Utah's Strategic Clusters: Performance, Benefits, Workforce Needs, and Rural Utah

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September 2018

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Introduction

Utah's six strategic clusters were designated in June 2005 and November 2006 and became the focus of economic development efforts. This report evaluates their performance before and since inception relative to the rest of the state's economy and relative to their performance nationwide. It analyzes the clusters' resilience during the Great Recession and its recovery, and assesses prospects for future growth. We also examine the economic benefits the clusters provide through their supply chain connections to the rest of the state's economy. We analyze workforce needs by examining growth forecasts for the top occupations used by each cluster. We assess whether these are still the "right" clusters and whether any new clusters should be considered. Finally, we evaluate the transferability of the clusters to rural Utah.

In 2017 employment in Utah's strategic clusters represented 16.6 percent of total state employment. Finance and IT/Software were the largest clusters, each with 5.2 percent of total employment and over 75,000 jobs. The smallest cluster was Outdoor Recreation, comprising 6,880 jobs representing 0.5 percent of total state employment.

Since the clusters were declared in June 2005 (and November 2006 for Outdoor Recreation) in Utah, the annual growth rate of all clusters combined has been 2.7 percent, about one-third faster than the 2.0 percent growth rate of the rest of the economy. The IT/Software, Life Sciences, and Finance clusters have performed the best since 2005, with growth rates exceeding those of the other clusters as well as the rest of the economy. Aerospace & Defense, Energy & Natural Resources, and Outdoor Recreation have all grown more slowly than the rest of the economy, with the latter two shrinking.

Rough estimates of annual cluster growth rates over the next decade range from 1.1 percent for Outdoor Recreation to 2.4 percent for Life Sciences, with the remaining clusters projected to expand by 2.0 or 2.1 percent annually. Over the same period, total state employment is projected to increase by 2.2 percent per year.

Across all of Utah's strategic clusters, over the next five years the greatest labor force needs are likely to be for software application developers, market research analysts and marketing specialists, computer and information systems managers, computer user support specialists, and systems software developers. Not only are these some of the largest cluster occupations, all of these occupations are forecast to grow more than 4 percent annually between 2014 and 2024, with application developers expected to grow by 6 percent a year.

Rural Utah provides challenges for cluster-based development. In most rural counties, the prevalent occupations that are also used by the state's clusters are unlikely to be sufficient to attract cluster firms to the areas. The most attractive non–Wasatch Front region is Cache County, which has concentrations in a wide range of occupations found in the clusters. Many non–Wasatch Front counties suffer from below-average levels of educational attainment, measured by both the share of the population with bachelor's degrees or higher and the number of science-, engineering-, and business-related degrees per 100 residents. Those few with above-average education are either home to a major university (Cache) or border the Wasatch Front (Morgan, Summit, and Wasatch). What the rural counties do have are above-average concentrations of residents with only an associate's degree. Many of Utah's rural communities are isolated by a lack of infrastructure. While rural Utah is well served with broadband internet access, fewer than half of the 25 non–Wasatch Front counties are crossed by an interstate highway or a rail line. On the plus side, all but Rich and Summit counties have at least one public airport, providing potential access to both suppliers and customers, and there are 41 higher-education campuses across the 25 counties, providing opportunities for residents to build their skills.

Cluster Performance

All employment data that follow are from the Utah Department of Workforce Services. As such they exclude the self-employed (sole proprietors and general partners) and military personnel. At the time of our analysis, monthly figures for 2017 were available only through September, therefore 2017 numbers represent a nine-month average.

Growth Since Inception

In 2001, before the clusters were designated, employment in the industries that would become Utah's clusters represented 15.7 percent of the state's total nonfarm employment.[1] In 2005, the clusters claimed 15.2 percent of total employment, but by 2017 their share had increased to 16.6 percent (see Table 1). As of 2017 Finance and IT/Software were the largest clusters, each with 5.2 percent of total employment and over 75,000 jobs. The smallest cluster was Outdoor Recreation, comprising 6,880 jobs representing 0.5 percent of total state employment.

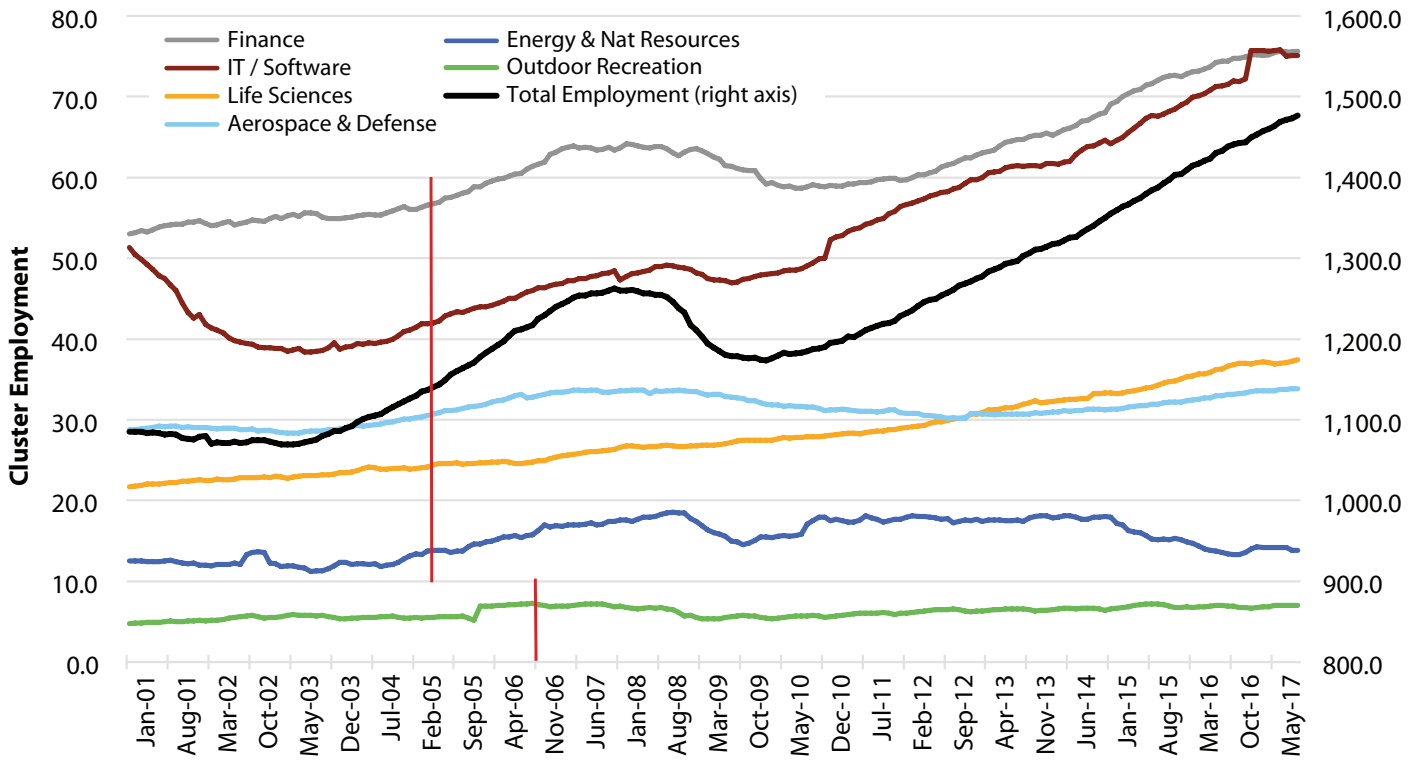
The IT/Software, Life Sciences, and Finance clusters have performed the best since 2005, with growth rates exceeding those of the other clusters as well as the rest of the economy. Aerospace & Defense, Energy & Natural Resources, and Outdoor Recreation have all grown more slowly than the rest of the econo-

Table 1: Utah Cluster Employment, 2001–2017

Cluster	2001	2005	2010	2015	2016	2017
Aerospace & Defense*	29,046	30,905	31,678	31,753	32,811	33,656
Share of Total Jobs	2.7%	2.7%	2.7%	2.3%	2.3%	2.3%
Energy & Natural Resources	12,434	13,753	16,272	16,012	13,970	14,028
Share of Total Jobs	1.1%	1.2%	1.4%	1.2%	1.0%	1.0%
Finance	53,816	57,202	59,052	71,099	73,842	75,307
Share of Total Jobs	5.0%	5.0%	5.0%	5.2%	5.2%	5.2%
IT / Software	47,295	42,555	48,724	66,613	70,808	75,278
Share of Total Jobs	4.4%	3.7%	4.1%	4.8%	5.0%	5.2%
Life Sciences	22,113	24,371	27,738	33,907	36,071	37,109
Share of Total Jobs	2.0%	2.1%	2.3%	2.5%	2.5%	2.5%
Outdoor Recreation (Nov. '06)	4,951	5,528	5,586	6,939	6,870	6,880
Share of Total Jobs	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Clusters Total	169,654	174,313	189,051	226,322	234,372	242,258
Share of Total Jobs	15.7%	15.2%	16.0%	16.4%	16.4%	16.6%
Non-Cluster Employment	912,032	973,932	992,804	1,151,580	1,192,255	1,217,283
Total Employment	**1,081,686**	**1,148,245**	**1,181,855**	**1,377,902**	**1,426,627**	**1,459,541**

* Does not include military employment.
Source: Utah Department of Workforce Services.

Figure 1: Utah Monthly Cluster Employment, January 2001–September 2017
(seasonally adjusted thousands; excludes self-employed)



Note: Vertical red lines indicate when the clusters were designated: June 2005 and November 2006.
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services data.

Table 2: Utah Clusters and Employment Growth, 2001–2017

	Jan 2001–Jun 2005			Jun 2005–Sep 2017		
Cluster	**Share of Growth**	**Total Growth**	**CAGR**	**Share of Growth**	**Total Growth**	**CAGR**
Aerospace & Defense	3.6%	7.4%	1.6%	0.9%	9.5%	0.7%
Energy & Natural Resources	2.3%	10.9%	2.3%	0.0%	–0.3%	0.0%
Finance	6.6%	7.3%	1.6%	5.6%	32.9%	2.3%
IT / Software	–15.4%	–17.7%	–4.2%	9.9%	77.7%	4.8%
Life Sciences	4.9%	13.3%	2.8%	3.9%	52.1%	3.5%
Outdoor Recreation*	1.7%	49.6%	7.2%	–0.1%	–1.9%	–0.2%
All Clusters	**3.4%**	**1.2%**	**0.3%**	**20.6%**	**39.4%**	**2.7%**
Non-Cluster Employment	96.6%	6.2%	1.4%	79.4%	27.3%	2.0%
Total Employment	100%	5.4%	1.2%	100%	29.1%	2.1%

CAGR = compound annual growth rate
* The Outdoor Recreation cluster was designated in November 2006. The metrics shown reflect this difference.
Source: Governor's Office of Economic Development and Kem C. Gardner Policy Institute analysis of monthly data from the Utah Department of Workforce Services.

my since 2005, with the latter two shrinking (see Figure 1 and Table 2). Part of Outdoor Recreation's poor performance is the result of an unusual jump in sporting and athletic goods manufacturing employment that lasted from January 2006 through about September 2008 and had disappeared by March 2009. Cluster employment has grown by 30 percent since then.

From January 2001 through June 2005 employment in all clusters combined grew at a compound annual growth rate of 0.3 percent, much slower than non-cluster employment (1.4 percent) and total employment (1.2 percent; see Table 2). Nationally, employment in the same clusters shrank by 1.1 percent annually over the same period, while the rest of the economy

Table 3: National Clusters and Employment Growth, 2001–2017

	Jan 2001–Jun 2005			Jun 2005–Jun 2017		
Cluster	Share of Growth	Total Growth	CAGR	Share of Growth	Total Growth	CAGR
Aerospace & Defense	–3.9%	–1.5%	–0.3%	1.5%	8.9%	0.7%
Energy & Natural Resources	–7.5%	–3.5%	–0.8%	2.0%	13.7%	1.1%
Finance	31.7%	4.2%	0.9%	1.4%	2.5%	0.2%
IT / Software	–146.4%	–18.7%	–4.5%	8.6%	19.5%	1.5%
Life Sciences	14.8%	4.4%	1.0%	2.2%	9.1%	0.7%
Outdoor Recreation*	–0.5%	–11.8%	–2.1%	0.0%	1.1%	0.1%
All Clusters	**–113.7%**	**–4.8%**	**–1.1%**	**15.8%**	**10.1%**	**0.8%**
Non-Cluster Employment	213.7%	1.7%	0.4%	84.2%	9.4%	0.8%
Total Employment	100%	0.7%	0.1%	100%	9.5%	0.8%

CAGR = compound annual growth rate
* The Outdoor Recreation cluster's metrics are calculated relative to November 2006 instead of June 2005.
Source: Governor's Office of Economic Development and Kem C. Gardner Policy Institute analysis of monthly data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages.

grew by 0.4 percent (see Table 3). Since the clusters were declared in June 2005 (and November 2006 for Outdoor Recreation) in Utah, the annual growth rate of all clusters combined has been 2.7 percent, about one-third faster than the 2.0 percent growth rate of the rest of the economy. Because of this disparity, the clusters' contribution to total state employment growth increased from 3.4 percent for the January 2001–June 2005 period to 20.6 percent for June 2005 through September 2017. By way of comparison, the same clusters nationally lost more jobs than the rest of the economy gained between January 2001 and June 2005. But from June 2005 through June 2017 the national clusters contributed 16 percent of total employment growth, averaging 0.8 percent annual growth and matching the pace of the rest of the economy.

The acceleration in total cluster growth has not been shared by all clusters in Utah. Between the 2001–2005 and 2005–2017 periods three of the six clusters saw their average annual growth rates fall while the other three accelerated. Aerospace & Defense slowed from 1.6 percent annual growth to 0.7 percent, while Energy & Natural Resources and Outdoor Recreation both switched from growing before cluster designation to shrinking. Of the accelerating clusters, Finance and Life Sciences growth rates increased modestly from 1.6 percent annually to 2.3 percent for the former and from 2.8 percent to 3.5 percent for the latter. However, the IT/Software cluster went from shrinking by 4.2 percent annually in 2001 through June 2005 to growing 4.8 percent a year in 2005 through September 2017. The IT/Software, Life Sciences, and Finance clusters have performed the best since June 2005, with growth rates exceeding those of the other clusters as well as the rest of the economy. Aerospace & Defense, Energy & Natural Resources, and Outdoor Recreation have all grown more slowly than the rest of the economy since being designated.

Nationally, all clusters saw positive net employment growth between June 2005 and June 2017, although Finance and Life Sciences—the only clusters to grow between 2001 and 2005—slowed down from the earlier period (see Table 3). This net growth also masks a 12 percent decline in national Outdoor Recreation employment that occurred from December 2007 to March 2010. Only the Energy & Natural Resources and Outdoor Recreation clusters have performed better nationally than in Utah. Both clusters have shrunk in Utah since June 2005 while nationally Energy & Natural Resources averaged 1.1 percent annual growth and Outdoor Recreation expanded at a meager 0.1 percent average annual growth rate. The Aerospace & Defense cluster saw similar growth rates both nationally and in Utah, not surprising given that it is largely driven by national defense policy. However, the Finance, IT/Software, and Life Sciences clusters grew three to 11 times faster in Utah than nationally.

Four clusters have exceeded their pre-recession employment peaks (see Figure 1, above). Seasonally adjusted employment in the Finance cluster, the largest, peaked in February 2008 with 64,134 jobs. As of September 2017 it had reached 75,586 jobs, 18 percent higher. The second largest cluster, IT/Software reached 49,155 jobs in September 2008 before declining slightly through August 2009. By September 2017 employment was 53 percent higher, at 75,075 jobs. The Aerospace & Defense cluster reached 33,685 jobs in August 2007. It briefly touched this level again in November 2008 before declining through November 2012. By September 2017 cluster employment was only 0.4 percent higher, at 33,815. The Life Sciences cluster has seen nearly continuous growth since January 2001. From December 2007, when the overall economy peaked, through September 2017 the cluster grew 42 percent, surpassing Aerospace & Defense as the third largest cluster.

Table 4: Resilience of Clusters

Cluster	Dec '07–Feb '10	Feb '10–Nov '12	Resistance	Recoverability
Total Employment	–7.0%	7.9%		
Aerospace & Defense	–4.8%	–5.4%	2.2%	–13.3%
Energy & Natural Resources	–10.9%	12.5%	–3.8%	4.6%
Finance	–6.6%	4.8%	0.4%	–3.1%
IT / Software	–0.9%	22.5%	6.2%	14.6%
Life Sciences	4.2%	10.1%	11.2%	2.2%
Outdoor Recreation	–20.6%	18.9%	–13.5%	11.0%

Note: Resistance and Recoverability measure the difference between each cluster's employment change and that of total employment during the recession and recovery, respectively.
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services data.

The remaining two clusters have not regained their pre-recession peaks. Although total statewide employment peaked in December 2007, the Energy & Natural Resources cluster continued to grow until October 2008, reaching a seasonally adjusted high of 18,514 jobs. By September 2017 it was 25 percent lower, with employment of 13,807. Employment in the Outdoor Recreation cluster reached a high of 7,238 in October 2006. It too has not yet regained or exceeded this peak; seasonally adjusted employment for the cluster was 3 percent lower in September 2017 at 6,991.

Since the clusters were declared in 2005 and 2006, combined they have grown about one-third faster than the rest of the state's economy, contributing about 20 percent of total state employment growth since June 2005. The IT/Software, Life Sciences, and Finance clusters have performed the best since 2005, with growth rates exceeding those of the other clusters as well as the rest of the economy. Aerospace & Defense, Energy & Natural Resources, and Outdoor Recreation have all grown more slowly than the rest of the economy, with the latter two shrinking. The Finance, IT/Software, and Life Sciences clusters grew three to 11 times faster in Utah than nationally. The Aerospace & Defense cluster saw similar growth rates both nationally and in Utah. Only the Energy & Natural Resources and Outdoor Recreation clusters have performed better nationally than in Utah.

Cluster Resilience

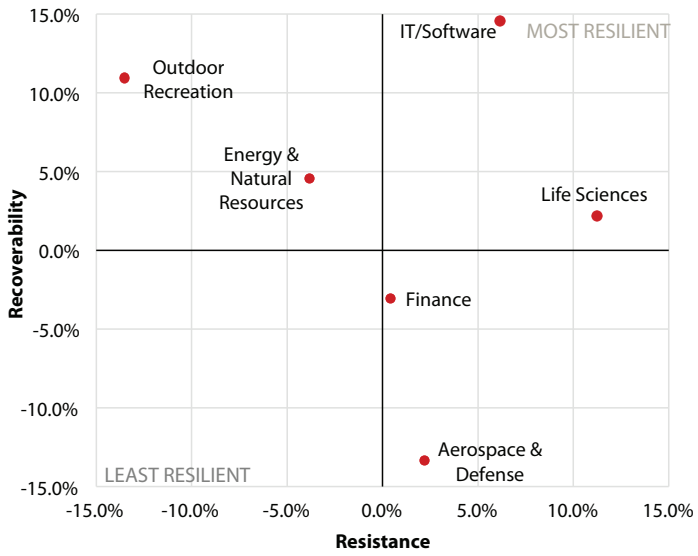
The Gardner Policy Institute adapted a technique developed by Ron Martin and his colleagues to assess the resilience of regions and applied it to Utah's strategic clusters.[2] It compares the employment change in each cluster to that of the state's overall economy during the 2008–10 recession ("resistance") and the ensuing recovery ("recoverability"). Resistance is the difference between a cluster's change in employment and the change in total employment, measured from the pre-recession peak in December 2007 to the trough in February 2010. It provides an indication of a cluster's resistance to downturns in the overall economy. Recoverability is the difference between the employment change in a cluster and the change in total employment, measured from the February 2010 trough to November 2012, when total employment regained its pre-recession peak. This indicates how quickly a sector recovers from a downturn.

Table 4 shows that the Life Sciences and IT/Software clusters were the most resistant to the statewide decline in employment that happened between December 2007 and February 2010. During this period total employment in the state shrank by 7 percent. IT/Software cluster employment declined by only 1 percent over the same period, while Life Sciences employment grew by 4 percent. Aerospace & Defense and Finance also shrank less than the overall economy. The least resistant clusters were Energy & Natural Resources, which shrank by 11 percent, and Outdoor Recreation, which shrank by almost 21 percent.

The recovery period is measured from February 2010 to November 2012, when total employment reached its pre-recession peak. During this period IT/Software and Outdoor Recreation recovered the fastest, growing by 22 percent and 19 percent, respectively, versus an 8 percent increase in total employment. Energy & Natural Resources and Life Sciences also saw above-average growth of 12 percent and 10 percent, respectively. Aerospace & Defense was the only cluster to shrink during the recovery, falling by 5 percent, while Finance grew but more slowly than the overall economy.

The combination of resistance and recoverability provides an indication of the overall resilience of a cluster. Those sectors that scored well on both measures are considered the most resilient, while those that scored poorly on both are the least resilient. Figure 2 plots the clusters on their two scores, with resistance along the horizontal axis and recoverability on the vertical. No clusters fall into the bottom left quadrant; that is, none underperformed the overall economy during both the recession and the recovery. IT/Software and Life Sciences are the only clusters that surpassed the overall economy in both periods. IT/Software had the fastest recovery, growing nearly 15 percent-

Figure 2: Resilience of Utah's Strategic Clusters During the Latest Recession and Recovery



Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services data.

age points faster than total employment; and Life Sciences was the most resistant to the downturn, continuing to grow and exceeding the change in total employment by 11 percentage points. Finance and Aerospace & Defense both shrank by relatively less than the overall economy, though not by much, but did not rebound as quickly. Outdoor Recreation and Energy & Natural Resources recovered more quickly than the economy as a whole, but declined more during the recession.

Prospects for Future Growth

There are no growth forecasts for the individual industries that make up the state's clusters, nor are there forecasts for the clusters themselves. However, the Gardner Policy Institute does publish employment projections for aggregated (two-digit NAICS) industry sectors (see Table 5). Of the 154 six-digit NAICS industries that compose Utah's strategic clusters, 53 are in the manufacturing sector; these are found mostly in Life Sciences, IT/Software, and Aerospace & Defense. The Finance cluster comprises the whole of the finance and insurance sector (NAICS 52) plus four professional and technical services industries. There are 13 professional and technical services industries that are found in five of the six clusters. And the Energy & Natural Resources cluster includes 10 utilities industries.

To estimate the growth prospects of the clusters, we calculated a growth rate that combines the average annual growth rates of a cluster's component industries, weighted by each industry's share of total cluster employment. This assumes that a sector's growth rate is the same across all of its subsectors, for example, that semiconductor manufacturing will grow at the same speed as dog and cat food manufacturing. Obviously this is not the case. Of the 364 six-digit NAICS industries in the manufacturing sector 53 are represented in the state's strategic clusters, and these tend to use more advanced technologies. Many of the subsectors included in the state's strategic clusters will likely grow faster than their parent sectors. Thus, some of the cluster growth estimates provided below are conservative and actual growth rate are likely to be higher.

Table 5: Utah Employment Projections by Selected Sector, 2017–2027

Sector	2017	2022	2027	Change	AAGR
Mining	10,724	13,852	14,875	38.7%	3.4%
Utilities	3,904	3,610	3,256	–16.6%	–1.8%
Construction	97,271	124,513	148,957	53.1%	4.4%
Manufacturing	128,103	135,395	140,333	9.5%	0.9%
Wholesale	53,114	59,397	63,195	19.0%	1.8%
Retail	168,195	175,950	181,335	7.8%	0.8%
Transportation and Warehousing	57,066	64,754	65,297	14.4%	1.4%
Information	36,792	41,294	45,370	23.3%	2.1%
Finance and Insurance	66,254	71,966	76,483	15.4%	1.4%
Professional and Technical Services	98,032	122,905	146,607	49.5%	4.1%
Health	152,182	176,810	199,949	31.4%	2.8%
Federal Government (civilian)	36,294	39,286	41,315	13.8%	1.3%
Total Employment	**1,998,217**	**2,254,342**	**2,448,420**	**22.5%**	**2.1%**

Note: Sectors shown contribute at least one industry to Utah's strategic clusters. Counts do not include the self-employed.
AAGR = average annual growth rate
Source: Kem C. Gardner Policy Institute 2017 State and County Projections.

Table 6: Cluster Projected Annual Employment Growth Rates to 2027

Cluster	Growth Rate
Aerospace & Defense	2.1%
Energy & Natural Resources	2.1%
Finance	2.0%
IT/Software	2.4%
Life Sciences	2.0%
Outdoor Recreation	1.1%

Source: Kem C. Gardner Policy Institute.

Table 7: Weighted Average Cluster Multipliers

Cluster	GDP	Labor Income	Jobs
Aerospace & Defense	0.914	0.689	12.9
Energy & Natural Resources	0.885	0.487	8.0
Finance	1.145	0.681	13.6
IT / Software	1.043	0.660	11.8
Life Sciences	0.905	0.585	10.4
Outdoor Recreation	0.814	0.482	9.3

Note: Jobs multipliers are per million dollars of output change.
Source: Kem C. Gardner Policy Institute analysis of IMPLAN 2015 statewide multipliers and 2016 QCEW employment data.

The Aerospace & Defense cluster is composed of 44 percent federal civilian jobs, 28 percent professional and technical services, 26 percent manufacturing jobs, and a little bit of transportation and warehousing. Based on the projected growth rates of these sectors, the cluster may grow by about 2 percent per year over the next decade (see Table 6).

Nearly 90 percent of the utilities sector is subsumed by the Energy & Natural Resources cluster. However, utilities make up only one-quarter of total cluster employment. The remainder of the cluster is composed of almost 40 percent mining, about 17 percent construction, 13 percent manufacturing, and less than 5 percent each of wholesale, retail, transportation, and professional and technical services. Given this industry mix, the Energy & Natural Resources cluster is expected to experience annual growth of 2 percent to 2027.

The Finance cluster comprises the whole of the finance and insurance sector plus some professional and technical services industries. These two sectors represent about 85 percent and 15 percent, respectively, of cluster employment. Given the sectors' projected growth rates, the Finance cluster is expected to grow by 2 percent per year to 2027.

The IT/Software cluster is composed of about 36 percent information sector jobs, 30 percent professional, scientific, and technical services, 18 percent manufacturing, 12 percent retail, and 4 percent wholesale. Given this industry mix, the cluster is expected to grow by 2.4 percent annually to 2027.

Over half of Life Sciences jobs are in manufacturing, plus about 20 percent in professional and technical services, 15 percent in wholesale, and 10 percent in health. Based on this industry mix, the Life Sciences cluster is expected to grow by 2 percent per year to 2027. However, this is a conservative estimate because the particular manufacturing industries that are included in the cluster are likely faster growing than the overall manufacturing sector.

Four-fifths of Outdoor Recreation jobs are in manufacturing, with sporting and athletic goods manufacturing alone accounting for 70 percent of the cluster's employment; the rest are in wholesale. Given this industry composition, the cluster is expected to grow by about 1 percent annually over the next decade.

Over the same period, 2017 to 2027, the Gardner Policy Institute projects total state employment to grow by 2.2 percent annually. While this is slightly faster than most clusters, most cluster projections are conservative and actual growth rates are likely to be higher.

Economic Benefits

To compare the economic contributions of each cluster, the Gardner Policy Institute estimated GDP, labor income, and employment multipliers for each cluster. They were constructed as the average of the IMPLAN multipliers for each component NAICS industry weighted by each industry's 2016 Utah employment. When employment was not disclosed it was roughly imputed based on the total employment for the cluster reported by DWS and the number of nondisclosed sectors in that cluster.

Using this approach, the Finance and IT/Software clusters are the only ones to contribute more than $1 to state GDP for every dollar of cluster output. The Finance cluster contributes approximately $1.14 to GDP per dollar of output, and the IT/Software cluster generates $1.04 in GDP for every dollar of sales. Each dollar of output in the Aerospace & Defense and Life Sciences clusters increases GDP by an estimated $0.91. Energy & Natural Resources output increases GDP by $0.89 on the dollar, and Outdoor Recreation contributes $0.81 (see Table 7).

The Aerospace & Defense cluster makes the most effective contributions to labor income,[3] or earnings, followed closely by the Finance and IT/Software clusters. Every dollar of output in the A&D cluster generates $0.69 of labor income for workers in Utah. The Finance and IT/Software clusters generate $0.68 and $0.66 of income, respectively, per dollar of output. Each dollar of output in Life Sciences generates $0.59 of earnings, while the Energy & Natural Resources and Outdoor Recreation clusters each generate less than $0.50 of labor income per dollar of sales.

The Finance cluster is the most effective job generator. For every million dollars of output, the cluster supports 13.6 jobs in Utah. Aerospace & Defense is almost equally potent, supporting

12.9 jobs per million dollars of output. The IT/Software cluster supports 11.8 jobs for every million dollars of output and Life Sciences supports 10.4 jobs. Outdoor Recreation contributes 9.3 jobs for every million dollars of sales, and Energy & Natural Resources contributes 8.0 jobs.

Workforce Needs

The Gardner Policy Institute used the 2017 state staffing patterns from the Department of Workforce Services to determine which occupations are utilized by Utah's strategic clusters. We also used DWS's 2014–24 state occupational projections to assess the clusters' potential employment needs. We matched occupations to the component industries of each cluster, then summed employment by occupation and calculated each occupation's share of total cluster employment. Tables 8 through 13 provide the top 25 occupations for each cluster ranked by 2017 employment share, as well as the statewide 2014–24 annual employment growth rate for each occupation.

The top 25 occupations in the Aerospace & Defense cluster account for 61 percent of total cluster employment. Within these largest occupations engineers make up 18 percent of the total, with production occupations (those with SOC codes beginning with 51) representing another 16 percent (see Table 8). Among the largest occupations in Aerospace & Defense, those with the fastest expected growth include computer-controlled machine tool operators (4.4 percent annual growth between 2014 and 2024), systems software developers and management analysts (both 4.3 percent annual growth), and construction and building inspectors (3.6 percent). No growth is expected for computer hardware engineers, the sixth largest occupation in the cluster.

The top 25 Energy & Natural Resources occupations account for 51 percent of cluster employment. Among these largest occupations, engineers represent less than 8 percent of the total, while blue-collar jobs like construction and extraction workers (SOC 47XXXX), production workers (SOC 51XXXX), and transportation and material-moving occupations (SOC 53XXXX) make up 18 percent (see Table 9). Customer service representatives, construction laborers, and industrial machinery mechanics are forecast to grow by 3.7 percent annually between 2014 and 2024. Employment of supervisors of construction trades and extraction workers is expected to grow 3.3 percent annually; mechanical engineering jobs are forecast to grow 3.2 percent annually; and jobs for civil engineers, laborers, and freight, stock, and material movers are each expected to grow 3.0 percent per year. Among the 25 largest occupations in the Energy & Natural Resources cluster, only oil and gas roustabouts are forecast to shrink, by 0.2 percent annually.

Table 8: Top 25 Occupations in the Aerospace & Defense Cluster

SOC	Occupation	2017 Share	Annual Growth*
17-2051	Civil Engineers	6.8%	3.0%
51-2028	Electrical, electronic, and electromechanical assemblers, except coil winders, tapers, and finishers	5.1%	N/A
51-2098	Assemblers and fabricators, all other, including team assemblers	4.2%	N/A
17-3011	Architectural and Civil Drafters	4.2%	1.5%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	3.2%	2.8%
17-2061	Computer Hardware Engineers	3.2%	0.0%
11-1021	General and Operations Managers	2.6%	2.9%
11-9041	Architectural and Engineering Managers	2.5%	2.6%
17-1011	Architects, Except Landscape and Naval	2.4%	2.6%
17-2011	Aerospace Engineers	2.4%	2.2%
15-1133	Software Developers, Systems Software	2.3%	4.3%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	2.3%	4.4%
17-2071	Electrical Engineers	2.2%	2.3%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2.0%	2.3%
49-3011	Aircraft Mechanics and Service Technicians	1.9%	2.1%
17-2112	Industrial Engineers	1.8%	3.3%
17-2141	Mechanical Engineers	1.7%	3.2%
43-9061	Office Clerks, General	1.4%	2.2%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.4%	3.0%
51-1011	First-Line Supervisors of Production and Operating Workers	1.3%	2.1%
13-1111	Management Analysts	1.2%	4.3%
17-1022	Surveyors	1.2%	1.2%
19-4031	Chemical Technicians	1.2%	3.0%
47-4011	Construction and Building Inspectors	1.2%	3.6%
13-1020	Buyers and Purchasing Agents	1.0%	N/A

* Projected 2014–24 annual growth rate.
NA: not available; projections were not produced for this occupation
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services 2017 state staffing patterns and 2014–24 occupational projections.

Table 9: Top 25 Occupations in the Energy & Natural Resources Cluster

SOC	Occupation	2017 Share	Annual Growth*
43-4051	Customer Service Representatives	5.2%	3.7%
17-2051	Civil Engineers	5.0%	3.0%
11-1021	General and Operations Managers	4.1%	2.9%
17-3011	Architectural and Civil Drafters	3.0%	1.5%
53-3032	Heavy and Tractor-Trailer Truck Drivers	2.8%	2.9%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	2.4%	2.2%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2.4%	2.3%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	2.0%	3.3%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	2.0%	3.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	1.9%	2.3%
51-2098	Assemblers and fabricators, all other, including team assemblers	1.8%	N/A
17-1011	Architects, Except Landscape and Naval	1.7%	2.6%
43-9061	Office Clerks, General	1.7%	2.2%
47-2061	Construction Laborers	1.7%	3.7%
17-2141	Mechanical Engineers	1.4%	3.2%
49-9041	Industrial Machinery Mechanics	1.4%	3.7%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	1.3%	2.8%
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	1.3%	1.1%
17-2071	Electrical Engineers	1.3%	2.3%
47-5041	Continuous Mining Machine Operators	1.3%	0.0%
47-5071	Roustabouts, Oil and Gas	1.1%	–0.2%
51-4121	Welders, Cutters, Solderers, and Brazers	1.1%	2.7%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1.1%	1.0%
43-5071	Shipping, Receiving, and Traffic Clerks	1.1%	2.3%
51-1011	First-Line Supervisors of Production and Operating Workers	1.0%	2.1%

* Projected 2014–24 annual growth rate.
NA: not available; projections were not produced for this occupation
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services 2017 state staffing patterns and 2014–24 occupational projections.

Table 10: Top 25 Occupations in the Finance Cluster

SOC	Occupation	2017 Share	Annual Growth*
43-4051	Customer Service Representatives	14.1%	3.7%
43-3071	Tellers	7.4%	0.9%
13-2072	Loan Officers	5.5%	2.8%
41-3031	Securities, Commodities, and Financial Services Sales Agents	5.2%	3.1%
41-3021	Insurance Sales Agents	4.4%	3.3%
43-4131	Loan Interviewers and Clerks	4.3%	2.9%
13-2011	Accountants and Auditors	3.9%	3.8%
43-3011	Bill and Account Collectors	3.7%	1.4%
11-1021	General and Operations Managers	3.4%	2.9%
11-3031	Financial Managers	3.2%	2.7%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	3.1%	2.8%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2.6%	2.3%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	2.3%	1.0%
13-1031	Claims Adjusters, Examiners, and Investigators	1.7%	2.6%
13-2051	Financial Analysts	1.7%	2.8%
43-9061	Office Clerks, General	1.6%	2.2%
43-3021	Billing and Posting Clerks and Machine Operators	1.5%	3.5%
13-2052	Personal Financial Advisors	1.5%	5.2%
13-1199	Business Operations Specialists, All Other	1.2%	2.2%
15-1132	Software Developers, Applications	1.2%	5.9%
13-1151	Training and Development Specialists	1.1%	3.3%
43-9041	Insurance Claims and Policy Processing Clerks	1.1%	2.8%
13-2082	Tax Preparers	1.1%	4.3%
13-1111	Management Analysts	1.0%	4.3%
13-1161	Market Research Analysts and Marketing Specialists	1.0%	5.1%

* Projected 2014–24 annual growth rate.
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services 2017 state staffing patterns and 2014–24 occupational projections.

The 25 largest occupations in the Finance cluster represent almost 80 percent of total cluster employment (see Table 10). Of these, customer service representatives alone make up 14 percent, with other office and administrative support occupations (SOC 43XXXX) accounting for another 28 percent. Business and financial operations occupations (SOC 13XXXX) within the top 25 account for 20 percent of cluster employment. Sales and related occupations (SOC 41XXXX) make up another 10 percent.

Among the largest occupations in the Finance cluster, software application developer jobs are expected to grow almost 6 percent annually between 2014 and 2024. Two other occupations are expected to see annual growth above 5 percent: personal financial advisors (5.2 percent) and market research analysts and marketing specialists (5.1 percent). No occupations are forecast to shrink between 2014 and 2024, with teller jobs growing the slowest at just under 1 percent annual increase.

The top 25 occupations in the IT/Software cluster account for almost two-thirds of total cluster employment. Among these, computer occupations (SOC 15XXXX) make up 24 percent of the total. Office and administrative support occupations (SOC 43XXXX) account for another 14 percent. Sales and related occupations (SOC 41XXXX) represent 11 percent (see Table 11). Among the largest occupations in IT/Software, three are expected to grow by at least 5 percent annually between 2014 and 2024: software application developers, market research analysts and marketing specialists, and computer systems analysts. No growth is expected for computer hardware engineers, and all other top 25 occupations are forecast to grow by at least 1.7 percent.

The top 25 occupations in the Life Sciences cluster account for 53 percent of total cluster employment. Among these largest occupations, various types of production workers (SOC 51XXXX) represent 17 percent of total 2017 cluster employment and engineers make up about 10 percent (see Table 12). Of the largest occupations, those expected to grow the fastest are software application developers (5.9 percent annually), dental lab technicians (4.7 percent), and systems software developers (4.3 percent).

The top 25 occupations in the Outdoor Recreation cluster account for more than two-thirds (68 percent) of total cluster employment. Among these largest occupations, production workers (SOC 51XXXX) represent 22 percent of total 2017 cluster employment. Office and administrative support positions (SOC 43XXXX) and transportation and material moving occupations (SOC 53XXXX) make up 14 percent each (see Table 13). The occupations expected to grow fastest among the top 25 are computer-controlled machine tool operators at 4.4 percent annually between 2014 and 2024, customer service representatives at 3.7 percent, machinists at 3.6 percent, and laborers and freight, stock, and material movers and industrial truck and tractor operators at 3.0 percent. None of the largest occupations are forecast to shrink over the period, but two are expected to see annual growth rates of less than 1 percent: molding, coremaking, and casting machine operators and cutting, punching, and press machine operators.

Table 11: Top 25 Occupations in the IT / Software Cluster

SOC	Occupation	2017 Share	Annual Growth*
43-4051	Customer Service Representatives	8.5%	3.7%
15-1132	Software Developers, Applications	7.6%	5.9%
15-1151	Computer User Support Specialists	4.5%	4.4%
15-1133	Software Developers, Systems Software	4.0%	4.3%
11-1021	General and Operations Managers	3.7%	2.9%
41-3099	Sales Representatives, Services, All Other	3.5%	4.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	3.4%	2.2%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	3.1%	3.3%
51-2028	Electrical, electronic, and electromechanical assemblers, except coil winders, tapers, and finishers	2.5%	N/A
15-1131	Computer Programmers	2.4%	2.1%
15-1199	Computer Occupations, All Other	2.3%	3.3%
11-3021	Computer and Information Systems Managers	2.1%	4.5%
13-1161	Market Research Analysts and Marketing Specialists	2.0%	5.1%
15-1121	Computer Systems Analysts	1.8%	5.0%
43-5071	Shipping, Receiving, and Traffic Clerks	1.7%	2.3%
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	1.6%	2.8%
15-1142	Network and Computer Systems Administrators	1.4%	3.6%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	1.4%	2.8%
17-2061	Computer Hardware Engineers	1.3%	0.0%
11-2022	Sales Managers	1.2%	2.8%
43-9061	Office Clerks, General	1.2%	2.2%
43-5081	Stock Clerks and Order Fillers	1.2%	2.1%
41-9041	Telemarketers	1.1%	1.7%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.1%	3.0%
11-2021	Marketing Managers	1.1%	3.8%

* Projected 2014–24 annual growth rate.
NA: not available; projections were not produced for this occupation
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services 2017 state staffing patterns and 2014–24 occupational projections.

Table 12: Top 25 Occupations in the Life Sciences Cluster

SOC	Occupation	2017 Share	Annual Growth*
51-2098	Assemblers and fabricators, all other, including team assemblers	4.7%	N/A
17-2051	Civil Engineers†	3.8%	3.0%
29-2010	Clinical Laboratory Technologists and Technicians	3.3%	N/A
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	3.0%	2.8%
51-2028	Electrical, electronic, and electro-mechanical assemblers, except coil winders, tapers, and finishers	2.9%	N/A
11-1021	General and Operations Managers	2.8%	2.9%
51-9111	Packaging and Filling Machine Operators and Tenders	2.8%	3.0%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	2.7%	3.3%
17-3011	Architectural and Civil Drafters	2.3%	1.5%
43-4051	Customer Service Representatives	2.3%	3.7%
17-2061	Computer Hardware Engineers	1.9%	0.0%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	1.8%	3.0%
15-1133	Software Developers, Systems Software	1.8%	4.3%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1.7%	2.3%
43-5071	Shipping, Receiving, and Traffic Clerks	1.5%	2.3%
11-9041	Architectural and Engineering Managers	1.5%	2.6%
17-2071	Electrical Engineers	1.4%	2.3%
17-2141	Mechanical Engineers	1.4%	3.2%
51-9081	Dental Laboratory Technicians	1.4%	4.7%
43-9061	Office Clerks, General	1.4%	2.2%
17-1011	Architects, Except Landscape and Naval	1.4%	2.6%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1.3%	2.2%
17-2112	Industrial Engineers	1.3%	3.3%
15-1132	Software Developers, Applications	1.2%	5.9%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.1%	3.0%

* Projected 2014–24 annual growth rate.
† It is not clear what role civil engineers actually play in the life sciences. The prevalence of this occupation is likely the result of the modest level of industry detail provided in the state staffing patterns linking occupations with industries.
NA: not available; projections were not produced for this occupation
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services 2017 state staffing patterns and 2014–24 occupational projections.

Table 13: Top 25 Occupations in the Outdoor Recreation Cluster

SOC	Occupation	2017 Share	Annual Growth*
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	11.1%	2.2%
51-2098	Assemblers and fabricators, all other, including team assemblers	9.2%	N/A
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	6.7%	3.0%
11-1021	General and Operations Managers	5.2%	2.9%
43-4051	Customer Service Representatives	4.0%	3.7%
43-5071	Shipping, Receiving, and Traffic Clerks	2.7%	2.3%
43-9061	Office Clerks, General	2.5%	2.2%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.2%	2.8%
53-3032	Heavy and Tractor-Trailer Truck Drivers	2.2%	2.9%
51-1011	First-Line Supervisors of Production and Operating Workers	2.0%	2.1%
51-4121	Welders, Cutters, Solderers, and Brazers	1.9%	2.7%
43-5081	Stock Clerks and Order Fillers	1.7%	2.1%
53-3033	Light Truck or Delivery Services Drivers	1.7%	2.7%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1.7%	2.3%
53-7051	Industrial Truck and Tractor Operators	1.6%	3.0%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1.6%	1.0%
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	1.5%	0.1%
53-7064	Packers and Packagers, Hand	1.3%	2.4%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	1.3%	4.4%
51-4041	Machinists	1.1%	3.6%
11-3051	Industrial Production Managers	1.1%	2.1%
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1.1%	0.4%
51-9071	Jewelers and Precious Stone and Metal Workers	1.0%	1.5%
13-1020	Buyers and Purchasing Agents	0.9%	N/A
51-9198	Helpers—Production Workers	0.9%	2.3%

* Projected 2014–24 annual growth rate.
NA: not available; projections were not produced for this occupation
Source: Kem C. Gardner Policy Institute analysis of Utah Department of Workforce Services 2017 state staffing patterns and 2014–24 occupational projections.

Across all of Utah's strategic clusters, over the next five years the greatest labor force needs are likely to be for software application developers, market research analysts and marketing specialists, computer and information systems managers, computer user support specialists, and systems software developers. Not only are these some of the largest cluster occupations, all of these occupations are forecast to grow more than 4 percent annually between 2014 and 2024, with application developers expected to grow by 6 percent a year.

Alternative Clusters

The U.S. Cluster Mapping Project at Harvard University identifies a dozen national clusters with a strong presence in Utah. These comprise, in descending order of size, Business Services, Transportation & Logistics, Financial Services, IT & Analytical Instruments, Aerospace Vehicles & Defense, Medical Devices, Recreational & Small Electric Goods, Furniture, Biopharmaceuticals, Video Production & Distribution, Metal Mining, and Jewelry & Precious Metals.

StatsAmerica at Purdue University looks at cluster concentrations by number of establishments, employment, and annual wages. Based on 2012 data, Utah had above average employment shares in the Mining; Computer & Electronic Product Manufacturing; Arts, Entertainment, Recreation & Visitor Industries; Transportation & Logistics; IT & Telecommunications; Printing & Publishing; Advanced Materials; and Education & Knowledge Creation clusters. Note, however, that StatsAmerica's clusters are not defined to be mutually exclusive; for example, the Printing & Publishing cluster overlaps with the Education & Knowledge Creation cluster.

Both the U.S. Cluster Mapping Project and StatsAmerica identify clusters that are similar to GOED's current clusters. Both sources also identify Transportation & Logistics as a cluster with a strong presence in Utah. Based on 2012 Bureau of Labor Statistics QCEW data, StatsAmerica calculates location quotients[4] for this cluster of 1.19 for establishments, 1.25 for employment, and 1.31 for annual wages. The Cluster Mapping Project identifies it as a strong cluster with employment specialization above the 90th percentile, based on 2015 data. Given the recent passage of SB 234 creating an inland port authority, the Transportation & Logistics cluster will likely only become stronger here and would be a natural choice for focused economic development efforts.

Aerospace & Defense has performed poorly since 2005, growing more slowly than the rest of the economy. Federal government employment represents close to half of the jobs in the cluster, making it subject to national political forces and less responsive to local development efforts. One option would be to expand or redefine Aerospace & Defense as Advanced Manufacturing, without the federal government sector NAICS 928110 National Security. The Brookings Institution has defined advanced industries to comprise 50 four-digit NAICS sectors with high R&D spending per worker and at least 20 percent of their workforce in STEM-intensive occupations.[5] Several of these are already represented in current GOED clusters, but about 15 other sectors could be added to Aerospace & Defense to create an Advanced Manufacturing cluster (see Table 14).

The Energy & Natural Resources cluster currently represents only energy-related industries. As such, it is vulnerable to volatile energy prices, particularly those of oil and natural gas, over which

Table 14: Potential Additional Sectors for an Advanced Manufacturing Cluster

NAICS	Sector	2016 Jobs	LQ
3253	Pesticides, Fertilizers, and Other Agr. Chemicals	165	0.48
3271	Clay Products and Refractory	201	0.52
3279	Other Nonmetallic Mineral Products	1,307	1.75
3311	Iron, Steel, and Ferroalloys	281–559	N/A
3315	Foundries	988	0.86
3332	Industrial Machinery	358	0.33
3333	Commercial and Service Industry Machinery	763	0.87
3339	Other General Purpose Machinery	2,210	0.87
3351	Electric Lighting Equipment	42–83	N/A
3352	Household Appliances	120–298	N/A
3361	Motor Vehicles	20–49	N/A
3362	Motor Vehicle Bodies and trailers	1,769	1.19
3363	Motor Vehicle Parts	4,668	0.82
3365	Railroad Rolling Stock	75–157	N/A
3366	Ship and Boat Building	55–119	N/A

Note: Employment reported as ranges was not disclosed by BLS and was estimated from the Department of Workforce Services' FirmFind data.
N/A = not available
Source: Brookings Institution, Bureau of Labor Statistics Quarterly Census of Employment and Wages, Utah Department of Workforce Services.

Table 15: Potential Additional Sectors for the Energy & Natural Resources Cluster

NAICS	Sector	2016 Jobs	LQ
212221	Gold Ore Mining	12–27	N/A
212234	Copper Ore and Nickel Ore Mining	1,210	9.49
212299	All Other Metal Ore Mining	52–107	N/A
212391	Potash, Soda, and Borate Mineral Mining	113	3.34
212393	Other Chemical and Fertilizer Mineral Mining	120–286	N/A

Note: Employment reported as ranges was not disclosed by BLS and was estimated from the Department of Workforce Services' FirmFind data.
N/A = not available
Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages, Utah Department of Workforce Services.

the state has no influence. Expanding it to include other metal and mineral mining like copper, gold, molybdenum, and lithium would diversify the mix and capture some of the strategic metals and minerals that are important to a high-tech, digital economy (see Table 15). Agriculture is also a form of natural resource production and is the main activity in much of rural Utah.

The Outdoor Recreation cluster has not performed well since its designation in November 2006. Employment in the cluster shrank by 2.5 percent between November 2006 and September 2017. The cluster is dominated by sporting and athletic goods manufacturing, which accounts for 70 percent of cluster employment. Part of Outdoor Recreation's poor performance is the result of a large jump in this industry's employment that lasted from January 2006 through about September 2008 and had disappeared by March 2009. Since then cluster employment has grown by about 3 percent annually. However, it is a small cluster, comprising just five industries with a total of fewer than 7,000 employees in 2017. The four manufacturing industries in the cluster could become part of a revised Advanced Manufacturing cluster.

Rural Utah

There are multiple definitions of "rural." The U.S. Census Bureau classifies counties as metropolitan, micropolitan, and nonmetropolitan based on population and commuting relationships. By this measure Utah has 10 metropolitan counties, five micropolitan counties, and 14 nonmetropolitan counties. Utah's Rural Planning Group classifies the state's 29 counties into urban (4), border (8), and rural (17). Governor Herbert's 25k Jobs Initiative counts 25 rural counties—all except Weber, Davis, Salt Lake, and Utah. Based on the data sources, the following analysis uses a combination of rural definitions. Occupational data is available for the state's five metropolitan statistical areas (MSAs) plus four nonmetropolitan regions. We examine the Logan and St. George MSAs, plus the nonmetropolitan regions. Educational attainment and infrastructure data are available by county or specific location, so for this discussion we tend to follow the Rural Planning Group's classifications.

Occupations

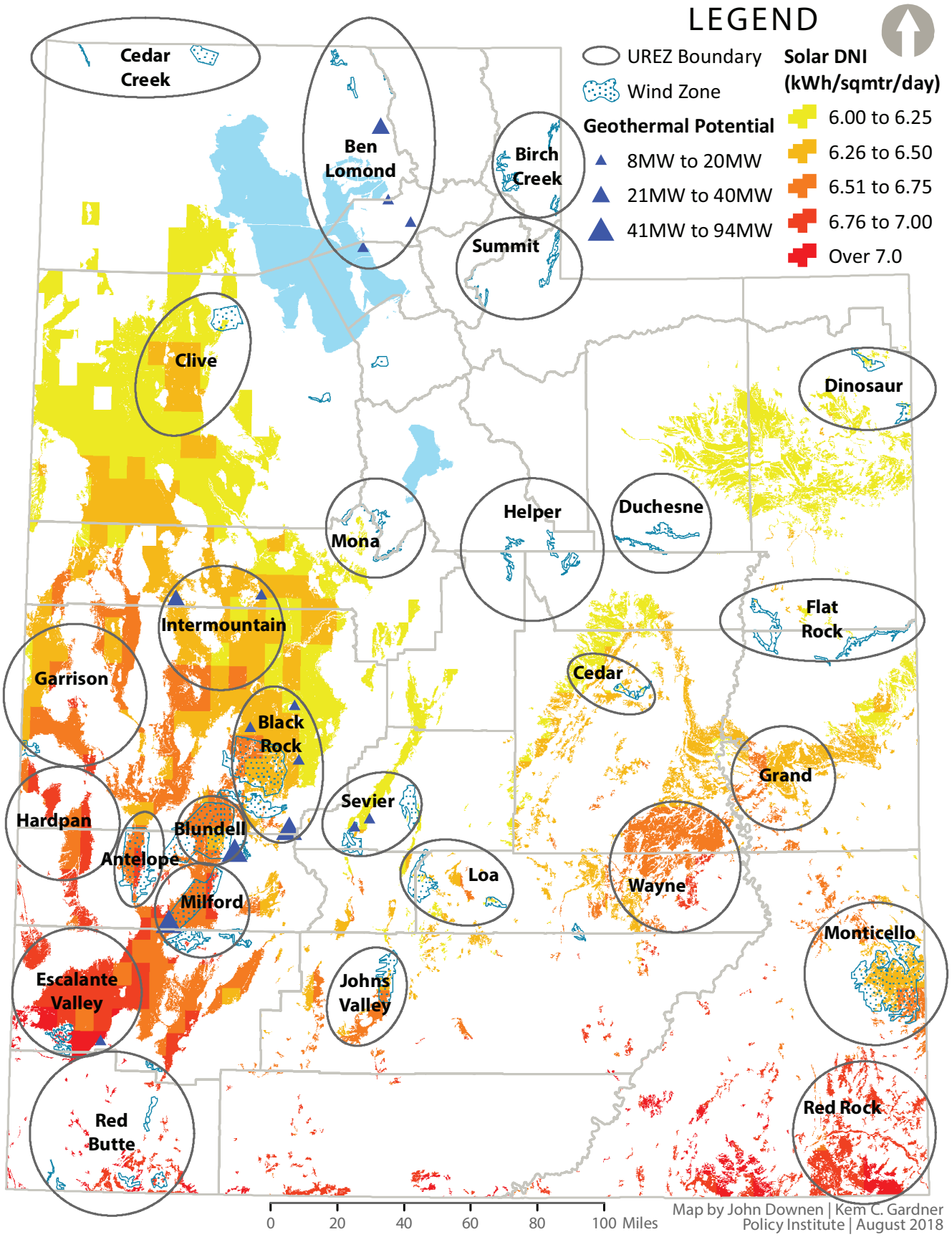
The Gardner Policy Institute used the Utah Department of Workforce Services state staffing patterns to determine which occupations appear in Utah's strategic clusters. We then used the Bureau of Labor Statistics' occupational employment data for the state's nonmetropolitan regions, plus the Logan and St. George MSAs, to assess cluster compatibility with rural Utah based on those occupations in which these regions have at least an average share of employment.[6] The following tables show the occupations in each of four nonmetropolitan regions plus the two MSAs for which that region has at least the national average share of employment in the occupation (represented by a location quotient of at least 1.00[7]) and the occupation represents at least 1.0 percent of total cluster employment. For each occupation, the tables indicate which clusters utilize it. These regions exclude Box Elder, Morgan, Tooele, and Juab counties since they are part of the Ogden-Clearfield, Salt Lake City, and Provo-Orem MSAs.

All six regions have concentrations in several occupations found in the Energy & Natural Resources cluster (see Tables 16 through 21). This cluster encompasses oil and gas production, coal and uranium mining, electric power generation and distribution, and related activities. The relevant occupations present in at least four of the six regions are general managers, supervisors, secretaries, welders, industrial machinery mechanics, construction equipment operators, heavy and tractor-trailer truck drivers, and construction laborers. None of these are specific to the Energy & Natural Resources industry, and the location of companies in this cluster is highly dependent on either the location of the resources or the existence of power generation and distribution infrastructure. While oil, gas, coal, and uranium deposits are well known and generally well developed, there is significant solar and wind energy potential in many of Utah's rural counties, as identified by the Utah Renewable Energy Zone Task Force (see Figure 3). Portions of Juab, Millard, Beaver, Iron, and San Juan counties exhibit high solar energy potential and the task force identified geothermal sites with at least 8MW potential in Box Elder, Juab, Millard, Sevier, and Beaver—the last of which has been developed. The task force also identified wind zones in 18 of Utah's non–Wasatch Front counties. Some of the solar potential in the state's west desert has been developed, with 35 solar power plants scattered across Millard, Beaver, and Iron counties according to the U.S. Energy Information Administration. There are also existing wind farms in southern Millard and northern Beaver counties, at the Tooele Army Depot, in Utah County, and in San Juan County. However, the occupational needs of renewable energy development are generally limited to the construction of the facility, with very few jobs associated with ongoing operations. Most long-term economic impacts from renewable energy production result from increases in local property tax revenues.

Turning to the regions, the Wasatch Back (Rich, Summit, and Wasatch counties) does not appear to have occupational concentrations that would attract firms in any of Utah's strategic clusters (see Table 16). The relevant cluster occupations in which the region has the strongest concentrations are operating engineers and other construction equipment operators, construction and building inspectors, surveyors, general and operations managers, and architects. While all of these occupations are utilized by at least one cluster, they seem unlikely to be sufficient to draw cluster firms.

Eastern Utah (Daggett, Duchesne, Uintah, Carbon, Emery, Grand, and San Juan counties) is already home to much of the state's Energy & Natural Resources cluster. Because of concen-

Figure 3: Renewable Energy Potential in Utah



Source: Utah Renewable Energy Zone Task Force and State of Utah, SGID.

Table 16: Wasatch Back Occupational Concentrations and Appropriate Clusters

SOC	Occupation	May 2017 Jobs	LQ	Median Annual Wage	Aerospace & Defense	Energy & Natural Resources	Finance	IT / Software	Life Sciences	Outdoor Recreation
11-1021	General and Operations Managers	1,320	2.52	63,170	Yes	Yes	Yes	Yes	Yes	Yes
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	610	1.13	35,050	Yes	Yes	Yes		Yes	Yes
47-2061	Construction Laborers	390	1.71	35,510		Yes				
43-3031	Bookkeeping, Accounting, and Auditing Clerks	380	1.03	37,400		Yes	Yes			Yes
47-2073	Operating Engineers and Other Construction Equipment Operators	380	4.35	45,410		Yes				
13-1161	Market Research Analysts and Marketing Specialists	220	1.54	56,170				Yes		
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	200	1.48	61,310		Yes				
17-2051	Civil Engineers	110	1.51	62,520	Yes	Yes			Yes	
11-2022	Sales Managers	90	1.01	70,720				Yes		
47-4011	Construction and Building Inspectors	90	3.70	60,210	Yes					
51-4121	Welders, Cutters, Solderers, and Brazers	90	1.02	37,610		Yes				Yes
17-1011	Architects, Except Landscape and Naval	50	2.08	61,990	Yes	Yes			Yes	
17-1022	Surveyors	40	3.56	44,940	Yes					

Note: Wasatch Back comprises Rich, Summit, and Wasatch counties.
LQ = location quotient
Source: Kem C. Gardner Policy Institute analysis of Bureau of Labor Statistics occupational data and Utah Department of Workforce Services' 2017 state staffing patterns.

Table 17: Eastern Utah Occupational Concentrations and Appropriate Clusters

SOC	Occupation	May 2017 Jobs	LQ	Median Annual Wage	Aerospace & Defense	Energy & Natural Resources	Finance	IT / Software	Life Sciences	Outdoor Recreation
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,610	3.15	47,410		Yes				Yes
11-1021	General and Operations Managers	1,460	2.27	61,610	Yes	Yes	Yes	Yes	Yes	Yes
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,110	1.69	34,690	Yes	Yes	Yes		Yes	Yes
47-2061	Construction Laborers	600	2.12	32,280		Yes				
47-2073	Operating Engineers and Other Construction Equipment Operators	580	5.43	49,310		Yes				
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	470	2.90	64,360		Yes				
49-9041	Industrial Machinery Mechanics	370	3.71	63,760		Yes				
47-5071	Roustabouts, Oil and Gas	350	24.90	40,440		Yes				
51-4121	Welders, Cutters, Solderers, and Brazers	220	2.00	45,900		Yes				Yes
43-3071	Tellers	170	1.19	26,400			Yes			
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	110	9.83	74,210		Yes				
13-1151	Training and Development Specialists	90	1.11	88,980			Yes			
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	90	1.33	69,360				Yes		
47-4011	Construction and Building Inspectors	80	2.63	49,980	Yes					
47-5041	Continuous Mining Machine Operators	80	21.53	58,030		Yes				
17-1022	Surveyors	50	3.61	62,500	Yes					
19-4031	Chemical Technicians	40	1.96	49,100	Yes					

LQ = location quotient
Source: Kem C. Gardner Policy Institute analysis of Bureau of Labor Statistics occupational data and Utah Department of Workforce Services' 2017 state staffing patterns.

trations of welders and chemical technicians that are about twice the national average share, the region might also be suitable for parts of the Outdoor Recreation or Aerospace & Defense clusters (see Table 17). However, a significant portion of the region suffers from poor accessibility, with only Emery and Grand counties served by an interstate.

Central Utah (Millard, Sanpete, Sevier, Piute, and Wayne counties) also has a concentration of welders that might make it attractive to firms in the Outdoor Recreation cluster, such as sporting and athletic equipment manufacturers (see Table 18). Millard and Sevier are crossed by I-15 and I-70, respectively, while Sanpete, Piute, and even Wayne are not far from an interstate.

Table 18: Central Utah Occupational Concentrations and Appropriate Clusters

SOC	Occupation	May 2017 Jobs	LQ	Median Annual Wage	Aerospace & Defense	Energy & Natural Resources	Finance	IT / Software	Life Sciences	Outdoor Recreation
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,120	4.39	47,520		Yes				Yes
11-1021	General and Operations Managers	490	1.52	50,550	Yes	Yes	Yes	Yes	Yes	Yes
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	440	1.34	28,790	Yes	Yes	Yes		Yes	Yes
43-9061	Office Clerks, General	440	1.01	24,790	Yes	Yes	Yes	Yes	Yes	Yes
47-2061	Construction Laborers	190	1.38	33,190		Yes				
47-2073	Operating Engineers and Other Construction Equipment Operators	170	3.14	43,300		Yes				
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	160	1.94	50,850		Yes				
43-3071	Tellers	100	1.39	25,200			Yes			
51-4121	Welders, Cutters, Solderers, and Brazers	90	1.65	37,230		Yes				Yes
49-9041	Industrial Machinery Mechanics	80	1.64	63,140		Yes				
51-9111	Packaging and Filling Machine Operators and Tenders	80	1.45	42,470					Yes	
13-2072	Loan Officers	50	1.11	37,450			Yes			
11-9041	Architectural and Engineering Managers	30	1.17	93,850	Yes				Yes	

Central Utah comprises Millard, Sanpete, Sevier, Piute, and Wayne counties.
LQ = location quotient
Source: Kem C. Gardner Policy Institute analysis of Bureau of Labor Statistics occupational data and Utah Department of Workforce Services' 2017 state staffing patterns.

Table 19: Southwest Utah Occupational Concentrations and Appropriate Clusters

SOC	Occupation	May 2017 Jobs	LQ	Median Annual Wage	Aerospace & Defense	Energy & Natural Resources	Finance	IT / Software	Life Sciences	Outdoor Recreation
11-1021	General and Operations Managers	730	1.95	49,380	Yes	Yes	Yes	Yes	Yes	Yes
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	600	1.57	29,350	Yes	Yes	Yes		Yes	Yes
47-2061	Construction Laborers	370	2.30	28,830		Yes				
53-3032	Heavy and Tractor-Trailer Truck Drivers	370	1.27	38,420		Yes				Yes
53-7064	Packers and Packagers, Hand	180	1.55	27,240						Yes
43-3071	Tellers	130	1.61	25,720			Yes			
47-2073	Operating Engineers and Other Construction Equipment Operators	120	1.95	44,060		Yes				
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	110	1.18	49,580		Yes				
41-3021	Insurance Sales Agents	70	1.01	35,880			Yes			
49-9041	Industrial Machinery Mechanics	70	1.27	44,000		Yes				
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	60	2.20	28,880						Yes
11-3051	Industrial Production Managers	30	1.10	67,190						Yes

Note: Southwest Utah comprises Beaver, Iron, Garfield, and Kane counties.
LQ = location quotient
Source: Kem C. Gardner Policy Institute analysis of Bureau of Labor Statistics occupational data and Utah Department of Workforce Services' 2017 state staffing patterns.

Southwest Utah (Beaver, Iron, Garfield, and Kane counties) has a high concentration (more than twice the national employment share) of metal and plastic molding, coremaking, and casting machine setters, operators, and tenders that could be attractive to Outdoor Recreation firms (see Table 19). Beaver and Iron are crossed by I-15, while Garfield and Kane are more remote.

The Logan MSA (Cache County) is the most attractive of Utah's rural counties (and the least rural), with above-average concentrations in several key occupations used by the Aerospace & Defense, IT/Software, Life Sciences, and Outdoor Recreation clusters (see Table 20). The share of electrical, electronic, and electromechanical assemblers in the region's workforce is 4.5 times the national share. This occupation is utilized by the Aerospace & Defense, IT/Software, and Life Sciences clusters. The share of software developers in the region is 11 percent above the average, and this high-paying occupation is found in the Aerospace & Defense, Finance, IT/Software, and Life Sciences clusters. Electrical engineers are more than twice as prevalent in the region than nationally, and they are used by the Aerospace & Defense, Energy & Natural Resources, and Life Sciences clusters. Computer-controlled machine tool operators' share of the local workforce is 65 percent higher than the national average,

Table 20: Logan MSA Occupational Concentrations and Appropriate Clusters

SOC	Occupation	May 2017 Jobs	LQ	Median Annual Wage	Aerospace & Defense	Energy & Natural Resources	Finance	IT / Software	Life Sciences	Outdoor Recreation
11-1021	General and Operations Managers	1,660	1.96	52,490	Yes	Yes	Yes	Yes	Yes	Yes
43-4051	Customer Service Representatives	1,360	1.28	23,820		Yes	Yes	Yes	Yes	Yes
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,090	1.26	28,440	Yes	Yes	Yes		Yes	Yes
51-9111	Packaging and Filling Machine Operators and Tenders	1,000	6.66	33,030					Yes	
43-5081	Stock Clerks and Order Fillers	780	1.00	21,920				Yes		Yes
53-3032	Heavy and Tractor-Trailer Truck Drivers	680	1.01	50,850		Yes				Yes
43-1011	First-Line Supervisors of Office and Administrative Support Workers	570	1.02	40,340		Yes	Yes	Yes		
43-3011	Bill and Account Collectors	470	4.52	27,510			Yes			
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	460	4.52	27,420	Yes			Yes	Yes	
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	460	2.23	30,710	Yes				Yes	Yes
47-2061	Construction Laborers	450	1.23	26,380		Yes				
51-1011	First-Line Supervisors of Production and Operating Workers	390	1.68	46,260	Yes	Yes			Yes	Yes
53-7051	Industrial Truck and Tractor Operators	370	1.67	35,120						Yes
15-1132	Software Developers, Applications	360	1.11	71,510	Yes		Yes	Yes	Yes	
43-3021	Billing and Posting Clerks	350	1.93	24,490			Yes			
43-5071	Shipping, Receiving, and Traffic Clerks	300	1.17	30,140		Yes		Yes	Yes	Yes
43-3071	Tellers	220	1.16	24,710			Yes			
51-4121	Welders, Cutters, Solderers, and Brazers	220	1.52	32,050		Yes				Yes
51-4041	Machinists	190	1.28	48,350						Yes
49-9041	Industrial Machinery Mechanics	180	1.34	49,480		Yes				
15-1199	Computer Occupations, All Other	170	1.42	34,030				Yes		
17-2071	Electrical Engineers	160	2.27	77,130	Yes	Yes			Yes	
11-3051	Industrial Production Managers	150	2.28	78,720						Yes
15-1131	Computer Programmers	150	1.54	53,420				Yes		
43-5061	Production, Planning, and Expediting Clerks	150	1.19	34,730					Yes	
13-2072	Loan Officers	140	1.21	53,200			Yes			
47-2073	Operating Engineers and Other Construction Equipment Operators	140	1.03	34,970		Yes				
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	140	2.76	31,930					Yes	
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	90	1.65	30,830	Yes					Yes
17-3011	Architectural and Civil Drafters	50	1.28	53,520	Yes	Yes			Yes	
19-4031	Chemical Technicians	30	1.35	43,810	Yes					

Note: The Logan MSA comprises Cache County, Utah and Franklin County, Idaho.
LQ = location quotient
Source: Kem C. Gardner Policy Institute analysis of Bureau of Labor Statistics occupational data and Utah Department of Workforce Services' 2017 state staffing patterns.

and they are found in the Aerospace & Defense and Outdoor Recreation clusters. Cache county has a larger, more diversified economy than most of Utah's other rural counties. It is the home of Utah State University, and firms like Icon Health & Fitness (exercise equipment manufacturer), Pierce Biotechnology (pharmaceutical manufacturing), and Campbell Scientific (measurement and control instrument manufacturer). Among Utah's 25 "rural" counties, Cache appears to be the most successful.

The St. George MSA (Washington County) does not appear to have any occupational concentrations that would attract firms in Utah's strategic clusters. Among occupations representing at least 1 percent of cluster employment, it has significant concentrations of construction laborers, operating engineers, telemarketers, and general managers (see Table 21).

Education

Most of the industries making up Utah's strategic clusters require a skilled workforce. Educational attainment is one way to assess the skill level of a local population.

Statewide, 10 percent of the population 25 and older has only an associate's degree, while 32 percent has a bachelor's degree or higher. None of Utah's 17 rural counties have above-average levels of bachelor's degrees or higher, ranging from 14 percent in Emery, Duchesne, and Daggett to 25 to 29 percent in Kane, Grand, Iron, and Wayne. Ten rural counties have high concentrations of residents with associate's degrees only, ranging from 10 percent in Kane, Sevier, and Millard to 13 percent in Emery and Carbon (see Table 22 and Figure 4). This may make these counties attractive for skilled production and technical jobs.

Table 21: St. George MSA Occupational Concentrations and Appropriate Clusters

SOC	Occupation	May 2017 Jobs	LQ	Median Annual Wage	Aerospace & Defense	Energy & Natural Resources	Finance	IT / Software	Life Sciences	Outdoor Recreation
11-1021	General and Operations Managers	1,980	2.02	52,500	Yes	Yes	Yes	Yes	Yes	Yes
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,420	1.42	28,910	Yes	Yes	Yes		Yes	Yes
43-9061	Office Clerks, General	1,410	1.07	27,790	Yes	Yes	Yes	Yes	Yes	Yes
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,360	1.76	*		Yes				Yes
47-2061	Construction Laborers	1,080	2.54	29,550		Yes				
47-2073	Operating Engineers and Other Construction Equipment Operators	410	2.52	43,050		Yes				
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	290	1.17	46,920		Yes				
43-3071	Tellers	260	1.19	27,780			Yes			
41-9041	Telemarketers	200	2.43	24,580				Yes		
13-2072	Loan Officers	150	1.11	56,810			Yes			
17-3011	Architectural and Civil Drafters	80	1.94	47,590	Yes	Yes			Yes	

Note: The St. George MSA comprises Washington County.
LQ = location quotient
N/A = not available
Source: Kem C. Gardner Policy Institute analysis of Bureau of Labor Statistics occupational data and Utah Department of Workforce Services' 2017 state staffing patterns.

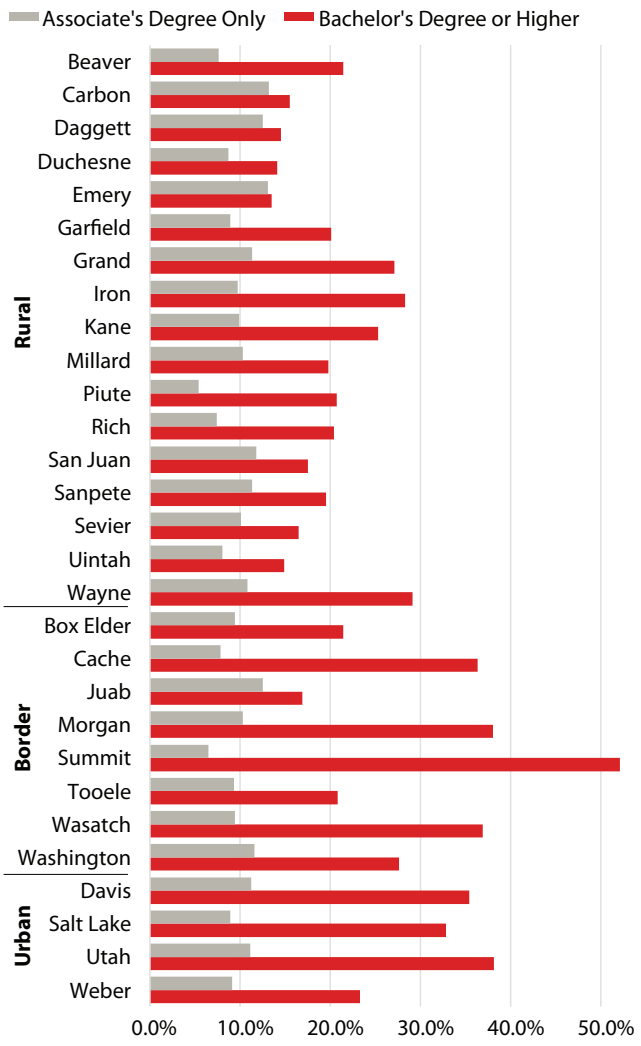
Table 22: Estimated Educational Attainment by County

(Population Aged 25 and Older)

	County	Associate's	Bachelor's+
Rural	Beaver	7.6%	21.4%
	Carbon	13.2%	15.5%
	Daggett	12.5%	14.5%
	Duchesne	8.7%	14.1%
	Emery	13.1%	13.5%
	Garfield	8.9%	20.1%
	Grand	11.3%	27.1%
	Iron	9.7%	28.3%
	Kane	9.9%	25.3%
	Millard	10.3%	19.8%
	Piute	5.4%	20.7%
	Rich	7.4%	20.4%
	San Juan	11.8%	17.5%
	Sanpete	11.3%	19.5%
	Sevier	10.1%	16.5%
	Uintah	8.0%	14.9%
	Wayne	10.8%	29.1%
Border	Box Elder	9.4%	21.4%
	Cache	7.8%	36.3%
	Juab	12.5%	16.9%
	Morgan	10.3%	38.0%
	Summit	6.5%	52.1%
	Tooele	9.3%	20.8%
	Wasatch	9.4%	36.9%
	Washington	11.6%	27.6%
Urban	Davis	11.2%	35.4%
	Salt Lake	8.9%	32.8%
	Utah	11.1%	38.1%
	Weber	9.1%	23.3%
State		**9.8%**	**31.7%**

Note: These are estimates based on a sample and have associated margins of error. Red shading indicates shares greater than the statewide average.
Source: U.S. Census Bureau, 2012–16 American Community Survey.

Figure 4: Educational Attainment of the Population 25 and Older



Source: U.S. Census Bureau, 2012–16 American Community Survey.

Table 23: Bachelor's Degrees by Selected Field in the Population 25 and Older

(Degrees per 100 people)

	County	Science & Engineering	Science & Engineering Related	Business
Rural	Beaver	8.0	2.3	3.1
	Carbon	4.6	1.7	2.7
	Daggett	7.2	0.9	2.5
	Duchesne	3.4	2.3	2.3
	Emery	4.0	1.6	1.6
	Garfield	6.9	3.3	1.9
	Grand	13.5	3.0	2.1
	Iron	7.6	3.8	5.2
	Kane	9.2	2.6	4.0
	Millard	7.2	1.7	3.0
	Piute	6.3	1.5	2.1
	Rich	6.7	2.9	1.8
	San Juan	5.7	2.6	1.7
	Sanpete	6.4	2.0	2.6
	Sevier	5.3	2.0	2.3
	Uintah	5.5	1.3	1.7
	Wayne	8.4	2.5	5.5
Border	Box Elder	7.8	2.3	3.1
	Cache	13.0	3.0	6.1
	Juab	5.5	2.3	3.1
	Morgan	11.2	4.7	8.2
	Summit	20.3	4.8	12.6
	Tooele	7.0	2.6	4.1
	Wasatch	12.2	3.7	8.6
	Washington	9.0	3.2	5.3
Urban	Davis	11.8	3.8	8.5
	Salt Lake	12.8	3.5	6.4
	Utah	12.3	3.8	6.8
	Weber	8.3	2.8	4.5
	State	**11.3**	**3.4**	**6.2**

Note: Red shading indicates rates above the statewide average.
Source: Kem C. Gardner Policy Institute analysis of U.S. Census Bureau, 2012–16 American Community Survey data.

The state's eight border counties have some of the largest shares of residents with a bachelor's degree or higher. Over half, 52 percent, of Summit County's residents age 25 and older have at least a bachelor's degree—the highest share in the state. In Morgan County, 38 percent of residents have a bachelor's degree or higher, while more than 36 percent of Cache and Wasatch county residents have undergraduate or graduate degrees. As already noted, Cache County is the home of Utah State University, and many residents of Summit County are high-income earners who commute to Salt Lake. Three of the border counties have above-average shares of the population with only an associate's degree: 10 percent in Morgan, 12 percent in Washington, and 13 percent in Juab.

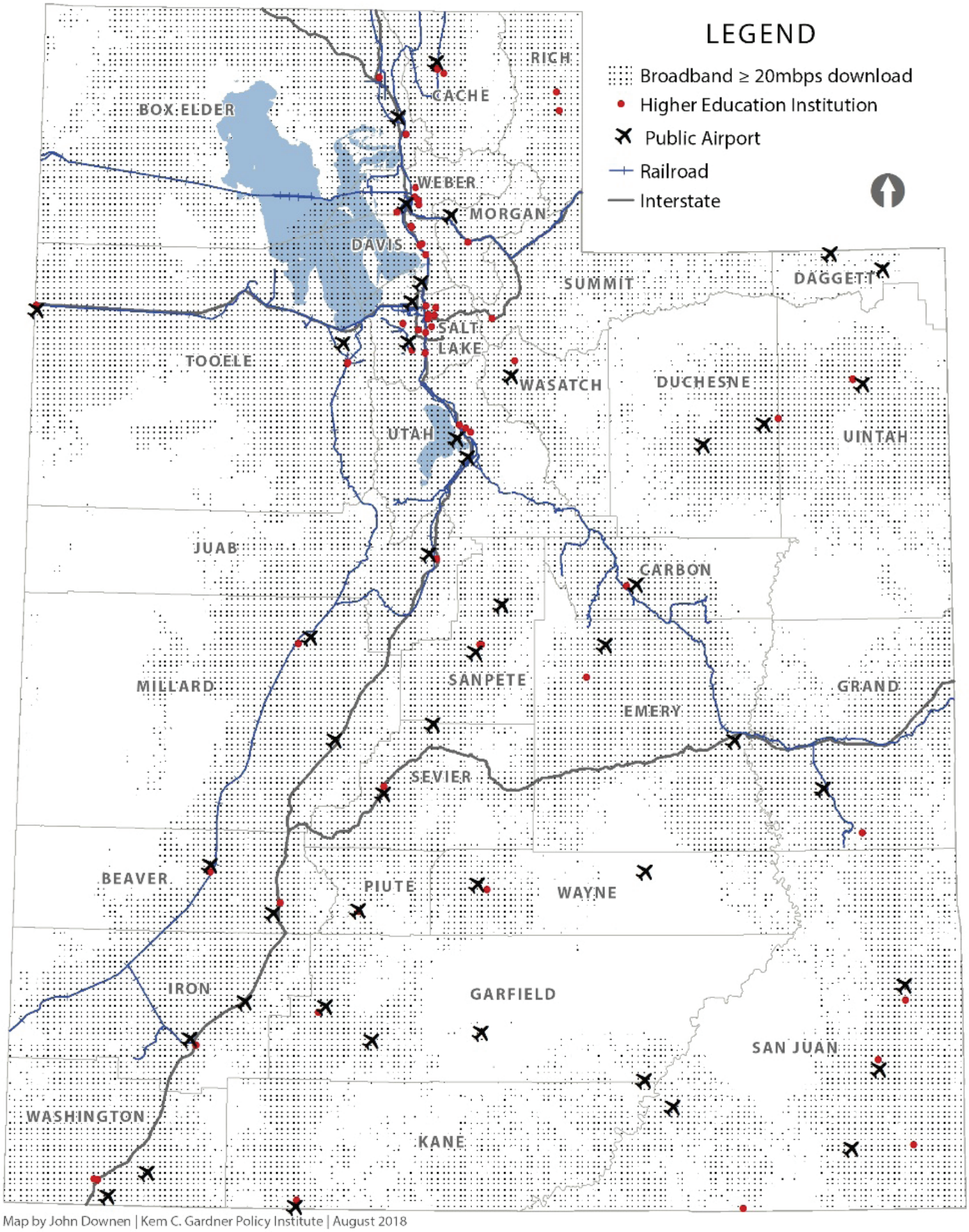
To gain a better understanding of the supply of skilled labor, we also examined the concentration of degrees by field of study in Utah's counties. Using American Community Survey data, we calculated the number of bachelor's degrees per 100 residents age 25 and older. Some individuals hold more than one degree, therefore these values are not equivalent to the share of the population with a degree in the particular field. Table 23 presents the estimated number of degrees in each county across three broad fields with relevance to the state's strategic clusters: science and engineering, science- and engineering-related fields, and business.[8]

Among Utah's rural counties, Grand has the highest concentration of science and engineering degrees, with 13.5 per 100 people age 25 and older. This is above the statewide average of 11.3 and the second-highest in the state after Summit's 20.3. The rest of the rural counties are below the average, with the next highest concentrations at 9.2 per 100 people in Kane, 8.4 in Wayne, and 8.0 in Beaver. Iron County has the highest concentration of science- and engineering-related degrees in rural Utah, with 3.8 per 100 residents 25 and older. This is above the state average of 3.4 and ties with the urban counties of Davis and Utah. The next highest concentrations in rural counties are in Garfield (3.3), Grand (3.0), and Rich (2.9). All of the state's rural counties have below-average concentrations of business degrees, with the highest number in Wayne (5.5 per 100 residents over 25), Iron (5.2), and Kane (4.0).

The border counties have higher concentrations of relevant bachelor's degrees, with above average rates in three of the eight counties. As noted above, Summit has the highest share of residents with at least a bachelor's degree. It also has the highest concentrations of science and engineering degrees (20.3 per 100 people age 25 and older), science- and engineering-related degrees (4.8), and business degrees (12.6). Wasatch County has above-average concentrations in all three fields as well, with 12.2 science and engineering degrees per 100 residents, 3.7 science- and engineering-related degrees, and 8.6 business degrees. Morgan has above average rates of science- and engineering-related degrees (4.7) and business degrees (8.2), and Cache has 13.0 science and engineering degrees per 100 residents 25 and older, also above the statewide average. Box Elder, Juab, Tooele, and Washington are below average for all fields.

Lower rates of educational attainment in Utah's rural counties make it difficult to attract high-quality jobs. The largest and fastest-growing occupations in the state's strategic clusters tend to require at least a bachelor's degree. Software application developers, market research analysts and marketing specialists, computer and information systems managers, computer user support specialists, and systems software developers are expected to see the most growth over the next five years. Only computer user support specialists require just some college but no degree; the rest require at least a bachelor's degree.

Figure 5: Infrastructure in Rural Utah



Map by John Downen | Kem C. Gardner Policy Institute | August 2018

Source: State of Utah, SGID.

Infrastructure

Many of Utah's rural communities are isolated by a lack of infrastructure. Communications and transportation infrastructure connect businesses with suppliers and markets and workers with opportunities. Universities, community colleges, and technical colleges help individuals increase their skills and can create knowledge and inventions with commercial applications (see Figure 5).

Rural Utah is well served with internet access. Three hundred and twenty-two of the state's 325 cities, towns, and unincorporated Census-designated places are at least partially covered by broadband internet service with download speeds of at least 20 mbps. The three places with slower service represent a population of roughly 300 people.[9] Unincorporated Clear Creek in Carbon County, the town of Hanksville in Wayne County, and Boulder in Garfield County are served by DSL and wireless internet service with download speeds of 10 to 15 mbps.

Twelve of Utah's 25 non–Wasatch Front counties are crossed by an interstate highway. Twelve are crossed by a rail line. All but Rich and Summit counties have at least one public airport. In those counties without direct access to an interstate highway, perhaps their airport could be better utilized as an economic development catalyst, providing supply chain and customer linkages for new or existing local businesses. Daggett, Wayne, Garfield, Kane, and San Juan—some of the state's most isolated counties—each have two or more public airports that could provide links to suppliers and markets.

There are 41 higher-education campuses in the 25 non–Wasatch Front counties, including 29 Utah State University campuses and seven technical college campuses. These provide rural residents with opportunities to increase their human capital. While this improves opportunities for individuals, it may not lead to better outcomes for rural places as these educated residents may leave for jobs elsewhere. On the other hand, providing a well-educated local workforce would help attract firms to rural areas.

Conclusions

Performance across Utah's strategic clusters has been uneven since their inception over a decade ago. While some have grown faster than the rest of the economy, others have stagnated or declined. Some of these underperforming clusters could be reformulated or combined into an advanced manufacturing cluster that might better capture high-growth industries. With the creation of an inland port in Salt Lake City, the state may want to consider including transportation and distribution among its strategic clusters. Due to isolation and lower education and skill levels, Utah's rural counties provide challenges for cluster-based development. Increasing the educational attainment and skill levels of residents expands their professional options, but it may not improve outcomes for rural places if there are not sufficient local opportunities. However, rural broadband and the airports found in most rural counties could provide avenues for growth.

Endnotes

1 Employment figures are full- and part-time jobs, counted equally, that are covered by unemployment insurance. As such, they do not include military personnel, of which there were about 16,000 in 2017, or the self-employed.

2 Ron Martin, Peter Sunley, Ben Gardiner, and Peter Tyler, 2016, "How Regions React to Recessions: Resilience and the Role of Economic Structure," *Regional Studies*, Vol. 50, No. 4, 561–585. See also Mallory Rahe and Nick Beleiciks, 2017, "Measuring Resilience Among Oregon Counties," State of Oregon Employment Department, www.qualityinfo.org/-/measuring-resilience-among-oregon-counties?inheritRedirect=true.

3 Labor income is defined as all forms of employment income, including wages and benefits paid to employees and the income of self-employed proprietors.

4 Location quotients measure relative concentrations in a study area to those in a reference area. Values greater than 1.00 indicate the industry represents a larger share of the study area's economy than it does of the reference area's.

5 Mark Muro, Jonathan Rothwell, Scott Andes, Kenan Fikri, and Siddharth Kulkarni, 2015, *America's Advanced Industries: What They Are, Where They Are, and Why They Matter*, The Brookings Institution, available at www.brookings.edu/research/americas-advanced-industries-what-they-are-where-they-are-and-why-they-matter/.

6 The BLS divides Utah's nonmetropolitan counties into four regions. The Wasatch Back comprises Rich, Summit, and Wasatch counties. Eastern Utah comprises Daggett, Duchesne, Uintah, Carbon, Emery, Grand, and San Juan counties. Central Utah comprises Millard, Sanpete, Sevier, Piute, and Wayne counties. Southwest Utah comprises Beaver, Iron, Garfield, and Kane counties.

7 Location quotients measure relative concentrations in a study area to those in a reference area. In this case, they are calculated as an occupation's share of total employment in a region divided by its national share of employment. Thus, values greater than 1.00 indicate a local concentration in that occupation.

8 Science and engineering degrees include computer science, mathematics, and statistics; biological, agricultural, and environmental sciences; physical and related sciences; psychology; social sciences; engineering; and multidisciplinary studies like nutritional science, cognitive science, or behavioral science. Science- and engineering-related fields include pre-med, physical therapy, and mechanical engineering technology. Business fields include business administration, accounting, finance, and human resources development.

9 Based on the 2012–2016 American Community Survey, the total population of these three places is 307 ±88. Note that individual margins of error represent 29 percent to 163 percent of the associated population estimate.

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