunities to secure additional federal funds. The recommendations put forward for Phase 1 are focused on near-term job creation strategies and positioning to seize near-term emerging opportunities.

Phase 2: January 2014 through December 2016: During this period the state will likely still be facing budget restrictions, though of a smaller magnitude than in Phase 1. Given ongoing fiscal challenges and a new gubernatorial administration, it is likely that state agencies and services will be in the process of significant restructuring, consolidating and streamlining. The recession will hopefully have eased and some industry sectors will be expanding. However, construction will likely still be suppressed. It is possible during this time to see significant activity in the development of regional or federal carbon pricing and market expansion. The recommendations put forth for Phase 2 are designed to catalyze vigilant evaluation of changing market conditions and creative options for financing economic incentives and workforce services. This phase requires a dual focus on immediate and long-term opportunities and trends.

Phase 3 runs from January 2017 through December 2018. Although it is impossible to know with certainty what conditions will exist at that time, the recommendations put forward for Phase 3 are based on the following assumptions. The state economy hopefully will have strengthened and most green industry sectors will be expanding. However, support from the federal level will likely be reduced as the federal government takes actions to reduce massive debt issues. This phase will require evaluation of overall success of the Green Jobs Growth Plan and preparations for the next stages of green jobs development in Oregon, based on evolving political and economic conditions, technological developments and updated labor market and economic impact data.

Under each action recommendation, responsible parties have been identified. These are intended to provide direction in assigning implementation responsibility. However, many of these strategies and actions will require the collaboration of numerous agencies and organizations. We have only listed the parties that we feel would need to take the lead at the outset, not a complete list for each action. Moreover, given a new incoming gubernatorial administration, it is likely that many agencies will be renamed, merged and restructured over the next several years. Successful implementation of the Green Jobs Growth Plan will require adapting to these agency changes.

Summary of Recommended Green Jobs Strategies

The following table provides a summary of the strategies recommended for each phase. These strategies are accompanied by over 100 specific action recommendations which are detailed in the following sections.

TABLE 6: SUMMARY OF RECOMMENDED GREEN JOBS STRATEGIES

	Phase 1 Strategies: Jan. 2011 – Dec. 2013	Job Growth Choke Point Addressed
1	Restructure the Green Jobs Council to function as a Green Jobs Intensive Action Team.	• Inadequate coordination among relevant state agencies and institutions
2	Invest resources in developing sector strategies for Top Priority Sectors: Energy Efficiency, Renewable Energy Production / Generation, Green Manufacturing and Energy Transmission, Distribution and Storage sectors.	• Lack of access to capital for businesses • Lack of economic development incentives for existing businesses • Inadequate skill levels across the workforce • Regulatory barriers • Inadequate coordination among relevant state agencies and institutions
3	Establish economic development and access to capital tools to support the targeted industry sectors.	• Lack of access to capital for businesses • Lack of economic development incentives for existing businesses
4	As capacity allows, implement policies to support the four second-priority industry sectors.	• Lack of access to capital for businesses • Lack of economic development incentives for existing businesses • Inadequate skill levels across the workforce • Regulatory barriers • Inadequate coordination among relevant state agencies and institutions
5	Provide marketing assistance to industries in targeted sectors.	• Indirect
6	Develop, enhance and coordinate green jobs training and career pathway opportunities.	• Inadequate skill levels across the workforce • Inadequate coordination among relevant state agencies and institutions
7	Measure outcomes, evaluate results, adapt.	• Supports all
8	Support the implementation of this Green Jobs Growth Plan with leadership and greater interagency coordination and resources.	• Inadequate coordination among relevant state agencies and institutions
9	Monitor energy and climate legislative developments likely to impact green jobs.	• Supports all

Summary of Recommended Green Jobs Strategies, cont.

	Phase 2 Strategies: Jan. 2014 – Dec. 2016	Job Growth Choke Point Addressed
1	Evaluate progress to date and efficacy of action recommendations implemented in Phase 1.	• Supports all
2	Evaluate efficacy of Green Jobs Intensive Action Team and whether that body should continue as structured, restructure or dissolve.	• Supports all
3	Assess efficacy of the Implementation Leadership and make adjustments as necessary.	• Supports all
4	Evaluate efficacy of initial sector strategies implemented including progress against the baseline metrics established for the four top-priority targeted industry sectors. Based on this evaluation and updated labor market data, implement sector strategies for the next four targeted industry sectors.	• Lack of access to capital for businesses • Lack of economic development incentives for existing businesses • Inadequate skill levels across the workforce • Regulatory barriers • Inadequate coordination among relevant state agencies and institutions
5	Continue to adapt and improve economic development, access to capital, and workforce development policies and tools.	• Lack of access to capital for businesses • Lack of economic development incentives for existing businesses
6	Convene a Green Jobs / Green Economy Summit to share results of Green Jobs Growth Plan and sector strategies evaluations and collect ideas for improvements and new opportunities.	• Inadequate coordination among relevant state agencies and institutions
7	Expand marketing assistance to industries in targeted sectors.	• Indirect
8	Expand Oregon's involvement in regional green economic development approaches.	• Indirect
9	Expand development and coordination of green jobs training and career pathway opportunities.	• Inadequate skill levels across the workforce • Inadequate coordination among relevant state agencies and institutions
10	Measure outcomes, evaluate results, adapt.	• Supports all

Summary of Recommended Green Jobs Strategies, cont.

	Phase 3 Strategies: Jan. 2017 – Dec. 2018	Job Growth Choke Point Addressed
1	Evaluate overall effectiveness of Green Jobs Growth Plan to date.	• Supports all
2	Evaluate efficacy of all sector strategies implemented. Measure progress against the baseline metrics established for the eight targeted industry sectors.	• Supports all
3	Convene a second Green Jobs / Green Economy Summit building upon the first Summit and accomplishments of the Green Jobs Growth Plan to date.	• Inadequate coordination among relevant state agencies and institutions
4	Analyze current labor market and economic impact data to identify additional green industry sectors for which strategic sector strategies should be implemented.	• Supports all
5	Expand state and private investment in Oregon's workforce system so as to enable maximum flexibility and innovation and reduce the limitations associated with federal funding streams.	• Lack of economic development incentives for existing businesses • Inadequate skill levels across the workforce • Inadequate coordination among relevant state agencies and institutions
6	Aggressively promote and market Oregon green jobs success stories.	• Supports all

Phase 1: January 2011 through December 2013

As noted above, the recommendations put forth for implementation in Phase 1 emphasize near-term job creation and low cost strategies that will lay the foundation for additional actions in Phases 2 and 3.

Intended Outcomes:

The intended outcomes of the following Phase 1 recommendations include:

- Grow jobs in the four top-priority targeted industry sectors by 10 percent cumulatively.
- Add or significantly expand at least 20 green businesses.
- Increase total dollar output from the four top-priority targeted industry sectors by 8 percent. [10]

Note: due to the cutting edge nature of this plan and green jobs development in Oregon, some of the data necessary to evaluate progress toward these intended outcomes does not exist. Baselines will need to be established; this is addressed in Strategy 7 below.

Strategies, Action Recommendations and Responsible Parties:

Strategy 1: Restructure the Green Jobs Council to function as a Green Jobs Intensive Action Team that will work closely with the Governor's office with the goal of rapid green jobs development.

> *Responsible Parties: Oregon Workforce Investment Board, Governor's Office*

The Green Jobs Council was formed to develop the Green Jobs Growth Plan and to oversee implementation of the State Energy Sector Partnership grant. The grant will be completed by December 2012. In the meantime, the Intensive Action Team may need to be a subset of the larger Council.

1.1: Design the Intensive Action Team to be flexible and able to identify and act upon emerging opportunities, trends, changing conditions and collaborative opportunities.

Strategy 2: Invest resources in developing sector strategies for Top Priority Sectors: Energy Efficiency, Renewable Energy Production/ Generation, Green Manufacturing and Energy Transmission, Distribution and Storage.

> *Responsible Parties: Oregon Workforce Investment Board, Governor's Office.*

The Green Jobs Council developed a thorough set of criteria to aid in the selection of targeted industry sectors. A description of these criteria and rationale for selection of the targeted industry sectors can be found in the section below beginning on page 52. Full profiles of all eight targeted sectors are provided beginning on page 39.

In truth all of the strategies and action recommendations put forth in the Oregon Green Jobs Growth Plan are part of the development of sector strategies. However, what's needed now is a targeted approach to pulling all the various workforce and economic development efforts together to establish highly productive, clearly defined sector strategies.

2.1: Convene each of the four top-tier sectors and begin development of coordinated sector strategies.

A. The convener should bring in all key stakeholders and provide leadership structure for industry representatives.

As the sector strategies are developed, industry will identify legislative concepts, policy and program ideas. However, as a starting point, based on current labor market information and research and consultation, the Green Jobs Council recommends the following policy actions to promote growth in of the four top-priority industry sectors.

- **Energy Efficiency Sector**

2.2: Residential Energy Retrofits
Residential energy retrofit occupations include energy auditors, weatherization technicians, HVAC installers, plumbers and electricians.

A. Reduce up-front cost barriers to residential energy retrofits by expanding existing pilot financing programs such as on-bill financing via the Energy Efficiency and Sustainable Technology Act of 2009 (EEAST) and Clean Energy Works Oregon (CEWO). Emphasize energy efficiency cost effective energy retrofits for single-family owner-occupied homes and installation of solar thermal and photovoltaic systems using favorable financing terms.
B. Integrate low income and general population residential weatherization and energy efficiency upgrade programs.
C. Establish revolving loan mechanisms, through utilization of pre-development gap funding and loan incentives, for developers of low-income housing facilities and channel the returns on these revolving loans into support for weatherization programs.
D. Build upon and support existing Energy Trust of Oregon (ETO) energy efficiency incentive programs to support seamless and easily accessed opportunities for interested energy efficiency consumers to take advantage of direct incentives and other ETO residential programs as an alternative to financing programs described above.

2.3: Public Buildings Energy Retrofits and Renewable Energy Installations
Oregon's public school buildings total 94 million square feet. Energy costs for these buildings range from $0.24 to $2.50 per square foot.

A. The State of Oregon should implement a public schools energy efficiency retrofit initiative that reduces school operating costs while creating jobs.
B. The Oregon Department of Energy should establish new targets for completion of the existing public schools energy efficiency retrofit program under SB 1149 to accelerate the speed with which retrofits occur, helping reduce school operating costs while creating more jobs.
C. Expand CEWO programs to encompass loans for commercial and public building energy retrofits and solar project installations.

2.4: Commercial Energy Efficiency
According to the Northwest Power and Conservation Council, the commercial sector is Oregon's second biggest opportunity for improved energy efficiency, with the potential for 1,400 MW of savings by 2029.

A. Create financing packages for existing public and private commercial facilities that will bridge the gaps in other program funding to encourage broader private sector retrofit upgrades in existing commercial buildings. Include both high-tech (energy management systems) and low-tech improvements.
B. Build upon and support existing Energy Trust of Oregon (ETO) and consumer owned utilities' commercial retrofit programs by expanding services through CEWO to provide financing opportunities for existing public and private commercial facilities.
C. Continue pursuit of an Energy Performance Score for commercial buildings, including disclosure at time of new lease negotiations.

2.5: Industrial Energy Efficiency
A healthy economic base of industrial and manufacturing activities depends on a variety of support approaches. Industrial efficiency presents different job creation and energy savings opportunities from residential and commercial retrofit projects, requiring higher levels of engineering expertise matched with specific technical analysis capabilities. Long-term benefits include improvements of industrial and manufacturing processes which lower energy and operating costs, keeping Oregon businesses healthy and competitive.

There are several main program categories to be continued and expanded, including:

A. Detailed, technical studies and analyses of energy efficiency savings opportunities conducted by ETO of all major industrial customers with similar program opportunities available through Bonneville Power Administration (BPA) to consumer owned utilities customers.
B. Continue evaluation and process improvement through the Industrial Energy Initiative conducted by ETO, resulting in operations and maintenance improvements and savings from behavior change with little capital investment required.
C. Continue market transformation activities for industrial customers, promoting long-term Strategic Energy Management investment commitments through the Northwest Energy Efficiency Alliance.
D. Promote routine evaluation and process improvement through the use of seminars and workshops on energy management systems.
E. Identify, draft, and promote legislative concepts that facilitate an efficient industrial economy.
F. Engage Oregon higher education industrial assessment, and industrial energy efficiency programs.

G. Implement an industrial / infrastructure energy efficiency retrofits initiative.
H. Establish a one-stop shopping portal for individuals and businesses interested in implementing energy efficiency measures. (See the Efficiency Maine Trust program administered by the State of Maine [11].)

2.6: The Oregon Department of Energy (ODOE) should continue its efforts to redefine eligibility requirements for energy efficiency state tax credits, focused on recommendations that preserve credits for those projects which deliver the greatest benefit for the least revenue impact.

It is noteworthy that the Green Building and Development Sector did not make it into the top-tier targeted sectors. As explained in the rationale section below, this is due to the likelihood of continued jobs suppression for the next few years, as well as the fact that a well-trained green building and development workforce already exists in Oregon. Finally, the ramp up of the energy efficiency sector will provide jobs and pull on the talents of the green building and development sector in the short-term.

- **Renewable Energy Production/ Generation Sector**
  The demand for renewable energy in Oregon is growing at both the utility scale and smaller community scale and building integrated levels. This demand is being driven by policies such as the state Renewable Energy Standard and Feed-in Tariff for solar PV as well as growing concerns about the environmental impacts of fossil fuel-based energy generation. This sector shows strong promise for job creation. We recommend the following Phase 1 activities:

2.7: The Oregon Department of Energy (ODOE) should continue its efforts to redefine eligibility requirements for renewable energy state tax credits, focused on recommendations that preserve credits for those projects which deliver the greatest benefit for the least revenue impact.

2.8: Oregon currently has a requirement that 1.5 percent of the cost of new public buildings must be invested in solar energy generation systems. This should be expanded to include all Renewable Energy Standard-recognized, onsite building-integrated renewable energy sources and technologies.

2.9: Support development of a comprehensive statewide sustainable energy plan that maps renewable energy sources, locations, and transmission options.

2.10: Streamline regulations for renewable energy and biofuels project development.

2.11: Create a collaborative process for siting clean energy projects. Conflicts need to be resolved through a structured process that includes clear guidelines, transparency, and timeliness.

2.12: Continue Energy Trust of Oregon programs for biopower, solar, small scale hydro, community wind, geothermal and open solicitation of renewable energy projects, providing incentives to project developers and owners in Investor Owned Utilities' service territory.

- **Green Manufacturing Sector**
  The green manufacturing sector includes both green products manufactured in Oregon and services to implement lean and sustainable manufacturing methods and equipment. The following recommendations are intended to increase job growth in this sector:

2.12: Where possible, adjust state government procurement policy to incent purchase of products produced in Oregon.

2.13: Create an inventory of the products commonly utilized in energy efficiency retrofits, including renewable energy products and the Oregon companies that provide them.

2.14: Continue to support the supply chain development for the renewable energy sector.

A. Build upon the Oregon Business Development Department's "connectory", a database that matches suppliers with local product availability.
B. Integrate sector strategies with Oregon Manufacturing Extension Partnership.
C. Develop financing opportunities for Oregon manufacturing companies to implement lean manufacturing equipment and practices.

- **Energy Transmission, Distribution and Storage Sector**
  This sector includes linemen, utility workers and grid technologies. Over the next decade Western utilities are expecting significant turnover in their workforce. In addition, the Northwest is experiencing significant activity related to emerging grid technologies and energy storage. We recommend the following actions:

2.15: Track and evaluate PGE's ARRA stimulus grant for smart grid development.

2.16: Support PGE's ARRA stimulus activity for electric vehicle charging stations.

2.17: Coordinate with the Northwest Power and Conservation Council regarding future peak management and demand side management needs and opportunities in Oregon.

2.18: Support the Northwest Energy Efficiency Alliance activities to influence regional and national smart grid development and standards for smart appliances.

2.19: Work with Energy Trust of Oregon (ETO), NW Natural and PGE on the OPower Pilot, promoting a comparison of energy usage in comparable residences and encouraging behavior change.

2.20: Support ETO, BPA and the Oregon Business Development Department in attracting and piloting remote technologies used to monitor and manage energy use in residential and commercial buildings.

2.21: Continue ETO promotion of Kill-a-Watt meters loaned through state libraries.

Strategy 3: Establish economic development and access to capital tools to support the targeted industry sectors and Oregon businesses in general.

> *Responsible Parties: Oregon Business Development Department, Oregon Department of Energy, Governor's Office*

Greater access to capital allows greater profitability in private business that can result in increased employment and higher salaries. Business growth provides state revenues needed for essential services. The recommendations below will benefit all Oregon businesses. However, we recommend special attention be placed on focusing these tools to the four top-priority industry sectors where possible.

3.1: Increase available cash/ credit for companies in targeted sectors. Strategies could include:

A. Develop additional tools to increase venture capital investment in Oregon. Consider options such as Certified Capital Company (CAPCO). A CAPCO

has been defined as a state-certified venture capital company with funding for its capitalization coming from insurance companies in the form of low-risk debt financing. As an incentive for the insurance company to provide capitalization loans to the CAPCO, a state provides dollar for dollar tax credits to the insurance company against their premium taxes.

B. Explore investment of 10-15 percent of the Oregon Growth Account into a Clean Energy Fund that can be used to target new business ventures and development of local entrepreneurial management.

3.2: Increase resources for *existing* Oregon businesses through policies including:

A. Refundable Income Tax Credit: Establish a payroll-based tax that would be based on a percentage of the increase in total payroll resulting from expansion or relocation, with the company applying the credit to its state corporate income tax. The incentive would be directly linked to job creation, with clawback provisions if performance metrics are not met.

B. Continue funding of the Building Opportunities for Oregon Small Business Today (BOOST) fund that provides financial resources to help Oregon small businesses access much needed capital. BOOST provides loans for small businesses seeking permanent working capital and grants to create new, permanent full-time jobs. Consider establishing a green business category in BOOST.

C. Implement an aggressive Economic Gardening approach, which focuses on creating a nurturing environment for growing local entrepreneurs rather than "hunting" or recruiting businesses from elsewhere.

3.3: Ensure that the Green Jobs Growth Plan is integrated into existing workforce strategies and plans, specifically:

A. Expand support for green industries into Local Unified Workforce Development Plans.

B. Expand support for green industries in OWIB's next strategic statewide plan.

3.4: Support local governments and community initiatives around the state. The most successful green jobs initiatives are grounded in local efforts. The State of Oregon should provide resources and technical assistance to local governments working to establish green jobs related initiatives. In Phase 1, the State should:

A. Preserve HB 2626 which created the Energy Efficiency and Sustainable Technology Act of 2009 (EEAST) and other bond programs as mechanisms to finance local government retrofits and community energy initiatives.

B. Provide assistance developing community sustainable economy/ sustainable energy plans.

C. Provide oversight to assure representation of all relevant stakeholders at the local level, including business, labor, government, education, and the low-income community in development and benefits of local initiatives.

Strategy 4: As capacity allows, implement policies to support the four second-priority industry sectors.

> *Responsible Parties: Oregon Workforce Investment Board, Oregon Business Development Department*

We recognize the State will not have the funds or capacity to develop all eight sector strategies in Phase 1. However, as noted throughout this document, the recommendations put forth will not be implemented in a perfectly linear pathway. For example, a number of economic and workforce development activities targeting the second-priority sectors are already underway. As capacity allows, these initiatives should be continued. In addition, the following policy development opportunities would further support the four second-priority industry sectors. We believe these actions would stimulate activity in these sectors in the short-term and position them for comprehensive sector strategy development in Phase 2.

- **Sustainable Transportation Sector**
  4.1: Continue active recruitment and support of electric vehicle and battery manufacturers and infrastructure initiatives.

  4.2: Support the Oregon Department of Transportation and local transit districts to pursue transit oriented development and high-density communities with easy transit access.

- **Sustainable Agriculture and Forestry Sector**
  Oregon is an international green building leader and a leading lumber producer. Yet, Oregon's LEED projects use only 7 percent of Oregon-produced lumber. The following recommendations are intended to increase jobs growth in this sector:

  4.3: Create incentives to encourage use of Oregon sustainable timber products in construction projects.

  4.4: Reconcile the conflict between the Sustainable Forest Initiative and the Green Building Council's sustainability protocol.

  4.5: Educate residential builders about LEED residential, which awards certification points for products produced within 500 miles of the building site.

  4.6: Promote a wood building culture for efficiency, carbon emission reductions, and local economic impacts.

- **Green Building and Development Sector**
  This is a critically important sector for the state. However, due to projections for slow job growth in the sector, we did not include it in the top-priority for Phase 1. Nonetheless, we recommend the following near-term actions:

  4.7: Support state code upgrades and standards for new construction of green buildings.

  4.8: Support Energy Trust of Oregon (ETO) Path to Net Zero programs for new commercial building construction.

  4.9: Design and implement an energy performance score for commercial building application.

  4.10: Explore mandatory retrofits to achieve higher energy efficiency standards in existing buildings at time of lease transfer.

  4.11: Develop a list of green products that are made in Oregon and recognized as such.

  4.12: Support training programs that allow construction workers to acquire green building competencies.

- **Environmental Technologies and Services Sector**
  As described in the sector profiles section, the environmental technologies and services sector is extremely broad and diverse including recycling, consulting, hazardous waste mitigation and water storage and conservation. In addition to technical services this sector also includes environmental restoration, which may provide near-term job creation

opportunities along with environmental improvement. Some simple actions will activate this economic sector:

4.13: Maximize the economic development tools available to private parties in the restoration and conservation economy. This includes the Clean Water Revolving Fund, mitigation loans, special tax treatment, etc.

4.14: Make restoration easy at every opportunity. This includes notice-based permitting, engaging federal agencies to synchronize permit timing and requirements, and engaging counties to make the land use permitting simpler. It may also include waiving all permit fees for restoration within priority areas.

Strategy 5: Provide marketing assistance to industries in targeted sectors.

Responsible Parties: Governor's Office, Oregon Business Development Department

In order to assist Oregon green industries in increasing sales and creating jobs, the State should continue to assist companies in marketing themselves nationally and internationally.

5.1: Support Oregon Business Development Department's strategic campaign to market Oregon products and businesses at national and international trade events, and the work of Team Oregon, a public collaboration of state and local governments, to recruit new clean technology companies to Oregon.

5.2: Develop strategic tools to communicate Oregon's green economy/ green jobs success stories as a jobs and business recruiting strategy, including development of case studies and best practices. Promote Oregon's green jobs successes nationally through Brand Oregon initiatives. Promote Oregon's successful green jobs training programs, particularly those with strong industry participation.

5.3: Oregon is a member of the Pacific Northwest Economic Region (PNWER), a bi-national collaboration between the states of Oregon, Washington, Idaho, Montana, Alaska and the provinces of British Columbia, Alberta, Saskatchewan, Yukon and the Northwest Territories. The 2011 annual PNWER conference will take place in Portland. The State should maximize this opportunity to promote green industries and products.

Strategy 6: Develop, enhance and coordinate green jobs training and career pathway opportunities.

> *Responsible Parties: Oregon State Board of Education, the Department of Community Colleges and Workforce Development, Apprenticeship Programs, Oregon University System and Local Workforce Investment Boards (Obviously this strategy involves numerous agencies and organizations and will require clear communications and collaboration from the outset.)*

Oregon currently enjoys a national and international reputation for leadership in green products and services and green jobs training programs and career pathways initiatives. Through targeted and coordinated training programs, the state has an opportunity to establish green knowledge and expertise as a significant competitive advantage across all economic sectors.

However, Oregon employers have noted that inadequate skills levels across the workforce has become a significant problem. Oregon's educational system has experienced significant disinvestment over the past two decades. In addition to making a course correction to strengthen Oregon's education system overall, the Green Jobs Council recommends the following actions to promote green competencies in Oregon students.

6.1: K-12 Green Jobs Preparation Education
In developing this Green Jobs Growth Plan, numerous recommendations for the K-12 system were developed. The overarching strategies are listed below with more detailed, specific actions listed in Appendix C.

A. Convene a working session of all relevant stakeholders to implement the strategies put forth in this Green Jobs Growth Plan.
B. Increase the sustainability literacy of each student exiting the K-12 system. Include middle and high school opportunities to develop skills and knowledge necessary for sustainable business operation, energy efficiency, development of renewable energy, and creation of a healthy natural environment.
C. Provide K-12 students with career guidance and information related to green jobs with a particular emphasis on reaching underserved populations.
D. Leverage community college, university and labor union shop and technical skills facilities to make hands-on learning opportunities available to middle and high school students.
E. Increase readiness of K-12 teachers to provide education for sustainability.

6.2: Post-Secondary Green Jobs Training Programs
As outlined in Appendix B, Oregon universities, community colleges, labor unions and nonprofit organizations currently offer several dozen training programs, ranging from multi-day industry certifications to four year degrees. The following recommendations are based on assessment of current programs and needs within the eight targeted industry sectors.

A. Utilize information gathered from sector strategies to develop/ enhance strategic training programs for the four top priority industry sectors. Emphasis should be on working with existing programs and facilities and leveraging resources wherever possible, rather than creating new.
B. Streamline the State's course and program approval process in order to improve response time to implement green jobs training.
C. Develop a training module to educate construction industry professionals about the tax, cash and utility incentives for green building and energy retrofit projects.
D. Develop better standardization between the numerous energy efficiency, energy auditor and weatherization technician training programs.
E. Work with regional industry partnerships to develop skill standards. In the places where green training has already been built from the ground up, state workforce systems should seek to link local credentials to national standards, where they exist.
F. Develop/ identify/ promote pilot green jobs training programs for under-represented populations including racial-ethnic minorities, ex-offenders (particularly those on the verge of being released from incarceration), at risk youth and low-income women.
G. Preserve and support Energy Trust of Oregon (ETO) programs to train homebuilders in new NW Energy Star residential construction techniques.
H. Support ETO activities to provide energy usage information in the Residential Multiple Listing Service and to train real estate agents in energy efficiency.
I. Support Clean Energy Works Oregon (CEWO) efforts to connect community workforce training and equity requirements to statewide energy efficiency financing program.

6.3: Develop a Green Jobs Skills Bank
Oregon, under the American Recovery and Reinvestment Act, is the only state that has been funded to conduct ACT WorkKeys Job Profiles for in-demand green occupations to determine what skills are needed for growing green jobs sectors. Ten in-demand green occupations are targeted to have job profiles conducted. Each occupation will have up to three profiles conducted that will include a WorkKeys Profile to determine the career skills needed as well as a green job task analysis. Each profile will be deposited into a Green Skills Bank. The skills bank can then be used to determine what skills are needed within a specific occupation or across a range of occupations. In doing so, our training programs can be aligned to the skill needs for green occupations.

To establish an Oregon Green Skills Bank the following action items are recommended:

A. Train and certify job profilers throughout the state.
B. Conduct profiles for all the in-demand occupations in the four top priority sectors.
C. Require training and certification programs be aligned to the Green Skills Bank.

6.4: Establish Career Pathways for Targeted Green Occupations
It is important that industries receiving public resources to train employees for jobs that provide a family wage. Toward this end, we recommend an emphasis on creating career pathways that provide people with numerous entry points and advancement opportunities in the targeted industry sectors.

A. Up to seven green career pathways will be established by 2012 through the ARRA Labor Market Information Improvement grant administered by the Oregon Employment Department. Additional green career pathways should be developed for high demand occupations in the four top priority targeted industry sectors.
B. Tie funds for training and job creation for entry-level (low-wage, low-skill) jobs to requirements that employers provide opportunities for follow-up training/ apprenticeship and pathways into higher-paid work.
C. Imbed green jobs pathways maps into community colleges pathways and OWIB's MyPath Careers websites – integrate labor union programs into pathway maps and website.
D. Utilize WorkSource Oregon to link people to the developing green career pathways.

Strategy 7: Measure outcomes, evaluate results, adapt.

> *Responsible Parties: Oregon Employment Department, Oregon Business Development Department, Department of Community Colleges and Workforce Development, Oregon Workforce Investment Board*

In order to invest in the most effective jobs growth stimulation and training programs, the State needs accurate information about the demand levels, growth projections, skill requirements and wage levels of targeted industries. Accurately measuring the outcomes of the Oregon Green Jobs Plan is essential to ensuring effective investment in green jobs training and economic development programs.

7.1: Comprehensive Green Jobs Labor Market Information

A. Update and expand the original *The Greening of Oregon's Workforce* report. Focus on the four top-priority targeted sectors.

7.2: Establish Effective Metrics

A. Establish baseline data on the four targeted green industry sectors (Energy

Efficiency, Renewable Energy Production/ Generation, Green Manufacturing, and Energy Transmission, Distribution and Storage) to include:

- Number of companies in each sector.
- Number of jobs currently in each sector.
- Wage levels.
- Total dollar output for each sector.

Strategy 8: Support the implementation of this Green Jobs Growth Plan with leadership and greater interagency coordination and resources.

> Responsible Parties: Oregon Workforce Investment Board, state agencies, Governor's Office

The Green Jobs Council recognizes that this plan cannot be fully implemented without the leadership of a responsible entity and the coordination of agencies and partners. Additionally, one of the critical challenges identified by start-ups, business owners or employers, and developers of clean energy projects is the need for improved awareness and integration of programs between regulatory agencies, economic development organizations and the workforce system. Increased collaboration is essential to effectively serving Oregon businesses and employees.

8.1: Green Jobs Growth Plan Implementation Leadership
Work with the Governor's Office to provide leadership and oversight for the implementation of the plan through the Oregon Workforce Investment Board (OWIB). The Board may decide to contract a project director or designate the provision of leadership through other structures. Functions will be to coordinate statewide green jobs projects, catalyze effective communications and share best practices among partners. The OWIB, in partnership with Business Oregon, will also lead in communicating Oregon's green jobs successes. The OWIB or its designee would also help to identify additional funding opportunities to expand and support the Green Jobs Growth Plan.

8.2: Integrate Key Agencies and Partners
OWIB or its designee will convene regular working sessions with relevant state agencies and other organizations to address green jobs related employment needs and programs, identify potential leverage points including on-the-job training opportunities, and integrate this information into green jobs planning efforts. These activities may be carried out through the Green Jobs Council, its successor, the Workforce Policy Cabinet or other committees or governance structures.

8.3: Develop a culture of wrap around services for business development that results in agencies working together to meet the needs of businesses in a streamlined and coordinated manner. For example, when processing a business permit, a lead entity would receive the application and then notify, as appropriate, Business Development Department, Department of Energy, Department of State Lands, Department of Land Conservation and Development, Building Codes Division and so on. These representatives would work with the applicant to expedite the project. Adopting wrap around services in state government requires an environment that lowers risk aversion to trying new ways of doing business and catalyzes collaboration.

8.4: Invest in adequate grant writing capacity to be able to capitalize on federal funding opportunities. It is likely that federal funding will continue to be available for green industry and green jobs training throughout the 2011 – 2013 biennium primarily in the form of competitive grants. The State needs to have the capacity to effectively respond to these opportunities.

Strategy 9: Monitor energy and climate legislative developments likely to impact green jobs and develop strategies and policies for capitalizing on emerging opportunities.

> *Responsible Parties: Oregon Workforce Investment Board, Oregon Business Development Department, Oregon Department of Energy*

It is beyond the scope of the Green Jobs Growth Plan called for in HB 3300 to recommend changes to, and creation of, new state energy and climate policy and corresponding actions. However, developments in those areas have the potential for significant impacts on green job creation. At the time of finalizing this plan, numerous policy options are being explored by legislators, government agencies and other organizations around the state.

9.1: The summary offered below includes policy developments that are likely to be in play, beginning as soon as the 2011 legislative session, and that would influence green jobs development. This summary is not all-inclusive, but provides a starting point based on best information at the time of completion of this document.

A. Western Climate Initiative: On the heels of the federal government's failure to address energy policy, the Western Climate Initiative has been re-invigorated. A regional cap and trade program may develop as a result.
B. Energy Performance Standards and Ratings (EPS): Efforts are underway to strengthen and expand the newly established energy performance standards and ratings for residential buildings and development of an EPS for commercial buildings in Oregon. This will impact the demand for training and development of qualified energy auditors and inspectors.
C. The Business Energy Tax Credit (BETC) and Residential Energy Tax Credit (RETC) are set to sunset in 2012 for projects other than manufacturing. Significant work is underway to redesign the BETC and RETC including possibly establishing an alternative program.
D. Changes to the Renewable Energy Standard (RES): Some groups are recommending altering the RES to include thermal, waste-to-energy, and quantifiable conservation measures.

Phase 2: January 2014 through December 2016

The actions recommended in Phase 2 are intended to build on the work implemented in Phase 1, while taking into account the following assumptions: likely state budgetary restrictions, restructuring directed by a new gubernatorial administration and a gradual easing of the recession.

The recommendations put forth for Phase 2 are designed to catalyze vigilant evaluation of changing market conditions and creative options for financing economic incentives and workforce services. This phase requires a dual focus on immediate and long-term opportunities and trends.

Intended Outcomes:

The intended outcomes of the following Phase 2 recommendations include:

- Grow jobs in the four top-priority targeted industry sectors (Energy Efficiency, Renewable Energy Production/ Generation, Green Manufacturing, and Energy Transmission and Storage) by 10 percent.

- Grow jobs in the second-priority targeted industry sectors (likely Green Building and Development, Transportation,

Agriculture/Sustainable Forestry, Environmental Technologies and Services) by 5 percent.

- Add or significantly expand at least 30 green businesses.
- Increase total dollar output from the four top-priority targeted industry sectors by 8 percent.
- Increase total dollar output from four second-tier targeted industry sectors by 5 percent.

Action Recommendations and Responsible Parties:

Strategy 1: Evaluate progress to date and efficacy of action recommendations implemented in Phase 1.

Responsible Parties: Oregon Employment Department, Oregon Business Development Department, Oregon Workforce Investment Board

1.1: Evaluate progress against the baseline metrics established for the four top-priority targeted industry sectors. Adapt the Phase 2 plan as necessary based on this evaluation.

Strategy 2: Evaluate efficacy of Green Jobs Intensive Action Team and whether that body should continue as structured, restructure or dissolve.

> *Responsible Parties: Governor's Office, Oregon Workforce Investment Board*

Strategy 3: Assess efficacy of the Implementation Leadership and make adjustments as necessary.

> *Responsible Parties: Oregon Workforce Investment Board, Governor's Office*

Strategy 4: Evaluate efficacy of initial sector strategies implemented including progress against the baseline metrics established for the four top-priority targeted industry sectors. Based on this evaluation and updated labor market data, implement sector strategies for the next four targeted industry sectors.

> *Responsible Parties: Oregon Workforce Investment Board, Oregon Employment Department, Oregon Business Development Department, Department of Community Colleges and Workforce Development.*

It is likely that these sectors will be Green Building and Development, Transportation, Agriculture/ Sustainable Forestry, Environmental Technologies and Services but a review of labor market data and economic conditions may suggest different Phase 2 priority industry sectors.

Strategy 5: Continue to adapt and improve economic development, access to capital, and workforce development policies and tools:

> *Responsible Parties: Governor's Office, Oregon Business Development Department, Oregon Department of Energy.*

5.1: Expand support for local governments and community initiatives around the state.

A. Provide assistance establishing community scale renewable energy projects. Wherever possible the State should provide technical assistance, and regulatory process streamlining to aid local governments in establishing renewable energy and distributed generation facilities.
B. Support local economic development entities in establishing green jobs related initiatives.

5.2: Support Oregon Green Entrepreneur Development
Several large U.S. cities are establishing worker-owned green businesses to provide anchor services to existing businesses. These projects focus on

creating the businesses first and then providing the training necessary for the workers/owners to succeed. The State should undertake the following:

A. Establish a pilot project worker-owned green business cooperative for low-income residents/ communities based on a survey of national best practices. Draw on the experience of existing Oregon worker-owned businesses and the state's resident owned manufactured home park program.

5.3: Increase Flexibility and Innovation in the Workforce System.
Reliance on a patchwork of categorical federal funding streams serving specific target populations does not allow for the flexibility needed to meet employers' needs.

A. The State needs to develop funding options to overcome these restrictions.

Strategy 6: Convene a Green Jobs / Green Economy Summit to share results of Green Jobs Growth Plan and sector strategies evaluations and collect ideas for improvements and new opportunities.

> *Responsible Parties: Governor's Office, Oregon Business Development Department, Oregon Employment Department*

6.1: Collaborate with the Oregon Business Plan and their annual Leadership Summit.

Strategy 7: Expand marketing assistance to industries in targeted sectors.

> *Responsible Parties: Governor's Office, Oregon Business Development Department, Oregon Workforce Investment Board, Department of Community Colleges and Workforce Development, Oregon University System*

7.1: Evaluate the marketing activities provided in Phase 1 and adjust to improve efficacy. Evaluation should include economic activity resulting from marketing efforts as well as feedback from key green industry representatives.

7.2: Expand green industry representation and participation in the Oregon Business Plan and their annual Leadership Summit.

7.3: Promote Oregon's green jobs successes nationally and internationally.

7.4: Market and promote the Oregon workforce system and the sector strategies resources so that green employers have a greater understanding of the services available to them.

7.5: Create a New Economy website that links green job openings, training programs and incentives with relevant information from all related agencies and organizations.

Strategy 8: Expand Oregon's involvement in regional green economic development approaches.

> *Responsible Parties: Governor's Office, Oregon Business Development Department*

Coordinated regional economic development initiatives may provide opportunities to reach economies of scale for some green industries and products and to learn from best practices. In addition, as carbon pricing is implemented and carbon markets

develop, there will be benefits for local sources of products. Specific recommendations include:

8.1: Provide leadership on the Pacific Coast Collaborative, which is comprised of the Governors of Oregon, Washington, California, and the Premier of British Columbia. Several action items agreed to by the Collaborative support green jobs development, including:

A. Promote development and delivery of renewable energy.
B. Seek collaborations on forest product innovation for renewable energy.
C. Collaborate on pilot projects for industrial energy efficiency.
D. Promote a wood building culture for climate action.
E. Collaborate on "net-zero community energy" homes and buildings.

8.2: Provide strong participation and leadership in the Pacific Northwest Economic Region (PNWER).

Strategy 9: Expand development and coordination of green jobs training and career pathway opportunities.

> *Responsible Parties: State Board of Education, the Department of Community Colleges and Workforce Development, Apprenticeship Programs, Oregon University System, Local Workforce Investment Boards*

It is anticipated that during the Phase 1 period, due to budgetary realities and increasing support for innovation, the public education system will undergo significant reformation and restructuring. At the same time, green jobs training programs will likely proliferate, as they already are at the time of the writing of this report. Therefore, it is especially important that the State evaluate the status of the education system and progress made by Phase 1 activities related to green jobs training and career pathways before moving forward with Phase 2 recommendations. However, the recommendations below reflect the Green Jobs Council's advice given current conditions and expected developments.

9.1: Evaluate progress to date and efficacy of action recommendations implemented in Phase 1. Adapt the following Phase 2 recommendations as necessary based on this evaluation.

9.2: K-12 Green Jobs Preparation Education

A. Evaluate the progress made during Phase 1 on the four key strategies below and the specific action items listed in Appendix C and identify the next action steps to implement:

- Increase the sustainability literacy of each student exiting the K-12 system. Include middle and high school opportunities to develop skills and knowledge necessary for sustainable business operation, energy efficiency, development of renewable energy, and creation of a healthy natural environment.

- Provide K-12 students with career guidance and information related to green jobs with a particular emphasis on reaching underserved populations.

- Leverage community college, university and labor union shop and technical skills facilities to make hands-on learning opportunities available to middle and high school students.

- Increase readiness of K-12 teachers to provide education for sustainability.

B. Evaluate any structural changes that have been made to the public education system and identify opportunities for making progress in the four key strategies noted above.

9.3: Post-Secondary Green Jobs Training Programs:

A. Resource the development of new/ expanded training programs identified by sector strategies development.
B. Develop state-supported incumbent worker training for companies wishing to expand their green jobs footprint beginning with:
   i. Green teachers certificate
   ii. Green health care workers certificate
   iii. Green Business Administration degree
C. Incorporate a sustainability strand into appropriate Career Technical Education (CTE) programs of study.
D. Update work with regional industry partnerships to develop skill standards. In the places where green training has already been built from the ground up, state workforce systems should seek to link local credentials to national standards, where they exist.
E. Expand successful green jobs training programs for under-represented populations that were developed in Phase 1.

9.4: Expand the Oregon Green Jobs Skills Bank

A. Expand development of the Oregon green jobs skills bank that was established with the ARRA Labor Market Information Improvement grant.
B. Explore development of a Green Career Readiness Certificate. Oregon is implementing the National Career Readiness Certificate statewide. This transportable certificate documents foundational workplace skills in the areas of Reading for Information, Locating Information and Applied Math. If there are specific foundational skills that cross all or most of the "green" jobs profiled under the Labor Market Information Grant, Oregon should explore how these skills might be documented and certified in a manner similar to the certification process used with the NCRC.

9.5: Expand Career Pathways for targeted green occupations:

A. Evaluate the status and effectiveness of green career pathways developed in Phase 1.
B. Develop the next career pathways for the top-priority, high demand green occupations as identified through labor market information and economic impacts assessment.
C. Develop resources to more accurately market green jobs and career pathways within targeted sectors to those accessing services via WorkSource Oregon

9.6: State Energy Sector Partnership:

A. Evaluate the effectiveness of the training provided through the State Energy Sector Partnership and replicate the most successful initiatives in other parts of the state.
B. Support local green jobs councils in developing and implementing effective, innovative green jobs initiatives.

Strategy 10: Measure outcomes, evaluate results, adapt.

> *Responsible Parties: Oregon Employment Department, Oregon Business Development Department, Department of Community Colleges and Workforce Development, Oregon Workforce Investment Board*

10.1: Measure progress toward intended outcomes for the four top priority targeted green industry sectors (Energy Efficiency, Renewable Energy Production/Generation, Green Manufacturing, and Energy Transmission, Distribution and Storage) based on baseline data established in Phase 1 including:

A. Number of companies in each sector.
B. Number of jobs currently in each sector.
C. Wage levels.
D. Total dollar output for each sector.

10.2: Establish baseline data for the next four priority targeted industry sectors (likely to be Green Building and Development, Transportation, Agriculture/Sustainable Forestry, Environmental Technologies and Services). Data should include:

A. Number of companies in each sector.
B. Number of jobs currently in each sector.
C. Total dollar output for each sector.

10.3: Utilize information gained through the Labor Market Information Improvement ARRA grant to assess and respond to new job creation opportunities, economic development strategies and training needs.

Phase 3: January 2017 through December 2018

During this period the state economy will have strengthened and most green industry sectors will be expanding. Support from the federal level will likely be reduced as the federal government takes actions to reduce massive debt issues.

Intended Outcomes:

The intended outcomes of the following Phase 3 recommendations include:

- Grow jobs in the eight targeted industry sectors by 8 percent.
- Add or significantly expand at least 30 green businesses.
- Increase total dollar output from the eight targeted industry sectors by 8 percent.

Action Recommendations and Responsible Parties:

Strategy 1: Evaluate overall effectiveness of Green Jobs Growth Plan to date.

> *Responsible Parties: Oregon Employment Department, Oregon Business Development Department, Oregon Workforce Investment Board*

Strategy 2: Evaluate efficacy of all sector strategies implemented. Measure progress against the baseline metrics established for the eight targeted industry sectors.

> *Responsible Parties: Oregon Workforce Investment Board, Oregon Employment Department, Oregon Business Development Department, Department of Community Colleges and Workforce Development*

Strategy 3: Convene a second Green Jobs / Green Economy Summit to share results of Green Jobs Growth Plan and sector strategies evaluations and collect ideas for improvements and new opportunities.

> *Responsible Parties: Governor's Office, Oregon Business Development Department, Oregon Employment Department*

3.1: Build upon the outcomes and evaluation of the Green Jobs/Green Economy Summit conducted in Phase 2.

Strategy 4: Analyze current labor market and economic impact data to identify additional green industry sectors for which strategic sector strategies should be implemented.

> *Responsible Parties: Oregon Workforce Investment Board, Oregon Employment Department*

Strategy 5: Expand state and private investment in Oregon's workforce system so as to enable maximum flexibility and innovation and reduce the limitations associated with federal funding streams.

> *Responsible Parties: Governor's Office, Oregon Workforce Investment Board*

Strategy 6: Aggressively promote and market Oregon green jobs success stories.

> *Responsible Parties: Governor's Office, Oregon Workforce Investment Board, Oregon Business Development Department, Department of Community Colleges and Workforce Development, Oregon Employment Department*

Oregon Targeted Green Industry Sector Profiles

Oregon economic development efforts have made significant progress in developing and implementing industry sector strategies, most notably in healthcare and manufacturing. In addition, the green industry sectors align well with the Oregon Business Plan clean technology cluster. Developing sector strategies for green industry sectors as recommended in this Green Jobs Growth Plan will complement and leverage this existing work. The Green Jobs Council recommends targeting the following industry sectors:

1. **ENERGY EFFICIENCY**
2. **RENEWABLE ENERGY PRODUCTION/ GENERATION**
3. **GREEN MANUFACTURING**
4. **ENERGY TRANSMISSION, DISTRIBUTION AND STORAGE**
5. **GREEN BUILDING AND DEVELOPMENT**
6. **TRANSPORTATION**
7. **AGRICULTURE/ SUSTAINABLE FORESTRY**
8. **ENVIRONMENTAL TECHNOLOGIES AND SERVICES**

Economic impact analysis, labor market information, recent business developments and current trends suggest that these eight industry sectors will become increasingly important in Oregon's economic development efforts.

1. ENERGY EFFICIENCY: Weatherization and conservation retrofitting and remodeling, strategic energy management for industrial, commercial and residential structures and dwellings.

Description: This sector includes a broad spectrum of firms across Oregon and the Northwest representing a diverse set of products, technologies and services. They hold in common the capacity to reduce energy consumption and costs in commercial, industrial, public and residential buildings and infrastructure. This sector comprises manufacturers, distributors, and retailers of energy efficient technologies and products, architectural design and engineering services, energy auditing, building commissioning, and construction contractors.

This sector, which includes a large percentage of sales and professional service positions that support many trades such as laborers, carpenters, plumbers, pipefitters, sheet metal workers, and electricians, comprises the largest group of green jobs in the state of Oregon [4]. While wage rates continue to be quite low in residential weatherization, there is an opportunity to build bridges between this and commercial retrofit work, which has higher income threshold.

A number of sector specific industry and trade associations represent interests in this sector, including the American Institute of Architects, American Society of Heating, Refrigeration and Air-conditioning Engineers, Illumination Engineers Society, a number of trade unions and trade groups, as well as trade unions. The Northwest Energy Efficiency Council (NEEC) is a regional trade association representing a broad array of business types that have energy efficiency as a core product and service function.

Labor Market Information: Weatherization companies in Oregon are projected to add workers, even with the current contraction in construction. A sampling of 16 HVAC and weatherization employers across the state resulted in listings for 105 new

workers. Nationwide, a 20 percent efficiency gain by 2030 could provide an estimated 800,000 net jobs, while a 30 percent efficiency improvement might generate as many as 1.3 million net jobs [12]. A 2008 Global Insights study projects that over the next 30 years, the retrofitting of the existing U.S. residential and commercial building stock would generate nearly 81,000 new jobs nationwide [7].

Weatherization has the second highest average annual direct income across all measures studied in the residential, commercial, and industrial efficiency sectors. Weatherization measures have the highest total employment impacts for all measures studied. Indeed, the total employment impacts for residential weatherization measures (9.5 jobs per million dollars spent) are almost 50 percent greater than the average across all residential measures [10].

Oregon Strengths / Advantages: Oregon has become a prominent leader in energy efficiency, with a quarter of its jobs in the green economy in this category [1]. With the significant contraction in the construction industry but expansion of energy efficiency activities, Oregon's construction workers have an opportunity to re-skill in areas of anticipated job growth:

- energy efficient buildings
- weatherization
- retrofits
- plumbing
- water
- HVAC mechanical systems
- electrical
- energy efficiency analysis

TABLE 7: SUMMARY OF OVERALL STATE SCORING ON ENERGY EFFICIENCY

Rank	State	Utility and Public Benefits Efficiency Programs and Policies Score	Transportation Score	Building Energy Code Score	Combined Heat and Power (CHP) Score	State Government Initiatives Score	Appliance Efficiency Standards Score	Total Score	Change in Rank from 2008 Results
	Maximum Possible Points:	20	8	7	5	7	3	50	
1	California	18.5	6	7	5	5	3	44.5	0
2	Massachusetts	17	4	7	4	5	2	39	5
3	Connecticut	17	5	4	5	4.5	2	37.5	0
4	Oregon	14	5	6	5	4.5	2	36.5	−2
5	New York	14	5	4.5	5	5	1	34.5	0
6	Vermont	19	4	3.5	2	4	1	33.5	−2
7	Washington	14	6	6	3	2	2	33	−1
8	Minnesota	16.5	2	5	3	4	0	30.5	−1
9	Rhode Island	13	4	5.5	1	2	2	27.5	2
10	Maine	8.5	4	5.5	4	4	0	26	9

**note: changes in state rankings from 2008 results are due to both changes in the scoring methodology as well as changes in state efficiency programs and policies.*

According to a recent research study by the American Council for an Energy-Efficient Economy (ACEEE), Energy-efficiency activities yield an average of a nearly 2-to-1 benefit-cost ratio [12].

Oregon was ranked fourth amongst all states in the State Energy Efficiency Scorecard for 2009 (see Table 7, p. 40) conducted by the American Council for an Energy Efficient Economy [13].

2. RENEWABLE ENERGY PRODUCTION/ GENERATION: Solar, Wind, Biomass, Geothermal, Wave, Bio-energy, Small Hydro, Biofuels.

Description: The renewable energy generation sector consists of industries and businesses that are involved in energy generation utilizing renewable energy technologies. This sector covers a wide variety of businesses, from small solar installer contractors to global wind technology and project developers.

The geothermal energy industry sector, for example, is a specialized and focused network of engineering, design, consulting and contracting firms who employ or contract with professional engineers, energy engineers, geologists with specific geothermal resource expertise, technical specialists, architects, designers and HVAC installers.

Wind energy firms in Oregon span the entire spectrum of the wind power industry, including production of turbine parts, project developers, turbine technology development, wind-related consulting, composites and turbine installation. They also employ turbine technicians, who install, operate, service and maintain wind farms.

Labor Market Information: As a group, the average annual personal income across all industries in the renewable energy generation sector is about 50 percent greater than the Oregon average of $50,800. However, this sector shows considerable variation in incomes for direct employees. Biomass ($36,400) and solar ($42,200) are both below the state average. Wind ($50,000) is slightly below, and ethanol ($113,000) and geothermal ($146,800) are significantly above the state average [10] (Table 8).

TABLE 8: AVERAGE ANNUAL RENEWABLE ENERGY PRODUCTION PERSONAL INCOME FOR DIRECT AND TOTAL EMPLOYMENT (ON AN FTE BASIS) IN 2010 DOLLARS

Industry	Direct	Total
Solar	$42,243	$46,780
Wind	$50,000	$46,653
Biomass	$36,383	$54,077
Geothermal	$146,845	$79,107
Wave	$76,779	$60,125
Ethanol	$113,046	$35,991
Small Hydroelectric	$649,641	$132,009
Biodiesel	$55,759	$54,287
Average All	$77,397	$59,815

The construction and extraction occupation group, which includes electricians who may be thought of as solar panel installers, is expected to add 696 jobs by 2010, a gain of 7 percent [3]. ODOE maintains a list of companies that employ one or more tax-credit certified solar technicians that can perform solar PV and/or thermal installations. In 2007, the list had 40 companies; as of September 2009, the number had tripled to 124. Wind turbine technicians are projected to fare well in the coming years as installation, maintenance, and repair occupations are expected to add 169 jobs in Oregon by 2010, an 8 percent gain from 2008 employment levels [3].

Oregon Strengths / Advantages: Oregon is rich in renewable energy resources, legislative policies and tax incentives making it a prime location for companies involved in installing, operating and maintaining renewable energy generation technologies. Both Vestas and Iberdrola, top global wind technology and project developers, have selected Portland as their North American headquarters. Portland is also the headquarters for three major utilities and has a competitive advantage in the renewable electricity market due to its close proximity to California.

Along with the better known technologies, lesser known and emerging technologies are taking hold in Oregon:

- Biomass resources provide energy and fuel for electricity generation, heating and transportation. More than 90 percent of Oregon's biomass energy comes from forest or urban woody biomass and paper mill pulping liquor. The remaining biomass energy is from landfill and wastewater treatment gas, or waste grease and seed oils converted to biodiesel. In 2004, biomass provided 79 trillion Btu of energy or approximately 6 percent of Oregon's total energy supply [14].

- Oregon's geothermal potential is third in the continental U.S. behind only Nevada and California. Nearly the entire state east of the Cascade mountain range has ample low- to mid-temperature geothermal resources for direct-heat applications. This is especially true of the south, central and southeastern portions of the state. As a result of this tremendous resource, Oregon has approximately 2,200 thermal wells and springs that furnish churches, schools, homes, communities, businesses, and facilities with 500 to 600 billion Btus of energy per year. From the inception of the residential tax credit in 1978 to the end of 2005, approximately 2,200 ground-source heat pumps had received a tax credit for space and water heating. Geothermal electric generation could provide important, renewable, base load generation, a constant source of electricity [14].

- There is significant opportunity for Oregon to emerge as a world leader in the production of renewable ocean wave energy, growing and attracting businesses and jobs and spurring clean energy investment. Wave energy technology today is being compared to wind energy technology 15-20 years ago and Oregon is primed to take full advantage:

  - The Oregon coast has strongly competitive wave resources in close proximity to readily available ports and coastal substations providing one of the best locations in the United States to develop wave energy. Wave power is projected to bring online at least 500 MW of new generation capacity by 2025, representing 2 percent of total energy supply of the major utilities in the region by 2025 [6].
  - The Oregon Wave Energy Trust (OWET) and Oregon State University have established the nation's first Wave Energy Center. OWET has received the first part of its $4.2 million budget approved by the 2007 state legislature, and is moving ahead with plans and activities to make Oregon a global leader in this emerging industry. OWET has funded a whale migration study, ecological impact workshop and community outreach. In the future, they are working toward a means of streamlining permitting, securing funding and increasing technology development.

- Clackamas-based Oregon Iron Works was recently awarded a contract to build a wave power buoy for Ocean Power Technologies Inc. The New Jersey company is developing the nation's first commercial-scale wave energy project off the Oregon coast. The "PowerBuoy" system, to be built by Oregon Iron Works, represents the project's first phase of a 10-buoy, 1.5 megawatt wave energy system. Construction of the first 150-kilowatt-capacity buoy, which is to be deployed by the end of 2010, is expected to generate 30 jobs over the next nine months. The nine remaining buoys will be built as part of a second phase to be developed over the next two to three years. While the initial project is just 1.5 megawatts, this project represents great job creation potential, as Ocean Power Technologies is permitted to expand the development to 50 megawatts.

3. GREEN MANUFACTURING: Solar, wind, wave, metals, composites, recycling technologies, supply chain components, food products and processing, lean/high performance practices.

Description: Existing manufacturing infrastructure is increasingly being tapped for whole system and supply chain production of solar PV cells, wafers, ingots, inverters, silicon and modules, smart grid devices, composite technologies, green building materials, and other renewable energy generation technologies.

According to a 2008 study by Global Insight, solar panel manufacturing alone holds tremendous job creation potential [7]. Production within the United States has surged over the past 10 years, growing from 46,354 peak kilowatts (capacity of manufactured devices) in 1997 to 337,268 peak kilowatts of capacity by 2007. This represents a seven-fold increase nationwide in manufacturing capacity and an additional 4,000 jobs.

Lesser known, but widely utilized, composites are deployed in a wide variety of industrial and consumer products and materials. Airplanes and other aviation sectors, wind energy turbine blades, healthcare devices, sporting goods (skis, snowboards, fishing rods, etc.), boats, bridges, railway sleepers, and automotive components all utilize composites, as do many other industrial and transportation products.

Labor Market Information: Demand for and competition among highly skilled manufacturing technicians is high, as many see the advantages, opportunities and jobs increasing as industries and their related manufacturing needs continue to mature. This demand mirrors the findings that the green manufacturing sector has the highest personal income multiplier of all industry sectors [10].

Increased demand for renewable energy technologies is creating new appetite for the supply chain component parts that make up the major renewable energy technologies. Nearly 43,000 firms throughout the United States operate in industries related to the manufacturing of components that go into renewable energy systems. This national development represents nearly $160.5 billion dollars of manufacturing investment and can result in more than 850,600 green jobs.

- Manufacturing in solar, wind, composites and wave energy technologies offers great potential for expansion for Oregon companies.

- Existing solar-related manufacturing companies have the potential to expand and fuel 1,905 new jobs.

- Fiberglass composites have an intimate link to green manufacturing and

renewable energy technologies and are witnessing expanding growth. Miles Fiberglass, an Oregon composites company, has a workforce of 70 employees includes 30 wind turbine technicians that work in the field repairing blades. This company accounted for 35 percent of its annual revenue by servicing wind turbine blades.

- Construction of a 150-kilowatt-capacity wave energy buoy, which is to be deployed by the end of 2010, is expected to generate 30 jobs over the next nine months. Successful project completion will require nine additional buoys to be built as part of a second phase to be developed over the next two to three years resulting in even more green jobs created.

Oregon Strengths / Advantages: Oregon boasts a solid manufacturing base, especially in computer, electronic products, composites and metals manufacturing. The Oregon Manufacturing Extension Partnership (OMEP), and similar organizations providing lean manufacturing training and implementation assistance to a wide variety of industry sectors, has a proven record of success in catalyzing lean manufacturing processes in the state. In the case of wave and ocean energy Oregon is drawing on its metals manufacturing and fabrication industries to land pilot project contracts and pioneer wave energy developments.

Wood fiber composites, specifically, are very well positioned in Oregon due to an intimate link with the building products industry. These composites have the capacity, with additional research and development, to improve utilization of low-grade woody biomass from forest thinning projects, which is increasingly being done to improve forest health. The breadth of this dynamic and emerging industry network offers great potential for decreasing reliance on less readily sustainable resources and Oregon training institutions are meeting the opportunity with robust training options:

- Central Oregon Community College has a Composites Manufacturing Technology (CMT) program that prepares students to enter the composites job market with the specialized manufacturing skills needed to excel in this field.

- Oregon State University has recently partnered with the Wood-Based Composites Center of Vermont and the Oregon Wood Innovation Center to develop an in-depth instructional program to assist technicians, managers and support personnel for career advancement in the wood-based composites industry.

- Clackamas Community College along with American Composite Manufacturers Association is developing a Composite Blade Repair & Inspection Curriculum. It will be the first in the country of its kind, complete with a third party certification.

The existing workforce in Oregon's mature semiconductor industry has proven a natural draw for attracting solar photovoltaic manufacturers. The state has become a prominent figure in the solar manufacturing arena and has taken advantage, early on, of the economic and job creation opportunities presented as the solar industry takes root and continues to mature. Table 9, on the following page, is a table summarizing existing and committed solar-related manufacturing companies that possess the potential to fuel 1,905 new jobs. These companies have selected Oregon as a strategic location to establish their manufacturing facilities.

Last but not least, Oregon is also home to a growing number of small wind energy turbine manufacturers:

- Abundant Renewable Energy manufactures small scale farm and home turbines 2.5 to 10kW in capacity;
- Windmatic manufactures 65 kW turbines;
- VoltAir manufactures 45kW turbines;
- Oregon Wind Corporation manufactures urban setting wind turbines.

4. ENERGY TRANSMISSION, DISTRIBUTION AND STORAGE: Linemen, smart grid, utilities.

Description: At the core of next generation energy transmission, distribution and storage are smart grid technologies. The emergence of smart grid technology, software and products builds on existing technology, workforce and intellectual capital strengths already present in utilities throughout Washington and Oregon. The simplest definition of what the smart grid means is applying information technology for the more intelligent and efficient generation, distribution, storage and delivery of electricity.

Smart grid technologies offer significant opportunities to innovative Northwest companies that can provide next-generation energy intelligence. This burgeoning field spans everything from software and smart meters to energy management systems and demand response – all of which require installers and generate jobs. Smart grid technologies, in many ways, hold the key to most of the Pacific Northwest's top clean-technology opportunities. Moving forward, the regional growth of the wind, solar, and green building and development networks will all rely to some extent on grid modernization.

TABLE 9: SOLAR MANUFACTURING JOB CREATION POTENTIAL

Company	Status	Product	Location	Projected Jobs
SolarWorld	Operating	Cells	Hillsboro	500 employees currently; 1,100 employees by 2012.
Sanyo Solar	Operating	Ingots/wafers	Salem	200 employees.
Solexant	Pending	Thin Film	Gresham	100 employees initiall; 200 employees by 2012.
MEMC/Solaicx	Operating	Ingots/wafers	Portland	80 employees currently; 200 employees by 2012.
PV Powered	Operating	Inverters	Bend	100 employees.
Peak Sun	Operating	Polysilicon	Millersburg	50 employees.
FT Solutions (Ferrotec)	Pending	Crucibles	Fairview	30 employees.
PV Trackers	Operating	PV tracking systems	Bend	25 employees.
Spectrawatt	Operating	Research	Hillsboro	20 employees.
SIC	Operating	Silicon recycling	Portland	20 employees.
Oregon Crystal	Operating	Wafers	Gresham	10 employees.
			Total:	1,135 initially, 1,955 employees at buildout.

Labor Market Information: Reports by economists and industry trade groups suggest that there will be an exodus of highly skilled utility workers in the next five to ten years due to retirement.

- Nationally, 50 percent of electric utility workers are projected to retire over the next 10 years. This represents a loss of some 200,000 highly experienced workers [15].
- A 2008 report by Washington State University illustrated that a staggering 58 percent of Oregon's utility workforce are 45 years of age or older [16].

Despite the economic downtown prompting some workers to delay retirement, the inevitable employment turnover over the coming years could create a skills vacuum in some areas as large numbers of highly-skilled workers retire and must be replaced by less experienced workers. Recruiting, training and retaining new employees while also upgrading the skills of existing workers will become essential to ensuring that the future utility workforce is skilled and ready to meet current and emerging needs of this dynamic industry sector.

Athena Institute, which evaluated the smart grid market for an earlier Climate Solutions report, identified 225 "smart energy" companies in the region in 2002, comprising $2 billion worth of a then $15 billion global industry [6]. More recently, Itron, of Seattle, Washington, posted revenue of $1.46 billion in 2007 and employs more than 8,500 people worldwide. Research firm Global Smart Energy, headquartered in Redmond, Washington, now estimates the global market for smart grid technologies at approximately $40 billion for 2007 [6].

As shown in Table 10, the grid technologies sub-industry, on a per-million-dollar basis, yields the highest level of economic benefits to the state. For every million dollars in output (services performed), grid technologies generate $1.2 million in total value added, including $989,000 in personal income and 16 jobs. These job impacts are nearly four-times greater than those from lineman services and utilities.

Oregon Strengths / Advantages: The Bonneville Power Administration (BPA) and Pacific Northwest Natural Laboratory (PNNL), a Richland, Washington U.S. DOE government research laboratory have been leaders in researching, developing, testing, and deploying a range of smart grid concepts and technologies. BPA's wide area management system (WAMS) substation sensors network provides updates on the Bonneville grid 30 times per second and has been used as a model for similar projects in the West and the Northeast U.S.

TABLE 10: TOTAL ECONOMIC IMPACTS PER MILLION DOLLARS OF OUTPUT FOR ENERGY TRANSMISSION, DISTRIBUTION AND STORAGE IN OREGON, IN 2010 DOLLARS (ECONORTHWEST, 2010)

Industry	Output	Gross State Product (a+b+c)	Personal Income (a)	Other Income (b)	Indirect Business Taxes (c)	Jobs	State and Local Taxes and Fees
Grid technologies	$1,978,994	$1,236,571	$988,516	$182,420	$65,635	16.0	$105,389
Linemen	$1,418,906	$997,020	$292,741	$549,343	$154,936	4.8	$168,603
Utilities	$1,399,996	$726,498	$304,215	$341,181	$81,102	4.1	$97,253
Average All	$1,599,299	$986,696	$528,491	$357,648	$100,558	8.3	$123,748

**Note: Indirect business taxes are a subset of state and local taxes, and the two should not be added together*

Smart grid technology deployment relies on advancement in software and information technology to more effectively and efficiently monitor, deliver and use electricity. This sector taps into the region's globally recognized IT leadership and workforce skills from Intel, Microsoft, and many other players.

While Washington is at the epicenter of smart grid developments in the Northwest, Oregon has strong regional positioning and is home to energy system automation startup companies. In addition, PV Powered, of Bend Oregon, is a national leader in solar inverter manufacturing. Inverters are a necessary component in many solar electric systems converting electricity generated from solar energy technologies into electricity usable by household appliances.

5. GREEN BUILDING AND DEVELOPMENT: Green design, development, engineering, contracting and planning.

Description: Oregon's green building and development industry includes architects, designers, developers, construction contractor associations, trade unions, engineers, planners, product developers, nonprofits, government agencies, higher education, community colleges and service providers working to integrate advanced building, planning, and development practices to design and build energy efficient and environmentally sound homes, buildings and communities here in Oregon and around the world.

In addition to design, construction, retrofitting and deconstruction jobs, this sector incorporates green building product suppliers such as producers and distributors of sustainably harvested lumber and specialized wood product manufacturing industries. About two thirds of employment in this sector is in manufacturing industries with the other third coming from professional services [17].

Labor Market Information: Clean Edge, Inc. projects that jobs in the green-building design sector in Oregon and Washington can grow from an estimated 3,826 today to 12,937 in 2025 [6].

The average personal income for employees in the green building and development sector, as a whole, are modestly above the Oregon average of $50,800. Green residential construction has the lowest average personal income ($48,900) and green design, engineering, and planning has the highest ($68,000). In general, incomes in the architecture, engineering and related industry are higher than those in the construction-related sectors [10].

Oregon Strengths / Advantages: Portland is an international leader in the development of sustainable buildings, with the highest number of LEED accredited buildings of any city in the United States. The state's green building industry is estimated to have a total payroll between $300 and $900 million annually.

The Oregon Built Environment and Sustainable Technologies (Oregon BEST) Center received $2.5 million in 2007 and another $2.75 million in 2009 to fuel the commercialization of clean energy, green building and green technologies.

6. TRANSPORTATION: Batteries, transit, fuel cells, electric vehicles, emissions controls and testing.

Description: The transportation sector is a broad sector that is continually being defined and expanded as technologies and industries emerge. Clean transportation systems and technologies comprise everything from plug-in hybrid electric vehicles to light rail and mass transit systems. The sector includes companies that develop hybrid diesel buses, traffic monitoring software, and liquid biofuels, as well as those that and that employ people who operate and maintain motor vehicles and equipment including public transit vehicles, rail cars and freight trucks. These transportation focused companies and their products are increasing in Oregon and the Northwest. Established transportation companies such as Boeing are developing fuel-efficient airplanes; freight companies such as Paccar are planning to adopt hybrid technologies for medium-duty trucks; and United Street Car has landed contracts to supply modern streetcar systems to cities across North America.

The transportation sector includes electric bicycles and scooters, electric and hybrid cars, trucks, public transit vehicles, ATVs (all terrain vehicles) and motorcycles. Electric vehicles have far fewer moving parts than those with internal combustion engines and they rely heavily on energy-management software and advanced design and manufacturing techniques. This is a young and emerging sector with promising potential to catalyze green job creation in manufacturing, research and development, software and IT engineering and electrical and mechanical engineering.

Companies involved in and affiliated with the transmission sector are researching, developing, manufacturing and implementing new and more efficient battery and fuel cell technologies for on-demand power and energy. Examples of these technologies include:

- Advanced batteries (Li-Ion, NiMH, advanced PB-acid, nickel zinc, thin film, ultra capacitors)
- Battery components, charging and management systems and accessories
- Fuel cells (methanol, PEM, solid oxide, hydrogen, systems integrators, zinc air)

Advanced energy storage technologies are utilized in a range of applications, from capturing excess renewable energy supply and releasing it on demand, to lithium ion batteries for hybrid and plug-in hybrid cars and motorcycles, and backup power fuel cells for remote location cell phone towers.

Labor Market Information: This sector employs a large number of engineers and technicians, including but not limited to:

- Electrical and electronic engineering technicians
- Electrical and electronic equipment assemblers
- Tool and die makers
- Electro-mechanical technicians
- Mechanical engineers
- Electrical engineers

Transportation and material moving account for a major occupation group of this network and comprise 5,255 green jobs, the fourth highest number of green jobs in Oregon [4]. These green jobs are in occupations like fuel system specialists, operations managers and logistics engineers that perform fleet tracking and operate traffic monitoring software.

Oregon Strengths / Advantages: Oregon, with its well-developed software industry and its green-friendly reputation, is proving highly attractive to electric car companies. Oregon and Washington were named as test markets for the new all-electric cars by the Electric Transportation Engineering Corp., known as eTec. eTec will receive $99.8 million in federal funds to study electric vehicle use.

- As part of the study, Nissan will deploy 1,000 cars in Oregon, and 2,500 charging stations will be installed at homes and businesses, primarily in the Portland area. To date, Portland General Electric has installed about 20 charging stations around the metro area and in Salem. PGE will team with eTec to help analyze electricity use once the cars are on the market.

Additionally, three Oregon based/affiliated companies were selected as part the federal governments $2.4 billion in stimulus money grants to develop the batteries and charging stations for electric cars:

- EnerG2, which intends to build the world's first commercial-scale plant for nano-structured ultra-capacitors for advanced energy storage, received a

$21 million federal grant. The plant is planned for Albany, Oregon. EnerG2 is one of the first commercial companies to arise from UW's nano-materials energy initiative.

- Entek, of Lebanon, working with Michigan car battery company Johnson Controls, is receiving $299 million to produce nickel-cobalt-metal battery cells and packs.

- ReVolt, a Swiss company developing zinc batteries for electric cars, has chosen Portland, Oregon as its U.S. headquarters and R&D center. ReVolt claims zinc-based batteries deliver more than twice the energy of lithium-ion batteries, and are cheaper to produce. The company plans to start with 75 Oregon workers and later add an additional 175 jobs.

Mass transit, a major part of any carbon emissions reduction strategy, is also a large opportunity for jobs and manufacturing opportunities in the state. These opportunities can be leveraged as state and local governments move to encourage the development and use of public transit alternatives big and small. Though comparatively small in numbers when compared to mass transit, bicycling is yet another source of both jobs and manufacturing. Portland has achieved a national reputation for policy and legislation fostering a bike safe city.

7. AGRICULTURE/ SUSTAINABLE FORESTRY:

Farming, food, aquaculture, forestry, forest products, nurseries.

Description: This sector includes forestry activities, fishing activities, nurseries, dairies, farms, aquaculture operations and landscaping/ food production greenhouses. It includes loggers, farmers, mill workers, forestry technicians, planters, fishers and aquaculture technicians, plumbers and technicians who install irrigation systems, as well as chemists who design alternative pest controls, and consultants who provide agricultural and forest sustainability planning.

Labor Market Information: Many traditional agriculture and forestry industries and occupational groups are being transitioned into green jobs as consumer demand changes and day-to-day skills, work methods, end products, and business practices move further toward sustainability. In fact, traditional Oregon "blue collar" industries have the most green jobs of all industries [4].

Farming, fishing, and forestry comprise a broad occupation group with 5,838 green jobs in 2008, the third highest number of green jobs in the State [4]. Significantly, 87 percent of these green jobs have no minimum education requirement.

Washington's and Oregon's jobs in bioenergy are projected to increase from 3,207 today to 6,946 by 2025 [5]. These jobs are primarily embedded in forest product industries, logging and forest and management operations that thin forests, fuel refineries, and farming operations growing fuel feedstock.

Organic farming is one of the fastest growing segments of U.S. agriculture. The U.S. rate of growth has been more than 20 percent annually, with growth forecasts in the 9-16 percent range through 2010 [18].

According to the 2010 Economic Multipliers report prepared by ECONorthwest [10] the average annual personal income in Agriculture and Sustainable Forestry possesses the lowest average personal income of any sector (Table 11).

TABLE 11: AVERAGE ANNUAL AGRICULTURE/ SUSTAINABLE FORESTRY PERSONAL INCOME FOR DIRECT AND TOTAL EMPLOYMENT (ON AN FTE BASIS), IN 2010 DOLLARS

Industry	Direct	Total
Aggregate Farming	$14,236	$23,623
Aquaculture	$4,919	$9,102
Forestry	$85,205	$57,697
Nurseries	$40,254	$41,109
Fishing	$19,769	$24,650
Average All	$32,877	$31,290

Oregon Strengths / Advantages: Oregon's thousands of acres of fertile farm land and an abundant natural resource base in forestry and fishing, combined with a long history of natural resource conservation makes the state prime for widespread adoption of sustainable forest, agricultural and food practices. Demand is surging for sustainably harvested lumber, organically produced food and sustainable fishing practices.

Business associations and the Oregon University System are deeply involved in education and research for sustainable land and forestry management practices, sustainable production and distribution of food, fiber and building materials.

8. ENVIRONMENTAL TECHNOLOGIES AND SERVICES:

Recycling, operation, service and maintenance of renewable energy technologies, consulting, hazardous waste mitigation, wastewater treatment, water storage and conservation.

Description: This industry sector includes technologies, project developers and service providers working in environmental protection and cleanup, waste and recycling, energy efficiency, water and wastewater, and sustainable business development practices. As a result, this sector includes a broad range of companies such as consulting and service firms in the areas of engineering, product design, science, law, consulting, insurance, laboratory analysis, fieldwork, construction, and project development.

In addition to the strong growth in energy-related work, a number of new and existing businesses are now providing climate management services. Their work services include carbon and greenhouse gas (GHG) inventory footprinting, carbon offset and renewable energy credit trading and project development. These firms are guiding traditional industry and government clients in taking voluntary reporting and mitigation actions. This trend will increase sharply if carbon reduction becomes a federal or state regulatory mandate.

Labor Market Information: The ascendance of renewable energy and climate change as driving issues, plus the resurgence of interest in environmentally sensitive practices tied to sustainability, has led to rapid growth of this sector.

Prior to the current economic downturn, job growth had been quite strong, with many technical positions going unfilled due to a shortage of skilled applicants. The shortage is most acute for experienced, project manager level professionals. Every $1 million spent on environmental restoration creates 16-22 jobs [19].

Table 12 depicts the average annual personal income for the two primary occupational areas of the environmental technologies and services sector. The combined average wage for the sector ranks Environmental Technologies and services fourth amongst the eight sector strategies [10].

TABLE 12: AVERAGE ANNUAL ENVIRONMENTAL TECHNOLOGY AND SERVICES PERSONAL INCOME FOR DIRECT AND TOTAL EMPLOYMENT (ON AN FTE BASIS) IN OREGON, IN 2010 DOLLARS

Industry	Direct	Total
Waste Management	$62,005	$54,267
Environmental Tech & Svcs	$68,675	$57,190
Average All	$65,936	$55,924

Oregon Strengths / Advantages: Oregon strengths include storm water management, pollution clean-up (soil and water), pollution prevention technologies, engineering, legal services, renewable energy services, consulting services and carbon management services. These service providers dominate this sector and a substantial amount of their work is performed outside of Oregon, with the revenues returning to the state.

Northwest Environmental Business Council (NEBC), a trade association established in 1996, represents the leading environmental technology and service firm in the Northwest working to protect, restore, and sustain the natural and built environment. Services and objectives include business development, member education, information dissemination, networking, and regulatory and legislative advocacy. NEBC's activities cover the states of Oregon, Washington, Idaho, Montana, and Alaska.

Industry Sector Selection Criteria and Rationale

Selection Criteria

To aid in the identifications of high demand, high impact green industry sectors, The Green Jobs Council developed a "Prioritization Matrix" that allowed for side-by-side industry sector comparison and prioritized rankings. Due to the format and size of the matrix it is not feasible to include it in this document. The full prioritization matrix can be viewed online at the website of the Oregon Workforce Investment Board: **www.worksourceoregon.org.** The following criteria were considered in the prioritization matrix:

Program-Related Considerations: Addresses the strength and existence of business development tools and incentives, on a state, local and federal level, for the Industry Sector. Considerations included:

- State Incentive Programs
- State Policy Tools
- Business Affirmation
- Federal Incentives, Policy Tools, and Funding

Economic Considerations: Addresses existing labor market information, prospective economic impact, employee wage level and history of each sector. Considerations included:

- Employment Information Available
- Impacts as "Output" Per Million Dollars in Spending
- R&D Funding
- Retraining Opportunities
- Existing Business Presence
- Existing Foundational / Historical Industry
- Site Availability / Attractiveness to Site Selectors
- Rural / Urban Job Creation
- Average Annual Sector Strategy Personal Income

Timing Considerations: Addresses the timeline and immediacy of job training needs to determine industry sectors growth and job creation potential. Considerations included:

- Immediate Job Training Needs
- Medium-Term Training Job Needs
- Long-Term Job Training Needs

Education Institutions Offering Training for Program Area: Addresses the presence of existing training programs and curriculum as well as historical/ foundational industry training programs and curriculum. This allowed the Green Jobs Council to gauge the availability and experience of training programs. Education institutions queried for program existence included:

- Community Colleges
- Universities
- Registered Apprenticeship Programs
- Private Training Centers

Rationale for Selection of Top 8 Green Industry Sectors

The Prioritization Matrix along with the data in the industry sector profiles and the Economic Multipliers and Metrics report produced by ECONorthwest[11] contributed to the selection of the top green industry sectors.

The Green Jobs Council commissioned ECONorthwest to conduct an economic analysis of green industry sectors. The project team utilized IMPLAN modeling software to calculate economic multipliers and other metrics for the green industry sectors. Economic impact multipliers are metrics that measure the economic linkages between an industry and the rest of the economy (i.e., all else equal, larger economic multipliers mean larger contributions to the economy). The analyses produced multipliers for output, personal income, and jobs, shown in Table 13.

Overall the combined green industry sectors' simple average personal income multiplier (1.90) is just slightly greater than the statewide average (1.79). The jobs multiplier across all sector strategies (2.40), however, is roughly 30 percent greater than the statewide average (1.85).

The average personal incomes for employees in green jobs reflect the wage structure of the underlying industry. For example, incomes in renewable energy generation, green manufacturing, green transportation, and energy transmission and storage strategies are higher than the state average, while incomes in the green building and development and energy efficiency strategies are comparable to the Oregon average, and incomes in the farming, forestry, and fishing sector strategy are lower (Table 14).

Table 15 summarizes the economic impacts on a per-million-dollar basis for each green sector strategy. In some green sectors, this basis represents a $1.0

TABLE 13: SUMMARY OF MULTIPLIERS BY GREEN INDUSTRY SECTOR

	Output		Personal Income		Jobs	
Green Sector Strategy	Multiplier	Rank	Multiplier	Rank	Multiplier	Rank
Green building and development	1.99	1	1.79	6	2.05	6
Renewable energy generation	1.72	6	2.12	2	3.15	2
Energy efficiency	1.86	3	1.66	8	1.83	7
Green manufacturing	1.82	4	2.18	1	2.74	3
Green transportation	1.73	5	1.98	3	2.34	4
Sustainable farming, forestry, and fishing	1.70	7	1.87	4	1.36	8
Energy transmission and storage	1.40	8	1.71	7	3.46	1
Environmental technologies and services	1.98	2	1.86	5	2.26	5
Green sector strategy average	**1.78**		**1.90**		**2.40**	
Oregon average	**1.83**		**1.79**		**1.85**	

The averages for each green sector strategy are simple averages developed for comparison purposes only.
For more information, see Green Industry Sector Profiles section on p. 39.

TABLE 14: SUMMARY OF AVERAGE ANNUAL PERSONAL INCOMES ASSOCIATED WITH THE DIRECT EMPLOYMENT FOR EACH GREEN INDUSTRY SECTOR (2010 DOLLARS)

Green Sector Strategy	Average Personal Income	Rank
Green building and development	$59,116	6
Renewable energy generation	$77,397	2
Energy efficiency	$56,381	7
Green manufacturing	$73,530	3
Green transportation	$65,739	5
Sustainable farming, forestry, and fishing	$18,746	8
Energy transmission and storage	$96,447	1
Environmental technologies and services	$65,936	4
Green sector strategy average	**$64,162**	
Oregon average	**$50,814**	

The averages for each green sector strategy are simple averages developed for comparison purposes only. For more information, see green industry details in the main section of the report.

TABLE 15: SUMMARY OF IMPACTS PER MILLION DOLLARS IN SPENDING OR OUTPUT, BY GREEN INDUSTRY SECTOR (2010 DOLLARS)

	Output		Personal Income		Jobs	
Green Sector Strategy	Amount ($)	Rank	Amount ($)	Rank	Full- and part-time jobs	Rank
Green building and development	$1,987,732	1	$734,893	1	14.8	2
Renewable energy generation	$1,580,881	7	$389,490	6	7.1	7
Energy efficiency	$746,174	8	$277,167	8	5.7	8
Green manufacturing	$1,821,764	3	$455,024	3	7.9	6
Green transportation	$1,729,565	4	$451,881	4	8.3	5
Sustainable farming, forestry, and fishing	$1,699,693	5	$438,018	5	21.4	1
Energy transmission and storage	$1,599,299	6	$528,491	2	8.3	4
Environmental technologies and services	$1,982,058	2	$312,240	7	13.4	3

The averages for each green sector strategy are simple averages developed for comparison purposes only. For more information, see green industry details in the main section of the report.

million change in output or production. In other green sectors, such as energy efficiency, it represents a $1.0 million change in spending. To supplement the information provided by the economic multipliers, the analysis also includes measures of average annual income for direct and total employment, as well as the full range of impacts on a per-million-dollar basis.

Table 15 also depicts how a change in output (production) or spending ripples through the Oregon economy. It relies on the economic multipliers discussed previously, but also provides additional information that can sometimes be masked by the multipliers alone. On a per-dollar basis, certain sub-industries yield larger economic benefits to the state than others. For example, the energy generation and transmission sector yields larger economic benefits to the state. The farming, forestry, and fishing sector tends to generate a high number of jobs, but with relatively low wages.

What follows is a synopsis of the rationale behind the prioritized rankings of the eight targeted industry sectors:

1. ENERGY EFFICIENCY

Oregon has become a prominent leader in Energy Efficiency, with a quarter of its jobs in the green economy in this category [1]. This bodes well for the state when you consider that on a per-dollar basis, the weatherization component of the Energy Efficiency sector yields the largest total economic impacts in Oregon among all energy-efficiency measures studied [11].

The relatively larger per-dollar impacts for the weatherization measures are attributed primarily to the large labor component associated with weatherization and the fact that Oregon has some manufacturing of energy-efficiency equipment used in weatherization projects (such as windows and doors, and insulation materials). This finding suggests that the industry might benefit from greater collaboration with Oregon's colleges and workforce training programs in training (or retraining) construction workers in the field of weatherization technologies. A review of existing training programs (Appendix B) illustrates that the infrastructure is in place and ready for such collaboration.

According to the Lawrence Berkeley National Laboratory (LBNL), employment in the energy efficiency sector is expected to grow between 6.2 and 11.6 percent annually, in the United States, through 2020 [19]. Clackamas, Lane, and Portland Community Colleges are rising to meet the need and now offer courses in weatherization training and energy/resource management that lead to degrees or certificates in this field. Weatherization jobs are in high demand among workers as they hold the second highest average annual direct income across all measures studied in the residential, commercial, and industrial sectors (Table 16, following page).

2. RENEWABLE ENERGY PRODUCTION/ GENERATION

Renewable Energy Production/ Generation generates the second highest personal income multipliers amongst all green industry sectors. In addition, the average annual personal income across all industries in the renewable energy generation sector strategy is about 50 percent greater than the Oregon average of $50,814. However, this sector shows considerable variation in incomes for direct employees employees (see Table 17). Biomass ($36,400) and solar ($42,200) are both below the state average. Wind ($50,000) is slightly below, and ethanol ($113,000) and geothermal ($146,800) are significantly above the state average.

TABLE 16: TOTAL ECONOMIC IMPACTS, PER MILLION DOLLARS IN SPENDING ON ENERGY EFFICIENCY, BY SECTOR AND MEASURE

Sector / Measure	Output	Gross State Product (a+b+c)	Personal Income (a)	Other Income (b)	Indirect Business Taxes (c)	Jobs	State and Local Taxes and Fees
Residential							
Lighting	$724,279	$407,487	$252,965	$136,131	$18,391	5.9	$32,833
HVAC	$922,625	$523,779	$330,415	$170,047	$23,317	7.9	$41,946
Water heating	$466,614	$252,178	$150,679	$90,098	$11,401	3.5	$20,390
Appliances	$590,736	$332,684	$211,632	$98,173	$22,879	5.0	$32,846
Weatherization	$1,195,124	$648,035	$408,666	$209,696	$29,673	9.5	$52,480
Residential All (average)	$779,876	$432,833	$270,871	$140,829	$21,132	6.4	$36,099
Commercial							
Lighting	$899,888	$476,873	$358,575	$93,522	$24,776	6.9	$40,070
HVAC	$825,019	$426,923	$324,541	$79,960	$22,422	6.3	$36,030
Water heating	$445,542	$216,420	$161,035	$43,836	$11,549	3.1	$18,435
Appliances	$533,095	$264,469	$197,989	$52,330	$14,150	3.8	$22,545
Weatherization (insulation)	$1,191,368	$618,292	$463,619	$122,362	$32,311	8.8	$52,131
Controls	$676,152	$361,713	$281,365	$61,567	$18,781	5.5	$30,302
Motors and drives	$348,091	$185,291	$140,508	$34,920	$9,863	2.6	$15,742
Commercial All (average)	$702,736	$364,283	$275,376	$69,785	$19,122	5.3	$30,751
Industrial							
Lighting	$899,888	$476,873	$358,575	$93,522	$24,776	6.9	$40,070
Weatherization (insulation)	$1,191,368	$618,292	$463,619	$122,362	$32,311	8.8	$52,131
Motors and drives	$348,091	$185,291	$140,508	$34,920	$9,863	2.6	$15,742
Irrigation	$768,527	$323,232	$217,458	$87,683	$18,091	4.2	$28,406
HVAC	$658,545	$332,641	$249,688	$65,329	$17,624	4.8	$28,221
Industrial All (average)	$773,284	$387,266	$285,970	$80,763	$20,533	5.5	$32,914
Efficiency All (average)	$746,174	$391,204	$277,167	$93,909	$20,128	5.7	$32,960
Other							
Energy audits	$1,875,878	$1,038,367	$737,015	$254,733	$46,619	14.4	$82,605
Household energy savings	$1,308,413	$741,517	$420,971	$245,600	$74,946	11.0	$92,066

**Notes:*
1. Indirect business taxes are a subset of state and local taxes, and the two should not be added together.
2. Sector averages are simple averages.

TABLE 17: AVERAGE ANNUAL PERSONAL INCOME FOR DIRECT AND TOTAL EMPLOYMENT (ON AN FTE BASIS) FOR THE RENEWABLE ENERGY PRODUCTION SECTOR, IN 2010 DOLLARS

Industry	Direct	Total
Solar	$42,243	$46,780
Wind	$50,000	$46,653
Biomass	$36,383	$54,077
Geothermal	$146,845	$79,107
Wave	$76,779	$60,125
Ethanol	$113,046	$35,991
Small Hydroelectric	$649,641	$132,009
Biodiesel	$55,759	$54,287
Average All	$146,337	$63,629

On a per-million-dollar basis, components of the Renewable Energy Production/ Generation sector have strong positive economic impacts. The economic impacts for wind in Oregon are among the largest in this sector strategy. Every million dollars in operating expenditures by wind power facilities generates a total of $2.5 million in output, including $1.3 million in gross state product and 21 jobs [10].

These are new jobs that the training infrastructure within Oregon can fill with highly accredited workers. The solar and wind components of this sector boast strong existing training infrastructure. Chemeketa, Portland, Tillamook Bay, Columbia Gorge, Portland, Clackamas and Linn-Benton Community Colleges all offer renewable energy technologies and/ or renewable energy technician programs. While these programs have emphasis on solar and wind they also include components and overlapping curriculum applicable to other emerging technologies within this sector.

3. GREEN MANUFACTURING

Economic multipliers for green manufacturing in Oregon generally exceed the statewide average for multipliers across all measures and have the highest personal income multiplier of all industry sectors.

In some instances – solar; wave power distribution, transformer, plate work, and structural steel manufacturing; wind tower; and metals – the multipliers for both personal income and jobs are significantly greater than their respective statewide averages. For example, personal income and job multipliers for solar manufacturing are 3.7 and 3.3 respectively, and both are more than double the statewide average. This outcome is likely the result of strong supply-chain relationships that have been developed by the state's high-technology sector over the last thirty-plus years, and that currently benefits solar manufacturers [10].

According to a 2008 Clean Edge report, employment in solar PV manufacturing is forecast to grow between 11.2 and 13.2 percent annually in Oregon/ Washington between 2008 and 2025 [7]. In addition, that same report shows that wind power employment in the Pacific Northwest is expected to grow steadily at 2.7 to 3.8 percent between 2008 and 2025.

This growth, combined with the total economic impacts per million dollars of output for green manufacturing in Oregon, provides some interesting insights. First, the manufacture of metals-related wind turbine components (towers, nacelle main frames and hubs) in Oregon generates the largest increase in gross state product. This area represents an opportunity for Oregon's historically strong metal manufacturing and machine shop industries. Second, the solar manufacturing sector, tax credits aside, generates the highest state and local taxes and fee revenues. Third, the manufacture of recycling technologies generates significant positive economic impacts in terms of output, personal income, and jobs [10].

The existing workforce in Oregon's mature semiconductor industry has proven a natural fit for attracting solar photovoltaic manufacturers and is well primed to take advantage of the aforementioned projected expansion. This workforce is populated from robust and expansive education institutions, spanning nearly every community college and many unions and universities in Oregon, offering custom manufacturing training and accreditation. These strengths have combined to make the state a prominent figure in the solar manufacturing arena and have taken advantage, early on, of the economic and job creation opportunities presented as the solar industry takes root and continues to mature. Existing and committed solar-related manufacturing companies that have selected Oregon as a strategic location to establish their manufacturing facilities possess the potential to fuel 2,980 new jobs (see Industry Sector Profiles, p.35).

In addition to the strong solar manufacturing foothold, Oregon is home to a growing number of small wind energy turbine manufacturers. Continued and expanded manufacture of metals-related wind turbine components would generate the largest increase in gross state product, representing a strong potential opportunity for Oregon's metal manufacturing and machine shop industries.

4. ENERGY TRANSMISSION, DISTRIBUTION AND STORAGE

U.S. utility companies involved in transmission, distribution and storage have recently undergone a long cycle of consolidation and improved efficiency over the past 15 years. A major recession and efforts to deregulate the industry during the 1990s led many companies to merge and invest in new technologies to improve operating efficiencies, but to reduce their workforce numbers. The result has been a steady decline in utility company employment and a national reduction of nearly 200,000 jobs over the past 15 years [16]. This employment decline corresponds with reduced investments in education and training programs to support the industry.

According to The Pew Energy Trust June 2009 report [1], one out of nine jobs in the clean energy sector will be in industries included in the quickly emerging energy transmission and storage sector strategy. The Pew report notes "It is really important that states develop their own smart grid plans—and better green energy plans for that matter—to encourage investment at the state level."

The emergence of smart grid technologies, software and products builds on existing technology, workforce and intellectual capital strengths already present in utilities throughout Washington and Oregon. This presents a unique opportunity for utilities, private companies and education institutions to create jobs, expand workforce and capture investment.

Successful smart grid technology deployment involves advancements in software and information technology to more effectively and efficiently monitor, deliver and use electricity. This sector taps into the region's globally recognized IT leadership and workforce skills from Intel, Microsoft and others.

Motivation is strong, from an economic impact perspective, to tap this existing IT leadership. On a per-million-dollar basis, the grid technologies sub-industry yields the highest level of economic benefits to the state. For every million dollars in output (services performed), grid technologies generates $1.2 million in total value added, including $989,000 in personal income and 16 jobs. These job impacts are nearly four-times greater than those from lineman services and utilities [10].

As shown in Table 18, the average annual incomes for direct hires in all industry areas in this sector are significantly above the statewide average—grid technologies is 75 percent greater, lineman is 83.5 percent greater, and utilities is 196 percent greater.

TABLE 18: AVERAGE ANNUAL PERSONAL INCOME FOR DIRECT AND TOTAL EMPLOYMENT (ON AN FTE BASIS), IN 2010 DOLLARS [10].

Industry	Direct	Total
Grid technologies	$88,799	$66,626
Linemen	$93,251	$65,036
Utilities	$150,541	$79,219
Average All	$110,864	$70,294

Research firm Global Smart Energy, headquartered in Redmond Washington, has estimated the global market for smart grid technologies at approximately $40 billion for 2007 [7]. This makes a compelling case for the economic stimulus and job creation opportunities within the Energy Transmission, Distribution and Storage sector.

With the advancing Energy Transmission, Distribution and Storage sector comprising such a large global marketplace and individual states needing to develop their own smart grid plans, the existing and historical education institutions offering training in IT and traditional utility and lineman positions are a valuable asset. These institutions have proven in the past that they are well suited to tailor curriculum in order to meet demands as the new and emerging components of this green industry sector continue to emerge and mature.

5. GREEN BUILDING AND DEVELOPMENT

Given Oregon's international leadership position in Green Building and Development, it may surprise some that this sector did not rise to the level of the first four top-priority sectors. As mentioned earlier, there are a number of reasons for this. First, due to constriction of the lending markets, and the lingering effects of the mortgage crisis, it is likely that this sector will remain depressed with high unemployment rates for the next few years.

In addition, this sector already has a fairly well coordinated network and numerous training programs, and will require relatively little assistance to develop a comprehensive sector strategy once the construction market rebounds.

While the average personal incomes for employees in the green building and development sector, as a whole, are modestly above the Oregon average of $50,800 the personal income multipliers for green building and development are slightly lower than the state average [10].

Finally, even though it is not given top-priority status, the Green Building and Development sector will benefit from development of the top-priority sectors. For example, approximately two thirds of employment in this sector is in manufacturing industries with the other third coming from professional services [17]. This large percentage of manufacturing related employment led the Green Jobs Council to place emphasis on the Green Manufacturing sector itself and rely on the residual benefits to boost this sector and other overlapping supply chains. Similarly, this sector will benefit from increased activity in energy efficiency and weatherization projects.

6. TRANSPORTATION

The green transportation sector primarily includes primarily manufacturing and, to a lesser extent, transportation services. All green transportation industries with close-knit manufacturing supply chain relations have multipliers that are greater than their respective statewide averages. The labor related installation multipliers, however, are lower than the statewide average across all impact measures. This implies that the manufacturing overlap of this sector, such as metals manufacturing, hold the strongest contribution to Oregon's economy [10]. As such, the Green Jobs Council has elected to place emphasis on the green manufacturing sector specifically.

Oregon is experiencing impressive developments in the electric vehicles and parts component of the sustainable transportation sector. Three Oregon based/affiliated companies have received $2.4 billion in stimulus money to develop the batteries and charging stations for electric cars (see Industry Sector Profiles p.35 for details). However, significant jobs growth in the electric vehicle arena is likely several years away.

The Green Jobs Council believes this will become an increasingly important industry sector as demand for electric vehicles, mass transit vehicles, parts and services and alternative transportation planning increases.

7. SUSTAINABLE AGRICULTURE/ FORESTRY

Although the Sustainable Agriculture and Forestry sector boasts a large percentage of Oregon's green jobs, most multipliers in this sector are lower than the weighted average multipliers for the state. Agriculture, farming and aquaculture have slightly higher personal income multipliers, but both have relatively low actual direct personal income associated with them [10].

For every million dollars spent, the farming, forestry, and fishing sector tends to generate a high number of jobs. However, these jobs pay relatively low wages [10]. Despite strong university and community college training programs in a variety of agriculture related occupations, labor intensive employment positions comprise the majority of jobs in this sector and require little or no accreditation [4].

With the exception of forestry, average annual incomes are lower in the farming, forestry, and fishing sector strategy than the Oregon average of $50,800 (Table 19).

TABLE 19: AVERAGE ANNUAL PERSONAL INCOME FOR AGRICULTURE/ SUSTAINABLE FORESTRY. DIRECT AND TOTAL EMPLOYMENT (ON AN FTE BASIS), IN 2010 DOLLARS

Industry	Direct	Total
Aggregate Farming	$14,236	$23,623
Aquaculture	$4,919	$9,102
Forestry	$85,205	$57,697
Nurseries	$40,254	$41,109
Fishing	$19,769	$24,650
Average All	$32,877	$31,236

In the case of aquaculture, it is apparent that these incomes are not the primary means of supporting these workers or their households and many jobs are intermittent and highly seasonal in nature.

The combination of low wage and education requirements within the industry resulted in the green jobs council placing prioritization emphasis on other sectors.

8. ENVIRONMENTAL TECHNOLOGIES AND SERVICES

Multipliers for the environmental technologies and services sector tend to be slightly higher than statewide averages in all areas except personal income, which is slightly lower than the statewide average.

In general, incomes in the aggregated environmental technologies and services industry are higher than those in the aggregated waste management industry. Many waste management industry occupations pay low wages with no benefits and provide little room for career track advancement. These same waste management and remediation service positions comprise the majority of employment in this sector [10].

Training and accreditation exist for environmental technologies and services. However, the wide diversity of this sector makes it difficult to effectively focus training programs. Prior to the current economic downturn, job growth in environmental technologies and services was quite strong.

Conclusion

The Oregon Green Jobs Growth Plan lays out a comprehensive and aggressive approach to green jobs development in Oregon. It calls for some state funding during a time when the State is facing significant projected budget shortfalls. The Green Jobs Council recognizes the difficult budgetary decisions the Governor and Legislature will be facing over the next several years. However, we believe development of green industries and growth of green jobs is one of Oregon's most powerful opportunities to diversify our economy, increase revenue and position the state advantageously in the burgeoning international green economy.

This Green Jobs Growth Plan provides a roadmap toward environmental protection and restoration, energy security and economic opportunities for people across the income spectrum. The recommendations in this plan support development of new, emerging green industries and integration of green measures and practices into existing, conventional industries in ways that provide them with competitive advantage in the marketplace.

The Green Jobs Council is grateful to the dozens of agencies, organizations and individuals who contributed their time, insights and expertise into the development of this plan. They are too numerous to list but we want to note that our work would not have been possible without their participation.

On one hand, this plan is the culmination of several years of research, work and creative thinking. On the other, it is just a beginning. The value of the Oregon Green Jobs Growth Plan lies in its implementation. Oregon is uniquely positioned to seize the opportunities provided by the emerging green economy. The Oregon Green Jobs Growth Plan is designed to assist the State in doing just that.

Appendix A:
Oregon Education and Workforce System Current Structure

Businesses often cite a trained workforce as one of the primary criteria they use to locate their businesses. This has been the case for several of Oregon's top green businesses. It is important to note that the green jobs workforce system is not separate from the existing workforce system but is delivered by the same schools, agencies and organizations that train all of Oregon's workforce.

In fact, the workforce system includes K-20 education, numerous state agencies and programs, registered apprenticeship programs and several nonprofit organizations.

State Agencies

There are six state agencies directly responsible for the implementation of the major programs involved in the workforce development system in Oregon. The majority of state agency workforce programs are federally funded and are categorically targeted at specific populations. Many of these programs are not exclusively workforce-oriented but contribute nevertheless to the ability of Oregonians to find and maintain employment.

DEPARTMENT OF COMMUNITY COLLEGES AND WORKFORCE DEVELOPMENT

The Department of Community Colleges and Workforce Development is unique in that it serves both to deliver higher education and direct workforce programs including:

- Workforce Investment Act (WIA) Title I -- Adult, Youth and Dislocated Worker Programs
- WIA Title II -- Adult and Family Literacy Act
- Carl Perkins Career and Technical Education (Postsecondary)
- Small Business Development Centers
- Provides access of participants to intensive training services based on their assessed needs, such as job-finding skills, basic academic and language skills, referral for specialized services, and access to training through Local Workforce Investment Boards, literacy and language services in community colleges, Career and Technical Education programs in community colleges, and assistance to small business development services through community colleges.

DEPARTMENT OF HUMAN SERVICES

The Department of Human Services delivers employment support services to low income Oregonians. Services include:

- Temporary Assistance to Needy Families (TANF) -- JOBS Program
- Food Stamps Employment and Training
- Vocational Rehabilitation
- Older Americans Act Title V – Senior Community Service Employment Program (SCSEP)
- Provides employment opportunities for public assistance recipients, employment related services for individuals with disabilities and older workers, and proven expertise in providing technical assistance to WorkSource centers.

EMPLOYMENT DEPARTMENT

The Employment Department delivers support during times of unemployment and placement services for job seekers and employers:

- Wagner-Peyser Act -- Employment Service
- Trade Adjustment Assistance
- Unemployment Insurance
- Labor Market Information
- Provides labor exchange, business services, referrals, labor market information, and access to iMatchSkills® through the WorkSource Centers described below. Coordinates information sharing and services across workforce and economic development partnerships.

DEPARTMENT OF EDUCATION

The Department of Education administers:

- Carl Perkins Career and Technical Education (secondary education)

THE OREGON BUSINESS DEVELOPMENT

- Department delivers support services to businesses for both general business development and employee training:
- Funding for training for new or expanding businesses (state funded, general fund or lottery).
- Uses state general funds and federal funds (CDBG, MEP) to assist large and small businesses, in partnership with workforce resources.
- Engages in cluster development, including coordination on workforce needs.
- Increases the emphasis on workforce development as an economic development tool.
- Provides business services centered on business recruitment and retention.

BUREAU OF LABOR AND INDUSTRIES

- Apprenticeship Division
- Provides oversight and coordination for the state's apprenticeship programs, and connects those programs to the broader workforce system

Other state agencies are involved in the management of allied workforce programs, such as the Commission for the Blind, Department of Corrections, Department of Housing and Community Services, and the Oregon University System (OUS).

OFFICE OF EDUCATION AND WORKFORCE POLICY

The Governor's Office of Education and Workforce Policy (OEWP) leads policy development for the workforce system in Oregon. This office:

- guides the development of state-level policy related to education and workforce issues;
- provides general direction and serves as a liaison between state and local efforts in education, training, economic and workforce development;
- ensures, through collaboration with the leadership of local workforce investment boards and regional workforce committees, the alignment of statewide, local and regional strategic plans, and the periodic reporting of performance in the implementation of such plans; and consults with local workforce investment boards and regional workforce committees on the development and implementation of a workforce performance measurement system.

Service delivery for all these programs is aligned in 15 geographic regions around the state. Regions are based on county jurisdiction. Human services, employment programs and community college districts are mostly aligned with these regions.

STATE WORKFORCE INVESTMENT BOARD

As does every state, Oregon has a state board: the Oregon Workforce Investment Board (OWIB). The OWIB is appointed by the Governor and is made up of leaders representing private sector businesses, labor, state, local governments and government agencies. A majority of the 24 members represent business.

The OWIB is the advisory board to the Governor on workforce matters. The OWIB is also charged with developing a strategic plan for workforce development in the state, and with creating a cohesive, effective and efficient workforce development delivery system. OWIB's strategic plan, *Winning in the Global Market*, focuses on providing the skilled workforce that Oregon employers need in order to be globally competitive. Through this plan and other policy priorities, the OWIB provides overall state workforce policy guidance which is implemented by the Local Workforce Investment Boards, state agencies and other partners.

Local Workforce Investment Boards

Oregon's governor has designated seven Local Workforce Investment Areas, each with a Local Workforce Investment Board (LWIB). LWIBs are led by private sector majorities, and charged with developing comprehensive local workforce development plans integrating the work of a variety of local workforce development, education and training providers into a strategy to prepare the workforce for current and future workforce needs.

LWIBs work to implement the OWIB's strategic plan at the local level. They coordinate and align workforce development activities to meet the needs of their communities. LWIBs oversee the delivery of workforce development and training services to adults, youth, and dislocated workers. Many of these services are delivered through WorkSource Oregon Centers throughout the state. WorkSource Centers are a partnership at the local level between the LWIBs and the Oregon Employment Department (OED). For the unemployed, underemployed and those seeking new jobs, WorkSource Centers provide assessment, job search, skill building and access to training to help them find jobs. For businesses WorkSource Centers provide employee recruitment and other services to attract and retain employees. WorkSource centers may

also house other program providers and certainly have referral relationships with all the programs.

Oregon's LWIBs also oversee a Youth Opportunity System designed to help low income youth with potential barriers to academic and career success connect to education, training and employment. These services are also mandated by the Workforce Investment Act. Many youth are placed in internships, apprenticeships, or subsidized work experiences in order to earn and learn.

In recent years, at the request of the OWIB, LWIBs have implemented the Employer Workforce Training Fund – a program to help companies become more competitive by providing matching funds for worker training. Through this program, LWIBs have helped to convene and facilitate a number of industry consortia, developing sector programs. Sector programs are public private partnerships to better meet the needs of industry and guide investments based on business input. LWIBs have also partnered with the Department of Community Colleges and Workforce development to redesign how services are delivered at WorkSource Centers. Through a "systems integration" initiative, job seekers now receive enhanced set of assessment and skill building services.

Workforce Policy Cabinet

Unique to the State of Oregon is the Governor's Workforce Policy Cabinet (WPC), which directly addresses policy and operational collaboration between and among workforce investment activities. The WPC is the formal interagency vehicle charged with establishing lines of communication to ensure open and effective sharing of information among the state agencies responsible for implementing the vision for the public workforce system. The WPC is staffed by the Governor's Office of Education and Workforce Policy (OEWP), coordinated by a staff person from Community Colleges and Workforce Development (CCWD), and is made up of the agency and program heads responsible for the various workforce programs and the mandatory WIA partners.

The WPC is Oregon's "virtual workforce agency." The WPC meets at least monthly to discuss workforce issues, and make strategic decisions for the system.

Current WPC membership includes:

- Governor's Workforce and Education Advisor
- Executive Staff to Oregon Workforce Investment Board (OWIB)
- Director, Department of Human Services (DHS)
- Director, Oregon Business Development Department (OBDD)
- Commissioner, Community Colleges and Workforce Development (CCWD)
- Director, Oregon Employment Department (OED)
- Chancellor, Oregon University System (OUS)
- Deputy Superintendent, Department of Education (ODE)
- Policy and Program Manager, Vocational Rehabilitation (OVRS)
- Administrator, Commission for the Blind
- Administrator, Office of Self Sufficiency Programs, TANF/Food Stamps (DHS)
- Director, Apprenticeship Division, Bureau of Labor and Industries (BOLI)

- CCWD Education and Workforce Policy Liaison, WPC Coordinator

The public workforce system in Oregon is effective at serving the targeted populations they are meant to serve. Oregon consistently meets or exceeds federally-mandated outcome measures. However, one major weakness of the system is that there is very little flexible funding to carry out policy directions outside the federal program purposes. To address this challenge the State continues to implement integration efforts between WIA IB and WagnerPeyser OED programs, the Governor's workforce development target areas, and local workforce boards and programs and community colleges.

K-12 Education

Obviously, a strong workforce starts with basic education. Unfortunately, in recent years, Oregon has disinvested in its public K-12 education system. Oregon public schools have the fifth highest class size in the nation. One third of all Oregon high school students drop out, and of those who do graduate only a third of them go on to higher education [21]. The continuation of these trends will make it extremely difficult to produce qualified workers for all industries including green economy industries.

The Oregon K-12 education system includes over 1200 schools of which 240 are high schools. There are over 560,000 students enrolled in all schools with 29 percent of those students in high school. Nearly 20,000 of those high school students in 2008-2009 took at least one credit of Career and Technical Education (CTE) course in career areas that could have strong green job connections.

Individual school districts provide the bulk of funds that support CTE through their general fund allocations. Unlike many states, Oregon does not have state categorical funding dedicated to CTE. Most high schools rely on the federal Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV) funds to enhance CTE education. Starting in 2006, the Oregon Department of Education and other partners began developing the CTE Program of Study concept that is required by the new Perkins IV act. This model for CTE education moves away from separate high school and community college programs to a unified approach to CTE that can be more responsive to economic needs.

Student interest alone is not enough to prepare for the new green workforce. Academic and technical skills also need to improve. Historically, Oregon students have exceeded national performance averages in areas such as math, reading, and writing. The National Assessment for Educational Progress (NAEP), the most often cited assessment used to compare states, has consistently ranked Oregon eighth grade students slightly above the national average. There is no similar measure for high school students. However, Oregon high school students rank at the top of the 22 states that test over 50 percent of their students with the SAT. In 2009 Oregon ranked 2nd in reading, 3rd in math, and 6th in writing. However, state assessments reveal that additional work needs to be done. Only 66 percent of all 10th grade students meet state benchmarks in reading and only 55 percent do so in math. This most likely improves as students continue their education since CTE data indicates that 72 percent of seniors who were CTE students meet reading benchmarks while 66 percent meet the math benchmarks.

In 2007 the State Board of Education recognized the need for improvement in student performance. They initiated changes in the requirements for an Oregon diploma because too many Oregon high school students are not adequately prepared to enter the workforce or post-secondary education. Many students lack the skills needed for today's high skill jobs, while others require remediation in basic academic skills at the post-secondary level. Among other changes, the Oregon diploma increases the credit requirements for core academic content, raises the minimum standards

to earn those credits, and recognizes that students need options to learn academic content in the context of career interests.

Another key measure of academic performance is graduation from high school and transition to post-secondary opportunities. Currently, 68 percent of the entering high school freshmen finish high school within 4 years. That level is far too low, but national and state data indicates the number can rise significantly when students have access to quality CTE programs in high school. CTE students typically graduate from high school at higher rates and also earn credits in community college technical programs. During the 2007-2008 academic years, high school students earned over 49,000 college credits in CTE courses. Many of those courses were in programs that support the green economy. A 2005 study from the Oregon University System found that 73 percent of all high school students who graduated were enrolled in college in the fall or winter term following their graduation. About 30 percent of the high school graduates entered an Oregon community college.

There is still a great deal of work needed to help high school students transition into green careers. During the 2009-2010 academic year, the Oregon Department of Education partnered with CCWD, PCC, PSU, Portland Public Schools and several business representatives to develop a CTE Program of Study in sustainable building. The model links the existing post-secondary programs in sustainable building with high school construction and architecture programs. The intent is to have a statewide model of CTE instruction that will help students better navigate the educational system with the right kind of education to be successful in sustainable building careers.

Higher Education

Oregon's higher education system consists of 17 community colleges, each governed independently by local boards, as well as seven universities within the Oregon University System (OUS).

Oregon's community colleges are facing increasing pressure in both numbers of students and price of tuition. In the mid-1970s community college tuition and fees averaged $360 per year per student; in 2009 the average was $3,574 a year. In the past ten years average tuition at community colleges in Oregon increased 99 percent and is now among the highest of the 15 western states. Enrollment at community colleges over the last two years has increased by 27 percent (11 percent in 2008-09 and 16 percent in 2009-10) to 121,000 students as colleges have responded to Oregon's high unemployment and economic turmoil. The fiscal and operational challenges tied to such increases have been substantial. Due to these challenges, the capacity at most of the community colleges to take on expansions or new initiatives is considerably reduced at this time.

The primary challenge facing the Oregon University System, which serves nearly 100,000 students, is a long-term reduction in state support over the last two decades. Since 1989, state funding for the universities has declined from $4,292 per student to $2,009 per student, in inflation adjusted dollars. In addition to funding challenges, the universities lack the operating flexibility to best meet their public missions.

The Oregon Health Sciences University is governed independently of the OUS and is set up as a public corporation. Their funding comes partly from public appropriations and largely from foundations and private sources.

Apprenticeship Programs

Apprenticeship programs are well-established, privately-funded programs of long standing. Registered apprenticeship is a system that allows workers to earn while they learn – apprentices work in the industry while taking classes at night, or for a specified number of weeks out of each year. Their wage rates are tied to journey level wages, typically starting at 50 percent of a full-fledged journey level rate and increasing steadily as the apprentice accumulates work and classroom hours.

There are 20 apprenticeship-training centers across the state, representing 28 occupations that are officially registered as apprenticeship programs with the State of Oregon. Enrolling approximately 3,000 apprentices and serving several hundred journey level workers in continuing education classes, these programs graduate an average of 500 people per year. (These numbers, of course, fluctuate with the economy.) Many of the union training centers have added new curricula in solar, wind, geothermal and other areas – this training is available to both apprentices and journey level workers. Thus, union workers can continue to learn and grow, and to develop new skills to match new industry demands.

A significant challenge for the registered apprenticeship programs is that the recession has led to a serious downturn in construction activity and many union workers with renewable energy and green building skills are currently unemployed or underemployed.

Green Jobs Training Programs

Many of Oregon's higher education institutions, labor apprenticeship programs, LWIBs and nonprofit organizations have, and are, developing training programs specifically for green occupations. At this time Oregon boasts over 40 such programs ranging from multi-day certification courses, to union apprenticeship programs of two to five years in length, to a full four-year Bachelor's degree. (Details on these programs are provided in Appendix B.)

Appendix B:

Oregon Green Jobs Training Programs

University Training for Green Industry Sectors & Related Occupations

Below is a representation of degrees and research at Oregon's universities related to the Green Jobs Growth Plan Green Industry Sectors. It is important to note that many departments and individual professors have offered (or are planning) sustainability courses within traditional degree programs, which are not represented below. For example, OSU has identified individual sustainability courses in more than 41 departments, and PSU currently has 22 departments that offer sustainability-focused curriculum. For more information, please visit individual university websites.

UNIVERSITY	UNDERGRADUATE	ACCREDITATION	RESEARCH/INITIATIVES
University of Oregon	Green Chemistry	Law School (seven green business law courses, including Climate Change, Renewable Energy, Green Construction, Sustainable Agriculture) Climate Master's Program	Ecological Design Center, within the Architecture School
Oregon State University	Ecological Engineering	Sustainable Natural Resources Certificate (18 credit hours)	Oregon BEST Green Building Materials Laboratory- joint venture, College of Engineering and College of Forestry. Sustainable Business Initiative in the College of Business.
Portland State University	Environmental Sciences and Management offers a Minor in Sustainability School of Urban Studies and Planning offers a Minor in Sustainable Urban Development.	Sustainability Certificate (22 credit hours)	Oregon BEST Green Building and Climate Change Research Laboratory, Center for Sustainable Processes and Practices (eco-roof efficiency)
Oregon Institute of Technology	BS in Renewable Energy Engineering BS in Environmental Science/ Sustainable Technologies Civil Engineering and Software Mechanical and Manufacturing Engineering Technology degrees all have relevance for green industry sectors and graduates are being employed by green industry companies	MS in Renewable Energy Engineering Concurrent BS degrees in Civil Engineering and Environmental Science	Geo-Heat Center oversees two geothermal power plants Oregon Renewable Energy Center – projects to help companies and communities deploy renewable energy solutions Forming two applied research consortia where companies will sponsor projects and shared research topics: Embedded Systems Engineering Consortium (smart grid); and Renewable Energy Consortium
Eastern Oregon University	College of Agricultural Sciences offers a Major in Environmental Economics, Policy and Management, and a Minor in Natural Resource Environmental Law and Policy.		
Southern Oregon University	Environmental Studies with a concentration in Sustainability and Policy		
Western Oregon University	NA		

Community College Training for Green Industry Sectors & Related Occupations:

The Oregon Community College Green Initiative prepared the following tables, which list training programs that correlate to the Oregon Green Jobs Growth Plan Green Industry Sectors. Please note that not every green course or initiative is represented here, as individual instructors are continually incorporating green training into the curriculum.

Following these tables are maps, which summarize programs by community college, and identify a number of "shovel-ready" planned green initiatives. For more information on these programs, please visit the Oregon Community College Green Initiative website at http://lanecc.edu/oasa/occgi/index.html.

**Related Training in bold and italics is a source of Historical/ Foundational Industry training; many of these programs have added green components and are a source of retraining opportunities.*

GREEN INDUSTRY SECTOR	RELATED TRAINING	COMMUNITY COLLEGES OFFERING TRAINING IN THIS PROGRAM AREA
Renewable Energy Production/ Generation: Solar, Wind, Biomass, Geothermal, Wave, Bio-Energy, Small Hydro, Biofuels	Solar	Chemeketa: Employer Specific Training in solar (non-credit); Portland: Solar PV Manufacturing: Cert and AAS; Portland: Renewable Energy Technology: AAS; Tillamook Bay: Building a Solar Hot Water Heater (non-credit) Lane: AAS, Renewable Energy Technician (solar thermal and PV), Solar PV practitioner training leading to NABCEP fundamentals exam and full NABCEP certification
	Wind	Columbia Gorge: Renewable Energy Technology – Cert and AAS degree; Portland: Renewable Energy Technology AAS degree; Clackamas and Linn-Benton offer training that prepares students for transfer into the Columbia Gorge wind program under a "feeder school" approach.
Green Building Development: Green design, Development, Engineering, Contracting and Planning	***Apprenticeship Programs***	Blue Mountain, Central Oregon, Chemeketa, Clackamas, Clatsop, Klamath, Lane, Linn-Benton, Mt. Hood, Portland, Rogue, Tillamook Bay and Umpqua, offer Apprenticeship degrees and certificates in Construction Trades, Industrial Mechanics and Maintenance & Electrician.
	Sustainable Building	Central Oregon: Sustainable Bldg. Advisor Cert (non-credit); Rogue – Eco-Educational House Project; Clatsop – Historic Preservation & Restoration, Mt. Hood – Green Bldg. Principles (non-credit), Lane: Sustainable Bldg. Advisor Cert (non-credit), Portland, Rogue, Treasure Valley, Umpqua
	Construction Technology	Blue Mountain, Central Oregon, Chemeketa, Clackamas, Clatsop (Historic Preservation and Restoration), Lane, Linn-Benton, Mt. Hood, Portland, Rogue, Tillamook Bay, Treasure Valley, Umpqua
	Engineering/ Design	AAS – Mt. Hood, Portland; Cert: Chemeketa, Rogue
	Architectural Design & Drafting	Blue Mountain, Central Oregon, Chemeketa, Clackamas, Clatsop (Historic Preservation and Restoration), Klamath, Lane, Linn-Benton, Mt. Hood, Portland and Rogue
	Welding Fabrication	Chemeketa, Lane, Portland, Southwestern Oregon, Treasure Valley, Umpqua

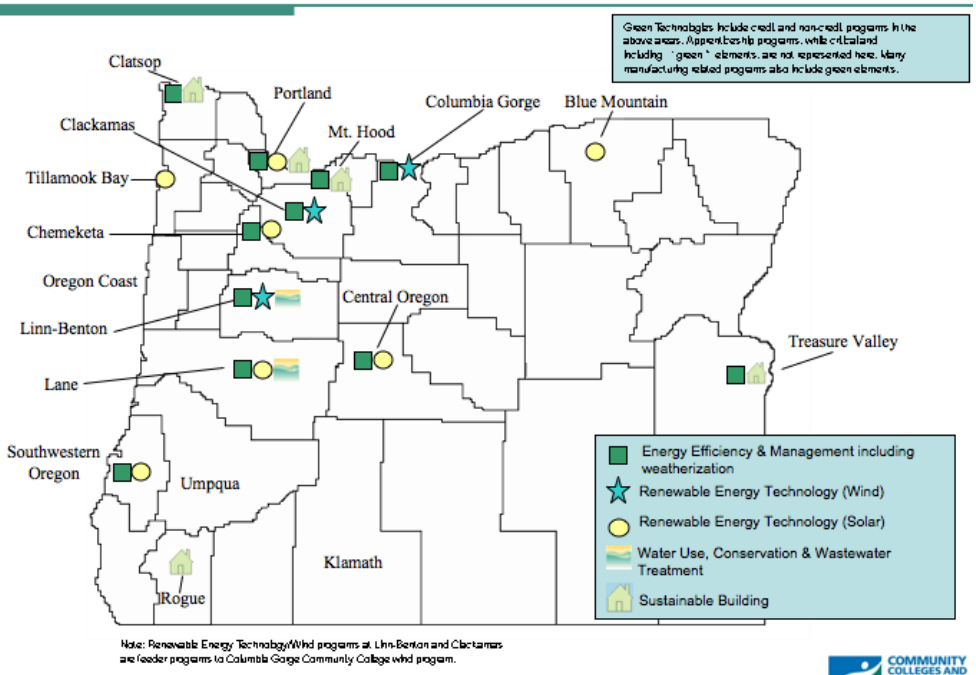
Community College Training

GREEN INDUSTRY SECTOR	RELATED TRAINING	COMMUNITY COLLEGES OFFERING TRAINING IN THIS PROGRAM AREA
Energy Efficiency: Weatherization and conservation retrofitting and remodeling, Strategic Energy Mgmt. for industrial, commercial and residential structures and dwellings	Energy Efficiency and Mgmt.	Clackamas: Energy & Resource Mgmt.: Cert & AAS; Lane: Energy Mgmt. Technician: AAS; Energy Mgmt.. Tech-Renewables: AAS; Energy Mgmt. Technician-Resource Conservation Mgmt. (RCM): AAS; Energy Mgmt. Certification (non-credit); Residential Energy Auditor Certification (non-credit); Building Operator Certification (non-credit); Portland: Facilities Mgmt. Cert (non-credit)
	Weatherization Training	Several colleges offer non-credit weatherization training. Colleges will need to be individually surveyed to determine course offerings. Lane – Residential weatherization auditor or technician (non-credit); Clatsop Sustainable Energy Technology, Weatherization Career Pathway
Green Manufacturing: Solar, Wind, Wave, Metals, Composites, Recycling Technologies, Supply chain components, Food products & processing, Lean/High Performance practices	Solar	Chemeketa: Employer Specific Training in solar (non-credit) Portland: Solar PV Manufacturing – Cert and AAS; Lane: Basic Manufacturing Technician Cert (solar emphasis) Portland: Renewable Energy Technology AAS; Tillamook Bay: Building a Solar Hot Water Heater (non-credit class)
	Wind	Columbia Gorge: Renewable Energy Technology – Cert and AAS; Portland: Renewable Energy Technology AAS; Clackamas and Linn-Benton offer training preparing students for transfer into the Columbia Gorge wind program under a "feeder school" approach.
	Manufacturing Machine Tool & Industrial Technology	Blue Mountain, Central Oregon, Chemeketa, Clackamas, Clatsop, Lane, Linn-Benton, Mt. Hood, Oregon Coast, Portland, Rogue, Southwestern Oregon, Tillamook Bay, Umpqua
	Sustainable Energy Technology	Clatsop: Cert & AAS
	Welding and Fabrication	Blue Mountain, Central Oregon, Chemeketa, Clackamas, Clatsop, Klamath, Lane, Linn-Benton, Mt. Hood, Portland, Rogue, Southwestern Oregon, Treasure Valley, Umpqua
	Engineering Technology	Blue Mt., Chemeketa, Linn-Benton, Mt. Hood, Portland, Rogue, Umpqua
	Viticulture	Chemeketa; Vineyard Mgmt.; Chemeketa, Linn-Benton, Umpqua: Wine Making
Transportation: Batteries, Fuel Cells, Electric Vehicles, Emissions controls and testing	***Automotive Technology***	Blue Mountain, Central Oregon, Chemeketa, Clatsop, Lane, Mt. Hood, Portland, Rogue, Umpqua

Community College Training

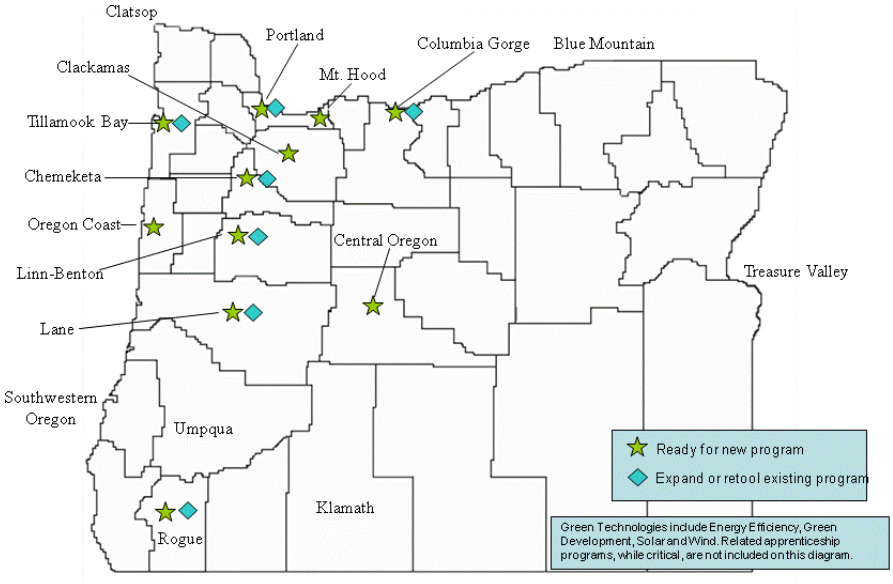
GREEN INDUSTRY SECTOR	RELATED TRAINING	COMMUNITY COLLEGES OFFERING TRAINING IN THIS PROGRAM AREA
Agriculture/Sustainable Forestry: Farming, Food, Aquaculture, Forestry, Forest Products, Nurseries	***Ag Production, Ag Business and Mgmt.***	Blue Mountain, Linn-Benton, Klamath
	Aquaculture	Clatsop: Maritime Science: Cert and AAS; Mt. Hood: Fisheries Technology: AAS; Oregon Coast: Aquarium Science: Cert and AAS
	Farm and Ranch Mgmt.	Treasure Valley
	Forest – Natural Resource Technology	Central Oregon, Klamath, Linn-Benton, Mt. Hood, Southwestern, Treasure Valley
	Horticulture Technology	Clackamas, Chemeketa, Linn-Benton
	Hospitality, Culinary, Restaurant & Tourism Mgmt.	Blue Mountain, Central Oregon, Chemeketa, Lane, Linn-Benton, Mt. Hood, Oregon Coast, Southwestern, Rogue, Tillamook Bay, Umpqua
	Turf & Landscape	Clackamas, Lane, Portland, Rogue, Southwestern
	Wildland Fire Technology	Central Oregon, Clackamas, Treasure Valley
Energy Transmission and Storage: Linemen, Smart Grid, Utilities	Energy Efficiency & Mgmt.	Clackamas: Energy & Resource Mgmt.: Cert & AAS; Lane: Energy Mgmt. Technician: AAS; Energy Mgmt.. Tech-Renewables: AAS; Energy Mgmt. Technician-Resource Conservation Mgmt. (RCM): AAS; Energy Mgmt. Certification (non-credit); Residential Energy Auditor Certification (non-credit); Building Operator Certification (non-credit); Portland Community College: Facilities Mgmt. Certificate (non-credit)
Environmental Technologies and Services: Recycling, Operation, Service & Maintenance of Renewable Energy Technologies, Consulting, Hazardous waste mitigation, Wastewater treatment, Water Storage and Conservation	Water & Wastewater Related Training	Clackamas: Water and Environmental Technology: Cert & AAS degree; Lane: Water Conservation, AAS, Rain Water Harvesting, (non-credit); Linn-Benton, Clackamas, Columbia Gorge: Water Quality & Wastewater Treatment; Mt. Hood: AAS; Clatsop: Non-Credit Weatherization & lead removal
	Environmental Mgmt. & Hazardous Materials	Mt. Hood: AAS
	Lead Removal	Clatsop: Non-Credit Weatherization & lead removal
	Sustainability	Lane: Sustainability Coordinator AAS
	Waste & Recycling	Many colleges offer non-credit recycling and “green living” courses

Oregon's Community Colleges Green Technologies Programs



COMMUNITY COLLEGES AND WORKFORCE DEVELOPMENT
WORKSOURCE OREGON

"Shovel Ready" Community College Training
New and Expanded Green Technologies Programs



COMMUNITY COLLEGES AND WORKFORCE DEVELOPMENT
WORKSOURCE OREGON

5

Union Apprenticeship Training for Green Industry Sectors & Related Occupations:

Union apprenticeship and training centers offer three basic types of training for jobs in green industry sectors:

1. **Pre-apprenticeship programs** for entry-level workers with no previous experience or training (often conducted in cooperation with community organizations);
2. **Registered apprenticeship programs** covering a broad range of occupational skills including green techniques; and
3. **Skill advancement classes** for workers who have already completed apprenticeship programs and need upgrade training in new technologies and processes.

TARGETED INDUSTRY CLUSTER	RELATED TRAINING	UNION TRAINING CENTERS OFFERING TRAINING IN THIS PROGRAM AREA
Renewable Energy Production / Generation: Solar, Wind, Biomass, Geothermal, Wave, Bio-Energy, Small Hydro, Biofuels	Solar Wind	Union electrical training centers offer an extensive Photo Voltaic technology curriculum. Covering wind and fuel cells as well as solar, this curriculum is currently being used to upgrade the skills of existing electricians as well as apprentices. **Inside Electrician** training prepares apprentices for the General Journeyman Electrician license. Jobs: electrical installations, including solar; construction, including "green building" work; and maintenance, repair and service of solar, wind, wave and other energy equipment. **Residential Electrician** training prepares apprentices for the Residential Electrical license. Jobs: electrical construction work on projects ranging from single-family residences to apartment complexes of no more than 3 stories, including solar installation. Perform repair and maintenance on existing installations. **Limited Renewable Energy Technician** training prepares students to install, maintain, finish, and remove renewable energy systems, including wind, solar, micro-hydroelectricity, fuel cells, and engine generators for off-grid systems. There are 16 electrical training centers in Oregon, including: NECA/IBEW Electrical Training Center, Portland Central Electrical Training Center, Tangent Bay Area Labor Center, North Bend Crater Lake Electrical JATC, Central Point Pacific Northwest Ironworkers & Employers Appr. & Training Committee, Portland – training for apprentices and journey level workers related to the installation and maintenance of wind towers Northwest Line Constructors – training for erection of electric transmission and distribution lines for residential, commercial, industrial and agricultural customers; related training for other utility occupations. (Shared locations in Portland, Springfield, Central Point, Tangent & Tualatin)

TARGETED INDUSTRY CLUSTER	RELATED TRAINING	UNION TRAINING CENTERS OFFERING TRAINING IN THIS PROGRAM AREA
Green Building Development: Green design, Development, Engineering, Contracting and Planning	Construction Technology	HVAC & Metals Institute/Sheet Metal Workers #16, Portland – Classes on efficient design and installation of energy-efficient heating, ventilation and air conditioning systems. Combines sheet metal and electrical work involving installation, wiring, service and repair of environmental control systems and the fabrication and installation of ductwork.
	Welding Fabrication	UA 290 Training Center, Tualatin (also offers classes in Redmond, Medford & other sites) – Classes for apprentices and journey level workers on steam & hydronic heating systems; refrigeration; HVAC; solar water heating; gray water reclamation; related geothermal applications.
		Pacific NW Carpenters, Portland (training also offered in Salem, Eugene and Redmond) - Green building training, including insulated concrete forms, siding and thermal barriers for buildings; skill advancement training available for journey level workers
		Glaziers Training Center, Gresham - Glazing techniques for energy efficiency; glass panel system installation; work on solar panels; weatherization; skylights
		Painters, Portland - Use of low solvent materials for green buildings.
		Roofers, Portland - Build extensive, semi-extensive and intensive green (“eco”) roofs and roofs using other energy-efficient materials.
		Heat and Frost Insulators, Portland – Training for mechanical insulation systems.
		Oregon/SW WA Laborers, Corvallis – Training in green building techniques.

TARGETED INDUSTRY CLUSTER	RELATED TRAINING	UNION TRAINING CENTERS OFFERING TRAINING IN THIS PROGRAM AREA
Energy Efficiency: Weatherization and conservation retrofitting and remodeling, Strategic energy management for industrial, commercial and residential structures and dwellings	Energy Efficiency and Management	OR/So. Idaho Laborers, Corvallis & Portland – Weatherization training, training for weatherization supervisors and energy auditors. Includes pathways into registered apprenticeship program.
	Weatherization Training	Pacific NW Carpenters Institute, Portland – Pre-apprenticeship weatherization installer training
		See also green building training opportunities above
Green Manufacturing: Solar, Wind, Wave, Metals, Composites, Recycling Technologies, Supply chain components, Food products & processing, Lean/High performance Practices	Solar Wind Manufacturing Machine Tool & Industrial Technology Welding and Fabrication	Oregon has a model manufacturing training program: registered apprenticeship. It gives manufacturing employers the vehicle for providing training for skilled jobs for new and incumbent employees in areas like Maintenance Mechanic or Electrician, Welder, Power Generating Plant Operator, etc. These programs are often conducted in cooperation with area community colleges, but they also include structured on-the-job training with journey level workers as mentors, predictable wage progression as training continues, and a portable journey level credential for workers who complete the apprenticeship program. Such programs currently operate in a number of metals manufacturing and wood products enterprises.
Energy Transmission and Storage: Linemen, Smart Grid, Utilities	Energy Efficiency and Management	Northwest Line Constructors – training for erection of electric transmission and distribution lines for residential, commercial, industrial and agricultural customers; related training for other utility occupations. (Shared locations in Portland, Springfield, Central Point, Tangent & Tualatin)
Environmental Technologies and Services: Recycling, Operation, service & maintenance of renewable energy technologies, Consulting, Hazardous waste mitigation, Wastewater treatment, Water Storage and Conservation	Water & Wastewater Related Training	Heat and Frost Insulators, Portland
	Hazardous Materials	OR/So. Idaho Laborers, Corvallis – training in hazardous waste removal techniques
	Lead Removal Waste & Recycling	

Workforce Investment Boards

The Oregon Workforce Partnership (OWP) is an association of the seven Local Workforce Investments Boards (WIBs) leading Oregon's workforce, training and job placement systems to meet the needs of job seekers and businesses. Each year, OWP members invest more than $40 million throughout the state to educate and train more than 16,000 citizens and assist hundreds of employers.

The tables on the following pages offer a sampling of recent OWP member investments into green jobs development and training. These projects train youth, current workers, and those dislocated from jobs. The projects range from comprehensive training efforts to capacity building initiatives to pilot projects. For more information on Oregon's state and local workforce boards, see http://www.worksourceoregon.org.

PORTLAND METRO AREA WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Increasing Regional LEED Training Capacity	Worksystems, Inc., Inc. is funding training for members of the Willamette Valley Carpenters Training Center Instructional Team that will lead to the US Green Building Council's Leadership in Energy and Environmental Design (LEED®) accreditation for each instructor. The goal of the project is to enable the WVCTC Instructional Team to become sustainable building experts and to develop, deliver and disseminate the first applied green building curriculum for union carpenters. This project is funded with WIA Employer Workforce Training Funds.	Construction	WSI Construction Skills Panel, AGC, Hoffman, Tice Electric, P & C Structures, Port of Portland, Providence Health System, Pacific Northwest Regional Council of Carpenters, Willamette Carpenters Training Center	10 current workers	+ 100 hours of sustainable building training to up to 150 Carpenter apprentices and journeymen and LEED Accreditation for each worker/ instructor	$35,000

PORTLAND METRO AREA WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Sandy River Habitat Restoration Youth Crew	Worksystems, Inc. funded a summer jobs project for youth to restore and protect critical habitat for native salmon runs. Non-native invasive plant removal, stream restoration, trail building, and other natural resource projects better salmon habitat. Environmental education centered on the themes of sustainability, eco-systems, watersheds, native plants, and natural habitat restoration is embedded in the work. This project is funded with ARRA funds.	Natural Resources and Mining	Mt. Hood Community College Natural Resources, Fisheries, and Outdoor Education programs; Project YESS	33 youth in Multnomah County	a. 80% of youth will have gains in Work Readiness Competencies b. 80% of youth will successfully complete their summer work experiences c. 80% of youth meet standard for punctuality and attendance e. 70% of worksites will report being satisfied with their summer experience f. 70% of youth will report being satisfied with their summer experience	$97,200
Clean Technology	Worksystems, Inc. established a Clean Technology Industry Skill Panel to guide regional workforce training investments. The panel identified training needs for workers within the industry including: Virtualization, Cloud Computing, Energy Consumption Measurement, Extending IT Systems Management to the Physical Environment. Training ran September run through December 2009. This project is funded with WIA Employer Workforce Training Funds.	Other Services –Software/ Clean Tech	CH2MHill, Inspiration Software, Intel, Energy Trust of OR, Ant Hill Marketing, Standard Insurance, Factory IQ, IBM, Portland CC	100-175 current workers in Portland Metro Area	100-175 incumbent workers will be trained in the identified curricula	$200,000
Green Futures / Green Building Pathway convening, training and advising project.	Worksystems, Inc. is working with the Construction Industry Skill Panel through CAWS (Construction Apprenticeship Workforce Solutions) and local training providers to build an articulated *Green Futures Pathway*, a continuum of training opportunities leading to employment in Green Building. Individuals can receive a range of academic skills remediation services, short and/or long-term occupational training leading to certification or degrees. This program offers a bridge out of poverty and an opportunity to retool highly skilled dislocated workers for green jobs. This project is funded with WIA and ARRA funds.	Construction Manufacturing	Employer and Labor Members of CAWS (Construction Apprenticeship Workforce Solutions), SE Works, businesses participating in the Construction Industry Skills Panel	Customers of WorkSource interested in pursuing training related to Green Jobs - approximately 200 to 300 job seekers	Occupational Skill certificates, an increased pool of qualified workers with knowledge on energy efficiency/ retrofit skills, as well as Green Building and Green Manufacturing principles and practices	$200,000

PORTLAND METRO AREA WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Adult/ Dislocated Worker Greening Up the Trades Training, Advising and Convening Project	In partnership with CAWS and Local 16, Worksystems, Inc. is developing "green" curriculum and training specifically designed to skill up the region's idled construction workforce. Construction workers who have been laid off will be trained in green and sustainable concepts and practices in their industry—knowledge and skills that will enable them to take full advantage of emerging green construction opportunities. This project is funded by WIA formula and ARRA funds.	Construction	WSI Construction Skills Panel, AGC, Hoffman, Tice Electric, P & C Structures, Port of Portland, Providence Health Systems, Laborers' Union Local 296, IBEW, Pacific NW Regional Council of Carpenters, Sheet Metal Workers Local 16, PCC, Willamette Carpenters Training Ctr, IBEW-NECA, HVAC Training Ctr	100 Adults and Dislocated Worker customers of WorkSource Portland Metro	50 Certificates of completion for targeted trainings, and 50 will gain skills in NABCEP, PVT Installation, Brazing, Installations, etc	$100,000
Green Training for Solar Industry Employees	As a result of the partnership between the Oregon Solar Energy Industry Association (OSEIA) and Worksystems, Inc., solar industry workers received one of five tracks of professional training at the Northwest Solar Expo (April 28th-May 2nd). The five tracks included courses on residential and commercial Solar Photovoltaics, Solar Thermal, North American Board of Certified Energy Practitioners (NABCEP) pre-certification, and a Solar Business track. This project is funded with Employer Workforce Training Funds.	Construction Utilities	Oregon Solar Energy Industry Association (OSEIA)	300 current workers	Nearly 300 incumbent workers were trained in solar thermal, photovoltaic, and solar business practices; 130 of whom received NABCEP pre-certification training and took the exam.	$54,000

PORTLAND METRO AREA WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Clean Energy Works Portland	Worksystems, Inc. has been chairing the City of Portland Clean Energy Fund's Workforce Committee. Its efforts are targeted toward a large scale residential retrofit project that is nationally recognized as the first on-bill, self-financed model partnering a city with utilities. The City is using Recovery Act dollars to eliminate upfront costs associated with energy efficiency retrofits by offering low-interest, long-term financing. All jobs created through this retrofit project will be posted with the region's public workforce development system, WorkSource Portland Metro, and Worksystems, Inc. will invest WIA funds in training necessary to address the demand for new workers as this project goes to scale. Additional resources are provided by CAWS.	Construction Utilities	Construction Green Building, CAWS, Laborers' Union Local 296, International Brotherhood of Electrical Workers, Pacific Northwest Regional Council of Carpenters, Regional Weatherization training agencies, City of Portland, Multnomah County, PGE, PacifiCorp, Northwest Natural Gas, Shore Bank, Energy Trust of Portland, PCC, MHCC, Oregon Trades Women, ETAP, Irvington Covenant	Customers of WorkSource interested in pursuing training related to Energy Efficiency retrofits. Also benefiting will be area weatherization small business owners -50 to 100 job seekers, 5 to 20 businesses	75 will complete the program, 75 will gain industry specific certifications. Wage replacement of $15.12/hour	$150,000
Green Building On-the-Job Training	Worksystems, Inc. is investing in On-The-Job Training (OJT) to provide Portland area jobseekers with experience and training in the industry and an interest in a career in green building trades with access to employment with businesses involved in Green Building projects. CAWS will identify a pool of qualified workers and match them to a pool of interested employers involved in Green Building projects through the WorkSource Portland Metro System. This project is funded via WIA and ARRA funds.	Construction Manufacturing	CAWS (Construction Apprenticeship Workforce Solutions), Portland CC, Mt. Hood CC, SE Works	25 WorkSource customers	20 WorkSource Oregon customers participating on Green Building OJT's will complete an OJT and be retained by their employer	$ 75,000

PORTLAND METRO AREA WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Greening the WorkSource System Training And Advising Project	Worksystems, Inc. is developing a set of "green" training products that will provide job seekers of all ages and skill levels with a competitive edge in the greening economy and culture: Green Jobs Workshops offered at all WorkSource Portland Metro Centers to educate job seekers on current and emerging opportunities, the functions and aspects of a job that makes it "green", knowledge and skill requirements for those jobs, and training and job search resources and how to access them; a modularized "Sustainability Curriculum" that covers sustainability principles, concepts, philosophy and practices that can be inserted into any existing program of training or course of instruction; and additional curriculum that covers the application of sustainability principals in Manufacturing, Healthcare, Office and Green Building industries. These curriculum modules will be available in August '09. This project is funded via WIA and ARRA funds.	Construction-Professional and Technical Services, Manufacturing, Healthcare	Portland Community College, Mt. Hood Community College, Sustainable Product Works, Green Building Services	This is a curriculum development project - it does not yet provide specific services to individuals	Curriculum modules to serve customers of the WorkSource System, organized labor, k-12 and business community. Regional Business Services staff with specialized knowledge of green and sustainable practices and training resources in targeted growth industries.	$100,000

CLACKAMAS COUNTY WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Sustainable Building Advisor Training Program, Energy Analyst Training Project	The Workforce Investment Board of Clackamas County (WICCO) is partnering to provide trainings that will result in recognized state and national certifications in the following occupations: • Architects and Engineers • Tenant and Developer Representatives • Project Managers • Other Building Industry Professionals • Resource Conservation Specialists This project is funded with WIA and ARRA Funds.	Construction	Clark College and Mt Hood Community College	10 dislocated workers/ disadvantaged adults in Clackamas County	Completions, skill gains, placements, retention	$45,000
Wind Power 2009	WICCO provided funding for Miles Fiberglass to attend the American Wind Energy Association Wind Power 2009 conference to learn to install wind power wind turbines. Miles Fiberglass has targeted this as a market that will help it grow and create hundreds of jobs. This project is funded via WIA Employer Workforce Training Fund.	Construction, Manufacturing, Other Services (Environmental services)	Miles Fiberglass	6 incumbent employees in Clackamas County	Conference resulted in clear goals to secure 2 manufacturing bids and 3 service agreements for maintenance in addition to participation in the development of a new patented wind tower	$6,550
Virtual Paint Sprayer	WICCO provided funding for Oregon and S.W. Washington Painters Apprenticeship to implement a computerized virtual reality program that simulates spray painting. Eliminates air contaminants, wasted paint and clean up. This project is funded via Employer Workforce Training Funds.	Construction, Manufacturing, Other Services (Environmental services)	Oregon and S.W. Washington Painters Apprentice-ship	161 current workers in Clackamas, Multnomah and Washington counties	No paint is used during training resulting in less waste, VOC put in the air, more accurate reporting on performance and flexibility of training location.	$41,000

MARION, POLK AND YAMHILL COUNTIES WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Greening the Entry Level Credential	In partnership with the Mid-Willamette Metals Consortium, the Enterprise for Employment and Education created an industry recognized Entry Level Credential (ELC) for Marion, Polk, Yamhill, Linn, Benton, and Lincoln county metal manufacturers. The ELC is currently being expanded into the secondary wood/ construction industry. Those in the program are also earning the statewide Career Readiness Endorsement. Curriculum on new green technologies is being added to these Entry level credentials.	Construction Manufacturing	Metals, Food Processing, Secondary Woods, High Performance Consortia, SEDCOR, McMinnville Economic Development Partnership, Oregon Business Development Department, Chemeketa CC, Linn-Benton CC, Willamette ESD, ARBOR, HALO, Salem/Keizer School District, Greater Albany School District, Community Services Consortium, Boys & Girls Club, Staffing Association, Employment Department	75 youth	75 youth will attain the Entry Level Credential, have an interview with a manufacturing company that leads to work experience or job placement.	$30,000
Green Jobs Training Project	The Enterprise is offering a green trade training that is a continuum of modularized training courses and certifications available to all populations through on-line training providers. Training topics include: LEED Certifications, Photovoltaic, Wind Energy Technology, Green Building Skills Professional, Certified Indoor Quality Manager, Certified Microbial Investigator, Certified Indoor Environmentalist (assessments), Energy Auditing Software Training, Home Energy Consultants, Commercial Energy Consultant, Weatherization Energy Auditor (DOE), Building and Home Energy Analyst, etc.	Construction, Administrative and Waste Services, Professional and Technical Services, Manufacturing, Utilities	Metals, Food Processing, Secondary Woods, High Performance Consortia, Construction, Bioscience, Youth Apprenticeship Programs, SEDCOR, MEDP, OECDD, Chemeketa Community College, Arbor, HALO, Staffing Association	150 youth	Youth will attain various learning and certificate levels. There are various modules in the training.	$15,000

LINCOLN, BENTON AND LINN COUNTIES WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Summer Natural Resource Crews	Community Services Consortium the Linn/ Benton/Lincoln Workforce Investment Board have partnered to implement Summer Natural Resource Youth Crews. The crews work on projects including: riparian area restoration, marine estuary research projects, water sampling, environmental clean up in forest areas, pioneer cemetery preservation, invasive species eradication, native plant reintroduction and sustainable agriculture. There is a heavy mix of science education, career exploration and green practices. Funding for this project comes from OYCC, OYEI, WIA/ARRA and foundation grants.	Construction, Administrative and Waste Services, Natural Resources and Mining, Professional and Technical Services, State & Local Government, Educational and Health Services	US Forest Service, US Fish and Wildlife, Port of Newport, Port of Toledo, The Nature Conservancy, Nestucca Bay Wildlife Refuge, Pioneer Cemeteries, Linn and Benton Counties, City of Monroe, Alsea School and Lincoln County Head Start, OSU Extension, Hatfield Marine Science Center, Mid-Coast Watershed Council, and Career Tech High School, OYC, OYEI, and CSC	139 youth in Lincoln, Benton, and Linn Counties.	95% program completion. Youth will gain skills in environmental and earth science, technology (GPS tracking), research techniques, and green practices. Youth will gain transferable job skills including: team building, leadership, record keeping, responsibility, reliability, conflict resolution, communication and support skills. These unemployed youth will earn a wage or stipend while in the program.	$486,500
Weatheriz-ation Training Program	Through its local weatherization program, the Community Services Consortium has partnered to create a weatherization training facility and flexible programs to meet the needs dislocated workers, unemployed/underemployed adults, and youth.	Construction, Utilities	Oregon Energy Coordinator's Association, and the Northwest Energy Education Institute at Lane Community College	40 youth, 42 dislocated workers and 28 unemployed/ underemployed adults.	100% will gain weatherization, science, lead based paint safety, & workplace safety skills. 95% will complete, 85% will pass the certification exam. 85% of exam completers will be hired or go on to further education. 75% are expected to retain employment/continue in education. 75% of youth will improve their wages.	$178,000

LANE COUNTY WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Aprovecho Training Project	Aprovecho Research Center will employ and train youth in a multidisciplinary laboratory in green technology, sustainable forest management and sustainable agriculture. Hands-on projects include water conservation, storage and abatement; lumber processing, basic carpentry and natural building; small scale aquaculture systems; and solar hot water system design and installation. Participants who display appropriate aptitude and work readiness skills may become interns in Aprovecho's summer "Sustainable Living Skills" Program. This project is funded with $66,000 of WIA formula and ARRA funds.	Construction, Natural Resources and Mining, Other Services, Educational and Health Services	Aprovecho, South Lane School District, Bureau of Labor and Industry	20 youth in South Lane County	90% will complete high school and connect with a career pathways 90% will improve work readiness skills	$66,000
CleanTech/ Green Industry Cluster Exploration	Lane Workforce Partnership is working with the community and local governments in Lane County to better define clean tech/green cluster in our area. The goal of this project is to determine workforce needs and the potential economic impact. This project is being supported with Workforce Investment Act funds.	Clean Tech/ Green as defined in The Greening of Oregon's Workforce	Good Company, OBD, Lane County Econ Dev, City of Eugene, Lane CC	This is a convening project benefitting the entire county.	Strategies to grow a clean/green cluster in Lane County	$7,000
Summer Youth Farm Training Project	Lane Workforce Partnership is funding Food for Lane County to run a summer farm to help youth develop skills in sustainable food growing. Youth learn about growing organic produce, using tools, reusing and recycling resources, preventing degradation of the natural environment, increasing energy efficiency and the impact their food choices have on the environment. This project is funded with ARRA funds.	Wholesale and Retail Trade, Natural Resources and Mining	LCC instructors, experts and employers in green/ clean employers	12 youth in Lane County	90% will complete and 90% will gain work readiness skills	$34,141

LANE COUNTY WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Summer Green/ Clean Youth Project	Lane Workforce Partnership is funding Riverfront Alternative School to partner with Green/Clean Technology industry employers to host internship placements, provide tours, arrange for guest speakers and assist with curriculum development. Youth participate in a training program that integrates energy efficiency concepts in the classroom and experience in the field. Projects include weather stripping, installing attic insulation, caulking, repairing ductwork, and installing power strips, low-flow shower heads, plug insulators and compact florescent bulbs. Youth receive experience auditing water and electric use. Tours of the Lane Community College's Energy Management Program will introduce youth to Green/Clean Technology career pathways. Counseling and assistance will be given to students interested in pursuing the two-year Energy Management Program in the fall. This project is funded with ARRA funds.	Construction, Natural Resources and Mining, Educational and Health Services, Utilities	LCC instructors & experts & employers in green/ clean, Looking Glass Youth and Family Services	10 youth in Lane County	90% will complete and 90% will gain work readiness skills	$25,000
Energy Management Training Scholarship Project	Lane Workforce Partnership awarded training scholarships to 6 low-income adults and dislocated workers entering Lane Community College's Energy Management Program. This program includes cooperative education providing opportunities for students to develop skills, explore career options, and network with professionals and employers. Program completion leads to high wages in this high demand occupation. This program is funded with WIA and ARRA funds at an approximate cost of $5200 per scholarship.	Construction, Administrative and Waste Services, Natural Resources and Mining, State & Local Government, Manufacturing Utilities	local green tech employers & experts in green/ clean tech, Utility Boards	6 dislocated workers/ disadvantaged adults	95% will complete the program and get jobs.	$31,200

LANE COUNTY WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Lane Community College: Energy Management Training and Work Experience Project	This project has been designed to assist dislocated workers get back to work within the high-demand energy industry sector and to introduce low-income adults to this sector. It includes implementation of a three strand training program: residential weatherization installer training, residential and commercial energy auditors training, and green construction. The green construction strand enables trades and construction workers to learn practices of green construction in building design and constructions. This six month training provides general building contractors with the knowledge to build within a "green environment". All trainings are accelerated and run 3-6 months. This project also provides trained journey-level electricians and plumbers with refresher training specifically to install renewable energy systems. This project is funded with ARRA resources.	Construction, Natural Resources and Mining, Utilities		80 Adults, and 120 Dislocated Workers	90% will complete & gain industry recognized skills. 75% of those will be employed in the energy management field.	$180,000

JACKSON AND JOSEPHINE COUNTIES WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Solar Photo-voltaic Grid Installation Certification Training Project	The Crater Lake Electrical Joint Apprenticeship Training Committee (JTAC) determined a need for journeyman elvectricians to become qualified to install, troubleshoot and maintain photovoltaic systems. They partnered with The Rogue Valley Workforce Investment Board to obtain funding for Oregon Energy Trust approved certification training. This project is funded with WIA Employer Workforce Training Fund dollars	Construction Utilities	4 Local Electrical Contrac-tor Firms	30 current workers in Jackson and Josephine Counties	Participants will receive 24 hours of continuing education credit, a completion certificate and be eligible for Level 1 Installer Exam for NABCEP Certification	$6,700
Oregon Youth Employment Initiative (OYEI) Project	This project is a partnership among Oregon Youth Conservation Corp/Oregon Youth Employment Initiative/The Job Council. OYC has provided funding for youth crews doing natural resource conservation/restoration and fuels reduction work in the forests and surrounding recreational areas of Jackson and Josephine County. The work provides improved access for the general public and environmental education for youth.	Natural Resources and Mining, State & Local Government Other Ser-vices	Oregon Dept. of Forestry, BLM, USFS, County Gov-ernment	30-42 Youth in Jackson and Josephine Counties	30-42 youth will gain work readiness skills. and learn about natural resource conservation, stewardship, work ethics, restoration, work experience, field study, environmental education.	$100,000
SusTEENability	Rogue Valley Workforce Development Council/ The Job Council provides curriculum/classroom activities to explore the basics of solar energy and green tech-nology and provide youth with hands-on skills/ experiences and education related to solar energy and exploration of job skills needed in solar/renewable energy sectors. This is funded by ARRA funds.	Construction Utilities		12 Youth in Jackson County	Skills learned regarding solar energy awareness, hands-on work constructing solar devices, and school credit earned	$15,000
Verde Village – Green Build Development	The Job Council's YouthBuild project is partnering to give youth hands on experience building a 15 unit green built, energy efficient affordable housing complex in Ashland, Oregon. The YouthBuild crew will provide a significant part of the labor while gaining on-site construction skills, green-build applications, and academic skills. This project is funded by DOL YouthBuild Funding in partnership with city and community based organization funding.	Construction	Rogue Valley Community Dev't Corp., Rogue CC, local union reps, local construction employer reps., Kolpia Counseling, Americorps	50 youth in Jackson County	50 youth will increase basic skills and 35-45 youth will obtain GED, 50 youth will obtain First Aid/CPR Cert., OSHA Cert., 50 youth will demonstrate compe-tency in 60 construction skills	$500,000

RURAL OREGON COUNTIES WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Green Training scholarships	The Oregon Workforce Alliance is targeting 40% of the 1,000 scholarships it is providing for disadvantaged adults and dislocated workers to attend community colleges and other training programs on green industries. These scholarships are funded via WIA and ARRA resources.	Sustainability, Utilities, Construction Conservation, Education	Clatsop CC, Tillamook Bay CC, Columbia Gorge CC, Central Oregon CC, Southern Oregon CC, Umpqua CC, Blue Mt. CC, Treasure Valley CC, TEC, MTC, UTE, SCBEC, COIC, CAPECO	approximately 400 disadvantaged Adults, dislocated workers and youth	Training in skills for emerging industries, some leading to degrees and certifications	$900,000
ARRA Summer Solar & Green Training Project	The Oregon Workforce Alliance is funding partnership projects in solar installation, weatherization, cob building, and geothermal installation. This project is funded via WIA and ARRA funds.	Construction	EO Solar Group, Klamath CC, Southern Oregon CC, South Coast Business and Ed. Consortium, Trng. and Educ. Consortium , COIC, U.S. Forest Service	200 dislocated workers/ disadvantaged adults and 50 youth	90% will complete and gain college credits	$400,000
The Living Machine	20 students on Oregon's North Coast are being trained the utilization of the Living Machine (low energy waste treatment facility).	Construction Natural Resources & Mining, Utilities	Clatsop CC and Clatsop Economic Development Alliance	20 individuals	College Credit	$45,000
North Coast Green Skills development	Community Colleges are developing non-credit courses for weatherization, lead removal and other building specializetions, drawing participants from local construction companies. The Automotive Technology degree & certificate program is incorporating alternative fuel and green principals. The Historic Preservation and Restoration degree & certificate program is incorporating green principals to increase recycling and build environment efficiency while keeping a historical prospective. TBCC is developing a certificate of completion in alternative energy technology "greening" curricula in industrial maintenance, maritime technology, construction, etc. Courses will be developed to introduce students to alternative energy careers.	Construction Natural Resources and Mining, Manufacturing	Various small businesses throughout the region- Clatsop CC, Principle Power Inc., Tillamook Bay CC, Clatsop Economic Development Resources (CEDR), WorkSource NW Oregon/ MTC Works, WorkSource NW/Oregon Employment Department, and Oregon Coast CC	55 students	Certificate or AAS, AGS degree. Students at the TBCC program will gain skills in alternative energy production and graduates will gain employment in wind energy or other alternative energy fields.	$123,750

RURAL OREGON COUNTIES WORKFORCE INVESTMENT BOARDS

PROJECT	DESCRIPTION	INDUSTRY FOCUS	PARTNERS	WHO IS SERVED	PROJECTED OUTCOMES	ESTIMATED INVESTMENT
Great Northern Energy Systems	The Oregon Workforce Alliance WIA Employer Workforce Training Funds were utilized in the La Grande area to help Great Northern Energy Systems, LLC attend North American Board of Certified Energy Practitioners entry level certification. The certification will qualify Great Northern Energy Systems to sign off on PV solar systems for customer so they can receive tax credits.	Utilities	Klamath CC, Southern Oregon CC, Training and Education Consortium	1 current worker	Certification	$5,000
ROV / Oregon Underwater Exploration Team	OWA funded youth from across the 24 county area and 10 Linn County Community college students are discovering the technology necessary to explore the depths of our lakes and oceans. Youth are learning about conservation practices, geology and much more.	Conservation, Manufacturing	Linn-Benton CC, Central Oregon CC, Clatsop CC	10 adults and 34 youth	CC Credits; Certification as Research Assistant	$50,000
Wind Tech Training	The Oregon Workforce Alliance was an initial investor in the Wind Technician Training Program in the Columbia Gorge. OWA continues to support the program by providing scholarships to about 10 students per year.	Maintenance / Utilities	Mid-Columbia Council Of Governments, Columbia Gorge CC	10 students this year	CC Associates Degree	$22,500
PV Powered Executional Excellence	PV Powered is a manufacturer of solar inverters which are critical components of solar energy systems. The Oregon Workforce Alliance utilized WIA Employer Workforce Training Funds for 58 employees to receive lean/continuous improvement training. As a result eight additional jobs have been created.	Manufacturing	Central Oregon Investment Council, PV Powered, Ten X Ventures (trade school)	Incumbent Workers in Central Oregon	Skills Upgrades	$25,000

Oregon Local Workforce Investment Board Summer Youth Employment Programs

Oregon's Local Workforce Investment Boards have a long history of funding environmentally focused, hands-on summer youth programs. In 2009, through the American Recovery and Reinvestment Act, the LWIBs were able to offer summer youth employment as part of these programs. A number of LWIBs placed youth in green jobs/internships/training for the summer. These hands-on learn-and-earn opportunities included:

- River habitat restoration and other types of environmental restoration, management, and research activities via youth crews.
- The enhancement and piloting of an Entry Level Credential developed for use in manufacturing environments to include curriculum on new green technologies. The Entry Level Credential is a hands-on/pencil and paper/online assessment and instruction tool. It is complemented with a continuum of modularized training courses and certifications available to all populations through on-line training providers. Offerings range from Sustainability 101 to senior sustainability professional certifications.
- Hands-on weatherization/energy efficiency training and internships.
- Training and apprenticeships as part of the "Sustainable Skills Living Program" at Aprovecho Research Center.
- Managing organic farm plots for local food banks.
- Hands on internships in solar/renewable energy.
- Green YouthBuild projects where youth assisted with the construction of green built energy efficient affordable housing.
- Underwater exploration teams utilizing cutting edge technology to explore the depths of Oregon lakes and oceans to learn about conservation practices, geology, etc.

This program targets low income youth with potential barriers to success. It complements what students learn during the school year, enhancing educational success and persistence of participants. Because it is run as a complement to what K-12 schools do, rather than within the K-12 system, the program is highly flexible, customizable, and fairly low cost. The infrastructure exists to continue this program and expand it. However, the funding is unlikely to continue. While last year's program did not focus exclusively on green jobs, future programs could expand this focus if funding becomes available. Last year's program cost $15 million of which $13 million went into local activities. It served over 4,000 youth logging one million hours of work, earning 1,600 college credits and over 600 high school credits. Continuation of this program and expansion with the use of general funds dollars would also allow the enrollment of students beyond those formally eligible under the Workforce Investment Act, the current primary source of funding for this program.

Nonprofit Programs

ENERGY TRUST OF OREGON

Energy Trust of Oregon is an independent nonprofit organization dedicated to helping Oregonians benefit from saving energy and tapping renewable resources. For more information, visit their website at http://energytrust.org.

Energy Trust Solar Water Heating Program Training

Energy Trust conducts free Solar Water Heating training sessions approximately five times a year. This training is required for those who wish to become Solar Water Heating trade allies, but open to anyone interested in learning more about Energy Trust's Solar Water Heating program requirements. The training covers:

- History and mission of Energy Trust and the Solar program
- Program administration
- Incentive application process
- Technical installation standards for commercial and residential solar thermal systems
- Industry best practices

Primary audience: Contractors wishing to become Energy Trust solar water heating trade allies.

Secondary audience: Staff of current trade allies; plumbers; code officials; inspectors; real estate professionals; general contractors and remodelers; builders; solar thermal equipment manufacturers; professionals interested in the market and standards for solar thermal in Oregon

Participation in 2009: 118 attendees

Energy Trust Solar Electric Program Training

Energy Trust conducts free Solar Electric training sessions approximately five times a year. This training is required for those who wish to become Solar Electric trade allies, but open to anyone interested in learning more about Energy Trust's Solar Electric program requirements. The training covers:

- History and mission of Energy Trust and the Solar program
- Program administration
- Incentive application process
- Technical installation standards for commercial and residential solar electric systems
- Industry best practices

Primary audience: Contractors wishing to become Energy Trust solar electric trade allies

Secondary audience: Staff of current trade allies; electrician; code officials; inspectors; real estate professionals; general contractors and remodelers; builders; solar electric equipment manufacturers; professionals interested in the market and standards for solar electric in Oregon

Participation in 2009: 248 attendees

Energy Trust Residential Trade Ally Contractor Trainings

Residential Trade Ally Contractor trainings offer opportunities to learn about energy efficiency and best building practices for new and existing homes. Trainings range from certification courses, continuing education workshops, program orientations, seminars about new technologies and more. Energy Trust offers more than 125 contractor trainings annually on the following topics:

- Building Performance Institute certifications (Building Analyst, Envelope Professional, Heating Professional)
- PTCS Duct Sealing Certification
- CheckMe! Heat Pump Commissioning certification

- House as a System
- Air Sealing and Mechanical Ventilation
- Deep Energy Retrofits
- Alternative Heating Options for Efficient Homes
- Moisture Management workshops
- Indoor Air Quality
- Build It Solar Ready
- Smart Design Concepts
- Small Home Design
- Building Energy Efficient Enclosures
- HomeCheck software
- Trade Ally orientations
- Weatherization Specifications webinars
- Home Energy Solutions Forms and Resources webinars
- Real Estate Professional Trade Ally trainings
- Architect and Design Professional Program Ally orientations
- Energy Performance Score orientations

Primary audience: Contractors and real estate professionals wishing to become an Energy Trust existing and new homes trade allies.

Participation in 2009: 1250 attendees

OREGON ENERGY COORDINATORS ASSOCIATION

Residential Energy Analyst Program (REAP)

REAP® is the certification system designed for use by the Oregon weatherization assistance network to enhance and augment the building performance skills and knowledge of staff, contractors and consultants who serve in participating agencies, businesses, utilities and organizations. It was developed in cooperation with experts and specialists from Oregon Housing and Community Services, the Oregon Energy Coordinators Association, and Saturn Resource Management. Three core Residential Energy Analyst Program (REAP) Certification courses are offered for energy auditors, technicians, and inspectors of energy and weatherization programs. Each of these three courses (Shell Technician 1, Energy Analyst 1, and Diagnostic Technician 1) is one week long. Shell Technician 1 and/or Energy Analyst 1 are prerequisites for taking Diagnostic Technician 1. Once successfully completed (with a passing score of 75 percent or better and 100 percent completion of field test form), these certifications are in effect for a period of five (5) years.

When a student passes EA-1, they have achieved the Analyst 1 level. When a student passes EA-1 and at least one of the technical courses (Shell Tech or Diagnostic Tech), they have achieved the Analyst 2 level. When a student passes both Shell Tech 1 and Diagnostic Tech 1, they have achieved the Building Performance Specialist 1 level. When a student passes EA-1 and both of the technical courses, they have achieved the Inspector level. If a student passes all of the courses and have two (2) years of field experience, they are then considered REAP-Certified and are eligible to become an Instructor in one of the REAP courses.

Once a student has become an Instructor, they are eligible to apply to take the Senior Energy Analyst Lead (SEAL) test. The SEAL test is a combination of field and written examinations administered by at least

two (2) currently certified SEALs. SEALs maintain their status by taking 18 hours of advanced curriculum (e.g. National Affordable Comfort Conferences, DOE Conferences) each year in place of basic level workshops (Energy OutWest). SEALs may also use network training courses and out of network training to document advanced curriculum credit hours.

For more information visit OECA at http://www.warmandsafenow.com/certification.html, and OHCS at http://www.oregon.gov/ OHCS/SOS_TrainingAndTechnicalAssistance.shtml.

OREGON TRADESWOMEN, INC.

Oregon Tradeswomen, Inc. is dedicated to promoting success for women in the trades through education, leadership and mentorship. Their website is http://www.tradeswomen.net.

To-Go Program

TO GO educates middle and high school students about careers in the building, construction, mechanical and utility trades. The program offers tradeswomen-led workshops and technical assistance to educators.

Pathways to Success

A seven-week pre-apprenticeship class for adult women designed to help them prepare for a high-skill, high-wage career in construction with a focus on apprenticeship. The program also helps participants with their job search and apprenticeship applications. Participants:

- Gain 30 hours of hands-on experience working alongside skilled female instructors on real jobsites—including the use of power tools.
- Learn basic trades math and measurement and explore topics like safety and construction culture in a classroom setting.
- Try out the tools of various trades through visits to apprenticeship training centers and real construction sites.
- Build muscle with 10 hours of strength training at the gym led by a female fitness trainer.

Appendix C:
Detailed K-12 Green Jobs Action Recommendations

In developing this Green Jobs Growth Plan, numerous recommendations for the K-12 system were developed. Only the overarching strategies were listed in the recommendations sections above. This appendix contains the entire detailed action recommendations.

- Convene a working session of all relevant stakeholders to implement the strategies put forth in this Green Jobs Growth Plan.

- Increase the sustainability literacy of each student exiting the K-12 system. Include middle and high school opportunities to develop skills and knowledge necessary for sustainable business operation, energy efficiency, development of renewable energy, and creation of a healthy natural environment:

    a. Support recommendations from the Oregon Environmental Literacy Taskforce, created in 2009 by House Bill 2544. The Task Force is charged with developing the Oregon Environmental Literacy Plan and reporting back to the Legislature by October 1, 2010.

    b. Incorporate identified industry standards related to sustainability knowledge and skills into each Career Cluster in the Oregon Skill Sets database so that CTE programs will begin incorporating those standards into instruction.

    c. Incorporate sustainability concepts into leadership events conducted by Career and Technical Student Organizations (CTSO). Currently, six CTSOs are supported by the Willamette ESD through a grant from ODE.

    d. Work with state agencies to incorporate sustainability elements into appropriate grants awarded to K-12 schools.

    e. Include options to obtain full or partial certification for green job fields, such as the Green CRC, within high school CTE programs.

    f. Provide online and credit-bearing course work related to sustainability and available to K-12 students and teachers.

    g. Provide energy resource managers throughout districts and ESDs to support teaching and learning opportunities in energy efficiency at school sites while implementing reductions of energy use in schools.

    h. Incorporate sustainability into service learning projects such as the State Farm service learning program and ODE Learn and Serve K-12, to prepare students for green jobs.

    i. Provide sustainability education grants to K-12 districts for implementation of sustainability activities. Grants should include a significant evaluation component to determine the impact on metrics related to green jobs.

    j. Develop incentives to produce a greater focus on green jobs in Oregon's federally funded youth development programs (Job Corp, Workforce Investment Act Youth programs, Youth Build, Youth Conservation Career Corp).

k. Continue to provide Energy Savers Kits through ETO and continue program expansion to schools, teachers, students and parents in COU service territories

l. Promote the "Cool Schools" curriculum.

- Provide K-12 students with career guidance and information related to green jobs with a particular emphasis on reaching underserved populations:

  a. Include green and sustainable careers and jobs in middle and high school job and career exploration opportunities such as career fairs and Oregon CIS.

  b. Provide professional development and career resources about green jobs to school career counselors.

  c. Provide sustainability training and technical assistance to existing programs that provide career guidance and workforce development for underserved populations so that they are able to incorporate preparation for green jobs. Examples of existing programs include TRIO Talent Search, Oregon Youth Conservation Corp, and Multnomah ESD Alternative Pathways.

  d. Develop sustainability elements within internship programs to help students and teachers become sustainability leaders in their own schools. Such a program has been outlined by SOSI and the Business Education Compact. Step it Up is an example of another existing program that provides internship opportunities for youth.

- Leverage community college, university and labor union shop and technical skills facilities to make hands-on learning opportunities available to middle and high school students:

  a. Conduct an environmental scan by region of resources available to high school and middle school students.

  b. Implement strategies to address gaps in the environmental scan conducted in Phase 1.

  c. Identify and disseminate models of collaboration in the use of technical skill facilities.

  d. Create a competitive grant process to support collaborative projects focused on developing methods for sharing resources between secondary schools post-secondary facilities including community colleges, universities, and labor union facilities.

- Increase readiness of K-12 teachers to provide education for sustainability:

  a. Work with organizations to develop and deliver professional development leading to Education for Sustainability and tied to Oregon standards.

  b. Support the collaborative development of a statewide K-12 Sustainability Education Institute, targeting teacher - administrator teams.

  c. Develop a teacher certificate in sustainability education that would help school districts identify teachers who have had specific training in sustainability education.

  d. Develop sustainability education curriculum for Oregon's Graduate Schools of Education.

e. Develop a mechanism to connect the K-12 employees with opportunities in workforce sustainability training.

f. Support the collaborative development of a statewide K-12 Sustainability Education Institute, targeting teacher - administrator teams.

g. Deliver the sustainability education for Oregon's Graduate Schools of Education that was developed in Phase 1.

h. Work with the Community College and University system to create a credit-bearing professional development sequence that would help teachers, administrators, and other district staff in the K-12 system educate for sustainability.

Appendix D:
Family Wage Definitions in Oregon Statute and Local Policy

There are a number of examples of attempts to define a family wage, or set a wage standard, in Oregon statute and city and county ordinances. They tend to fall into three categories: 1) measures of wages paid currently in particular geographic areas or occupations, 2) set labor standards, and 3) measures that reflect the cost of living.

1) Measures of current wage levels

In July 2009, the Oregon Employment Department published an article on wage and income measures.[22]

> "In Oregon, there is no official definition for a family wage, although the phrase is mentioned several times in the Oregon Revised Statutes. The Oregon Economic and Community Development Department (OECDD) offers one definition for a family wage: the average pay per worker covered by the state's unemployment insurance system. This 'average covered wage' is calculated down to the county level in Oregon using data from the Oregon Employment Department."

Other examples of attempts to set wage standards based on actual wages paid include:

- Prevailing wages: The Bureau of Labor and Industries (BOLI), with the help of the Oregon Employment Department, conducts a prevailing wage study for construction occupations, setting required wage and benefit levels for publicly funded construction projects in the state. These wage standards are set county by county, and occupation by occupation, via a survey of employers.[23] The federal government also computes prevailing wage levels; the federal prevailing wage for residential weatherization projects is used by agencies receiving federal funding for such projects in Oregon.[24]

- The Business Energy Tax Credit (BETC). BETC administrative rules do not contain a wage standard, though companies are required to report on "...the amount and type of jobs potentially created or eliminated in the construction, installation and operation of the facility in Oregon, [and] the benefits of the facility with regard to overall economic activity in this state..." Compensation paid by applicants for the manufacturing BETC is routinely evaluated according to whether it constitutes 150 percent of the county average wage.

2) Standards tied to specific wage levels

- The Energy Efficiency and Sustainable Technology Act of 2009 (E-EAST) requires 180 percent of state minimum wage for energy retrofit work (2010 state minimum wage is $8.40/hour, so this statute requires a wage of at least $15.12/hour).[25]

- The Clean Energy Works Portland program follows the E-EAST standards but adds two features, requiring that the federal prevailing wage be paid if it is higher than 180 percent of the state minimum, and providing a form of preference to contractors who provide health benefits.[26]

3) Measures that reflect the cost of living

- Worksystems Inc., the Region 2 workforce system, has moved to a self-sufficiency wage calculation based on real costs in each county, plus family size.[27]

- City and county ordinances – City of Portland and Multnomah County, among others, require that contractors pay a "living wage." In the case of Portland, the wage level was set originally according to the Northwest Job Gap Study.[28]

Wage standards based on actual wages paid or a set amount like the minimum wage are easier to calculate but tie wages to levels that might not be adequate (especially in high-unemployment, rural parts of the state).

Wage standards based on the cost of living more accurately identify what an adequate income might be for a worker/family in particular parts of the state, but present complexities for those who make the calculations and are unrelated to specific occupations.

Appendix E:
Oregon Incentives and Access to Capital Tools

Strategic Reserve Fund (SRF)

The Strategic Reserve Fund (SRF) is a forgivable loan program administered by Business Oregon. The Governor has sole discretion over how the investment funds are spent in Oregon. Oregon's SRF program offers a flexible incentive that can be offered in discreet amounts for development purposes according to a company's needs. The ultimate goal of the SRF is to both help maintain jobs and create new jobs.

Though modestly sized compared to such tools in other states, it is crucial for advancing diverse business projects throughout Oregon. All awards carry job retention or creation targets as a requirement for each SRF award. As an added safeguard, clawback provisions—a retroactive penalty or requirement to pay back the benefit, if the business firm fails to satisfy certain criteria and requirements—are a standard feature of the program to ensure the state's investment is protected. In addition, the loans are forgivable once the borrowers reach the term of the loan agreement.

Strategic Investment Program (SIP)

Under Oregon's Strategic Investment Program (SIP), eligible companies who make significant investments in new real and personal property may qualify to pay lower property tax rates. Business investment in excess of $25 million in rural areas and more than $100 million in urban areas may qualify a company for reduced property taxes for 15 years. The company receiving the SIP benefits must obtain local approval through an agreement with the county and city in which the project is located. A business is required to pay a community service fee equal to 25 percent of the abated taxes, up to a yearly maximum of $2 million (urban) or $500,000 (rural). The community service fees are subject to local distribution agreements. The county, cities and non-school local taxing districts must participate in the execution of this agreement.

The SIP program was instrumental in helping assist the high-tech industry growth in Oregon during the 1990s. Now, it is a critical component of the state's efforts to establish a vibrant, renewable energy industry in Oregon.

Building Opportunities for Oregon Small Business Today (BOOST)

BOOST fund offers two independent resources to small business owners in Oregon. The first resource is a direct loan which offers loans to traded sector businesses in need of permanent working capital. The second resource is a grant for businesses that create new, permanent, full-time jobs in Oregon.

BOOST LOANS

The BOOST loan program is a revolving loan fund that provides term fixed-rate financing for small businesses in need of operating capital. Loan proceeds may be used to support daily operations (i.e., rent or mortgage payments, utilities, marketing expenses, employee expenses, accounts receivable/payable, small equipment purchases, etc). Participants must be a small business with 100 or fewer employees and must be a traded-sector business in manufacturing, processing or distribution. A BOOST loan applicant will need to demonstrate a reasonable capacity to create or retain jobs, provide adequate collateral for the loan, and demonstrate a reasonable prospect of repayment.

BOOST GRANTS

The BOOST grant program will award and make grants as an incentive to Oregon businesses that create new, full-time jobs in Oregon. Applicants must be businesses with 100 or fewer employees, must create and retain new full-time jobs for a period of at least 6 months, must be a traded-sector business in manufacturing, processing or distribution, and must demonstrate that comparable wages are provided to their employees. Up to $2,500 may be awarded to an applicant for each full time job created and retained with an annual maximum of $50,000 per applicant in a calendar year.

Oregon Finance Programs

The Business Oregon finance team manages the following loan programs and business services to assist businesses with their financial needs:

Oregon Business Development Fund (OBDF) provides direct loans that leverage private capital and provides incentives for businesses to expand or locate in Oregon.

Oregon Capital Access Program (CAP) provides a form of loan portfolio insurance so banks may make business loans that carry higher than conventional risks while complying with federal and state banking regulations.

Oregon Credit Enhancement Fund (CEF) provides loan guarantees to banks in order to increase capital availability to small businesses.

Oregon Industrial Development Bonds (IDB) are available to manufacturing projects, exempt facilities and nonprofit organizations to provide access to capital primarily for value-added manufacturing.

Entrepreneurial Development Loan Fund (EDLF) offers direct loans to help new businesses get started.

Brownfields Redevelopment Fund
A brownfield is property where expansion or redevelopment is complicated by actual or perceived environmental contamination. The Brownfields programs range in activities from site assessment to cleanup for properties where known or suspected environmental contamination is a barrier to redevelopment.

The Business Energy Tax Credit Program

The Oregon Department of Energy offers tax credits to businesses to encourage them to invest in energy conservation, recycling, renewable energy resources, transportation efficiency, sustainable buildings and less polluting transportation fuels.

Oregon facilities that manufacture renewable energy resource equipment may be eligible for a Business Energy Tax Credit. Eligible costs may include the building, equipment and machinery and other costs used to manufacture equipment, machinery or products designed exclusively to use a renewable energy resource. The facilities are eligible for a tax credit of 50 percent of eligible costs, up to a maximum of $40 million in eligible costs for each phase of development.

Tax credit amounts vary by the type of project completed.

The tax credit is 50 percent of the eligible project costs for:

- High Efficiency Combined Heat and Power
- Renewable Energy Resource Generation
- Renewable Energy Resource Equipment Manufacturing Facilities

The tax credit is generally taken over five years at 10 percent per year.

For all other projects:

Tax credit is 35 percent of eligible project costs (the incremental cost of the system or equipment that is beyond standard practice). You take the credit over five years: 10 percent in the first and second years and 5 percent each year thereafter.

If you can't take the full tax credit each year, you can carry the unused credit forward up to eight years. Those with eligible project costs of $20,000 or less may take the tax credit in one year.

The tax credit can cover all costs directly related to the project, including equipment cost, engineering and design fees, materials, supplies and installation costs. Loan fees and permit costs also may be claimed. Replacing equipment at the end of its useful life and equipment required to meet codes or other government regulations are not eligible. Maintenance costs are not eligible.

State Energy Loan Program (SELP)

The purpose of the State Energy Loan Program is to promote energy conservation and renewable energy resource development. The program offers low-interest loans for projects that:

- Save energy
- Produce energy from renewable resources such as water, wind, geothermal, solar, biomass, waste materials or waste heat
- Use recycled materials to create products
- Use alternative fuels

The Energy Loan Program can loan to individuals, businesses, schools, cities, counties, special districts, state and federal agencies, public corporations, cooperatives, tribes, and nonprofits.

Energy Trust of Oregon

An independent nonprofit organization, Energy Trust of Oregon provides technical assistance, cash incentives and other services to help residential, commercial, agricultural and industrial customers of all sizes save energy, generate renewable energy, and manage energy costs.

Energy Trust serves customers of Portland General Electric, Pacific Power, NW Natural and Cascade Natural Gas in communities across the state of Oregon. Funding for the programs, services, and cash incentives offered by Energy Trust is provided by the customers of these utilities. Energy Trust also serves school districts, cities, counties, and other public and nonprofit organizations in these utility territories.

Energy Trust incentives range from cash back for energy-efficient appliances, equipment, weatherization, and lighting for homes, businesses, and industry, to financial incentives for new residential and commercial building design features that surpass Oregon energy code, and investment in renewable energy project development.

Energy Trust services range from online do-it-yourself tools and no-cost low-cost tips, to home and business audits, to complex technical studies for commercial and industrial facilities. Energy Trust also works with regional nonprofit organizations, task forces, alliances, and businesses to influence the market availability and consumer adoption of highly-efficient designs and products.

Energy Trust supports a network of more than 1,700 local trade ally contractors who are trained in Energy Trust programs and help deliver services throughout the state.

Appendix F:
Full Text of House Bill 3300

75th OREGON LEGISLATIVE ASSEMBLY--2009 Regular Session

Enrolled

House Bill 3300

Sponsored by Representatives D EDWARDS, CANNON, READ; Representatives BAILEY, BARNHART, BOONE, BRUUN, GALIZIO, HOLVEY, SHIELDS, J SMITH, WITT, Senators SCHRADER, WALKER

CHAPTER .....

AN ACT

Relating to the green economy; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

SECTION 1. Sections 2 to 6 of this 2009 Act are added to and made a part of ORS 660.300 to 660.339.

SECTION 2. As used in sections 2 to 6 of this 2009 Act:

(1) "Green job" means a job that provides a service or produces a product that:

(a) Increases energy efficiency;

(b) Produces renewable energy;

(c) Prevents, reduces or mitigates environmental degradation;

(d) Cleans up and restores the natural environment; or

(e) Provides education, consultation, policy promotion, accreditation, trading and offsets or similar supporting services for any of the activities identified in this subsection.

(2) "Targeted population" means:

(a) Entry level or similar workers in high demand green job careers who are in or preparing for high wage green jobs;

(b) Dislocated workers in declining industries who are in or are seeking training for high wage green jobs;

(c) Dislocated workers in the timber, agricultural or energy sectors who are in or are seeking training for high wage green jobs;

(d) Veterans who are residents of Oregon or members of the Oregon National Guard; or

(e) Members of disadvantaged groups.

SECTION 3. (1) The State Workforce Investment Board, in consultation with the Governor, the Education and Workforce Policy Advisor and other parties deemed appropriate by the board and after consideration of the clean energy and energy efficiency policies of this state, shall develop a plan for a green jobs growth initiative to promote the development of emerging technologies and innovations that lead to, create or sustain family wage green jobs.

(2) The plan for the initiative developed by the board shall:

(a) Identify industries that are high demand green industries based on current and projected creation of family wage green jobs and the potential for career pathways created for such jobs.

(b) Use the needs of identified high demand green industries as the basis for the planning of workforce development activities that promote the development of emerging green tech-

nologies and innovations. These activities include, but are not limited to, such efforts undertaken by community colleges, the institutions of the Oregon University System, designated signature research centers, registered apprenticeship programs and other private sector training programs.

(c) Leverage and align existing public workforce development programs and other public and private resources to the goal of recruiting, supporting, educating and training of targeted populations of workers.

(d) Require the board to work collaboratively with stakeholders from business, labor and low income advocacy groups in the regional economy to develop and implement the initiative.

(e) Link adult basic and remedial education programs with job training for skills necessary for green jobs.

(f) Require the board to collaborate with employers and labor organizations to identify skills and competencies necessary for green job career pathways.

(g) Ensure that support services are integrated with education and training for green jobs and that such services are provided by organizations with direct access to and experience with targeted populations.

SECTION 4. The State Workforce Investment Board, in consultation with state agencies, boards, commissions and private entities deemed appropriate by the State Workforce Investment Board shall develop a list of defined terms related to green jobs and the green economy that are consistent with current workforce development and economic development terminology.

SECTION 5. (1) The State Workforce Investment Board shall submit the final plan for the green jobs growth initiative required under section 3 of this 2009 Act in the manner provided in ORS 192.245 by January 14, 2010.

(2)(a) The plan submitted in accordance with this section shall also be submitted to the appropriate interim committees of the Legislative Assembly.

(b) In addition to providing the final plan, the board shall also submit progress reports on the development of the plan as requested by the interim committees.

SECTION 6. The Economic and Community Development Department, in consultation with the State Workforce Investment Board, shall:

(1) Develop criteria for existing investments and new or expanded financial incentives and comprehensive strategies to recruit, retain and expand green economy industries and small businesses.

(2) Make recommendations for new or expanded financial incentives and comprehensive strategies to stimulate research and development of green technology and innovation.

SECTION 7. The payment of costs associated with sections 2 to 6 of this 2009 Act is the responsibility of the Office of the Governor and those costs shall be paid from moneys available for disbursement at the direction of the Governor.

SECTION 8. The Legislative Assembly finds that the development of green jobs is essential to the economic well-being of Oregonians and encourages the Governor to support clean technology and efforts to prepare workers for employment in green jobs.

SECTION 9. This 2009 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2009 Act takes effect on its passage.

Passed by House June 17, 2009

Passed by Senate June 23, 2009

Appendix G:
Oregon Green Jobs Council, Members and Staff

NAME	COMPANY	TITLE
Business:		
Lori Luchak	Miles Fiberglass	President
Lorie Wigle	Intel	Eco-Tech Program Officer
Dave Williams (OWIB Chair)	NW Natural Gas	V.P. Utility Services
Economic Development:		
Karen Goddin	Oregon Business Development Dept.	Business Innovation and Trade Mgr.
Workforce and Education:		
Camille Preus	Community College and Workforce Dev.	Commissioner
Laurie Warner	Oregon Employment Dept.	Director
Brad Avakian	Bureau of Labor and Industry	Commissioner
Ronald Adams	OSU-Dean of Engineering	Chair, Oregon Energy Council
Linda Gerber	PCC Sylvania	Campus President
Tom Hughes (rep for K-12)	Tonkin Torp, LLP	Attorney
Labor:		
Barbara Byrd	Oregon AFL-CIO	Secretary-Treasurer
Local Workforce Investment Boards:		
Agnes Balassa	Oregon Workforce Partnership	Director
Dept. of Energy		
Bob Repine	Oregon Department of Energy	Director
Nonprofits:		
Steve Jole	Community Services Consortium	Weatherization Supervisor
Margie Harris	Energy Trust of Oregon	Executive Director
Legislators:		
David Edwards	Oregon Legislator	State Representative
John Huffman (OWIB member)	Oregon Legislator	State Representative
Governor's Office:		
Nancy Hamilton	Office of the Governor	Senior Policy Advisor
Amy Keiter	Office of the Governor	Pacific Coast Partnerships
Staff:		
Greg White	Oregon Workforce Investment Board	Executive Staff
Kristi Bowman	Oregon Workforce Investment Board	Executive Asst.
Cylvia Hayes	3EStrategies LLC	CEO
David Rafkind	3EStrategies LLC	Project Manager
Rebecca Diaz	3EStrategies LLC	Executive Asst.

Appendix H:
Terms and Definitions

abatement
(Environment) Elimination or reduction of polluting or hazardous substances by either removing them completely or lessening their effect through better waste management.
U.S. Environmental Protection Agency

accreditation
The process by which a recognized organization grants public recognition to an educational institution which has voluntarily submitted to an evaluative comparison with established qualifications and standards, both upon initial application and periodically thereafter.
Accrediting Council for Continuing Education and Training

alternative energy
Fuel sources that are other than those derived from fossil fuels. Typically used interchangeably with renewable energy. Examples include: wind, solar, biomass, wave and tidal energy.
U.S. Department of the Interior, Minerals Management (MMS)

ARRA
American Recovery and Reinvestment Act of 2009
P.L. 111-5

bioenergy
biofuel, biomass, or municipal waste-to-energy
U.S. Department of Energy

biofuel
Liquid fuels and blending components produced from biomass feedstocks, used primarily for transportation.
U.S. Department of Energy

biomass
Organic non-fossil material of biological origin constituting a renewable energy source.
U.S. Department of Energy

biomass gas
A medium Btu gas containing methane and carbon dioxide, resulting from the action of microorganisms on organic materials such as a landfill.
U.S. Department of Energy

blue collar job
Includes precision production, craft, and repair occupations; machine operators and inspectors; transportation and moving occupations; handlers, equipment cleaners, helpers, and laborers; and service occupations.
Bureau of Labor Statistics

career pathways
A systemic framework for connecting a series of educational programs with integrated work experience and support services, thereby enabling students and workers to combine school and work and advance over time to better jobs and higher levels of education and training.
League for Innovation in the Community College and The National Council of Workforce Education

career pathways certificate
Career Pathway Certificate of Completion programs (12-44 credits) acknowledge proficiency in technical skill occupation and are a "stepping stone" toward completion of an Associate of Applied Science degree.
WorkSource Oregon

career readiness certificate
An employee credentialing system that measures foundational job skills and supports skill building for career success. The Oregon National Career Readiness Certificate is awarded after an applicant completes an assessment process that measures skills in three areas: applied math, reading for information and locating information.
WorkSource Oregon

clean energy
Clean energy includes energy efficiency and clean energy supply options like highly efficient combined heat and power as well as renewable energy sources.
U.S. Environmental Protection Agency

clean energy economy
Generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.
The Pew Charitable Trusts

cogeneration
Cogeneration is the production of electrical energy and another form of useful energy, such as heat or steam, through the sequential use of energy.
U.S. Department of Energy

ecosystem management
An approach to natural resource management that focuses on sustaining ecosystems to meet both ecological and human needs in the future.
United Nations Environment Programme

energy efficiency
(Electricity) Refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided.
U.S. Department of Energy

Energy Efficiency and Conservation Block Grant Program (EECB)
This Program, authorized in Title V, Subtitle E of the Energy Independence and Security Act of 2007 (EISA) and signed into Public Law (PL 110-140) on December 19, 2007, provides funds to units of local and state government, Indian tribes, and territories to develop and implement projects to improve energy efficiency and reduce energy use and fossil fuel emissions in their communities. The Program is administered by the Office of Weatherization and Intergovernmental Programs (WIP) in the Office of Energy Efficiency and Renewable Energy (EERE) of the U.S. Department of Energy (DOE).
U.S. Department of Energy

family wage
See "living wage"

federal poverty guidelines
A federal poverty measure (sometimes incorrectly referred to as "federal poverty level"), issued each year in the Federal Register by the Department of Health and Human Services (HHS). The guidelines are a simplification of the poverty thresholds for use for administrative purposes — for instance, determining financial eligibility for certain federal programs.
U.S. Dept. of Health and Human Services

General Educational Development (GED)
Tests which give adults who did not graduate from high school the opportunity to earn a high school equivalency certificate.
State of Oregon - Community Colleges and Workforce Development

green collar job
Blue collar jobs that have been upgraded to respect the environment. These are family-supporting and career-track jobs open to people without high levels of education.
Green for All

green economy
An economy that promotes environmental protection and restoration, energy security, and provides economic opportunities for people across the income spectrum.
Oregon Green Jobs Council

greening the economy
Refers to the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities.
United Nations Environment Programme

green job
A job that provides a service or produces a product in any of these categories:

1. Increasing energy efficiency
2. Producing renewable energy
3. Preventing, reducing, or mitigating environmental degradation
4. Cleaning up and restoring the natural environment
5. Providing education, consulting, policy promotion, accreditation, trading and offsets, or similar services supporting categories 1-4.

Oregon Employment Department

high-demand occupation
Occupations having more than the median number of total (growth plus replacement) openings for statewide or a particular region.
Oregon Employment Department

high-wage job
Occupations paying more than the all-industry, all-ownership median wage for statewide or a particular region.
Oregon Employment Department

high-skill job
Occupations with a minimum educational requirement of post-secondary training or higher; AND Occupations with long-term on-the-job training or related work experience as a minimum educational requirement, and post-secondary training or above as competitive educational requirement.
Oregon Employment Department

LEED
LEED is an internationally recognized green building certification system, developed by the U.S. Green Building Council, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across the following metrics: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.
U.S. Green Building Council

living wage
A living wage is a wage that allows families to meet their basic needs, without public assistance, and that provides them some ability to deal with emergencies and plan ahead.
Northwest Federation of Community Organizers/ Clean Tech

middle-skill job
Jobs that require more than a high school diploma, but less than a four-year degree.
The Workforce Alliance

organic agriculture
A system of agriculture that uses crop rotation, green manure, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control for pests. Organic agriculture does not use synthetic fertilizers or pesticides, plant growth regulators, livestock feed additives or genetically modified organisms.
National Sustainable Agriculture Coalition

photovoltaic energy
(Electric utilities) Energy radiated by the sun as electromagnetic waves (electromagnetic radiation) that is converted at electric utilities into electricity by means of solar (photovoltaic) cells or concentrating (focusing) collectors.
U.S. Department of Energy

photovoltaic (PV) cell
An electronic device consisting of layers of semiconductor materials fabricated to form a junction (adjacent layers of materials with different electronic characteristics) and electrical contacts and being capable of converting incident light directly into electricity (direct current).
U.S. Department of Energy

remediation
(Environment) Abatement, cleanup, or other method to contain or remove a hazardous substance from an environment.
U.S. Environmental Protection Agency

renewable energy
Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include: biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.
U.S. Department of Energy

retrofit
To install new or modified parts or equipment in something previously manufactured or constructed
Merriam Webster

riparian restoration
The restoration and reconstruction of stream channels and corridors (riparian zones) to improve habitat for fish and to stabilize banks against erosion and incision.
U.S. Environmental Protection Agency

smart grid
Smart grid is an umbrella term that covers modernization of both the transmission and distribution grids. A common element to most definitions is the application of digital processing and communications to the power grid, making data flow and information management central to the smart grid.
Combined, U.S. Department of Energy and IEEE

Standard Occupational Classification (SOC) System
This system is being adopted by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into 1 of more than 800 occupations according to their occupational definition. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. Each broad occupation includes detailed occupations) requiring similar job duties, skills, education, or experience.
Bureau of Labor Statistics

sustainability
Sustainability means using, developing and protecting resources at a rate and in a manner that enables people to meet their current needs and also provides that future generations can meet their own needs. Sustainability requires simultaneously meeting environmental, economic and community needs.
State of Oregon (Executive Order 00-07)

sustainable agriculture
An integrated system of plant and animal production practices having a site-specific application that will over the long-term:

Satisfy human food and fiber needs.

Enhance environmental quality and the natural resource base upon which the agriculture economy depends.

Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls.

Sustain the economic viability of farm operations.

Enhance the quality of life for farmers and society as a whole.

U.S.Code Title 7, Section 3103

traded industry sectors
Broad industry groupings of related industries that in effect represent a "supply chain" of inputs, final goods and services, and distribution.
Oregon Workforce Investment Board

underemployment
The condition in which people in a labor force are employed at less than full-time or regular jobs, or at jobs inadequate with respect to their training or economic needs.
Merriam Webster

unemployed
Persons aged 16 years and older who had no employment during the reference week, were available for work, except for temporary illness, and had made specific efforts to find employment sometime during

the 4-week period ending with the reference week. Persons who were waiting to be recalled to a job from which they had been laid off need not have been looking for work to be classified as unemployed.
Bureau of Labor Statistics

weatherization
Conservation activities applied to a dwelling which help to conserve heat, maintain temperature and provide a safe and healthy living environment.
MN Dept. of Commerce

workforce development
The act of coordinating the development and delivery of a skilled workforce to achieve business competitiveness. This includes the education, employment, and job-training efforts designed to help employers get a skilled workforce as well as to help individuals to succeed in the workplace.
National Governors' Association, refined by Oregon Workforce Partnership

workforce development system
The set agencies and organizations that deliver workforce development services as defined above.
Oregon Workforce Partnership

workforce readiness preparation
Assuring that individuals have the basic skills and behaviors that employers seek in entry level employees. These include basic educational levels as well as personal management, ability to communicate and work in teams, and the ability to learn the specifics of the job.
Oregon Workforce Partnership

Workforce Investment Act of 1998
To consolidate, coordinate, and improve employment, training, literacy, and vocational rehabilitation programs in the United States, and for other purposes.
P.L. 105-220

Appendix I:
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Appendix J:
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