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MACKENZIE.

Non-Retail Employment Land Demand Forecast

Prepared For:

Clackamas County, Oregon

Prepared By:

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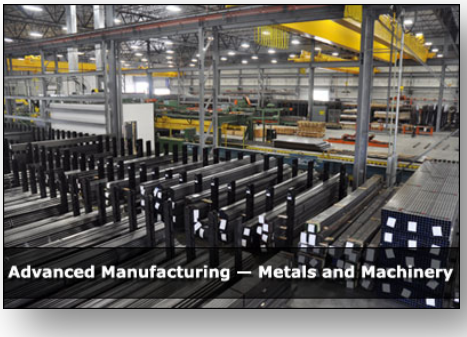

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INTRODUCTION AND PURPOSE

JOHNSON ECONOMICS was retained by Clackamas County to develop a county specific employment land need analysis for non-retail uses within the Metro Urban Growth Boundary. The County commissioned this analysis to allow the County and its partners to have a focused discussion in the context of regional land supply. The County focused on non-retail jobs, since retail positions are typically paid less. The methodology of this analysis closely follows the approach typically taken in conducting economic opportunities analysis for local areas in accordance with Statewide Planning Goal 9.

This analysis will also draw comparisons to findings in the 2014 Metro Urban Growth Report (UGR). The UGR is a regional planning exercise to determine gross land needs on a macro level. This report is intended to reflect the socioeconomic, geographic, and political conditions unique to Clackamas County, and determine whether Clackamas County's needs are distinct from those of the region. We find that Clackamas County may be considerably underserved with employment land necessary to accommodate economic growth over a 20-year planning period.

Fundamental outcomes of this report include:

- Our general approach was to (1) determine a range of job growth scenarios; (2) translate that into a range of land needed; (3) evaluate that need against the supply of suitable land; and (4) determine whether Clackamas County has a shortage of suitable land, and if so, how much.

- **Steps 1 and 2.** Our analysis shows that there will be demand for 39,800 to 51,600 jobs over the 20-year planning period. This translates into a gross need for 1,649 to 2,728 acres of non-retail employment land.

- **Step 3.** Nearly 45% of Clackamas County's land supply identified in Metro's 2014 Urban Growth Report is located in the City of Damascus. Of the land in Damascus, infrastructure and topographic challenges (nearly three-quarters of all identified supply is classified as constrained or heavily constrained by slopes) plague the vast majority of identified supply. Damascus' own local planning efforts identify land supply 45% below the estimates used in the UGR. We estimate that between 40% and 60% of the land supply identified in the UGR is actually suitable and available for non-retail employment uses.

- **Step 4.** As a result, in a real-world context where market pressures drive development, Clackamas County's inventory of employment land is likely considerably lower than regional estimates. Depending on how much of the land supply is unsuitable, Clackamas County is short between 329 to 934 acres of industrial land and as much as 246 acres of commercial land, with an overall shortage of 329 to 1,180 acres.

EXECUTIVE SUMMARY

National Trends

- The next several decades will mark a generational demographic shift in the United States—one with far reaching implications for the United States economy. Over the next 20-years, the share of the U.S. population age 65 and older will reach 21%, up from 14.5% today. This condition alone will strain workforce availability across many sectors. With the narrowing of global wage differentials, foreign migration is likely to fall as well. To maintain competiveness in the post-Baby Boomer

economy, U.S industries will need to be increasingly productive, with greater reliance on capital investment and technical innovation.

- Despite forthcoming workforce challenges, the U.S. economy is showing signs of reversing the decades-long trend of firms establishing manufacturing operations abroad. For years manufacturing in the United States was in decline. However, many U.S. manufacturers are now looking to re-establish production domestically in light of narrowing labor advantages in foreign markets, high transportation costs, concerns over protection of intellectual property, and a focus on closing supply chains.

- The most likely industries to capitalize on the on-shoring trend are those with products having high weight to value ratios, large domestic markets, and domestic R&D/supply chains. These include metals, chemicals, transportation equipment, machinery, and electronics and appliances.

- The "Shale Revolution" of the last half-decade will have far reaching impacts on U.S. economic activity. Natural gas and oil prices have fallen considerably in recent years. While oil is more susceptible to global influences, natural gas is difficult and costly to export, making domestic production largely captive. The impacts of lower energy prices are expected to translate to the creation of over one million jobs over the next 20-years[1].

- Taken together, the prospects for strong economic growth in the United States are positive, with workforce characteristics presenting the greatest challenge. However, within the United States, migration patterns suggest some areas will be more challenged than others. For example, Oregon is expected to exhibit accelerated net in-migration from other states in the coming years—particularly in the context of natural resource constraints in California and the U.S. Southwest.

State and Local Trends

- Oregon's economic future is not without risks. Many of Oregon's top export industries face considerable global pressure, namely computers and electronics. The interconnectedness of Oregon's economy with global trading patterns will continue to make it susceptible to global political, environmental, or other supply shocks. Domestically, Oregon has been benefiting from a sound housing market recovery. Real wage growth is a concern limiting Oregon's ability to grow domestic demand and attract new workers in the long-term.

- In Clackamas County, demographic growth has held par with the region dating back to 2000. Over this period the county grew at roughly the same pace as Multnomah County, adding nearly 48,000 new residents. While growth has fallen off in the post 2010 recovery, Clackamas County has actually exhibited one of the strongest in-migration rates (6.4 persons/1,000) in the state, outpacing both Washington (4.7) and Multnomah (3.7) County.

- However, the local population skews slightly toward a retiree and pre-retiree base, indicating a lower concentration of residents in their most productive and/or risk-taking years. In the context of economic growth, Clackamas County will have to trend toward attracting more young residents (as exhibited in the migration data) or accept higher commute rates to meet growing workforce needs.

- The current economic cycle in Clackamas County has been characterized by a deeper recession relative to the region and a far more tepid recovery. However, during the "Great Recession", two of

[1] PricewaterhouseCoopers

the economic sectors that saw the greatest contraction were Construction and Real Estate. These two sectors have also famously been sluggish in their recovery during the early phases of the expansion cycle. Unfortunately, in Clackamas County these two sectors comprise an unusually large share of the economy. In other words, much of Clackamas County's perceived "lagging" recovery is isolated in a few sectors. In fact, across most sectors, Clackamas County is performing on par or better than the region. This would suggest that Clackamas County is not at a fundamental disadvantage regionally, rather, its economic fragilities are pronounced in a few industries.

Which Industries are Likely to Grow?

This report utilized a range of analytical tools to determine the types of industries most likely to expand in Clackamas County over the next 20 years.

- The most common analytical tool to evaluate economic specialization is a location quotient analysis. This metric compares the concentration of employment in an industry at the local level to a larger geography. In other words: which industries are relatively concentrated in Clackamas County?

- In Clackamas County, the 20 most specialized industries (highest location quotient) account for roughly 43% of employment in the economy. Meanwhile, three out of every five jobs in Clackamas County are in the 20 largest industries. The Clackamas economy is highly specialized in a few sectors, none more so than the manufacturing sector, which accounts for five of the most specialized, and three of the largest industries in the economy. Other highly concentrated sectors include non-durable goods wholesaling, warehousing & truck transportation, and professional, technical, and financial services.

- Another key determinant of target industries is to identify those sectors of the economy that are driving growth. In Clackamas County, industries are generally following the direction of the national economy. Around half the industries are growing and outperforming industry trends, while half are underperforming. Key performing subsectors include, software publishing, administration & support services, banking, and construction.

In addition to the previous metrics, we took a more granular look at the composition of industry sectors and the local businesses that operate within them. This is an essential exercise when forecasting industrial growth, as changes in a particular "foundational" industry are likely to permeate through other related businesses within a cluster. Our methodology is detailed at length in the analysis. This process revealed an identification of eight well-organized industry cluster ecosystems in the County.

- Construction & Real Estate
- Advanced Manufacturing: Metals and Machinery
- Advanced Manufacturing: Computers and Electronics
- Agriculture and Food Processing
- Logistics, Distribution, and Wholesale
- Software Development and Computer Programming
- Business Support and Back Office Operations
- Health Care and Biotechnology

Land Demand

- Our methodology for land demand forecasting begins with forecasts of employment growth by industry over the planning period. We tested four scenarios. The first two relied on regional and state growth rates. These scenarios did not consider large-lot employment impacts.

- Scenario III and Scenario IV utilized alternative industry growth rates that better reflect local economic conditions and opportunities in Clackamas County. These forecasts also considered potential impacts from large-lot recruitments. A detailed overview of our methodology is included in the technical narrative.

- Taken together, our analysis resulted in employment growth rates ranging from 1.4% to 1.8%, or 36,700 to 53,700 jobs over the planning period.

	2014-2035 Job Growth	
Forecast Scenario	**Jobs**	**AAGR**
Baseline Scenario I	39,874	1.4%
Baseline Scenario II	44,274	1.5%
Alternate Scenario III	43,143	1.5%
Alternate Scenario IV	51,608	1.8%

- The next step in the analytical process is to translate employment growth forecasts into land demand. This process utilizes assumptions of employment distribution into varying building types, rates of space utilization, and building coverage ratios by building type. This methodology is consistent with the process used in the Metro UGR.

- We evaluated each of the four employment growth scenarios following this process. For our baseline scenarios (I and II), we used assumptions derived from the aforementioned regional assumptions used for the Metro UGR. For the alternative scenarios (III and IV), architecture and engineering firm Mackenzie developed data on 11 unique building typologies common in Clackamas County. This information is included in Appendix A of this report.

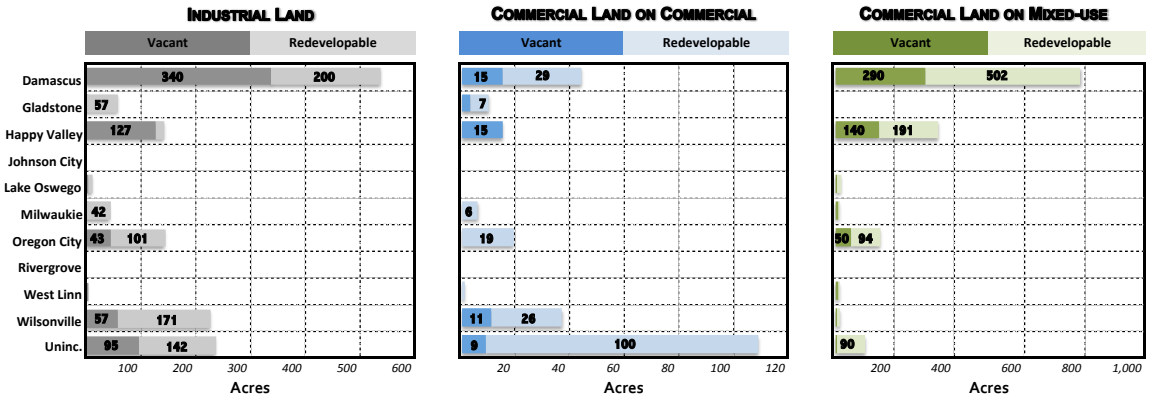
- Taken together, our analysis estimates commercial land demand ranging from 813 to 1,002 acres, and industrial demand ranging from 824 to 1,726 acres.

	2014-2035 Growth		
Forecast Scenario	**Commercial**	**Industrial**	**Total**
Baseline Scenario I	825	824	1,649
Baseline Scenario II	813	1,040	1,853
Alternative Scenario III	816	1,373	2,189
Alternative Scenario IV	1,002	1,726	2,728

- Across all scenarios, the average blended job density ranged from 19.7 (Scenario IV) to 22.4 (Scenario II) jobs per acre.

- Our analysis further reconciled estimated land demand with available supply in Clackamas County. The supply analysis relied on supply estimates and characteristics outlined in the Metro UGR's Buildable Land Inventory. Key observations from the Metro UGR include:

- Over half of Clackamas County's industrial land supply, and two-thirds of commercial land supply is met by "potentially redevelopable" land.
- Over 54% of commercial land supply is accounted for by commercial on "potentially redevelopable" mixed-use land.
- A considerable share of Clackamas' inventory is located in outlying areas on the periphery of the UGB.
- The UGR employment land inventory in Clackamas County has considerable physical constraints ranging from transit access (93% of acreage has "fair access" designation) to slope (74% of acreage classified as "constrained" or "heavily constrained").
- While on net the UGR finds a surplus of land in Clackamas County, there is a considerable disconnect between the geographic locations of supply and demand.



- Clearly, some of the land assumed to be available in the UGB is unsuitable for development. Under every scenario, Clackamas County's land supply is deficient on industrial land.

- Clackamas County's ability to meet employment demand with land and development sites suitable to the market will be directly related to its realized economic growth over the planning period. A lack of suitable industrial and commercial land will translate into missed economic opportunity. Under the most pessimistic scenario, over 8,000 jobs would not be realized due to insufficient land supply.

NATIONAL, STATE, AND LOCAL ECONOMIC TRENDS AND CONDITIONS

This report section summarizes long and intermediate-term trends at the national, state, and local level that will influence economic conditions in Clackamas County over the planning period. This section is intended to provide an economic context for growth projections and establish a socioeconomic profile of the Clackamas County region. This report's national evaluation has a focus on potential changes in structural socioeconomic conditions both nationally and globally. Our localized analysis considers local growth trends, demographics, and economic performance.

NATIONAL TRENDS

The most commonly used metric by which economic prosperity is evaluated is real gross domestic product per capita. The basic principal being that increased purchasing power of the population translates into greater investment in health care, education, housing, leisure, and many other factors[2]. Interestingly, the U.S. economy has exhibited surprisingly stable real GDP per capita growth with relatively little variability. Spanning over a 100+ year period, only modest and temporary deviations from an average 1.8% growth rate have been exhibited in any given decade[3]. This outcome has been realized in light of considerable shifts in economic and social conditions—a finding that suggests long-term economic growth has structural underpinnings relating to demographics and investment in physical and human capital. In other words: monetary, economic, and fiscal policy may influence growth in relation to potential economic output of a given business cycle, but long-term growth stems out of capital investment, demographic conditions, and global influences.

Considering this preface, this section of our analysis provides a foundation of how these factors can be expected to influence economic conditions on a national and local scale during the planning period.

Demographic Factors and Labor Force Participation

The aging of the Baby Boomers into their retirement years will perhaps be the greatest challenge to the U.S. economy over the planning period. By 2035, the share of the population age 65 and over will have grown to 21% from 14.5% today[4]. Despite the fact that an increasing number of Boomers expect to work at least part time past age 65, the impact of this demographic shift on the labor force participation rate, and by extension potential output will be considerable. Such a demographic shift will undoubtedly reduce the size of the workforce considerably over the next 20 years.

[2] We acknowledge however that many other factors influence quality of life, such and social and economic equality, crime, environmental factors, etc.

[3] Elwell, Craig. CRS Report to Congress: Long-Term Growth of the U.S. Economy: Significance, Determinants, and Policy (2006).

[4] U.S. Census Bureau Population Estimates Program

Figure 1: Distribution of the Resident Population by Age, United States (2015)

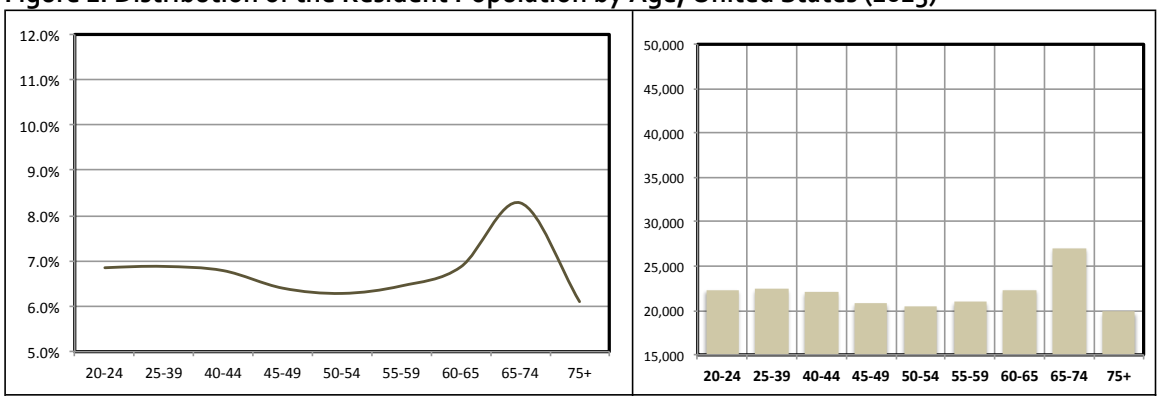
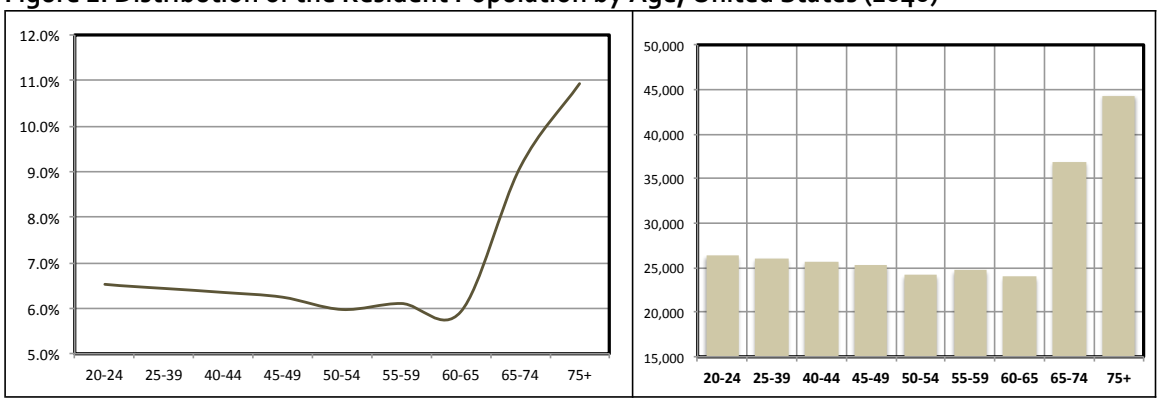


Figure 2: Distribution of the Resident Population by Age, United States (2040)



Boomers however, are not the whole story. Labor force participation is also likely to shift within some cohorts. On the positive side, persons aged under 25 years, discouraged in recent years by a dismal labor market, fled to colleges and universities across the country. The enrollment rate for 18-24 year olds increased from 37.3% to 42.0% between 2006 and 2011[5]. They are expected to return with vigor and an enhanced productive capacity from their educational endeavors. However, growth in the labor force participation rate among women in their most productive working years (25-54), a segment that has grown steadily over the last half century, has likely reached its peak. To a lesser degree, labor force growth will also be modestly tempered by changes in people's economic incentives associated with the Affordable Care Act[6].

Over the near-term, an improved economic landscape and positive wage pressure will incentivize a return to the workforce for some workers, narrowing the gap between actual and potential output. However, the aforementioned structural factors will generally limit long-term growth in productive capacity to a rate below that exhibited in previous expansions.

Global Impacts on Migration

Rising globalization has driven growth in emerging economies over the last twenty years, specifically in China, Southeast Asia, India, Latin America and some African countries. This growth has delivered increased incomes and purchasing power in many parts of the world. With incomes in emerging

[5] National Center for Education Statistics, Digest of Education Statistics (2013)

[6] Congressional Budget Office, The Budget and Economic Outlook: 2014 – 2024 (Feb 2014).

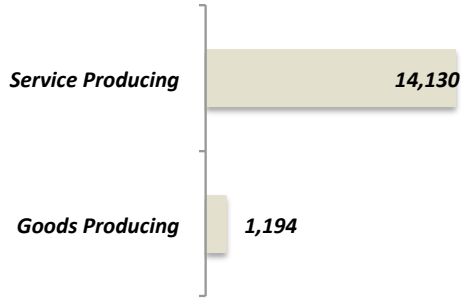
economies expected to grow at an accelerated rate relative to the U.S. over at least the next 50 years, the differential between domestic and foreign incomes and standard of living will certainly decrease. While undoubtedly a positive for reducing poverty and increasing global demand for goods and services (some of which produced are the United States), the improved incomes of emerging countries will reduce the competitive labor advantages of those nations, resulting in lower rates of international migration to the U.S. Over the last 25 years roughly 35% of population growth in the U.S. was derived from international migration[7].

Taken together with domestic demographic trends, the U.S. labor force could be facing the dual impacts of aging demographics and lower migration. One estimate suggests these combined factors could result in a reduction of the domestic labor force of 15% by 2060[8]. In this context future gains in per-capita GDP will be increasingly dependent on gains in productivity, skills, innovation, and technical knowledge. In a way, this shift could favor U.S. economic strengths; provided the United States maintains its competitive advantage in education and innovation.

Shifting Industrial Patterns

The pressure on innovation to drive growth will continue to support the on-going shift in domestic industrial composition. Over the next ten years, service providing industries are expected to account for 92% of non-agricultural wage and salary growth in the United States[9].

National Employment Forecast (2012-2022)



** (figures in thousands)*

SOURCE: Bureau of Labor Statistics

Reshoring Prospects

The offshoring trend that occurred over the last half century saw firms capitalize on the cost advantages of labor and to some extent materials in foreign markets, resulting in a shift in production and investment abroad. This phenomenon extended beyond production activities and into some back office functions (i.e. call centers, IT Services, etc.) to shift millions of jobs abroad.

This offshoring trend began to decline over the last decade, with companies facing mounting challenges to their offshore productive functions. This has lead many economists to speculate on the prospects of a pending renaissance of manufacturing activity in America. To be sure, some level of reshoring of manufacturing activities is likely to occur over the next few business cycles.

Abroad, some industries are facing mounting foreign production challenges. To begin with, as mentioned previously, the labor cost competitive advantage in some counties is quickly deteriorating. A shift in manufacturing processes for many industries to be increasingly reliant on more technically skilled labor is also challenging. Other issues such as value chain management and intellectual property rights are also growing concerns.

Domestically, firms looking to reshore are finding labor force availability to be the primary limitation. Further, the regulatory process and costs for getting production facilities up and running are

[7] Migration Policy Institute tabulation of data from the United Nations, Department of Economic and Social Affairs (2013).

[8] OECD (2014), Shifting Gear: Policy Challenges for the next 50 Years", OECD Economics Department Policy Notes, No. 24 July 2014.

[9] Bureau of Labor Statistics, Occupational Employment Projections (2012-2022)

considerably higher. This is a particularly relevant condition locally in the context of industrial land availability.

In the end, reshoring is likely to occur on some level, but will be limited to sectors where it is most advantageous. Firms with low labor force utilization in their production activities that can capitalize on the United States' growing energy advantage will see the biggest shift. Firms with less reliance on foreign demand will also be a factor. Generally, these industries include, (but are not limited to) early value chain products such as metals, glass, chemicals, machinery, plastics, and some technology products.

Global Factors Influencing Growth

In addition to the aforementioned conditions, the following global dynamics are expected to influence economic conditions nationally and locally over the planning period.

- Concurrent with the narrowing of cross-country economic gaps, trade linkages between nations are likely to increase, resulting in a rise in global value chain linkages. This will influence global demand for domestic products as well as the balance of trade between the United States and its trading partners.

- Rising global demand is expected to benefit the primary sectors of resource rich countries to the greatest degree. This bodes well for U.S. energy and agricultural markets, provided the U.S. can keep pace with supporting export capacity.

- An ancillary benefit of rising global interdependency is a dilution of risk associated with domestic shocks, a product of which should lead to enhanced global stability.

Other Factors Influencing Growth

- Increased life expectancy along with demographic shifts will continue to support growth in demand for health care services while placing additional pressure on the transfers of income necessary to support federal obligations for Social Security and Medicare.

- The impacts of lower international migration have the potential to adversely impact innovation in America. Immigrants are twice as likely to start a business compared to domestic residents[10]. This is especially the case in the high-tech sector where 25% of U.S. technology and engineering companies started over the last 20 years had at least one immigrant founder[11].

- Lower domestic energy costs, specifically derived from natural gas, are expected to increase manufacturing competitiveness in some industries. As it exists today, export capacity and oceanic transport of natural gas is limited, making domestic supply increases largely captive. As a result, natural gas is expected to maintain a cost advantage over the planning period. Industries that can capitalize on this shift (and their supply chain derivatives), including power generation, fleet transportation, chemicals, and metals are in the best position to increase cost competitiveness.

[10] Kaufman Index of Entrepreneurial Activity

[11] Wadhwa, Vivek, et al. *America's New Immigrant Entrepreneurs, 2007*

- Global climate change has the potential to reduce global GDP by as much as 1.5% and almost 6% in Southeast Asia if unmitigated (Elwell 2006).

- The negative impacts of the "Great Recession" will be long lasting on potential output. Over the intermediate-term potential output will grow at a rate below average due to deterioration of skills from the long-term unemployed.

OREGON TRENDS

Factors affecting growth in the State of Oregon can be evaluated in the context of broad economic conditions previously discussed. Here, we consider some of these factors, among others. Further, this section draws on some observations explicitly addressed in the Oregon Office of Economic Analysis' (OEA) most recent economic forecast[12].

Continued in-migration from other states will maintain sustained growth in population and labor force. An acceleration of net-migration rates is increasingly likely in the context of resource constraints in California and the U.S. Southwest. Water resources in these regions in particular are considerably constrained under existing conditions. The ability of southwestern states to accommodate projected growth is questionable, with Oregon being a likely outlet for growth transfer.

Urbanization: Within Oregon, the broader trend of increased urbanization is likely to continue. A larger share of the world's population is living in urban areas and Oregon is no different. The share of Oregon residents living in the Willamette Valley is expected to reach 71% by 2040[13].

Housing: Oregon should maintain its competitive advantage in housing and cost of living in relation to other west coast markets such as San Francisco and Seattle. In the near-term, housing investment and construction is expected to continue to support Oregon's emergence from the Great Recession.

Shifting Industrial Composition: Oregon has exhibited a decades long shift away from natural resource based industries toward more value-added manufacturing activities such as technology, machinery, equipment, and fabricated metals. This trend is expected to continue. More so, Oregon should continue to follow the national trend of growth in service-oriented industries outpacing goods production.

Exports: With port capacity and a position along the Pacific Rim, Oregon is well positioned to build global markets and increase exports considerably. Oregon exports are primarily concentrated in computers & electronics, equipment and machinery, and agriculture. China and Canada are Oregon's major trading partners, with Japan, Korea, and Malaysia also accounting for a measurable share. The Portland Metropolitan Area has the highest export intensity in the United States (24.4% of GDP compared to 13.2% nationally). The Portland region has established a strategy to double exports in five years.

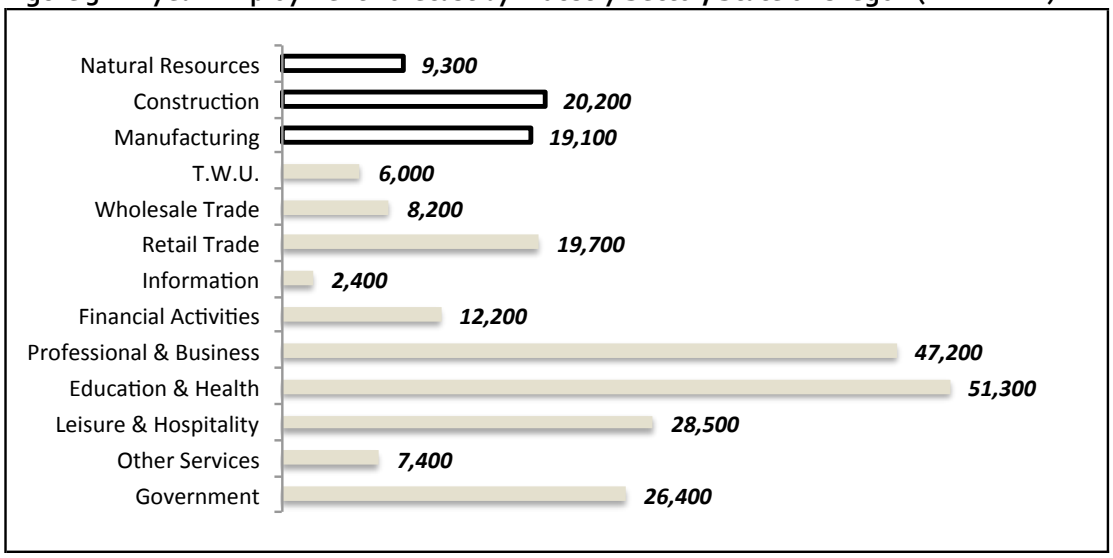
[12] Oregon Office of Economic Analysis, "Oregon Economic and Revenue Forecast (June 2014).

[13] Oregon Office of Economic Analysis: Demographic Forecast (2012)

Green Technology: Among the strategic opportunities Oregon faces is leading growth in green energy and technology. The initiative to increase energy efficiency, reduce carbon emissions, and develop alternative means of energy have resulted in increased investment across a range of industries. Oregon has competitive advantage in many of these arenas, including biofuels, wind and wave energy, and solar energy.

Other Long-Term Advantages: Oregon holds many other long-term competitive advantages on both a national and global scale, including but not limited to its relatively low electricity costs, strategic economic location on the Pacific Rim and proximity to Vancouver B.C., California, and Asia. Relative to these markets communities in Oregon boast clean water supplies, cost of living advantages, and lower space rents.

Figure 3: 10-year Employment Forecast by Industry Sector, State of Oregon (2012-2022)



SOURCE: Oregon Employment Department

Economic Risks

The economic outlook for Oregon is not without risks, particularly over the long-term planning period. Those risks recently identified by the June 2014 OEA include:

Federal Fiscal Policy—On-going effects of the 2013 spending reductions and sequester. Oregon has minimal risk due to low federal presence.

Housing Market Recovery—In the near-term housing is expected to be a catalyst for growth to achieve escape velocity from recent lackluster economic growth. Rising interest rates, stringent credit, and low inventories threaten the breadth of housing investment.

European Debt—While domestic credit markets are easing, problems in the Eurozone persist, with the threat of financial market contagion not fully abated.

Commodity Prices—While trending downward, commodity prices remain high and any demand driven commodity price inflation would threaten global expansion.

Other Global Spillovers—Political stability in the Middle East, Ukraine, and Israel, viral outbreaks or health crises in West Africa, growth in the Chinese economy, and inflation in emerging markets.

Real Wage Growth—Oregon's growth in real wages has been stagnant for over a decade.

LOCAL TRENDS

Local economic growth over the planning period will be, in part, functionally representative of demographic and economic trends observed locally and in the region. A review of these conditions provides a useful context for establishing a baseline expectation of future growth in Clackamas County. In this section we consider local demographic and workforce conditions, recent business activity, and the overall performance of the economy in recent years.

Population Growth

During the last decade Clackamas County added over 37,600 new residents at a rate of roughly 1.1% per year. This rate was slightly below the regional average but roughly on par with statewide growth. In the first three years of the ensuing decade, population growth has decelerated at the state, regional, and local level. Over this interval Clackamas County captured 19.2% of regional growth, roughly consistent with its 10-year capture rate during the 2000s. However, the region is poised to enter housing development cycle, and Clackamas County has a seemingly strong advantage in its ability to absorb ensuing housing demand. Our assessment of near and long-term planned housing capacity indicates that 44% of regional single-family lot inventory is in Clackamas County.

Figure 4: Recent Population Growth Trends, Oregon, Clackamas County

	YEAR			'00-'10			'10-'13		
Geography	2000	2010	2013	#	%	AAGR	#	%	AAGR
OREGON	3,421,399	3,831,074	3,919,020	409,675	12%	1.1%	87,946	2.3%	0.8%
Region*	1,444,219	1,641,036	1,693,600	196,817	14%	1.3%	52,564	3.2%	1.1%
Multnomah	660,486	735,334	756,530	74,848	11%	1.1%	21,196	2.9%	1.0%
Washington	445,342	529,710	550,990	84,368	19%	1.8%	21,280	4.0%	1.3%
Clackamas	**338,391**	**375,992**	**386,080**	**37,601**	**11%**	**1.1%**	**10,088**	**2.7%**	**0.9%**

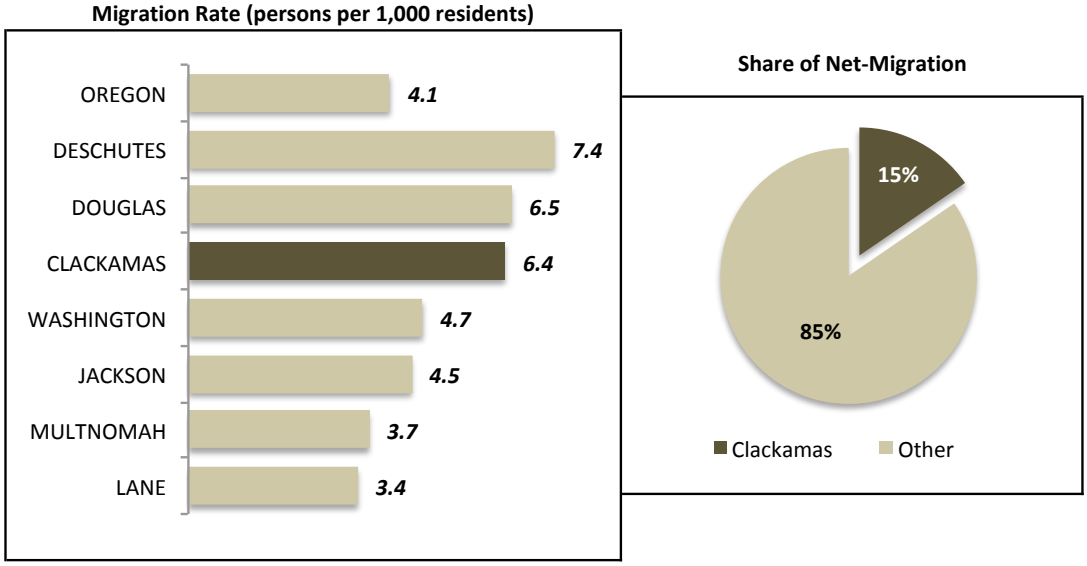
* Clackamas, Multnomah, & Washington County Combined

SOURCE: Portland State Population Research Center

Migration

In the current expansionary cycle, accelerated net in-migration is a driving force of the economic recovery. Statewide, Oregon is adding 4.1 persons per 1,000 residents annually from new migrants. In Clackamas County, this rate 6.4 persons per 1,000, good for third among Oregon's larger counties. Clackamas County is actually capturing 15% of **new residents** moving to Oregon for employment, retirement, or otherwise. The 3-county region is actually split fairly evenly, with Washington, Clackamas, and Multnomah County each capturing roughly one-third of new migrants on net.

Figure 5: Clackamas County Net-Migration Rate, 2010-2013



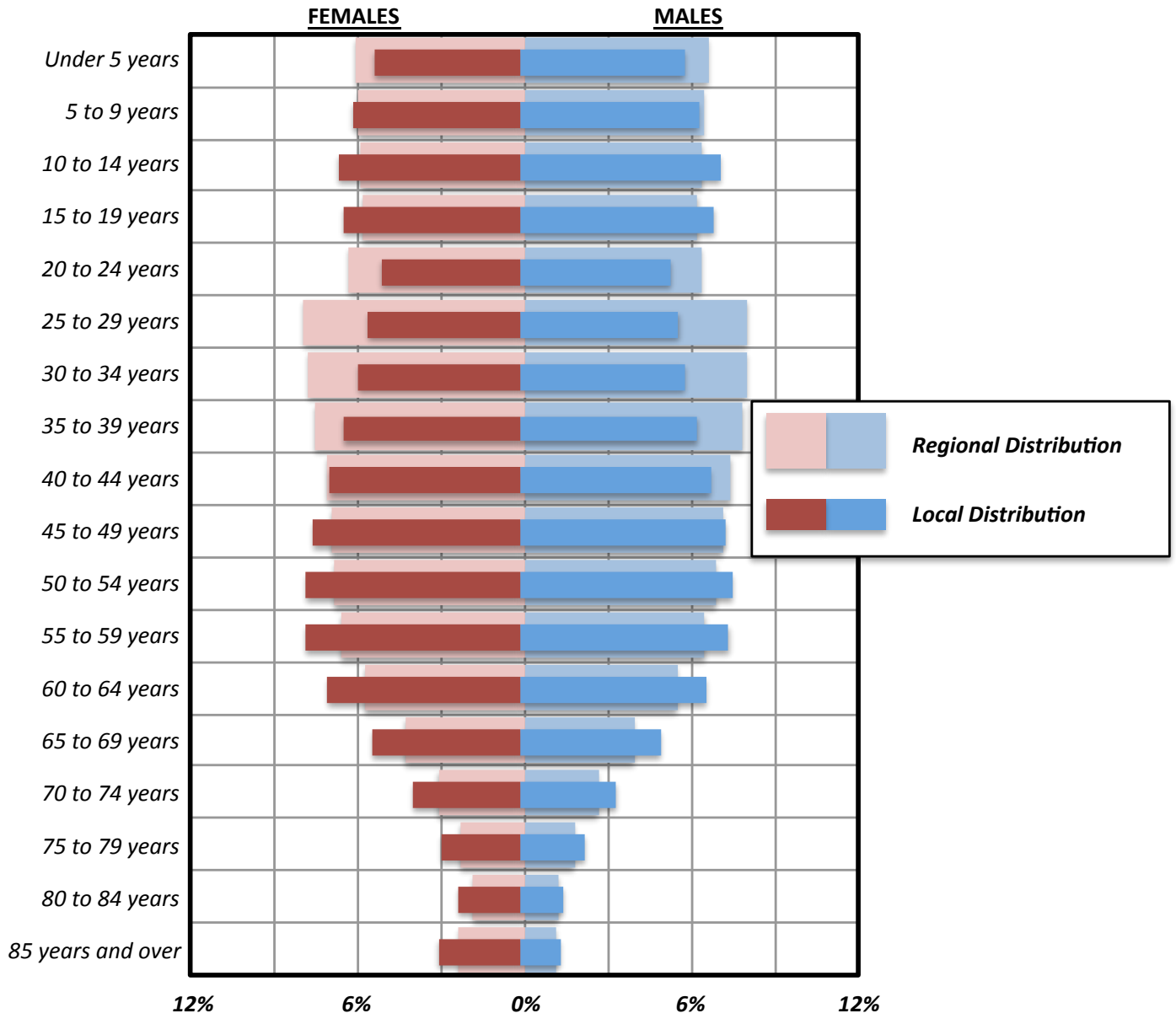
SOURCE: PSU Population Research Center

Population Distribution

The distribution of Clackamas County's population deviates somewhat from regional averages in some cohorts. Specifically, Clackamas County is generally older on average with a considerably larger concentration of pre-retirees (50-64) and early retirees (65-74). Consequently, Clackamas County has fewer younger residents on average, particularly in the 20 to 39 year age groups. This segment makes up 23% of the local populace compared to 30% regionally. This condition is a potential economic speed bump for Clackamas County, as this demographic segment is among the most productive subsets of the labor force. Further, younger age groups are innately more likely to absorb greater economic risk, an inherent requirement for entrepreneurship and innovation. Strong concentrations in the middle bound age cohorts are generally correlated with challenges to the status quo in the business community through innovative and entrepreneurial behavior.

However, in the context of Clackamas County's migration advantage, we expect this to be an improving condition locally. Recent mobility data from the U.S. Census' American Community Survey suggest that new migrants to the region are generally younger and more educated than the existing populace.

Figure 6: Clackamas County Population Distribution, 2012



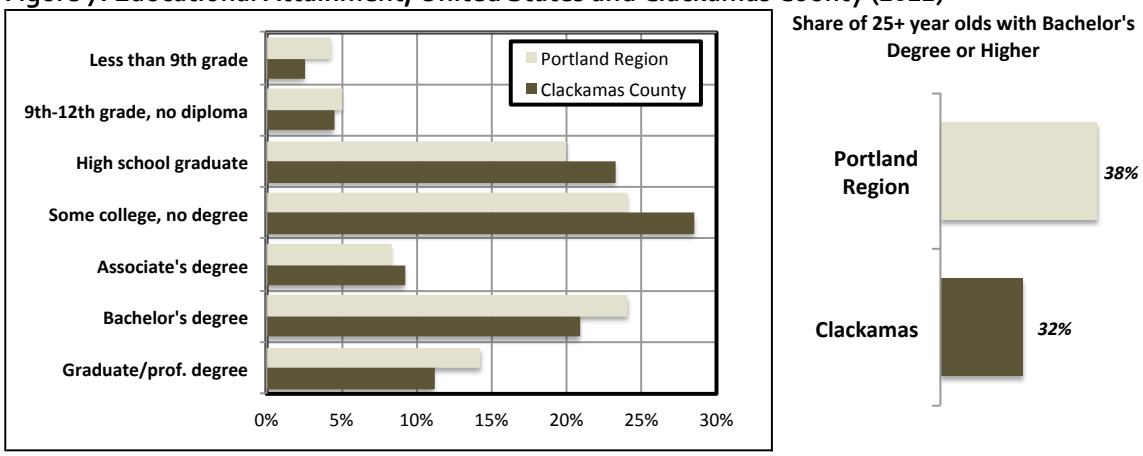
SOURCE: U.S. Census Bureau American Community Survey (2012)

Education

Education is a measure of the collective skills and knowledge of a populace. In theory, populations with greater skills and knowledge should translate into a heightened capacity for innovation. Moreover, the ability of firms is to find adequately trained labor is an important factor to economic and productivity growth. Clackamas County exhibits slightly below average rates of educational attainment in terms of four-year degrees or higher.

However, Many of the industries that drive Clackamas County's economy are trending toward a different form of skilled labor. A recent study conducted by USA Today detailed the shifting nature of skill requirements and technical training to get there[14]. Over just the next few years U.S. firms are expected to hire over 2.5 million workers to family wage occupations requiring "medium skills", defined as workers with an education level of a high school diploma or some postsecondary training but less than a bachelor's degree[15].

Figure 7: Educational Attainment, United States and Clackamas County (2012)

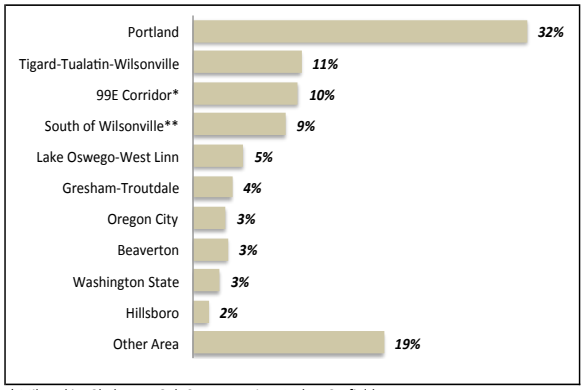


SOURCE: U.S. Census Bureau, American Community Survey (2013)

Commute Trends

An important characteristic of the labor force is the extent to which workers are residing locally or commuting from other areas. Clackamas County is a large area, and it is difficult to estimate the extent to which residents are working locally. However, we do estimate the communities or employment areas that Clackamas County residents are working in. We estimate that 32% are working in the jurisdictional boundaries of Portland, followed by Tigard-Tualatin-Wilsonville (12%), the Hwy 99E corridor (10%) and areas south of Wilsonville (9%). Based on this analysis in Figure 8, Clackamas County commuting patterns are roughly consistent with regional trends.

Figure 8: Commute Balance, Clackamas Co. (2011)



* Milwaukie, Gladstone, Oak Grove, Jennings Lodge, Oatfield

** Woodburn, Salem, Eugene

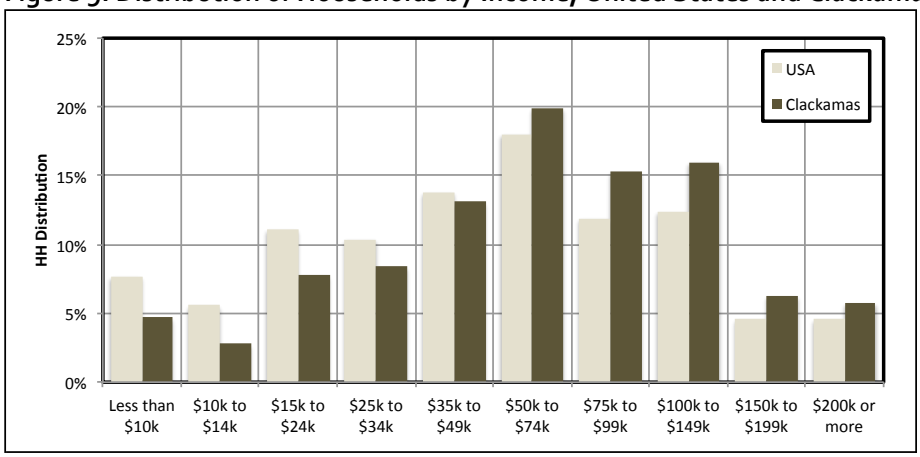
[14] USA Today Report. Where the Jobs Are, Part 1 (Oct. 2014)

[15] Bureau of Labor Statistics

Income

On net, Clackamas County is more affluent than the national average, with a median household income of $66,750 compared to $51,370 nationally. Looking at the distribution of households by income, the share of local households earning between $50,000 and $150,000 in Clackamas County is 51% compared to a 42% national average.

Figure 9: Distribution of Households by Income, United States and Clackamas County, (2012)

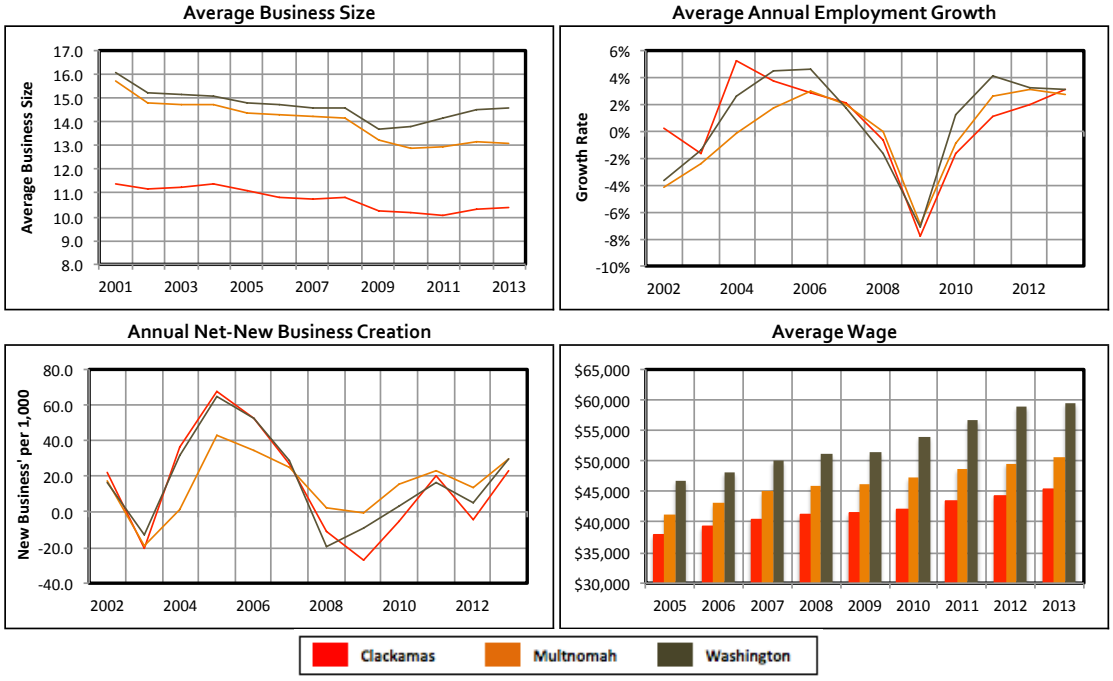


SOURCE: U.S. Census Bureau, American Community Survey (2012)

Relative Economic Performance

Figure 10 exemplifies relative economic performance of the Portland Metro Area's three principal counties across a range of business performance metrics. These metrics are commonly correlated to economic growth. These metrics are derived from QCEW covered employment data dating back to 2001:

Figure 10: Relative Economic Performance, Three-County Region (2001-2013)



Average Business Size

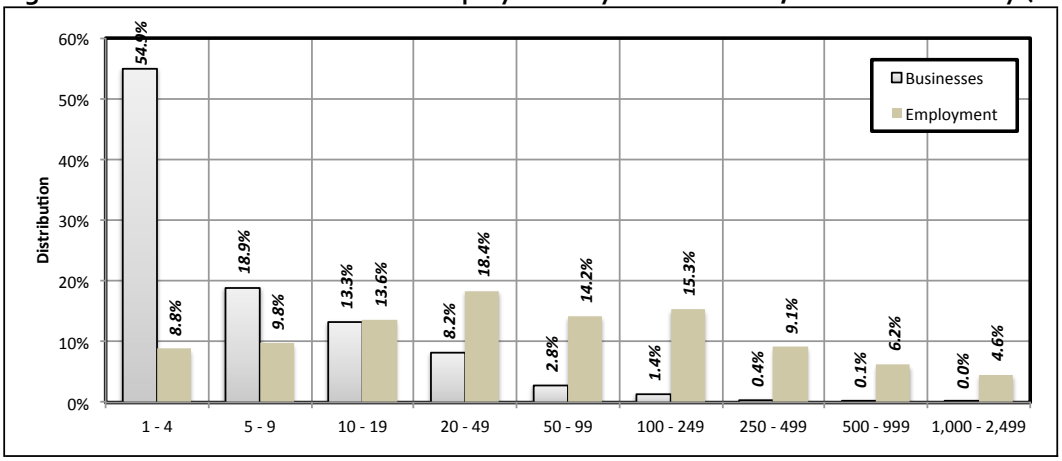
- The average size of a business across the entire region has trended downward over the past two business cycles—indicating a structural trend toward increased worker productivity.

- The cyclical dip in business size during the recession is indicative of reduced payrolls (jobs declined at nearly twice the rate as business decline). While Washington County has recovered to pre-recession levels, the recoveries in both Multnomah and Clackamas have been more tempered.

- Clackamas County is certainly more of a small business community compared to the rest of the region. The average business in Clackamas County has 10.5 employees with 68% of all private sector firms having less than 10 employees, compared to 60% regionally.

- However, these small businesses account for only 18.6% of employment. Roughly half of all jobs in Clackamas County are in firms with 50 or more employees.

Figure 11: Share of Businesses and Employment by Business Size, Clackamas County (2012)



SOURCE: Oregon Employment Department and Johnson Economics

Annual New Business Creation

- The rate of new business formation is indicative rates of market entry, which has a high correlation to innovation and economic growth. On net, all three counties have trended similarly, with Clackamas County exhibiting more destruction during the recession and a slightly more tempered recovery.

- In 2013 there were 471 more private sector businesses in Clackamas County compared to the 2010 business cycle trough.

Private Sector Employment

- Much like business formation, employment growth in all three counties trend similarly, with Clackamas County exhibiting a greater decline during the recession and thus far a more tepid recovery. However, the long-term trend indicates that dating back to 2001 Clackamas County (0.67% AAGR) has been slightly outpaced by Washington County (0.87% AAGR) but has outperformed Multnomah County, which has exhibited zero net private sector employment growth over the 12-year period.

Income and Wages

- Despite relatively high incomes among residents, Clackamas County private sector employees earn wages ($45,278) well below the regional average ($59,930).

- Nominal incomes in Clackamas County have increased at an average annual rate of 2.5% of the last 12 years, on par with Multnomah County but trailing Washington County (2.9%).

- In the thee-year recovery, both Clackamas (2.4%) and Washington (3.3%) County have been exhibiting greater wage growth than Multnomah (2.3%) on average. This has lead to a narrowing of the wage differential with Multnomah County firms but Washington County expanding with wage advantage over the region.

Business Cycle Inflection & Recovery

With most economies experiencing the cyclical inflection point coming out of the recent recession and entering a slow by steady recovery, we evaluate Clackamas County's recovery and which sectors are driving local economic expansion as an indicator of local economic strengths and early growth prospects.

Figure 12 exhibits industry sector performance in the Clackamas County economy during the recent recession (2007-2010) and a three-year recovery period (2010-2013). The x-axis exhibits how an industry performed during the recession, with negative values indicating job losses and positive values indicating job gains. Similarly, the y-axis tracks losses and gains during the three-year recovery (the size of the bubbles indicate the relative size of the sector in terms of employment). By comparing the two axes, we can classify industry sectors into one of four performance quadrants:

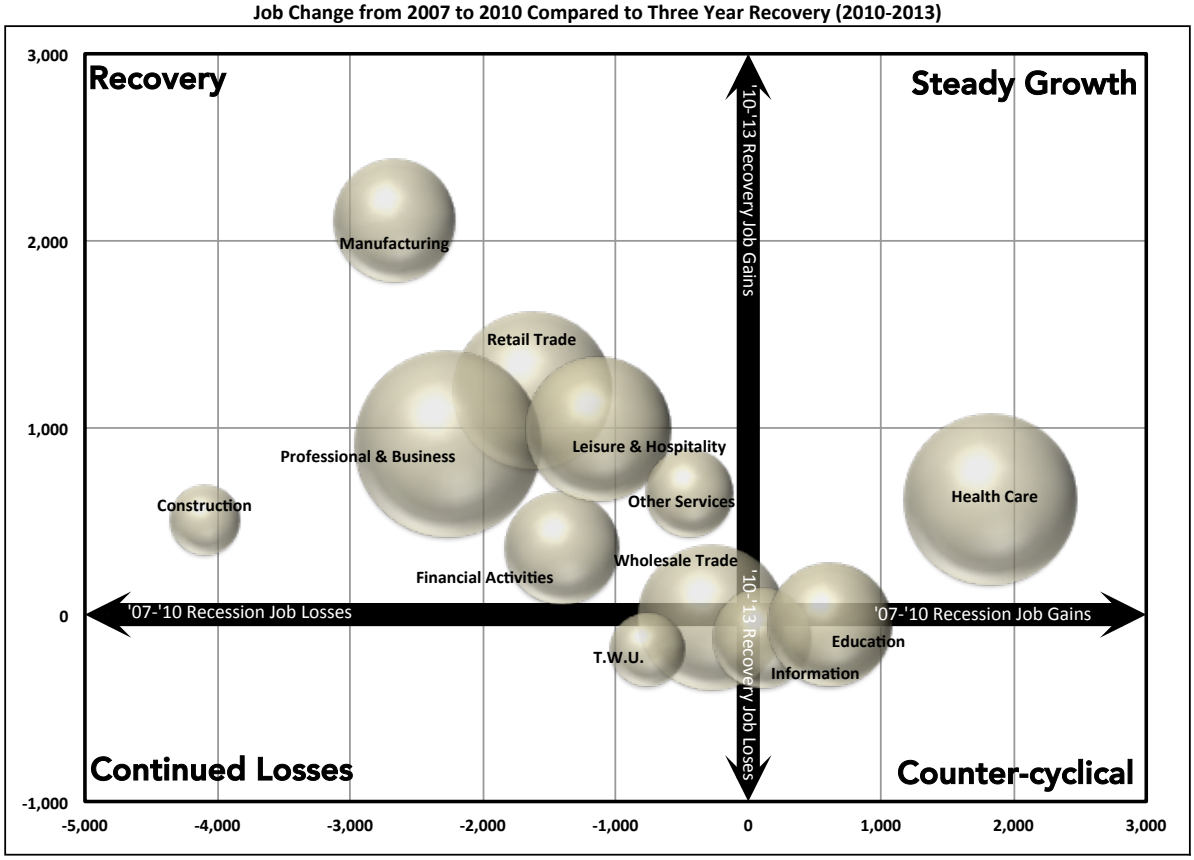
Recovery: Industries that lost jobs during the recession but have since recovered some of previous losses.

Continued Losses: Industries that lost jobs during the recession and have continued on a downward trend during the recovery.

Counter-Cyclical: Industries that gained jobs during the recession but have since exhibited losses during the recovery.

Steady Growth: Industries that gained jobs during the recession and have since continued on an upward trend.

Figure 12: Industry Sector Performance, Clackamas County, (2013)



Over the course of the recession and subsequent economic recovery some sectors have clearly outperformed others. During the recession, the professional & business, manufacturing, and construction sectors were hit the hardest, accounting for 75% of private sector jobs losses. Health care, information, and education were the only two sectors that did not decline during the recession at the county level. Across all industries, some have recovered much stronger than others. In addition to education and health care, only the other services sector has recovered fully to exceed pre-recession employment levels.

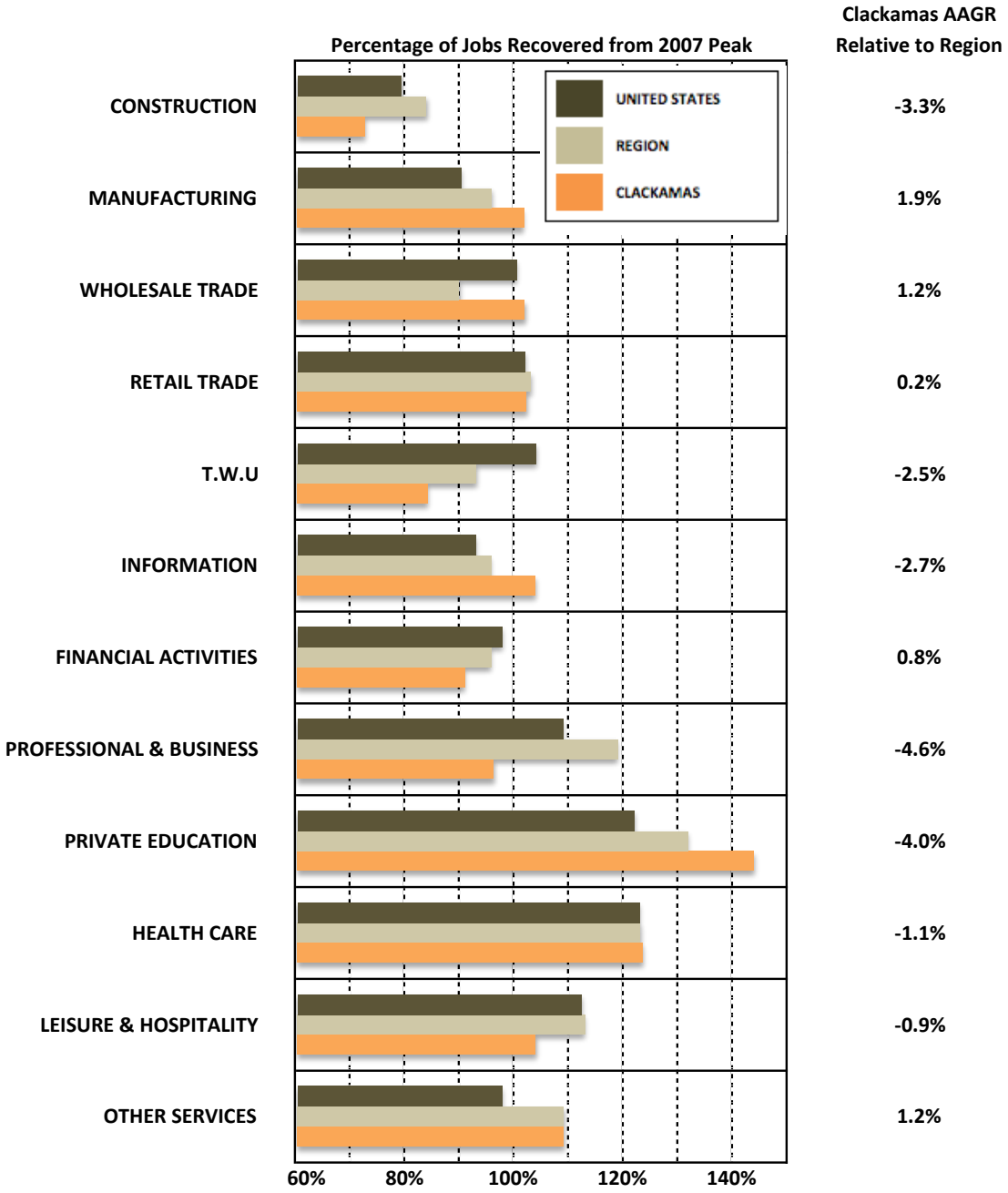
Conclusions on Economic Performance

Much has been made locally about the recent economic recovery, and where jobs are being created geographically in the region. It is a fact that since 2010, 85% of new business creation and 87% of job creation has happened in Washington and Multnomah County. However, considering gross figures alone is erroneous in the context of the recovery's composition.

During the "Great Recession", two of the economic sectors that saw the greatest contraction were construction and real estate. These two sectors have also famously been sluggish in their recovery during the early phases of the expansion cycle. Unfortunately, in Clackamas County these two sectors comprise an unusually large share of the economy. In other words, much of Clackamas County's perceived "lagging" recovery is isolated in a few sectors that have been structurally challenged.

In fact, across most sectors, Clackamas County is performing on par or better than the region, adjusting for baseline size of the economy. This would suggest that Clackamas County is not at fundamental disadvantage regionally, rather, its economic fragilities are pronounced in a few industries. We consider each sector individually:

Figure 13: Current Employment as a Percentage of Peak Employment and Relative Growth Rate During the Three Year Recovery, Clackamas County, Portland Region, and United States (2007-2013)



Construction
Clackamas County's worst performing sector. Employment is still 3,500 jobs below peak having recovered to only 71% of previous employed level.

Manufacturing
Clackamas County is outperforming the region in terms of job recovery and growth rate since 2010. The employed level has recovered to 97% of peak after growing at 4.3% annually, which is good for 1.9 percentage points faster than the region.

Wholesale Trade
Clackamas County is again outperforming the region by a considerable margin. Job loses were not pronounced during the recession, and Clackamas has held near 97% of peak employment. Meanwhile, the region is contracting at 1.3% annually.

Retail Trade
All three geographies are performing roughly the same, having recovered to pre-recession levels after averaging roughly 2.4% average annual growth.

Transportation, Warehousing, & Utilities
This sector accounts for roughly 4% of the Clackamas County economy roughly on par with the region. During the recession this sector contracted by 15%, losing 760 jobs. This sector is Clackamas County's only sector that has exhibited continued loses into the recovery. In the context of structural recovery in the industry, this is a concern for Clackamas County's competitiveness that we will explore later in this analysis.

Information
In Clackamas County, the Information sector ran countercyclical during the recession, meaning that it actually expanded during the recession in terms of employment. However, since 2010, the information sector has given back 128 jobs locally. On net, this sector has outperformed the region since 2007 as a percentage of the economy.

Financial Activities
Real estate and rental leasing makes up a large share of this sector in Clackamas County, much more so than other parts of the region. Similar to the construction sector, these industries contracted severely during the recession. In Clackamas County, the employed level is still over 1,000 jobs off peak employment, having recovered to 87% of the peak compared to 94% regionally. However, since the 2010 expansion began, the financial sector in Clackamas County has grown at 1.7%, nearly twice the rate exhibited regionally (0.9%).

Professional & Business Services
Aside from construction, this is perhaps the most troubling sector of the Clackamas County economy in that it has been recovering at a far slower rate than both the regional and national average. The County has recovered to only 87% of peak employment while the region has surpassed its peak by nearly 15,000 jobs. The growth rate Clackamas County (2.0% AAGR) has been less than one-third the regional rate (6.6% AAGR). If there is a competitiveness concern in Clackamas County, it's in this sector. Later analysis in this report will explore this finding in greater detail.

Private Education
Like the information sector, private education ran countercyclical in Clackamas County, continuing a strong expansion during the recession and moderating since. Given that current employment is 145% of pre-recession levels, we'd conclude this sector is on sound footing.

Health Care
In most geographies the health care sector continued its expansion during the recession and immediately afterword. Clackamas County and the Portland region is no different. Both have employed levels at 122% of pre recession levels. Growth has been more accelerated elsewhere in the region, however.

Leisure & Hospitality
This sector is heavily concentrated in food services, which, similar to retail, generally moves with overall economy. The sector is underperforming relative to the region but not by a considerable margin.

Other Services
Both Clackamas County and the region have recovered to about 110% of their pre-recession peak. Because the sector was hit harder in Clackamas County it's taken 3.9% average annual growth to get there compared to 2.8% in the region. Other services is a strongly performing sector.

Knowledge Based Metrics

Earlier in this report we identified gains in productivity, knowledge, and technology to be critical elements for future economic growth. The influence of knowledge-based industries is proliferating globally; with communities across the country increasingly adopting cluster based economic development strategies. By extension, the geographic integration of knowledge-based institutions throughout a community's economic fabric is being successfully utilized as a vehicle for spreading knowledge, providing resources, and recruiting capital in a knowledge driven economic development strategy. Here, we discuss some key metrics regionally and locally that impact Clackamas County's advancement in high knowledge based industrial growth.

Venture Capital
Venture capital is an important mechanism for firms to advance new ideas and bring them to market. As it related to increasing productivity through innovation, this is especially the case in early stage, angel, and seed funding levels.

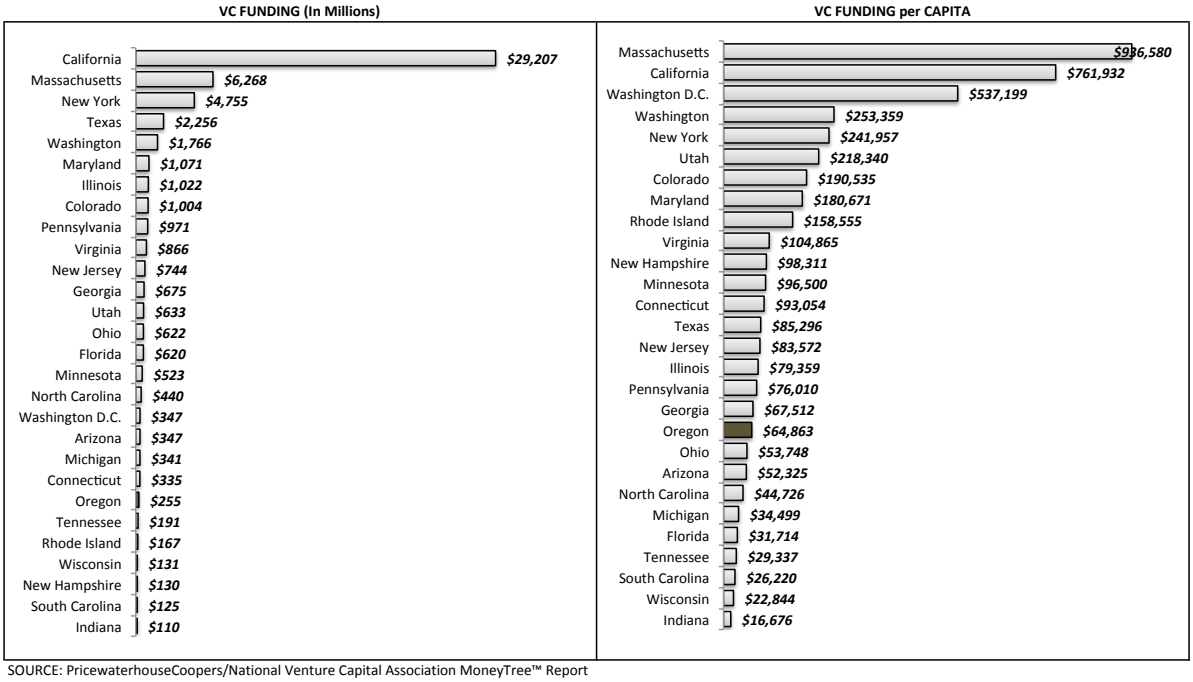
Our research found nearly 50 active venture capital funders in Oregon, funding deals ranging from $25,000 seed money to $30+ million later stage deals.

Figure 14: Active Venture Capital Firms in Oregon

Ventur Capital Firms in Oregon		
- Oregon Angel Fund	- DFJ Frontier	- Nth Power
- Portland Angel Network	- Emergence Capital	- Oregon Investment Fund
- OEN Angel Oregon	- Epic Ventures	- Oregon VC Fundraising Successes
- Portland Seed Fund	- Equilibrium Capital Group	- OVP
- The Indus Entrepreneur (TiE), TiE Oregon Angels	- Firelake Capital	- Pivotal Investments
- Clean Tech Open: Accelerator for cleantech	- Foundry Group	- Prairie Gold Ventures
- Oregon BEST	- Globespan Capital Partners	- Reference Capital
- Nike Accelerator	- Intel Capital	- Rocket Ventures
- OHSU Innovation and Seed Fund	- Invite Investments	- RPM Ventures
- Oregon Nanoscience and Microtechnologies Institute	- Keating Capital	- Saffron Hill Ventures
- Portland Incubator Experiment (PIE)	- Kleiner Perkins Caulfield & Buyers	- Seven Peaks Ventures
- PSU University Venture Development Fund	- Madrona	- SmartForest Ventures
- Anthem Venture Partners	- Millennium Technology Value Partners	- True Ventures
- August Capital	- Mohr Davidow Ventures	- Voyager Capital
- Birchmere Ventures	- Mt. Hood Equity Partners	- Walden Venture Capital
- Capybara Ventures	- Northwest Technology Ventures	
- Chrysalix Energy Venture Capital	- Norwest Venture Partners	

However, Oregon is not a powerhouse in the venture capital world, ranking 22nd in venture capital dollars and 19th in venture capital per capita over the last two years. At the MSA level, since 2005 the Portland MSA has averaged $10.55 in V.C. investment per $10,000 in GDP[16]. By comparison, Portland ranks 14th among similar MSA's, with V.C. rates 1/7th the size of Austin and 1/4th the rate achieved in Seattle.

Figure 15: Venture Capital by State (2012-2013)



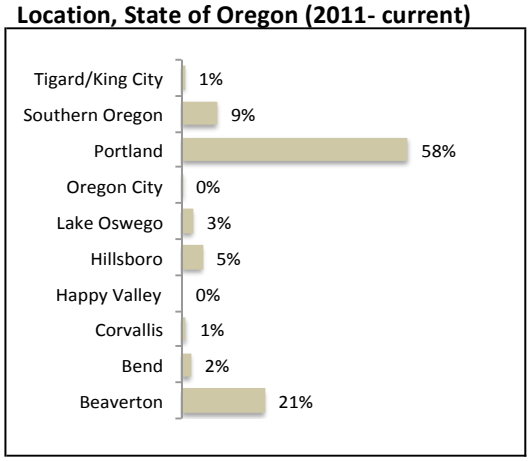
SOURCE: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report

[16] Venture Capital Investment compared to the size of the overall economy is another strong indicator of innovation health.

We further considered where venture capital in Oregon is going. As it turns out, some Clackamas County communities have firms attracting large national and regional capital. Since 2011, firms in Lake Oswego, Oregon City, and Happy Valley have landed V.C. investments.

Note: Figure 16 includes communities with "0%". This is indicative of either rounding or deals that had unreported investment amounts.

Figure 16: Share of Venture Capital by Location, State of Oregon (2011- current)



SOURCE: PricewaterhouseCooper

Broadband Access

Broadband Internet access provides high-speed connections to businesses, individuals, institutions, and consumers. High-speed access has a direct link to economic performance, as the Internet has become an essential tool in spreading, accessing, and sharing ideas globally and remotely. The availability of high-speed Internet is common in most central city metro areas. However, we highlight the importance here as communities in the Portland Metro Area have recently been named a candidate location for Google Fiber. Without getting too technical, Google Fiber replaces copper based telecommunications connections within a community with fiber-optic lines. This infrastructure allows connection speeds of up to 100 times the average speed in America[17]. Such a leap in infrastructure and productivity is likely to result in innovation that we can't even imagine today, similar to the way the transition from dial-up to broadband gave birth to the internet economy.

The service is already available in several peer cities, including Kansas City, Provo, and Austin. In Kansas City, the investment itself encouraged the development of an innovation task force (K.C. Digital Drive) to explore ways to leverage faster connectivity in education, workforce, and economic development.

This infrastructure investment would yield a considerable competitive advantage both for the region an internally within the region across a broad range of industries including software, film and media, advanced manufacturing, research & development, and health care, among others.

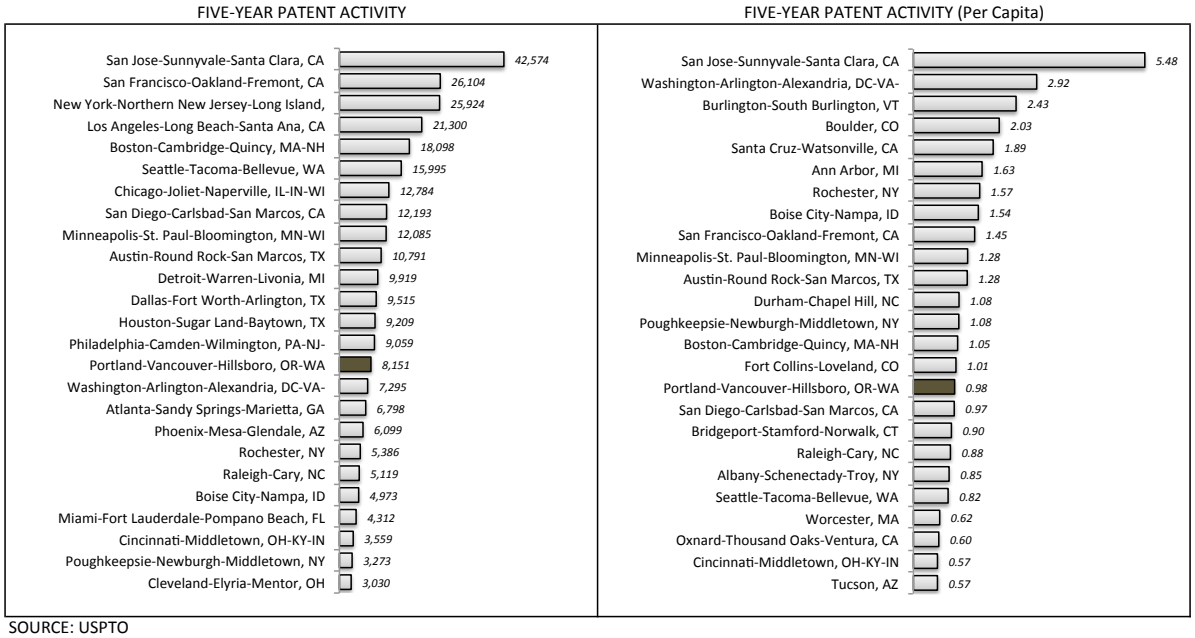
Patent Activity

Patent activity is perhaps the most commonly used metric to measure innovation. Intuitively this makes sense, as it is a direct measure of new products, design, and services. Patent data is derived from the U.S. Patent Office and is coded at the MSA and county level.

At the MSA level, the Portland-Vancouver-Beaverton MSA ranks adequately high on the patent scale, ranking 15th and 16th respectively in total patents and per-capita patents over the last five years (across all metro areas, in the fifteen year-sample of peer cities only Portland ranked 9th).

[17] Based on 9.8 Mbps (Akamai 2013)

Figure 17: Patents Granted by MSA, Top 25 Metro Areas (2009-2013)

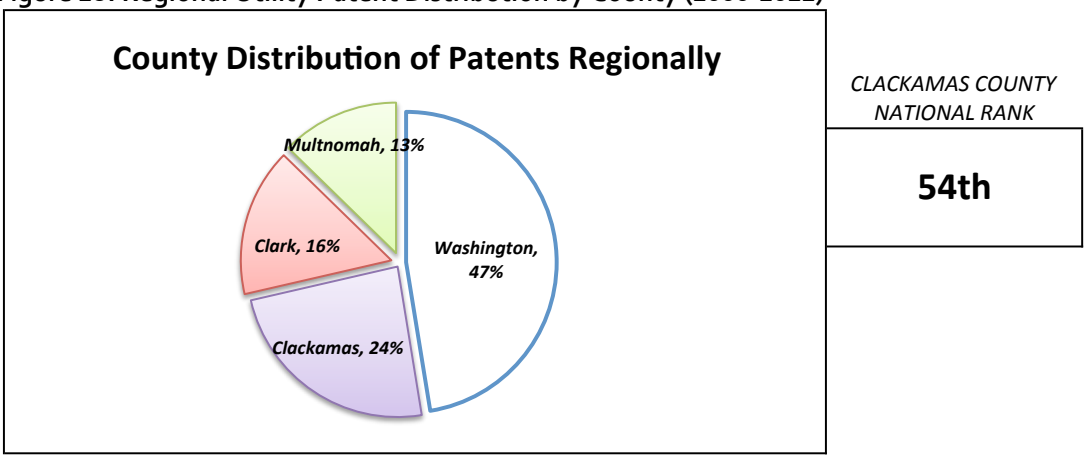


SOURCE: USPTO

However, a deeper look into the data would indicate that this metric, as it commonly does, overestimates the true innovative climate of a community. For example, 55% of all utility patents issued over the last 10-years in the MSA were give to just five companies (Intel, Sharp, Hewlett-Packard, Digimarc, and Nike). Intel alone accounted for 38% of regional patent activity.

However, Clackamas County ranks 54th nationally among all counties in the number of patents issued to companies. Regionally Clackamas County trails only Washington County in this metric, accounting for 24% of all patents in the region[18].

Figure 18: Regional Utility Patent Distribution by County (2000-2011)



SOURCE: USPTO

[18] Including Clark County

TARGET INDUSTRY ANALYSIS

This report section utilizes a range of analytical tools to assess the economic Landscape in Clackamas County toward the determination of industry typologies the County should consider targeted economic opportunities over the planning period. Here, we seek to identify industry anchors and clusters of interrelated industries that have assembled spatially in the community. Where possible, we look to identify the sectors that are likely to drive growth in current and subsequent cycles and to identify opportunities for new, emerging, or relocating sectors.

FOUNDATIONAL RESEARCH

This analysis builds upon foundational research conducted by Clackamas County. Through its Economic Landscaping Project, Clackamas County has identified eleven key industries it considers integral to the local economy. The County Economic and Community Development Department tracks changes across these industries on a periodic basis. This is a specialization-based approach that simply looks at concentrations and growth outlook for specific NAICS (North American Industrial Classification System) based industries. Later in this analysis, we move beyond looking at simple industry groupings and further evaluate the relationships between related industries and firms.

For example, consider NAICS 332: Fabricated Metals Manufacturing, a critical industry to Clackamas County's economy. This is a very broad classification, and different firms within this sector serve a broad range of functions in the economy that will not move in unison. For example, it includes firms that produce direct to retail goods, components for the aerospace industry, materials used in heavy construction, tools used in high-tech manufacturing processes, among other functions. Here, we attempt to desegregate industry sectors from their NAICS groupings and alternatively map the ecosystem of which companies and industries function.

INDUSTRY CLUSTERS DEFINED

Sound regional economies are best organized around a healthy set of industry clusters—similar and related businesses and industries that are mutually supportive, regionally competitive, attract capital investment, and encourage entrepreneurship. Generally, clusters develop as an agglomeration of businesses in a geography that holds an innate competitive advantage in that industry—whether it is natural resources, human capital, political policies, or geography. For example, Oregon's oldest industries—namely forestry and agriculture, emerged from physical and environmental attributes such as its climate, trees, soils, and access to shipping and distribution networks. In turn, these industries spawned interrelated clusters that include food processing & food manufacturing, wood product manufacturing, wholesaling & distribution, machinery manufacturing, and host of other industries. In many local economies, we find also that a large firm or group of firms can often anchor a local cluster—for example Precision Cast Parts (PCC Structurals) anchoring Clackamas' metals cluster.

While specialization is a critically important factor, it is important for communities to understand that a cluster goes beyond a high concentration of employment or output within a given sector or group of similar sectors. Rather, it is the vertical integration of supply chains, distribution, wholesaling, or even competitively unrelated industries that share common inputs such as materials and trained labor. Clusters can organize around natural resources, training institutions, or a particular firm or group of firms, among many other factors. In our analysis, we attempt to draw inferences about the organization of Clackamas County's clusters across anchor, primary, and

ancillary industries, while looking to identify the local characteristics that could encourage growth within this economic ecosystem.

STUDY AREA DEFINED

The objective of our overall analysis is to forecast the need for non-retail employment land demand in Clackamas County within the Metro UGB. To this end, our study area includes all firms that are both located within the jurisdictional boundaries of Clackamas County and within the Metro UGB.

DATA SOURCES

Our evaluation of Clackamas County industry clusters is constructed from two primary sources of empirical information:

Quarterly Census of Employment and Wages (QCEW)

The QCEW data from the Oregon Employment Department provides covered employment and payroll data for Clackamas County firms. The term "covered" refers to employees that are covered by unemployment insurance. Therefore, it does not consider the self-employed and commissioned workers. This data is geocoded at the firm level and provides data on the number of employees, payroll, and industrial NAICS code firms classify as. The use of this dataset has a number of limitations, the most pronounced of which is misclassification of firms by industry. This is particularly problematic for large firms with multiple reporting units, who often misclassify spatially or within a particular industry classification. Other potential limitations include improperly geocoded data and misclassification in NAICS categories. These impacts generally affect a small sample of firms. Where possible, we augment the data based on known factors about major businesses and their operations.

IMPLAN Input-Output Tables

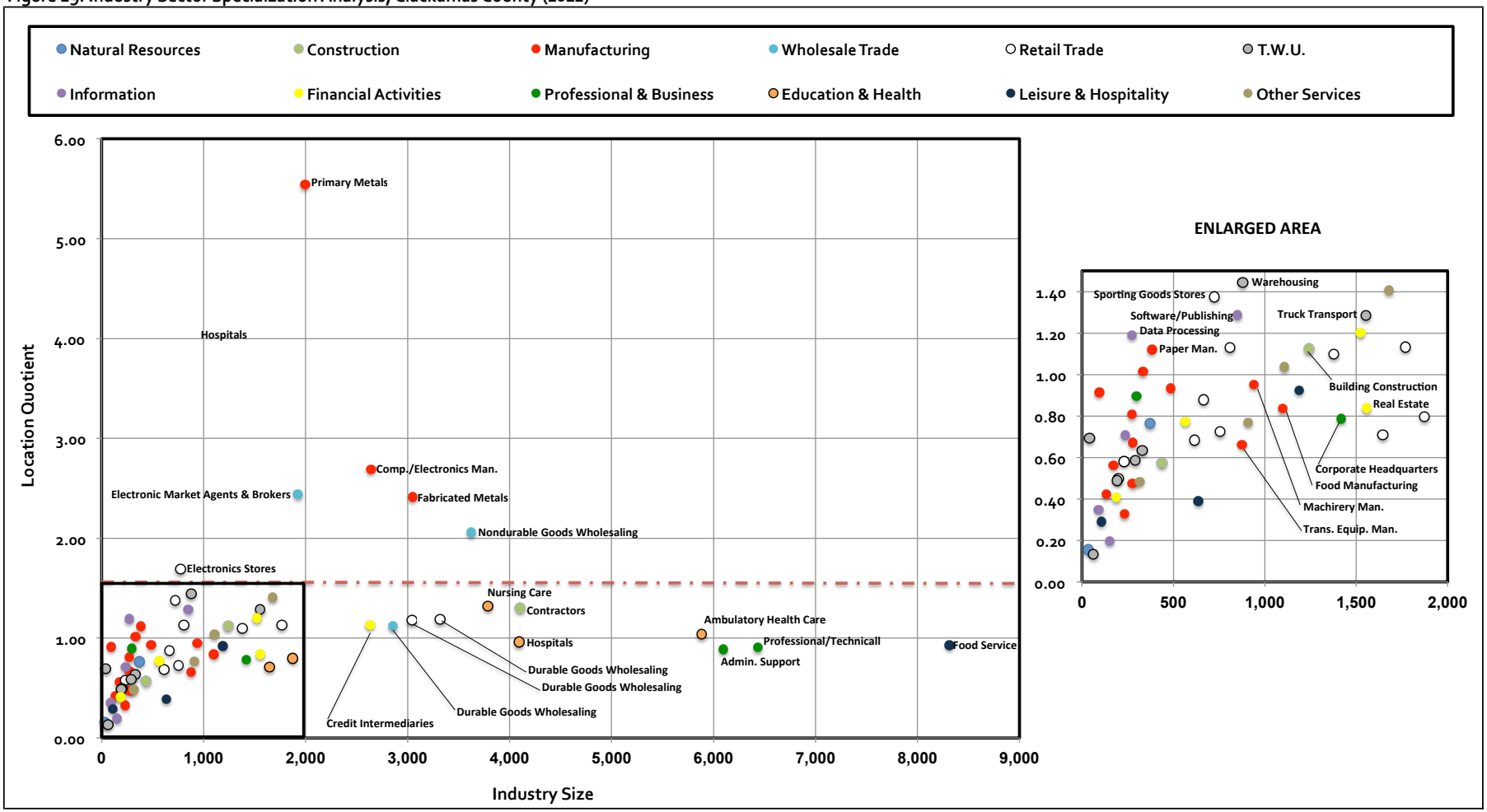
IMPLAN (IMPact for PLANning)[19] datasets are input/output multiplier models that can be used to demonstrate linkages between interrelated industries. Developed by the Forest Service to assist in land and resource management planning, IMPLAN is an economic impact model designed for analyzing the effects of industry activity (employment, income or business revenues) upon all other industries in an economic area. A primary limitation of this data is that we rely on county level data as a proxy for local conditions.

ECONOMIC SPECIALIZATION

The most common analytical tool to evaluate economic specialization is a location quotient analysis. This metric compares the concentration of employment in an industry at the local level to a larger geography. For example, a location quotient of 1.50 for widget manufacturing would indicate that the share of employment in widget manufacturing locally was 50% higher than the national average. Generally, 1.50 is a common threshold indicating a relatively high specialization. Large industries are also obviously considerable components of the local economy and should also be considered. When we plot these industries graphically by size, specialization, and sector, we can begin to see some patterns in the data.

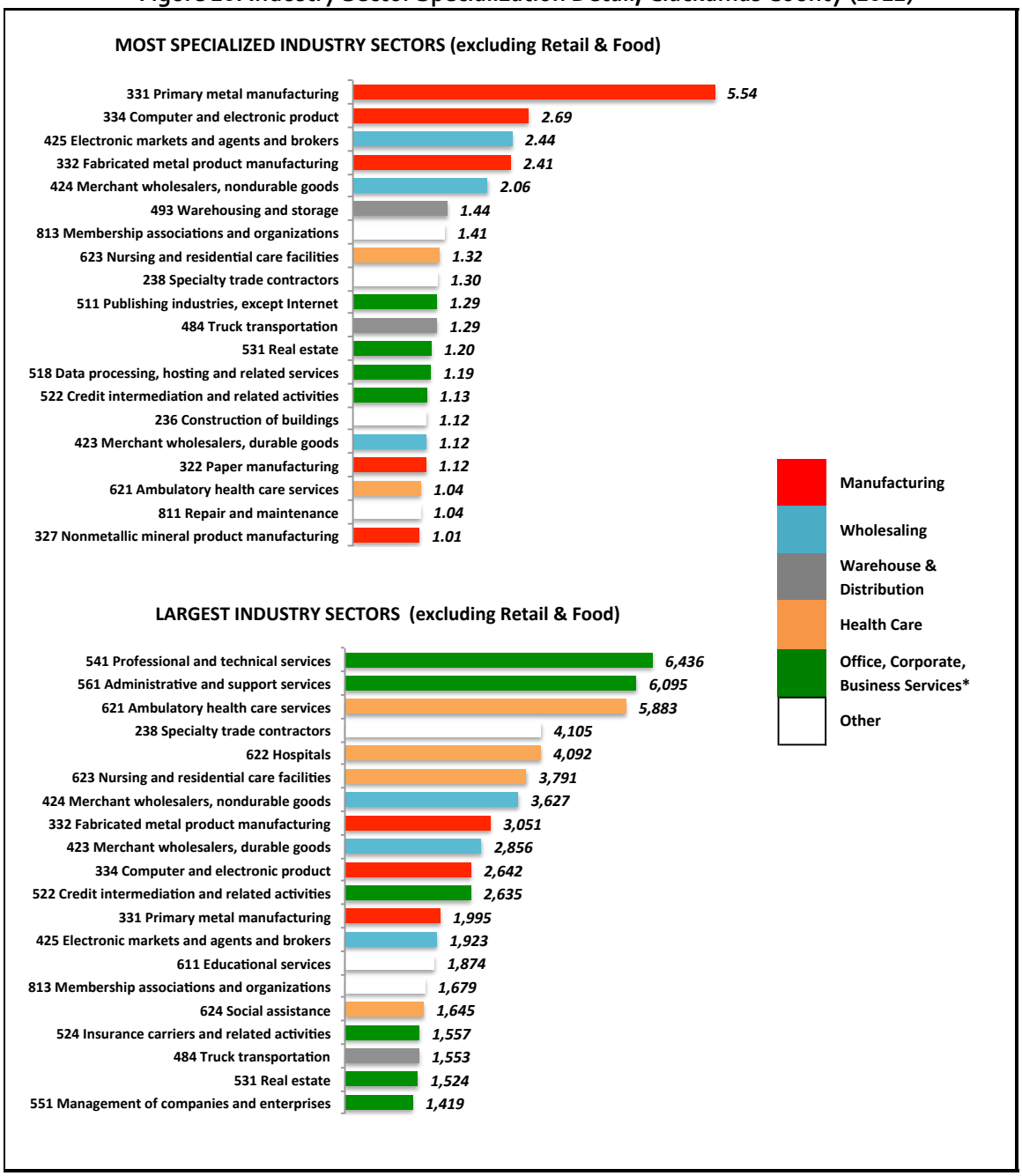
[19] *Minnesota IMPLAN Group (MIG), Stillwater, Minnesota*

Figure 19: Industry Sector Specialzation Analysis, Clackamas County (2012)



We see groupings of industries within specific sectors by size and specialization, with outliers that have exceedingly high specialization, are among the largest industries in the local economy, or both. Industries or groups of industries with these features are the best candidates for our cluster anchors.

Figure 20: Industry Sector Specialization Detail, Clackamas County (2012)



* Information, Professional & Technical Services, Admin. Support Services, Corporate Headquarters, Finance & Banking, Real Estate.

From Figures 19 and 20 we can derive that that Clackamas economy is highly specialized in a few key sectors. Some key findings:

- The 20 most specialized industries (highest location quotient) account for roughly 43% of employment in the economy. Meanwhile, three out of every five jobs in Clackamas County are in the 20 largest industries.

- The Clackamas County economy is highly specialized in a few sectors, none more so than the manufacturing sector, which accounts for five of the most specialized, and three of the largest industries in the economy. Highly specialized manufacturing processes include primary metals, fabricate metals, minerals & paper, and computers & electronics.

- Wholesaling activities are also highly concentrated in Clackamas County, building upon the durable goods manufacturing base in computers, electronics, and metals markets. All three wholesaling subsectors are top 20 in terms of specialization and size. In combination with associated activities in the warehousing, storage, and transportation sectors, we expect to find a well-organized warehouse and distribution cluster in the region.

- Company's conducting professional, technical, and business activities comprise a considerable share of the local economy. Professional & technical and administrative support services are the two largest subsectors of the economy, accounting for one out of every eight jobs. This sector is very diverse, including corporate headquarters, advertising and marketing firms, offices of lawyers and accountants, engineering firms, computer programmers, temporary help services, and research and development activities, among others.

- When combined with Clackamas County's concentration in financial services and information, it is clear that Clackamas County has a well-defined business services cluster.

- Finally, while the local composition of health care services is roughly on par with expectations given the size of the economy and populace, firms in the health care sector account for nearly 16% of the private sector economy.

ECONOMIC DRIVERS

The identification of the unique and shifting economic drivers of a local or regional economy are critical in informing the character and nature of future employment, and by extension land demand over a planning cycle. To this end, we employ a shift share analysis of the local economy emerging out of the current expansion cycle[20]. A shift share analysis is an analytical procedure that measures local effect of economic performance within a particular industry or occupation. The process considers local economic performance in the context of national economic trends—indicating the extent to which local growth can be attributed to unique regional competitiveness or simply growth in line with broader trends. For example, consider that widget manufacturing is growing at a 1.5% rate locally, about the same rate as the local economy. On the surface we would consider the widget manufacturing industry to be healthy and contributing soundly to local economic expansion. However, consider also that widget manufacturing is booming across the country, growing at a robust 4% annually. In this context, local

[20] Measured from the trough of recent recession to 2012, the most recent period available for local employment data.

widget manufactures are struggling, and some local or regional condition is stifling economic opportunities.

Generally we can classify industries, groups of industries, or clusters into four groups:

Growing, Outperforming: Industries that are growing locally at a rate faster than the national average. These industries are the true drivers of the expansion and have characteristics locally leading them to be particularly competitive.

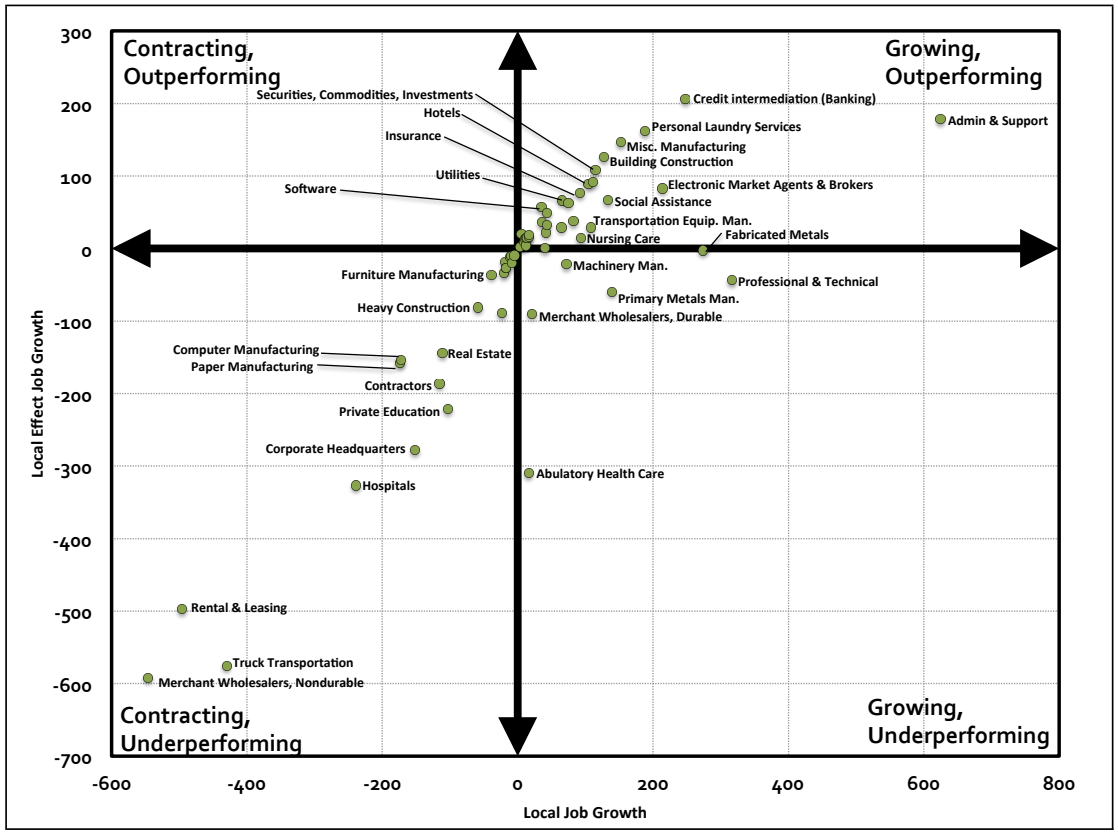
Growing, Underperforming: Industries that are growing locally but slower than the national average. These industries generally have a sound foundation but some local factor is limiting growth.

Contracting, Outperforming: Industries that are declining locally but slower than the national average. These industries have structural issues that are impacting growth industry wide. However, local firms are leveraging some local or regional factor that is making them more competitive than other firms on average.

Contracting, Underperforming: Industries that are declining locally at a rate faster than the national average. These industries have structural issues that are impacting growth industry wide. However, some local or regional factor is making it increasingly tough on local firms. These are industries in the local economy at the greatest risk.

In association with our knowledge of specialized industrial composition, these metrics help policy makers craft targeted programs and policies to both facilitate the expansion of outperforming industries as well as support those exhibiting risk of deterioration. Clackamas County's economic drivers are considered in Figure 21:

Figure 21: Industry Sector Shift-Share Analysis, Clackamas County (2010-2012)



	LOCAL EFFECT JOB GROWTH
Credit intermediation and related activities	206
Administrative and support services	178
Personal and laundry services	162
Miscellaneous manufacturing	146
Construction of buildings	126
Securities, commodity contracts, investments	108
Accommodation	91
Membership associations and organizations	88
Electronic markets and agents and brokers	83
Insurance carriers and related activities	76
Social assistance	67
Utilities	66
Food manufacturing	63
Publishing industries, except Internet	57
Telecommunications	50
Primary metal manufacturing	-59
Heavy and civil engineering construction	-81
Warehousing and storage	-89
Merchant wholesalers, durable goods	-90
Real estate	-144
Paper manufacturing	-153
Computer and electronic product manufacturing	-158
Specialty trade contractors	-186
Educational services	-222
Management of companies and enterprises	-278
Ambulatory health care services	-309
Hospitals	-327
Rental and leasing services	-497
Truck transportation	-575
Merchant wholesalers, nondurable goods	-592

From Figure 21 we can consider the industries that are both driving the local economic expansion as well as those industries at risk of becoming increasingly less competitive. Some key findings:

- Industries in the local economy are generally following the direction of the national economy. Around half the industries in Clackamas County are growing and outperforming the industry trends, while half are underperforming. We did not find any industries that were declining but outperforming the industry average.

- Clackamas County has a tale of two economies. The top 15 performing sectors accounted for over 2,300 new jobs since 2010. However, this growth was offset by losses of a similar number of jobs in the top 15 worst performing industries.

- On the positive side, non-real estate financial activities are playing a large part in driving economic growth. Also, while professional & technical services firms have grown at a rate below expectations, administration & support activities are among the best performing industries in the county.

- We see the local software publishing industry expanding moderately and above trend.

- It's positive to see building construction outperforming and expanding. When specialty trade contractors follow suit it will be a positive signal for the economy.

- Most manufacturing activities have performed in line with their industry trends, with a few exceptions. Clackamas County's metals and machinery cluster has exhibited positive growth that is slightly below the industry standard, but not by a considerable margin. Misc. manufacturing has exhibited strong growth. However, while unrelated to each other, both computer manufacturing and paper manufacturing are contracting, and at a rate considerably worse than their industry direction.

- Perhaps the most underperforming group of sectors are nondurable goods wholesaling, warehousing, and transportation. Even during the current expansion these industries have combined to account for nearly 1,000 lost jobs since 2010.

TARGET INDUSTRY LINKAGES AND PROFILES

In addition to the previous metrics, we took a more granular look at the composition of industry sectors and the local businesses that operate within them. This is an essential exercise when forecasting industrial growth, as changes in a particular "foundational" industry are likely to permeate through other related businesses within a cluster. For example, if widget manufacturing is expected to exhibit strong growth, then local firms related to widget manufacturing (i.e. widget wholesaling & distribution, packaging & labeling of widgets, construction & maintenance of widget making machinery, etc.) are also likely to grow in some multiple.

We find in economic cluster analysis that industries are linked in a variety of ways. Specifically, we have identified five general categories of linkage by which firms and industries agglomerate spatially or are fundamentally interrelated, although others likely exist.

Source of Demand: Firms or populations that support the demand for goods or services within a particular cluster. The "end user" of a good or service. Examples include population centers, foreign markets, or industries that utilize a particular good or service.

Source of Production Inputs: Firms or industries that supply inputs to the production process of another industry. Examples include raw materials, software, equipment, or components for assembly.

Distribution Activity: Firms or industries that facilitate the processing, transportation, distribution, or wholesale of goods and services. The intermediary between sourcing or end users. Examples include food packaging and labeling, trucking/distribution, and wholesale trade brokers.

Ancillary/Business Support: Firms or industries that provide services that support the business operations of populations or other businesses in the economy. These firms generally exist in part or on whole due to the presence of other businesses, industries, & clusters. Examples include legal and accounting services, payroll services, and building maintenance.

Unrelated/Labor Pool or Sourcing: Sectors that are unrelated to each other but have agglomerated in the same geography due to a sharing of value chain or labor force. Examples include industries that utilize a common raw material or skill set in the workforce.

Our analysis began with an investigation of how industries are organized with respect to their cross industry linkages, derived from an evaluation of input-output linkages using 2012 IMPLAN datasets. This dataset can be used to measure the magnitude of typical economic linkage between broad industry classes. However, while a sound approach in theory, this evaluation proved to have considerable limitations. First, for some industries, wholesaling for example, IMPLAN classifications do not drill down below the supersector level. Secondly, the data derived from national and regional inputs does not reflect local business activity. And finally, the data does not consider other factors that influence cluster development, such as physical proximity to an institution or critical piece of infrastructure, the presence of a foundational "anchor", or the influence of shared workforce dynamics.

In other words, the IMPLAN data provides an additional screen, or a theoretical level input to industry linkages, but falls short of fully informing how actual businesses are connected and how clusters are organized at the local level. In the end, IMPLAN was better at measuring the magnitude of aggregate household response and tertiary impacts such as impacts on real estate, food, and other professional services.

Therefore, building upon this and our specialization and economic driver metrics as a screen, we researched businesses within each sector to define their primary economic function in the context of known linkages.

Excluding service industries such as leisure, food service, retail, and personal care services, we classified all firms with 20 or more employees by their economic function. This covered over two-thirds of all employment in the study area. Industry class was used to aggregate smaller firms. For each business we assigned a "primary" and if applicable a "secondary" cluster designation. We define these categories as follows:

Primary: *The sector or cluster that a firm's primary business activity is concentrated.*

Support/secondary: *A sector or industry that is not directly related to a firm's output, but a linkage exists or the firm supports production or output in some way.*

For example, a large plumbing and HVAC construction contractor would be classified as construction for its primary sector, because the firm's primary business activity is construction. However, if in our research of the firm we found that its business function is the install and maintenance of clean rooms for the region's high-tech industry, it's secondary classification would be high-tech because it serves an essential function in the high-tech cluster's production process.

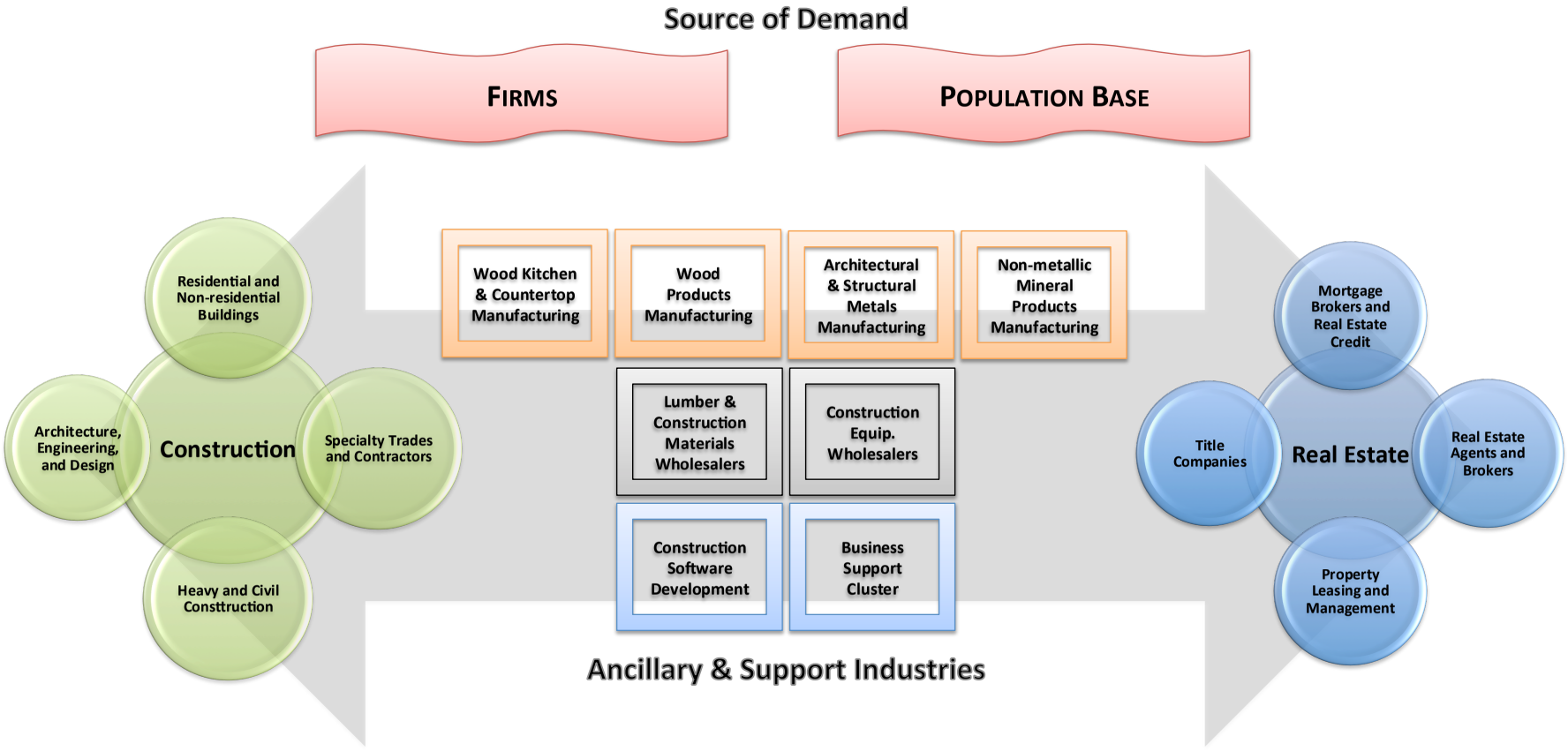
This approach in not without limitations and caveats. The most common limitation we found was businesses with diverse functions that operate across clusters that could be placed into multiple cluster designation. More so, the analysis also bears the inherent subjectivity of human classification and error. Nevertheless, this approach proved to be constructive as it reflected actual business operations and relationships while also allowing us to adjust for the inflexibility of NAICS classifications. More so, this approach has the value-added benefit in the forecasting of growth in particular industries, because we account for the impact of related economic activities on subsets of a particular industry or group of firms.

All told, we organized the economy into eight distinct target industry clusters:

- Construction & Real Estate
- Advanced Manufacturing: Metals and Machinery
- Advanced Manufacturing: Computers and Electronics
- Agriculture and Food Processing
- Logistics, Distribution, and Wholesale
- Software Development and Computer Programming
- Business Support and Back Office Operations
- Health Care and Biotechnology

Profiles were developed for each cluster, presented here:

Construction and Real Estate



Construction and Real Estate

Representative Industries

Primary Industries

2361 Residential Building Construction
2362 Nonresidential Building Construction
237 Heavy and Civil Engineering Construction
238 Specialty Trade Contractors
4233 Lumber and Other Construction Materials Merchant Wholesalers
53111 Lessors of Residential Buildings and Dwellings
5312 Offices of Real Estate Agents and Brokers
53131 Real Estate Property Managers
54131 Architectural Services
54133 Engineering Services

Secondary Industries

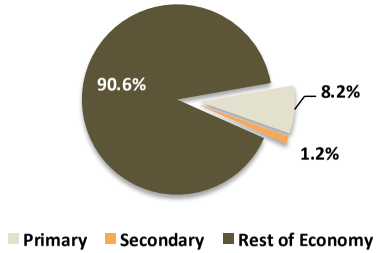
321214 Truss Manufacturing
321911 Wood Window and Door Manufacturing
3273 Cement and Concrete Product Manufacturing
327991 Cut Stone and Stone Product Manufacturing
3323 Architectural and Structural Metals Manufacturing
33711 Wood Kitchen Cabinet and Countertop Manufacturing
42372 Plumbing and Heating Equipment and Supplies) Merchant Wholesalers

Total Jobs Associated with Cluster: 10,509 jobs

Cluster Overview

Somewhat under the radar, construction and real estate play an exceedingly large role in the Clackamas County economy. Core construction activities that include construction of buildings, heavy and civil construction, and specialty trade contractors account for nearly 6,000 jobs. But the cluster's breadth goes considerably further into the manufacturing, wholesale, professional services, and financial activities sectors. Wood products manufacturing in Clackamas County is overwhelmingly concentrated in lumber, truss, window, door, and kitchen cabinetry products. Similarly, professional services firms specializing in interior design, architecture, engineering, landscape and design are a considerable component of professional services. And finally, source materials for construction represents a sizeable share of Clackamas' metals sector. All told nearly 10% of all Clackamas County employment can be linked to the Construction and Real Estate Cluster.

Share of Economy

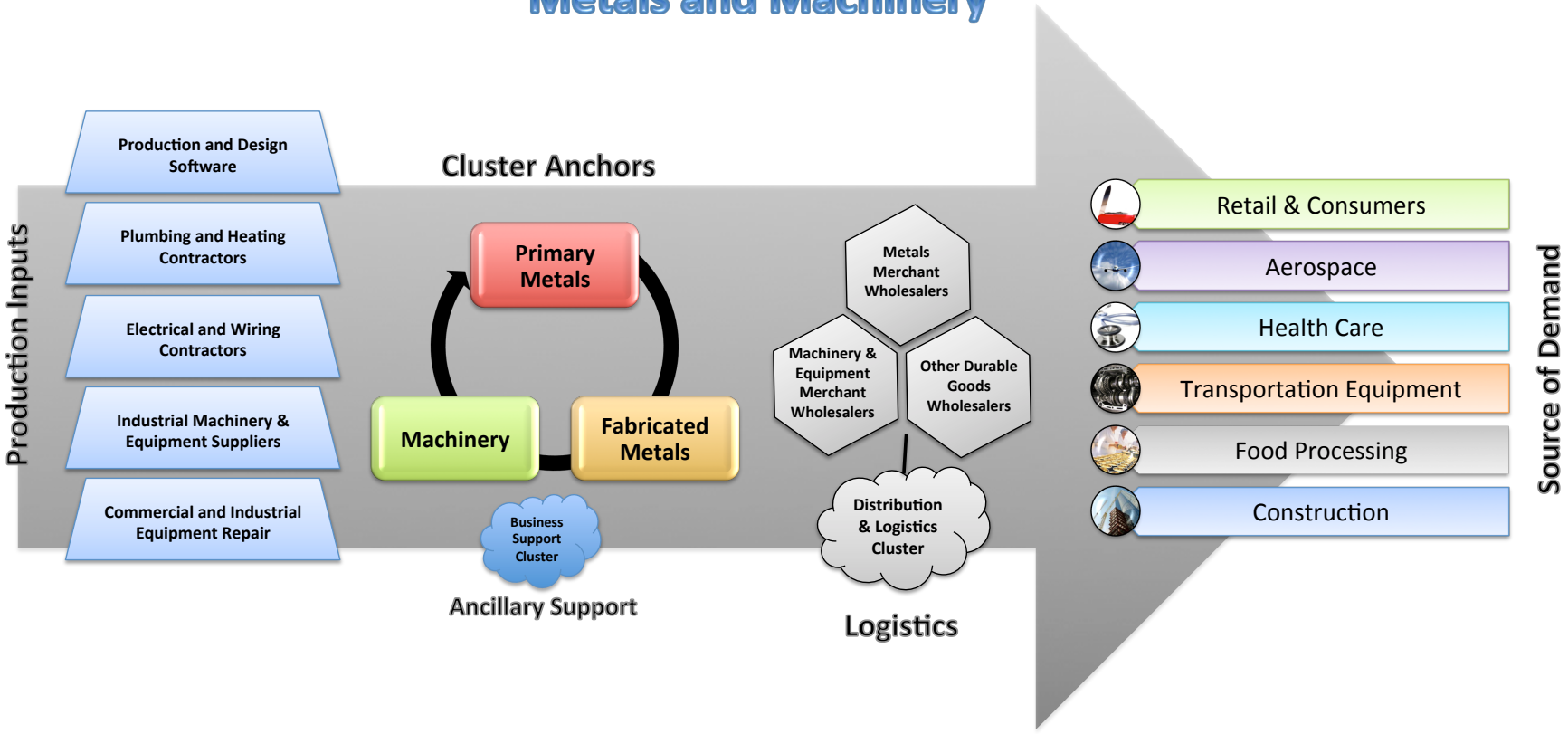


Representative Firms

- Stoner Electric
- Johnson Controls
- American Residential
- Portland Mechanical Contractors
- Jacobs Engineering
- Princeton Property Management
- Orepac Building Product

Advanced Manufacturing

Metals and Machinery



Advanced Manufacturing: Metals & Machinery

Representative Industries

Primary Industries

331512 Steel Investment Foundries
331523 Nonferrous Metal Die-Casting Foundries
331529 Other Nonferrous Metal Foundries (except Die-Casting)
33221 Cutlery and Handtool Manufacturing
332216 Saw Blade and Handtool Manufacturing
332312 Fabricated Structural Metal Manufacturing
332999 All Other Miscellaneous Fabricated Metal Product Manufacturing
33314 Optical Instrument and Lens Manufacturing
42383 Industrial Machinery and Equipment Merchant Wholesalers

Secondary Industries

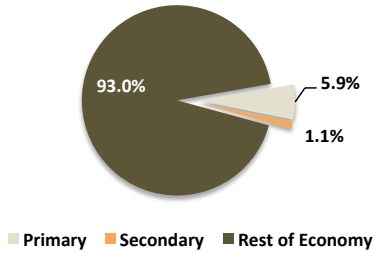
23822 Plumbing, Heating, and Air-Conditioning Contractors
336350 Motor Vehicle Transmission and Power Train Parts Manufacturing
33637 Motor Vehicle Metal Stamping
336413 Other Aircraft Parts and Auxiliary Equipment Manufacturing
33995 Sign Manufacturing

Total Jobs Associated with Cluster: 7,809 jobs

Cluster Overview

Metals and Machinery in Clackamas County is anchored around the workforce and supply-chain dynamics surrounding a few key industries. Generally, this cluster provides component and machinery for other manufacturing processes, including aerospace, semiconductors, food processing, and transportation parts and equipment. In turn, other industries including logistics and wholesale, contactors, equipment testing and calibration, and other industrial machinery maintenance and repair services have agglomerated locally.

Share of Economy

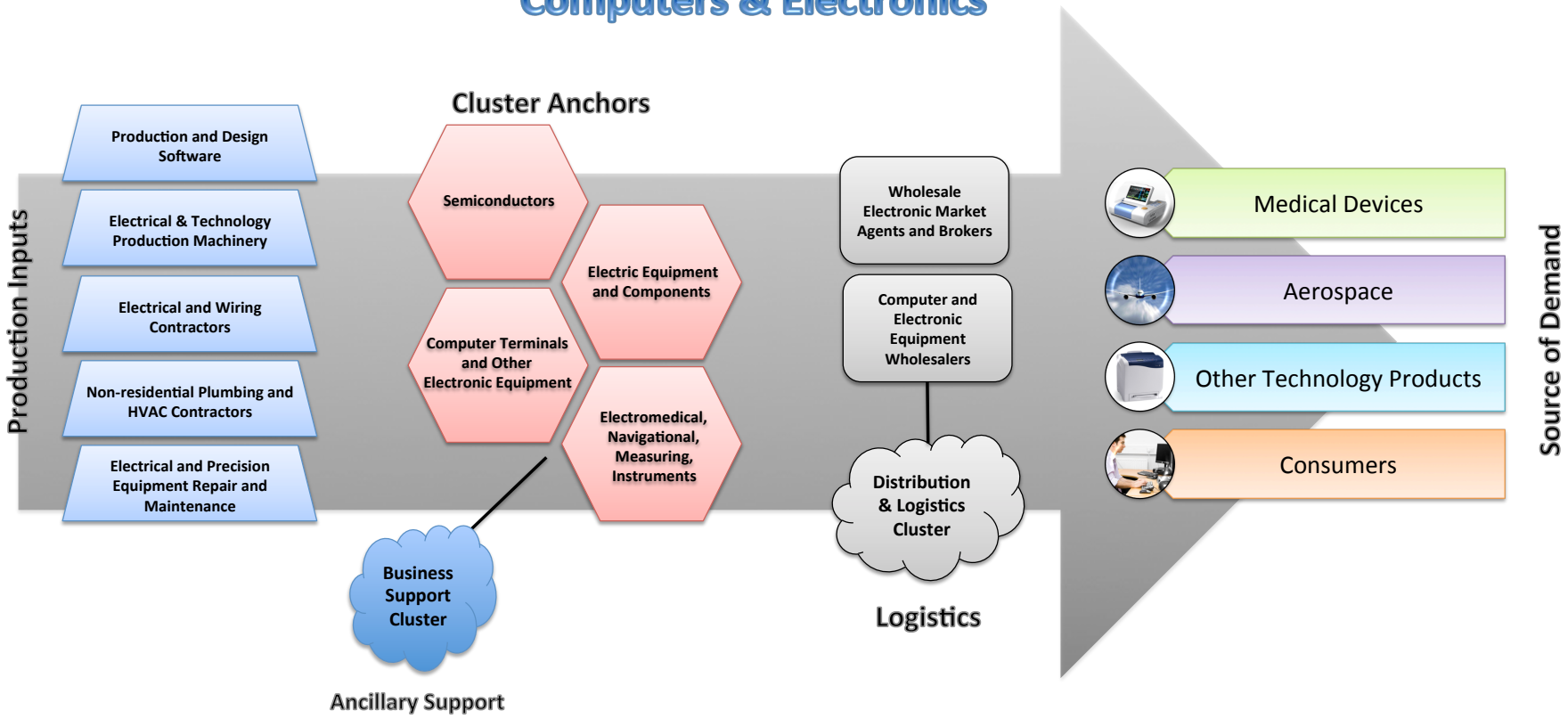


Representative Firms

- Consolidated MEtco
- Oregon Iron Works
- PCC Structural
- Oregon Cutting Systems
- Western Precision Products
- Enoch Manufacturing
- Black and Decker
- Warn Industries

Advanced Manufacturing

Computers & Electronics



Computer and Electronic Devices

Representative Industries

Primary Industries

33411 Computer and Peripheral Equipment Manufacturing
3344 Semiconductor and Other Electronic Component Manufacturing
3345 Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
42343 Computer & Computer Peripheral Equipment and Software Merchant Wholesalers
42361 Electrical Apparatus & Equip., Wiring Supplies, & Related Equip. Wholesalers
42369 Other Electronic Parts and Equipment Merchant Wholesalers
54169 Other Scientific and Technical Consulting Services

Secondary Industries

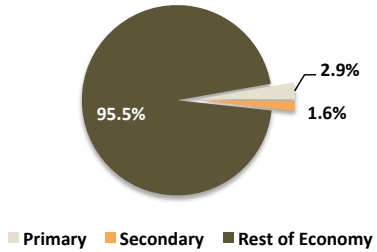
23821 Electrical Contractors and Other Wiring Installation Contractors
332999 All Other Miscellaneous Fabricated Metal Product Manufacturing
335314 Relay and Industrial Control Manufacturing
335921 Fiber Optic Cable Manufacturing
5112 Software Publishers
54151 Computer Systems Design and Related Services

Total Jobs Associated with Cluster: 5,020 jobs

Cluster Overview

The Portland Metropolitan Region maintains a distinct competitive advantage in the semiconductor, computer, and microelectronics filed. Born out of early establishments such as Tektronix, the cluster has expanded to include divisions of multiple international firms. The workforce and value-chain advantages are broad-based, covering everything from construction to logistics and distribution. In Clackamas County, the industry is grounded by a select few anchor firms, developing products and components for both value-chain and end consumer products across the medical device, computer, and aerospace industries, among others.

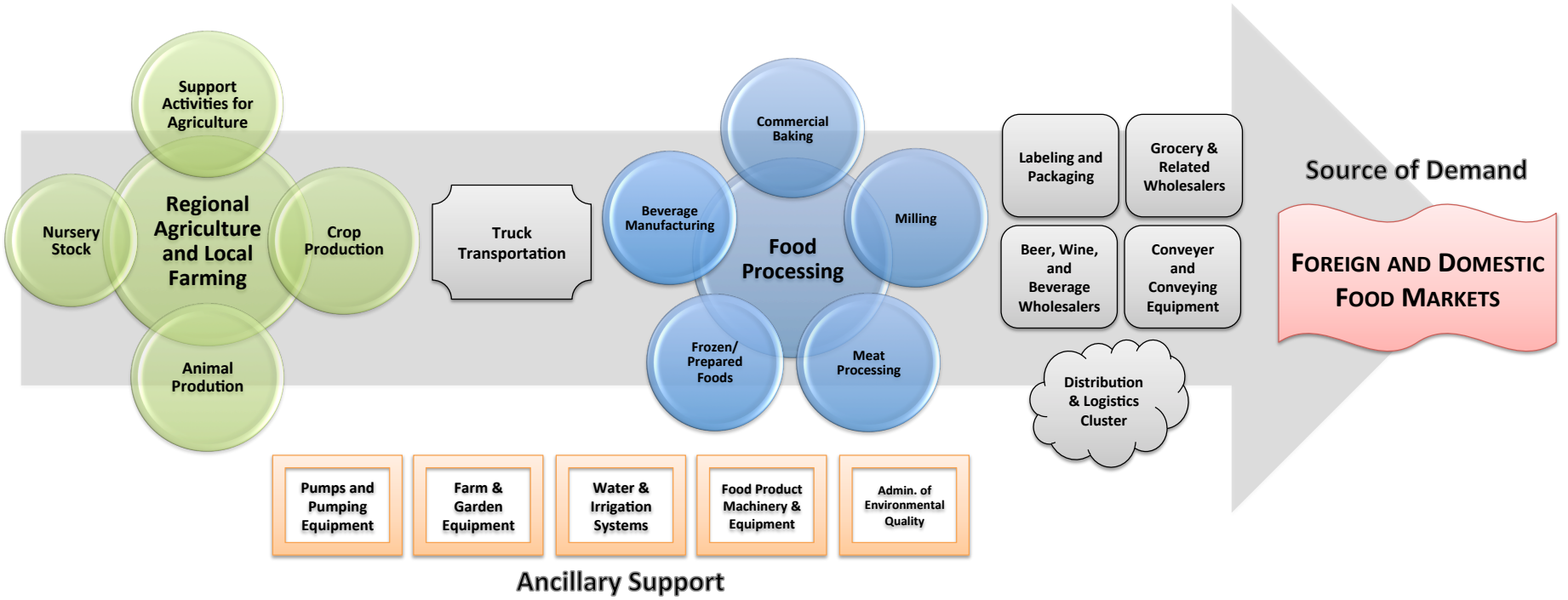
Share of Economy



Representative Firms

- Cisco
- Xerox
- Micro Systems
- Tyco
- Pacific Scientific-OECO
- Astoria Pacific
- Apple
- Indigo Systems

Agriculture and Food Processing



Agriculture and Food Processing

Representative Industries

Primary Industries

11142 Nursery and Floriculture Production
31121 Flour Milling and Malt Manufacturing
3114 Fruit and Vegetable Preserving and Specialty Food Manufacturing
31151 Dairy Product (except Frozen) Manufacturing
311812 Commercial Bakeries
3119 Other Food Manufacturing
32222 Paper Bag and Coated and Treated Paper Manufacturing
42441 General Line Grocery Merchant Wholesalers
42449 Other Grocery and Related Products Merchant Wholesalers
92614 Regulation of Agricultural Marketing and Commodities

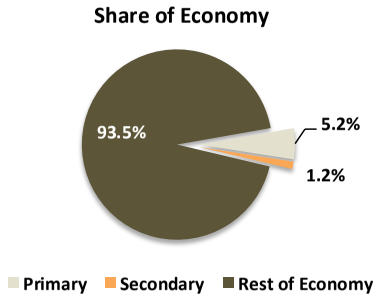
Secondary Industries

22131 Water Supply and Irrigation Systems
33391 Pump and Compressor Manufacturing
333922 Conveyor and Conveying Equipment Manufacturing
42344 Other Commercial Equipment Merchant Wholesalers
49311 General Warehousing and Storage
493120 Refrigerated Warehousing and Storage

Total Jobs Associated with Cluster: 7,229 jobs

Cluster Overview

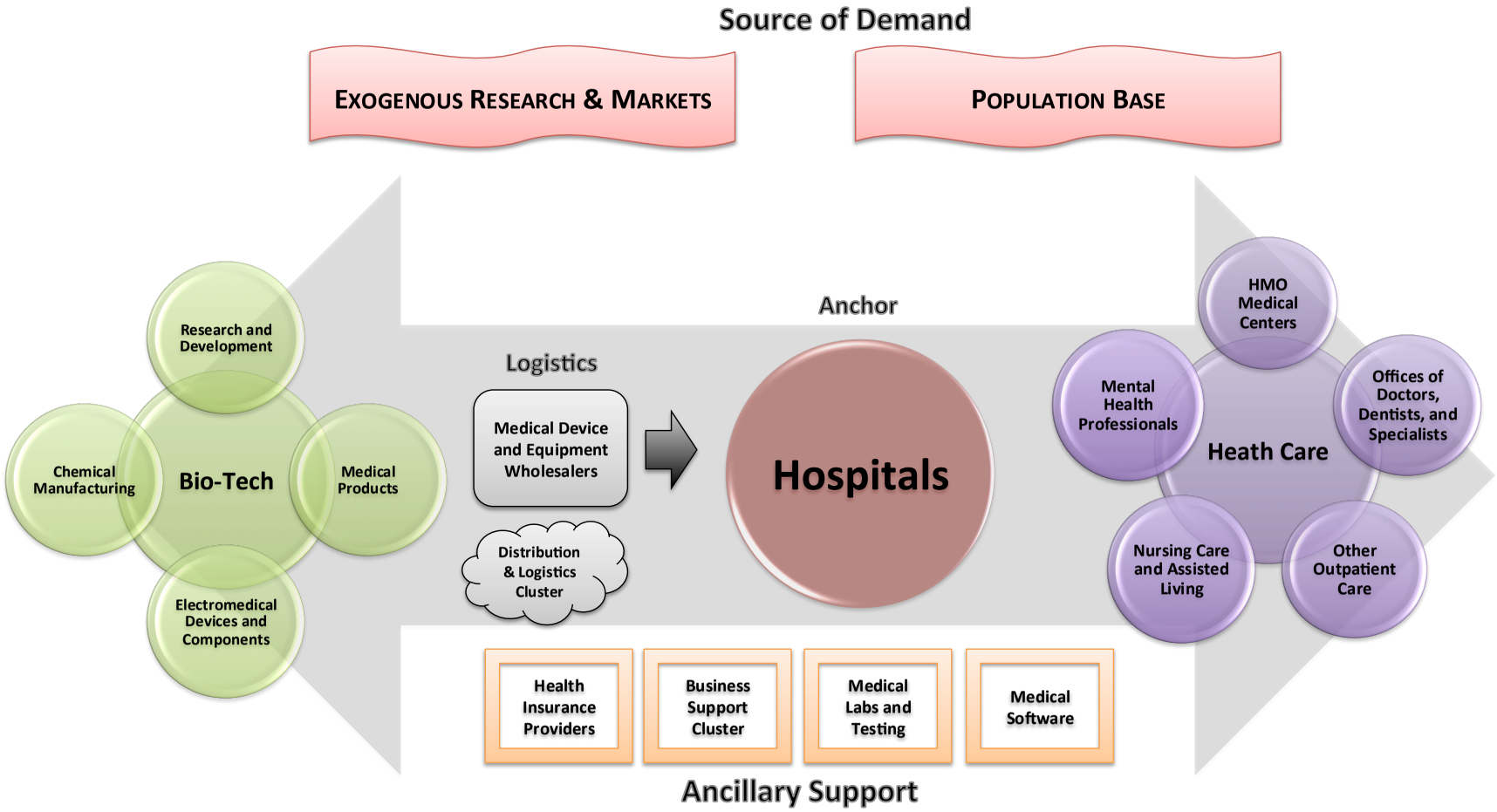
Clackamas County's Agriculture and Food cluster is anchored in regional crop production and farming, although there is some farming activity occurring within the urban growth boundary, primarily limited to nursery stock. Food processing in Clackamas County has emerged as an industrial stronghold, anchored by several large firms, which also have regional corporate management functions locally. The cluster has less emphasis on Food Manufacturing, which only makes up 18% of the cluster's primary employment. Rather, the primary function is in the packaging, labeling, distribution, and wholesale of food products. In turn, the presence of these activities has spawned a range of ancillary functions that provide the equipment and maintenance but also for the wholesale and distribution of products to end users.



Representative Firms

- Kroger
- Interstate Meat
- United Grocers
- Safeway
- Sysco
- Craftsman Label
- Pacific Seafood
- Bobs Red Mill

Health Care and Biotechnology



Health Care and Biotechnology

Representative Industries

Primary Industries

3254 Pharmaceutical and Medicine Manufacturing
33911 Medical Equipment and Supplies Manufacturing
42345 Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
551114 Corporate, Subsidiary, and Regional Managing Offices
5417 Scientific Research and Development Services
621 Ambulatory Health Care Services
622 Hospitals
623 Nursing and Residential Care Facilities

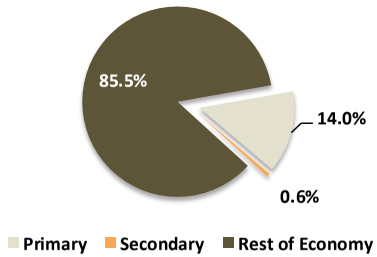
Secondary Industries

331529 Other Nonferrous Metal Foundries (except Die-Casting)
33441 Semiconductor and Other Electronic Component Manufacturing
334516 Analytical Laboratory Instrument Manufacturing
334510 Electromedical and Electrotherapeutic Apparatus Manufacturing
5112 Software Publishers
524114 Direct Health and Medical Insurance Carriers

Cluster Overview

Related primarily in workforce and research funding linkages, these sectors are anchored by regional hospitals that provide and attract a critical mass of trained workers but also serve as a source of demand for medical products and services. Health care activities in general are driven by demographic factors. Bio-technology on the other hand is more discrete. In this analysis we include the manufacture of medical devices and tools but also research and laboratory functions. The cluster also supports growing ancillary functions that include development of medical software, testing and research laboratories and other back office functions.

Share of Economy

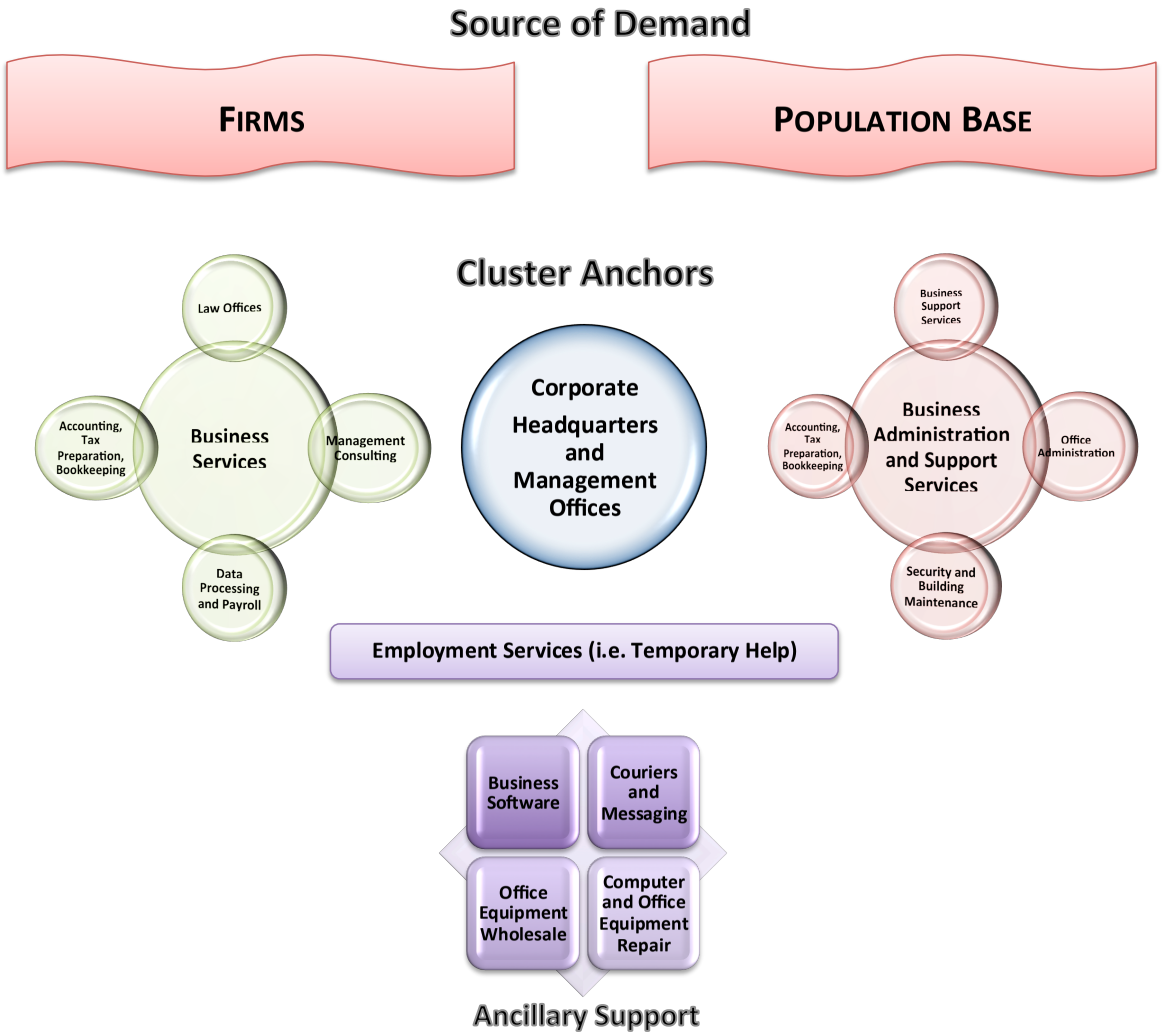


Representative Firms

- Providence
- Legacy Meridian Park Hospital
- Sunnyside Hospital
- Health Wright Products
- Kirkman
- Rehab Specialists Inc.
- Kaiser
- Biotronik

Total Jobs Associated with Cluster: 16,210 jobs

Business Support and Back Office



Business Support and Back Office Operations

Representative Industries

Primary Industries

51821 Data Processing, Hosting, and Related Services
51913 Internet Publishing and Broadcasting and Web Search Portals
5411 Legal Services
5412 Accounting, Tax Preparation, Bookkeeping, and Payroll Services
5416 Management, Scientific, and Technical Consulting Services
551 Management of Companies and Enterprises
56132 Temporary Help Services
56142 Telephone Call Centers
5617 Services to Buildings and Dwellings
8139 Business, Professional, Labor, Political, and Similar Organizations

Secondary Industries

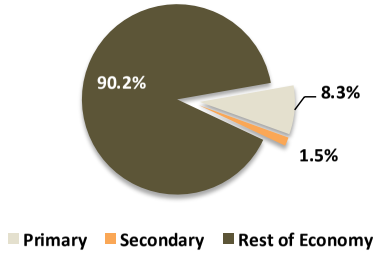
54138 Testing Laboratories
54151 Computer Systems Design and Related Services
56199 All Other Support Services
5112 Software Publishers

Total Jobs Assoicated with Cluster: 10,897 jobs

Cluster Overview

Firms in the Business Support and Back Office Services Cluster serve both a growing economic and population base. This cluster of businesses includes the majority of non-technical and scientific professional services that generally serve the broad business community. In some cases this localized agglomerations of the cluster can be anchored around the corporate or management headquarters of large campuses or a particular real estate concentration with locational advantages such as the Kruse Way office corridor. The primary components of the cluster include legal, payroll, management consulting, and accounting services. The cluster also includes back office customer service and call services as well as activities relating to the service, maintenance, and operation of buildings. Staffing and temporary help services comprise a significant share of the cluster. Finally, we also include business and professional organizations and labor unions in this category. These activities and realted functions make up nearly 10% of the economy.

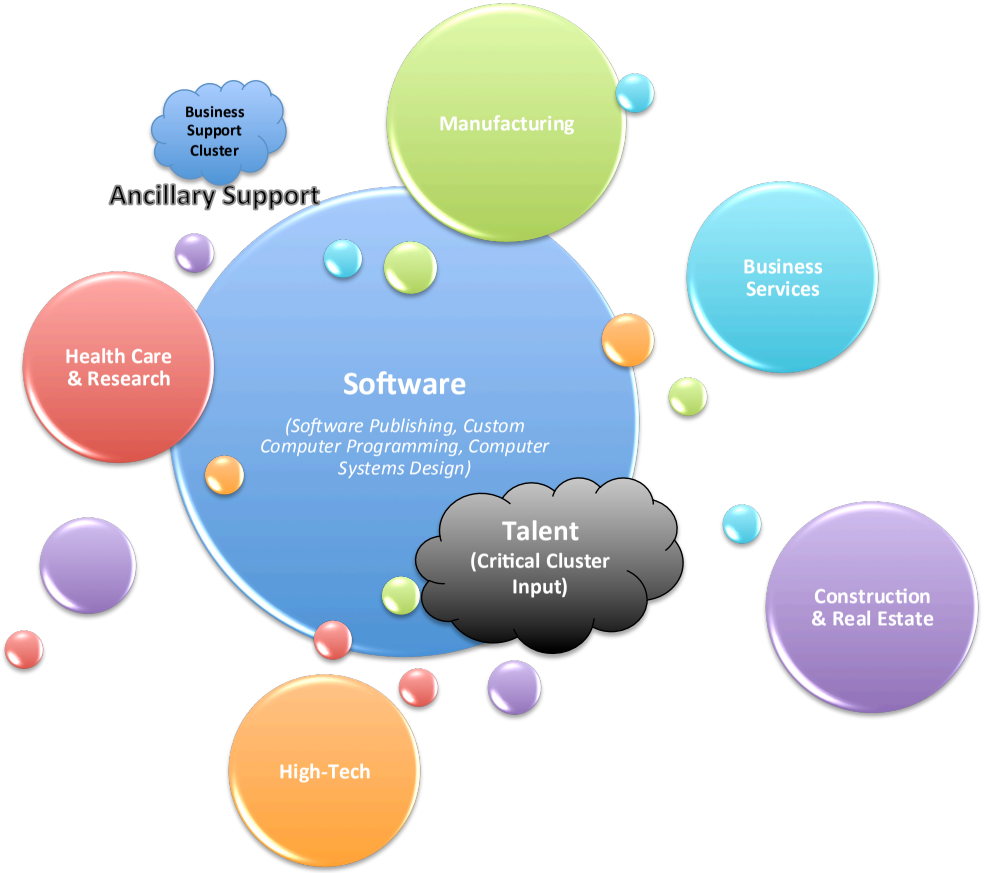
Share of Economy



Representative Firms

- Aerotek
- Active Telesource
- Servicemaster
- Express Employment Services
- WIllamette Building Services
- ADP

Software Development



Software Development

Representative Industries

Primary Industries

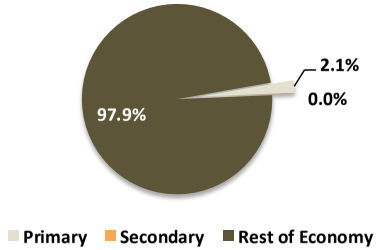
5112 Software Publishers
541511 Custom Computer Programming Services
541512 Computer Systems Design Services
541513 Computer Facilities Management Services
541519 Other Computer Related Services
541611 Administrative Management and General Management Consulting Services

Secondary Industries

Cluster Overview

Software development is technically a subcomponent of the Business Support Cluster. However, while it exists to serve foundational industries, we consider it alone given its size (nearly 2,400 jobs), growth prospects, and more importantly its agglomeration around talent. As companies across nearly all industries are increasingly reliant on information technology to enhance productivity, Software development will continue to expand. Software is a sector that is attracting the majority of the region's venture capital. Unlike other parts of the metro area, in Clackamas County, most software activities are an extension of large firms.

Share of Economy

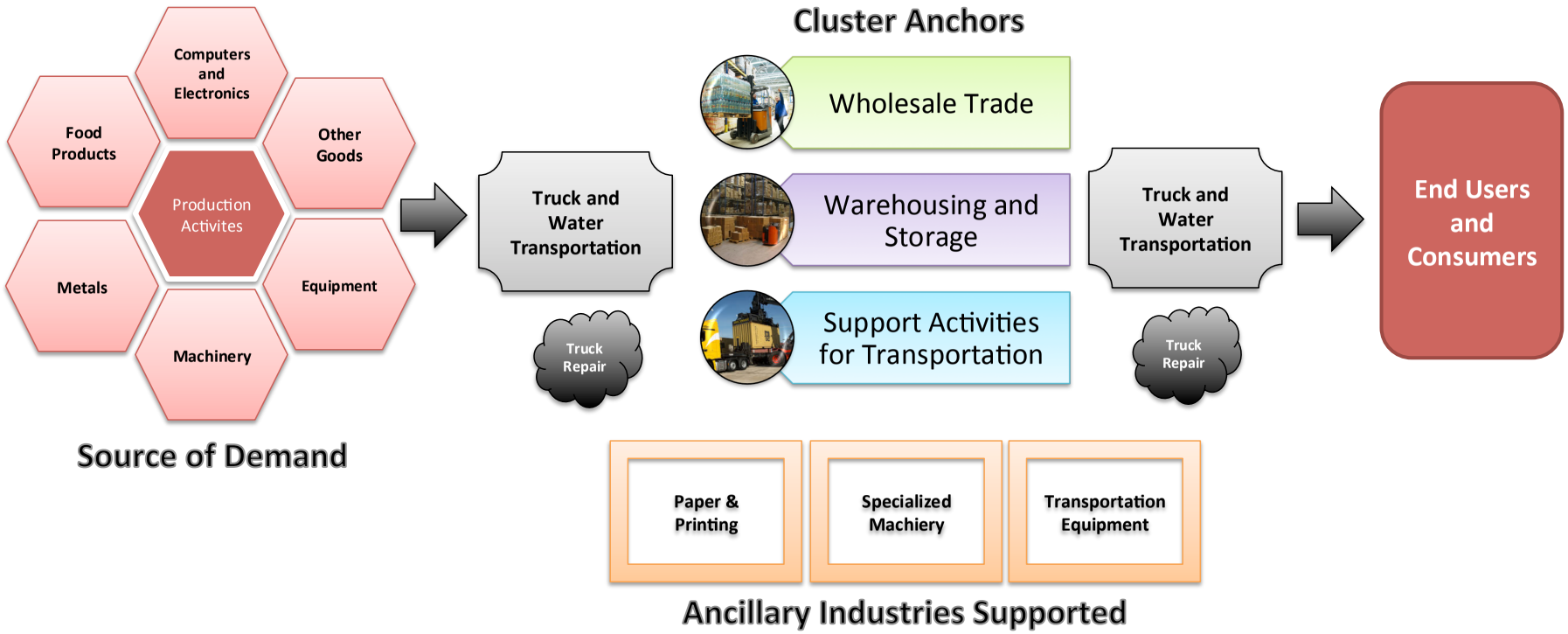


Representative Firms

- AutoDesk
- Jeppesen Sanderson
- Convergence NW
- Mentor Graphics
- Exterro
- Huron Consulting

Total Jobs Assoicated with Cluster: 2,360 jobs

Logistics, Distribution, and Wholesale



Logistics, Distribution, and Wholesale*

Representative Industries

Primary Industries*

4231 Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
42344 Other Commercial Equipment Merchant Wholesalers
42393 Recyclable Material Merchant Wholesalers
4251 Wholesale Electronic Markets and Agents and Brokers
484 Truck Transportation
4881 Support Activities for Air Transportation
491 Postal Service
493 Warehousing and Storage

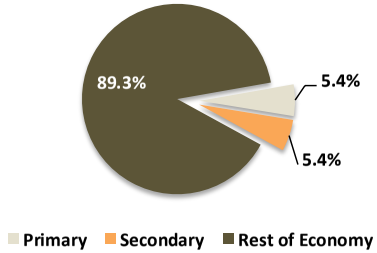
Secondary Industries

32222 Paper Bag and Coated and Treated Paper Manufacturing
323111 Commercial Printing (except Screen and Books)
Wholesale Trade Associated with Other Clusters

Cluster Overview

The movement and sale of goods between intermediaries and consumers is an essential component of any regional economy. In Clackamas County, Logistics and Distribution is perhaps the most well rounded component economy, reach nearly every sector of the local and regional economy. Components of the cluster include the manufacture of conveying and packaging equipment, commercial printing, packaging, and labeling, storage and cold storage, truck transportation, and all wholesaling activities. The cluster also includes federal postal services. The locational and infrastructure advantages of the region have attracted several large-scale distribution anchors.

Share of Economy



Representative Firms

- Safeway
- Gordon Trucking
- Emmert International
- Distribution Inc.
- Rite Aid
- United State Postal Service
- NTP Distribution
- Con-Way

Total Jobs Assoicated with Cluster: 11,976 jobs

* Our evaluation of this cluster is unique, as we have allocated many of these functions to other specifically related clusters. For example, we include grocery and food packaging and distribution as a primary activity of the Food Processing Cluster. In this case primary industries are those not allocated elsewere (i.e. transportation equip.) and Wholesale Trade assoicated with other clusters in considered a secondary activity. This is done to prevent double counting of primary functions.

CLACKAMAS COUNTY EMPLOYMENT FORECASTS

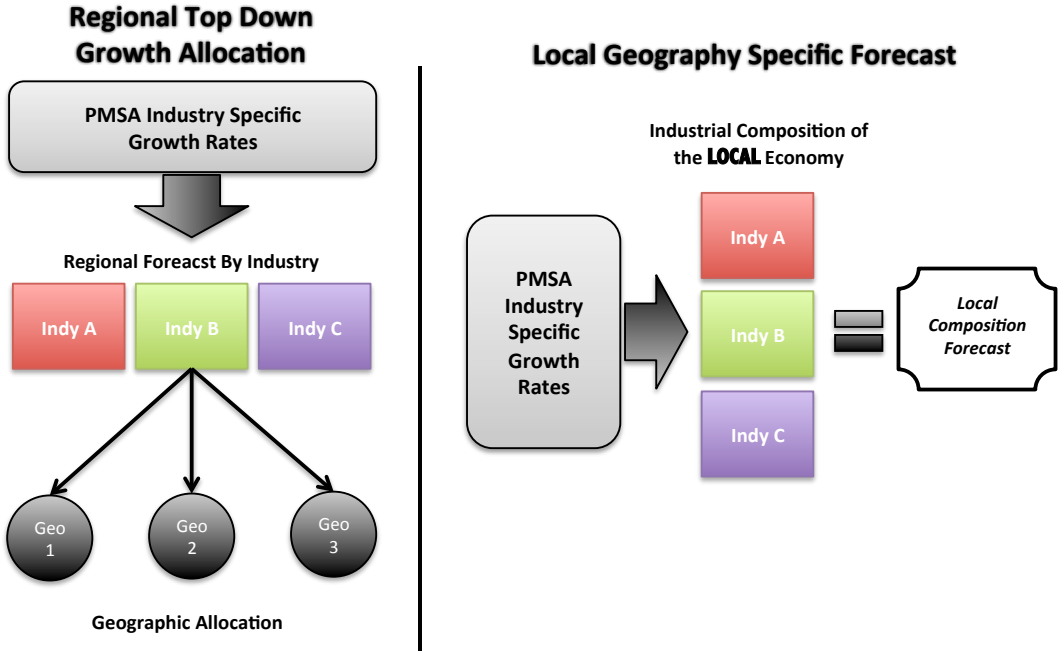
Building upon our previous assessment of economic trends and conditions, and identification of economic opportunities and targeted clusters, Johnson Economics developed a series of employment forecasts over the planning period. We have broken these forecast into two categories, baseline and alternative forecasts. The baseline forecasts generally rely on third-party growth estimates at the sector level. The alternative forecasts reflect more opportunity driven scenarios that reflect trends among local industries, foundational firms, and the policy direction of the county toward economic development.

BASELINE FORECAST:

Scenario I:

The first forecast relies on regional growth rates outlined in the Metro UGR. In that analysis, growth forecasts were developed at the industry sector level for the entire Portland-Vancouver-Beaverton PMSA and then allocated down (top down approach) to unique geographies. Scenario I in this report relies on these macro variable based growth rates, but applies them to the specific industrial composition of the local economy.

Figure 22: Overview of Baseline Employment Forecast Approach



Scenario II:

Scenario II in this analysis uses the same local concentration approach as Scenario I. However, this scenario uses industry sector level forecasts from the Oregon Employment Department for Clackamas County only. These forecast are produced for the entire County, includes areas outside of the UGB. However, we apply them only to the insider the UGB base. Because the urban economic base is likely to grow at a faster rate than outside of the metro area, this forecast is likely to be conservative.

Forecast Results:

Both forecasts produce similar gross employment estimates, ranging from nearly 40,000 jobs (1.4% AAGR) to over 44,000 jobs (1.5% AAGR) over the forecast period. However, the distribution of growth across industries is variably different. Note also that even in Scenario I where growth rates are derived from PMSA estimates, the overall growth rate is higher locally. This is the result of Clackamas County having a higher concentration in higher growth industries. Some additional observations:

Figure 23: Baseline Growth Forecasts, Clackamas County in Metro UGB (2012-2035)

	BASE YEAR	SCENARIO I			SCENARIO II		
Industry	2014	2035	#	AAGR	2035	#	AAGR
Natural Resources	465	430	-35	-0.4%	716	251	2.1%
Construction	6,667	11,336	4,668	2.6%	11,578	4,911	2.7%
Manufacturing	13,902	13,942	40	0.0%	17,406	3,504	1.1%
Wholesale Trade	8,650	11,587	2,937	1.4%	10,864	2,213	1.1%
Retail Trade	15,065	19,447	4,382	1.2%	19,885	4,821	1.3%
T.W.U.	4,122	4,946	824	0.9%	5,353	1,231	1.3%
Information	1,333	1,850	516	1.6%	1,620	286	0.9%
Finance	4,665	5,105	440	0.4%	6,393	1,728	1.5%
Real Estate	1,824	2,109	285	0.7%	2,390	566	1.3%
Professional Services	7,404	10,758	3,354	1.8%	11,962	4,558	2.3%
Management	1,418	2,178	760	2.1%	1,903	485	1.4%
Admin & Waste	6,573	10,310	3,737	2.2%	10,116	3,543	2.1%
Education	7,672	10,551	2,879	1.5%	10,663	2,991	1.6%
Health & Social Assistance	16,588	24,782	8,193	1.9%	23,195	6,607	1.6%
Arts. Ent. Rec.	1,514	1,914	399	1.1%	2,015	501	1.4%
Accomodation & Food	9,457	11,855	2,398	1.1%	13,240	3,783	1.6%
Other	4,238	6,211	1,974	1.8%	5,528	1,290	1.3%
Government	5,181	7,125	2,123	1.5%	6,185	1,004	0.8%
TOTAL:	**116,738**	**156,434**	**39,874**	**1.4%**	**161,013**	**44,274**	**1.5%**

- The PMSA forecast (Scenario I) anticipates zero growth in the manufacturing sector compared to a 1.1% expansion for Clackamas County forecasted by the Oregon Employment Department (Scenario II).

- A similar trend is exhibited for natural resources, an industry that has a low utilization of urban land.

- The state forecasts are much more bullish on population serving industries than the PMSA forecasts. Growth rates for finance, real estate, professional services, education & health, leisure, and retail, are all measurably higher in the Scenario II forecasts.

- Both forecasts have a similar disposition toward construction activity.

- Taken together, the forecast would represent an increase in the employment base of roughly 34% and 38% in Scenarios I and II, respectively.

ALTERNATIVE FORECAST

The estimates in the preceding analysis are useful in creating a baseline understanding of macroeconomic growth prospects. They are common and broadly accepted approaches when looking at large geographic regions. After all, this approach is similar to the methodology used to produce the employment forecasts in Metro's UGR and estimates for state budgeting purposes. However, forecasts grounded in broad based economic variables do not account for the realities of local businesses and trends among evolving industries. Industries continually evolve and new opportunities arise. Just ten years ago data centers barely existed in the Northwest, e-commerce business models such as Amazon were still being questioned as viable, social media was in its infancy, commercial aerial drones didn't exist, and the first smart phones were just being designed. Five years ago app development wasn't even an industry and most macro forecasts had the information sector (includes software publishing) declining or exhibiting flat growth. Any long-term forecast is wrought with uncertainty, and subject to inherent error.

The extent to which a forecast reflects discrete information about companies and industries can reduce error bands while providing value-added direction on how policy can influence outcomes.

Potential Deviations from Macro Forecasts

In the context of discrete knowledge about the Clackamas County economy and structural economic trends we've identified (i.e. energy market advantages, on-shoring prospects, migration trends) we derive an alternative economic opportunities based employment forecast. In part, this forecast is predicated on the notion that local economies are reflective of policy decisions, investments, and actions a community takes to successfully encourage and foster growth. We begin by identifying six critical factors that influence the growth and direction of a particular industry.

1. **Population Base**

   Growth in the local and regional population bases will increase demand for goods and services consumed locally. The extent of population growth will directly impact firms and industries that produce these economic activities. Examples include housing, retail, health care, financial services, and personal care.

2. **Policy**

   Policy decisions at the local and national level will influence the need for specific goods and services. For example, investment in infrastructure impacts demand for construction & utilities just as investment in schools or technical training programs would increase growth in the education sector. Other factors such as trade and tax policy are also impactful, among others.

3. **Global/Exogenous Factors**

   Goods and services produced locally that are exported outside of our region will be heavily influenced exogenous factors. This would include both raw goods such as agricultural products as well as components or manufactured goods such as computer, electronic, and aerospace components.

4. **Industrial Shifts/Trends**

   Similarly, shifting processes, production, and other trends within foundational industries will impact demand for locally produced goods. For example, the merging of microelectronics, software, and robotics across medical, automotive, and aerospace industries will increase demand for these products and the mutual interdependencies of these sectors.

5. **Regional Economic Growth/Business Demand**

   Firms and sectors that support broad-based economic activity will be influenced by growth in foundational industries. Examples include business support activities, the movement of goods (logistics & distribution) and the construction and maintenance of new facilities and equipment.

6. **Specific Event/Recruitment**

   The region is in the process of coordinating a regional large-lot industrial recruitment strategy. As our analysis has found, many industrial clusters organize around a particular anchor firm or groups of anchor firms. The successful recruitment of large foundational user would increase demand for ancillary, value-chain, and support products and services markedly in addition to direct employment.

In Figure 24, we consider growth prospect for targeted industries (as well as other sectors) in the context of identified growth prospects.

Figure 24: Influence of Growth

	Population Base	Policy	Global/Exogenous Factors	Industry Shifts/Trends	Regional Economic Growth	Specific Event or Recruitment
Education	Growth correlation to population base	Public investment in expanded public education facilities			Potential for increased demand for technical training facilities in key production industries	Potential for increased demand for technical training facilities in key production industries
Retail, Food Services, and Personal Care	Growth correlation to population base			Increasing number of office and other uses (banking, daycare, etc.) locating in retail space	Some localized growth could occur above and beyond trend comensurate with daytime employment concentrations	
Leisure, Hospitality, and Recreation (nonfood)	Growth correlation to population base				Growth in hotel accomodations will be a function of economic and tourism growth	
Finance	Growth correlation to population base		Financial market stability impact on access to capital		Growth in finance will in part be a function of economic growth locally	
Agriculture & Food Processing	Growth correlation to population base	Impact on workforce training, incentive programs for industrial recruitment and retention	Foreign and domestic demand growth	Potential for a shift in production away from resource constrained regions. Expansion west for access to export markets.	Regional growth in core activities will influnece demand in ancillary functions (i.e. equipment, distribution/logistics)	Regionally significant recruitment target industry
Bio-Tech and Health Care	Growth correlation to population base	Impact on workforce training, incentive programs for industrial recruitment and retention	Expanding global and domestic investment seeking west coast locations	Shift in research funding to private donors, expanded integration of microelctronics, advances in processes that leverage local strengths	Regional presence in bio-technology and research is growing (i.e. OHSU, OSU)	Regionally significant recruitment target industry
Business Support & Back Office	Growth correlation to population base			Increasing utilization of Information Technology and Software. Large firms internalizing these functions	Growth in business support services will in part be a function of economic growth locally	
Computers and Electronics	Indirect impact relating to market size for end user products	Impact on workforce training, incentive programs for industrial recruitment and retention	Increasing global demand for goods, intellectual property rights, production processes requiring more trained workforce	Microelectronics expansion into other industries, shifts in production processes	Value-chain growth coincident with anchor industry expansion	Regionally significant recruitment target industry
Construction & Real Estate	Growth correlation to population base	Local land policy impacting the character, form, and extent of development and redevelopment		Changes in character of development may impact the composition of the cluster, material sourcing. Brokerage threatened by technology and software	Growth in Construction will in part be a function of economic growth locally	
General Industrial	Indirect impact relating to market size for end user products	Impact on workforce training			Growth in Misc. industrial activites will in part be a function of economic growth locally	
General Professional Services	Growth correlation to population base	Impact on workforce training		Industries exhibiting a preference for urban locations	Growth in Misc. industrial activites will in part be a function of economic growth locally and regionally. Many activites are supportive of regional concnetrations in activewear and retail commericce	
Government and Public Admin.	Growth correlation to population base	Changes in the size of Government in relation to the population base				
Logistics, Distribution & Wholesale	Indirect impact relating to market size for end user products	Impact on workforce training		Conversion of shipping methods to natural gas, conversion to full-service facilities, E-commerace fullfillment growth	Growth will be in part a function of regional business demand	
Metals & Machinery	Indirect impact relating to market size for end user products	Impact on workforce training, incentive programs for industrial recruitment and retention	Foreign and domestic demand growth, expansions to west coast markets, shifting of investment from Asian markets.	Cheap natural gas increasing competitiveness, on-shoring, advances in technological processes	Sector provides ancillary inputs to a range of regionally significant industries (aerospace, trans. Equip. ect.)	Regionally significant recruitment target industry relating to specialized machinery
Software Development & Computer Programming	Indirect impact relating to market size for end user products	Impact on workforce training		Changes in competitiveness with access to fiber, growing imprtance on productivity gains, growing automated processes, big data	Growth will be in part a function of regional business demand	
Utilities and Services	Growth correlation to population base	Incentive programs for clean-tech and renewable energy products and services	Commodity price impacts on rates		Growth will be in part a function of regional business demand	Expansion of service capacity to serve industrial sites

Our assessment of macro forecasts and local economic concentrations and growth prospects yield the some **potential** deviations from baseline estimates. Here, we review the most critical. Applicable baseline AAGR's from Scenario I are in parentheses.

Natural Resources (-0.4%): Low macro level estimates are likely to be driven primarily by negative trends in forestry, mining, and other agricultural sectors. In Clackamas County, however, the sector is largely driven by nursery stock, an industry that is more closely related to construction activity. Oregon is also the largest exporter of nursery stock in the nation.

Wood Products Manufacturing (-0.4%): Similarly, negative growth forecasts in the sector are certainly related to a downturn in milling and forestry related activities, which have been declining for years. In Clackamas County the sector is primarily concentrated in products serving the construction industry, namely kitchen cabinetry, wood windows, doors, and countertop manufacturing.

Food Manufacturing (-0.4%): Most of the employment in local food manufacturing is concentrated in commercial baking and locally produced and consumed goods. While there is a threat to growth of a large user leaving the county, there is at least an equal likelihood of these users expanding or new users or businesses finding local advantages. Also, beverage manufacturing is growing regionally at an accelerated pace. Clackamas County has a strong beverage wholesaling presence but has no beverage manufacturing businesses. This is an opportunity for industry expansion. Other opportunities include leveraging the cluster strengths in distribution and packaging to see additional frozen or prepared foods industry presence. In other words, the cluster has considerable upside opportunities will limited downside risk.

Other Non-Durable Goods (0.3%): National forecasts are predicted to decline markedly with PMSA forecasts coming in very low. "Other non-durable goods" generally includes textiles, apparel, chemicals, printing, and plastics. Some of these sectors such as textiles and apparel face increasing growth threats in off-shore production. Others such as chemicals and printing do not, and are tied to regionally concentrated industries such as bioscience and distribution. Clackamas County's other non-durable goods sector does not have an apparel or textile presence.

Paper Manufacturing (-2.4%): A significant share of local employment is in an industry subsector that faces considerable production challenges. There is a very real likelihood that declines in this sector a measurable larger than PMSA forecasts. The sector could nearly disappear in Clackamas County.

Metals & Machinery (-0.7%): This sector is among the largest and most specialized in Clackamas County. It is an industry that is anchored by large publically traded anchors. It is an industry that could benefit from on-shoring and domestic energy advantages. Negative growth would be a reversal of the 10-year trend in Clackamas County. There is an isolated threat to the machinery subsector, which could see a reversal as technology becomes more integrated in mechanical processes. Alternatively both metals categories should at least maintain a status quo trend locally.

Computers and Electronics Manufacturing (1.3%): This is an industry that has competing prospects locally. On one hand firms are facing increasing foreign competition, on the other some firms are brining foreign production back home in light of workforce needs and intellectual property concerns. The industry should exhibit structural expansion resulting from integration into other sectors such as automotive components, avionics, bioscience, and electromedical devices. This sector arguably has the best opportunity for one or more large-scale business recruitments in the broader metropolitan region.

Wholesale Trade (1.4%): PMSA forecasts call for stable growth in wholesaling in light of declining or stagnate manufacturing activity. In the event that manufacturing does decline measurably in key sectors such as food, metals, and computers, we would expect this forecast to be optimistic.

Alternative Forecast Scenario III & IV:

Based on all our proceeding research and analysis, Johnson Economics developed alternative growth scenarios reflecting supplemented growth rates for select subsets of industries. This process involved a complex matrix of actual firms and subsector industries disaggregated into cluster groups. Industries that were not given a cluster designation received a growth rate similar to its macro sector rate as in Scenario I or II. Segments of industries that were considered part of a large cluster ecosystem received an alternative forecast based on the overall local growth prospects of the cluster. Consider the following example:

> *The PMSA growth forecast for fabricated metals is -0.5% AAGR. In other words, the regional forecast is for a 20-year contraction of -9% in the industry. However, our analysis reveals that "X%" of the local fabricated metals sector directly provides materials used in heavy & civil, and buildings construction—a sector that is forecasted to **expand** by 66% over the same period. As such, our model generates an alternative growth rate for **this subset** of fabricated materials subsectors based on its linkage to the growing construction sector as well as alternative assumptions about the underlying growth trends of the industry. As in most forecast models, this analysis also includes a sensitivity metric to create a lower and upper bound forecast.*

Large-Lot Overlay

In addition to the analysis above, our employment forecasts also consider the direct and indirect/induced impacts of regionally significant large-lot recruitments on Clackamas County's employment base, and by extension land demand. The region has identified improving large-lot industrial competitiveness as an economic development objective. Metro maintains an inventory of all large industrial sites greater than 25 acres and the readiness of such lands to accommodate potential users. Clackamas County in its own right has undertaken considerable efforts to improve and market its large-lot industrial land supply. The County has developed an award winning online search tool to inventory sites and site conditions and market sites to the business and development community. As an extension of this project, the County completed its Strategically Significant Employment Lands Project. This analysis developed detailed concept plans and readiness assessments on 21 large industrial sites across the county. It also identified the economic impacts and job creation associated with each concept plan. And finally, Clackamas County is participating in the Greater Portland Partnership for Economic Advancement's (GPPEA) Large-Lot Demand and Recruitment Strategy.

Quantifying demand for large industrial sites is much different than trended economic analysis, as these sites reflect the decisions of individual firms that cannot be measurably predicted by economic variables. Rather, we must consider if the region is likely to be competitive in attracting users over the 20-year planning period. For this process, we lean on the site-specific work conducted by Clackamas County as a part of its Strategically Significant Employment Lands Project. That analysis identified a number of sites in the UGB that would be competitive options over that time frame. Upon review, we have selected two sites we consider to be most likely to develop. They are summarized here:

Clackamas Industrial Site-0 (CIAO):

The site is 62 gross acres with roughly 39 acres considered to be developable after accounting for natural resource mitigation and slope. The analysis found this site to be among the least constrained in the study. CIAO benefits from a location in the Clackamas Industrial Area, which includes a critical mass of metals, machinery, food processing, and distribution users. The site has had recruitment interest in recent years. The unique quality of the site is that the County itself owns the site, and is motivated to see an economically productive user on site. This condition alone makes the likelihood of an industrial siting on CIAO highly likely over the 20-year period. The conceptual development plan for CIAO was designed for an advanced metals or machinery manufacturer capable of delivering 550 jobs on site at full build-out. Ancillary impacts elsewhere in the regional economy totaled 993 jobs. For the purpose of this analysis, given the location of the site and proposed user, we assume that Clackamas County would capture one-third of ancillary impacts.

Wilsonville Industrial Development Site-1 (WIDS-1)

This site includes 30 net-developable acres in Wilsonville. The site is fundamentally strong with a strategic location within Wilsonville's high-tech cluster and offers excellent visibility and access. Development constraints are also very limited, making the site increasingly marketable. The concept planning and economic analysis identified this site as being ideal for a single high-tech manufacturer of computers, electronics, or components. The plan assumed up to 720 jobs on-site at full capacity. Indirect and induced job creation was estimated at over 2,800 jobs. Ancillary impacts are much greater for high-tech users because of higher wages paid to households and broad value-chains. For the purpose of this analysis, given the location of the site near other jurisdictions and the location of value chain sourcing, we assume that Clackamas County would capture only one-fifth of regional ancillary impacts.

Impact on Growth Scenarios

In our forecast scenarios, the lower bound forecast assumes that only the CIAO site develops over the planning period, while the upper bound forecast assumes both sites have successful recruitments sometime in the next 20-years. Further, we ignore any potential impacts that a recruitment outside of Clackamas County would have on local businesses and household spending.

Forecast Results:

The Scenario III forecast estimates roughly 1.5% annual growth on the way to projecting over 44,000 new jobs. Meanwhile, the Scenario IV forecast projects 1.8% annual growth and over 53,750 new jobs. Collectively, these scenarios reflect a more optimistic outlook for the manufacturing sector in light of potential large-lot recruitments and an alternative perspective on the growth prospects for local manufacturers of metals, machinery, and electronic products, as well related industries within these clusters. Alternative forecasts also reflect less optimistic estimates for industries that are likely to be increasingly threatened by technological displacement. Examples include the impact of automation on the finance and real estate industry and growing e-commerce impacts on brick and mortar retail.

Figure 25: Alternative Scenario Employment Forecasts

	BASE YEAR	SCENARIO III			SCENARIO IV		
Industry	2014	2035	#	AAGR	2035	#	AAGR
Natural Resources	465	534	69	0.7%	548	83	0.8%
Construction	6,667	10,936	4,269	2.4%	11,508	4,841	2.6%
Manufacturing	13,902	19,017	5,114	1.5%	20,984	7,082	2.0%
Wholesale Trade	8,650	11,979	3,329	1.6%	12,740	4,090	1.9%
Retail Trade	15,065	19,134	4,069	1.1%	19,652	4,587	1.3%
T.W.U.	4,122	5,124	1,003	1.0%	5,377	1,256	1.3%
Information	1,333	1,903	570	1.7%	2,070	737	2.1%
Finance	4,665	5,216	551	0.5%	5,423	758	0.7%
Real Estate	1,824	2,028	204	0.5%	2,131	307	0.7%
Professional Services	7,404	11,751	4,347	2.2%	12,958	5,554	2.7%
Management	1,418	2,132	714	2.0%	2,353	935	2.4%
Admin & Waste	6,573	10,099	3,526	2.1%	11,075	4,502	2.5%
Education	7,672	10,384	2,713	1.5%	10,722	3,051	1.6%
Health & Social Assistance	16,588	24,317	7,729	1.8%	25,841	9,252	2.1%
Arts. Ent. Rec.	1,514	1,878	364	1.0%	1,953	438	1.2%
Accomodation & Food	9,457	11,621	2,164	1.0%	12,030	2,573	1.2%
Other	4,238	6,108	1,870	1.8%	6,362	2,124	2.0%
Government	5,181	6,597	1,416	1.2%	6,782	1,601	1.3%
TOTAL:	**116,738**	**160,759**	**44,021**	**1.5%**	**170,509**	**53,770**	**1.8%**

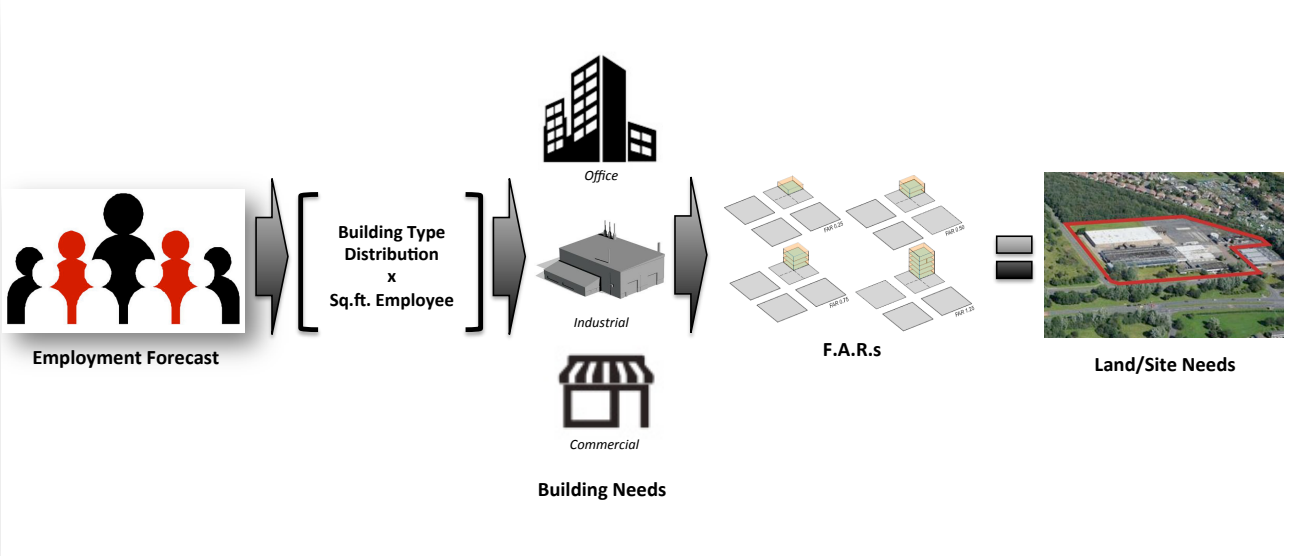
CLACKAMAS COUNTY EMPLOYMENT LAND FORECAST

The next analytical step in our analysis is to convert projections of employment into forecasts of land demand over the planning period. The generally accepted methodology for this conversion begins by allocating employment by sector across a distribution of building typologies those economic activities usually locate in. Fore example, insurance agents typically locate in traditional office space, usually along commercial corridors. However, a percentage of these firms locate in commercial retail space adjacent to retail anchors. Cross-tabulating this distribution provides an estimate of employment in each typology.

The ensuing step is to convert employment into space estimates using assumptions of the typical square footage exhibited within each typology. Adjusting for market clearing vacancy we arrive at an estimate of total space demand for each building type.

Finally, we can consider the physical characteristics of individual building types and the amount of land they typically require for development. The site utilization metric commonly used is referred to as a "floor area ratio" or F.A.R. For example, assume a 25,000 square foot general industrial building requires roughly two acre to accommodate its structure, setbacks, parking, and necessary yard/storage space. This building would have an F.A.R. of roughly 0.29.

EMPLOYMENT FORECAST TO LAND DEMAND METHODOLOGY



BASELINE LAND DEMAND ANALYSIS

Similar to how baseline employment forecasts followed assumptions in the Metro UGR, we maintain that trend here. Specifically, the UGR outlined assumptions for a distribution of employment by sector into six building typologies, provided general assumptions about sq. ft. per employee for these typologies, and indicated a series of F.A.R.s to complete the conversion process. An overview of how those assumptions were derived can be found in the Metro UGR. However, we note several limitations and caveats here:

- The baseline distribution matrix includes six typologies:
  - Traditional Office (commercial)
  - Institutional (commercial)
  - Flex/Business Park (industrial)
  - General Industrial (industrial)
  - Warehouse (industrial)
  - Retail (commercial)

  These development typologies do not include broad diversity within individual sectors. In reality there is a considerable difference between many development forms within these categories.

- The designation of an entire typology into a single land class is limiting (commercial or industrial). In reality some of these typologies cross over land categories, particularly industries in institutional uses that locate on both commercial and industrial land.

- Square feet per employee assumptions reflect different rates for more urban (inner ring) and exurban (outer ring) locations. Our analysis did not evaluate discrepancies in geographic areas. Therefore, we calculated a weighted average based on gross employment distribution.

- Similarly, the UGR identified a different set of F.A.R.s for variances in geographic forms. For example, higher F.A.R. assumptions for Regional & Town Centers. However, the report does not provide background information on how these allocations were made. Again, we relied on a weighted average to consolidate into a single assumption by type.

- The UGR land demand analysis was for all land and employment across all sector types. The Clackamas County analysis is a non-retail study. As such, we have excluded the retail and accommodation & food service sectors from all land demand scenarios.

As a result of these caveats, we cannot consider our baseline assumptions to be 100% reflective of UGR estimates, albeit the error is likely to be small.

Forecast Results:

- The baseline Scenario I forecast estimated 1,648 net-developable acres to accommodate forecasted economic growth. Additional acreage of up to 20% could be required if considerable extension or development of new infrastructure was required to deliver suitable land. Based on exhibited assumptions, the balance of need across commercial and industrial types is roughly equal.

- The model for baseline Scenario II projects slightly higher demand at 1,853 net-developable acres. The same caveat for potential gross acreage conversion applies. In this forecast the additional acreage is entirely concentrated across industrial uses, primarily the result of a more optimistic manufacturing outlook.

Figure 26: Baseline Land Demand Forecasts

SCENARIO I

Industry	Base Year 2014	Est. 2035	NET-NEW EMPLOYMENT IN BUILDINGS Office	Inst.	Flex/BP	Gen. Ind.	Warehouse	Retail
Construction	6,667	11,336	654	0	840	1,867	840	467
Manufacturing	13,902	13,942	3	0	10	24	3	0
Wholesale Trade	8,650	11,587	235	0	646	587	1,175	294
Retail Trade	15,065	19,447	219	44	263	0	526	3,330
T.W.U.	4,122	4,946	124	0	99	107	453	41
Information	1,333	1,850	129	0	129	206	0	52
Finance	4,665	5,105	317	4	22	4	4	88
Professional Services	7,404	10,758	2,415	34	168	34	34	671
Management	1,418	2,178	601	38	61	0	0	61
Admin & Waste	6,573	10,310	2,691	37	187	37	37	747
Education	7,672	10,551	864	1,526	144	29	29	288
Health & Social Assistance	16,588	24,782	2,458	4,342	164	0	0	1,229
Arts. Ent. Rec.	1,514	1,914	140	0	40	0	0	220
Other	4,238	6,211	1,421	20	99	20	20	395
Government	5,181	7,125	836	680	97	19	19	292
TOTAL:	**104,993**	**142,040**	**13,105**	**6,726**	**2,968**	**2,935**	**3,140**	**8,174**
		Average SF/Emp:	*328*	*555*	*826*	*690*	*1,580*	*478*
		Estimated Square Feet of Space*:	**4,720,917**	**4,105,920**	**2,695,697**	**2,227,973**	**5,457,999**	**4,293,134**
		Average FAR:	*0.35*	*0.49*	*0.29*	*0.29*	*0.29*	*0.31*
		TOTAL ACRES DEMANDED	**309**	**193**	**214**	**176**	**433**	**322**
		Commercial:	**825**					
		Industrial:	**824**					
**Includes 10% market clearing vacancy*		**TOTAL:**	**1,648**					

SCENARIO II

Industry	Base Year 2014	Est. 2035	NET-NEW EMPLOYMENT IN BUILDINGS Office	Inst.	Flex/BP	Gen. Ind.	Warehouse	Retail
Construction	6,667	11,578	687	0	884	1,964	884	491
Manufacturing	13,902	17,406	280	0	841	2,103	280	0
Wholesale Trade	8,650	10,864	177	0	487	443	885	221
Retail Trade	15,065	19,885	241	48	289	0	579	3,664
T.W.U.	4,122	5,353	185	0	148	160	677	62
Information	1,333	1,620	72	0	72	115	0	29
Finance	4,665	6,393	1,244	17	86	17	17	346
Professional Services	7,404	11,962	3,282	46	228	46	46	912
Management	1,418	1,903	383	24	39	0	0	39
Admin & Waste	6,573	10,116	2,551	35	177	35	35	709
Education	7,672	10,663	897	1,585	150	30	30	299
Health & Social Assistance	16,588	23,195	1,982	3,502	132	0	0	991
Arts. Ent. Rec.	1,514	2,015	175	0	50	0	0	275
Other	4,238	5,528	929	13	65	13	13	258
Government	5,181	6,185	432	352	50	10	10	151
TOTAL:	**104,993**	**144,667**	**13,518**	**5,622**	**3,697**	**4,935**	**3,456**	**8,445**
		Average SF/Emp:	*328*	*555*	*826*	*690*	*1,580*	*478*
		Estimated Square Feet of Space*:	**4,869,781**	**3,432,238**	**3,358,307**	**3,745,929**	**6,007,208**	**4,435,904**
		Average FAR:	*0.35*	*0.49*	*0.29*	*0.29*	*0.29*	*0.31*
		TOTAL ACRES DEMANDED	**319**	**162**	**267**	**296**	**477**	**333**
		Commercial:	**813**					
		Industrial:	**1,040**					
**Includes 10% market clearing vacancy*		**TOTAL:**	**1,853**					

ALTERNATIVE LAND DEMAND ANALYSIS

Our methodology for determining alternative land forecasts relies on the same conversion methodology. However, our analysis relies on a more detailed set of assumptions reflecting case studies and the market driven expertise of our consultant team. For this analysis Johnson Economics partnered with architectural and engineering Mackenzie to develop 11 building typology profiles based on the industry sectors we found most likely to exhibit employment growth.

Identification of Industry Typologies

Building upon our analysis of targeted industry clusters in Clackamas County and industries likely to exhibit measurable growth over the planning period, Johnson Economics teamed with Mackenzie to identify commercial and industrial development typologies across a range of industry types. Driven by a case study evaluation of businesses across the region, we began with the identification of 11 prototypical non-retail development typologies.

MANUFACTURING BASED

1. **Food Manufacturing and Processing:**
   Examples: Frozen food packaging, commercial baking, brewing

2. **Fabricated Metals:**
   Examples: Construction materials, transportation equipment components, machinery components, cutlery, medical tools

3. **Specialized Machinery:**
   Examples: General industrial. Broad range includes food processing equipment, optics, pumps, industrial molds, etc.

4. **Computers, Electronics, & Electronic Components**
   Examples: Tyco, Eaton, MSEI

5. **General Manufacturing Category**
   Examples: More generalized uses we can lump other activities under, such as paper and printing, furniture, wood products, etc. More traditional industrial business park

LOGISTICS/DISTRIBUTION BASED

6. **Wholesaling:**
   Examples: Commercial equipment, medical/dental, industrial machinery (Biotronik, Phillips, United Grocers, Coca Cola, etc)

7. **Distribution Center:**
   Examples: Safeway, Rite-Aid

SERVICES BASED

8. **Traditional Offices (Finance & Business Support)**
   Examples: Finance, law offices, real estate, etc.) Kruse Way

9. **Creative Offices**
   Examples: Advertising, software development, architecture & engineering, graphic design

10. Medical Offices

Examples: Medical office campus, specialists, outpatient care

11. Research and Development

Examples: Laboratory space, flexible uses, science, electronics, or biology research.

Mackenzie then developed a matrix of site need requirements for small, medium, and large users across each typology, derived from their unique experience in the development community as further case study analysis. This analysis is included in Appendix A.

Building Typology Matrix

Similar to our employment forecast, Johnson Economics then researched the composition of businesses within each cluster by their most likely of our 11 building typologies. Repeating this process within every subsector for every cluster we developed a case study matrix typology distribution unique to Clackamas County development patterns.

Figure 27: Building Typology Matrix

Industry	Computer Manufacturing	Wholesale	Traditional Office	Metals Manufacturing	Machinery Manufacturing	Medical Office	Creative Office	Distribution	Flex/R&D	Food Manufacturing	General Industrial	General Manufacturing	Institutional	Retail
Construction	0%	0%	2%	0%	0%	0%	0%	0%	36%	0%	61%	0%	0%	0%
Manufacturing	40%	0%	0%	31%	3%	0%	0%	5%	8%	6%	0%	6%	0%	0%
Wholesale Trade	0%	57%	0%	0%	0%	0%	0%	32%	11%	0%	0%	0%	0%	0%
T.W.U.	0%	0%	2%	0%	0%	0%	0%	69%	9%	0%	20%	0%	0%	0%
Information	0%	0%	42%	0%	0%	0%	23%	0%	30%	0%	4%	0%	0%	1%
Finance	0%	0%	85%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	5%
Real Estate	0%	0%	74%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	20%
Professional Services	0%	0%	48%	0%	0%	0%	23%	0%	26%	0%	3%	0%	0%	0%
Management	0%	0%	19%	0%	0%	0%	0%	0%	60%	0%	14%	0%	7%	0%
Admin & Waste	0%	0%	41%	0%	0%	0%	0%	0%	20%	0%	37%	0%	1%	0%
Education	0%	0%	42%	0%	0%	0%	0%	0%	5%	0%	0%	0%	40%	13%
Health & Social Assistance	0%	0%	6%	0%	0%	49%	0%	0%	0%	0%	0%	0%	45%	0%
Arts. Ent. Rec.	0%	0%	0%	0%	0%	0%	0%	0%	18%	0%	0%	0%	0%	82%
Other	0%	0%	15%	0%	0%	0%	0%	0%	8%	0%	21%	0%	0%	56%
Government	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	55%	10%

Square Feet Per Employee

This analysis also made assumptions about square feet per employee for each building typology. This is perhaps the most difficult metric to estimate, as changes in technology, productivity, market conditions, and broad variance across firms and subsectors create wide deltas within a given building type. Our approach was to lean on third-party resources, case study analysis using QCEW data and Metro's RLIS GIS data, and Mackenzie's expertise to develop range estimates for each building type. Third-party sources include baseline estimates from the Metro UGR, national estimates from the Energy Information Administration's Commercial Building Energy Consumption Survey (CBECS), and estimate by employment sector from the Urban Land Institute.

F.A.R.s

Range F.A.R.s by building type for small, medium, and large users were provided by Mackenzie as a component of their site needs assessment deliverable.

Forecast Results:

- Forecasted growth in Alternative Scenario III projects roughly 2,188 net-developable acres would be required to accommodate employment growth in the region. This estimate includes roughly 1,373 acres of industrial land 816 acres of commercial land.

- Alternatively, Scenario IV projects a maximum of 2,728 acres of employment land through 2035. This estimate includes 1,726 acres of industrial land and 1,002 acres of commercial land. In both scenarios, commercial land predominately reflects growth in industries that utilize traditional, creative, & medical office space as well as institutional and office uses in retail space. Both scenarios also include the build-out of identified large-lot concept plans.

Figure 28: Alternative Land Demand Forecasts

SCENARIO III									
Building Typology	'14-'35 Growth	EMP/Sq. ft. Low	EMP/Sq. ft. High	Est. Square Footage Low	Est. Square Footage High	Est. FAR Low	Est. FAR Medium	Est. FAR High	Mean Acres Demanded
Computer Manufacturing	2,069	550	605	1,251,792	1,376,972	0.28	0.30	0.33	99
Wholesale	1,898	900	990	1,878,608	2,066,468	0.38	0.40	0.42	111
Traditional Office	7,010	425	468	3,277,026	3,604,729	0.28	0.28	0.30	269
Metals Manufacturing	1,576	700	770	1,213,558	1,334,914	0.33	0.37	0.39	80
Machinery Manufacturing	169	700	770	130,396	143,436	0.32	0.34	0.36	9
Medical Office	3,764	550	605	2,277,221	2,504,944	0.24	0.25	0.25	213
Creative Office	1,196	350	385	460,513	506,564	0.26	0.29	0.29	38
Distribution	1,996	1,850	2,035	4,062,056	4,468,262	0.26	0.27	0.29	352
Flex/R&D	5,228	825	908	4,744,108	5,218,519	0.28	0.28	0.30	389
Food Manufacturing	306	900	990	302,677	332,944	0.25	0.30	0.35	25
General Industrial	4,827	700	770	3,716,642	4,088,306	0.25	0.28	0.32	322
General Manufacturing	306	700	770	235,969	259,566	0.30	0.32	0.34	17
Institutional	5,469	550	605	3,308,978	3,639,876	0.40	0.44	0.50	181
Retail	1,904	475	523	994,644	1,094,109	0.25	0.30	0.33	83
TOTAL:	**37,718**			**27,854,190**	**30,639,609**			**TOTAL ACRES:**	**2,188**
								Commercial:	**816**
								Industrial:	**1,373**

SCENARIO IV									
Building Typology	'14-'35 Growth	EMP/Sq. ft. Low	EMP/Sq. ft. High	Est. Square Footage Low	Est. Square Footage High	Est. FAR Low	Est. FAR Medium	Est. FAR High	Mean Acres Demanded
Computer Manufacturing	2,865	550	605	1,733,275	1,906,603	0.28	0.30	0.33	137
Wholesale	2,332	900	990	2,308,346	2,539,180	0.38	0.40	0.42	136
Traditional Office	8,769	425	468	4,099,635	4,509,598	0.28	0.28	0.30	336
Metals Manufacturing	2,182	700	770	1,680,335	1,848,368	0.33	0.37	0.39	110
Machinery Manufacturing	234	700	770	180,551	198,606	0.32	0.34	0.36	13
Medical Office	4,506	550	605	2,726,003	2,998,604	0.24	0.25	0.25	255
Creative Office	1,536	350	385	591,245	650,369	0.26	0.29	0.29	49
Distribution	2,508	1,850	2,035	5,104,403	5,614,843	0.26	0.27	0.29	442
Flex/R&D	6,481	825	908	5,881,827	6,470,009	0.28	0.28	0.30	482
Food Manufacturing	423	900	990	419,097	461,006	0.25	0.30	0.35	35
General Industrial	5,823	700	770	4,483,958	4,932,354	0.25	0.28	0.32	388
General Manufacturing	424	700	770	326,731	359,404	0.30	0.32	0.34	24
Institutional	6,427	550	605	3,888,428	4,277,271	0.40	0.44	0.50	213
Retail	2,435	475	523	1,272,505	1,399,755	0.25	0.30	0.33	106
TOTAL:	**46,947**			**34,696,337**	**38,165,971**			**TOTAL ACRES:**	**2,728**
								Commercial:	**1,002**
								Industrial:	**1,726**

CHARACTERISTICS OF CLACKAMAS COUNTY LAND DEMAND

Beyond a consideration of gross acreage, Mackenzie's analysis further provides some high level assessment of the varying site characteristics that industries in demand would require for future growth. We summarize some key findings here:

- The majority of targeted industry types require a workforce population of between 20,000 and 30,000 workers. High-tech and research and development generally require a larger workforce base in the order of 60,000 workers to draw from.

- Public transit access for the labor force is generally preferred, however, for more intensive creative office users it is generally a requirement in firms' location decision.

- Industrial buildings are generally more susceptible to slope constraints due to larger building footprints. For a site to be competitive for most industrial uses, a 5% slope is the maximum for development sites. Office and commercial uses are generally smaller and more vertical, allowing for slopes up to 15%.

- Most industries require some direct access to a major transportation route, particularly manufacturing and distribution industries that move goods throughout the region and beyond. A distance of 10 to 20 miles to a major interstate is generally acceptable for most manufacturing activities, but distribution activities require 5 miles or less and generally prefer a direct interstate linkage. Visibility is highly important to most commercial activities and site location along a major commercial arterial is commonly required.

- Railroad access is preferred for most manufacturing activities, with the exception of high-tech. Some users require direct on-site access while others generally make use of a local or regional hub.

- Access and capacity for water, power, gas, and sewer infrastructure is more important to industrial than commercial operations. Water/sewer lines of up to 10" are commonly required for large manufacturers. Appendix A details utility infrastructure requirements by typology.

- Fiber telecommunications networks are likely to be increasingly required in site selection criteria for many commercial office and manufacturing industries. Medical, high-tech, creative office, research & development, and most professional service industries will prefer or require strong fiber access in the coming business cycles.

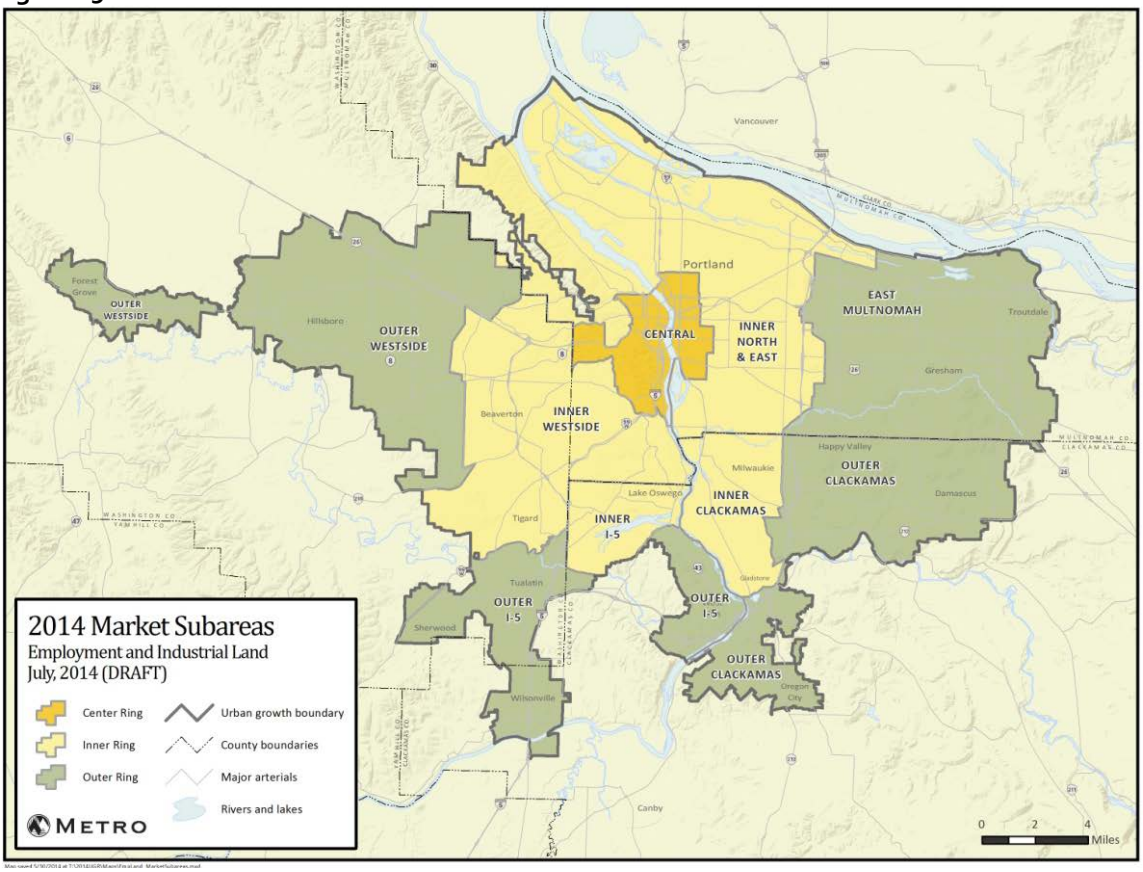
FORECAST COMPARISON TO METRO UGR ESTIMATES

As a member of the broader Metro urban area, it is prudent for Clackamas County to recognize regional planning efforts and how its own economic development objectives may differ from regional allocations. Here, UGR demand estimates are summarized relating to Clackamas County in comparison to forecast scenarios in this analysis. The methodological overview for production of UGR demand estimates are included as Appendix 6 in the 2014 Metro UGR.

UGR DEMAND ESTIMATES BY LAND TYPE

The UGR forecasts demand into two broad land categories, general industrial and commercial. Manufacturing, warehouse, distribution, and flex/business park are considered industrial uses; while office, retail, and institutional are uses are consolidated in the commercial category. The UGR methodology also allocates demand by geographic subarea and type (i.e. regional center, corridors, employment area, etc.) Different assumptions are used geographically in the region across a range of nine subareas. Four of these subareas cover Clackamas County; Outer Clackamas, Inner Clackamas, Inner I-5, and Outer I-5/205. Large-lot demand is considered in a separate analysis.

Figure 29: Metro UGR Demand Subareas



From Figure 29 we observe a limitation of this process when considering county specific data. Specifically, these subareas do not conform to county boundaries. In the case of Clackamas County, the Outer I-5/205 subarea includes West Linn and Wilsonville but also parts of Tualatin and Sherwood in Washington County.

With this condition, it is impossible to make direct apples to apples comparisons for county specific forecasts. Considering this caveat, this analysis allocates a share of Outer I-5/205 demand to Clackamas County. Detailed results in Figure 30 represent the forecast's Baseline Growth Scenario.

Figure 30: Metro UGR Employment Land Demand by Subarea and Type, Clackamas County (2015-2035)

Subarea	Central	Corridors	Regional Centers	Town Centers	RSIA's[1]	Industrial	Employment	Other[2]	Total
COMMERCIAL									
Inner Clackamas	0	65	53	21	17	17	22	92	287
Inner I-5	0	61	28	38	0	2	73	108	310
Outer Clackamas	0	0	0	1	0	1	2	3	7
Outer I-5/205[3]	0	39	5	20	1	29	72	79	243
TOTAL:	**0**	**165**	**86**	**80**	**18**	**49**	**169**	**282**	**847**
INDUSTRIAL									
Inner Clackamas	0	96	9	4	89	55	23	43	319
Inner I-5	0	34	14	12	0	5	62	45	172
Outer Clackamas	0	0	0	1	1	1	2	5	10
Outer I-5/205[3]	0	93	16	23	47	168	127	79	550
TOTAL:	**0**	**223**	**39**	**40**	**137**	**229**	**214**	**172**	**1,051**

1 Regionally Significant Industrial Area

2 Definition unspecified in UGR

3 Assumes 50% allocation to Clackamas

- With the assumption that 50% of the Outer I-5/205 subarea demand is driven by Wilsonville and West Linn, an estimated 847 acres of commercial and 1,051 acres of industrial land in the UGR forecast is attributable to Clackamas County.

- This represents only a 24% capture of metro wide commercial demand and 28% of industrial demand.

- Roughly 39% of Clackamas County commercial land demand is expected to be driven by corridor, town, and regional center development forms. An additional 53% is from employment and "other" areas.

- On the industrial side, 29% of industrial development is driven by corridor, regional, and town centers with 21% in industrial areas, 20% in employment areas, and 13% in regionally significant industrial areas.

- The Outer Clackamas subarea is projected to account for less than 17 acres (< 1%) of total demand across both land types.

LARGE-LOT INDUSTRIAL

A separate analysis was conducted to evaluate the impacts of large-lot industrial demand in the region. This analysis forecasted potential demand for 21 large industrial sites in the region over the next 20-years. That analysis did not specify demand geographically in the region.

Figure 31: Metro UGR Large-Lot Demand Baseline Forecast, Portland Metro Area, 2015-2035

Building Type	25-49 Acres	50-99 Acres	100+ Acres	LAND AREA (Acres) Low	-	High[1]
Flex/Business Park	4	1	1	250	-	445
Manufacturing Industrial	4	1	0	150	-	295
Warehouse	6	3	1	400	-	741
TOTAL	**14**	**5**	**2**	**800**	**-**	**1,481**

[1] Assumes a maximum of 150 acre site

The Metro UGR large-lot demand analysis established a baseline scenario net-need for 800 to nearly 1,500 acres of large-lot industrial land over the next 20-years. The more aggressive high-growth scenario identified 34 sites at 1,430 to 2,470 large-lot industrial acres demanded regionally.

COMPARISON TO CLACKAMAS FORECAST SCENARIOS

The Clackamas County forecasts in our analysis did not attempt to distribute demand geographically within the region. Therefore in Figure 32 we consider only combined Clackamas County estimates. It is important to note in this section that the UGR estimates consider all commercial demand, including retail, while the Clackamas County forecasts consider only employment uses on commercial land (i.e. office, medical, creative, institutional etc.).

Figure 32: Metro UGR and Clackamas Non-Retail Demand Forecast Reconciliation[21]

Land Type	UGR FORECAST Baseline	UGR FORECAST High	CLACKAMAS NON-RETAIL SCENARIOS Scenario I	Scenario II	Scenario III	Scenario IV
Commercial	847	1,367	825	813	816	1,002
Industrial	1,051	1,375	824	1,040	1,373	1,726
Large-Lot Industrial [1]	319	535	None	None	*	*
TOTAL:	**2,217**	**3,277**	**1,648**	**1,853**	**2,188**	**2,728**

[1] Assumes midrage estimate by scenario @ Metro's 28% industrial capture rate for Clackamas County

* Large-lot demand stimates are includeed in the industrial demand category of Scenarios III and IV.

- Excluding large-lot demand, despite using different assumptions, our estimates in Scenario I and II are similar to the UGR baseline estimates.

- The Scenario III forecast projects roughly 30 fewer acres of commercial land but a sizably larger share, 322 acres of industrial land. When-large lot demand is considered in the UGR analysis; the Scenario III gross industrial estimates are inline with the Baseline UGR forecast.

- Similarly, the more optimistic Scenario IV forecast assumes commercial demand in the middle of the two identified UGR based forecasts at roughly 1,000 acres. The general industrial land estimates are higher in Scenario IV, which is offset in gross terms when large-lot demand is considered.

[21] Demand in the UGR forecast is based on a series of capture assumptions for large-lot demand and for Clackamas County's share of demand in the Outer I-5/205 subarea. Changes or refinement of these assumptions would influence findings in Figure 32 considerably.

- It is clear that the forecasts produced in the Clackamas County Non-Retail Demand Analysis are more optimistic about manufacturing growth potential in Clackamas County—and by extension general industrial land demand, compared to the UGR forecasts.

RECONCILIATION WITH CLACKAMAS COUNTY LAND SUPPLY

The final analytical step in our analysis is to consider future growth in the context of the location, quality, and characteristics of Clackamas County's industrial land supply. This process moves beyond a consideration of simple gross acreage comparisons and provides insight into the extent to which Clackamas County's land inventory is suitable to accommodate expected growth.

SOURCE OF INFORMATION

While Clackamas County is working to maintain a comprehensive inventory of employment lands in its jurisdiction, at this time it was determined by the County to be premature to provide meaningful input to this analysis. Therefore, we relied on the buildable land inventory and characteristics report in the 2014 Metro UGR to derive land supply assessments. Due to sheer area the UGR covers in its analysis, it must rely on GIS based assumptions and metrics relating to value, slope, natural resources, development, etc. to derive its land supply assessments[22]. Our review of this analysis finds that this methodology generally results in a more liberal inventory of vacant and redevelopable land than studies done on a local basis that factor in local and more detailed knowledge of sites or areas.

For large-lot land supply, we rely on Metro's recent update of its Phase 1 regional large-lot industrial land inventory.

LAND SUPPLY ASSESSMENT

Total Acres

The 2014 Metro UGR estimates vacant and "potentially" redevelopable land by jurisdiction throughout the metro area for commercial and industrial uses. Additionally, the UGR estimates the commercial capacity that could be met by mixed-use areas through new or redeveloped properties. Taken together, Clackamas County's inventory of buildable land includes 1,234 vacant acres and 1,829 "potentially" redevelopable acres, totaling roughly 3,063 acres of buildable land. This includes roughly 1,405 acres of industrial land and 1,658 acres of commercially developable land.

Figure 33: Clackamas County BLI by Type, 2014

Type	Vacant	Redev.	Total
Industrial	667	738	1,405
Commercial on Commercial Land	*53*	*188*	*241*
Commercial on Mixed-Use Land	*514*	*903*	*1,417*
Total Commercial	567	1,091	1,658
TOTAL LAND	**1,234**	**1,829**	**3,063**

SOURCE: 2014 Metro UGR

[22] See Appendix 2 of the 2014 Metro UGR for an overview of their buildable land inventory methodology.

Location & Type

Appendix 3 of the Metro UGR details buildable land supply by location and type within Clackamas County jurisdictions.

Industrial Land:

- An estimated 38% of all vacant industrial land is located in the City of Damascus, with an additional 17% located in unincorporated areas. Happy Valley, Oregon City, and Wilsonville are the only other communities with a significant industrial land base.

- Roughly 47% of buildable industrial land in Clackamas County is classified as vacant, with the remaining 53% or 738 acres coming from "potentially" redevelopable parcels. Outside of Damascus and unincorporated areas, almost two-thirds of all industrial land supply is derived from redevelopment potential. All these jurisdictions combine for only 232 acres of vacant and 396 acres of "potentially" redevelopable Industrial Land.

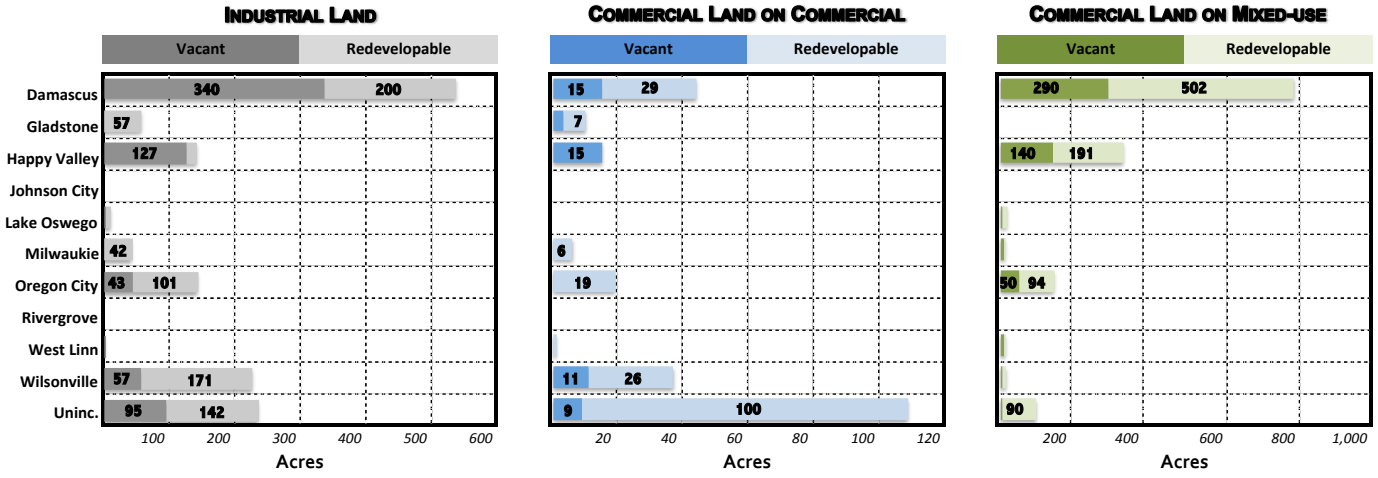
Commercial Land:

- The UGR considers both commercial land capacity from vacant and redevelopable commercial land as well as mixed-use land's ability to meet commercial demand. This is an important distinction as 85% of Clackamas County's buildable commercial land is represented by mixed-use parcels.

- The report identifies a total of 53 vacant commercial acres (3.2% of supply) in all of Clackamas County, all other land is either redevelopable commercial land or mixed-use.

- Over half of all buildable commercial land in the inventory is located in the City of Damascus, with an additional 12.3% located in misc. unincorporated areas. Happy Valley, Oregon City, and to a certain extent Wilsonville have measurable commercial capacity.

Figure 34: Clackamas County BLI by Location and Type, 2014[23]



[23] Metro. 2014 Urban Growth Report, Appendix 3, Page 7, converted to graphic by Johnson Economics

Physical Characteristics

In addition to the analysis above, Appendix 9 of the Metro UGR consolidates land supply into the nine subareas used to for demand calculations. In this section, the Metro analysis provides some detail on the general land characteristics within each subarea. Here, we summarize some of these findings as it relates to the Clackamas County Subareas[24].

Total Acres by Subarea:

Figure 35 summarizes buildable commercial and industrial land by subarea from Appendix 9 of the Metro UGR. Because we consider large-lot separately in this analysis, these figures exclude large-lot estimates.

Figure 35: Buildable Employment Land Inside the Metro UGB by Clackamas County Subarea (2014)

Subarea	Industrial	Commercial
Inner Clackamas	107.0	32.9
Inner I-5	10.6	17.1
Outer Clackamas	973.1	1323.2
Outer I-5*	589.5	72.0
SUBTOTAL	**1680.2**	**1445.2**

* Not entire share in Clackamas County

Visibility:

Visibility is certainly more important to commercial development than industrial, however some industrial uses such as business parks and campus industrial tend to desire visibility and arterial frontage as well. Most of the buildable land in the Inner Clackamas, Inner I-5, and Outer I-5/205 subareas has reasonable visibility. In Outer Clackamas, half the commercial land and 62% of the industrial land has limited to poor visibility. In Outer I-5/205, 60% of the industrial land is also limited.

Figure 36: Visibility Characteristics of Clackamas County Land Inventory, 2014

		Distance to Major Arterial			
Subarea	Type	< 1/4 mile	1/4 to 1/2 mile	1/2 to 3/4 mile	3/4 + mile
Inner Clackamas	*Commercial*	32	0	1	0
	Industrial	83	0	1	22
Inner I-5	*Commercial*	16	0	0	1
	Industrial	11	0	0	0
Outer Clackamas	*Commercial*	422	226	202	473
	Industrial	357	9	261	346
Outer I-5/205	*Commercial*	63	0	0	9
	Industrial	197	35	69	288
TOTAL	*Commercial*	**533**	**226**	**203**	**483**
	Industrial	**649**	**45**	**331**	**656**

All figures in acres, rounded to the nearest acre

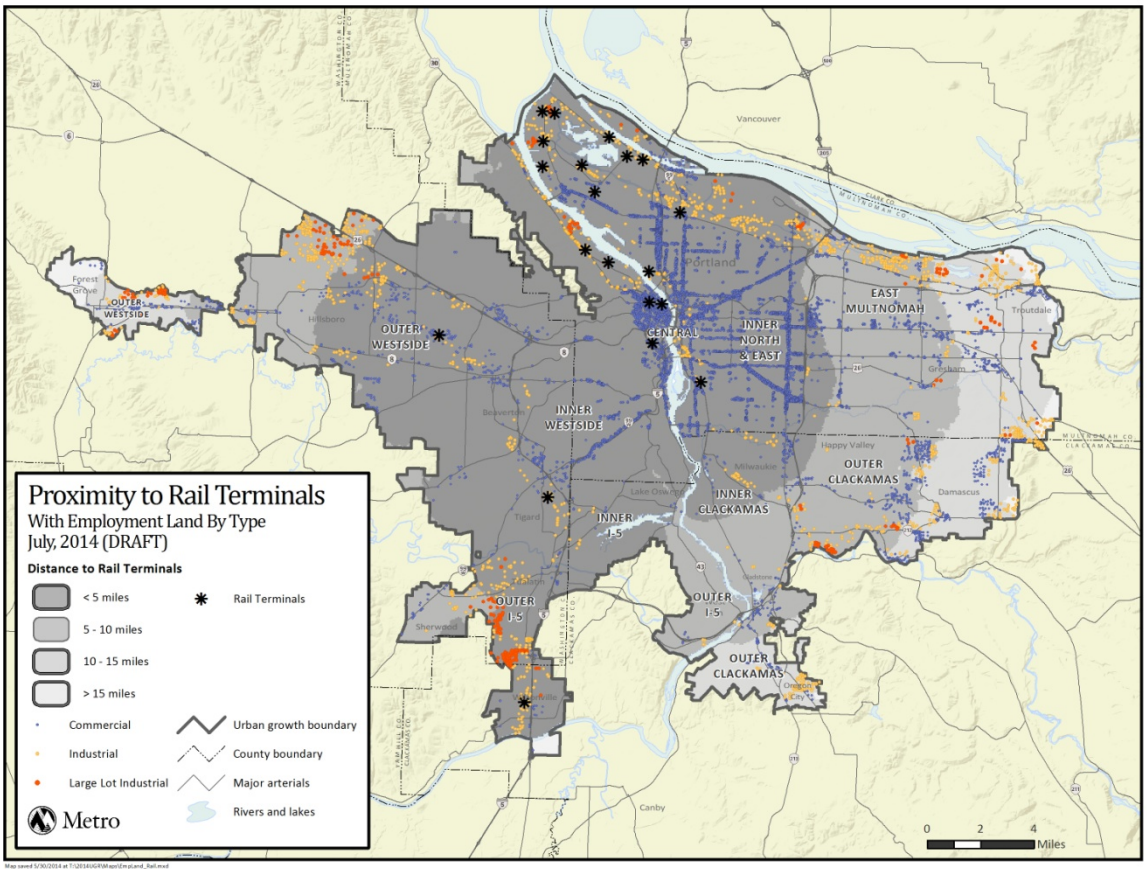
SOURCE: 2014 Metro UGR, Appendix 9, Table 3

[24] Gross acreages from Appendix 3 and Appendix 9 to not directly match, likely due to draft revisions or geographical changes or errors.

Rail Connectivity:

Most of Clackamas County's land inventory is considerably removed from major rail terminals.

Figure 37: Rail Connectivity of Clackamas County Land Inventory, 2014



SOURCE: 2014 Metro UGR, Appendix 9, Map 9

Transit Access for Labor Force:

Most of Clackamas County's buildable employment land is currently underserved by public transit. This condition will limit overall competitiveness over the planning period, particularly in the development of mixed-use land.

Figure 38: Transit Access of Clackamas County Land Inventory, 2014

		Transit Access Index				
Subarea	**Type**	**Excellent**	**Very Good**	**Good**	**Fair**	**Poor/No Access**
Inner Clackamas	*Commercial*	0	22	7	3	0
	Industrial	0	1	0	106	0
Inner I-5	*Commercial*	0	3	1	13	0
	Industrial	0	0	0	11	0
Outer Clackamas	*Commercial*	0	71	10	1,243	0
	Industrial	0	8	0	965	0
Outer I-5/205	*Commercial*	0	16	4	52	0
	Industrial	0	76	7	507	0
TOTAL	*Commercial*	**0**	**112**	**22**	**1,311**	**0**
	Industrial	**0**	**84**	**7**	**1,589**	**0**

All figures in acres, rounded to the nearest acre

SOURCE: 2014 Metro UGR, Appendix 9, Table 10

Slope Constraints:

Slope constraints are particularly pronounced in Clackamas County, specifically for industrial land. On net, 79% (1,137 acres) of commercial land is at least partially constrained by slope, with 69% (999 acres) constrained or heavily constrained. Similarly, 86% (1,439 acres) of industrial land is at least partially constrained with 79% (1,324 acres) classified as constrained or heavily constrained.

Figure 39: Slope Constraints of Clackamas County Land Inventory, 2014

		Slope Constraints (% of site area with greater than 7% slope)			
		Unconstrained	Partially Constrained	Constrained	Heavily Constrained
Subarea	Type	< 10%	10% to 50%	50% to 90%	> 90%
Inner Clackamas	*Commercial*	1	3	9	19
	Industrial	1	1	90	14
Inner I-5	*Commercial*	8	0	6	3
	Industrial	0	1	5	5
Outer Clackamas	*Commercial*	290	130	526	377
	Industrial	159	112	363	340
Outer I-5/205	*Commercial*	8	12	20	32
	Industrial	81	2	291	215
TOTAL	*Commercial*	**308**	**145**	**561**	**432**
	Industrial	**241**	**116**	**749**	**575**

All figures in acres, rounded to the nearest acre

SOURCE: 2014 Metro UGR, Appendix 9, Table 12

Utility Infrastructure:

The Metro UGR did not conduct a detailed evaluation of utility infrastructure availability and capacity in proximity to potential buildable lands. However, necessary infrastructure investments have been identified in other studies[25] as a considerable constraint precluding site suitability of employment lands in the region.

Prevailing Land Values:

Prevailing land values are a principal determinant of the market's ability to redevelop underutilized properties. Higher land values in relation to site readiness improvements and investments lead to higher rates of developability and redevelopability.

Average Clackamas County land values range from $2.62 to $10.57 per-square-foot for commercial land and $1.97 to $4.66 per-square-foot for industrial land.

Figure 40: Average Prevailing Land Values, Clackamas County Land Inventory, 2014

Subarea	Type	Avg. Land Value/Sq. Ft.
Inner Clackamas	*Commercial*	$7.04
	Industrial	$3.26
Inner I-5	*Commercial*	$6.90
	Industrial	$4.66
Outer Clackamas	*Commercial*	$2.62
	Industrial	$1.97
Outer I-5/205	*Commercial*	$10.57
	Industrial	$3.68
TOTAL	*Commercial*	**N/A**
	Industrial	**N/A**

SOURCE: 2014 Metro UGR, Appendix 9, Table 17

[25] Metro's 2012 Regional Industrial Site Readiness Project & Clackamas County's Strategically Significant Employment Land Readiness Analysis.

Large-Lot Inventory

Metro's Phase 1 large-lot inventory[26] for 2014 identified 54 sites that are 25 acres or larger in the region that could potentially accommodate a large industrial user. This analysis classifies sites by their ability or "readiness" to meet potential market demand. Tier 1 sites are ready for development within 180 days and have very few regulatory, land use, market, or physical constraints. Tier 2 sites are marginally more constrained (ready in 7-30 months) and Tier 3 sites are more heavily constrained (typically taking more than 30 months for site development) and are not typically competitive development sites in the current market. Tier 3 sites typically have severe unfunded public infrastructure needs and/or severe on-site physical, environmental, or natural resource constraints.

Figure 41: Clackamas County Large-Lot Supply Conditions

Site	Tier	Gross Acres	Constrained Acres	Net Dev Acres	% Dev.	Brownfield	Annex. Required	Infrastructure Score: Water	Sewer	Storm	Transportation Score: System	Access	Freight	Notes
Clackamas Development Site	Tier 1	61.9	21.9	40.0	65%	Yes	No	B	B	B	B	B	C	Can mitigate brownfield within 2 months (completed phase 2 assessment); Site certified by Business Oregon for 40 acres
Elligsen Site	Tier 1	33.4	3.2	30.2	90%	No	No	A	A	A	A	B	B	Price constrained: currently not at industrial price; site is currently zoned RA-H with industrial comp plan designation and requires rezone (120 days with City Council approval); BPA poles on site; Existing trees can not be removed (~3ac); Future trail to be located on site and $5.5M Beckmann Creek habitat improvements required with development; No further wetland investigation warranted - per DSL
Rock Creek Site	Tier 2	40.8	4.0	36.8	90%	No	No	C	A	B	B	C	C	2 parcels currently for sale; remaining parcels are willing to transact to aggregate a larger site; 2 property owners and 5 parcels
NW Sand & Gravel Site	Tier 3	26.2	1.1	25.1	96%	No	Yes	B	A	B	B	B	C	Previously used as quarry; requires significant earthwork/fill (30+ months) due to steep excavated slopes; development requires 50ft buffer from Clackamas River. Wetland determination was completed by DSL (WD#:2014-0239_Revised) which indicated gravel pits were constructed for surface mining purposes and would be exempt per OAR 141- 085 -0515 (7) and can be filled. Wetlands associated with the Clackamas River remain subject to the state Removal-Fill Law

SOURCE: Mackenzie and Metro

According to the inventory, Clackamas County currently has 4 sites totaling 162 gross acres within the Metro UGB suitable for large-lot development. Two of these sites are Tier 1 sites that are fairly ready for development and suitable for identified industry types. Clackamas also has a Tier 2 and a Tier 3 site that have considerable challenges to development and/or redevelopment.

EMPLOYMENT LAND SUITABILITY ANALYSIS

Reconciling demand and site need characteristics with the inventory of available land for development yields some concerning analysis relating to Clackamas County's ability to meet economic development objectives.

Location

The most obvious concern for Clackamas County is the disparity between where growth is projected to occur and where available supply is located. Even omitting supply conditions and considering gross supply and demand estimates directly reported in the UGR, this condition is clear.

[26] Metro. Regional Industrial Site Readiness: A 2014 Update, Mackenzie (Sep. 2014)

Figure 42: Reconciliation of UGR Land Supply and Demand By Location (2015-2035)

	BUILDABLE LAND SUPPLY[1]		PROJECTED DEMAND[2]		RECONCILIATION	
Subarea	Industrial	Commercial	Industrial	Commercial	Industrial	Commercial
Inner Clackamas	107.0	32.9	319.0	287.0	-212.0	-254.1
Inner I-5	10.6	17.1	172.0	310.0	-161.4	-292.9
Outer Clackamas	973.1	1,323.2	10.0	7.0	963.1	1,316.2
Outer I-5/205[3]	589.5	72.0	599.0	486.0	-9.5	-414.0
TOTAL	**1,680.2**	**1,445.2**	**1,100.0**	**1,090.0**	**580.2**	**355.2**

[1] Metro UGR (2014), Appendix 9

[2] Metro UGR (2014), Appendix 6

[3] Not entire share in Clackamas County

Simply put, 73% of total available land supply is located in the Outer Clackamas subarea, an area where less than 1% of demand is expected. While on net the County's totals appear sufficient, the Metro UGR identifies three subareas combining for a deficiency of 383 industrial acres and 961 commercial acres.

Characteristics

- An alarming share of buildable land in Clackamas County is expected to come from "potentially" redevelopable parcels, particularly in outlying areas. According to the UGR, redevelopment parcels in Damascus meet nearly 25% of total buildable inventory, with an additional 11% met by redevelopment parcels in unincorporated areas.

- A similar concern exists in the share of commercial capacity to be met by mixed-use. According to Appendix 3 of the UGR, 48% (792 acres) of all commercial capacity in Clackamas County is met by mixed-use development in the City of Damascus.

- Slope constraints are an especially limiting condition in the competiveness of Clackamas County's reported land supply. Conservatively, over 770 acres of industrial land (46% of buildable supply) has uncompetitive slope constraints. Commercial uses have a higher slope threshold, however, at least 760 commercial acres (52% of supply) has a slope of 7% or greater.

- Redevelopment land inventory is very optimistic in Clackamas County subareas where prevailing land values are relatively low. In the context of the physical constraints identified in this and other analyses, prevailing land values are not likely to overcome the cost of necessary land improvements. For example, average industrial land values of under $2.00psf in Outer Clackamas are not likely to entice considerable redevelopment activity.

Large Lot Inventory

Clackamas County currently has only four sites totaling 132 net-developable acres in its large-lot inventory. Two of these sites are relatively competitive, totaling around 70 acres. Clackamas' remaining two sites are highly constrained and would require millions in investment to be true development sites. In a regional context that could see 20+ sites demanded over a 20-year period, Clackamas County is left at a severe competitive disadvantage in the recruitment and retention of large industrial users—the result of which would be pushing development to tertiary markets or an all out loss of economic opportunities.

CLACKAMAS NON-RETAIL LAND DEMAND RECONCILIATION

Our analysis reconciled estimated demand with supply assumptions to determine a residual surplus or deficit of commercial and industrial land. Here, we acknowledge the constrained nature of Clackamas County's land supply by parsing out a share of gross land supply that should be considered "suitable" for development.

Over the planning period, a number of factors will contribute to actual land supply suitable for development differing broadly gross land supply. The most significant factors include slope, location, and emphasis on redevelopable supply. An estimated 58% of buildable industrial land and 91% of commercial land is located in the Outer Clackamas Submarket. As exhibited in the previous analysis, this subarea has the most severe slope constraints, limited infrastructure in place, and fair to poor transit access. This area also has the lowest prevailing land values in the County. This inventory is grossly uncompetitive in a regional marketplace. Other factors such as wetland constraints will also reduce the suitability of gross land supply considerably.

The undertaking of a detailed buildable land analysis is beyond the scope of this project. However, to exhibit a range of potential land suitability scenarios, we reconciled demand with supply at a sensitivity range of buildable land suitability scenarios at the 60% and 40% level. We consider this reasonable given that the majority of documented land supply is either constrained or heavily constrained by slope alone. We conduct this analysis for three demand scenarios:

UGR Baseline—The baseline demand scenario for Clackamas County from the Metro UGR
This scenario resulted in a net deficit of industrial land across both suitability assumptions, ranging from 448 acres at 60% suitability to 756 acres at 40% suitability. Commercial deficit was only identified in the 60% suitability assumptions.

Non-Retail Demand Low—The average of forecast Scenarios I and II in this report
This scenario resulted in the lowest demand output. However, it results in a deficit of industrial land ranging from 329 acres to 636 acres. A commercial deficit of 156 acres in only realized at the 40% suitability level.

Non-Retail Demand High—The average of forecast Scenarios III and IV in this report
This scenario resulted in the highest demand output. It results in a severe deficit of industrial land ranging from 627 to 934 acres. A commercial deficit of 246 acres in only realized at the 40% suitability level.

It is also important to recognize that commercial demand in our study is conservative as it includes employment uses only. Additional commercial demand, likely in mixed-use formats, will be generated by increased pressure for retail services. This demand will more closely follow the residential path of growth over the planning period.

Figure 43: Reconciliation of Demand Scenarios with Suitability Constrained Land Assumptions (2015-2035)

Scenario	Land Type	Estimated Demand	Buildable Land Supply		Surplus/Deficit Range	
			Suitability Share[5]*:* *60%*	*40%*	Low	High
URG BASELINE	Commercial	847	995	663	148	-184
	Industrial [3]	1,370	922	615	-448	-756
	Total	**2,217**	**1,917**	**1,278**	**-300**	**-939**
NON-RETAIL DEMAND LOW [1]	Commercial [4]	819	995	663	176	-156
	Industrial	1,251	922	615	-329	-636
	Total	**2,070**	**1,917**	**1,278**	**-153**	**-792**
NON-RETAIL DEMAND HIGH [2]	Commercial [4]	909	995	663	86	-246
	Industrial	1,549	922	615	-627	-934
	Total	**2,458**	**1,917**	**1,278**	**-541**	**-1,180**

[1] Calculated as the Average of Scenarios I and II in Figure 26

[2] Calculated as the average of Scenarios III and IV in Figure 28

[3] Includes Large-lot

[4] Demand is for employment uses only. Additional need for retail uses would have to be accomodated.

[5] The assumed share of Clackamas County land supply that is competitive and suitable for economic use.

All figures are rounded to the nearest acre

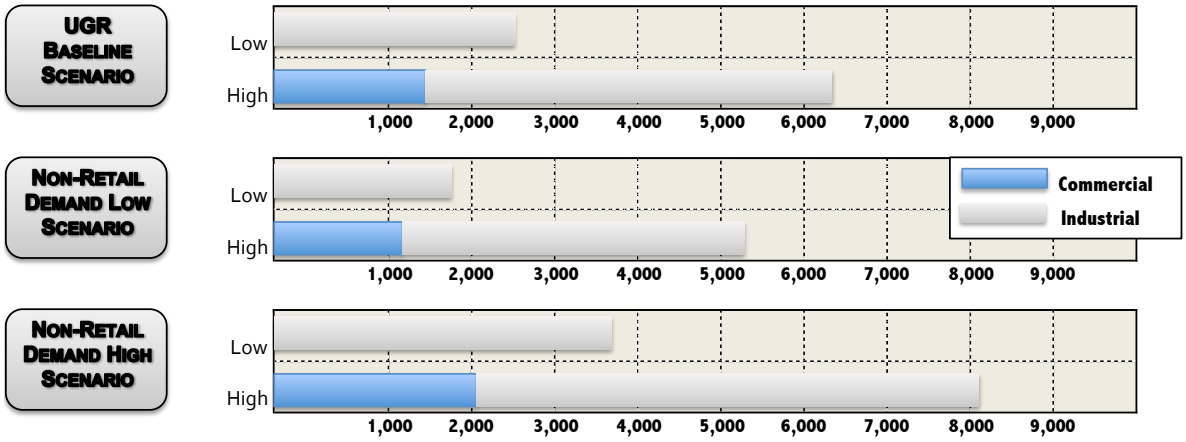
In this analysis we address the economic opportunities facing Clackamas County over the next 20-years. Clackamas County has an aggressive economic development strategy designed to build upon its robust manufacturing, commercial, and service base that has added nearly 23,000 jobs to the regional economy since 2001[27].

However, Clackamas County's growth prospects are increasingly restrained by a land supply that suffers from constraints crossing physical, infrastructure, and regulatory levels. The inability of the region to address future land needs could result in measurable economic costs to the county in the future.

At existing development density assumptions outlined elsewhere in this analysis, the cost to the economy in terms of jobs could be quite severe. Under the most pessimistic scenario, over 8,000 would not be realized due to insufficient land supply.

[27] Oregon Employment Department, Private Sector Covered Employment, QCEW Dataset 2Q01 to 2Q14.

Figure 44: Potential Economic Costs of Deficient Land Supply to the Clackamas County Economy[28]



These findings should encourage policy makers to move beyond looking at gross land estimates that do not reflect a land inventory's ability to meet true economic needs. As a region is should be a paramount objective to strategically provide land that can be used for a productive use as well as to develop policies to improve existing employment lands so that they could be more marketable.

[28] Considers the Metro UGB portion of the Clackamas County economy. We acknowledge that a share of growth would likely substitute to other tertiary areas within Clackamas County.

APPENDIX A
MACKENZIE TYPOLOGY ANALYSIS

MACKENZIE.

DESIGN DRIVEN | CLIENT FOCUSED

SITE DEVELOPMENT MATRIX

To
Clackamas County

For
Non-Retail Employment Land Need Study

Submitted
December 4, 2014

Project Number
2140344.00

MACKENZIE
Since 1960

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ATTACHMENTS

Clackamas County Industrial Development Matrix

I. INTRODUCTION AND PROJECT DESCRIPTION

Description of Project

For this project, Mackenzie developed estimates for building coverage and basic site utility and transportation infrastructure requirements for the 11 identified target industry typologies outlined below, as provided by Johnson Economics.

11 IDENTIFIED TARGET INDUSTRY TYPOLOGIES FOR CLACKAMAS COUNTY		
Manufacturing	**Logistics/Distribution**	**Services**
Food Manufacturing and Processing	Wholesale	Traditional offices (Finance & Business Support)
Fabricated Metals	Distribution Center	Creative Office
Specialized Machinery		Medical Office
Computers, Electronics, and Electronic components		Research and Development
General Manufacturing		

This product is based on a scenario for a 3-acre site user, a 5-acre site user, and a 10-acre site user in each of the 11 industry typologies, with the exception of 20-acre + site users for the logistics/distribution based clusters. The result of this analysis is a matrix with each of the infrastructure categories and building coverage for each of the 3 different acreage scenarios for each industry cluster (Attachment 1). These user needs were established through case studies of existing users of a similar size in the Portland metropolitan region, or based on project knowledge of Mackenzie designers.

The matrix was designed to reflect two categories of land characteristics that affect the location of economic activity. The first category is general location factors that are desired by users or investors in choosing a location for employment/industrial uses. The second category is location factors that are specific to particular industry types. Both of these sets of location factors should be considered when determining the potential economic productivity of land under consideration for urban employment areas. General land characteristics that are key location factors for economic activity include:

- Access to major transportation routes for distribution of product
- Proximity to public utilities (e.g., sanitary sewer and water)
- Proximity to private utilities (e.g., electrical, gas, telecommunications)
- Transportation access for labor force

There are also industry-specific characteristics that are key to the 11 target industries. The target industries for a particular urban area are determined by the local community and reflected in the June 2012 Economic Landscape Final Report prepared for Clackamas County. It is necessary to analyze the community's target industries to understand their unique location factors and to consider these as part of determining the appropriateness of new urban areas for these industries.

II. METHODOLOGY

This section describes how the values in the Clackamas County Industrial Development Matrix were derived.

General Requirements

For a site to be considered for development with one of the target industries, a number of conditions must be met. These factors have been included in the matrix (see Attachment 1).

- The use is permitted outright;
- the site is located in the urban growth boundary (UGB) or equivalent;
- the site is outside the flood plain; and
- the site does not contain contaminants, wetlands, protected species, cultural resources, or has mitigation plan(s) that can be implemented to support the proposed use.

Physical Site Characteristics

The physical site characteristics include the maximum slope for a site to be competitive for a target industry plus building coverage ratios that are typical of the industry.

Competitive slope

The competitive slope listed in the matrix identifies slope that is reasonably mitigated through grading activities to support development for the target land use. While some sites with higher slopes could certainly be developed with the target industries, the associated higher earthwork costs may make the sites less competitive. Generally speaking, manufacturing and distribution uses need competitive slopes of 5% or less, while service industries may be able to build on competitive slopes of up to 15%.

Building Coverage

Building coverage represents the fraction of the site area that is covered by a building footprint. Site topography, physical dimensions, easements, and encumbrances on specific sites will affect potential coverage for all uses. The building coverage ranges in the matrix reflect typical ratios for the target industries. Multiple considerations affect how sites develop and the corresponding building coverage:

- Industrial sites that are rectangular will generally accommodate rectangular buildings more easily than irregular site shapes, allowing higher building coverage.
- Circulation, parking, and truck maneuvering represent a greater portion of smaller sites, reducing building coverage. Larger sites can accommodate higher parking ratios, and also provide more flexibility for site layout so higher building coverage may be achievable.
- Manufacturing uses typically include larger employee counts than other industrial occupancies (e.g., distribution) so additional parking is necessary, limiting building coverage.
- Manufacturing of weather-sensitive products (e.g., fabricated metals) may require more product to be stored indoors, increasing building coverage. Where products are less weather-sensitive, outdoor storage may be employed to reduce building coverage and construction costs.

- Logistics/distribution uses generally require limited vehicle parking, allowing greater building coverage of the site. By contrast, service-based users require greater parking ratios than other industrial uses, leading to lower building coverage.

Workforce Size

Different target industries require various labor market sizes to provide an adequate pool of appropriately-skilled workers. The values included in the matrix are generally in line with the Business Oregon Industrial Development Competitiveness Matrix. The location of Clackamas County sites should be able to accommodate all of the target industries since they can draw on the labor pool of the entire Portland metropolitan region, and the target industries require workforce sizes of 60,000 or less.

Transportation Factors

As with the Business Oregon Industrial Development Competitiveness Matrix, the transportation assessments are based on the following definitions.

- 'Required' factors are seen as mandatory in a vast majority of cases, and have become industry standards.

- 'Competitive' factors significantly increase marketability, and are highly recommended by Business Oregon. These factors may also be linked to financing to enhance the potential reuse of the asset in case of default.

- 'Preferred' factors increase the feasibility of the subject property and its future reuse. Factors in other categories may prove more critical.

Trip Generation

The range of trip generation rates from the Business Oregon matrix was utilized for the same/similar land uses as the target industry in the matrix. Trip rates for medical offices were estimated using the range of rates presented in the ITE Trip Generation Manual, 9th Edition, based on an assumed 20% Floor Area Ratio (FAR). Traditional and Creative office trip rates were based on an assumed 35% FAR % and range or trips rates for general office in the Trip Generation Manual.

Transit Access for Labor Force

The importance of transit access for employees is assessed based on the likely skill level and pay range, with lower skilled/paid employees more likely to rely on transit. Further, creative office users are assumed more likely to utilize transit and require access to it. For medical offices, access to transit may be more important for customers.

Miles to Major Routes and Railroad Access

These values are based on the Business Oregon Matrix assessments for the same or similar uses. Such access is assumed to not be needed for office uses, as shipping needs are very low.

Utility Demands

The utility industry models are based on the Business Oregon matrix, using the model flow/power rates and site acreages listed in the matrix to develop a per-acre demand rate. All "Required/Competitive/Preferred/Not Required" factors are as defined by the Business Oregon matrix. It is important to note that utility demands can vary wildly within these industry clusters; specific sites need to be evaluated based on specific users.

Water/Sewer

The per-acre rate ranges from 500 GPDA to 10,000 GPDA, with typical ranges from 1,000 GPDA to 2,000 GPDA. This rate generally aligns with per-acre rates used for local sewer master plans for industrial zoning (1,000 to 1,500 GPDA).

The recommended Water and Sewer service main sizes are based on the associated Business Oregon matrix. Generally, water main lines serving industrial properties are no smaller than 6" to 8" lines; however, 4" lines do exist in some low-demand areas. Similarly, fire sprinkler and hydrant service lines are generally no smaller than 6" lines, regardless of the industrial/domestic water demand.

Electricity

The per-acre model rate ranges from 0.005 MWA to 0.10 MWA based on the Business Oregon models.

Natural Gas

The Business Oregon matrix does not list specific gas demand, but instead lists the gas service line size. The Clackamas County matrix assumes a similar gas line-to-acre ratio, assuming a minimum line size of 2" for transmission/distribution mains.

Telecommunications

The closest industry categories in the Business Oregon matrix was used as the basis for telecommunications requirements.

III. CONCLUSION

This report documents the basis on which thresholds were selected for each of the development criteria that affect the target industries for sites in Clackamas County. The information in the site matrix reflects industry standards, and the experience of Mackenzie designers in selecting, evaluating, and laying out industrial sites in the Portland region and throughout the state.

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Clackamas County Industrial Development Matrix
December 4, 2014

		Manufacturing Based														
		1 Food Manufacturing and Processing			2 Fabricated Metals			3 Specialized Machinery			4 Computers, Electronics, Electronic Components			5 General Manufacturing Category		
		Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac
DEVELOPMENT CRITERIA																
PHYSICAL SITE																
Competitive Slope:	Maximum Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	7%	7%	7%	5%	5%	5%
Building coverage:	Percent	28-30	28-30	30-32	32-37	35-39	37-40	30-34	32-36	34-38	27-30	28-32	30-35	28-32	30-34	32-36
WORKFORCE																
Available workforce population in 50 mile radius	People	20,000	20,000	20,000	30,000	30,000	30,000	30,000	30,000	30,000	60,000	60,000	60,000	30,000	30,000	30,000
TRANSPORTATION																
TRIP GENERATION:	ADT/Acre	75- 100	75- 100	75- 100	42-58	42-58	42-58	42-58	42-58	42-58	50-75	50-75	50-75	76-106	76-106	76-106
TRANSIT ACCESS FOR LABOR FORCE	Dependency	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	preferred	preferred	preferred	preferred	preferred	preferred	preferred	preferred	preferred
MILES TO MAJOR ROUTES (INTERSTATE OR OTHER PRINCIPLE ARTERIAL) FOR FREIGHT AND LABOR FORCE:	Miles	within 30	within 30	within 30	within 10	within 10	within 10	within 10	within 10	within 10	within 15	within 15	within 15	within 20	within 20	within 20
RAILROAD ACCESS:	Dependency	preferred	preferred	preferred	preferred	preferred	preferred	preferred	preferred	preferred	not required	not required	not required	preferred	preferred	preferred
UTILITIES																
WATER:	Minimum Line Size (Inches/Diameter)	6"	8"	10"	4"	6"	8"	4"	6"	10"	4"	6"	10"	4"	4"	8"
	Minimum Fire Line Size (Inches/Diameter)	6"	8"	10"	6"	8"	8"	6"	8"	8"	6"	8"	10"	6"	8"	8"
	High Pressure Water Demand Dependency	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Not Required	Not Required	Not Required
	Flow (GPD)	15,000	25,000	50,000	7,200	12,000	24,000	7,500	12,500	25,000	7,500	12,500	25,000	4,500	7,500	15,000
SEWER:	Minimum Service Line Size (Inches/Diameter)	6"	8"	10"	8"	8"	8"	4"	6"	8"	4"	6"	8"	4"	4"	6"
	Flow (GPD)	15,000	25,000	50,000	7,200	12,000	24,000	7,500	12,500	25,000	7,500	12,500	25,000	4,500	7,500	15,000
NATURAL GAS:	Preferred Minimum Service Line Size (Inches/Diameter)	4"	4"	6"	4"	4"	4"	2"	2"	2"	2"	2"	4"	2"	2"	4"
	On Site	Preferred	Preferred	Preferred	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive
ELECTRICITY:	Minimum Service Demand	0.05 MW	0.10 MW	0.15 MW	0.15 MW	0.20 MW	0.40 MW	0.15 MW	0.20 MW	0.40 MW	0.05 MW	0.05 MW	0.10 MW	0.10 MW	0.15 MW	0.25 MW
	Close Proximity to Substation	Not Required	Not Required	Not Required	Competitive	Competitive	Competitive	Competitive	Competitive	Competitive	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
	Secondary System Dependency	Not Required	Not Required	Not Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Not Required	Not Required	Not Required
TELECOMMUNICATIONS:	Major Communications Dependency	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Required	Required	Required	Preferred	Preferred	Preferred
	Route Diversity Dependency	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Preferred	Preferred	Preferred	Required	Required	Required	Not Required	Not Required	Not Required
	Fiber Optic Dependency	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Required	Required	Required	Preferred	Preferred	Preferred
GENERAL REQUIREMENTS		Use is permitted outright, located in UGB or equivalent and outside flood plain; and site (NCDA) does not contain contaminants, wetlands, protected species, or cultural resources or has mitigation plan(s) that can be implemented in 180 days or less.														

Abbreviations:
AC = Acres
ADT = Average Daily Trips
GPD = Gallons per day
MW = Megawatts
NA = Not applicable
NCDA = Net contiguous developable acres

Notes:
Utility demands can vary wildly within these industry clusters. Specific sites need to be evaluated based on specific users.

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Clackamas County Industrial Development Matrix
December 4, 2014

		Logistics/Distribution Based					
		6 Wholesale			7 Distribution Center		
		Small - 3 ac	Medium - 5 ac	Large- 20 + ac	Small - 3 ac	Medium - 5 ac	Large- 20 + ac
DEVELOPMENT CRITERIA							
PHYSICAL SITE							
Competitive Slope:	Maximum Slope	5%	5%	5%	5%	5%	5%
Building coverage:	Percent	36-40	38-42	40-44	36-40	38-42	40-44
WORKFORCE							
Available workforce population in 50 mile radius	People	20,000	20,000	20,000	20,000	20,000	20,000
TRANSPORTATION							
TRIP GENERATION:	ADT/Acre	65-86	65-86	65-86	65-86	65-86	65-86
TRANSIT ACCESS FOR LABOR FORCE	Dependency	preferred	preferred	preferred	preferred	preferred	preferred
MILES TO MAJOR ROUTES (INTERSTATE OR OTHER PRINCIPLE ARTERIAL) FOR FREIGHT AND LABOR FORCE:	Miles	within 5 (only interstate or equivelent)	within 5 (only interstate or equivelent)	within 5 (only interstate or equivelent)	within 5 (only interstate or equivelent)	within 5 (only interstate or equivelent)	within 5 (only interstate or equivelent)
RAILROAD ACCESS:	Dependency	preferred	preferred	preferred	preferred	preferred	preferred
UTILITIES							
WATER:	Minimum Line Size (Inches/Diameter)	6"	8"	10"	4"	4"	6"
	Minimum Fire Line Size (Inches/Diameter)	6"	8"	10"	8"	10"	10"
	High Pressure Water Demand Dependency	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
	Flow (GPD)	6,000	12,000	24,000	2,500	5,000	10,000
SEWER:	Minimum Service Line Size (Inches/Diameter)	4"	6"	8"	4"	4"	6"
	Flow (GPD)	6,000	12,000	24,000	2,500	5,000	10,000
NATURAL GAS:	Preferred Minimum Service Line Size (Inches/Diameter)	2"	2"	2"	2"	2"	2"
	On Site	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
ELECTRICITY:	Minimum Service Demand	0.10 MW	0.10 MW	0.20 MW	0.05 MW	0.05 MW	0.10 MW
	Close Proximity to Substation	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
	Secondary System Dependency	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
TELECOMMUNICATIONS:	Major Communications Dependency	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
	Route Diversity Dependency	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
	Fiber Optic Dependency	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
GENERAL REQUIREMENTS		Use is permitted outright, located in UGB or equivalent and outside flood plain; and site (NCDA) does not contain contaminants, wetlands, protected species, or cultural resources or has mitigation plan(s) that can be implemented in 180 days or less.					

Abbreviations:
AC = Acres
ADT = Average Daily Trips
GPD = Gallons per day
MW = Megawatts
NA = Not applicable
NCDA = Net contiguous developable acres

Notes:
Utility demands can vary wildly within these industry clusters. Specific sites need to be evaluated based on specific users.

MACKENZIE.
DESIGN DRIVEN | CLIENT FOCUSED

Clackamas County Industrial Development Matrix
December 4, 2014

		Services Based											
		8 Traditional Offices (Financial/Business Support)			9 Creative Offices			10 Medical Offices			11 Research & Development		
		Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac	Small - 3 ac	Medium - 5 ac	Large - 10 ac
DEVELOPMENT CRITERIA													
PHYSICAL SITE													
Competitive Slope:	Maximum Slope	15%	15%	15%	15%	15%	15%	15%	15%	15%	7%	7%	7%
Building coverage:	Percent	24-28	26-28	28-30	24-28	26-28	28-30	22-24	22-25	22-25	24-28	26-28	28-30
WORKFORCE													
Available workforce population in 50 mile radius	People	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	60,000	60,000	60,000
TRANSPORTATION													
TRIP GENERATION:	ADT/Acre	120-165	120-165	120-165	120-165	120-165	120-165	234-417	234-417	234-417	50-75	50-75	50-75
TRANSIT ACCESS FOR LABOR FORCE	Dependency	Competitive	Competitive	Competitive	required	required	required	Competitive	Competitive	Competitive	preferred	preferred	preferred
MILES TO MAJOR ROUTES (INTERSTATE OR OTHER PRINCIPLE ARTERIAL) FOR FREIGHT AND LABOR FORCE:	Miles	NA	NA	NA	NA	NA	NA	NA	NA	NA	within 10	within 10	within 10
RAILROAD ACCESS:	Dependency	not required	not required	not required	not required	not required	not required	not required	not required	not required	not required	not required	not required
UTILITIES													
WATER:	Minimum Line Size (Inches/Diameter)	4"	4"	8"	4"	4"	6"	4"	4"	6"	4"	6"	10"
	Minimum Fire Line Size (Inches/Diameter)	6"	8"	8"	6"	6"	8"	6"	6"	8"	6"	8"	10"
	High Pressure Water Demand Dependency	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Preferred	Preferred	Preferred
	Flow (GPD)	4,500	7,500	15,000	3,000	5,000	10,000	3,600	6,000	12,000	6,000	10,000	20,000
SEWER:	Minimum Service Line Size (Inches/Diameter)	4"	4"	6"	4"	4"	8"	4"	4"	8"	4"	8"	10"
	Flow (GPD)	4,500	7,500	15,000	3,000	5,000	10,000	3,600	6,000	12,000	6,000	10,000	20,000
NATURAL GAS:	Preferred Minimum Service Line Size (Inches/Diameter)	2"	2"	4"	2"	2"	4"	2"	2"	2"	2"	2"	4"
	On Site	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Competitive	Competitive	Competitive
ELECTRICITY:	Minimum Service Demand	0.15 MW	0.25 MW	0.50 MW	0.15 MW	0.25 MW	0.50 MW	0.15 MW	0.25 MW	0.50 MW	0.05 MW	0.05 MW	0.10 MW
	Close Proximity to Substation	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
	Secondary System Dependency	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred
TELECOMMUNICATIONS:	Major Communications Dependency	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
	Route Diversity Dependency	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
	Fiber Optic Dependency	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
GENERAL REQUIREMENTS		Use is permitted outright, located in UGB or equivalent and outside flood plain; and site (NCDA) does not contain contaminants, wetlands, protected species, or cultural resources or has mitigation plan(s) that can be implemented in 180 days or less.											

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