

SKILLS REQUIRED:

Preparing Puget Sound for
Tomorrow's Middle-Wage Jobs



Paul Sommers, Ph.D.
Seattle University

Mark Gardner
Seattle Jobs Initiative

Juliet Scarpa
Seattle Jobs Initiative

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Introduction

Decades of changes in industrial structure in the U.S. and in Washington have produced an economy and job market that differs in many respects from the job market in the early and middle parts of the last century. The growth of high wage jobs often gets the most attention, particularly in regions such as the Puget Sound where new and emerging high tech industries dominate. However, research has shown that high wage job growth has often been accompanied by an equal or greater expansion of low wage jobs, and a slowdown of job growth in the middle of the wage and quality spectrum, creating an “hourglass economy” increasingly polarized between high and low paying jobs.¹

Recent examination of the national economy and workforce suggests that this polarization is overstated, with middle-skills jobs – those requiring some education and training beyond high school but less than a bachelor’s degree (BA) - making up roughly half of current available jobs.² Statewide, employers are finding it difficult to find a supply of workers who have completed mid-level preparation – more than one year but less than four-years of postsecondary training or education.³ A report by the Washington State Workforce Education and Training Board suggests that an estimated 69,000 Washington employers – about one in every three – had difficulty finding qualified job applicants during 2005.⁴ The shortage is greatest for jobs requiring post-secondary training.

An available supply of skilled workers to fill these jobs makes career ladders to the middle class increasingly important. Research shows that often the best way for low wage workers to get to better paying jobs is by shifting to industries or occupations with better advancement prospects.⁵ This in turn often requires building skill sets in order for workers to jump the gap to better paying industries or occupations. The availability and accessibility of middle-wage jobs ensures that the opportunities for low-income workers to enter and progress along career paths to the middle class remain open. These jobs not only supply a means of simply getting by, but rather an opportunity to get ahead, providing what is needed to cover basic necessities, but also a little more – for asset building or future training for continued job and wage advancement. At the same time, making certain that the local skills are present in the workforce can also help to accelerate job growth of these promising industries.

While the general market trend towards higher education requirements is clear, it is also important to note that two-thirds of the residents of the Puget Sound region have not earned a 4-year college degree. As the figures below illustrate, as of 2006, the Washington State Population Survey estimates that 94% of Puget Sound Region residents had graduated from high school, but only 42% had earned a bachelor’s degree. For this segment of the working population, there remains a variety of occupations in demand in the economy that do not require a 4-year college or graduate degree. However, for many of these jobs, a high school diploma is no longer sufficient. At least “some college,” a term used in the higher education policy arena to describe anything from a few college courses to an

¹ See, for example, Eric Olin Wright and Rachel Dwyer, *The Great American Jobs Machine*, September 8, 2000.

² Harry Holzer & Rebert Lerman, *America’s Forgotten Middle-Skill Jobs: Education and Training Requirements in the Next Decade and Beyond*, November 2007, The Workforce Alliance: Washington DC.

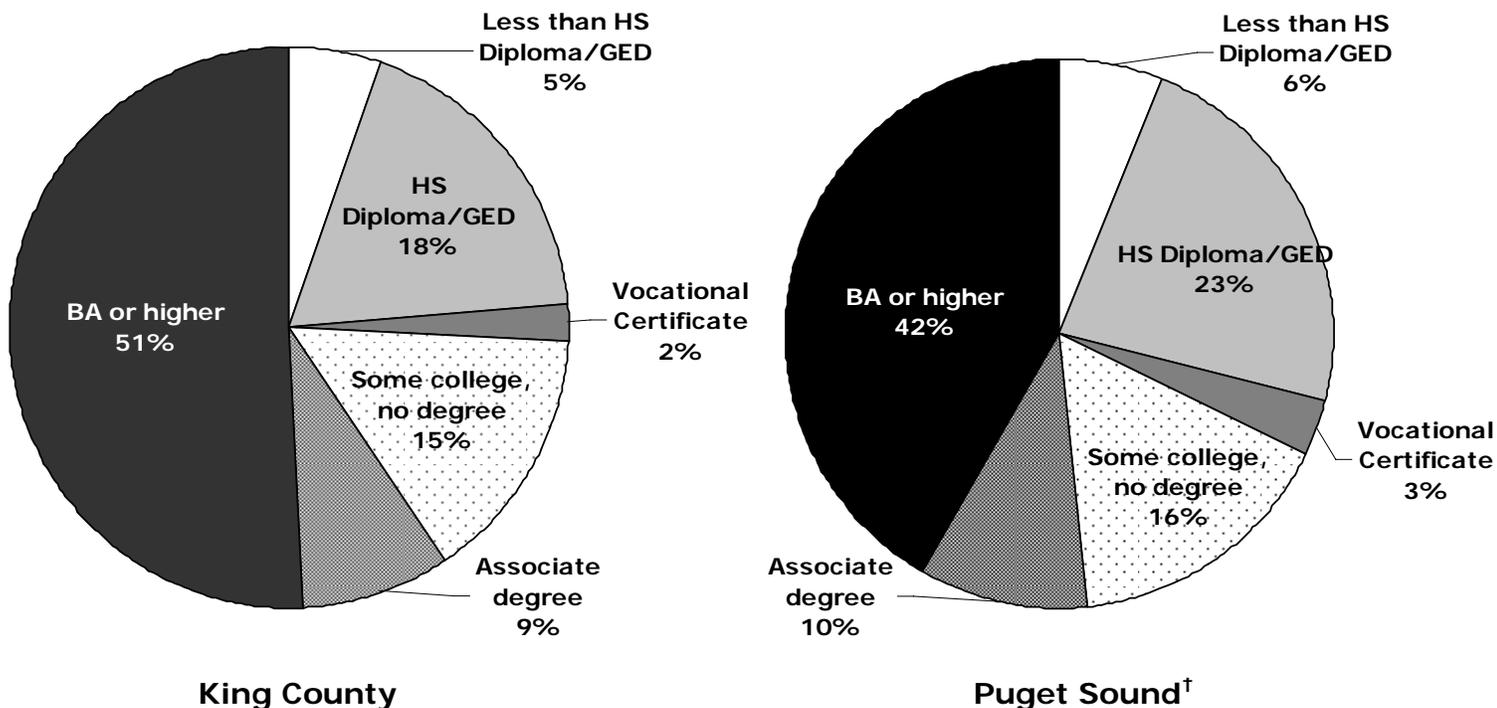
³ Washington Higher Education Coordinating Board & Washington State Board for Community & Technical Colleges, *A Skilled and Education Workforce: An assessment of the number and type of higher education and training credentials required to meet employer demand*, December 13, 2005.

⁴ Washington State Workforce Education and Training Board. *Washington State Employers’ Workforce Training Needs and Practices*, 2006.

⁵ Harry Holzer, *Encouraging Job Advancement among Low-Wage Workers: A New Approach*, May 2004, Brookings Institution: Washington, DC.

associate degree, is necessary to get into occupations that can provide a sufficiently high wage or salary. Research shows that one year of additional training beyond a high school diploma provides a substantial boost in earnings.⁶

**Educational Attainment for King County and Puget Sound Region (Age >= 18),
Washington State Population Survey, 2006**



† For the above analyses only, Puget Sound includes King, Pierce, Snohomish, Thurston, and Kitsap counties.

This report uses two basic ideas to analyze the prospects for new middle-wage jobs accessible to the many residents of the Puget Sound region who have not earned bachelor's degrees: adequate wage levels and education requirements of occupations. To identify "accessible middle-wage jobs" we examine both wage and education characteristics of occupations. We define accessible middle-wage jobs as those in occupations that had a median wage of at least \$17 per hour in 2004, and where 40% or fewer employees in that occupation have a bachelor's degree or higher. Using this definition, 20 to 25% of all jobs in the four Puget Sound counties qualify as accessible middle-wage jobs, as the following table shows.

<i>County</i>	<i>Estimated Number of Middle-Wage Jobs</i>	<i>Total Jobs</i>	<i>% Middle- Wage</i>
King	247,735	1,109,248	22.3%
Kitsap	17,860	71,803	24.9%
Pierce	56,822	254,252	22.3%
Snohomish	42,397	209,693	20.2%

Source: Calculated from 2004 LMEA occupation industry data.

⁶ Washington State Board for Community and Technical Colleges. *Building Pathways to Success for Low-Skill Adult Students: Lessons for Community College Policy and Practice from a Longitudinal Student Tracking Study* (The "Tipping Point" Research), April 2005.

As major industry clusters grow, middle-wage jobs are created to different degrees. Some clusters have proportionately more accessible middle-wage jobs, other clusters have higher concentrations of occupations requiring workers with college degrees, and a third group is staffed primarily by lower wage occupations that do not meet a living wage standard. Therefore, the importance of identifying and strengthening industry clusters with a high proportion of middle-wage jobs cannot be overstated.

This report investigates particular industry clusters targeted by local economic development efforts to assess the growth of middle-wage jobs within these clusters and existing training opportunities. Particular industry clusters considered promising for future job growth are examined specifically for estimates of middle-wage job creation in the Puget Sound region: **Construction, Health Care, Aerospace, Professional & Business Services, Logistics & International Trade, Leisure & Hospitality, Green Building, and Clean Technology.**⁷ These clusters make up traditionally large job-creating Puget Sound industries, industries which provide key service sector jobs, and emerging and expanding industries of interest and importance in the future of the area. In addition, the training pathways into occupations in these clusters are described.

This research is supported by the Seattle Jobs Initiative (SJI), a workforce intermediary working with low-income/low-skill individuals looking to improve their economic situation through industry-based skill training and better employment opportunities. In the experience of SJI and of other area workforce organizations working with low-income populations, roughly only 1 in 10 clients have college degrees; in fact, many have not earned a high school diploma or GED. For these clients, it is very difficult to find a good job that can sustain their family's needs for the basic necessities and some of the comforts of a middle class life style. The region's economy seems to be marching away from a historical reliance on industries such as basic manufacturing and resource extraction that provided many middle-wage job opportunities for people who have not earned college degrees. Many existing employers, such as Boeing or the large banks and insurance companies, are today requiring a higher percentage of their employees to have 4-year college degrees due to the increasing technological sophistication of their workplaces as well as the complex and changing nature of work. New industries such as software development, internet-based commerce, and life sciences rely much more heavily on a college-educated population than traditional employers in this region. Many of these industries employ a substantial number of workers with graduate degrees. It therefore becomes imperative to refocus attention on those industries that will see growth and expanded capacities for middle-wage jobs. It is the availability of these jobs, combined with articulated training pathways, that will help clients like those serviced by SJI, as well as the large percentage of Puget Sound residents without a BA, to find work that provides a livable wage and opportunities for advancement.

The information presented in the following analyses is useful in at least two complementary ways. First, by identifying those industries or clusters that have accessible, quality jobs, it can help a city, county, or region ensure that its economic development efforts target the right mix of jobs. Expanding the middle-wage tier through targeted economic development of industries with many middle-wage jobs is one strategy to ensure that career paths to the middle class remain open. Second, by identifying sets of quality occupations associated with the growth of particular industries or clusters, as well as information about available training

⁷ Except for Professional & Business Services, clusters were selected by either the Puget Sound's regional industry cluster strategy, Prosperity Partnership, or the City of Seattle as key areas of interest, based on previous work completed by SJI in January 2007 that examines middle-wage jobs across a wide spectrum of industries, occupations, and industry clusters; Paul Sommers and Mark Gardner, *Accessible Middle-Wage Jobs in Seattle and the Puget Sound Region*, January 31, 2007, Seattle Jobs Initiative Working Paper.

options, it can provide local workforce training providers with strategic information to proactively plan for the needs of both students and emerging industries. Many of the jobs slated to be created through industry growth require some level of higher skills. These skills, however, can be obtained to fill these jobs through training programs of 2 years or less that are more accessible to working adults. The availability of training tailored to the needs of emerging opportunities can in turn accelerate or at least help to maintain industry growth by helping employers avoid skill shortages and gaps.

Defining Middle-Wage Jobs

Middle-wage jobs are a vital part of a healthy labor market, presenting opportunities for many low-income and low- to medium-skilled workers to find employment and a pathway to a livable wage. Accessible middle-wage jobs are those that do not require a 4-year college or graduate degree and pay a decent wage. Specifically, accessible middle-wage jobs in these analyses are identified as those paying at least \$17 an hour in occupations where no more than 40% of the present workforce pool has 4-year degrees. Using these guidelines to identify accessible middle-wage jobs in growing industry clusters, along with information about current training opportunities for these jobs, creates a foundation for economic and workforce development strategies to bolster the essential middle core of regional industry employment.

In the following analyses, middle-wage employment estimates are provided for 2004 for the Puget Sound region within select industry clusters. We use Washington State employment and wage data, coupled with national data on the characteristics of workers in various occupations, to provide a definition of middle-wage jobs that simultaneously measures wages and accessibility of jobs for those at different education levels. This report relies on occupational projections from the federal Bureau of Labor Statistics (BLS) and the Labor Market and Economic Analysis unit of Washington's Employment Security Department (LMEA), supplemented with educational attainment and job quality data from the Census Bureau.

BLS data on the educational attainment of incumbent workers in each occupation is derived from Census files. In this report, we define "accessible" jobs as those occupations in which no more than 40% of the incumbent workers nationally have attained a bachelor's or higher degree. The rationale is that if 60% or more of the workers in the occupation have gained these positions with less than a bachelor's degree education level, then the occupation is relatively accessible to those with a high school diploma or some college. Using a cutoff of 60% or more without a BA helps correct for national educational levels within particular occupations that tend to be somewhat lower than Washington's levels, given higher-than-average education attainment of residents of this state. Second, while this method may not identify all promising occupations that could be accessible with less than BA training, it should provide a robust method of selecting those industry clusters with a large proportion of employment in accessible occupations.

The second component of the middle-wage jobs definition is a minimum wage level of \$17/hour. On an annual basis, assuming full-time work throughout the year, this hourly wage is equivalent to annual earnings of \$35,360. At \$17 per hour in 2004, a two-earner family with both workers employed in jobs at this wage would have family earnings at about the median family income for King County.⁸ While this wage is lower than the living wage levels identified in some studies⁹ as a livable wage for a single earner with two children, it

⁸ Median Family Income in King County for 2004 was \$71,814 (American Community Survey).

⁹ Northwest Federation of Community Organizations, *Searching for Work That Pays: 2007 Northwest Job Gap Study, Seattle*, April 2007; NWFCO suggests a living wage of \$17.54 for a single adult with one child at home, and \$21.77 for a couple with one child and one adult in the workforce.

recognizes the fact that in high-cost areas of Washington, two earners are often necessary to reach an adequate income. Lastly, it is important to note that the \$17 per hour wage represents a minimum, and most occupations included as “accessible middle-wage” occupations have higher median wages.

Unlike some studies looking at the growth of industries or occupations providing a middle class standard of living, we do not include an upper wage cutoff for occupations. However, in practical terms the presence of an education standard means that there are few jobs that meet the education limit that fall within the very highest reaches of the wage spectrum. Since the purpose of this research is to identify occupations and associated industry clusters offering good paying jobs to those with less than a BA, there is no practical reason to add an upper wage cutoff.

Industries of Interest

Many economic development organizations have become interested in the industry cluster concept as a way of organizing firms with similar interests or as a strategy to achieve higher rates of job and income growth. Industry clusters have been defined by Michael Porter, Harvard Business School professor and director of the Institute for Strategy and Competitiveness, as well as well as other economists, as geographically dense groupings of firms in related industries; agglomeration and urbanization of economies cause certain types of firms to locate near suppliers and/or customers, attaining greater competitive strength and displaying higher rates of innovation than like firms located outside these clusters.¹⁰ At the same time, rapid innovation is possible in clusters because customers and suppliers and research institutes can communicate more easily, adapting more rapidly to changing technology and market conditions. Thus, strong clusters are associated with regional competitiveness.¹¹ In the Puget Sound, the City of Seattle has defined a number of clusters to focus efforts of its Office of Economic Development, and the Puget Sound Regional Council uses a cluster concept in its Prosperity Partnership initiative to catalyze economic development efforts in the four-county Central Puget Sound region (King, Snohomish, Pierce, and Kitsap counties). Previous work completed by Seattle Jobs Initiative examined middle-wage jobs across a wide spectrum of industries, occupations, and industry clusters.¹² The following industries clusters were examined for this report as potential key middle-wage job industry clusters: **Construction, Health Care, Aerospace, Professional & Business Services, Logistics & International Trade, Leisure & Hospitality, Green Building, and Clean Technology.**¹³

These clusters, classified more broadly into categories representing traditional big industries in the Puget Sound, service sector industries, and emerging and expanding industries, were selected for a number of reasons. Traditional industries for the Puget Sound Region include Construction, Aerospace and Logistics & International Trade. All three industries generate large numbers of total jobs for the region, with varying but significant percentages of those jobs being accessible quality middle-wage occupations. For the service sector, Health Care also represents a large number of jobs in the Puget Sound region, with a potential to create a high proportion of middle-wage jobs. The Professional & Business Services industry cluster was included because recent rapid growth of jobs in that cluster brings forth questions of

¹⁰ Porter, Michael E. August/October 2003. *The Economic Performance of Regions*. *Regional Studies*, 37(6&7): 549–578 (559-60).

¹¹ Ibid.

¹² Paul Sommers and Mark Gardner, *Accessible Middle-Wage Jobs in Seattle and the Puget Sound Region*, January 31, 2007, Seattle Jobs Initiative Working Paper.

¹³ Except for Professional & Business Services, clusters were selected by either the Puget Sound’s regional industry cluster strategy, Prosperity Partnership, or the City of Seattle as key areas of interest, as outlined in Paul Sommers and Mark Gardner, *Accessible Middle-Wage Jobs in Seattle and the Puget Sound Region*, January 31, 2007, Seattle Jobs Initiative Working Paper.

whether newly created jobs are accessible to those with less than a BA. Leisure & Hospitality was included because of strong interest locally and statewide in targeting that cluster, as well as previous work showing a sizable number of middle-wage jobs in the cluster. Finally, two emergent or evolving clusters – Green Building and Clean Technology – were included. The growing portion of the Construction industry focused on green building is important to keep in mind in the middle-wage job conversation. Similarly, Clean Technology, although currently quite small, through the impact of various economic and political trends, could expand rapidly.

Projected Growth of Select Industry Clusters

Table 1 shows total jobs and projected growth in total jobs of all wage and skill levels for King County and for the four-county Puget Sound region in the identified clusters of interest. Health Care is the largest industry cluster, currently employing nearly 108,000 workers in the Puget Sound region, approximately two-thirds of which are in King County.

Industry cluster growth stimulates job growth by both direct and indirect occupation creation. Direct jobs are those jobs created in the industry. Projected growth for all seven clusters reveals that the largest industry cluster, Health Care, will continue to provide multiple job opportunities for the Puget Sound region, growing by roughly 28,700 direct jobs by 2014. Construction follows closely behind Health Care in job creation with estimated job growth of an additional 22,300 jobs.

The growth of these clusters will impact the rest of the regional economy through multiplier effects stemming from purchases made in cluster firms from other businesses in the area and from the purchases made by employees of firms in the clusters and those receiving new orders from cluster firms.¹⁴ (See Appendix for specific values for multiplier effects for each industry cluster). This multiplier effect provides for estimation of indirect job creation – for every one direct industry job created, a certain number of indirect jobs are created in other industry-related areas. The ‘ripple effect’ therefore creates additional jobs in other areas to support the supply and output of workforce and materials of the industry cluster. As Table 1 shows, the expansion of the Health Care cluster and the expansion of industries related to this cluster will stimulate creation of another 87,600 jobs, with 59,000 of the total coming from the multiplier effect of health care industries and their payroll on other industries in the region. Similarly, the direct job growth of the Construction industry is coupled with more than twice as many indirect jobs being created in other industries that support Construction trades and building.

¹⁴ These multiplier impacts are derived from the model, dividing the total projected employment for the cluster by an assumed amount of direct employment. Cluster expansion and multiplier impacts of cluster expansion are then filtered through a four county regional industry by occupation table to project the occupational impacts, both direct and indirect, of cluster expansion.

Table 1. Total Jobs by Cluster in 2004 and Projected Growth by 2014 for the Puget Sound Region and King County

	Puget Sound		King County	
	2004 Total Employment	Projected 2014 New Employment	2004 Total Employment	Projected 2014 New Employment
TRADITIONAL INDUSTRIES				
Construction				
Total	98,010	70,379	59,858	38,000
Expected Direct Growth		22,343		12,820
Expected Indirect Growth		48,036		25,180
Aerospace				
Total	61,069	51,418	38,112	28,760
Expected Direct Growth		14,254		7,970
Expected Indirect Growth		37,164		20,789
Logistics & International Trade				
Total	54,561	26,794	47,345	16,749
Expected Direct Growth		7,757		4,739
Expected Indirect Growth		19,037		12,010
SERVICE SECTOR INDUSTRIES				
Health Care				
Total	107,781	87,659	71,387	52,282
Expected Direct Growth		28,671		17,255
Expected Indirect Growth		58,988		35,027
Professional & Business Services				
Total	38,628	49,429	31,353	40,344
Expected Direct Growth		12,481		11,376
Expected Indirect Growth		36,948		28,968
Leisure & Hospitality				
Total	54,861	18,841	42,700	13,369
Expected Direct Growth		6,850		4,858
Expected Indirect Growth		11,991		8,511
EMERGING INDUSTRIES				
Green Building†				
Total	9,801	7,037	5,986	3,800
Expected Direct Growth		2,234		1,282
Expected Indirect Growth		4,803		2,518
Clean Technology‡				
Total	1,091	872	906	698
Expected Direct Growth		306		234
Expected Indirect Growth		566		464

† The Green Building Industry Cluster is assumed to represent roughly 10% of the total Construction Industry.

‡ The Clean Technology Industry Cluster is made up of the following industries, as identified by the Puget Sound Regional Council: Other Electric Power Generation; Environmental Consulting Services; Solid Waste Combustors and Incinerators; Air Purification Equipment Manufacturing; Materials Recovery Facilities; Environment, Conservation and Wildlife Organizations; and Hazardous Waste Treatment and Disposal.

Source: Washington State Employment Security Department long-term employment projections by industry - grouped into clusters by author.

Job Quality

Although wages are important, job quality has other aspects as well. A closer look at the occupational data used in this report and particular indicators of quality in the industry clusters identified reveals that, though some industries may provide a wealth of middle-wage jobs, this positive growth may be tempered by poor quality. For example, occupations with higher average unemployment levels and incidence of involuntary part-time work generally are likely to provide less stable employment and income. Findings relating certain measures of quality to particular industry clusters may assist workforce development organizations in preparing clients for entry into occupations in these various clusters. For example, if part-time work or spells of unemployment are likely in a particular cluster, training programs may include material on combining jobs in different industries – a “portfolio” strategy for workers.

BLS has prepared estimates of several job quality variables for a national sample for each distinct occupational category. Using these national job quality estimates, the direct and indirect impacts of cluster expansion are shown for frequency of part-time work and frequency of spells of unemployment. It is important to note that these job quality estimates are for industry clusters as a whole, and not related directly to those middle-wage jobs created in the clusters. Therefore, it may be that those jobs paying less than middle-wages or requiring fewer skills are representing the bulk of unemployed or part-time jobs in a particular industry. Still, job quality indicators illustrate an overall industry climate that may prove useful for workforce development.

Part-time employment

Table 2 examines the incidence of part-time employment by industry cluster.¹⁵ There are pluses and minuses to part-time employment. Some workers prefer part-time employment because it enables them to continue their education, meet family responsibilities, work fewer hours, or supplement a full-time job. On the other hand, part-time work rarely comes with health care or other benefits, and some workers are forced to accept part-time positions because they cannot find suitable full-time positions. Some of these struggling workers end up holding more than one part-time position to make ends meet. Existing government data systems do not distinguish multiple job holders from other workers in part-time positions, making it very difficult for analysts to get an accurate picture of the situation of part-time workers.

As Table 2 shows, the Aerospace cluster has the lowest propensity to create part-time jobs; 85% of the jobs in this cluster in the Puget Sound region have a very low incidence of being part-time, and 59% of the indirect jobs stimulated by growth of the Aerospace cluster have a very low incidence of part-time jobs. In contrast, 65% of the direct jobs in the Leisure & Hospitality cluster in the Puget Sound region have a high or very high incidence of part-time employment. Health Care also has a relatively high incidence of part-time employment with 58% of direct jobs and 45% of indirect jobs having a high or very high incidence of part-time employment.

¹⁵ One cautionary note is required concerning these estimates, which are based on national incidence rates by occupation. Because labor market tightness varies substantially around the country, the incidence of part-time employment could differ from national estimates. The Puget Sound has a lower level of unemployment at present compared to the nation and therefore the incidence of part-time work by occupation may be lower. The indicators in Table 3 should be regarded as long-term propensities and not accurate reflections of the local labor market at a particular stage of the business cycle.

Table 2. Incidence of Part-Time Employment in the Puget Sound Region by Industry Cluster, 2004

<i>Cluster</i>	<i>Very Low</i>	<i>Low</i>	<i>High</i>	<i>Very High</i>
TRADITIONAL INDUSTRIES				
Construction†				
Expected Direct Growth	65%	35%	0%	0%
Expected Indirect Growth	59%	34%	5%	1%
Aerospace				
Expected Direct Growth	85%	8%	7%	0%
Expected Indirect Growth	59%	23%	15%	3%
Logistics & International Trade				
Expected Direct Growth	54%	36%	2%	8%
Expected Indirect Growth	48%	35%	11%	7%
SERVICE SECTOR INDUSTRIES				
Health Care				
Expected Direct Growth	26%	15%	46%	12%
Expected Indirect Growth	32%	22%	36%	9%
Professional & Business Services				
Expected Direct Growth	48%	30%	22%	0%
Expected Indirect Growth	43%	32%	21%	4%
Leisure & Hospitality				
Expected Direct Growth	16%	19%	47%	18%
Expected Indirect Growth	31%	27%	32%	10%
EMERGING INDUSTRIES				
Green Building†				
Expected Direct Growth	†	†	†	†
Expected Indirect Growth	†	†	†	†
Clean Technology				
Expected Direct Growth	58%	33%	9%	0%
Expected Indirect Growth	53%	33%	13%	2%

Very Low: 6.7% or less of workers are part-time; Low: 6.7% to 14.6% of workers are part-time; High: 14.7% to 26.0% of workers are part-time; Very High: Greater than 26% of workers are part-time.

† Construction estimates include Green Building.

Source: Calculations by author based on Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections data, 2004.

Unemployment

The incidence of spells of unemployment¹⁶ for the Puget Sound region by industry cluster is shown in Table 3. The Construction cluster presents the highest proportion of jobs generating high rates of unemployment. 82% of the direct jobs and 70% of the indirect jobs associated with this cluster have high or very high levels of unemployment. This is due in large part to the Construction industry's seasonality, with employment dropping to a low every January, and increasing through the summer of each year. The Professional & Business Services cluster has the lowest percentages of direct (27%) and indirect (30%) jobs subject to spells of unemployment.

Table 3. Incidence of Unemployment in the Puget Sound Region by Industry Cluster, 2004

<i>Cluster</i>	<i>Very Low</i>	<i>Low</i>	<i>High</i>	<i>Very High</i>
TRADITIONAL INDUSTRIES				
Construction†				
Expected Direct Growth	10%	8%	29%	53%
Expected Indirect Growth	16%	14%	26%	44%
Aerospace				
Expected Direct Growth	12%	46%	19%	23%
Expected Indirect Growth	25%	38%	18%	18%
Logistics & International Trade				
Expected Direct Growth	16%	43%	37%	5%
Expected Indirect Growth	24%	38%	28%	9%
SERVICE SECTOR INDUSTRIES				
Health Care				
Expected Direct Growth	54%	21%	6%	20%
Expected Indirect Growth	47%	26%	10%	17%
Professional & Business Services				
Expected Direct Growth	22%	51%	25%	2%
Expected Indirect Growth	32%	38%	19%	11%
Leisure & Hospitality				
Expected Direct Growth	28%	37%	15%	21%
Expected Indirect Growth	31%	36%	17%	16%
EMERGING INDUSTRIES				
Green Building†				
Expected Direct Growth	†	†	†	†
Expected Indirect Growth	†	†	†	†
Clean Technology				
Expected Direct Growth	16%	23%	26%	34%
Expected Indirect Growth	22%	27%	23%	28%

Very Low: 2.7% or less of workers are unemployed; Low: 2.7% to 4.1% of workers are unemployed; High: 4.1% to 7.1% of workers are unemployed; Very High: Greater than 7.1% of workers are unemployed.

† Construction estimates include Green Building.

Source: Calculations by author based on Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections data, 2004.

¹⁶ A worker is counted as unemployed in this data only if he/she applies for unemployment compensation. Some seasonal workers may not qualify for unemployment benefits and thus the data could under-count the true level of unemployment due to seasonal jobs.

Projected Growth by Wages and Skill Level

Table 4 breaks down the new jobs projected for each cluster by wage and skill level for the Puget Sound region. Middle-wage jobs are shown as one of three groupings of total jobs; the other two groups are high skill jobs requiring a BA degree or higher, and jobs paying less than \$17 per hour. (See Appendix Table 1 for similar findings for King County.) In all, these three categories represent the full spectrum of new job opportunities for the growing industry clusters – from entry-level to those jobs paying a middle-wage but not requiring a 4-year degree to those positions requiring at least a BA.

The findings reveal varying degrees of middle-wage job growth across the industry clusters. Within the traditional big growth industries of the Puget Sound, Construction is slated to produce the largest quantity of middle-wage jobs – 17,000, with proportionately more than any other cluster – 82% of all direct jobs. The Aerospace cluster is projected to generate over 6,000 new direct middle-wage jobs. Still, 45% of the total new jobs created by 2014 in Aerospace will require a BA or more. Though evidence suggests that the Aerospace industry is shifting away from high skill jobs, it remains an industry heavily dependent on 4-year degrees. The Logistics & International Trade cluster is expected to generate nearly 4,000 direct middle-wage jobs – roughly half of the industry's total growth. At the same time, almost 40% of new jobs in Logistics & International Trade will pay less than \$17 hourly.

For the Service Sector, the Health Care cluster is expected to expand by almost 28,700 direct employees in the Puget Sound region from 2004 to 2014, the largest growth of all industries examined. Of those new jobs, roughly 7,700 are expected to be direct middle-wage jobs. In addition, 9,200 of the new direct Health Care jobs are projected to be high skill jobs requiring a bachelor's or higher level university degree, while more than 11,700 new jobs paying less than \$17 per hour are projected. The Professional & Business Services cluster is expected to expand by about 2,000 direct middle-wage jobs. Still, much of the growth attributed to this industry – 63% - will be attributed to jobs requiring a BA or more. Finally, Leisure & Hospitality has the lowest percentage of direct middle-wage jobs – 14%. This service sector industry also has some of the highest rates of direct jobs paying less than \$17 per hour – 71% – confirming its record for providing a large proportion of entry-level occupations.

The growing interest in sustainable industries will undoubtedly lead to job growth for emerging industry clusters like Green Building and Clean Technology, yet predicting the scope of this growth is difficult. For Green Building, the majority of occupation growth is associated with the larger general construction trades. While materials will change and standards will direct implementation, the occupational requirements for this industry are estimated to largely remain unchanged. Therefore, as Table 4 reveals, the authors assume a modest proportion of the total Construction industry growth – 10% - as a possible estimate for Green Building growth potential in the Puget Sound region. The patterns of middle-wage job growth therefore mirror those of the Construction industry as a whole. It's impossible to predict if middle-wage job growth will function differently than its parent industry.

While there is no doubt about the growth bound for new clean technology industry and innovation, predicting the size and shape of this new market industry, along with the new occupations created by new technologies, is unclear. Job growth is certain, but occupations yet to be created make predicting the size of this supply of new jobs and specifically middle-wage jobs impossible at this time. Given that, the numbers presented in Table 4 for clean technology are based solely on those occupations that currently exist that are likely to remain in tact as they are transformed by the growing clean technology industry cluster. The same conservative estimate used for Green Building's potential portion of construction

growth is used by the authors, assuming 10% of this total growth can at minimum be attributed solely to clean technology. Using these criteria, middle-wage job growth is predicted to represent over half (55%) of the total share of new clean technology jobs, confirming that these industries are and continue to be valuable sources for accessible jobs.

Table 4. Expected Direct Employment Growth by Industry Cluster for the Puget Sound Region, 2004-2014

	<i>Projected 2014 New Direct Employment*</i>	<i>Number of New Industry Cluster Jobs</i>			<i>Percent of All New Direct Industry Cluster Jobs</i>		
		<i>Less than \$17/hr jobs</i>	<i>Middle- Wage Jobs</i>	<i>BA+ Jobs</i>	<i>Less than \$17/hr jobs</i>	<i>Middle- Wage Jobs</i>	<i>BA+ Jobs</i>
TRADITIONAL INDUSTRIES							
Construction	21,398	3,064	17,474	860	14%	82%	4%
Aerospace	14,253	1,626	6,181	6,446	11%	43%	45%
Logistics & International Trade	7,757	2,959	3,959	839	38%	51%	11%
SERVICE SECTOR INDUSTRIES							
Health Care	28,671	11,732	7,739	9,200	41%	27%	32%
Professional & Business Services	12,481	2,573	2,063	7,845	21%	17%	63%
Leisure & Hospitality	6,850	4,875	978	997	71%	14%	15%
EMERGING INDUSTRIES							
Green Building†	2,139	306	1,747	86	14%	82%	4%
Clean Technology‡	306	74	168	64	24%	55%	21%

* Cluster totals are not the same as in Table 1 due to rounding errors and missing wage or education data.

† The Green Building Industry Cluster is assumed to represent roughly 10% of the total Construction Industry.

‡ The Clean Technology Industry Cluster is made up of the following industries, as identified by the Puget Sound Regional Council: Other Electric Power Generation; Environmental Consulting Services; Solid Waste Combustors and Incinerators; Air Purification Equipment Manufacturing; Materials Recovery Facilities; Environment, Conservation and Wildlife Organizations; and Hazardous Waste Treatment and Disposal.

Source: Calculations by author on Washington State Employment Security Department long-term employment projections by industry.

Traditional Industry Cluster Growth

Some traditional “blue collar” clusters are currently creating large numbers of middle-wage jobs. The Construction industry stands out among area clusters in the overwhelming preponderance of accessible middle-wage jobs in its employment base— three quarters of all jobs in current construction jobs meet middle-wage job criteria and any expansion of this cluster generates a substantial number of middle-wage jobs. Aerospace also contributes a large portion of regional employment. Though this industry is declining as a portion of the overall job base, it is still large and currently expanding. Local ports and airports provide the base for a strengthening Logistics & International Trade cluster that has the potential to counteract some of the local job loss in manufacturing.

Cluster Focus: Construction

Research confirms that the Construction industry in the Puget Sound region is booming. With many large-scale projects underway and on the horizon, construction employers are experiencing an increased need for a skilled workforce, particularly in terms of middle-wage openings. The industry’s rapid growth translates into Construction representing a large portion of the total job base, with many middle-wage jobs accounting for these positions. Recent growth rates are starting to tilt toward heavy and civil engineering, consistent with a picture of large public works projects coming online in Puget Sound, and the impact of the beginning of the residential housing slowdown on building construction. Though this slowdown may hasten job growth over the coming year, Construction will remain a vital industry in the Puget Sound region. Although the net new job creation in the industry generally is smaller than that for other clusters examined here, expected steady if not spectacular growth, coupled with a large wave of looming retirements, is expected to maintain long-term demand for workers in this industry.¹⁷

As detailed later on in this report, the future growth of the Construction industry will likely include changes in materials and standards as sustainable practices transform the Green Building portion of the market. While these changes will fuel demand for workers with the latest skills, Construction is and will likely always be both a seasonal and cyclical industry – that is, every year job losses mount as weather forces slowdowns in activity, and it also remains an industry heavily affected by overall business cycles, sometimes “boom and bust.” Nationally, employment in the industry is beginning to contract as the latest residential housing construction cycle comes to an abrupt end. These job losses have been counteracted somewhat by a recent upswing in commercial construction. Whether this can be maintained is an open question. One positive trend locally is the slow but steady ramp-up of a number of large civil engineering projects, especially mass transit and highway construction/reconstruction. This could help cushion job losses in other sectors of the industry.

Occupations and Training Opportunities in the Construction Industry Cluster

The Construction industry stands out among area clusters in the overwhelming preponderance of accessible middle-wage jobs in its employment base— over three quarters of all jobs in current construction jobs meet middle-wage job criteria and any expansion of this cluster generates a substantial number of middle-wage jobs. Table 5 below summarizes projected new construction jobs by occupation. An array of traditional construction trades dominates the majority of middle-wage job growth in this industry. Prominent occupations like carpenters, laborers, and site managers will see increases in the number of accessible job openings in the thousands. In part, some of this growth can be attributed to the growing

¹⁷ For a recent overview of the Construction industry in the Puget Sound Region, see Seattle Jobs Initiative, *Quarterly Job Trends Report, Industry Spotlight: Construction*, September 2007.

interest in new sustainable practices adopted by the Construction industry to meet the demands for greener production. Discussion later in the paper focuses on the participation in Green Building and its growing influence on middle-wage job growth in the Construction industry.

The middle-wage occupations have many established pathways for training, including apprenticeships, community college training, on-the-job-training, and various combinations of these pathways. Combined with the growing need of employers to fill slots emptied by an aging workforce, numerous opportunities exist for those interested in breaking into construction. These include various pre-apprenticeship training programs. Many programs provide opportunities for women, low-income individuals, and people of color to gain key skills for successful placement in apprenticeships and further construction employment.¹⁸ Union apprenticeships still provide a dominant means for entering into any construction trade, with efforts in place to support continued training post-apprenticeship, as well as resources to overcome barriers and find and retain employment.

Table 5. Growth of Middle-Wage Occupations in the Construction Industry Cluster in the Puget Sound Region, 2004-14

<i>Occupation</i>	<i>New Direct Jobs</i>
Carpenters	2,902
Construction laborers	2,025
First-line supervisors/managers of construction trades and extraction workers	1,523
Electricians	1,177
Painters, construction and maintenance	904
Operating engineers and other construction equipment operators	854
Plumbers, pipefitters, and steamfitters	824
Drywall and ceiling tile installers	668
Roofers	552
Construction managers	524
Cost estimators	453
Tapers	441
Sheet metal workers	429
Truck drivers, heavy and tractor-trailer	406
Cement masons and concrete finishers	315
Telecommunications line installers and repairers	307
Structural iron and steel workers	304
Heating, air conditioning, and refrigeration mechanics and installers	210
First-line supervisors/managers of office and administrative support workers	197
Glaziers	194
Elevator installers and repairers	144
Pipelayers	143
Executive secretaries and administrative assistants	133
Maintenance and repair workers, general	125
Tile and marble setters	111
Payroll and timekeeping clerks	109

¹⁸ Seattle Jobs Initiative, *Quarterly Job Trends Report, Industry Spotlight: Construction*, September 2007.

Preparing for Careers in Construction: Local Training Programs

Construction training opportunities exist in a variety of programs throughout the Puget Sound area.

Local Training for Construction & Green Building-Related Careers
Bates Technical College <ul style="list-style-type: none">▪ Carpentry (certificates, ATA)▪ Boat building (certificates, ATA)
Clover Park Technical College <ul style="list-style-type: none">▪ Construction – Residential (pre-apprenticeship certificate program)
Edmonds Community College <ul style="list-style-type: none">▪ Construction Industry Training (certificates, pre-apprenticeship training)▪ Construction Management Program (certificates, ATA)
Renton Technical College – <ul style="list-style-type: none">▪ Construction Management (certificate, AAS)▪ Construction Trades Preparation (certificate)
Seattle Central Community College <ul style="list-style-type: none">▪ Cabinetmaking (AAS-T, certificate), Carpentry (AAS-T, certificate), Marine Carpentry (AAS-T, certificate)
Seattle Vocational Institute <ul style="list-style-type: none">▪ Building Trades Pre-Apprenticeship
Pierce College <ul style="list-style-type: none">▪ Construction Management (certificates, ATA)
Other training programs in Construction: <ul style="list-style-type: none">▪ RVCDF Pre-apprenticeship program▪ ANEW Apprenticeship Opportunities Project▪ ANEW Construction Readiness Training Program▪ Seattle City Light Lineworker Pre-apprentice Program

This list is not exhaustive.

Cluster Focus: Aerospace

The Aerospace cluster, led by The Boeing Company's airplane manufacturing division, is a long time contributor to the economic base of the Puget Sound region. Boeing has airplane plants in Everett, Seattle, and Renton, as well as smaller facilities in Pierce County related to airplane manufacturing, and in the Kent Valley related to its missile and space division. The region also hosts a number of smaller companies which are subcontractors to Boeing, Airbus, or other leading aerospace companies.

As noted in Table 1, this cluster employed 68,500 workers in 2004 and is projected to expand by 14,300 workers by 2014. Though this estimated expansion is large, it will likely not reach the same levels of high employment as those seen in 2000. Much of this future expansion depends on the success of Boeing's new 787 "Dreamliner" model, an airplane that is selling well in anticipation of deliveries starting in 2008. This airplane is based on many new technologies and has many international partners working with Boeing. In the future, Boeing may choose to re-engineer other models such as the ever popular 737 based on some of the new technologies used in the 787. A long-term implication of these developments in technology and sourcing of parts and systems is that Boeing's local workforce may change in composition and may be less prone to the large cycles in overall employment that have defined many rises and falls in the Puget Sound over the decades since Boeing rose to prominence in the aerospace industry. In particular, Boeing is likely to have fewer production workers and a higher percentage of marketing, sales, design and engineering, and program management and coordination workers in the future. More of the occupations in Boeing's local workforce are likely to require a college degree than is

currently the case.¹⁹ The projections support this idea, with 46% of all new direct jobs created forecasted to be high wage jobs.

Efforts to encourage the growth of this cluster have been a prominent feature of the state's economic development policy, especially since Boeing's corporate headquarters was moved to Chicago, as well as an important focus of the Prosperity Partnership regional economic development strategy and the efforts of local organizations such as the Snohomish Economic Development Council and the Workforce Development Councils in all Puget Sound counties. A new industry association, Aerospace Futures Alliance of Washington, has been formed to advance the interests of the many subcontractors in the state focused on manufacturing aerospace parts and systems, a move necessitated by a shift toward a truly global sourcing system by the Boeing Company.

Based on the declining workforce and contraction of middle-wage jobs in the Aerospace industry to date²⁰, this is a cluster to monitor closely for clues to the long-term configuration of activities at Boeing, as well as the success of subcontractors in this region in securing orders from Boeing, Airbus, or other leading aerospace companies. This discussion is not meant to suggest that Boeing is going to end all manufacturing activities in the region, but the composition of its workforce may shift away from direct manufacturing jobs over time.

However, while Boeing may be shifting toward a workforce with more formal education, this is not necessarily true of its suppliers—many of which also produce products for other companies, giving them some independence from the local production cycle. Also, the industry hires many people outside manufacturing to provide support activities needed in managing and assembling planes. The projected results from these analyses support the creation of 6,000 new direct middle-wage jobs in the Aerospace industry, including such clerical positions such as purchasing managers or executive secretaries.

Lastly, demographic factors—especially an aging workforce—coupled with retirements or job switching that occurred in the last industry slowdown is resulting in shortages of many needed skills in the local workforce. As such, workers with the proper skill mix remain in demand even though the industry is unlikely to play the same role in anchoring the middle class as it did in prior years.

Occupations and Training Opportunities in the Aerospace Industry Cluster

Table 6 shows projected job growth from 2004 to 2014 by occupation in the Aerospace cluster in the entire Puget Sound region. Several of the occupations with high numbers of projected openings are unique to the aerospace industry, e.g., aircraft structural assemblers and aircraft mechanics. Others such as drafters, purchasing agents and engineering technicians are also employed in other industries. Aircraft structure assemblers lead new job growth—consistent with a growing emphasis on final assembly, rather than a production of various components, at Boeing. Although not among those occupations with the largest number of expected new jobs, blue collar manufacturing occupations—such as machine tool operators, machinists, tool and die makers, and welders and related metal workers—are still expected to add a substantial number of new jobs. Positions maintaining aerospace manufacturing facilities, or the planes themselves, also figure prominently. These include occupations such as aircraft mechanic, electrical and electronics repairers, and industrial machinery mechanics.

Despite recent job growth this remains an industry subject to waves of highs and lows, affected both by demand cycles for new aircraft, and by geopolitical realities that affect

¹⁹ Conversely, other regional aerospace companies offer predominantly low-wage, entry-level positions. See Dominic Gates & Justin Mayo. *Pay in aerospace is low for non-Boeing workers*. Seattle Times, December 16, 2007.

²⁰ Separate analyses performed by the authors reveal that, from 1998 to 2004 jobs requiring at least a BA expanded from 46% to 52% of the Aerospace workforce in Washington, while middle-wage jobs contracted from 30% to 23% in the same time period.

passenger aviation and corresponding demand for passenger jets. The competitiveness of local suppliers within Boeing's production system is still in a state of flux, and this will affect demand for many occupations. The main Boeing subcontractors will have a much greater influence in the future on total middle-wage aerospace jobs and these companies do not have local headquarters and could shift work elsewhere. On the upside, a looser relationship between Boeing and local subcontractors could open up opportunities for work with other companies (e.g. Airbus). Thus, while this industry cluster will continue to offer good jobs, the specific mix of local occupations bears continual monitoring in this rapidly changing industry.

Some additional developments could also affect the skills training available locally within the industry. For example, a new Employment Resource Center, paid for by the state for use by Boeing, is developing training curricula for the Boeing workforce, but it is unclear at this point what level of skills will be emphasized. The state has also convened and funded a private Aerospace Futures Board composed of Boeing, its suppliers, and various organizational partners to plan for the future of the aerospace workforce in the area that may also influence local training offerings.²¹ An Aerospace Manufacturing Degree Program is also in the works at the State Board for Community and Technical Colleges. Given all these simultaneous developments, it will be important for workforce professionals and those wishing to work in this industry to monitor both skills in demand, and local training resources available in response to those emerging skill needs.

Table 6. Growth of Middle-Wage Occupations in the Aerospace Industry Cluster in the Puget Sound Region, 2004-14

<i>Occupation</i>	<i>New Direct Jobs</i>
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	1,211
Aircraft Mechanics and Service Technicians	701
Drafters, All Other	432
Purchasing Agents, Except Wholesale, Retail, and Farm Products	418
Industrial Engineering Technicians	411
Business Operations Specialists, All Other	373
Engineering Technicians, Except Drafters, All Other	354
Executive Secretaries and Administrative Assistants	189
Electrical and Electronics Repairers, Commercial and Industrial Equipment	160
First-Line Supervisors/Managers of Production and Operating Workers	153
Computer-Controlled Machine Tool Operators, Metal and Plastic	129
Machinists	121
Tool and Die Makers	119
Welders, Cutters, Solderers, and Brazers	110
Industrial Machinery Mechanics	100
Transportation Inspectors	94
Maintenance and Repair Workers, General	92
Cost Estimators	79
Production, Planning, and Expediting Clerks	70
Mechanical Drafters	65
Painters, Transportation Equipment	59
Metal Workers and Plastic Workers, All Other	59
Truck Drivers, Heavy and Tractor-Trailer	55
Maintenance Workers, Machinery	51

Table does not display occupations that add less than 50 total jobs from 2004-2014.

²¹ December 19, 2003 press release, "Gov. Gary Locke, Boeing Sign Final 7E7 Agreement."

Preparing for Careers in Aerospace: Local Training Programs

The following table summarizes some local community-college-based programs, some oriented to aerospace, and others providing more general skills for manufacturing. Curricula specialized for aerospace careers include two-year degrees or certificates in aviation maintenance, and degrees in piloting or air traffic control. Curricula that are generally useful in manufacturing include those focused on computer-aided design, and machining.

Local Training for Aerospace-Related Careers (including advanced and general manufacturing training)
Edmonds Community College <ul style="list-style-type: none">▪ CAD (drafting and design, AA and certificates).▪ Computer and Numerical Controls (Certificates and AA Degree).
Everett Community College <ul style="list-style-type: none">▪ Aviation Maintenance Technology. Certificates in Airframe and Powerplant technology and Aviation Maintenance. Associate in Technical Arts in Aviation Maintenance Technology.▪ Advanced Manufacturing (CAD, Composites, Precision Machining, Fabrication, with certificates and technology degrees available).
Green River Community College <ul style="list-style-type: none">▪ AAS degree in Aviation Technology (training for Air Traffic Control, Aircraft Dispatch, Professional Pilot, and Helicopter Pilot occupations).▪ Manufacturing Technology (Computer Integrated Manufacturing).
Shoreline Community College <ul style="list-style-type: none">▪ Certificate in Basic Manufacturing, Computer and Numerical Controls▪ AAS Degree, Computer and Numerical Controls Technology▪ Certificate, Computer Aided Design and Drafting
South Seattle Community College <ul style="list-style-type: none">▪ Aviation Maintenance Technology Program (AAS and technical degrees, certificates).▪ Aeronautical Technology (AA and technical degrees).

For further information see <http://www.the-mpdc.com/education/>

Some of the skills needed in future aerospace are different from those in traditional manufacturing given the use of new materials such as composites. In response, Edmonds and Everett community colleges have created a Materials and Process Development Center to support research and curricula around composites manufacturing and software development for advanced assembly work.

This list is not exhaustive.

Cluster Focus: Logistics & International Trade

Logistics & International Trade industries constitute a significant cluster in the Puget Sound economy due to the success of the Ports of Seattle and Tacoma in attracting international shipping. This success has made the Puget Sound Region a premier location for transshipments of cargo coming in by ship and then transferred to rail to continue on to major distribution centers such as Chicago.

Along with the growth of the ports and rail activity, the growth of this cluster has stimulated growth of trucking and warehousing, other transportation services including air transportation and coastal marine transportation, and a variety of services and specialized construction activities needed to keep the port facilities operating. These industries expect further growth as American consumers take advantage of low cost goods coming in from Asia and more production activities in a variety of industries move offshore in search of lower wage rates.

This cluster also includes air transport services, making Sea-Tac International Airport a key player in the cluster. Both passenger and freight air services are essential to the movement of goods across the Pacific. Lighter, higher value, time-sensitive goods are often shipped by air freight rather than by sea. Business people frequently cross the Pacific to negotiate deals that result in the movement of goods, making passenger service an essential element in the Logistics & International Trade cluster.

Three factors limit the potential gains in employment in the Logistics & International Trade cluster. First, the Port of Seattle is essentially out of expansion space in Elliott Bay, and incremental growth is shifting to the Port of Tacoma. Second, competition is emerging not just from the Los Angeles/Long Beach port complex, the largest in the United States and one with a much larger local market to attract shipping lines, but also from ports in Mexico and Canada that are trying to take advantage of expanding shipments across the Pacific. Third, air and water pollution concerns are problematic for both the California and Puget Sound Ports. Technical solutions to these issues, such as substituting electrically powered equipment fed by shorepower and encouraging use of cleaner fuels and more efficient ship engines for freight vessels are being implemented at some ports.²²

Given these environmental concerns, the projections for the growth of this cluster shown in Table 1 may be too high or perhaps too low. The projections show the addition of 7,700 jobs by 2014, a 14% expansion over 2004 levels. Whether this projection turns out to be too low or too high depends on how the competitive factors play out along the west coast, as well as the related difficulties in resolving environmental issues. Longer term, the construction of a new Panama Canal that could accommodate the current generation of container ships could also alter the competitive balance.

Based on the current growth projections, nearly 4,000 new middle-wage jobs are expected for the Logistics & International Trade Cluster in the Puget Sound region. Table 10 shows the estimated growth of key occupations in this cluster. Due to the expansion of these occupations, there will also be substantial new jobs for supervisors of the occupations listed previously, implying some additional career ladders.

Occupations and Training Opportunities in the Logistics & International Trade Industry Cluster

The growth of the Logistics & International Trade Cluster in the Puget Sound area has produced a relatively diverse set of industries and occupations, all with something in common: they relate, directly or indirectly, to coordinating the movement of people or goods locally, nationally, and internationally. As shown in Table 2 of this paper, almost a third of jobs created directly in this industry cluster are accessible middle-wage jobs. Echoing these findings, a study by Port Jobs found that jobs requiring less than a BA are relatively plentiful in the industry, and are in some ways more accessible than manufacturing jobs.²³ However, the report also finds that “opportunities for career advancement within the LIT sector may be somewhat limited...[and] advancement within the LIT sector may require as much education as advancement within Manufacturing.”²⁴

Four transportation modes, and associated occupations, figure prominently in the local cluster: seaports (Seattle and Tacoma), airports (especially Sea-Tac), rail, and the local and interstate highway systems. Each of these transportation modes supports occupations, which are specialized for that mode and its activities, and others which are more broadly in

²² For example, the Port of Seattle has an agreement with Princess Cruise Line to use shorepower connections while cruise ships are at the dock so that the ship's engines can be shut down. Plug-in hybrid trucks and perhaps even electric rail locomotives may be necessary to deal with the air pollution impacts. The water pollution issues have to do with discharge of water ballast, which may contain many contaminants, as well as sewage from cruise ships that also call frequently at the Port of Seattle in the summer months.

²³ Port Jobs, *Employment in Logistics and International Trade: Opportunities with Limitations*, 2006.

²⁴ *Ibid.* Page 6.

demand across the cluster. For example, within the airports part of the cluster, the companies and activities relating to moving freight are somewhat distinct from those focused on passenger travel. As a result, airports sustain some occupations that cross over with other portions of the Logistics & International Trade cluster (e.g. shipping and warehousing) and others which are relatively specialized to that mode, such as personnel devoted to coordinating and serving air passengers (e.g. flight attendants, ticketing agents, and the myriad customer service occupations related to serving passengers at the airport).

Similarly, the marine sector has distinct occupations such as sailor and mate, but also others which cross over with other parts of the cluster, such as truck driving or warehousing. Some activities within the cluster act as bridges between the different transportation modes, such as those at intermodal freight facilities which store and load goods between the ports and the rails or highways.

Sailors and Marine Oilers, and Captains, Mates, and Pilots of Water Vessels are clearly in the marine side of the cluster. The close relationship between these two occupations implies relatively obvious career pathways. Ship engineers are also clearly related to ocean transportation. Demand for these occupations is also strengthened by demand in other parts of the local marine industry, such as cruise ships and the state ferry system. Various private schools in the area offer training, often combined with work experience, to advance in the industry.²⁵

Flight attendants and aircraft mechanics are concentrated in the airport side of the cluster. Training for flight attendants is from three to eight weeks and is usually conducted by the specific airline. Airport Jobs, a program of Port Jobs, offers training leading to placement in the various customer service occupations relating to passenger airways. While not all of these jobs are middle-wage occupations, they have the potential to serve as a stepping stone to more lucrative jobs as employees gain greater skills.

Other occupations cut across the cluster. These include first line managers of office and administrative support workers, and cargo and freight agents. Since these occupations employ skills used across many clusters, it is more appropriate to think of these as part of career ladders in office-related clusters or occupations rather than specifically within the Logistics & International Trade cluster. As such, training pathways to these jobs are not logically located only in this cluster, but could begin with training in generic computer and office skills, with job placement occurring in this cluster to take advantage of expected openings. For example, cargo and freight agents share many skills with office occupations, and could be a placement option for those in an office training program interested in careers in maritime, air transport, or warehousing.

Truck drivers are strongly in demand within this cluster, with skills related to other occupations also in demand, such as machine and vehicle operators. Truck driving skills are also transferable to other industrial sectors requiring short or long distance surface shipping.

While there are many accessible quality jobs in this cluster, some of the middle-wage occupations in this cluster may provide more secure futures than others. For example, while average wages in trucking jobs are good, it is important that someone entering this industry research the specifics of local employment situations. For example, the deregulation of the trucking industry nationally, and the conversion of many short-haul truckers (who haul to freight rail lines or local warehouses for storage) from waged workers to independent owner-operators, has resulted in deterioration of working condition, wages, and salaries. A recent survey by Port Jobs of Seattle-area short-haul truckers revealed that a majority

²⁵ See, for example, courses offered at the Pacific Maritime Academy.

made less than \$30,000 per year after expenses, two-thirds did not have health insurance, and 81% had no retirement plan.²⁶

More broadly, since activities in this cluster are very complex and interrelated, and the overall future of these activities depends in part on broader political and economic trends, predictions for the stability of employment in particular occupations may be difficult. For example, while long-term expansion of demand for passenger air travel is relatively certain, geopolitical concerns could affect short-term or intermediate job prospects. In the marine transportation side of the cluster, job growth depends on the relative competitiveness of local ports, ability of the area to solve transportation bottlenecks, environmental considerations, and local support for maintaining lands for marine and transport-related jobs, as opposed to allowing real estate development.

Table 7. Growth of Middle-Wage Occupations in the Logistics & International Trade Industry Cluster in the Puget Sound Region, 2004-14

<i>Occupation</i>	<i>New Direct Jobs</i>
Truck Drivers, Heavy and Tractor Trailer	1,525
Cargo and Freight Agents	244
Flight Attendants	231
Transportation Workers, All Other	200
First Line Supervisors/Managers of Transportation and Material Moving Machine and Vehicle Operators	178
Dispatchers, Except Police, Fire, and Ambulance	167
Sailors and Marine Oilers	157
Captains, Mates, and Pilots of Water Vessels	155
Aircraft Mechanics and Service Technicians	152
First Line Supervisors/Managers of Office and Administrative Support Workers	131
Ship Engineers	90
Bus and Truck Mechanics and Diesel Engine Specialists	80
Maintenance and Repair Workers, General	76
First Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand	73
Transportation, Storage, and Distribution Managers	61
First Line Supervisors/Managers of Mechanics, Installers, and Repairers	50

Table does not display occupations that add less than 50 total jobs from 2004-2014.

²⁶ Port Jobs, *Big Rig, Short Haul, A Study of Port Truckers in Seattle*, 2006.

Preparing for Careers in Logistics & International Trade: Local Training Programs

The table below lists some community college training sources for those interested in starting a career in this cluster. Many of these programs relate to trade and logistics, and a few are related to air transport specifically. Two colleges in the Puget Sound, joined by various proprietary schools, offer training and certification in truck driving, an occupation strongly in demand locally. Other programs offer generalist training in business skills useful in many parts of the cluster.

Local Training for Logistics & International Trade-Related Careers
Edmonds Community College <ul style="list-style-type: none"> ▪ ATA (Assoc. of Technical Arts) degree in International Business ▪ Certificate in Bilingual Business
Green River Community College <ul style="list-style-type: none"> ▪ Certificate and AAS Degrees, Air Transportation
Highline Community College <ul style="list-style-type: none"> ▪ International Business & Trade (Certificate and AAS Degrees in Import/Export and Freight Forwarding)
North Seattle Community College <ul style="list-style-type: none"> ▪ International Trade Certificate
Seattle Central Community College – Seattle Maritime Academy <ul style="list-style-type: none"> ▪ Marine Deck Technology (certificate) ▪ Marine Engineering Technology (certificate)
Shoreline Community College <ul style="list-style-type: none"> ▪ International Trade and Purchasing/Supply Chain Management
Tacoma Community College <ul style="list-style-type: none"> ▪ AAS Degree in Global Business ▪ Certificate in Transportation & Secure Logistics
Other training programs in Logistics & International Trade: <i>Commercial Truck Driver programs:</i> <ul style="list-style-type: none"> • Bates Technical College, Tacoma • South Seattle Community College

This list is not exhaustive.

A recent award by the State Board for Community and Technical Colleges to Highline Community College for the creation of a Center of Excellence in International Trade, Transportation, and Logistics at Highline Community College should help to advance local training in this sector. (Highline Community College, "Center of Excellence," Press Release, March 28, 2007.)

The Expanding Service Sector

Service sector industries have often been defined by their preponderance of low-wage high-turnover jobs. There are, however, opportunities within industries for middle-wage jobs and career advancement, and will continue to provide these opportunities as they expand. The largest of these industries examined is Health Care. Health Care has continued to expand throughout the ups and downs of the business cycle, providing many accessible jobs to those with some technical training. The Professional & Business Services industry cluster is also expanding, creating many jobs rapidly, though the proportion of these jobs being middle-wage remains low. Finally, an examination of the Leisure & Hospitality industry reveals that, though the majority of new job creation are in occupations that pay less than \$17 per hour, there exist some opportunities for middle-wage jobs and advancement.

Cluster Focus: Health Care

Health Care is the largest and fastest growing set of industries, and includes hospitals, doctors and dentists offices, rehabilitative facilities, etc. Due to the aging of the population as well as overall growth in the population of the Puget Sound, these industries are expected to expand from the 2004 base of nearly 108,000 jobs, adding 28,700 new direct workers by 2014 (Table 1). The findings project the Health Care cluster to be the largest contributor of middle-wage jobs – 7,700 new direct - to the Puget Sound region by 2014, as well as being the largest job producer overall.

In building workforce programs targeted at this cluster, there are several trends to monitor that may affect these occupational projections. The first is health care policy reform efforts at the state and federal level. Growing concern over rapidly rising health care costs is leading employers to change benefit packages and governments to consider options to control costs. For example, a Washington State blue ribbon commission on health care cost and access was convened in 2006; members included the governor and senior legislative leaders as well as health care experts.²⁷ The 2007 legislature considered bills derived from this commission's report such as those promoting healthier behavior by state employees and improving utilization of electronic medical records.²⁸ Policy changes in the past have shifted demand from one type of facility to another -- e.g., from general hospitals to out-patient care facilities -- or restricted demand for certain expensive procedures.²⁹ On the other hand, the aging of the population virtually guarantees a rising demand for health care services and a growing workforce in this set of industries.

Another intriguing trend is the use of offshore health care services. Hospitals may contract with foreign-based companies to read and interpret x-rays; digital images are easily shipped around the world via the internet enabling such practices. Other remote diagnostic procedures may emerge, enabling use of lower cost labor. In addition, some business operations such as accounting and determining eligibility for insurance reimbursements can either be out-sourced or shifted to computerized systems that replace direct human labor.³⁰ The increasing use of information technology is a trend to monitor in this cluster.

Several workforce organizations have noted a barrier to career ladders in health care posed by certification requirements. A person who trains for an entry-level nursing job through a one or two-year certificate program may have to start all over in higher education in order to advance into a registered nurse job. These certification issues have inhibited investment by workforce development programs in health care to some degree. And finally, the growing demand for nurses and a few other health care occupations has led employers to turn to immigrant labor since too few current residents with appropriate skills are available. The state legislature has made several investments in "high demand" fields within the state's public colleges and universities to assist employers and provide good job opportunities to state residents, but to date, demand continues to out-strip supply, especially in the health care field.

Occupations and Training Opportunities in the Health Care Industry Cluster

The Health Care industry cluster is abundant with opportunities for livable wage jobs, from entry-level up through advanced positions. These occupations aid professionally trained occupations in the medical industry. They do so through either direct medically-trained assistance (i.e. nurses, paramedics, therapists), through technological and mechanical

²⁷ Washington State Blue Ribbon Commission on Health Care Costs and Access. Final Report. January 2007.

²⁸ "Washington State House Passes Health Care Reform Legislation Based On Blue Ribbon Commission Recommendations". *Medical News Today*. April 18, 2007.

²⁹ See, for example, "Impact of the Medicare short stay transfer policy on patients undergoing major orthopedic surgery," or "Rural health care and health insurance," August 2007.

³⁰ See, for example, Health Care Technology Project (<http://www.hctproject.com>)

support (i.e. technicians, sonographers), or through general health care business maintenance support and administration (i.e. payroll, business operations, human resources, administrative assistance). Along the way, opportunities exist for advancement through on-the-job experience, employer-sponsored training, and options for continued training and advancement through further education.

According to the Bureau of Labor Statistics, registered nurses³¹ consist of the largest health care occupation nationally, and are projected to create the second largest number of new jobs among all occupations. "Job opportunities in most specialties and employment settings are expected to be excellent, with some employers reporting difficulty in attracting and retaining enough RNs".³² Registered nurses rank first for middle-wage job growth, representing almost half of all new direct middle-wage jobs forecasted for Puget Sound (48%). Local area analyses confirm these projections, with nursing occupations accounting for the largest number of new openings in the Puget Sound Region.

As Table 6 shows, many other occupations in Health Care will also expand, as well as a variety of occupations carrying out the business operations of health care organizations. Many of the remaining occupational openings in this cluster consist of clinical medical assistance and aide positions in various fields. These jobs function under the direction and supervision of more formally/advanced trained occupations like dentists and physicians, performing anything from routine tasks to advanced procedures, which support the complex nature of the medical work.

Equally prevalent in the middle-wage job growth projected for the Health Care industry are those jobs defined by technical knowledge and expertise. These positions, like radiologic and surgical technologists, play the crucial role of providing diagnostic and key analytical skills. In addition, they must be knowledgeable about the mechanical equipment and tools involved in their given trade.

The final group of positions making up growth for middle-wage jobs in this industry cluster can be considered administrative, providing support for the business end of the health care field. These jobs run the behind the scenes functions for medical offices and hospitals, dealing with medical records and insurance claims, payroll and human resources, as well as providing key infrastructure support through service, maintenance and repair.

Employment for many of these jobs can be found in hospitals, but a growing percentage of jobs are in other settings depending on the occupation, including physician's offices, outpatient care centers, ambulatory surgical centers, diagnostic imaging centers, nursing care facilities and in-home health care services. For some of the more technical occupations, jobs may be in medical equipment and supply manufacturing laboratories, which usually are small, privately owned businesses.

For most of the direct medical positions in this middle-wage job cluster, the job prospects are excellent, with employment increasing faster than average, and creating a need for a larger pool of qualified applicants. In addition, the aging population combined with a greater reliance on preventative care and constantly changing technological innovations make these much needed occupations to fill and properly train.³³

³¹ Registered nurses were added to the list of middle-wage occupations even though upwards of 60% of incumbent registered nurses in Washington have a bachelor's degree or higher. In this state, the registered nurse occupation can be entered with a 2-year college degree, but once hired, these nurses often keep studying to earn a bachelor's degree.

³² U.S. Department of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook: Registered Nurses. (<http://www.bls.gov/oco/ocos083.htm>)

³³ For more information on medical career training information, visit <http://www.medical-career-training.com>.

Table 8. Growth of Middle-Wage Occupations in the Health Care Industry Cluster in the Puget Sound Region, 2004-14

<i>Occupation</i>	<i>New Direct Jobs</i>
Registered Nurses	3,706
Dental Assistants	911
Licensed Practical and Licensed Vocational Nurses	728
Dental Hygienists	468
Radiologic Technologists and Technicians	283
First-Line Supervisors/Managers of Office and Administrative Support Workers	240
Respiratory Therapists	168
Physical Therapist Assistants	146
Maintenance and Repair Workers, General	143
Surgical Technologists	132
Massage Therapists	128
Diagnostic Medical Sonographers	91
Human Resources Assistants, Except Payroll and Timekeeping	63
First-Line Supervisors/Managers of Food Preparation	58

Table does not display occupations that add less than 50 total jobs from 2004-2014.

Preparing for Careers in Health Care: Local Training Programs

A host of training and educational opportunities exist for those interested in pursuing one of the many middle-wage occupations in the Health Care industry. Depending on the occupation, specialized programs range from short-term continuing education courses to certification to associate's and bachelor's degrees. In some cases, in addition to formal coursework, qualifying and/or licensing exams must be taken upon completion of programs to qualify for a job in hospitals or some medical offices. Training programs are offered by a variety of institutions, including community and junior colleges, vocational colleges, universities, private medical employment training agencies, as well as in hospitals and in the military. Some of these occupations are considered entry-level positions where they can get experience and training and then return to school to become any number of different occupations. In all cases, continuing experience and training is valued.

Local Training for Health Care-Related Careers

Bates Technical College

- Administrative Medical Assistant
- Biomedical Service Technician
- Hearing Instrument Technician
- Practical Nursing
- Dental Assistant (certificate); Dental Lab Technician (certificate)
- Medical Transcriptionist (certificate); Denturist

Bellevue Community College

- Clinical Lab Assistant – (certificate)
- Electroneurodiagnostic Technologist - (certificate)
- Medical Office Reception - (certificate)
- Health Unit Coordinator (certificate)
- Radiation Therapy – (AAS)
- Radiology Technology (certificate, AAS)
- Nuclear Medicine Technology – (certificate, AAS)
- Phlebotomy Technician – (certificate)
- Magnetic Resonance Imaging - (certificate)
- Nursing (AAS); Certified Nursing Assistant – (certificate)
- Vascular Intervention Program - (certificate)
- Diagnostic Ultrasound - AAS

This list is not exhaustive.

Local Training for Health Care-Related Careers (cont'd)

Cascadia Community College

- Phlebotomy (certificate)
- Associate in Pre-Nursing (DTA/MRP)

Clover Park Technical College

- Dental Assistant (AAT)
- Health Unit Coordinator (certificate)
- Hemodialysis Technician (certificate)
- Histology Technician (AAS-T)
- Medical Assistant (certificate)
- Medical Laboratory Technician (AAT)
- Nursing Assistant (certificate)
- Pharmacy Technician (AAS)
- Surgical Technology (AAT)

Edmonds Community College

- Dental office management (courses)
- Clinical Lab Assistant (certificate)
- Electrocardiography (EKG) Technician (certificate)
- Health Unit Coordinator (HUC) (certificate)
- Medical Information Technology (certificate)
- Patient Care Technician (certificate)
- Pharmacy Technician (certificate)
- Phlebotomy Technician (certificate)
- Practical Nursing (LPN) (certificate); Nurse Assistant (certificate)

Everett Community College

- Dental Hygiene (AAS)
- Nursing; Nursing Assistant Certified (1 qtr – prep for CNA)
- Emergency Medical Technician (certificate)
- Health Care Risk Management (3 courses)
- Medical Assistant (certificate or ATA)
- Phlebotomy (certificate)
- Physical Therapist Assistant (AAS)
- Radiologic Tech (certificate)
- Physical Education (AAS-T)
- Medical Coding (certificate); Medical Transcription (certificate)

Green River Community College

- Medical Office Assistant (AA); Medical Transcriptionist (certificate)
- Occupational therapy (AAS)
- Physical Therapy (AAS)

Highline Community College

- Health Information Management (AAS)
- LPN-Registered Nursing (AAS); Nursing Assistant (certificate); LPN to RN (AAS); Registered Nurse (AAS)
- Medical Assistant – AAS; Medical Transcriptionist - (certificate)
- Polysomnographic Technology – (certificate), AAS
- Respiratory Care (AAS)

Lake Washington Technical College

- Dental Assistant (certificate, AAS); Dental Hygiene (AAS); Dental Hygiene Expanded Duties (certificate); Dental Front Office Manager (certificate)
- Emergency Medical Technician – Basic (certificate)
- Medical Assistant (certificate, AAS); Medical Coding and Billing Professional (certificate); Medical Transcription (certificate)
- Nursing (AAS); Practical Nursing (certificate); Nursing Assistant (certificate)
- Health Unit Coordinator - (certificate)
- Physical Therapist Assistant (AAS)
- Science Technician (AAS)

This list is not exhaustive.

Local Training for Health Care-Related Careers (cont'd)

Shoreline Community College

- Dental Hygiene (AAS)
- Dietetic Technology (AAS)
- Health Information Technology (AAS)
- Medical Coding and Reimbursement (certificate)
- Dental Business Office Specialist (certificate)
- Medical Laboratory Technology (AAS, certificates)
- Nursing (RN) (AAS)

North Seattle Community College

- Emergency Medical Technician (certificate)
- Medical Assisting (certificate)
- Pharmacy Technician (certificate)
- AAS in Allied Health Sciences for Medical Assisting, Practical Nursing, and Pharmacy Technician certificate program graduates
- Phlebotomy (Blood Collection)
- Practical Nursing (certificate)
- Information Technology for Healthcare (certificates, AAS-T)

Olympic Community College

- Nursing (AA); Practical Nursing (LPN); Nursing Assistant (certificate)
- Medical Office Assistant (ATA certificate); Medical Receptionist; Medical Receptionist (Cert/C)
- Phlebotomy
- Physical Therapist Assistant (certificate); Physical Therapist Assistant (AAS)
- Medical Assisting (ATA); Medical Assisting (Cert/S)
- Phlebotomy (Cert/R)
- Nursing (ATA); Transition to Associate Degree Nursing (ATA); Practical Nursing (Cert/S); Nursing Assistant (Cert/R)

Pierce College

- Dental Hygiene (AA)
- Office Assistant: General (certificate); Office Assistant: Medical (certificate); Office Assistant: Medical Billing (certificate); Medical Transcriptionist (certificate)
- Diagnostic Health and Fitness Technician (certificate)
- Emergency Medical Technician (certificate)
- Medical Services Representative (certificate)
- Nursing (AA); Certified Nursing Assistant (certificate)

Renton Technical College

- Central Service Technician (PT) - (certificate)
- Dental Assistant (certificate, AAS, AAS-T)
- Practical Nurse (certificate); Nursing Assistant (PT) - (certificate); Registered Nurse, Associate Degree (AAS-T)
- Medical Assistant (certificate, AAS, AAS-T)
- Medical Lab Technician (certificate, AAS-T)
- Medical Coding Specialist-Physician Based (certificate, AAS); Medical Office Certificate (PT) - (certificate); Medical Receptionist - (certificate); Medical Reimbursement Specialist - (certificate)
- Pharmacy Technician (certificate, AAS, AAS-T)
- Phlebotomy Technician (PT) (certificate)
- Surgical Technologist (certificate, AAS, AAS-T)

Seattle Central Community College

- Dental Hygiene (AAS-T)
- Respiratory Care (AAS)
- Surgical Technology (certificate)
- Nursing (AAS-T)

This list is not exhaustive.

Local Training for Health Care-Related Careers (cont'd)

Seattle Vocational Institute

- Dental Assistant (certificate)
- Acute Care Hospital Nursing Assistant (certificate); Nursing Assistant (certificate)
- Health Unit Coordinator (certificate)
- Medical Assistant (certificate)
- Phlebotomy (certificate)

South Seattle Community College

- Certified Nursing Assistant – (certificate); Licensed Practical Nurse (certificate); Registered Nurse (AAS-T) (LPN to RN Ladder Program)
- Medical Office Clerk – (certificate)

Tacoma Community College

- Diagnostic Medical Sonography (AAS)
- Paramedic Education (certificate)
- Emergency Medical Technician (certificate)
- Health Information Management (AAS); Health Information Coding Specialist (certificate)
- Medical Billing Specialist (certificate); Medical Office Assistant (certificate); Medical Transcriptionist (certificate)
- Nursing, Associate Degree; Nursing Assistant, Certified (noncredit)
- Pharmacy Technician (certificate, AAS)
- Radiologic Science (AAS)
- Respiratory Therapy (AAS)

Other training programs in Health Care:

Everest College - Dental Assisting, Medical Assisting, Medical Billing, Pharmacy Technician, Medical Administrative Assistant, Medical Laboratory Assistant/Phlebotomist

Capstone Career College - Medical Coding & Billing Specialist, Medical Transcription Specialist

Pima Medical Institute - Dental Assistant, Health Unit Coordinator, Medical Assistant, Medical Administrative Assistant, Pharmacy Technician, Phlebotomy Technician, Physical Therapist Assistant, Radiography

This list is not exhaustive.

Cluster Focus: Professional & Business Services

The Professional & Business Services cluster, while not explicitly targeted by local economic development agencies, has been growing quite rapidly. As Table 1 shows, this cluster is expected to continue to grow from its 2004 base of 38,600 jobs by adding another 12,400 direct industry workers in the Puget Sound region by 2014. While this paper shows that most (almost two-thirds) of the jobs in this cluster will require a BA, given its large size there are still significant numbers of middle-wage job openings expected. Job quality measures indicate that jobs in this cluster are low in their incidence of part-time employment (78%) as well as in unemployment (73%). Over 2000 direct middle-wage jobs are expected to be created by 2014.

The Professional & Business Services cluster consists of a wide range of technical and professional services sold mainly to other businesses. These industries have been a growing part of the economy for the last several decades. Such expansion and rapid growth is likely to drive demand for new workers in a variety of fields, flagging the Professional & Business industry cluster as a potentially significant source of new jobs. These new jobs will come from within the Professional & Business industry as well as those sectors which both supply the industry with work and those industries which use Professional & Business industry

product or output. The direct jobs created in this cluster represent a variety of types of occupations, but all directly serve the Professional & Business Services industry.

Occupations and Training Opportunities in the Professional & Business Services Industry Cluster

As Table 9 illustrates, the expected occupations for middle-wage job growth in the Professional & Business Services industry cluster are relatively diverse. Interestingly, some of the occupations expected to add the most jobs are located outside of an office setting. These include Telecommunications Line Installers and Repairers. Correctional Officers and Jailers are also expected to add a substantial number of new jobs, as well as Broadcast Technicians.

Many of the middle-wage occupations expected to grow by 2014 could be rungs on the ladder of an office occupation career pathway, starting with basic office/computer skills. Additional training can provide more specialized skills. Office-related occupations include Executive Secretaries and Administrative Assistants, Legal Secretaries, and also supervisory positions within office settings. Production, Planning, and Expediting Clerks could also be part of a career path beginning in office occupations.

The diversity of industries included in this cluster makes for a complex group of occupations around which to focus workforce strategies. This multi-faceted cluster may therefore suggest more targeted occupation strategies to be effective. Many of these industries utilize office settings for their highly educated professional workers, and in many cases these professionals require support staff to carry out administrative tasks. Many of the middle-wage job opportunities fall in the administrative support staff group of occupations. Unlike some clusters (such as Health Care and Construction) where many of the jobs in occupations most associated with that cluster are also located in the cluster, thousands of business and professional jobs will also be created in other industry clusters, greatly expanding the job base of these occupations.

The problems of occupations in this cluster stem more from an excess of choice and possibility than from limitations on supply of jobs or training programs. With so many different occupations and training pathways, those who wish to work in these occupations need to research the proper fit between training programs and desired jobs. Also, since many of these occupations rely on computer skills, those who fail to continually upgrade skills could get stuck in low paying careers. At the same time, some of the occupations in the cluster may not offer steady opportunities. For instance, telecommunications-related positions, while growing now, suffered job losses during the recent dot-com job contraction.³⁴

³⁴ Rick Lockhart and Dave Wallace, *Top Five Jobs in Telecommunications*, Sept. 19 2005, Washington State Employment Security Department.

Table 9. Growth of Middle-Wage Occupations in the Professional & Business Services Industry Cluster in the Puget Sound Region, 2004-14

<i>Occupation</i>	<i>New Direct Jobs</i>
Legal Secretaries	153
Executive Secretaries and Administrative Assistants	147
Correctional Officers and Jailers	142
First-Line Supervisors/Managers of Office and Administrative Support Workers	130
Sales and Related Workers, All Other	120
Production, Planning, and Expediting Clerks	95
Telecommunications Line Installers and Repairers	84
Drafters, All Other	67
Broadcast Technicians	55
First-Line Supervisors/Managers of Non-Retail Sales Workers	51

Table does not display occupations that add less than 50 total jobs from 2004-2014.

Preparing for Careers in Professional & Business Services: Local Training Programs

The table below lists some community college training sources for those interested in starting a career in this cluster or in related occupations. There are also numerous proprietary programs offering computer and office skills. For a complete list, search the state's Eligible Training Providers List at: <http://www.wtb.wa.gov/etp/Program.asp>.

Local Training for Professional & Business Services-Related Occupations
<p>Bates Technical College</p> <ul style="list-style-type: none"> ▪ Administrative Office Assistant; Legal Office Assistant [(AT Degree (Associate of Technology), Certificate)]
<p>Bellevue Community College</p> <ul style="list-style-type: none"> ▪ Office Manager (AA Degree) ▪ Certificates in Advanced Business Software, Administrative Assistant, Business Software Specialist, and Office Assistant
<p>Edmonds Community College</p> <ul style="list-style-type: none"> ▪ Office Supervision/Management [(ATA (Assoc. of Technical Arts))] ▪ Basic and Advanced Office Skills (Certificates)
<p>Green River Community College</p> <ul style="list-style-type: none"> ▪ Administrative Assistant (AAS and Certificate) ▪ Legal Administrative Assistant (AAS)
<p>Highline Community College</p> <ul style="list-style-type: none"> ▪ Administrative Assistant; Administrative Management (Certificate and AAS Degree) ▪ Bookkeeping (Certificate)
<p>Lake Washington Technical College</p> <ul style="list-style-type: none"> ▪ Administrative Assistant (AAS, Certificates) ▪ Office Assistant (Certificate) ▪ Business Applications Support (AAS, Certificates in Business Applications, Microsoft Office, Project Management Support) ▪ Legal Support Professional (AAS), and Certificates in Legal Support, Law Office Clerical, Legal Support Clerical, Law Office Professional)
<p>North Seattle Community College</p> <ul style="list-style-type: none"> ▪ Administrative Assistant (AAS and Certificate) ▪ Legal Administrative Assistant (Certificate)

This list is not exhaustive.

Local Training for Professional & Business Services-Related Occupations (cont'd)

Renton Technical College

- Administrative Office Management; Legal Secretary/Legal Assistant (AAS, Certificate)
- Executive Assistant (AAS)
- Certificates in Basic Computer Applications, Office Support Specialist, Legal Office Assistant, Office Assistant/Receptionist, and Supervision and Management

Shoreline Community College

- Business Technology (AAS, certificates)

Seattle Central Community College

- Business Information Technology (AAS-T, Certificate)
- Business Administration Transfer Program (AAS-T, Certificate)
- Publishing Arts (AAS-T, Certificate)

South Seattle Community College

- Business Information Technology (AAS, Certificate)
- Office Occupations Program, operated by Seattle Jobs Initiative (Certificate)

Other jobs in the cluster—such as telecommunications line workers—have limited formal training opportunities. Locally, Bellevue Community College provides training for telecom-related occupations.

This list is not exhaustive.

Cluster Focus: Leisure & Hospitality

Because of the natural beauty of Washington State, Leisure & Hospitality and the industries that support it have been part of the local economy for many years. Visitors come to ride on a state ferry across the Sound, see Mt. Rainier, and go up in the Space Needle for a view of the city and the mountains. In addition, professional sports teams and a wide variety of music and theater options draw visitors to the region. Cruise ships taking passengers up the Inside Passage to Alaska originate or end many cruises in Seattle each summer; the cruise ships bring many additional visitors through the airport as they enter or depart the region, and into downtown Seattle as they prepare to board or depart their ship. The growth of the casino industry at nearby tribal gaming facilities represents another significant expansion of the Leisure & Hospitality industry cluster in recent years. Visitors drawn by any of these entertainment options, as well as business travelers, require hotels and restaurants, and may patronize other retail establishments in the area. A growing local population also patronizes the entertainment venues and local restaurants. Combined with consistent job growth and demand for services, all of this translates into a continuous local market in need of a workforce.³⁵ Consequently, the Leisure & Hospitality industry cluster, which employed nearly 55,000 in 2004, is expected to expand by 6,800 direct jobs by 2014.

To generate large numbers of middle-wage jobs, Leisure & Hospitality must expand very rapidly due to the small percentage of jobs meeting the middle-wage jobs criteria. Measures of job quality indicate that this is an industry prone to high levels of part-time employment (65%) but, interestingly, low incidence levels of unemployment (65%). This finding may seem surprising since much of Leisure & Hospitality is seasonal. Many workers may be combining seasonal or part-time work with other jobs or sources of income. However, the cluster definition includes food service and lodging jobs that may not be seasonal, and workers in seasonal industries such as outdoor recreation or sports stadium jobs may recognize the seasonality and develop strategies for other jobs during the “off season.” These characteristics of the Leisure & Hospitality cluster make it very difficult to interpret the available job quality statistics.

³⁵ Seattle Jobs Initiative, *Quarterly Job Trends Report, Industry Spotlight: Leisure & Hospitality*, December 2007.

In all Leisure & Hospitality-related industries, there is a problem of separating out how much of the industry is supported by visitor dollars versus how much is dependent on local patrons. Studies such as the ArtsFund impact analyses shed some light on this issue, indicating that 73% of the revenues of local arts organizations came from local patrons, with the remainder, over a quarter, coming from visitors to the area.³⁶ Thus, future job growth in arts and in other parts of the Leisure & Hospitality cluster is dependent on the ability of these organizations to attract visitors to performances, festivals, games, and other events.

Occupations and Training Opportunities in the Leisure & Hospitality Industry Cluster

The Leisure & Hospitality cluster presents a small but diverse selection of opportunities for middle-wage jobs. Table 10 provides details on the handful of occupations contributing most to the projected expansion of middle-wage jobs in the Leisure & Hospitality cluster in the Puget Sound region. Sales-related occupations, gaming supervisors, and gaming change persons are the three largest sources of expanding middle-wage jobs in this cluster. A number of supervisory or managerial positions, though not listed due to the small number of direct jobs created, collectively contribute roughly 40% of the jobs in the expansion of middle-wage jobs in this cluster. This finding suggests a career path strategy for entry into middle-wage jobs in Leisure & Hospitality: workers may be able to start out as entry-level personal service or food preparation workers and advance to supervisory positions in order to achieve a living wage in the long run.

Subclusters around recreation, travel services, lodging and accommodations, and food service and production present various career pathways into the Leisure & Hospitality industry. Synergies across these Leisure & Hospitality occupations focus on service provision, which require some knowledge of and skill with customer service, as well as the ability to plan and manage time and individuals. Other valuable skills across the occupations in this cluster involve planning, managing, communications, and providing various support and production services. Sales-related occupations (such as customer service clerks), and gaming supervisors are the largest sources of expanding middle-wage jobs in this cluster (41% of Puget Sound jobs).

The main portions of the direct middle-wage jobs created by the Leisure & Hospitality cluster represent supervisory positions. At the same time, Leisure & Hospitality is an industry known for promoting within and large numbers of young managers. These two findings combined suggest that the way to a middle-wage job in Leisure & Hospitality may be through securing of an entry-level position and subsequent career advancement. Such supervisory occupations usually involve using communication and organizational skills to coordinate, manage, or train others to accomplish goals.

Advancement into many middle-wage jobs in the Leisure & Hospitality cluster is often contingent on the size of a company and its practices around seniority for promotion, but is aided by ability and eagerness to learn new job skills, continuing education training and on-the-job work experience. Training programs geared towards meeting the needs of this industry cluster therefore need to address both the specific skills of subclusters as well as overall service-oriented, supervisory and management skills. Current training programs in the Leisure & Hospitality industry, though few and far between, provide opportunities for those interested in pursuing such occupations with necessary soft skills and training.³⁷ The lack of articulated formal career pathways presents some barriers for those seeking entry and progression into middle-wage jobs in the Leisure & Hospitality industry.

³⁶ Seattle Post-Intelligencer, "Study shows the arts are a boon to the local economy," November 24, 2004.

³⁷ For more information about leisure and hospitality training programs in the Seattle area: Seattle Jobs Initiative, *Quarterly Job Trends Report, Industry Spotlight: Leisure & Hospitality*, December 2007.

The dependency on entry-level jobs in the Leisure & Hospitality industry has led to few efforts for developing career pathways to middle-wage jobs in the area. As Table 4 shows, 71% of the direct jobs created in the Leisure & Hospitality cluster by 2014 will be entry-level. This dependence creates some instability for those seeking jobs with livable wages and some benefits. At the same time, issues of recruiting a properly skilled workforce and retaining regular employees may plague employers in the industry.

Table 10. Growth of Middle-Wage Occupations in the Leisure & Hospitality Industry Cluster in the Puget Sound Region, 2004-14

<i>Occupation</i>	<i>New Direct Jobs</i>
Sales and Related Workers, All Other	215
Gaming Supervisors	175
Gaming Change Persons and Booth Cashiers	126
First-Line Supervisors/Managers of Personal Service Workers	99

Table does not display occupations that add less than 50 total jobs from 2004-2014.

Preparing for Careers in Leisure & Hospitality: Local Training Programs

In general, the most influential training for advancement into middle-wage jobs in the Leisure & Hospitality industry is through on-the-job training and experience. More formal training opportunities in this cluster can vary widely depending on the particular occupation of interest, subcluster concentration, previous experience and availability of supports. In general, trainings focus around sales and retail business related to tourism, hospitality, food service and preparation, and hotel management.

Local Training for Leisure & Hospitality-Related Careers
Bates College <ul style="list-style-type: none"> ▪ Culinary Arts (ATA, certificate)
Clover Park Technical College <ul style="list-style-type: none"> ▪ Culinary Arts (AAT) ▪ Restaurant Operations (certificate); Hospitality Accounting & Financial Management (certificate)
Edmonds Community College <ul style="list-style-type: none"> ▪ Culinary Arts (ATA); Basic Commercial Cooking (certificate); Advanced Commercial Cooking (certificate); Basic Catering (certificate) ▪ Event Planning (certificate); Travel (certificate); Lodging Management, (certificate); Hospitality & Tourism (certificate, ATA); Travel Business (ATA); Entrepreneurship & Management (ATA)
Everett Community College <ul style="list-style-type: none"> ▪ Tribal Enterprise Management (certificate)
Highline Community College <ul style="list-style-type: none"> ▪ Hotel & Hospitality Management (certificate, AAS) ▪ Travel & Tourism Industry Management (certificate, AAS)
Lake Washington Technical College <ul style="list-style-type: none"> ▪ Baking Arts (AAS); Culinary Arts/Commercial Cooking (certificate, AAS); Hospitality/Wine Education (certificate)
Olympic Community College – Culinary Arts Institute <ul style="list-style-type: none"> ▪ Sous Chef (ATA); Lead Cook (certificate); Prep Cook (certificate); Cook's Helper (certificate); International Cuisine Experience (certificate) ▪ Hospitality Management (ATA); Hospitality Operations (certificate); Hospitality Supervisor (certificate)
Pierce College <ul style="list-style-type: none"> ▪ Travel and Tourism Online Training (certificate)

This list is not exhaustive.

Local Training for Leisure & Hospitality-Related Careers (cont'd)	
Renton Technical College	<ul style="list-style-type: none"> Professional Baking (certificate); Culinary Arts (certificate, AAS, AAS-T)
Seattle Central Community College - Seattle Culinary Academy	<ul style="list-style-type: none"> Culinary Arts (certificate, AAS-T); Specialty Desserts and Breads (certificate, AAS-T)
South Seattle Community College	<ul style="list-style-type: none"> Wine Making (certificate); Wine Marketing & Sales (certificate); Food & Wine Pairing (certificate); Pastry and Specialty Baking (certificate, AAS) Catering and Banquet Operations (certificate, AAS); Restaurant Food Service Production (certificate, AAS) Hospitality Management (BAS)
Tacoma Community College	<ul style="list-style-type: none"> Hotel and Restaurant Management Online (certificate)
Other training programs in Leisure & Hospitality:	<ul style="list-style-type: none"> Washington State Culinary Arts Apprenticeship Training Program

This list is not exhaustive.

Emerging Industries of Interest

The growing interest in green issues and sustainability practices has boomed in the Puget Sound region within recent years, foreshadowing what some would call the next industrial revolution.³⁸ This interest is matched in momentum at state and national levels, with a Climate Action and Green Jobs bill proposed to the Washington legislature, and Energy Bill emphasizing the jobs created by a green economy as a pathway out of poverty.³⁹ Demand for sustainable development and design has taken a prominent position in determining how industries like Construction and Technology will function in an increasingly green market. With an increasing market comes demand for jobs, generated in construction and manufacturing. Within the large job base of the more traditional Construction industry, a “green building” component, centered around design, architecture and construction firms, is beginning to transform the industry, create local jobs and new occupations in the process. This transformation of the industry may also include the creation of new occupations. However, the extent to which the green portion of the industry will change existing occupations is not readily predictable. Clean technology, an emerging cluster focused on energy efficiency and pollution reduction, has a small number of current jobs but huge expansion potential. The trajectory, number, and type of jobs is not well known in this emerging cluster, making local job growth in this industry cluster difficult to predict. Estimates predict that investments in the state green economy could as much as quadruple the number of “green jobs” by 2020.⁴⁰

Cluster Focus: Green Building

The growth of sustainable markets and interest in green issues in the Puget Sound region can be seen in burgeoning areas, most prominently in the Construction industry and related Green Building. Environmental and energy concerns are the societal driver behind ongoing changes in the Construction industry. The U.S. Green Building Council, which has developed certification programs for construction and building operation under its Leadership in Energy

³⁸ Crai Bower. *Clean technology signals next industrial revolution*. 36th Annual enterpriseSeattle Economic Forecast: The Economics of Clean Technology. January 2004.

³⁹ Brita Belli. *Welcome to Green-Collar America*. Emagazine.com: Vol.18 Number 6, November/December 2007.

⁴⁰ Shirley Skell. *Number of Green Jobs May Quadruple*. The Green Report: Supplement to the Puget Sound Business Journal. February 15, 2008.

and Environmental Design (LEED) program, is the leading catalyst in the technical and design side. Seattle is among leading cities in the number of LEED certified buildings, and Washington State is catalyzing further growth of these techniques by requiring that all new construction of major public buildings, and large remodels, be certified as LEED Silver, one of the highest rankings in the LEED system.⁴¹ The Puget Sound area is well-placed with a number of leading architecture and design firms specializing in design and related activities.

This cluster consists of the conventional construction industries, related manufacturing industries that are beginning to produce a range of “green” materials such as wood products made from wood extracted from forests certified to a green or sustainability management standard, and portions of the real estate industry dealing with residential and commercial buildings. The expansion of Green Building involves the transformation of existing practices and occupations related to the Construction industry in general, rather than the development of entirely new industrial techniques. As such, it is important to focus on the specific skills demanded by Green Building within the context of the existing Construction industry and its large job base. Sustaining strong local sources of expertise is essential in ensuring that the majority of green construction jobs go to local companies and workers. Strengthening local green construction could also help catalyze local manufacturing since much of green construction involves new or modified building materials.

Despite shifts in practice and materials in construction and a growing awareness of energy conservation and recycling issues among consumers, no clear estimates exist of the proportion of the Construction and related industries that have shifted over to green practices and materials. Due to the uncharted nature of this industry, it is difficult to predict with any certainty its growth trajectory. For this work, because there are no solid estimates on how many construction jobs currently are and will likely be jobs specifically in green building, the estimate of numbers of middle-wage jobs in this industry cluster are purely hypothetical. These estimates are based on what the authors feel is a conservative assumption that at least 10% of the growth in Construction can be directly attributed to green and sustainable industry expansion. As new construction techniques take over old skills, more and more of the total jobs in Construction will be affected.

Occupations and Training Opportunities in the Green Building Industry Cluster

Trends in Green Building are likely to affect most occupations in the industry to some degree. For some, the main changes will be the availability of new, more environmentally-friendly building materials. As such, the content of training will likely be relatively modest, involving understanding the uses, strengths and pitfalls of new materials. In other cases, changes will be more dramatic, showcasing the more exacting and sometimes complicated construction and operating standards needed within buildings and their supporting systems. In addition, some entirely new occupations could develop. For example, since meeting LEED standards often involves measurement and testing, new occupations will be created for those who can test and certify buildings.

The middle-wage construction occupations have many established pathways for training, including apprenticeships, community college training, on-the-job-training, and various combinations of these pathways. Even though there are few Green Building-specific programs available, the nature of the growth in the Construction trade is such that the skills of general construction remain crucial. To answer the need for knowledge of standards and the skills that go along with the changes in the industry, several community colleges in the state have created green or sustainable building practices curricula in their construction trades programs to train students to use new materials and procedures in construction. Still, traditional construction pathways like those detailed earlier in this research remain the best

⁴¹ *Environmental Design and Construction*, “Washington State Law Requires Green Building,” May 9, 2005.

means currently for entry onto pathways towards the middle-wage jobs expected in the future of Green Building.

Preparing for Careers in Green Building: Local Training Programs

A number of courses offering skills for green building are available, some at community colleges. However, the full integration of green construction techniques into the curriculum in construction or carpentry courses appears rare. Bates Technical College offers an “Environmentally Sound Construction Series” with a wide variety of courses to train workers, builders and others in green construction. Courses cover construction techniques and materials, indoor air quality, water quality, and estimating and sales techniques for green construction. Training incorporates LEED standards, and is offered through continuing education so that working professionals can obtain the training. Outside of the community college system, The Master Builders Association of King and Snohomish Counties offers courses to educate builders on its “built green” program and associated construction techniques. Overall, some specific training curricula focused on the new skills, both for employees and employers. Still, the previously mentioned trainings in general construction are better sources for more articulated training paths in the region for middle-wage jobs into the trades.

Cluster Focus: Clean Technology

Like Green Building, the Clean Technology industry cluster also represents a shift of current industry into new, sustainable markets which are somewhat uncharted and therefore difficult to predict with any certainty. Nationally, investment in clean technology innovations has led to it being the third largest venture investment category, with projections for new job creation at more than 500,000 by 2010.⁴² Currently there exists in Washington more than 400 Clean Tech companies, many of which are growing extremely fast.⁴³ Washington ranks 4th in terms of venture capital investments in clean technology, with Seattle and the Puget Sound region becoming home to many startups that are spurring the industry.⁴⁴ As of 2004, an estimated 1,100 jobs were in Clean Technology⁴⁵, with these analyses projecting an expansion of a little over 140 jobs by 2014. However, given the current political and economic trends, as well as acceleration of activities in this cluster from private and public goals of increasing energy efficiency, actual growth could be much larger. A recent report estimates that the job-creating potential of renewable energy technologies could mean an additional 8,500 jobs for the state of Washington.⁴⁶ At the same time, lawmakers have recently approved legislation that will simultaneously aim to cut greenhouse gas emissions statewide and increase the number of “green economy” jobs to 25,000 by 2020 through investment in worker training.⁴⁷ These pieces combined make clean technology an interesting industry cluster for economic development and workforce organizations to monitor and perhaps assist in a cautious way to foster a more sustainable future in this region.

⁴² David Allen, *Making the Connection: Creating Pathways to Career Success for the Next Generation of Workers.*, Field hearing of the U.S. Senate H.E.L.P. Subcommittee on Employment and Workforce Safety: Clean Technology Arrives in Washington State. November 28, 2007.

⁴³ Ibid.

⁴⁴ Angel Gonzalez. *Seattle area a new hub for “clean” technology.* The Seattle Times, January 2, 2008.

⁴⁵ The Clean Technology Industry Cluster is made up of the following industries, as identified by the Puget Sound Regional Council: Other Electric Power Generation; Environmental Consulting Services; Solid Waste Combustors and Incinerators; Air Purification Equipment Manufacturing; Materials Recovery Facilities; Environment, Conservation and Wildlife Organizations; and Hazardous Waste Treatment and Disposal.

⁴⁶ Blue Green Alliance & Renewable Energy Policy Project. 2007. *Washington’s Road to Energy Independence.* Blue Green Alliance.

⁴⁷ Stiffler, Lisa and Chris McGann. *Bill orders firm steps to make state ‘greener’.* Seattle Post-Intelligencer, February 19, 2008.

Given growing concern about sustainability and climate change issues, many business and government leaders are thinking about the potential for use of new materials and technologies that could reduce carbon emissions, shrink reliance on imported fossil fuels, promote recycling, and in other ways reduce the consumption of non-renewable materials. Legislation is currently being proposed to create programs to train and transition workers into clean energy jobs that will provide family wage jobs.⁴⁸

A new industry association, the Washington Clean Technology Alliance, was formed in spring 2007 to help accelerate development of this cluster. According to the Alliance, the cluster includes sustainable design, clean energy and renewable fuels, energy efficiency, water conservation and treatment, waste management, recycling, and recycled products, and environmental protection and remediation. (Some of these areas—especially sustainable design and energy efficiency—cross over with the Green Building industry cluster discussed in this paper.) Similarly, the Prosperity Partnership defined a Clean Technology cluster based on ideas about industries that are currently major users of fossil fuels (electric power generation) or potential users of new more sustainable materials (construction), or enable more recycling (waste management).

While these industries all exist currently and their current occupational profile is known, there are no available estimates of what proportion of these industries might shift over to some sort of “green” or “clean” technology, nor are there projections of shifts in the occupational profiles of these industries that may accompany the shift to clean technologies. Unlike Green Building, where it is a matter of teaching some new skills, Clean Tech requires shifting the composition of work into new or different occupations. Furthermore, the industry base to build this cluster is very limited outside King County⁴⁹.

As illustrated in Table 4, over half of expected new jobs in the Clean Technology cluster are middle-wage. However, the growth trajectory of clean technology is not very predictable using standard labor market forecasting methods. Growth of the cluster will be governed both by public policy and market variables that are at present unknown. According to local industry experts, biofuels and recycling are among the fastest growth areas in this cluster in Washington State. Also, since the cluster itself is made up of a number of industries, each of which is only partially devoted to clean technology (as opposed to more traditional activities), even existing industry and occupation job totals are uncertain. Nevertheless, this cluster likely represents significant growth potential given the likely intensification of the political and economic trends behind it.

Overall estimated industry growth is based on the assumption that a percentage of the current industry base might shift to clean technologies, using the same sorts of workers as these industries do now. However, none of the available data describing this cluster should be regarded as definitive descriptors of current occupational characteristics or growth potential, both of which are essentially unknown. Still, while the precise number of new jobs is not known, some studies project a large overall jobs impact. For example, a study commissioned by a group of utilities and economic development agencies projected that new jobs from the energy portion of the cluster could total 12,000 in the next two decades for the Pacific Northwest Region encompassing Washington, Oregon, and British Columbia.⁵⁰ They also project that with policies in place to accelerate the industry, jobs could increase to 32,000 over the same period.

⁴⁸ Climate Action and Green Jobs bill (HB 2815/SB 6516).

⁴⁹ Many of the sectors identified as part of the cluster are not shown in the industry by occupation tables provided by the Washington State Employment Security Department for the counties other than King County.

⁵⁰ *Poised for Profit: How Clean Energy can Power the Next High-Tech Job Surge in the Northwest*, Climate Solutions, 2001.

Occupations and Training Opportunities in the Clean Technology Industry Cluster

Occupations in Clean Technology for the Puget Sound region are likely to be located in recycling and remediation area, such as hazardous materials removal workers and refuse and recyclable material collectors. Due to the unknown size of the current Clean Technology industry, new jobs projected for some occupations are relatively small so that minor changes in real growth in the economy could greatly affect the nature of various occupation growth and creation. Prospective workers in this cluster should therefore be advised to obtain foundational skills useful in this cluster while closely monitoring emerging job opportunities and their specific skill requirements.

Preparing for Careers in Clean Technology: Local Training Programs

Career development below the BA level for the emerging clean tech focus of industries that comprise the cluster are limited at present. Shoreline Community College is developing curricula in alternative fuels, energy conservation, and renewable energy systems. One set of courses in the works will cover the installation and maintenance of solar panels, and will likely include curricula representing a continuum of training, starting with those in need of adult basic skills and English language learning, to certificates, to AAS degrees, and, for those with requisite interest and training, transfer to a 4-year institution. Shoreline maintains a branch of Washington State University's Northwest Solar Center, which is assisting in the development of the new curriculum.[†] The college is also the local member of the National Alternative Fuels Training Consortium and is developing training in alternative fuels and related technology within its automotive technician curriculum. South Seattle Community College is also currently in the planning stages of developing curricula to teach building management, focusing on maintenance, operations and energy efficiency.

[†]See Shoreline Community College, "WSU selects SCC as site for flagship NW Solar Center demonstration/test facility," Press Release.

Conclusions

Given long standing trends in local and national labor markets, the conventional wisdom is to counsel future jobseekers to earn a 4-year degree before venturing into the labor market. This is excellent advice for K-12 students who still have the opportunity to prepare themselves to meet entrance requirements. Lifetime earnings are higher for workers with bachelor's degrees than for those with lower levels of education attainment, and the wedge between earnings at the bachelor's and higher level and those with lower levels of education has increased over the last three decades. Counseling youth to prepare for 4-year college degree programs makes sense. Even for those high school students convinced that they do not want a job in an office or laboratory that requires a 4-year degree, meeting the entrance requirements while in high school opens up entry to many technical occupations in a variety of types of workplaces with a year or two of additional study at a community college.

However, for the two-thirds of adults in the workforce who have already left academia behind and entered the workforce, financial and family obligations, as well as personal preference, often inhibit a return to school in pursuit of a 4-year degree. Given some degree of success in the workforce, such workers face substantial opportunity costs if they left the workforce to return to school long-term. While we should encourage the pursuit of various post-secondary degrees, there will still be a portion of the population who won't. Staying in the workforce and out of the higher education system is a rational decision for many older workers. Another group of labor force participants who face major barriers in higher education are recent immigrants whose language skills and prior education place them at a severe disadvantage when it comes to entry into a baccalaureate program. For all of these labor force participants who lack 4-year degrees and face significant hurdles that will prevent them from earning degrees, we need to identify and encourage jobs that will sustain these workers and their families. The goal of this report is to identify the groups of related industries, or clusters, that have been identified by local economic development organizations and to assess the current and future capacity of these industry clusters to generate middle-wage jobs – jobs that pay at least a minimal “living wage” yet do not require a baccalaureate degree to enter the occupation.

The analysis presented in this report suggests that three major industry clusters provide the best prospects for future middle-wage jobs in the Puget Sound region: Construction, Health Care, and Aerospace. Together these three clusters are projected to create nearly 65,000 new jobs in the local economy by 2014, and over 31,100 of those new jobs will be direct middle-wage jobs. In addition, these clusters are expected to stimulate the further creation of jobs in other industries by their local purchase of goods and services and by the payrolls they generate that get spent within the local economy.

Construction remains the largest producer of accessible jobs in the region, with projections of over 17,000 new middle-wage jobs by 2014. Shifts toward higher skill levels in the Aerospace cluster suggest some caution about investments in programs preparing workers for middle-wage careers in Aerospace; the occupational structure in this cluster is moving towards jobs requiring at least a bachelor's degree. The Aerospace, Logistics & International Trade, and Health Care clusters also have favorable job quality characteristics, including many occupations with a low propensity towards part-time employment that may not provide health care and other benefits. Business cycles, however, do pose challenges of coping with spells of unemployment in both the Aerospace and Logistics & International Trade clusters.

Other clusters in the region also have expanding middle-wage job opportunities. Professional & Business Services is likely to expand substantially (12,400 new jobs) but the

diversity of industries in this cluster means that effective workforce development strategies will require basic preparation for administrative jobs, with possible specialized tracks for those able to master the general skills of these occupations. Leisure & Hospitality is a large cluster with many low-wage jobs that provide an entry point for new participants in the labor force. Career ladder strategies can lead some of these workers to middle-wage jobs in supervisory positions. Finally, the Green Building and Clean Technology clusters may expand substantially in the future due to changing consumer preferences and new government requirements. If this expansion materializes, these clusters have the potential to generate many middle-wage jobs.

The middle-wage jobs construct may provide useful guidance to workforce development and economic development organizations in the four county Central Puget Sound region. By targeting education and training programs and economic development efforts on the industries and clusters that have relatively high numbers of middle-wage jobs, we can help ensure that residents of the region who have not earned university degrees have access to good jobs with training. As with any workforce or economic development strategy, a focus on middle-wage jobs is not the “one size fits all” answer for all purposes. However, an explicit focus on middle-wage jobs could complement other efforts to meet workforce needs of high tech employers.

Major technology industry employers and trade associations have increasingly dominated discussions of workforce and economic development policy due to the rapid growth and high wage characteristics of such industries as software publishing, internet-based commerce and services, and life sciences. An added focus on middle-wage jobs directs attention back to basic industries, long-term and substantial employers in industries such as Aerospace, Construction, Logistics & International trade, and the maritime cluster of fishing vessels, shipbuilding, and marine transportation. It also helps identify promising new industries or clusters whose growth can be encouraged. A more balanced workforce and economic development strategy including a focus on middle-wage jobs would help meet the employment needs of a broad segment of the population in the Puget Sound region.

A strengthened focus on those clusters expected to experience big middle-wage job gains – Construction, Health Care, and Aerospace – by economic development and workforce training organizations would open up new job opportunities for labor force participants who are not likely to earn a baccalaureate degree. In addition, the growing influence of Green Building within the Construction industry cluster and Clean Technology should continue to be industries to watch. Logistics & International Trade remain important in the local labor market structure.

Diversity in a regional economy benefits all participants, from entry-level through middle-wage to high-skill employment opportunities. This report suggests a complementary focus on clusters that create middle-wage job opportunities so as to provide a balanced portfolio of job types to meet the needs of a very diverse labor force in the Puget Sound region. A focused effort on protecting middle-wage jobs and encouraging job growth in these growing industries areas through expanded training and education is key to the economic health of the Puget Sound regional economy, both now, leading up to 2014, and beyond.

Appendix: Methodology & Additional Tables

Middle-Wage Jobs

We use Washington State employment and wage data, coupled with national data on the characteristics of workers in various occupations, to provide a definition of middle-wage Jobs that simultaneously measures wages and accessibility of jobs for those at different education levels. The decennial census is the only source of state- or county-specific data on the educational attainment of incumbent workers. The Public Use MicroSample (PUMS) files associated with the decennial census and the annual American Community Survey contain data on the occupation of respondents, but the small sample size in Washington and the sample frame limited to places with a population of at least 65,000 limit the usefulness of these data for county or multi-county regional analyses. This report relies instead on occupational projections from the Federal Bureau of Labor Statistics (BLS) and the Labor Market and Economic Analysis unit of Washington State's Employment Security Department (LMEA), supplemented with educational attainment and job quality data from the Census Bureau.

BLS's occupational projections program is operated within Washington State by LMEA. The LMEA program provides estimates of employment by occupation and industry for over 700 occupations classified by the Standard Occupational Classification, and over 240 industry categories classified by the North American Industry Classification System. Base year (2004) employment and wage data are provided for both occupations and industries, and industry by occupation tables show the distribution of base year employment by occupation statewide and in 12 Workforce Development Areas (WDAs) in the state.

King, Pierce and Snohomish counties are each separate WDAs, but Kitsap County is part of the Olympic Consortium WDA along with Jefferson and Clallam counties. Kitsap County industry by occupation employment distributions were estimated here using the Olympic Consortium WDA industry-by-occupation table, and adjusting the entries by estimates of industry employment in Kitsap County obtained from the BLS covered employment data series. Since Kitsap County's employment level constitutes over 60% of the Olympic Consortium regional employment total, these Kitsap County estimates should be valid.

BLS data on the educational attainment of incumbent workers in each occupation is derived from Census files. These estimates are derived from a national sample to get more accurate estimates than is possible with small state or metropolitan area samples. The BLS data show the percent of incumbent workers in each of 700+ occupations in three educational attainment categories: high school graduate or less, some college, and bachelor's degree and above. In this report, we define "accessible" jobs as those occupations in which no more than 40% of the incumbent workers nationally have attained a bachelor's or higher degree. The rationale is that if 60% or more of the workers in the occupation have gained these positions with less than a bachelor's degree education level, then the occupation is relatively accessible to those with a high school diploma or some college. Using a cutoff of 60% or more without a BA helps correct for national educational levels within particular occupations that tend to be somewhat lower than Washington's levels, given higher average education attainment of residents of this state. Second, while this method may not identify all promising occupations that could be accessible with less than BA training, it should provide a robust method of selecting those industry clusters with a large proportion of employment in accessible occupations. Further research can drill down into specific occupations as needed for career and curriculum planning.

The second component of the middle-wage jobs definition is a minimum wage level of \$17/hour. On an annual basis, assuming full-time work throughout the year, that is equivalent to annual earnings of \$35,360. At \$17 per hour in 2004, a two-earner family with both workers employed in jobs at this wage would have family earnings at about the median

family income for King County. While this wage is lower than the living wage levels identified in some studies (e.g. the recently published Job Gap study⁵¹) as a livable wage for a single earner with two children, it recognizes the fact that in high-cost areas of Washington, two earners are often necessary to reach an adequate income. Lastly, it is important to note that the \$17 per hour wage represents a minimum, and most occupations included as “accessible middle-wage” occupations have higher median wages.

Unlike some studies looking at the growth of industries or occupations providing a middle class standard of living, we do not include an upper wage cutoff for occupations. However, in practical terms the presence of an education standard means that there are few jobs that meet the education limit that fall within the very highest reaches of the wage spectrum. Since the purpose of this research is to identify occupations and associated industry clusters offering good paying jobs to those with less than a BA, there is no practical reason to add an upper wage cutoff.

Because wage levels vary in response to living costs and labor market supply/demand conditions, county-specific wage data from LMEA are used in this report for all but approximately 30 occupations. For these 30 occupations, national wage data was used in lieu of local data to confirm that these occupations meet the standard for middle-wage jobs. Therefore, these 30 occupations were included in the list of accessible middle-wage occupations. In addition, one occupation was added to the list of middle-wage occupations even though upwards of 60% of incumbent workers in this state have a bachelor’s degree or higher: registered nurses. In this state, the registered nurse occupation can be entered with a 2-year college degree, but once hired, these nurses often keep studying to earn a bachelor’s degree.

In addition to middle-wage jobs, this report provides estimates of the number jobs in occupations requiring at least a bachelor’s degree (occupations in which more than 40% of incumbent workers have at least a bachelor’s degree), and the number of jobs in lower pay occupations (less than \$17 per hour). These three groups of occupations encompass the full range of jobs in the economy.

Multiplier Effects

Projected 2014 New Employment Multiplier		
	Puget Sound	King County
Health Care	3.03	3.03
Aerospace	3.61	3.61
Professional & Business Services	3.98	4.25
Logistics & International Trade	3.45	3.53
Leisure & Hospitality	2.75	2.75
Construction	3.19	3.20
Clean Technology	2.97	2.98

⁵¹ Northwest Federation of Community Organizations, *Searching for Work That Pays: 2007 Northwest Job Gap study*, Seattle, April 2007; NWFCO suggests a living wage of \$17.54 for a single adult with one child at home, and \$21.77 for a couple with one child and one adult in the workforce.

Appendix Table 1: Employment Growth by Cluster for King County, 2004-14

	<i>Projected 2014 New Direct Employment*</i>	<i>Number of New Industry Cluster Jobs</i>			<i>Percent of All New Direct Industry Cluster Jobs</i>		
		<i>Less than \$17/hr jobs</i>	<i>Middle- Wage Jobs</i>	<i>BA+ Jobs</i>	<i>Less than \$17/hr jobs</i>	<i>Middle- Wage Jobs</i>	<i>BA+ Jobs</i>
TRADITIONAL INDUSTRIES							
Construction	12,820	3,786	7,855	1,180	19%	75%	6%
Aerospace	7,951	2,156	1,734	4,061	20%	28%	52%
Logistics & International Trade	4,739	1,948	2,378	413	41%	50%	9%
SERVICE SECTOR INDUSTRIES							
Health Care	19,154	7,293	5,263	6,598	38%	27%	34%
Professional & Business	11,376	3,786	1,089	6,501	21%	17%	63%
Leisure & Hospitality	4,858	3,494	633	731	71%	14%	15%
EMERGING INDUSTRIES							
Green Building†	1,283	379	786	118	19%	75%	6%
Clean Technology‡	234	60	122	52	26%	52%	22%

* Cluster totals are not the same as in Table 1 due to rounding errors and missing wage or education data.

† The Green Building Industry Cluster is assumed to represent roughly 10% of the total Construction Industry.

‡ The Clean Technology Industry Cluster is made up of the following industries, as identified by the Puget Sound Regional Council: Other Electric Power Generation; Environmental Consulting Services; Solid Waste Combustors and Incinerators; Air Purification Equipment Manufacturing; Materials Recovery Facilities; Environment, Conservation and Wildlife Organizations; and Hazardous Waste Treatment and Disposal.

Source: Calculations by author on Washington State Employment Security Department long-term employment projections by industry.