The CEWD Get Into Energy Career Pathways Project

Supply-Demand Gap Analysis and Demographic Evaluation

Executive Summary

The Center for Energy Workforce Development (CEWD), in conjunction with support from the Bill and Melinda Gates Foundation, is seeking to provide a stable and secure energy future for America. Because a disproportionate number of America's energy workforce will be retiring soon, and due to the nation's growing and changing energy demands, the CEWD has launched its "Get into Energy" campaign. This effort is intended to promote awareness of energy occupations and provide pathways into these essential careers for America's youth.

To this end, a supply and demand analysis and demographic evaluation is performed for a sample of nine states: California, Florida, Georgia, Indiana, Minnesota, North Carolina, Ohio, Texas, and Washington. The existing supply and demand situation is assessed by compiling industry needs and college graduations for five select energy occupations: lineworkers, technicians, plant operators, pipefitters/pipelayers, and engineers. This is done at the county level, and results are mapped to geographically display patterns and areas of potential concern. Secondly, population growth and poverty rates in the education age (16 to 22 years of age) and early career (23 to 26 years of age) cohorts are examined by county. This is done to inform recruitment efforts and help end the cycle of poverty.

The analyses uncover some nationwide trends deserving attention:

- Far more lineworkers and plant operators are needed than are currently supplied. A continued shortage of these critical energy industry-specific occupations would be a huge impediment to economic growth and foreshadow profound national security issues.

- Although the early career cohort is expected to increase in size in every state in the sample, slightly more than half of the states in the sample are expected to experience declines in the education age cohort. Further, states with expected declines in the education age cohort also have the lower poverty rates today. This ironically suggests the potential for demand-side price deflation in these regional economies since there will be fewer people demanding goods and services than today—leading to less capital investment, fewer jobs, lower wages, and decreased purchasing power outside the regional economy.

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Introduction

The Get Into Energy (GIE) Career Pathways Model provides a roadmap for entry into skilled utility technician positions in the energy sector with pathways to higher-level jobs in a variety of work settings. This career pathways model focuses on the needs of the following three stakeholder groups: students and potential applicants; educators; and employers. The system is divided into key modules that support these stakeholders. These modules include GIE Outreach and Career Coaching; Career Pathways Curriculum and Stackable Credentials; and Employer Collaboration and Support.

The initiative is receiving support from a Bill and Melinda Gates Foundation planning grant given to the Center for Energy Workforce Development (CEWD). The purpose of the Gates Foundation Initiative is to double the number of people aged 26 or younger who graduate with a postsecondary degree or certificate that has value in the marketplace. The GIE Initiative will help the Bill and Melinda Gates Foundation and CEWD to achieve their shared goals.

The purpose of the planning grant is to evaluate the readiness of state energy workforce consortia for implementing Get Into Energy Career Pathways. Currently, there are nine state consortia to be evaluated, which are as follows: Ohio, Texas, North Carolina, Washington, Georgia, Florida, California, Indiana, and Minnesota. The target audience for GIE is low-income young adults aged 16 through 26.

In support of this initiative, Economic Modeling Specialists LLC has developed a gap analysis for the education supply and the occupation demand in the above-listed states. The analysis also includes demographic and poverty estimates. Through analysis of these data perspectives, CEWD and other supporting partner organizations can gain a deeper understanding of where the supply gaps and opportunities for the target population exist. This work seeks to aid in narrowing the list of nine state consortia down to a selection of specific pilot states.

Background and Overview

Energy jobs offer promising opportunities to both experienced and new workers. The industry as a whole is projected to experience growth in the coming years, particularly with the increase in public investments in renewable energy, clean energy generation, energy efficiency, and the Smart Grid. The growth in demand coincides with the large number of retirements projected in the industry. Energy employers will need skilled workers for traditional energy jobs as well as future positions related to energy generation, transmission, and distribution. These are jobs that are active, hands-on, rewarding, and available in every state in the country. In addition, they are jobs in an industry where adding new skills translates into additional opportunities to make more money. As new technologies are created, workers will need new skills to install and operate the new energy systems, and this means new job opportunities in a stable and growing industry.

The GIE Career Pathways Model is built on the following principles:

- Targeted outreach and support for students and potential applicants through recruiting and employment.
- Pathway-based curricula leading to a flexible portfolio of credentials and degrees.
- Employer involvement in all phases of workforce development, ultimately leading to employment.

In order to understand the requirements for occupations and needs for workers in the energy sector, detailed data must be gathered at both the education and occupation levels. These data must also give a narrow geographic picture; i.e., the energy occupation needs of one state are particular to that state and are not likely to be relevant anywhere else. Furthermore, in support of both the GIE Initiative and Gates Foundation Initiative, specific focus must be given to low-income 16- to 26-year-olds.

To achieve these data goals, a process was developed that estimates the demand for key energy sector occupations and compares those occupations to corresponding education programs. This occupation demand versus education supply analysis is known as a *gap analysis* and can lead to the derivation of many important conclusions. Moreover, a comparison of demographics and poverty estimates in conjunction with local gaps can highlight areas of opportunities for accomplishing the objectives of the GIE initiative and working with state consortia and regional stakeholders. In order to do this, geographic information systems (GIS) are heavily used to interpret the massive quantity of geographical data developed for this project.

This report consists of the following sections: 1) a main body summary, which outlines the methodology and key findings and describes how to read and interpret the data and maps; 2) nine state sections, providing detailed maps and data for each of the evaluated states; and 3) a summary of the data sources used to compile the necessary information.

Methodology

Five occupations were selected that are critical to the production of energy and infrastructure maintenance. These are lineworkers, technicians, plant operators, and pipefitters/pipelayers, and engineers.

To understand the current supply and demand situations of these five occupations, data were collected by industry, occupation, and state sources where available.

For industry data, EMSI combines the employment data covered by the Department of Labor’s Quarterly Census of Employment and Wages (QCEW) with the total employment data in the Regional Economic Information System (REIS), which is produced by the Bureau of Economic Analysis (BEA). The data are then augmented with information from County Business Patterns (CBP) and Nonemployer Statistics (NES), published by the U.S. Census Bureau. Projections are based on the latest available EMSI industry data, local trends in each industry for the past fifteen years, growth rates in statewide and (where available) sub-state area industry projections published by individual state agencies, and (in part) growth rates in national projections from the Bureau of Labor Statistics.

For occupation data, a workforce-oriented view of the regional economy is made possible through organizing the regional employment information by occupation. EMSI's occupation data are based on EMSI's industry data as well as the regional staffing patterns taken from the Occupational Employment Statistics program (U.S.

Bureau of Labor Statistics). Wage information is partially derived from the American Community Survey. The occupation-to-program (SOC-to-CIP) crosswalk is based on one done by the U.S. Department of Education, with customizations by EMSI.

Interpreting the GIS Maps for Workforce Supply and Demand

For each state, GIS maps show the estimated workforce demand, supply, and gap for each of the following key occupations: lineworkers, technicians, plant operators, pipefitters /Pipelayers, and Engineers. The states' demographic and poverty makeup are also included.

Demand Maps:

The demand maps represent new and replacement job openings for energy occupations. New jobs are calculated by converting industry projections into occupations through the use of a national staffing pattern matrix for the various energy industries. Replacement jobs were determined from an extensive survey conducted by CEWD on retirement and job attrition for the five major occupation categories. Both replacement jobs and new jobs were projected out five years and divided by five to develop an average annual occupation demand.

On the maps, demand estimates for the different occupations begin at 0, which is colored in white and shows that in certain counties, supply is balanced with demand. In other counties, demand increases upward, going from yellow to orange to red. By definition, demand cannot be negative.

Supply Maps:

The supply maps show the number of individuals who have completed a post-secondary program of study at an institution which reports to the National Center for Education Statistics (NCES). The database used to compile this information is the Integrated Post-Secondary Education Data System (IPEDS). Publicly funded community colleges, technical colleges, and four-year universities report their program completion data to NCES. In addition, many private technical schools and other private schools report their program completion numbers to NCES. The supply maps do not capture internal industry training, nor do the maps include apprenticeship workforce pipelines. The data portrayed in each map represent 2008 education program completers.

On the maps, supply estimates begin at 0, colored in white, and increase upward, going from lighter blue to darker blue. As with demand, by definition, supply cannot be negative.

Workforce Supply Gap Maps:

The purpose of this analysis is to gauge county-level workforce needs and future availability of jobs across the evaluated states.

The supply gap maps mesh both supply and projected annual demand to determine whether an education program's output of completions results in a surplus or deficit in the state's workforce. Counties where supply and demand are balanced, i.e., where supply equals demand, are shaded in white. Counties with more demand than supply are shaded in yellow, progressing to red as the severity of the demand increases in counties where is a significantly higher level of occupation demand relative to program supply. Conversely, counties with more supply than demand are shaded in light green and progress to a darker green wherever there is a significantly higher rate of program completion relative to occupation demand. Thus, areas with a darker red color likely have an energy workforce shortage, whereas areas with darker green could have an excess of potential skilled workers.

Additionally, a table providing numbers indicating surplus or deficit is given at the beginning of the section for each state. A black positive number shows that supply is greater. It indicates that a large number of program completers may be available to fill the necessary energy workforce demand. A red negative number shows that demand is greater, indicating the degree to which a deficit is estimated.

The reader must note that a positive number does not necessarily guarantee that program completers will enter the energy workforce. Many programs offered at post-secondary institutions allow for multiple career pathways that do not involve the energy sector. This analysis only evaluates occupation demand in the energy sector, not in all the industries in the states' and regions' economies. The reader should understand that many program completers will likely seek employment in similar occupations outside of the energy sector. For example, in Illinois, a chemical technician could enter into a number of alternative industries, including pharmaceuticals, testing laboratories, or paint manufacturing.

Interpreting the GIS Maps for Demographics and Poverty

There are three sets of maps for each state under this category. The first set shows the projected population changes from 2010-2015 for 16- to 22-year-olds, and the second set shows the same changes for 23- to 26-year-olds. For all of these maps, the darker red counties are projected to see the biggest decrease in the key demographic from 2010-2015, while darker green counties are projected to see the biggest increase.

The third set of maps displays counties where the target demographic may be concentrated. The total population aged 16 to 26 years in 2010 is displayed in green by county. The larger this age group is in a particular county, the darker the shading of green. Overlaid atop this is the total percentage of people in the county who are in poverty. Unfortunately, the percentage in poverty is only available for the population at large—not by age group. Hence it is assumed that the overall count poverty rate accurately reflects the true poverty rate of the 16 to 26 year old age group. This assumption is conservative in that younger people who are just starting out on their own tend to be among the least wealthy age groups.

Interpreting the Summary Data Tables

For each selected state, key employment in the energy sector and population projections for the cohort population by gender and ethnicity are also discussed. We compare the estimated projected annual demand to supply (i.e., the energy field completers for 2008) in order to estimate the supply gap in the energy field. A positive value under the 'Gap' variable shows excess supply, and a negative value shows excess demand for that occupation. Readers should know that supply is estimated based on the total number of energy-related program completers, whereas the demand is projected based on actual energy field employment. Thus, it is possible that the supply might be overestimated for the energy field since some of the completers seek employment in similar occupations, though not in the energy field. The supply-demand ratio tells us how many program completers are estimated to be supplied for every individual job demanded in a particular energy-related employment. For example, the 5.1 supply-demand ratio for technicians in California (Table 3) tells us that California supplied 5.1 technicians for every one technician needed in the energy sector.

The 16-through 26-year-old population was considered for every state. The 16-22-year-old population is classified as the "Education Age" cohort, and the 23-26-year-old population is classified as the "Early Career" cohort for the analysis.

Individual State Evaluations

Table 1 shows energy field employment by selected states. For each state, we use 2010-2015 data. The estimate shows that California, Florida, Georgia, and Texas shows positive job growth in the next five years. Indiana, Minnesota, North Carolina, Ohio, and Washington show the decline in projected jobs in 2015. North Carolina has the highest decline with 11% followed by Ohio (-5%). The projected annual demand is estimated based on current actual energy field employment.

Table 1 - Electrical and Natural Gas Utilities, Key Employment – by State

State	2010 Jobs	2015 Jobs	Change	% Change	2010-2015 Projected Annual Demand
California	54,893	56,002	1,109	2%	25,808
Florida	20,966	21,235	270	1%	9,609
Georgia	20,223	20,612	389	2%	9,261
Indiana	12,887	12,393	(495)	(4%)	5,284
Minnesota	12,421	12,136	(285)	(2%)	5,212
North Carolina	11,288	10,009	(1,278)	(11%)	3,728
Ohio	20,383	19,280	(1,103)	(5%)	8,009
Texas	42,708	43,400	692	2%	19,684
Washington	4,082	4,052	(30)	(1%)	1,821

Table 2 shows the population projections for the Education Age and Early Career cohorts by state, along with state overall poverty estimates. Even though the poverty estimates are for the entire state population, we can assume that each of the two cohort populations also have the same poverty percentages. Texas has the highest poverty rate, followed by Georgia and North Carolina. As for the Education Age population, California, Indiana, Minnesota, Ohio, and Washington show decline. Minnesota has the largest decline in that population (-6.7%), followed by Ohio (-5.6%) and Washington (-3.9%). The projected Early Career cohort population shows positive growth for all the states. The highest growth is projected in California (14.7%), followed by Florida (11.6%). Minnesota projected the least growth (1.7%) for the next five years.

Table 2 - Population Projection by Cohort

	Poverty		2010 Population		2015 Projection		Change (%)	
State	Total Population under Poverty	Poverty %	Education Age	Early Career	Education Age	Early Career	Education Age	Early Career
California	4,781,201	13.3%	4,000,143	2,265,821	3,938,177	2,598,495	(1.5%)	14.7%
Florida	2,375,225	13.3%	1,667,508	991,246	1,679,177	1,106,467	0.7%	11.6%
Georgia	1,388,959	14.7%	969,671	554,896	1,010,888	602,118	4.3%	8.5%
Indiana	799,567	12.9%	623,999	342,550	611,701	354,421	(2.0%)	3.5%
Minnesota	489,714	9.6%	504,723	291,292	470,863	296,194	(6.7%)	1.7%
N Carolina	1,301,882	14.6%	912,613	519,893	927,699	550,064	1.7%	5.8%
Ohio	1,489,314	13.3%	1,102,515	607,081	1,040,887	629,955	(5.6%)	3.8%
Texas	3,755,944	15.8%	2,518,815	1,477,854	2,640,152	1,587,668	4.8%	7.4%
Washington	727,156	11.3%	614,037	377,945	590,087	385,742	(3.9%)	2.1%

Table 27 shows that Washington supplied only 1 plant operator in 2008 though it will demand 58 plant operators annually in future years. Washington supplied more than the required jobs in all other energy field employment categories. For every projected demand for an engineer, the state supplied 36. Similarly for every projected demand for a pipefitter, Washington supplied 54. Overall, the state supplied approximately 7 jobs for every projected job demand in the energy field per year. Readers should be aware that the numbering of the tables and maps in this report matches the numbering in the main report and thus does not flow sequentially.

Table 27 - Electrical and Natural Gas Utilities, Key Occupation Employment – Washington

SOC Code	Description	2010-2015 Projected Annual Demand	2008 Supply	Gap	Supply-Demand Ratio	2009 Median Annual Earnings
Lineworkers		**58**	**78**	**20**	**1.3**	**$64,688**
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	7	n/a	(7)	n/a	$63,690
49-9051	*Electrical power-line installers and repairers*	52	78	26	1.5	$68,037
Technicians		**69**	**376**	**307**	**5.4**	**$54,163**
19-4031	*Chemical technicians*	1	1	0	1.6	$42,224
19-4051	*Nuclear technicians*	9	0	(9)	0.0	$54,829
47-2073	Operating engineers and other construction equipment operators	3	79	76	22.9	$52,374
47-2111	*Electricians*	4	109	105	24.4	$55,994
49-2095	*Electrical and electronics repairers, powerhouse, substation, and relay*	26	187	161	7.2	$61,069
49-9012	Control and valve installers and repairers, except mechanical door	26	n/a	(26)	n/a	$48,194
Plant / Field Operators		**58**	**1**	**(57)**	**0.0**	**$63,523**
51-8011	Nuclear power reactor operators	42	0	(42)	0.0	$76,898
51-8092	Gas plant operators	16	1	(15)	0.1	$49,899
Pipefitter / Pipelayer / Welder		**10**	**566**	**556**	**54.1**	**$47,944**
47-2151	*Pipelayers*	0	0	(0)	0.0	$49,046

47-2152	*Plumbers, pipefitters, and steamfitters*	7	0	(7)	0.0	$52,499
47-3015	*Helpers, pipelayers, plumbers, pipefitters, and steamfitters*	0	0	(0)	0.0	$33,155
51-4121	Welders, cutters, solderers, and brazers	3	566	563	187.1	$41,621
Engineers		**13**	**482**	**469**	**36.4**	**$82,368**
17-2041	Chemical engineers	0	100	100	939.9	$89,856
17-2071	Electrical engineers	8	382	374	50.8	$77,854
17-2161	Nuclear engineers	6	0	(6)	0.0	$88,150
TOTAL*		**210**	**1,394**	**1,184**	**6.7**	

Note: (i) Italics SOC code refers to the overlapping of '2008 Supply' across employment category
(ii) * Values may not total exactly due to double counting in "2008 Supply."

- Washington Demand Maps

Figures 145-149 depict the estimated demand for lineworkers, technicians, plant operators, pipefitters/pipelayers, and engineers for each county in Washington. By definition, demand can never be negative. Demand estimates for the different employment types begin at 0 (colored in white) and go from yellow, to orange, to red as demand increases.

Figures 145, 146 and 147 show how demand for lineworkers, technicians, and plant operators exhibits a similar pattern. Demand for all three is fair, scattered across the state, and higher in the urbanized areas. Figures 148 and 149 show demand for pipefitters/pipelayers and engineers. Demand for these is lower than that of the other three and is mainly found in the more populated areas of the Puget Sound.

- Washington Supply Maps

Figures 150-154 show the estimated supply of lineworkers, technicians, plant operators, pipefitters/pipelayers, and engineers for each county. By definition, supply can never be negative, so estimates begin at 0 (colored in white) and increase (from lighter blue to darker blue).

Figure 150 shows the supply of lineworkers. These are found in just two counties. Figure 151 shows supply for technicians, which are seen to come from across the state. Figure 152 shows only one plant operator was supplied in the entire state. Figure 153 shows the supply of pipefitters/pipelayers is the highest in the Puget Sound and along the Pacific coast. Finally, Figure 154 shows that the supply of engineers comes mainly from the urban areas or those counties with engineering programs.

- Washington Workforce Supply Gap Maps

Figures 155-159 show the gap between the estimated supply and estimated demand for the five occupations. The gap is simply the estimated demand for a particular occupation in a given county minus the estimated supply of that occupation from that same county. Counties are shaded in white where supply and demand are balanced, i.e., where supply equals demand. Counties with more demand than supply are shaded in yellow and progress in severity to red. Conversely, counties with more supply than demand are shaded in light green and progress to a darker green.

Figures 155, 156 and 157 show the gap for lineworkers, technicians, and plant operators. Overall, the state shows deficits of each, and the gap patterns are similar. Figure 158 shows a general surplus of pipefitters/pipelayers, and Figure 159 shows that the supply and demand for engineers is balanced in most counties.

- Washington Population Growth

Table 28 and 29 show the population growth for the Education Age and Early Career cohorts by gender and ethnicity in Washington State. The estimates show that the Education Age population is likely to decline about 3.9 percent, whereas the Early Career cohort population will grow about 2.1 percent over the next five years. Whites play the major role in Education Age cohort decline, and Hispanics play the major role for the Early Career cohort's growth.

Table 28 – Education Age Cohort (16-22 years) by Gender and Ethnicity - Washington

	2010			2015 Projection			Change (%)		
Ethnicity	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
White	224,235	206,159	430,394	199,909	187,038	386,947	-10.8%	-9.3%	-10.1%
Black	14,506	11,749	26,255	13,739	11,668	25,407	-5.3%	-0.7%	-3.2%
Hispanic	40,891	35,869	76,760	49,002	43,469	92,471	19.8%	21.2%	20.5%
Asian	18,124	17,950	36,074	19,401	19,983	39,384	7.0%	11.3%	9.2%
Other	22,568	21,987	44,554	23,169	22,709	45,878	2.7%	3.3%	3.0%
TOTAL	**320,324**	**293,713**	**614,037**	**305,221**	**284,866**	**590,087**	**-4.7%**	**-3.0%**	**-3.9%**

Table 29 - Early Career Cohort (23-26 Years) by Gender and Ethnicity - Washington

	2010			2015 Projection			Change (%)		
Ethnicity	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
White	139,393	130,408	269,800	138,496	125,976	264,472	-0.6%	-3.4%	-2.0%
Black	9,658	7,087	16,745	10,416	7,651	18,068	7.9%	8.0%	7.9%
Hispanic	24,504	19,382	43,886	29,675	23,115	52,790	21.1%	19.3%	20.3%
Asian	11,964	12,252	24,216	12,260	12,399	24,659	2.5%	1.2%	1.8%
Other	11,647	11,650	23,297	13,036	12,717	25,752	11.9%	9.2%	10.5%
TOTAL	**197,165**	**180,780**	**377,945**	**203,883**	**181,858**	**385,742**	**3.4%**	**0.6%**	**2.1%**

Figures 160 and 161 show the estimated five-year population change for those aged 16 to 22 and 23 to 26. Each county is shaded to reflect the absolute population change in each cohort. Counties with only slight positive or negative absolute change are colored in white. Decreases in absolute cohort population are colored in red with the highest decreases colored in bright red. Positive absolute cohort population change is colored in green with the highest increases colored in bright green. It should be emphasized that because absolute numbers are plotted, counties with relatively smaller total populations may have far larger percent changes than their larger counterparts. Therefore, the local impacts of population change on the supply and demand for energy workers may be much more pronounced in counties with smaller populations.

Washington is expected to have a net loss in the Education Age cohort of 3.9 % and a gain in the Early Career cohort of 2.1%. Figure 160 shows that most counties, in particular the metro areas, are expected to experience decreases in the Education Age cohort. Figure 161 shows that the Early Career cohort is expected to increase most in the Seattle-Tacoma and Yakima areas.

- Washington Poverty Map

This map was created to show where the population aged 16 to 26 in lower income brackets currently live. To this end, the total estimated population of people aged 16 to 26 for 2010 is overlaid with the estimated county poverty rates for 2010. Note that estimated poverty rates could only be obtained for the entire population of the county. It is thus assumed that the percentage of people in poverty in the 16- to 26-year age bracket is the same as the percentage for the entire county population. In reality, this may be a conservative estimate.

The map shows the total population of all county residents 16 to 26 years of age in green. The higher the population of the group is, the darker the shade of green will be. The percent of the total county population in poverty is shown by a red dot for each county. The smaller green dots represent lower percentages of people in poverty; this percentage increases as the size of the dot increases.

Figure 162 shows these relationships. The more urban counties have the lowest poverty rates, in contrast with the highest poverty rates in the rural counties.

Figure 145. Demand for lineworkers in Washington, by county

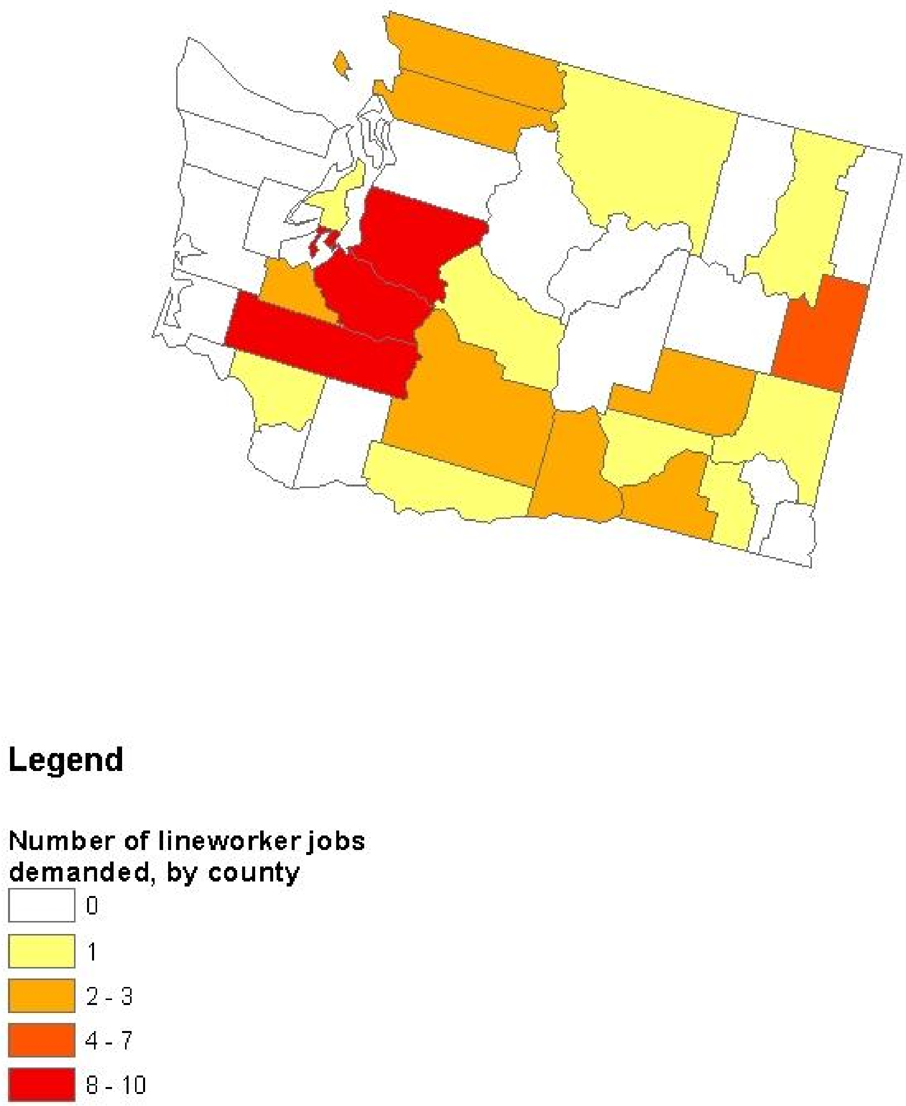
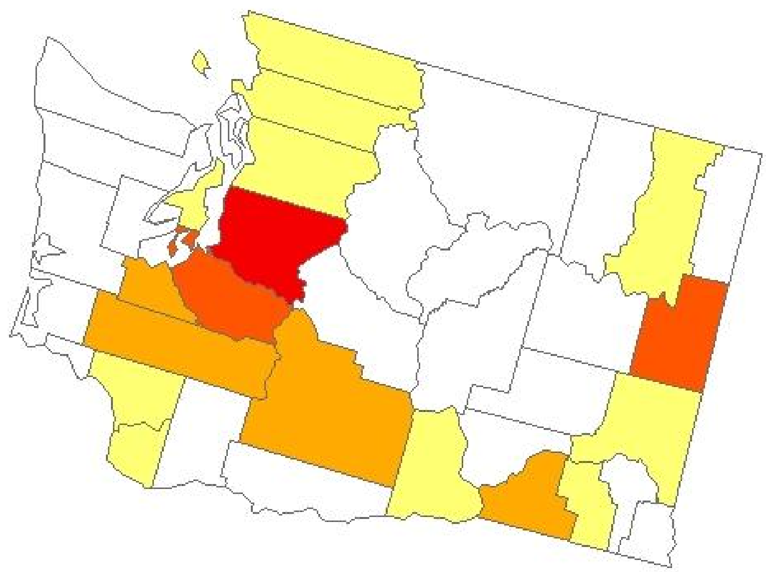


Figure 146. Demand for technicians in Washington, by county

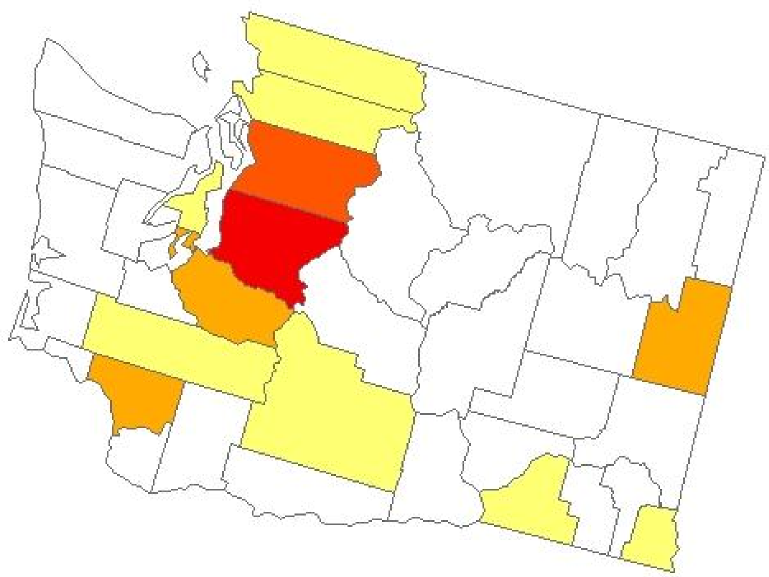


Legend

Number of technician jobs demanded, by county

- 0
- 1 - 2
- 3 - 6
- 7 - 12
- 13 - 20

Figure 147. Demand for plant operators in Washington, by county

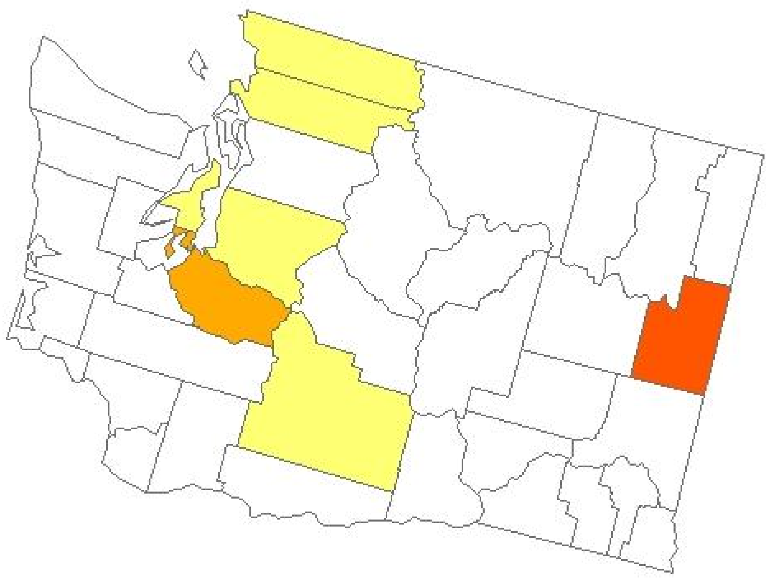


Legend

Number of plant operator jobs demanded, by county

- 0
- 1
- 2
- 3 - 4
- 5 - 39

Figure 148. Demand for pipefitters/pipelayers in Washington, by county

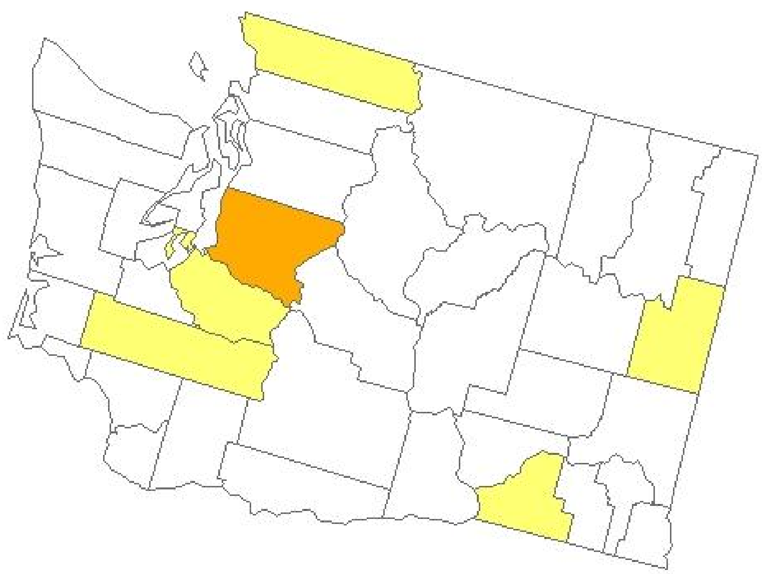


Legend

Number of pipefitter/pipelayer jobs demanded, by county

- 0
- 1
- 2
- 3

Figure 149. Demand for engineers in Washington by county



Legend

Number of engineering jobs demanded, by county

(white)	0
(yellow)	1
(orange)	2 - 5

Figure 150. Supply of lineworkers in Washington, by county

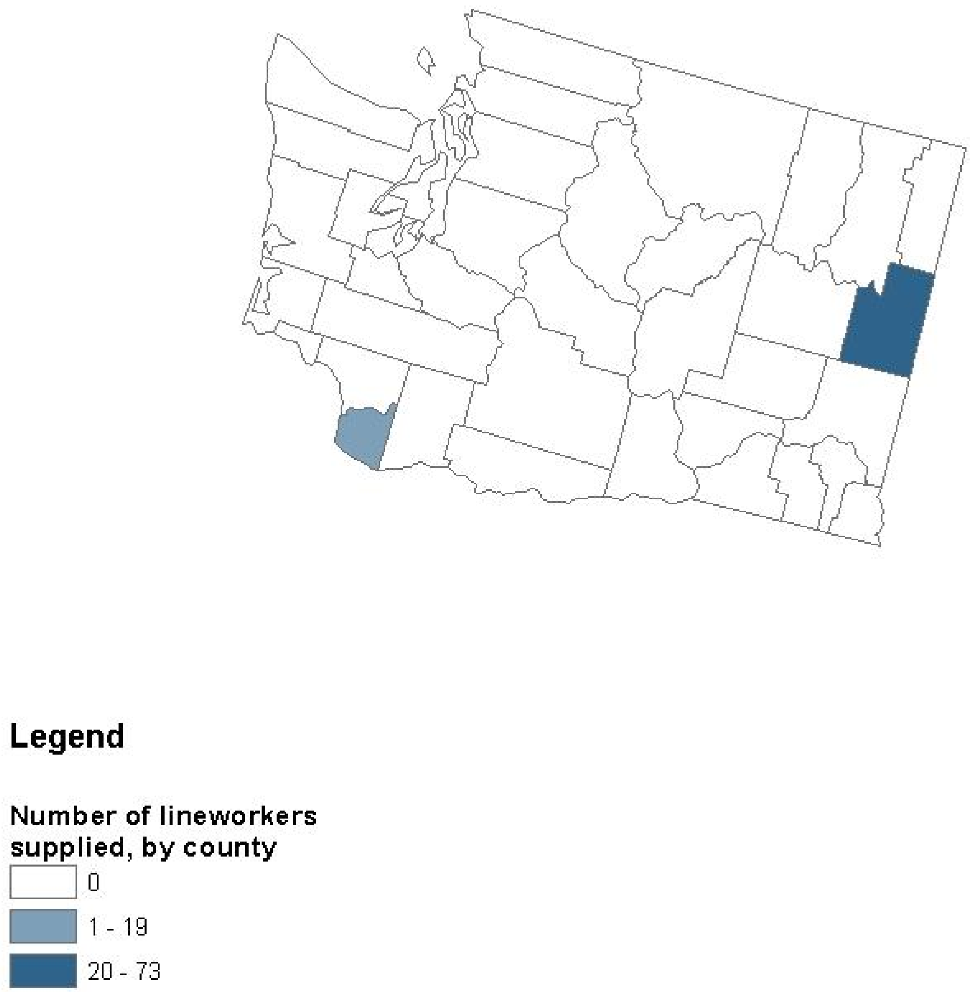
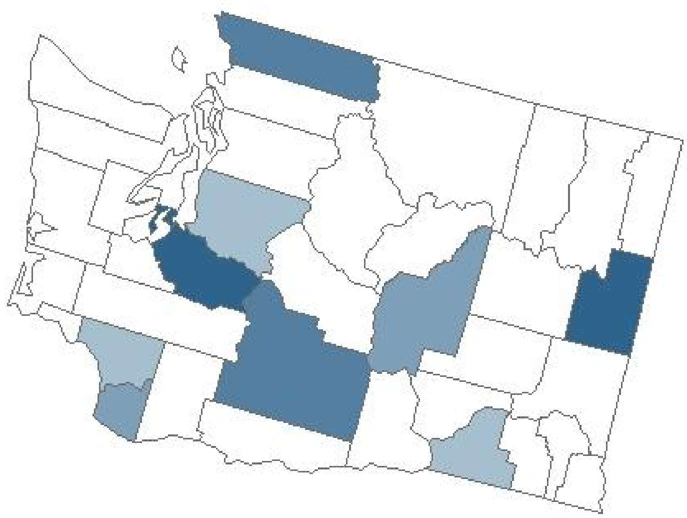


Figure 151. Supply of technicians in Washington, by county

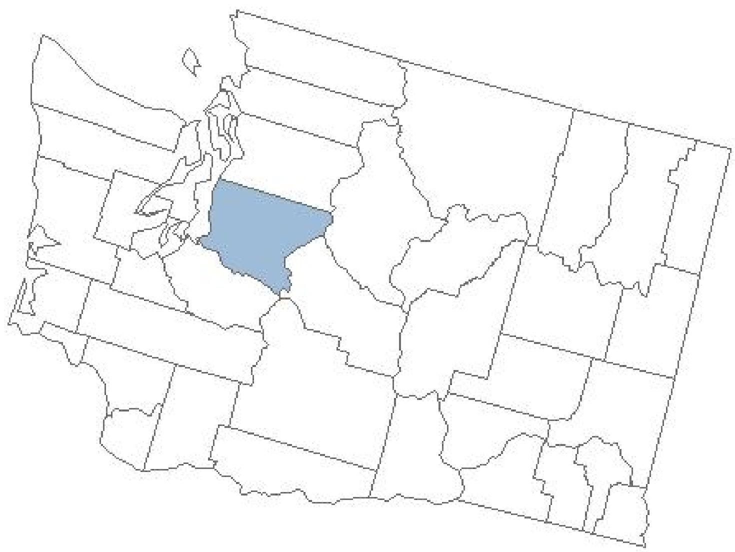


Legend

Number of technicians supplied, by county

- 0
- 1 - 5
- 6 - 18
- 19 - 72
- 73 - 86

Figure 152. Supply of plant operators in Washington, by county



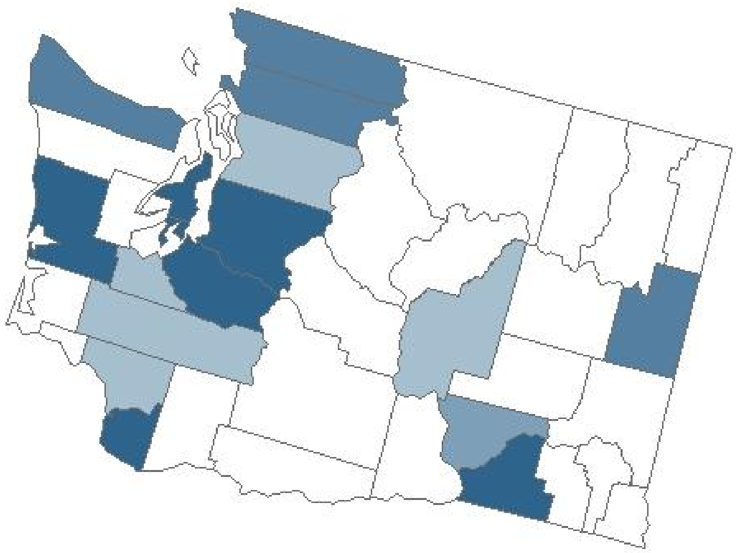
Legend

Number of plant operators supplied, by county

0

1

Figure 153. Supply of pipefitters/pipelayers in Washington, by county



Legend

Number of pipefitters/pipelayers supplied, by county

- 0
- 1 - 6
- 7 - 16
- 17 - 40
- 41 - 97

Figure 154. Supply of engineers in Washington, by county

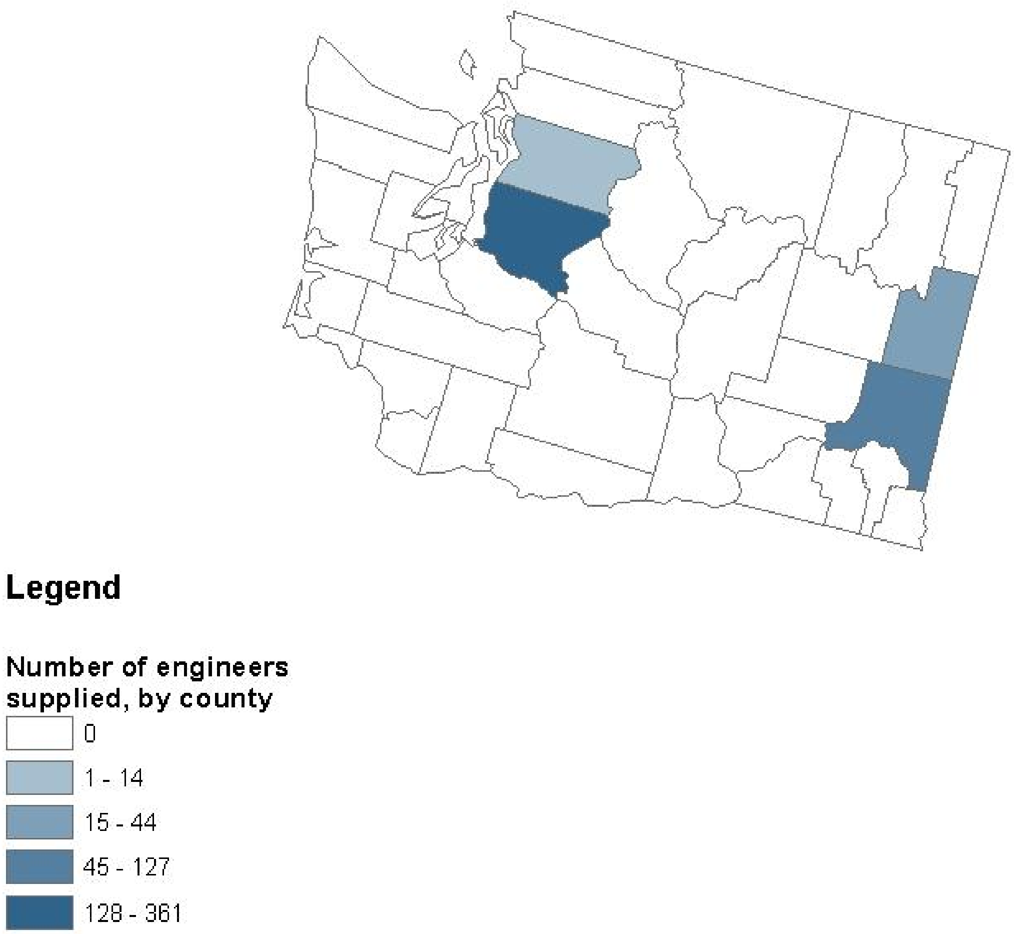
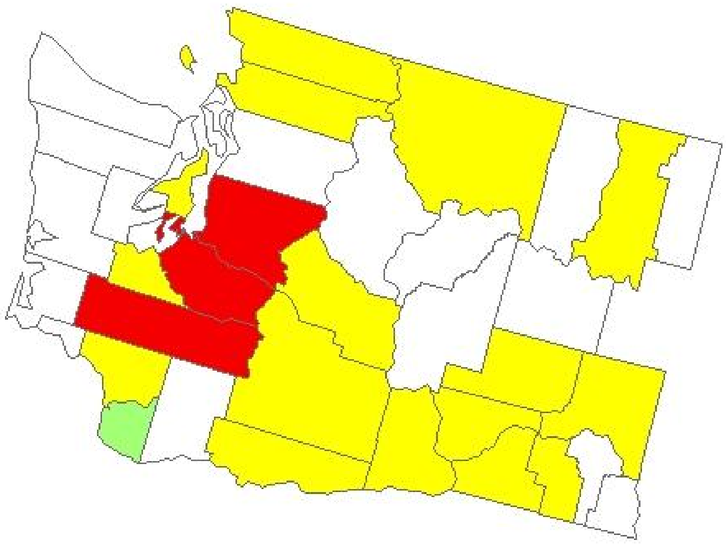


Figure 155. Gap between supply and demand for lineworkers in Washington, by county

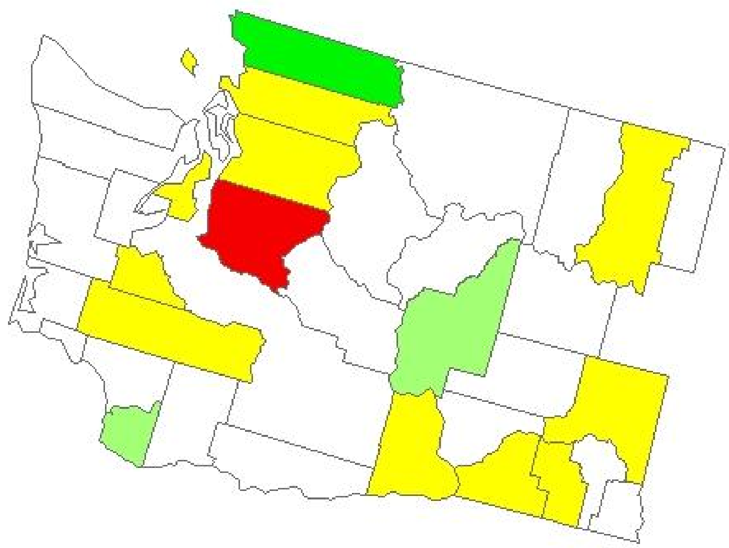


Legend

Surplus/deficit of lineworkers, by county

- -10 - -5
- -4 - -1
- 0
- 1 - 20
- 21 - 40

Figure 156. Gap between supply and demand for technicians in Washington, by county

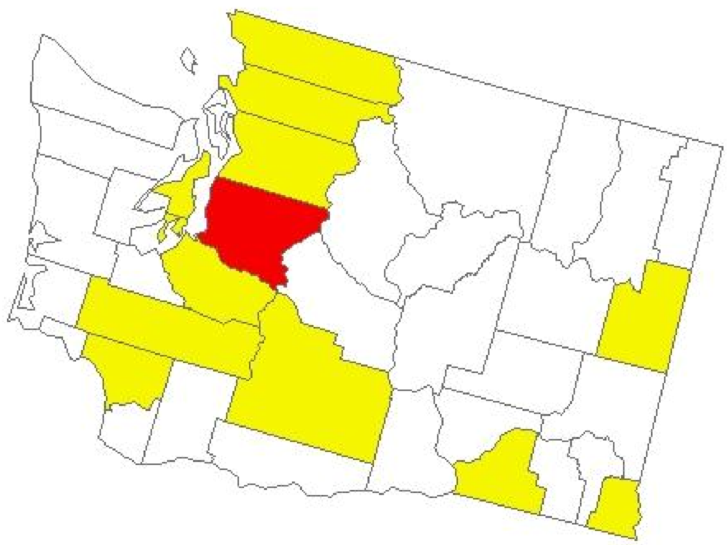


Legend

Surplus/deficit of technicians, by county

- -19 - -10
- -9 - -1
- 0
- 1 - 20
- 21 - 40

Figure 157. Gap between supply and demand for plant operators in Washington, by county

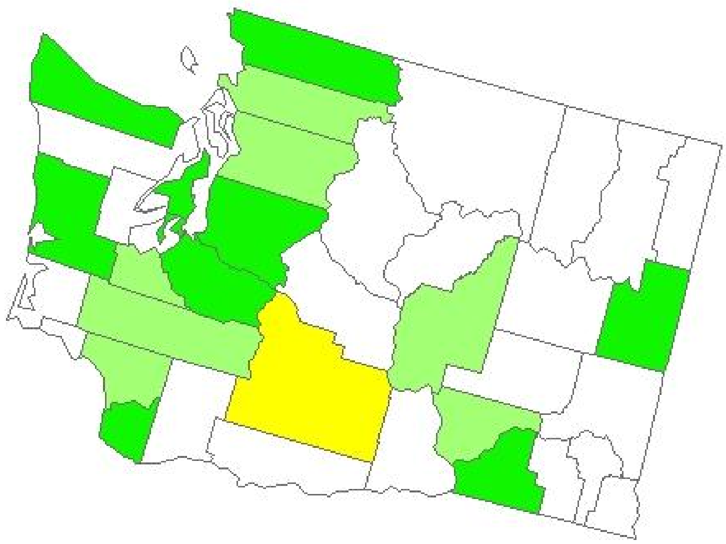


Legend

Surplus/deficit of plant operators, by county

- -38 - -20
- -19 - -1
- 0

Figure 158. Gap between supply and demand for pipefitters/pipelayers in Washington, by county



Legend

Surplus/deficit of pipefitters/pipelayers, by county

- -1
- 0
- 1 - 25
- 26 - 50

Figure 159. Gap between supply and demand for engineers in Washington, by county

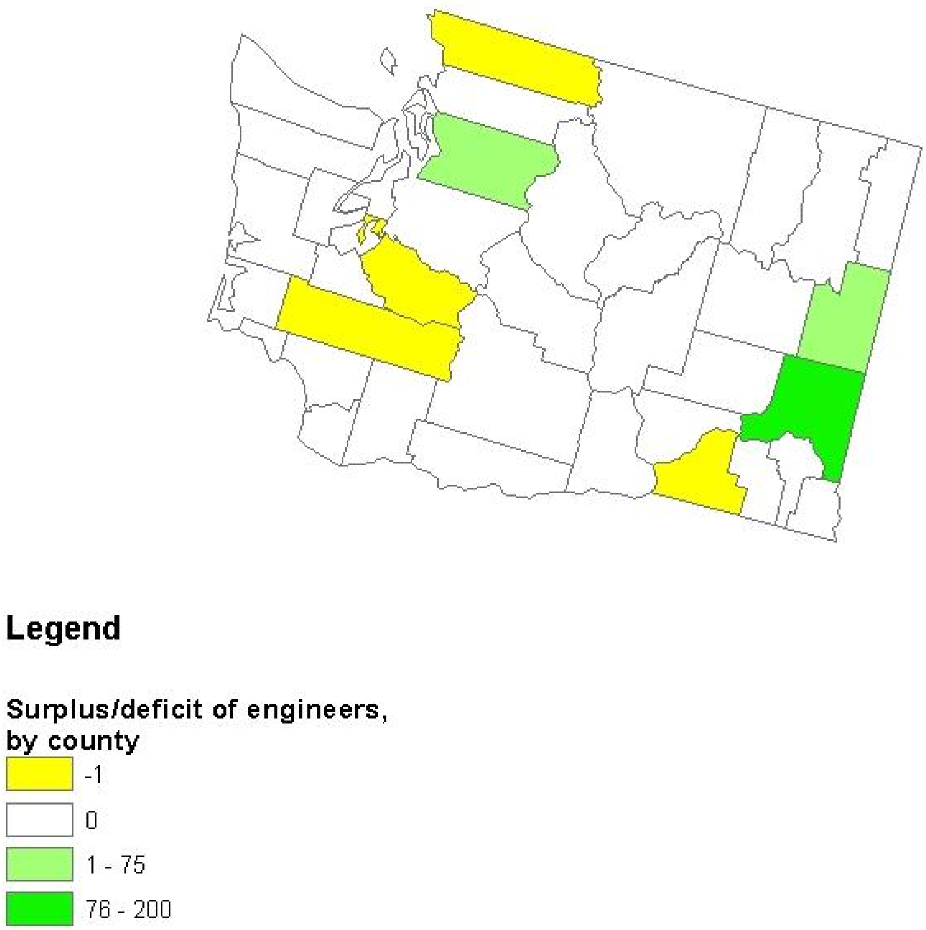
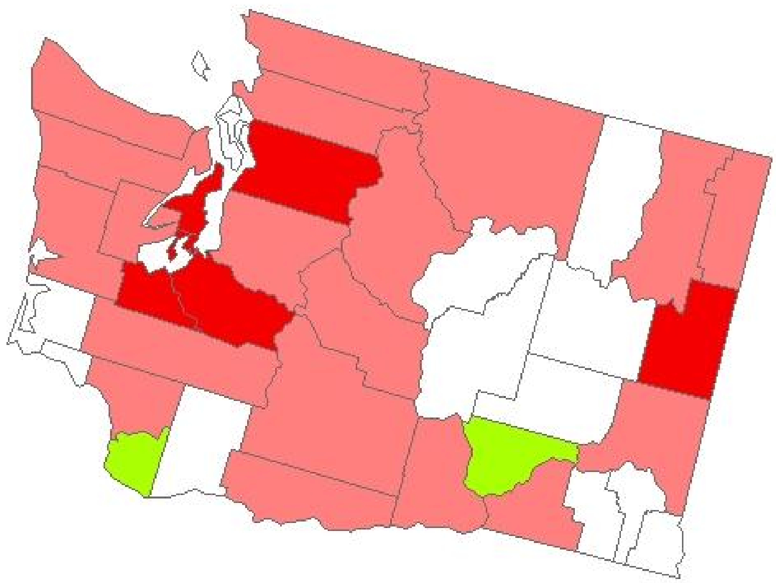


Figure 160. Projected five-year change (from 2010 to 2015) in total population aged 16 to 22 years in Washington

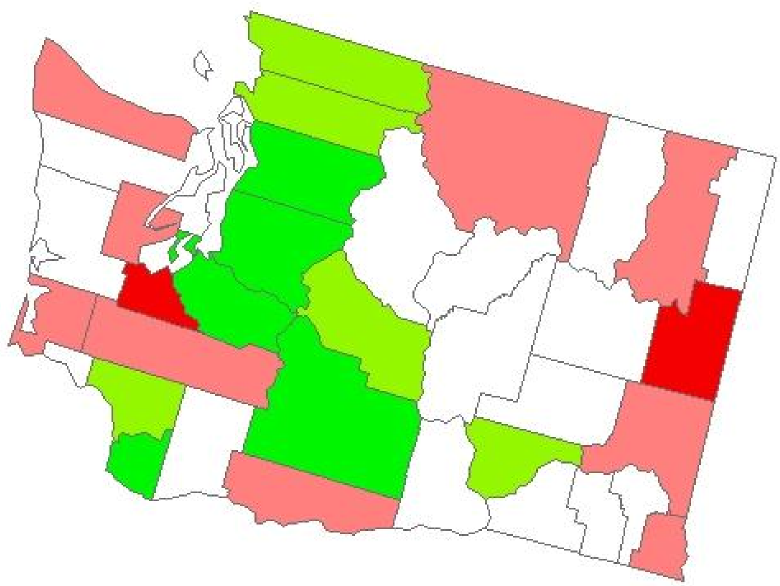


Legend

Change in target population, by county

- -3333 - -1500
- -1499 - -200
- -199 - 200
- 201 - 542

Figure 161. Projected five-year change (from 2010 to 2015) in total population aged 23 to 26 years in Washington

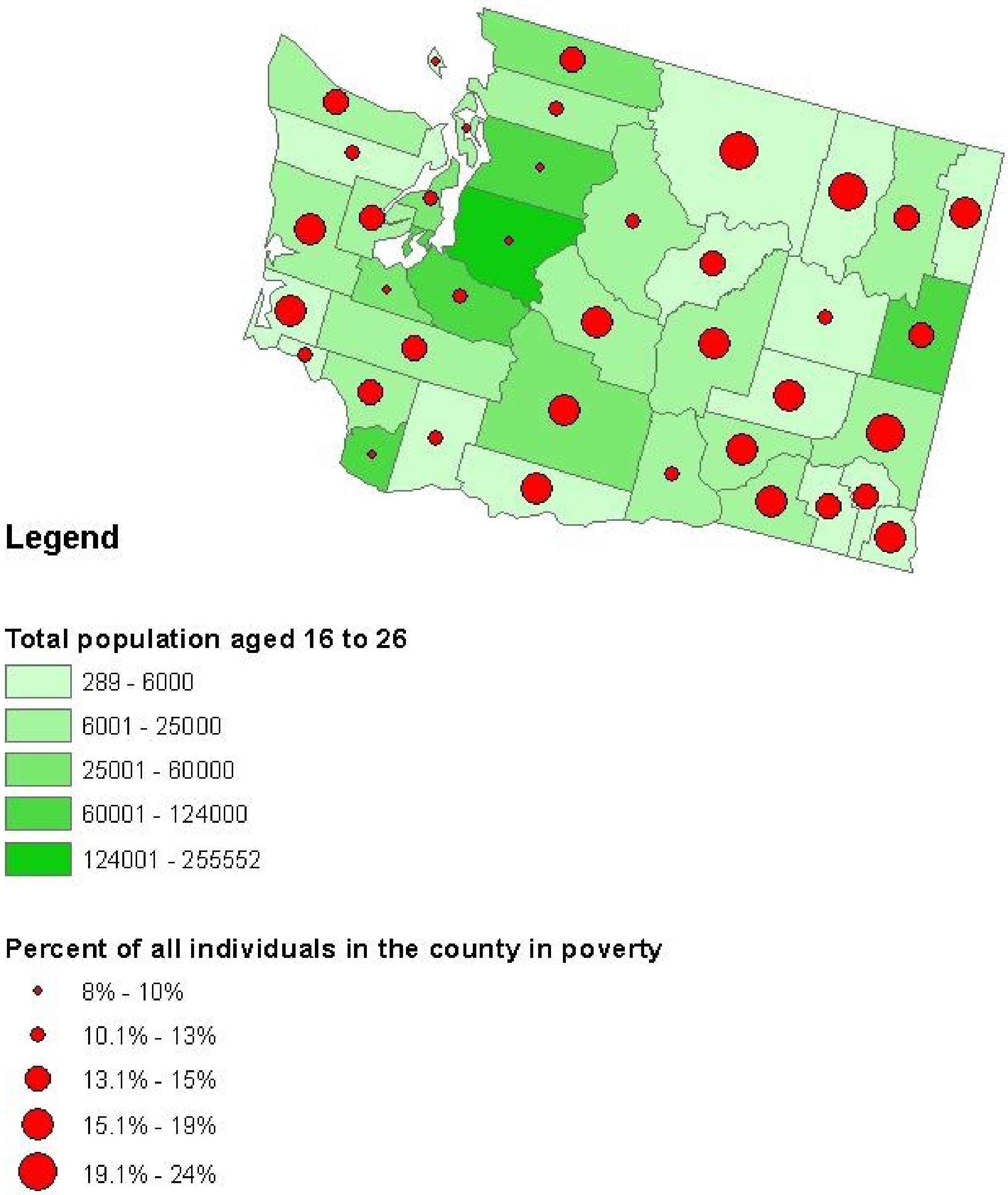


Legend

Change in target population, by county

- -782 - -579
- -578 - -100
- -99 - 100
- 101 - 1000
- 1001 - 4136

Figure 162. Total population in 2010 aged 16 to 26 and poverty estimates in Washington, by county



Conclusions

An exhaustive enumeration of the supply and demand situations within each county in each state will not be attempted. The interested reader can perform detailed comparisons and assessments they deem informative for their region. Instead, macro-level trends will be summarized.

Perhaps the most immediately apparent trends are those relating to the education age (16 to 22 year olds) and early career (23 to 26 year olds) cohorts. All states are expected to experience a rise in the early career cohort by 2015. The rate of increase varies between 1.7% and 14.7%. Yet for the education age cohort, roughly half the states are expected to experience declines. The rate of change varies from -6.7% to 4.8%. States with lower increases in the early career cohort tend to have decreases in the education age cohort. Further, states with lower poverty rates today are expected to have lower—if not negative—population growth in both age cohorts. Therefore, states with lower poverty rates today may experience demand-side price deflation in the future, whereas the opposite trend may occur for states with relatively higher poverty rates today. Demand-side price deflation may occur simply because of the smaller total population size. Thus the total amount of goods and services demanded in the regional economy would be less—leading to less capital investment, fewer jobs, lower wages, and decreased purchasing power outside the local economic region. Demand-side price deflation is thought to be undesirable and may lead to a deflationary spiral.

Macro trends for the five occupations might best be seen when comparing the gap maps across states. The largest occupational deficits exist for lineworkers (Washington state is the only exception), while technicians are estimated to be in surplus in every state. However, it needs be noted that the analysis only accounts for demand from the energy sector. Certainly demand for the occupational types exists from other sectors, so estimates that result in surpluses may be odious. Estimates resulting in deficits are more reliable, since a deficit is reported when the total supply from educational institutions is less than the total demands of just the energy sector alone. Plant operators are also at a large occupation deficit (with Texas as the only exception). Even though demand for plant operators is the lowest among the five occupations modeled, the low supply of such highly-skilled positions may prove critical. For pipefitters/pipelayers, large surpluses exist in every state, but again the impact on the energy sector is unknown at this level of analysis. Lastly, for engineers, the situation varies greatly by state, so no macro trends can be discerned.

The occupational gaps suggest areas where additional college educational programs, industry-sponsored education and training, and recruitment and retention efforts are lacking—or are overly successful. From this nine state sample, it can be inferred that there will be nationwide shortages of lineworkers and plant operators, and nationwide surpluses of technicians and pipefitters/pipelayers. A reallocation of educational training and recruitment efforts is needed in order to meet the future demands of the energy section and society.