

Regional Economic Assessment & Strategy for Coal-Impacted Navajo and Apache Counties, Arizona

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Prepared for:



Navajo County, Arizona

Economic and Workforce Development
P.O. Box 668
Holbrook, Arizona 86025-0668

Prepared by



Highland Economics
2344 NE 59th Avenue
Portland, Oregon
www.highlandeconomics.com

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ES EXECUTIVE SUMMARY

The coal mining and associated power production industries have historically been key economic engines in Navajo and Apache counties in Northeast Arizona, with three coal-fired power plants and a coal mine located in the region. Changes in regional, national, and international energy markets, as well as changes in state and federal energy policy, are resulting in a national and regional decrease in coal mining and coal-fired power production. While changes in production (and associated employment and income) at power plants in Apache County are not expected in the short-term, coal-related economic activity in Navajo County has already declined (with the shut-down of one unit at Cholla Power Plant and reduced coal production at the Kayenta Mine), with further declines in power plant and coal mine production expected in the near future. In the face of the current and likely future declines in employment and income in this economic sector, the Northeast Arizona region is proactively seeking economic development strategies to strengthen and diversify its economy and stabilize the financial base for its communities and governments.

As part of this effort to increase resiliency, Navajo County, in partnership with the Real Arizona



Development Council (nonprofit organization with the purpose to attract industry and investment to Navajo and Apache Counties) and Arizona Public Service (APS) Electric Company, **sponsored a comprehensive strategic planning process to assess the extent of the economic impact that changes to the region's energy industries will have on Navajo and Apache counties, and provide recommended actions for the region as a whole to strengthen its economic foundation.** Recommended actions to foster economic growth and diversification include strategies to be undertaken by local and regional organizations to develop the right environment for economic growth, as well as target industries to attract or grow in the region. In addition to funding from the three sponsoring organizations, the funding is through the Federal Economic Development Administration's program, "Assistance to Coal Communities", or ACC.



This report documents the findings of this strategic planning process, which has relied on close collaboration with Navajo County and other regional partners, such as local economic development organizations and businesses.

Findings at this stage of the strategic planning process support Phase I of the ACC funding grant. In Phase II, Navajo County will use the findings and recommendations from this Phase I report to work with local partners to develop and implement an action plan.



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This executive summary focuses on the six types of findings and recommendations developed through this process:

1. Current Economic and Demographic Conditions
2. Type and Magnitude of Adverse Economic Impact
3. Regional and Community Strategies for Mitigating Economic Impact
4. Infrastructure Needs for Economic Development
5. Economic Diversification Opportunities
6. Recommended Priority Actions and Next Steps

Findings in each of these five areas is summarized below.

ES.1 CURRENT ECONOMIC AND DEMOGRAPHIC CONDITIONS

This section provides an overview of the population and economy of Northeast Arizona. This information serves as a foundation for the economic analysis and strategic assessment by providing information on demographic and economic strengths and weaknesses, and provides context by comparing local conditions to regional and national baselines. Topics covered in this section include population, educational attainment, employment, and industry trends. In each case we compare data at the national and state level to that of Apache and Navajo Counties, and where data are available, to the largest cities in the region.

Key points in this section:

- **Population growth:** Between 1990 and 2016, Navajo County's population grew faster than the nation's population (1.3 percent annual average growth compared to 1.0 percent average annual growth in the nation), while Apache County has been growing less quickly at a rate of 0.6 percent average annual growth. Population in both counties grew less quickly than the state as a whole, which grew an average of 2.4 percent annually between 1990 and 2016. Working age population growth in Northeast Arizona has also been similar to the nation as a whole over the last several decades (though, again, lower than the state). Overall population growth as well as working age population growth are good indicators for the long-term economic strength of the area and ability to retain young people and families.
- **Educational Attainment:** Similar to many rural areas, educational attainment in Northeast Arizona lags the state and national averages. However, towns and cities in the region generally have higher educational attainment, with several communities in the region (such as Eagar, St. Johns, and Pinetop-Lakeside) having greater educational attainment than the nation or state as a whole – again, indicating the potential skillsets are there for long-term economic growth and the role and importance of local educational institutions such as Northland Pioneer College.
- **Labor force:** Current working age population (16 to 64) in the two counties is approximately 102,500 people. Labor force participation rate of this group of people is lower at the county level in both counties, but meets or exceeds state and national averages in many towns and cities in the region.

- **Unemployment/Underemployment:** There are significant numbers of people who are available to work, or to work more in the two-county region. Unemployment is high in both counties compared to the state and the nation. In 2017 there were approximately 2,100 unemployed people in Apache County and approximately 3,100 people unemployed in Navajo County. Based on national underemployment data (i.e., data on people who want to have a job but have given up looking or who are working part-time and want a full-time job), there may be at least as many underemployed people in the two-county area as there are unemployed – i.e., there may be a total of approximately 4,200 people unemployed or underemployed in Apache County and 6,200 unemployed or underemployed in Navajo County, for a total of 10,400 people in the two county area. In addition to these workers, there are approximately 8,000 residents of Apache and Navajo counties who work outside their county of residence; a portion of these workers may be interested and available to work in jobs in their home county versus commuting outside the county.
- **Employment and wage composition:** Compared to the state and nation, employment and income are more highly concentrated in government sector jobs and less concentrated in private sector jobs. Additionally, there are fewer proprietor (self-employed) jobs and associated income than elsewhere in the state and nation.
- **Employment and wage concentration:** Current economic strengths in the region include healthcare and social assistance, accommodation and food services, utilities, mining, public administration, and farming (high employment, but with low wages). In short, the local economy is heavily reliant on natural resource extraction, associated power generation or natural resource-based tourism. The focus of this study is developing diversification strategies to make the economy resilient to potential downturns in the mining and utilities sectors.
- **Employment trends:** Growing sectors in both counties include healthcare and social assistance; accommodation and food services; information (primarily telecommunications); administrative and waste services sectors; transportation and warehousing; arts, entertainment, and recreation; and agriculture and forestry. An additional emerging sector in Navajo County is real estate (including rentals and leasing). Elsewhere in the state and nation, other key growth sectors are skilled service jobs, including professional, scientific, and technical services; management of companies and enterprises; and finance and insurance.

In summary, our assessment of the region's current demographic and economic strengths and weaknesses is presented below in **Table ES-1**.

Table ES-1: Regional Demographic and Economic Strengths and Weaknesses

Strengths	Weaknesses
<ul style="list-style-type: none"> • Population growth overall, which is a positive indicator of the region’s ability to attract and retain residents. • Many towns have an equal or greater proportion of working age population as the state and nation, indicating a sustainable long-term labor force. • Several towns have educational attainment levels equal to or higher than state and national averages, indicating a supply of skilled labor in certain areas of the county. • Regional economic strengths and relatively high concentration of employment in natural resource sectors such as ranching, forestry products, mining, and tourism industries, as well as energy production and transmission. • Several local service sectors have grown over the last decade, particularly accommodation and food service, healthcare and social assistance, telecommunications, and transportation and warehousing. • There is a large population of people available for work, including unemployed, underemployed, and individuals commuting outside the county. 	<ul style="list-style-type: none"> • Similar to many rural areas, employment and income are relatively highly concentrated in the government sector. • Outside the farm sector, the level of proprietor employment and associated income is relatively low, indicating a relatively low level of entrepreneurship and small business development. • Unemployment rate is higher and labor force participation rate is lower than the state or nation, potentially indicating a shortage of economic opportunity. • Educational attainment for the area as a whole is lower than state and national averages, potentially indicating a limited supply of skilled workers. • Aside from utilities, limited economic growth over the last two decades in sectors selling goods and services outside the two county area (base or export industries). Relatively low wages in the region compared to the state and the nation indicate relatively low rate of productivity (value of goods/services produced per unit of resources used) in the region.

ES.2 TYPE AND MAGNITUDE OF COAL-RELATED ECONOMIC IMPACTS

Quantifying the current contribution of coal-related industries, particularly in the context of the size of the regional economy, helps to ‘diagnose’ the level of reliance on these industries in Northeast Arizona. This, in turn, will inform the level and type of response required to mitigate current and potential future downturns in this sector. A key purpose of the Assistance to Coal Communities (ACC) initiative is to help communities that have historically coal-dependent economies adapt to change in evolving energy markets. This assessment focuses on the effects of power plant downsizings/shutdowns and consequent reduction in regional coal demand. However, as discussed in later sections of this report, changes in energy markets also may present opportunities for Northeast Arizona in the renewable energy sector.

Key findings include:

- 1) **Direct employment and income in the coal mining and power generation sectors in the two county region is currently estimated at approximately 1,170 jobs and \$151.8 million in employee compensation (including wages and benefits) annually.** For Apache County,



there are an estimated 650 jobs and \$83.6 million in employee compensation, representing 3.6 percent of county employment and 3.8 percent of total county personal income (including non-wage income). For Navajo County, there are an estimated 520 jobs and \$68.2 million in employee compensation, representing approximately 1.4 percent of county employment and 2.1 percent of county personal income. Approximately 30 percent of employee compensation is benefits (pensions, medical insurance, and payroll taxes paid by the employer); after accounting for this portion, average wages in the coal mining and power generation sectors are approximately \$91,000 annually. This is more than three times higher than the \$28,100 in average annual wages per job in Apache County and \$28,800 in average annual wages per job in Navajo County.

- 2) **Total employment (direct, indirect, and induced) in all sectors of the economy supported by coal and power generation is estimated to range from approximately 2,200 to 4,300 jobs, with approximately 55 percent of these jobs in Apache County and 45 percent in Navajo County. Total income impacts are estimated to range from approximately \$215 million to \$365 million, with approximately half of this income in Apache County and half in Navajo County.** This represents approximately three to five percent of the Navajo County economy, and approximately four to eight percent of the Apache County economy. However, impacts are not evenly distributed throughout the counties – the Reservations and communities immediately surrounding the power plants and mine will be much more significantly impacted.
- 3) **Current tax receipts to all levels of local and tribal government from the power plants and mine are estimated to be at least \$69 million annually.** Of this an estimated \$9.4 million supports public entities in Navajo County, at least \$19 million supports public entities in Apache County and approximately \$40 million supports Navajo/Hopi tribal governments.

ES.3 REGIONAL AND COMMUNITY STRATEGIES FOR MITIGATING ECONOMIC IMPACT

This section identifies and recommends strategies for enhancing rural economic development that have been successful in other areas, particularly for communities and regions that have successfully transitioned from resource extraction or reliance on a single industry to a more diversified and resilient economy. Rural regions that have diversified their economies have commonly employed the following strategies:

- Engaging the community, including engaging with each Native community (recognizing the diverse viewpoints among and between tribes) in order to develop a shared vision for the path forward; and
- Enhancing quality of life, including investments in downtown redevelopment and other infrastructure, services, and amenities to attract businesses, residents, and visitors;
- Investing in regional branding initiatives to market regional products and regional strengths to benefit local businesses and attract visitors, residents, and new businesses;

- Developing and investing in a business environment that streamlines and encourages investment, nurtures small businesses and entrepreneurs, reduces tax burden (such as the Navajo and Apache County Opportunity Zones as designated under the 2017 federal Tax Cuts and Jobs Act), and provides resources and infrastructure to support business of all types;
- Nurturing local regional networks, public-private partnerships, state partnerships, and leveraging these to obtain funds and support;
- Developing other industries that draw on the region's strengths, with the following diversification elements showing success across many other similar regions: local food systems, recreation/tourism, and entrepreneurship.

Apart from the last point, developing or enhancing other industries, addressed in **Section 7** when economic diversification opportunities are discussed, each strategy is separately addressed in the sections below.

As indicated by success stories from other regions around the country (see **Section 4**), as well as efforts already underway in Northeast Arizona, economic development strategies across the region should include a focus on these strategies. These strategies are broadly applicable for all economic development and diversification efforts in the region, and not just for those areas most impacted by declines in coal mining and power generation. All of the strategies listed above are discussed in detail in **Section 5**, and each is key for the region's successful, long-term economic development and diversification. The focus for each of these strategies will depend on community priorities, which should become well-defined through a community visioning process. We briefly summarize each of these strategies and associated action items here.

ES. 3.1 Community Visioning

A shared community vision is central to a successful economic development strategy. Northeast Arizona needs to decide what it wants to be strong in and what its economic identity is, and then focus its infrastructure investments, quality of life efforts, workforce training, marketing and branding, and business attraction/retention/expansion efforts accordingly. What does Northeast Arizona want as its economic identity? What are its goals for growth? For quality of life? Which industries does it most want to excel in? The Northeast Arizona region and its communities have limited resources to devote to economic development; a clear, strong vision of the future will help to prioritize its economic development efforts. Answer these questions, and the region can decide which opportunities are good for its future and which are not. Given the strength of the outdoor recreation environment in the region, developing the brand associated with this asset, and investing in related amenities and activities (whether the focus be hunting, biking, hiking, high altitude training, archery, etc.), will likely play a prominent role in this vision.

Defining a vision with strong buy-in from community leaders and residents is important. Economic transition can involve not just economic dislocation but also social challenges. Transition often includes new residents, visitors, or industries that may influence the identity of a community and a region – so it is important to articulate that future identity clearly and have strong community support for the vision. Development of a shared vision of the future that builds on the region's assets, addresses its

weaknesses, and also meets residents' needs and addresses community concerns is critical for communities to successfully navigate and embrace economic transition.

Specific questions that the region may want to address include: Does Northeast Arizona want to first and foremost be known as a retirement, tourism, and second home destination? Does it want to be known for an active, rural lifestyle with strengths in sports, athletic training, outdoor recreation, and the outdoor recreation manufacturing industry? Does it want to be known as an entrepreneurial rural area with strong small businesses and opportunities for families wanting a rural, high quality of life lifestyle?

ES. 3.2 Quality of Life

Investments in quality of life are key to long-term, resilient economic development. **Regions with high quality of life are better able to attract and retain residents and businesses, as well as provide an attractive destination for tourists.** Residents and visitors alike are drawn to live and to recreate in areas with nice amenities – including cultural, natural, and built environment amenities. **Investments in quality of life can benefit and aid in developing all sectors of an economy, and therefore, support a more diversified, self-reliant, and resilient economy by:**

- Keeping young people and retirees in the area;
- Growing the high-paying and geographically mobile professional, technical, and businesses service sectors;
- Attracting industrial and manufacturing employers; and
- Benefiting the tourism and visitor services sectors.

With the digital revolution, and the freedom it provides to work anytime anywhere, more and more people, particularly those working in the 'knowledge economy' can choose to live where they want. In this world, quality of life, and the associated image of a region to prospective residents, really matter. In general, the factors influencing quality of life include cost of living, transportation infrastructure, educational opportunities, easy access to work/shopping/retail/recreational destinations, healthcare accessibility, housing choices, weather, recreational amenities, and cultural and social opportunities. For some of these factors, rural regions such as Northeast Arizona face specific challenges because small communities often lack the capital investments to improve their infrastructure and support diverse cultural and social amenities. As such, Northeast Arizona needs to compete in different ways, focusing on quality of life factors such as a strong sense of community, access to open space, proximity to recreational amenities, weather, and small town culture. The area also has an advantage in its relatively low cost of living, and in the relative proximity of neighborhoods and communities with diverse housing costs.

As discussed in detail with specific action items identified in **Section 5.2**, several primary weaknesses that the counties and cities in the Northeast Arizona region could collectively and individually address are increasing offerings and accessibility of arts, entertainment and recreation attractive to both residents and visitors; and enhancing the attractiveness and vibrancy of communities.

Additionally, the region should consider engaging in a concerted effort to identify key, quantitative quality of life indicators to measure current conditions, community quality of life goals, and

measurement of progress in achieving those goals. Identifying key indicators makes it possible for policymakers and interested citizens to look at a more manageable set of numbers when assessing changes in quality of life over time. The process of choosing key indicators also helps citizens and policymakers realize gaps in their current information

Finally, the region should consider focusing on a strategy of attracting workers and talent to the area. Much economic development effort focuses on attracting firms; however, focusing on attracting talent to the local area is another approach. This approach, often complementary to attracting firms, focuses on attracting workers who are self-employed, own their own professional firms, or have the flexibility to work anywhere. Attraction efforts are aimed at local investments in quality of life, and then marketing positive images of the community to prospective workers. Regions may be better able to compete for skilled labor if employers and communities work together to develop approaches to attract and retain workers in rural and remote areas.

Rural and remote communities in particular, need to promote their attractiveness to potential visitors, residents, and employees. Such marketing should target specific groups such as mid-career or end-of-career employees and should include developing a positive image, as well as focusing on specific actions to enhance the quality of life and local infrastructure desired by these groups. To effectively market, it is important to identify and enhance the inherent strengths of the local community, and to effectively emphasize and communicate the positives of living and working in the community.

One target demographic that may be particularly effective for Northeast Arizona is former residents who may be interested in returning 'home' to raise their families. Several studies **indicate that return migration can be encouraged through specific types of family-oriented investments in schools and community facilities, as well as through investment in services and facilities (such as high speed internet and co-working spaces) conducive to remote workers and entrepreneurs.** It is also facilitated by developing a strong community 'welcoming' culture to new migrants, so that such new migrants can develop the social ties that strengthen their connection to the community and long-term prospects for staying. Focusing on enhancing the community characteristics desired by return migrants, and marketing specifically to this group may be a high potential strategy for Northeast Arizona. Reaching this demographic to communicate the benefits of the community (and succeeding in convincing them to relocate) is likely much easier than attracting other types of workers, and upon moving, this group's roots in the community and existing social network may enable them to make a more immediate and stronger contribution socially and economically.

ES. 3.3 Branding and Regional Marketing

One strategy used to attract target industries and residents is to create a reputation, or brand, and then marketing that brand and associated positive images to prospective industries and workers. In all branding efforts, the environment and quality of life are likely the region's most important asset and differentiator.

Regional marketing, simply by virtue of covering a greater area and more businesses, increases visibility and effectiveness. Also, by pooling resources, regional marketing can enable larger-scale marketing of an area. A marketing plan proceeds naturally out of a visioning process that identifies the region's strengths that the region envisions as the foundation for growth in target industries. For

example, for Ogden, Utah, marketing of recreation and tourism is closely related to its marketing of itself as a great location for outdoor recreation manufacturing; this connection is also directly relevant to Northeast Arizona.

Another important element in marketing to industries and developing an image is active participation and support at the state level. For example, in the Wyoming example of attracting gun examples (highlighted in Section 4.3), the governor attended industry trade shows and gave speeches about Wyoming as a gun-friendly state. The governor also hosts a national shooting competition as part of a state-wide effort to brand Wyoming as a state that is friendly to the firearms manufacturing industry.

A regional marketing plan can identify and include such elements as:

- Regional identity and key destinations, events, or products to highlight, such as astro-tourism, or outdoor recreation, or high altitude athletics, or firearm competitions.
- Regional brand and logo that highlights the regional identity.
- Businesses in the region that can be active participants in the marketing, or businesses currently not in the region who should be a target for the marketing campaign.
- Signage design and grant programs for businesses and community centers and gateways
- Regional 'trails' that link cultural, historic, natural, or retail attractions. For example, an astro-tourism trail, or a hit list of key high-altitude training locations.

ES. 3.4 Business Environment

Developing a good business environment is another factor influencing the establishment and growth of local businesses, and the attraction of new businesses. Factors affecting business climate include: skillsets and education level of local workforce; level of support for innovation and entrepreneurship; availability of investment funds and business advice; formal and informal networks and venues that facilitate the transfer of business and industry knowledge and skills, infrastructure (including transportation, broadband, educational institutions, hospitals, utilities), tax structure and incentives; and the level of local and regional collaboration between the government, businesses, and educational institutions. Some of the strategies in cultivating a positive business environment that is conducive to economic development include:

- **Developing an entrepreneurial community** by 1) developing the capacity of entrepreneurs themselves – their ability to develop the necessary skills to grow their businesses, and 2) building the capacity of the community to support entrepreneurs. Different types of entrepreneurs and small businesses need different levels and types of support. These can include developing support facilities for small businesses, such as shared office spaces for remote workers or incubator spaces that can be shared by multiple new businesses; investing in workforce development programs geared at developing the workforce for target industries; developing sources of seed capital for entrepreneurs; and perhaps most importantly, developing networks of mentors and advisors that connect existing business leaders and advisors with entrepreneurs and small business owners. This is likely the most important aspect of developing a growth environment for small businesses and entrepreneurs. This is a key opportunity for Northeast Arizona – with the second home owners in the area, the potential to tap into the

business experience and skillsets of this population may be a tremendous asset to the region in developing an entrepreneurial culture. These individuals may provide mentorship, capital for investing in startups, and connections to related businesses and advisors in Phoenix and beyond.

- **Developing business support networks and business incubators to provide educational and resource support to entrepreneurs and businesses.** Support resources may include trainings, funding, work spaces, and networking opportunities. There are many community-wide benefits to business incubators. Businesses that have been through an incubation program stay in business longer and within the community longer than businesses that haven't been through an incubation program. In addition, Incubator programs have a high rate of return. There are likely many residents of Northeast Arizona with skills that could be turned into a profitable businesses – provided the right level of financing, business skills support, and mentorship were available.
- **Streamlining Resources for Business** Another aspect of creating the right environment is to make it easy on businesses and workers considering relocating to the area by providing easily accessible information and making resources readily available. This can include developing shovel-ready sites at industrial parks and other locations that are primed and ready for new businesses, and providing easy to navigate, comprehensive websites with photos, resources on the area, and potentially informational videos on the area and its amenities and key infrastructure (such as the quality of local schools and healthcare systems, as done for example in the case study of rural Queensland, described in **Section 4.1**). It can also take the form of streamlining land use and permitting processes, such as was done by Gila Bend in Arizona (see case study in **Section 4.6**) to make development less costly and time-consuming for the renewable energy industry.
- **Developing regional partnerships, including private-public partnerships that are inclusive and responsive to regional needs and vision.** Developing relationships within a community and across community, county, and tribal boundaries can enhance economic development efforts in many ways. Specifically, partnerships can benefit all parties by leveraging assets that each entity brings to the table, increasing likelihood of obtaining funding from outside sources, limiting counterproductive competition, increasing networks and cluster effects, enhancing efficiency and reducing redundancy of efforts and investments, facilitating communication across industries and agencies to coordinate and enhance mutually beneficial efforts; and strengthening and coordinating a unified message for marketing of regional attractions and products. These partnerships and networks are particularly important in rural areas, to pool the available knowledge, financial, and technology resources.

ES.4 INFRASTRUCTURE INVESTMENTS

The single greatest infrastructure gap in Northeast Arizona that affects the viability of many potential economic development strategies and several target industries is broadband availability and reliability. This adversely affects the region's ability to grow and attract small business, entrepreneurs, remote workers, while also limiting the market and development opportunities for existing businesses. This recognized gap is being addressed through several partnerships, such that the outlook is positive for increased broadband access in many parts of the region. Additionally, natural gas capacity is insufficient

to meet all potential economic development needs and may be a key factor in preventing siting of a large-scale industrial facility in the region. However, no key strategy (as discussed in **Section 5**) or target industry (as discussed in **Section 6**) is expected to rely on significant natural gas capacity, so it may not be a high-priority strategic investment in the region's future. Furthermore, positive infrastructure assets in the region include access the Apache Rail spur and the Burlington Northern-Santa Fe main rail line, interstate access (I-40), reasonably priced and reliable electricity, and a regional airport with daily passenger flights in Show Low.

ES.5 OTHER SECTOR ECONOMIC DIVERSIFICATION OPPORTUNITIES

This section focuses on the growth potential for several industries identified as target industries for Navajo and Apache Counties.¹ The targeted industries were selected based on the region's strengths and assets, particularly its natural resource base and a high amenity environment. Specifically, it presents information on the potential for the following industries: renewable energy, forest product manufacturing, animal feeding operations, food processing, potash mining and processing, helium extraction, carbon dioxide pipeline, outdoor and recreation manufacturing, tourism, and remote-work industries.

In general, rural regions such as Northeast Arizona tend to be stronger in resource-dependent manufacturing industries and traditional manufacturing clusters such as processed food, automotive, forest products, furniture making and products with motors (USDA, 1999) (Headwaters, 2017). Based on its assets and its location, target manufacturing industries for Northeast Arizona are thus identified as resource dependent manufacturing (such as forest products) or as tied to the natural amenities of the region (such as outdoor recreation equipment manufacturing).

Our evaluation considered the current market conditions and expected trends in the target industries, industry key characteristics and input needs, whether these needs could be met in the study area, and the potential economic impacts if the venture were to be developed (i.e., jobs and income potential). Where possible, we identify specific recommended actions along with key players in the industry for recruitment and/or retention efforts. Strengths and weaknesses are internal to the region (Apache and Navajo counties) whereas opportunities and threats are external to the region.

In general, the target industries are selected as they are a good match for the existing resources, infrastructure, and workforce in the area. While the region's strengths and reasons it is suited for these target industries varies somewhat by industry, but for nearly all industries the basis for future growth is due to the following regional characteristics:

- Abundant supply of natural resources and natural resource amenities
- Strategic location to major markets
- Transportation infrastructure
- Low cost of living

¹ The project team worked closely with Navajo County economic development leadership in narrowing the analyzed industry list to those presented in this section.

- Competitive cost of doing business²

Section 7 of this report contains a detailed Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for each of the industries evaluated. A brief summary of why the region is suitable and competitive for each industry (strengths) as well as key action items and opportunities for the industry are provided in the table below.

² There are two published lists that compare the cost of doing business across states, Forbes and CNBC. Arizona ranks 23rd and 26th in these publications, respectively.

Table ES-2: Strengths and Opportunities of Key Industries

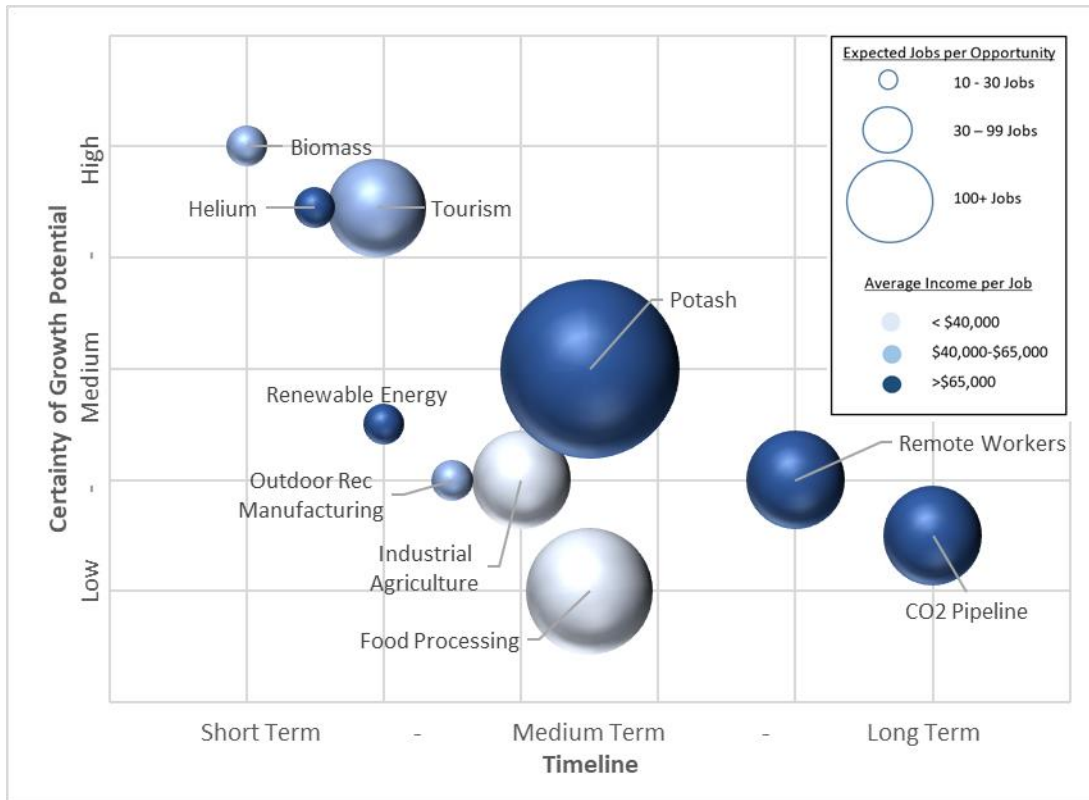
Industry	Strengths	Opportunities / Action Items
Renewable Energy	High resource development potential Transmission capacity is available Successful example in Dry Lake Wind Farm	Identify Exclusion Areas Encourage Community Participation 6 to 14 jobs for every 60 MW
Forest By-Product Manufacturing	4 FRI Existing manufacturing cluster Support from SRP	Investments in processes that use biomass Effort to promote policies, education on social/environmental benefits 2018 Farm Bill Programs
Livestock and / or Poultry	Remoteness Apache Rail Synergies with Smithfield	Attract contract farmers Recruit poultry operation Synergies with nutrient management
Food Processing	One day access to major markets Apache Rail Navajo and Apache traditional foods provide unique marketing angle	Processors and retailers with emphasis on regionally sourced foods Entrepreneurship opportunities (incubator) Large scale processors
Potash Mining & Processing	The Holbrook basin has 0.7 – 2.3 billion metric tons of potash The deposit is located close to major highways and rail networks	Several companies have pursued potash interest in recent years Recent study shows production costs below recent prices, indicating profit potential Global demand for potash expected to increase in the short-term
Helium Extraction	The Holbrook basin has traditionally been one of the world's best helium-producing areas, known for high concentration of gas Deposits close to highway and rail	Three companies have taken steps in recent years to assess and extract helium resources from the area. Prices rising due to limited supply and inelastic demand Supply shortages expected in the next few years

Apache and Navajo Counties Economic Assessment & Strategy

Industry	Strengths	Opportunities / Action Items
Carbon Dioxide Pipeline	<p>A large carbon dioxide deposit is present</p> <p>Kinder Morgan has conducted extensive planning of a pipeline</p> <p>Close proximity to source of demand; oil fields in the Permian Basin (New Mexico)</p>	<p>Enhanced oil recovery (EOR) stymied due to insufficient supplies</p> <p>Demand for EOR projected to increase 25% in the next decade</p> <p>Congress expanded a tax credit for carbon dioxide in EOR</p>
Outdoor and Recreation Manufacturing	<p>Outdoor culture of the area</p> <p>Public perception of White Mountains and Mogollon Rim</p> <p>Actively recruiting and welcoming manufacturing companies</p>	<p>Manufacturers leaving CA & CO due to employment costs, anti-gun sentiment, and new regulations on gun purchasing</p> <p>Local, niche apparel companies</p> <p>Enhance or retain quality of life to retain or attract manufacturers</p>
Remote Workers	<p>Low cost of living</p> <p>Outdoor recreation amenities and open space</p> <p>Sense of community</p> <p>Show Low airport</p> <p>Northland Pioneer College</p>	<p>Remote work (telecommuting) on the rise</p> <p>'Diaspora' with interest in returning home</p> <p>Second home community as a source of workers or advisors</p> <p>Often knowledge workers with higher than average salaries</p> <p>Attracted to high quality of life areas</p> <p>IT domestic outsourcing on the rise</p>
Tourism	<p>White Mountains outdoor recreation</p> <p>Diverse and plentiful wildlife</p> <p>Desirable climate</p> <p>High visitation national monuments</p> <p>Route 66</p> <p>3 hours from Phoenix, proximity to I-40</p> <p>Native American cultures</p> <p>Water-based recreation</p> <p>High tourist visitation to broader region</p> <p>Dark skies (astro-tourism)</p> <p>Sunrise Park Ski Resort</p>	<p>High tourist interest in outdoor recreation, historic destinations, cultural experiences</p> <p>Growing astro-tourism market</p> <p>42 million domestic and international visitors to Arizona annually</p> <p>Investments in recreation opportunities and facilities benefits residents and tourists alike, benefitting nearly all industries and overall regional economic development</p>

The following graph depicts our findings in terms of the certainty of growth potential (vertical axis) and expected timeline for development to occur (horizontal axis) for analyzed industries. The size of the bubble for each analyzed industry indicates the potential number of jobs for each industry, while the color represents the average income expected per job.

Figure ES-1: Economic Diversification Summary



As shown in the figure, the conditions for additional development of the forest product manufacturing sector (specifically with regard to biomass) are favorable given the abundance of that resource available in the area. Another type of manufacturing that has strong potential in the area is outdoor recreation and equipment manufacturing, as there is strong cohesion between this type of manufacturing and the potential image or brand of the region. Other sectors that are expected to experience growth in the region in the near-term are renewable energy and tourism. Dependent on continued high commodity prices, helium and potash, show good growth potential in the region. These natural resource extractive industries have the highest wages by sector (relative to most of the other sectors evaluated) but these jobs are at risk of boom and bust cycles. In addition to potash, the industrial agriculture and food processing sectors have the largest employment opportunities associated with them. However, these jobs tend to have lower wages, relative to jobs in the other industries considered here.

ES.6 NEXT STEPS: ACTION PLAN

A key purpose of the ACC initiative is to help communities such as those in Northeast Arizona that have strong coal-related industries to make changes and investments in response to evolving energy markets

and policy environments. The goal is to minimize the adverse effects of these changes on coal industries and to build a more resilient, diverse economic future. This report identifies a wide variety of strategies and target industries for the region to consider in developing its action plan for economic development. This action plan, currently being developed by Navajo County, is the critical next step for the region – and should very clearly and specifically identify the following:

1. Regional vision for economic development goals and priorities. As time/effort/money resources are limited, success depends on clearly defining (and likely narrowing) desired outcomes.
2. For each key regional priority, identify the sector strategies that focus on a set of key action items for developing and promoting the target industry or attracting the targeted workforce. These key action items should focus on creating the right community and business environment for the vision to succeed. To identify and implement the key action items, develop partnerships of companies, educational institutions, economic development/workforce development, and community organizations.
3. Funding needs and sources. Identifying and leveraging outside funding can be a key component. Even a small amount of outside funding that is strategically used and leveraged to support a community's vision and plans can help increase local commitment and interest and spur local investment.
4. Steps to market the vision, to target industries, tourists, and workforce populations.

In other words, for each key priority/target industry the action plan will identify the specific action items necessary to develop the right environment conducive to growth, the specific funding and partnerships required to implement the action items, and the plan to market these opportunities. Through successful development and implementation of such an action plan, the region will position itself to make the most of its assets to grow and diversify its economy.

1 INTRODUCTION

The coal mining and associated power production industries have historically been key economic engines in Navajo and Apache counties in Northeast Arizona, with three coal-fired power plants and a coal mine located in the two counties. Changes in regional, national, and international energy markets, as well as changes in state and federal energy policy, are resulting in a national and regional decrease in coal mining and coal-fired power production. While changes in production (and associated employment and income) at power plants in Apache County are not expected in the short-term, coal-related economic activity in Navajo County has already declined (with the shut-down of one unit at Cholla Power Plant), with further declines in power plant and coal mine production expected in the near future. In the face of the current and likely future declines in employment and income in this economic sector, the Northeast Arizona region is proactively seeking economic development strategies to strengthen and diversify its economy and stabilize the financial base for its communities and governments.



As part of this effort to increase resiliency, Navajo County, in partnership with the Real Arizona Development Council (a nonprofit organization with the purpose to attract industry and investment to Navajo and Apache Counties) and Arizona Public Service (APS) Electric Company, **sponsored a comprehensive strategic planning process to assess the extent of the economic impact that changes to the region's coal-related industries will have on Navajo and Apache counties, and provide recommended actions for the region as a whole to strengthen its economic foundation.** Recommended actions to foster economic growth and diversification include strategies to be undertaken by local and regional organizations to develop the right environment for economic growth, as well as target industries to attract or grow in the region. In addition to funding from the three sponsoring organizations, the funding is through the Federal Economic

Development Administration's program, "Assistance to Coal Communities", or ACC.



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This report documents the findings of this strategic planning process, which has relied on close collaboration with Navajo County and other regional partners, such as local economic development organizations and businesses. Findings at this stage of the strategic planning process support Phase I of the ACC funding grant. In Phase II, Navajo County will use the findings and recommendations from this Phase I report to work with local partners to develop and implement an action plan.

1.1 GEOGRAPHIC SCOPE

This study focuses on Northeast Arizona, specifically Navajo and San Juan Counties. Approximately two-thirds of the land base in these two counties is in Native American Reservations, specifically, the

White Mountain Apache, Navajo, Hopi, and Zuni Indian Reservations. In Navajo County, approximately 16 percent of the land is publicly owned (by state and federal government) and in Apache County, approximately 21 percent is in public land. This leaves approximately 16 percent of Navajo County and 13 percent of Apache County as privately owned (Apache County, 2004) (Navajo County Arizona, 2011). There are concurrent ACC grants funding studies of economic opportunities on the Navajo and Hopi Reservations. Given this, and the fact that the study's sponsoring government and economic development organization are located off of the Reservations, **the analysis covers impacts and opportunities throughout the two counties but particularly focuses on opportunities on the private lands.**

1.2 PURPOSE AND SCOPE

There are four purposes of the analysis:

1. Estimate the current economic contribution of coal-related economic activity, which represents the potential adverse impact associated with declines in coal-related industry.
2. Identify strategies for the region and its communities to undertake to create the right social, economic, environmental, and political conditions for business establishment, growth, and diversification.
3. Identify gaps in the region's infrastructure that may hinder economic growth.
4. Recommend growth industries for the region that will diversify and strengthen the local economy.

For the first purpose regarding potential adverse impacts, the scope is to use existing studies and regional economic impact data to assess the potential jobs, income, and tax implications to the region of changes in coal-related economic activity. For the latter three components of the analysis, the scope of the analysis is to 1) assess the region's strengths and weaknesses, 2) analyze these strengths and weaknesses in light of the relevant regional and national research on the factors and conditions critical for economic growth for rural economies and specific industries, and 3) make recommendations regarding the strategies and opportunities most suitable and promising for Northeast Arizona.

1.3 SETTING THE STAGE: FACTORS AFFECTING RURAL ECONOMIC GROWTH

There is significant variation in economic performance amongst rural areas in the United States. Several studies have reviewed the general factors that appear to have the largest impact on economic development in rural areas of the United States. For example, a United States Department of Agriculture statistical study found that the factors most affecting economic growth in rural counties are: skill levels (measured by high school completion rates and spending on education), transportation infrastructure (measured as proximity to an airport), and natural attractiveness (as measured by climate index and presence of retirees) (Aldrich & Kusmin, 1997). More recent studies have found that adoption of broadband by residents and businesses can also play a significant role in rural economic growth.

Much of the literature on economic growth in rural regions is focused on the quality of available workforce skills – recognizing that rural populations tend to be less educated than urban populations, particularly the proportion of the population with a college degree. In addition to education level, a

workforce skilled in the use of advanced technologies is important for diverse industry sectors. As such, the important role of research universities and colleges, as well as quality local schools, is emphasized in many studies. While much of the research identifies the economic benefits of four-year universities and research institutions in the modern knowledge economy, studies also show that established community colleges can have a significant and positive impact on job growth, particularly if they specialize in particular skills relevant to regional industries. Benefits to the region include better-trained workers, increased social capital and knowledge sharing, increased use of information technology, and increased levels of wages and innovation (Crookston & Hooks, 2012; Rosenfeld, 2000).

A limiting factor for Northeast Arizona is the relatively low population density and distance to metropolitan areas. Several studies have found that rural economic growth tends to vary based on population as well: proximity to metropolitan areas is associated with greater economic growth (due to such factors as access to markets, reduced transportation costs, access to educational institutions and centers of innovation, etc.) (Porter, *The Economic Performance of Regions*, 2003), as is a higher population density (increases the positive technology and information transfer between companies and individuals and reduces the per capita costs of physical infrastructure, educational training, and support services) (Stauber, 2001).

However, low population density can be an advantage for some types of economic development, particularly related to recreation, tourism, retirement communities, and attracting workers and industries that are drawn to a rural lifestyle and low cost of living. Many studies have identified that rural areas such as Northeast Arizona that have high levels of scenic beauty, open space (particularly with mountains and topographic variation as well as waterbodies), and associated recreational amenities typically have stronger economic performance. Workers, retirees, tourists, and business owners are often drawn to these ‘high amenity’ regions, and boost the local economy through bringing knowledge and skills to the local area, creating businesses, and spending money in the local economy.

As such, Northeast Arizona’s region’s relatively low population density; relatively remote location; high amenity qualities—including outstanding natural, historical, and cultural assets; relatively low cost of living; and type of established educational institutions influence its economic future, but they do not determine it. Local leadership and choices to investment in infrastructure, education and workforce training, entrepreneurship and small business development, and a high quality of life are critically important in capitalizing on the region’s strengths for a strong economic future.

As noted by the well-known economic researcher, Michael Porter, in a review of the economic competitiveness of rural regions, “Regional economic development is perhaps best seen as a combination of a natural evolutionary process driven by market forces together with **conscious planning which aims to identify strengths to reinforce, improve the business environment, and invest to seize opportunities** that have presented themselves” (*emphasis added*) (Porter, Ketels, Miller, & Bryden, 2004).

1.4 APPROACH, SCOPE, AND REPORT OUTLINE

To achieve the four purposes outlined in Section 1.2 above, and recognizing the role of inherent regional characteristics as well as strategies that can be implemented by local leadership to enhance economic development, this analysis takes a multi-faceted approach. Specifically, there are seven primary

elements to the approach in this planning process, each represented by a separate section of this document:

1. **Examine and describe demographic and economic context (Section 2).** This section serves as a foundation for the economic analysis and strategic assessment by providing information on demographic and economic strengths and weaknesses, and provides context by comparing local conditions to regional and national baselines. Topics covered in this section include population, educational attainment, employment, and industry concentration and trends. While the economic past and present does not determine the economic future, new and emerging businesses and industries often evolve from existing industries.
2. **Estimate type, magnitude, and distribution of economic impact (Section 3).** This section identifies the expected level of reduced coal mining and power generation, and translates that into total job and income impacts throughout the regional economy, with a focus on how these impacts are distributed between Navajo and Apache counties. The section also presents information on the potential fiscal impacts to local governments, local public service jurisdictions, and tribal governments.
3. **Identify case studies and best practices (Section 4).** This section describes the economic conditions and economic transition experiences of areas across the United States, focusing on best practices and lessons learned to meet the economic and social challenges of transitioning from an economy reliant on one or a few industries to a more diversified and resilient economy.
4. **Recommend regional and community strategies for increasing economic vitality (Section 5).** Based on experiences in other regions that are applicable to the Northeast Arizona region, this section identifies and recommends strategies for how Northeast Arizona can build on its assets to invest in the business environment and position the region for economic growth. These are community and regional-level strategies that facilitate economic development and growth, often done in partnership with all stakeholders in a region including private business, educational institutions, tribes, non-profits, and residents. These strategies are distinct from the industry opportunities, which are focused on specific areas of growth potential for private businesses.
5. **Identify infrastructure assets and weaknesses (Section 6).** This section summarizes the current infrastructure gaps in Northeast Arizona that affect the viability of economic development strategies and specific industries. Specifically, the section identifies and discusses broadband availability and natural gas capacity as being insufficient to meet all potential economic development needs. On the other hand, we also discuss positives for the region, which include access to Apache Rail and the Burlington Northern-Santa Fe main rail line, reasonably priced and reliable electricity, interstate access, and the regional airport in Show Low.
6. **Identify priority growth industries for diversification (Section 7).** This section identifies potential target industries that can provide greater economic diversification, focusing on industry outlook and market analysis, labor considerations, siting considerations, economic development potential, major industry players, and legal/regulatory considerations.
7. **Recommendations and Next Steps (Section 8).** This section identifies areas of focus and steps for local and regional economic development organizations.

2 DEMOGRAPHIC AND ECONOMIC OVERVIEW

This section provides an overview of the population and economy of Northeast Arizona. This information serves as a foundation for the economic analysis and strategic assessment by providing information on demographic and economic strengths and weaknesses, and provides context by comparing local conditions to regional and national baselines. Topics covered in this section include population, educational attainment, employment, and industry trends. In each case we compare data at the national and state level to that of Apache and Navajo Counties, and where data are available, to the largest cities in the region.

Key points in this section:

- Population growth:** Between 1990 and 2016, Navajo County's population grew faster than the nation's population (1.3 percent annual average growth compared to 1.0 percent average annual growth), while Apache County has been growing less quickly at a rate of 0.6 percent average annual growth. Working age population growth in Northeast Arizona has also been similar to the nation as a whole over the last several decades (though lower than the state). Overall population growth as well as working age population growth area goods indicator for the long-term economic strength of the area and ability to retain young people and families.
- Educational Attainment:** Similar to many rural areas, educational attainment in Northeast Arizona lags the state and national average. However, towns and cities in the region generally have higher educational attainment, with several communities in the region (such as Eagar, St. Johns, and Pinetop-Lakeside) having greater educational attainment than the nation or state as a whole – again, indicating the potential skillsets are there for long-term economic growth.
- Labor force:** Current working age population (16 to 64) in the two counties is approximately 102,500 people. Labor force participation rate of this group of people is lower at the county level in both counties, but meets or exceeds state and national averages in many towns and cities in the region.
- Unemployment/Underemployment:** There are significant numbers of people who are available to work, or to work more in the two-county region. Unemployment is high in both counties compared to the state and the nation. In 2017 there were approximately 2,100 unemployed people in Apache County and approximately 3,100 people unemployed in Navajo County. Based on national underemployment data (i.e., data on people who want to have a job but have given up looking or who are working part-time and want a full-time job), there may be at least as many underemployed people in the two-county area as there are unemployed – i.e., there may be a total of approximately 4,200 people unemployed or underemployed in Apache County and 6,200 unemployed or underemployed in Navajo County, for a total of 10,400 people in the two county area. In addition to these workers, there are approximately 8,000 residents of Apache and Navajo counties who work outside their county of residence; a portion of these workers may be interested and available to work in jobs in their home county versus commuting outside the county.

- **Employment and wage composition:** Compared to the state and nation, employment and income are more highly concentrated in government sector jobs and less concentrated in private sector jobs. Additionally, there are fewer proprietor (self-employed) jobs and associated income than elsewhere in the state and nation.
- **Employment and wage concentration:** Current economic strengths in the region include healthcare and social assistance, accommodation and food services, utilities, mining, public administration, and farming (high employment, but with low wages). In short, the local economy is heavily reliant on natural resource extraction, associated power generation or natural resource-based tourism. The focus of this study is developing diversification strategies to make the economy resilient to potential downturns in the mining and utilities sectors.
- **Employment trends:** Growing sectors in both counties include healthcare and social assistance; accommodation and food services; information (primarily telecommunications); administrative and waste services sectors; transportation and warehousing; arts, entertainment, and recreation; and agriculture and forestry. An additional emerging sector in Navajo County is real estate (including rentals and leasing). Elsewhere in the state and nation, other key growth sectors are skilled service jobs, including professional, scientific, and technical services; management of companies and enterprises; and finance and insurance.

In summary, our assessment of the region's current demographic and economic strengths and weaknesses is presented below in **Table 2-1**.

Table 2-1: Regional Demographic and Economic Strengths and Weaknesses

Strengths	Weaknesses
<ul style="list-style-type: none"> • Population growth overall, which is a positive indicator of the region’s ability to attract and retain residents. • Many towns have an equal or greater proportion of working age population as the state and nation, indicating a sustainable long-term labor force. • Several towns have educational attainment levels equal to or higher than state and national averages, indicating a supply of skilled labor in certain areas of the county. • Regional economic strengths and relatively high concentration of employment in natural resource sectors such as ranching, forestry products, mining, and tourism industries, as well as energy production and transmission. • Several local service sectors have grown over the last decade, particularly accommodation and food service, healthcare and social assistance, telecommunications, and transportation and warehousing. • There is a large population of people available for work, including unemployed, underemployed, and individuals commuting outside the county. 	<ul style="list-style-type: none"> • Similar to many rural areas, employment and income are relatively highly concentrated in the government sector. • Outside the farm sector, the level of proprietor employment and associated income is relatively low, indicating a relatively low level of entrepreneurship and small business development. • Unemployment rate is higher and labor force participation rate is lower than the state or nation, potentially indicating a shortage of economic opportunity. • Educational attainment for the area as a whole is lower than state and national averages, potentially indicating a limited supply of skilled workers. • Aside from utilities, limited economic growth over the last two decades in sectors selling goods and services outside the two county area (base or export industries). Relatively low wages in the region compared to the state and the nation indicate relatively low rate of productivity (value of goods/services produced per unit of resources used) in the region.

2.1 POPULATION

Table 2-2 shows the total population of Apache and Navajo counties, as well as some of the larger population centers in the region. Total population in the two-county area is approximately 180,000 people, of which sixty percent (approximately 108,000) live in Navajo County. The largest cities in the study area are Show Low and Winslow in Navajo County, with populations, respectively of approximately 10,900 and 9,600 people. Other towns in the study area with populations between approximately 2,000 and 5,000 people are Holbrook and Pinetop-Lakeside in Navajo County and Eagar, St. Johns, and Springerville in Apache County.

Table 2-2: Total Population of Counties and Cities in Northeast Arizona

Geographic Location	Decennial Census			American Community Survey
	1990	2000	2010	2016
Apache County	61,591	69,423	71,518	72,346
St. Johns	3,294	3,269	3,480	3,542
Springerville	N/A	1,972	1,961	1,728
Eagar	4,025	4,033	4,885	4,943
Navajo County	77,658	97,470	107,499	108,209
Holbrook	4,686	4,917	5,053	5,011
Pinetop-Lakeside	N/A	3,582	4,282	4,314
Show Low	5,019	7,695	10,660	10,875
Winslow	8,190	9,520	9,655	9,539
Total 2-County Area	139,249	166,893	179,017	180,555

Source: (U.S. Census Bureau, 1990) (U.S. Census Bureau, 2000) (U.S. Census Bureau, 2010) (U.S. Census Bureau, 2017)

Most of the areas have experienced overall growth since 1990, with the exception of Springerville, where population fell by 12 percent from 2000 to 2016 (see **Table 2-3**). While the overall population has generally been increasing, nearly all areas have experienced declining growth rates over the last few decades, which are consistent with the State of Arizona and U.S. as a whole. So while the region tends to be growing, it is growing more slowly. In fact, between 2000 and 2010, Apache County was the second slowest growing county in the state (ranking 14 out of 15 counties; Greenlee County was the slowest growing county, with a decline in population). Navajo County ranked 11 out of 15 counties for growth during this time period (U.S. Census Bureau, 2012).

Table 2-3: Population Growth in the Region, State, and the U.S.

Area	Average Annual Growth in Total Population				Average Annual Growth in Population Ages 18 - 64 Years		
	1990 - 2000	2000 - 2010	2010 - 2016	1990-2016	2000 - 2010	2010 - 2016	2000-2016
US	1.2%	0.9%	0.5%	1.0%	1.1%	0.4%	0.8%
Arizona	3.4%	2.2%	0.9%	2.4%	2.3%	0.7%	1.7%
Apache	1.2%	0.3%	0.2%	0.6%	0.9%	0.4%	0.7%
Eagar	0.0%	1.9%	0.2%	0.8%	2.3%	-2.1%	0.7%
St. Johns	-0.1%	0.6%	0.3%	0.3%	0.8%	1.1%	0.9%
Springerville	N/A	-0.1%	-2.1%	N/A	-0.3%	-2.6%	-1.1%
Navajo	2.3%	1.0%	0.1%	1.3%	1.4%	-0.1%	0.9%
Holbrook	0.5%	0.3%	-0.1%	0.3%	1.2%	-0.7%	0.5%
Pinetop-Lakeside	N/A	1.8%	0.1%	N/A	1.5%	-1.6%	0.3%
Show Low	4.4%	3.3%	0.3%	3.0%	3.4%	-0.4%	2.0%
Winslow	1.5%	0.1%	-0.2%	0.6%	0.7%	-0.4%	0.3%

Derived from: (U.S. Census Bureau, 1990) (U.S. Census Bureau, 2000) (U.S. Census Bureau, 2010) (U.S. Census Bureau, 2017)

2.1.1 Age Distribution

During the last Census, the region had higher proportions of its population under 18 years old than the state or nation (around five percentage points higher, see **Table 2-4**). It also had a smaller percentage of its population in the prime working-age years of 24-54 (roughly nine percentage points lower).

Proportions in age groups 18-24 and over 54 years in the region were similar to Arizona and the U.S. In general, cities in Northeast Arizona largely reflect the patterns of the region: Higher proportions of people under 18 years and lower proportions of people aged 24-54. Pinetop-Lakeside and Show Low had higher proportions of adults 55 years and older, while St. Johns had a large proportion of children (32 percent).

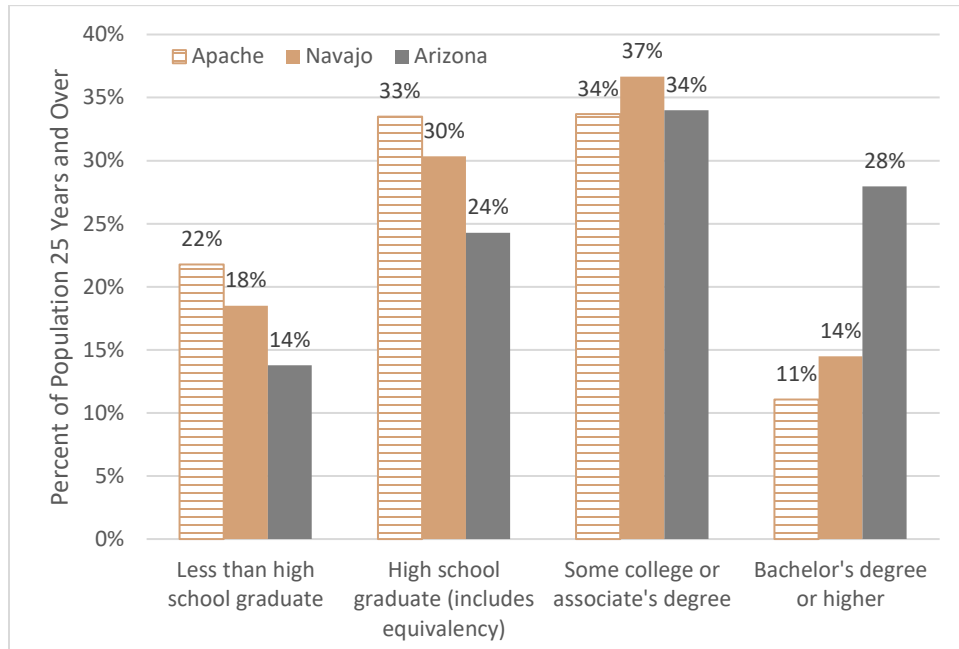
Table 2-4: Age Distribution in the Region and State in 2010

Area	Age Distribution			
	Under 18	18-24	24-54	55+
US	24%	10%	68%	25%
Arizona	26%	10%	66%	25%
Apache	32%	10%	58%	23%
Springerville	29%	8%	58%	28%
St. Johns	32%	7%	57%	26%
Navajo	30%	10%	58%	25%
Holbrook	28%	11%	65%	21%
Pinetop-Lakeside	25%	7%	55%	33%
Show Low	24%	8%	56%	34%
Winslow	26%	11%	72%	20%

2.1.2 Educational Attainment

Educational attainment is an indicator of the skill level in the local workforce. **Figure 2-1** compares the educational attainment of Apache and Navajo Counties to that of Arizona in 2016 for the population aged 25 and over. As shown in the figure, approximately 51 percent and 45 percent, respectively of the Navajo County and Apache County populations, have some college education. However, the region lags behind the state as whole, where 62 percent have some college education. While the proportion of residents that have some college is similar between the areas, county residents are about half as likely to hold a Bachelor's degree or higher than are state residents (28 percent at the statewide level compared to 14 percent and 11 percent, respectively in Navajo and Apache Counties). The region also has more individuals without high school diplomas than the state as a whole (18 percent and 22 percent for Apache and Navajo Counties, respectively, compared to 14 percent for the state).

Figure 2-1: Educational Attainment in the Region and State in 2016 (ages 25+)



Source: (U.S. Census Bureau, 2017)

As shown in **Table 2-5**, individual cities in Northeast Arizona also generally show less educational attainment than elsewhere in the state (as is common for rural areas) (U.S. Census Bureau, 2017). There are a few exceptions – as highlighted in bold in **Table 2-5**, several communities have higher high school graduation rates and one community, Pinetop-Lakeside, has a higher proportion of the population with some college education. With the exception of Holbrook and Winslow, the region's cities generally have higher proportions of residents with a college education than their respective county average. Since 2000, there has been a general trend at the local, county, and state level towards more educated residents. The proportion of the population without a high school diploma has fallen since 2000 in each area, most notably in Apache County (a drop of 15 percentage points). The proportion with at least some college has risen in each case, as well (U.S. Census Bureau, 2000).

Table 2-5: Educational Attainment, Population 25 Years + Age Population

Metric	% With High School Diploma or Equivalent	% With Post-Secondary Education (at least some college)
US	87%	60%
AZ	86%	62%
Apache County	78%	45%
St. Johns	91%	64%
Eagar	89%	67%
Springerville	82%	67%
Navajo County	82%	51%
Show Low	91%	60%
Pinetop-Lakeside	92%	65%
Taylor	85%	59%
Holbrook	87%	50%
Winslow	78%	49%

2.1.3 Commuting Patterns

The number of residents of Navajo and Apache counties who work in other counties or states can indicate two things: 1) the number of local workers who may be available to work inside the county if additional, high quality jobs were available (that could draw them away from their current jobs located outside the county), and 2) the extent to which a high local quality of life and sense of community may

Apache County	
Residents working outside the county:	2,744
Residents working outside Arizona:	2,579
Residents working from home:	1,269
Navajo County	
Residents working outside the county:	2,384
Residents working outside Arizona:	264
Residents working from home:	2,367

be keeping people in the area despite traveling outside the county for work (although it is important to recognize also that many workers may be crossing county lines without a long commute). Both of these factors may be at work in Northeast Arizona, because Northeast Arizona residents tend to work outside their county of residence more frequently than Arizona as a whole, as shown in **Figure 2-2** below.

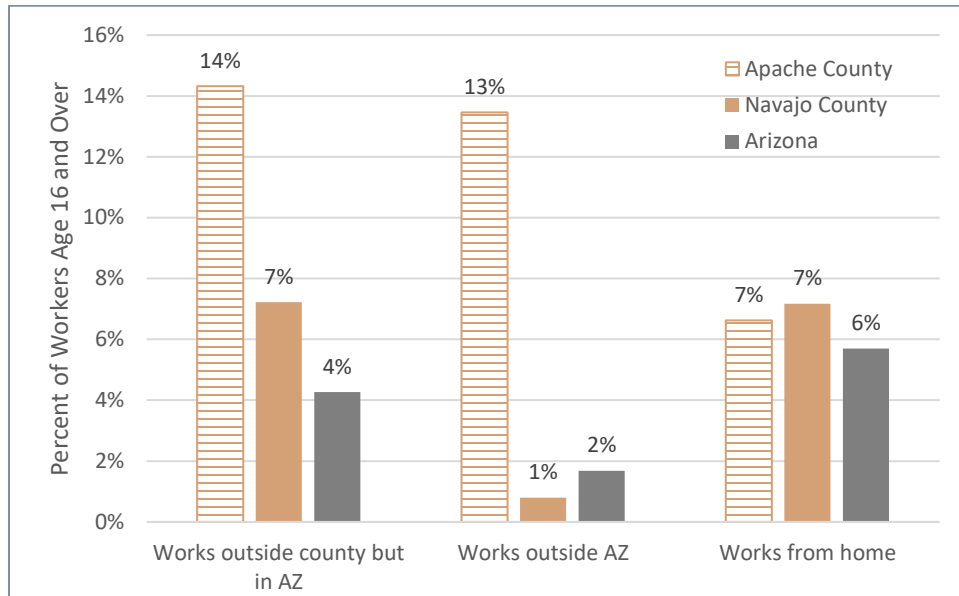
Apache County residents are especially likely to work elsewhere in Arizona (2,744 people),

accounting for roughly one out of every seven workers (see **Figure 2-2**). Nearly the same proportion work outside Arizona (2,579), resulting in a total of 28 percent of workers leaving Apache County for work. The average commute length for Apache residents is about 26 minutes, which is very close to the state average of 25 minutes (U.S. Census Bureau, 2017).

About seven percent of Navajo County residents work in a different county (2,384 people) while only a small percentage work outside Arizona (264), resulting in about eight percent of county workers leaving the area for employment. The rates at which the region's residents work at home roughly matches that

of the state as a whole: Around six percent of workers work from home. In both counties, there may be an upward trend in the proportion of people working from home since 2000, however the margin of error associated with the data makes it difficult to be certain. The average commute for Navajo County workers is 21 minutes (U.S. Census Bureau, 2017).

Figure 2-2: Place of Work in the Region and State in 2016



Source: (U.S. Census Bureau, 2017)

Because Navajo County is a Micropolitan Statistical Area (Show Low), the Census provides a more detailed story of where people work. Roughly 20 percent of the county's workers ages 16 and over work in the area's 'principal city,' Show Low. About five percent work in a Metropolitan Statistical Area, which is likely Cococino County as it is the only one bordering Navajo County. About half of these commuters likely work in its 'principal city,' Flagstaff. Only about one percent of Navajo County workers travel to another Micropolitan Statistical Area, which could be Gila County, Graham County, or McKinley County in New Mexico.

2.2 LABOR FORCE

The size and the skillset of the labor force in the local area is an important factor for many employers, and is an indicator of the health of the local economy. **Table 2-6** presents the total working age population (i.e., the likely population that may choose to enter the labor force) in the two-county area compared to the state and the nation. As of 2016, there were approximately 102,500 working age adults in the area, or 57 percent of the total population. This compares to 60 and 62 percent in the state and the nation, respectively. As shown in the final column of **Table 2-6**, the working age population has been growing in the study area since 2000, and at roughly the same rate as elsewhere in the United States, but lower than the rate elsewhere in Arizona. This is a positive sign for the region, and is in contrast to many other rural areas that are experiencing a shrinking of the local working age population as young people find work in other areas.

However, except for St. Johns, it appears that the working age population growth from 2010 to 2016 grew more slowly than was experienced from 2000 to 2010. While it appears that many areas may actually have lost some of their working age population from 2010 to 2016 (i.e. have a negative value in the column showing growth from 2010 to 2016), because of the margin of error in the 2016 estimates (these are from a survey that samples the population, whereas 2000 and 2010 data are from a census of the entire population), it is possible that slightly negative values actually had little or no change in this population since 2010. Apache County's working age population has increased slightly since 2010, while Navajo County's has been mostly flat.

Table 2-6: Working Age Population in the Region, State, and the U.S.

Area	Population Ages 18 - 64 Years		Average Annual Growth: Population Ages 18 - 64 Years		
	2016	% of Total Population	2000 - 2010	2010 - 2016	2000-2016
US	198,765,092	62%	1.1%	0.4%	0.8%
Arizona	4,038,808	60%	2.3%	0.7%	1.7%
Apache	41,517	57%	0.9%	0.4%	0.7%
Eagar	2,445	49%	2.3%	-2.1%	0.7%
Springerville	924	53%	-0.3%	-2.6%	-1.1%
St. Johns	2,051	58%	0.8%	1.1%	0.9%
Navajo	60,964	56%	1.4%	-0.1%	0.9%
Show Low	5,866	54%	3.4%	-0.4%	2.0%
Winslow	5,981	63%	0.7%	-0.4%	0.3%
Holbrook	2,951	59%	1.2%	-0.7%	0.5%
Pinetop-Lakeside	2,261	52%	1.5%	-1.6%	0.3%

Derived from: (U.S. Census Bureau, 1990) (U.S. Census Bureau, 2000) (U.S. Census Bureau, 2010) (U.S. Census Bureau, 2017)

As **Table 2-7** shows, Apache and Navajo counties have a much lower labor force participation rate (the percent of people over the age of 16 who are working) than Arizona as whole. Apache County's rate has fallen since the turn of the century, while Navajo County experienced a rise through 2010 before dropping below its 2000 level. In general, the region's population centers tend to have a higher labor force participation rate than their counties. Most cities have seen either stable or slightly falling labor force participation rates in the last 15 years, with the exception of St. John's which saw a slight increase. Pinetop-Lakeside may have experienced a particularly large decline over this period. Again, though, due to margin of error in the 2016 estimates, the decline may have been much smaller (U.S. Census Bureau, 2000; U.S. Census Bureau, 2017). Focusing in on the prime working age population of 16 to 54, the difference in labor force participation between the state and several of the region's cities diminishes (likely due to a higher proportion of retirees in the area), with some of the region's cities actually having a higher labor force participation rate than the state as a whole.

Table 2-7: Labor Force Participation Rates of Population 16 Years and Older in the Region and State

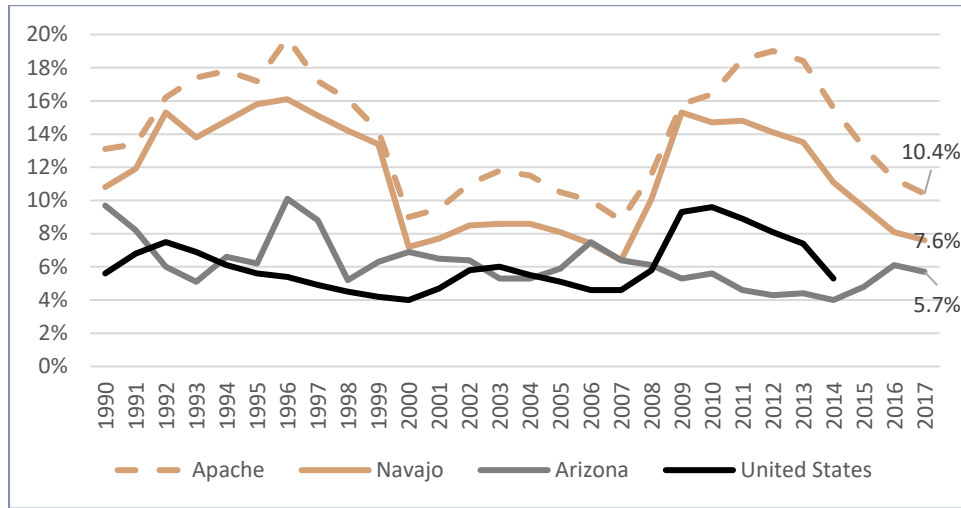
Geographic Location	Labor Force Participation Rate (Population Age 16+)			Labor Force Participation Rate (Population Age 16-54)	
	2000	2010	2016	2010	2016
US	64%	65%	64%	77%	76%
Arizona	61%	62%	60%	75%	74%
Apache County	46%	44%	40%	51%	48%
Eagar	62%	61%	53%	75%	75%
St. Johns	52%	57%	57%	63%	74%
Springerville	58%	60%	58%	76%	81%
Navajo County	51%	54%	49%	65%	61%
Holbrook	63%	67%	57%	74%	64%
Pinetop-Lakeside	61%	58%	48%	84%	68%
Show Low	57%	56%	53%	80%	73%
Winslow	47%	49%	46%	55%	52%

Sources: (U.S. Census Bureau, 2000) (U.S. Census Bureau, 2017)

2.2.1 Unemployment

As shown in **Figure 2-3**, despite employment gains in recent years, unemployment in Northeast Arizona remains at high levels compared to the rest of the state and the nation (as has been the pattern for the last thirty years). In 2017, Apache County had the second highest unemployment level (10.4 percent) in the state, second only to Yuma County. Navajo County has a lower unemployment rate, 7.6 percent, but still ranks fourth for highest unemployment (after Yuma, Apache, and Santa Cruz counties). These rates compare to the 2017 state unemployment rate of 5.7 percent. These rates corresponds to approximately 2,100 un-employed people in Apache County in 2017 and approximately 3,100 people unemployed in Navajo County in 2017.

Figure 2-3: Unemployment Rates 1990 to 2017



Source: Bureau of Labor Statistics (Local Area Unemployment Statistics)

Cities in the region tend to have lower unemployment rates than their respective counties. Winslow and Springerville generally reflect the unemployment rates in their counties. The other cities generally have unemployment rates that are approximately half the county-level unemployment rate. St. Johns' rate is especially low, even below the state level (U.S. Census Bureau, 2000; U.S. Census Bureau, 2017).

2.2.2 Underemployment

The unemployment rate includes only jobless persons who are available to work and have actively sought a job within the past four weeks (Bureau of Labor Statistics, 2018). Notably left out of this figure are (1) discouraged workers and (2) involuntary part-time workers. These worker groups include people that would like to work more and are available to work more but are unable to do so. Discouraged workers are people not currently in the labor force who want and are available for work and have looked for a job within the previous 12 months, while involuntary part-time workers are working fewer than 35 hours per week but who want to work full time and are available to do so but are unable to find full-time work. Including these additional measures of underutilized employees provides a clearer picture of the available workforce.

The Bureau of Labor Statistics, the agency in charge of tracking the unemployment rate, provides six measures of unemployment (Bureau of Labor Statistics, 2018). Of these, two measures of particular interest are the official unemployment rate (U-3) and a comprehensive measure of those unemployed and underemployed (U-6):

- U-3, total unemployed as a percent of the civilian labor force (this is the definition used for the official unemployment rate);
- U-6, total unemployed plus all marginally attached workers (including discouraged and others not actively seeking work but desiring a job) plus involuntary part-time workers, as a percent of all potential workers (the civilian labor force plus all marginally attached workers).

Comparing U-3, the traditional measure of unemployment, to U-6, unemployment and underemployment combined, indicates the relative number of underemployed workers. While

unemployment is reported at the county level, the Bureau of Labor Statistics does not report statistics on underemployed workers at the county level.

Table 2-8 summarizes BLS unemployment/underemployment data for measures U-3 and U-6 for Arizona and other southwestern states. Over the past five years, Arizona consistently exhibits relatively high unemployment (U-3) compared to the nation as a whole, though generally it has lower unemployment rates than neighboring Nevada or New Mexico (but higher than Utah). Likewise, in the last four years, the U-6 measure of total unemployment/underemployment has been higher than the United States as a whole. Furthermore, the ratio of total unemployment/underemployment to unemployment is also higher in Arizona (averaging over 2.0). This means that for every worker who is officially unemployed in Arizona (approximately 4.7 percent of the workforce currently), there is another worker who is underemployed (meaning they don't have a job but want one, or have a job but would like to work more hours). As the labor force participation rate in northeastern Arizona is lower than for the state as a whole, it is likely that the ratio of underemployed to unemployed may be even higher in this region.

Given, as noted above, that in 2017 there were approximately 2,100 unemployed people in Apache County approximately 3,100 people unemployed in Navajo County in 2017, there may be at least as many people under-employed in each county. In other words, there may be a total of approximately 4,200 people underemployed in Apache County and 6,200 underemployed in Navajo County, for a total of 10,400 people in the two county area.

Table 2-8: Unemployment and Underemployment in the US and Selected States, 2014-2017

Geographic Area	2017			2016			2015			2014		
	U-3	U-6	Ratio	U-3	U-6	Ratio	U-3	U-6	Ratio	U-3	U-6	Ratio
United States	4.4	8.5	1.93	4.9	9.6	1.96	5.3	10.4	1.96	6.2	12.0	1.94
Arizona	4.7	9.5	2.02	5.2	10.8	2.08	6.0	12.8	2.13	7.0	14.7	2.10
Nevada	5.0	10.8	2.16	5.9	12.2	2.07	6.9	13.9	2.01	7.7	15.3	1.99
New Mexico	6.1	11.3	1.85	6.8	12.6	1.85	6.8	12.6	1.85	7.0	13.2	1.89
Utah	3.4	6.9	2.03	3.6	7.5	2.08	3.6	7.5	2.08	3.9	8.2	2.10

Source: Bureau of Labor Statistics

Underemployment is more common amongst workers without a college degree. Workers without a high school diploma are nearly 1.8 times more likely to face underemployment than that of college-educated workers. Similarly, workers employed in low-skill jobs are 70 percent more likely to face underemployment than workers in high-skill jobs. Relatedly, frequency of part-time work and associated underemployment also varies by industry, with underemployment more frequent in the construction, trade, agricultural, extractive, and service industries. On the other hand, part-time work and associated underemployment is less common in manufacturing, public administration, transportation, utilities, communication, finance, insurance, and real estate. Black and Hispanic workers are more likely to face underemployment as compared with non-Hispanic whites (BLS, 2016). Hispanic workers are especially prone to involuntary part-time work, particularly foreign-born Hispanics, and in

particular those without citizenship (BLS, 2016). Much of this disadvantage is related to educational attainment.

Amongst those with a college degree, underemployment tends to be an issue with recent graduates or those new to the labor force. Sometimes this group of educated employees unable to find a job in their field is referred to as ‘well-educated baristas’ (CoBank, 2014). Regardless of the economy’s position in the business cycle, recent graduates have higher levels of underemployment (The FED). Field of study also affects a recent graduates’ underemployment level with engineering and health care majors experiencing lower rates of underemployment. In addition, high levels of cyclical unemployment often causes underemployment with unemployed workers taking available work in any industry during a recession even if the job isn’t in their respective field.

2.3 EMPLOYMENT AND INCOME

This section provides a summary of employment and income by source—focusing on private, public, and self-employed (proprietor) sources. This is followed by an analysis of employment and income by industry sector.

2.3.1 Employment and Income by Source

Table 2-9 summarizes total employment and average per capita income in the two counties. As shown in the table, estimates vary by government agency, due to different data sources and methods to estimate employment. According to the Bureau of Economic Analysis (BEA) in 2016 total full- and part-time employment, including self-employed workers and proprietors, was just over 42,100 jobs in Navajo County and over 28,400 jobs in Apache County. The Bureau of Labor Statistics (BLS) reports 2016 wage and salary employment (i.e., not including self-employed individuals) at nearly 38,000 for Navajo County and approximately 17,800 for Apache County. Per capita income in 2016 in Navajo and Apache counties was just under \$30,000. This compares to 2016 per capita income in the state and nation, respectively, of approximately \$40,400 and \$49,200.

Table 2-9: Summary of Employment and Income

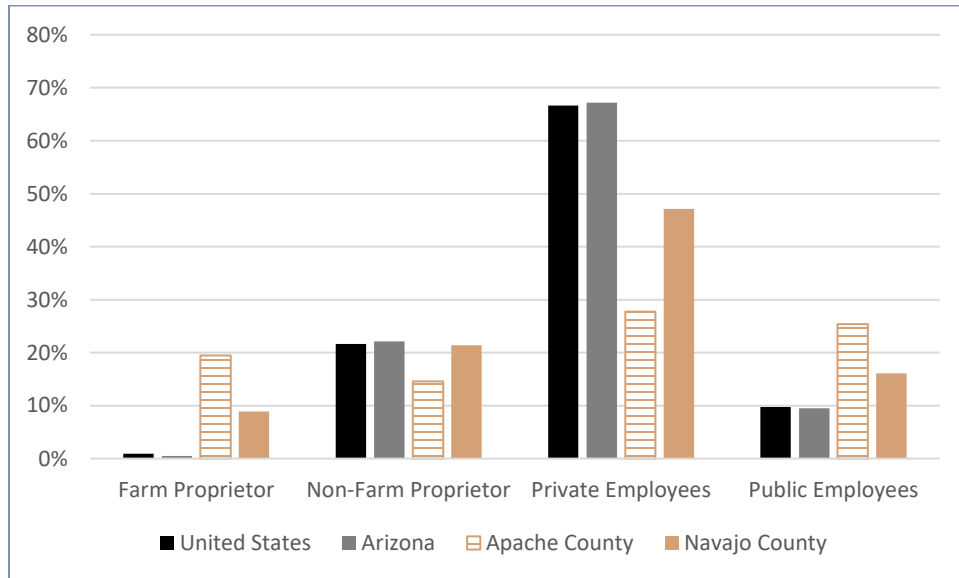
Geographic Area	Navajo	Apache
Wage and Salary Employment (BLS)	37,967	17,791
Wage and Salary Employment (BEA)	29,407	18,565
Total Employment, Including Self-Employed (BEA)	42,172	28,144
Per capita personal income (2016)	\$29,408	\$29,737

Sources: Bureau of Labor Statistics, Bureau of Economic Analysis

Northeast Arizona has much higher proportions of workers who are farm proprietors than the state or country as whole (which are very low), and also has a higher proportion of workers who are public employees. Apache County has especially high percentages in these two areas. The proportion of non-farm proprietors in Navajo County is similar to Arizona and the U.S., while Apache County’s is roughly one-third lower. The largest difference between the region and the state and country lies in the

percentage of private employees. Navajo County is about 20 percentage points lower, while Apache County is almost 40 percentage points lower.

Figure 2-4: Type of 2016 Employment



Source: Bureau of Economic Analysis Regional Accounts

Over the last decade, wage and salary employment in Navajo and Apache Counties has grown at total of 6 percent (approximately 0.7 percent annually), according to BLS data. Navajo County employment grew slightly from around 35,700 in 2007 to almost 38,000 in 2016. Apache County employment fell slightly from about 18,400 to 17,800 during this same time period.

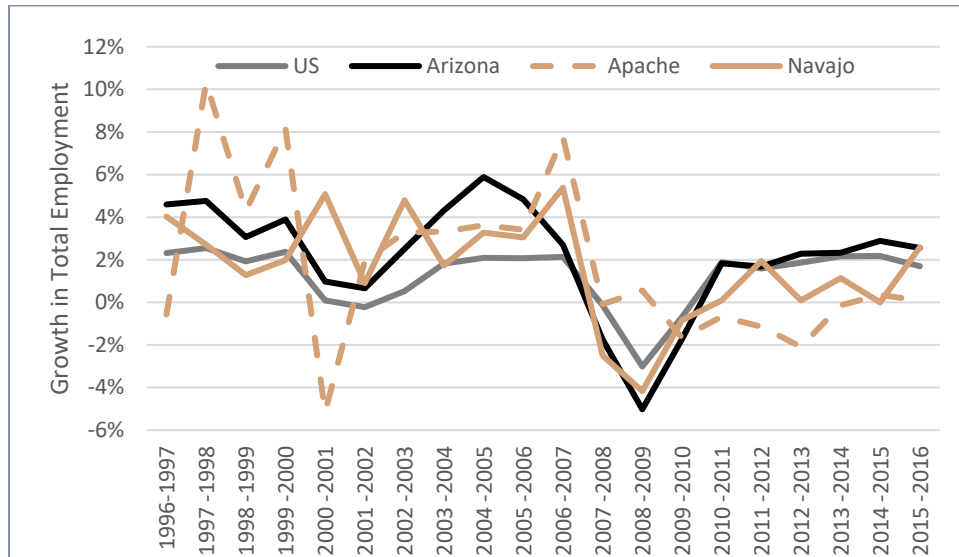
Using BEA data and looking further back over the last 20 years, total employment in Apache and Navajo Counties has generally grown. Navajo County only experienced a decline in employment from 2007 to 2011 during the Great Recession years. Since then, total employment in Navajo County has grown, although generally not as quickly as the state or the country. Since 2010, job growth in Navajo county has been between roughly zero and 2.6 percent.

Apache County has experienced much more volatility in total employment, with stronger growth prior to 2000, a sharp reduction in employment from 2000 to 2001, followed by a strong growth rate in 2006-2007 that was higher than the state or nation. At the beginning of the Great Recession, Apache County fared better than Arizona and nation, actually gaining jobs from 2007 to 2009. However, job losses came in the following years while Navajo County, the state, and the country were all seeing job growth. The most recent three years of data show generally stagnant job growth.

Figure 2-5 compares employment growth for non-farm proprietors, private employees, and public employees (we exclude farm proprietors as these grew at extremely high rates in Navajo and Apache Counties, but have very little income associated with this employment). As shown in this figure, while private employment in Northeast Arizona actually outpaced the nation between 2001 and 2016 (but with lower growth than the state) the region really lags the state and nation in terms of growth in non-

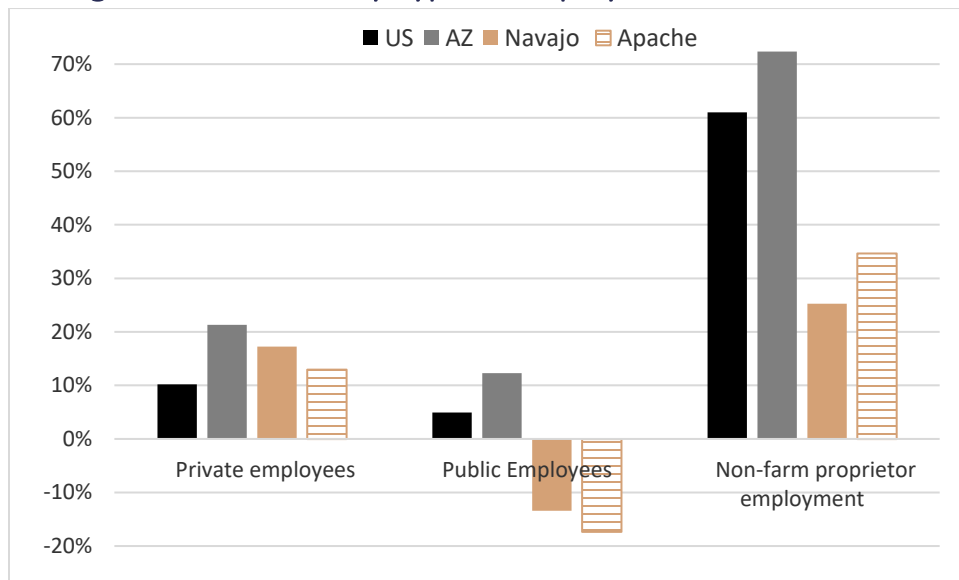
farm proprietors. This is an important data point for the region, as this group of self-employed entrepreneurs can be catalysts for growth.

Figure 2-5: Growth in Employment in the Region, State, and Nation



Source: (U.S. Bureau of Economic Analysis, 2017)

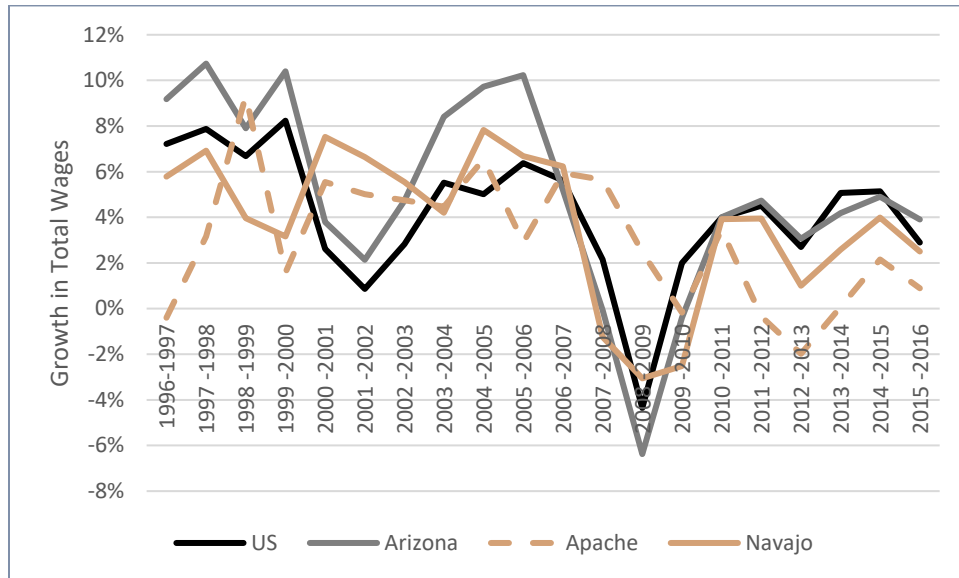
Figure 2-6: Growth by Type of Employment: 2001 to 2016



Similar to total employment, total wages and salaries in the region have generally grown over the last two decades (see **Figure 2-7**). For Navajo County, total wage income only fell between 2007 and 2010 during the Great Recession, which is similar to both Arizona and the U.S. as a whole. Apache County saw total wages decline from 1996 to 1997 and 2011 to 2013, again showing resilience during the beginning of the Great Recession but a slower recovery afterwards. On average in the last two decades, annual

growth in total wages in Apache and Navajo Counties (3.0 and 1.6 percent, respectively) has been much lower than the nation (4.1 percent) and the state (4.9 percent) (U.S. Bureau of Economic Analysis, 2017).

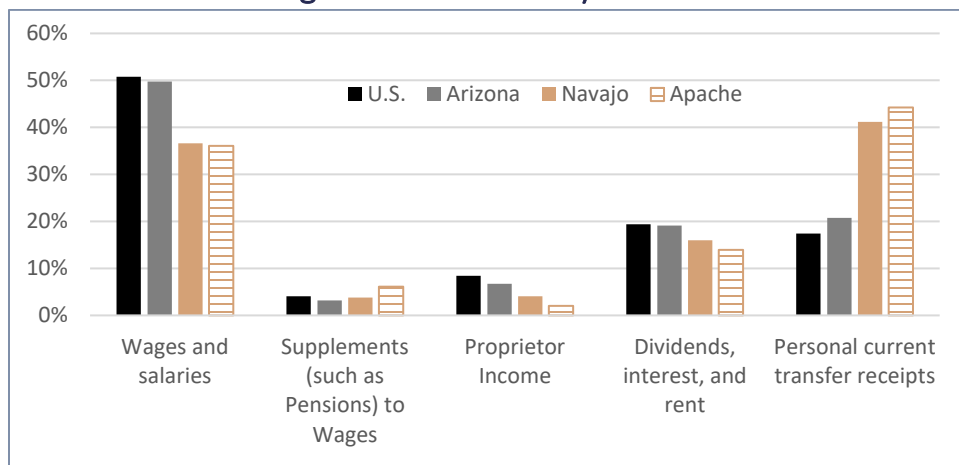
Figure 2-7: Growth in Total Wages in the Region, State, and Nation



Source: (U.S. Bureau of Economic Analysis, 2017)

Figure 2-8 highlights the proportion of income by component in the two county area compared to the state and nation. As highlighted in the figure, the region has a high proportion of income from transfer receipts (which are government programs, including Social Security, Medicare, Veteran’s benefits, and social assistance programs) and a low proportion of income from wages and salaries. This is similar to many other rural areas. Proprietor income and income from investments (dividends, interests, and rent) are also relatively low, indicating the relatively low presence of proprietors and investors.

Figure 2-8: Income by Source

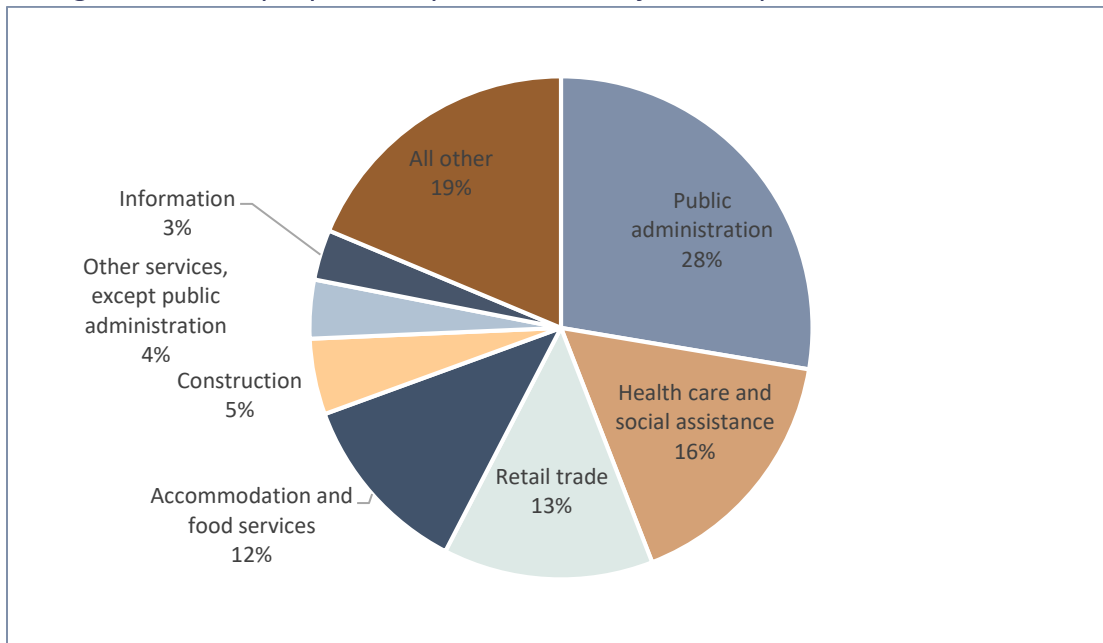


Source: Bureau of Economic Analysis Regional Accounts

2.3.2 Employment and Earnings by Industry

This section presents employment and earnings data by industry. The purpose is to identify the region's current economic strengths, and also to identify growing industries. **Figure 2-9** shows the composition of the region's economic base in 2016 (the last full year data are available from BLS) in terms of industry sectors, which represent general categories of economic activity. A sector is comprised of industries and firms that do similar work, make similar products, or provide similar services. Based on traditional industry sector definitions, the public administration sector provides the most jobs across the two-county region. Health care and social assistance, retail trade, accommodations and food services, and construction round out the top five leading industry sectors. Overall, the region's economy lacks balance, as nearly 75 percent of the employment is concentrated in these top employing sectors (Bureau of Labor Statistics, 2018). Diversity and balance of employment is important, as it provides resilience during economic downturns.³

Figure 2-9: Employment by Sector, Navajo and Apache Counties, 2016



2.3.3 Comparative Analysis of Employment

Comparative strengths of an economy can be measured based on the relative employment concentration in each industry relative to the United States as a whole (referred to as a location quotient – LQ—or employment concentration). Emerging economic sectors are also identified based on recent employment growth (measured in the following tables as the time period 2001 to 2016 based on BEA data, and in the following figures as the period 2008 to 2016 based on BLS data).

A high employment LQ indicates a specialization in that sector, industry or cluster when compared to the national average, and employment growth highlights growing demand for those industries or clusters. As shown in the BEA data in **Tables 2-10** and **Figure 2-10**, industry sectors that are more

³ By comparison, the top five employment sectors in the US represent 40 percent of total employment.

concentrated in Apache County relative to the nation are: farm employment (nearly all proprietor, but with very little income), utilities (nearly all power generation), and government. However, farm employment currently generates very little income in Apache County, government services employment is shrinking, and potential future downturns in the utility sector is the focus of this study. As such, the focus of Apache County should be on growing other sectors to diversify the economy. Growth is currently occurring in the following sectors (as measured by greater than 10 percent growth since 2001): health care and social assistance; transportation and warehousing; information; administration and support in waste management and remediation services; arts, entertainment and recreation; and accommodation and food services.

As highlighted in **Table 2-11** and **Figure 2-11**, Navajo County has a more diversified county. Sectors that are concentrated in Navajo County relative to the nation are forestry, farming (nearly all proprietor, but with very little income), government, retail trade, information, and accommodation and food services. Sectors with growth over 10 percent since 2001 include all those that are growing in Apache County.

Similar information (and conclusions) from BLS data are provided graphically in the bubble charts below (one for each county). The charts provide information on growth and concentration in each economic sector from the beginning of the Great Recession (2008) through 2016.

The following criteria will aid in interpretation of the charts below:

- The size of the bubble indicates the employment size (in number of jobs identified) for a particular sector.
- The horizontal axis indicates employment change over the period 2008-2016. The farther right the bubble is located, the greater the employment growth over this period (a bubble located at the intersection of indicates no change in employment status between the Great Recession (2008) and 2016.)
- The vertical axis indicates the 2016 concentration of the industry relative to the nation. The higher the bubble is located, the more concentrated the industry is compared to the nation (a bubble located at the intersection of the horizontal and vertical axes indicates no difference in concentration from the nation).

Sectors that have a high concentration and low employment growth (top left quadrant of the above graphs) are mature sectors in the region. These sectors have a strong presence in the two counties but have not recently experience any significant growth. In both counties, public administration (government employment) is the largest mature sector. In **Figures 2-10 and 2-11**, public administration has been excluded as it is not a focus of this study; concentration of public administration does generally not stimulate economic growth but is rather a result of economic growth. For Navajo County, additional mature sectors include mining and construction.

The sectors identified in the top right quadrant are important growth sectors for the region. These sectors have experienced growth recently and employ relatively more people than the nation as a

whole. For both counties, the utilities and health care sectors fall into this category to varying degrees.⁴ In Navajo County, additional important growth sectors include accommodations and food service, information, and retail trade.⁵ For Apache County, an additional important growth sector is mining, quarrying and oil and gas extraction.

The sectors identified in the lower right quadrants of the above graphs represent sectors with positive growth rates in employment since the beginning of the Great Recessions but are under-represented in the region (have low concentration of employment relative to the nation). These are considered possible emerging sectors in the region. In both counties the finance and insurance sector along with the administrative and waste services sectors are emerging. In Apache County additional emerging sectors are transportation and warehousing, agriculture and forestry, manufacturing, and information. An additional emerging sector in Navajo County is real estate (including rentals and leasing).⁶

BLS projects sector growth across the nation for the next decade (2016 – 2026). Five sectors are projected to have annual employment growth rates of more than one percent annually, including: mining, construction, professional and technical services, education services, and health care. The two-county region is well positioned to grow in both the health care/social services and construction sectors as these are two of the top five sectors in terms of employment in the region. Further, BLS projects only the manufacturing sector will have annual contraction in jobs across the nation.

⁴ The utility sector is not identified in the above figures due to the purpose of this study in addressing potential future losses in employment of these sectors regionally.

⁵ Manufacturing in Navajo County shows low concentration and under representation compared to the nation. However, within that sector the wood product manufacturing industry shows both growth and high concentration within Navajo County.

⁶ These data does not include employment for the New Life sawmill which just opened and would have moved the manufacturing bubble to the right on the graph.

Table 2-10: Employment Growth and Concentration in the Region vs. the Nation and State: Apache County

Description	US	Arizona		Apache County					
	% Growth since 2001	% Growth since 2001	LQ	Jobs 2001	Jobs 2016	% 2016 Jobs	% Jobs Growth since 2001	Jobs LQ	% 2016 Earnings
Farm Employment (proprietor)	-14%	53%	0.7	516	5,485	19%	963%	14.3	0%
Forestry, fishing, and related activities	14%	-11%	0.9	(D)	217	1%	N/A	1.6	0%
Mining, quarrying, and oil and gas extraction	75%	71%	0.8	(D)	185	1%	N/A	0.9	1%
Utilities ¹	-2%	16%	1.1	238	788	3%	231%	9.0	1%
Construction	3%	-13%	1.0	1,164	600	2%	-48%	0.4	1%
Manufacturing	-23%	-17%	0.7	610	355	1%	-42%	0.2	1%
Wholesale trade	11%	12%	0.9	208	(D)	N/A	N/A	N/A	N/A
Retail trade	6%	23%	1.1	1,533	1,375	5%	-10%	0.5	3%
Transportation and warehousing	31%	48%	0.9	309	592	2%	92%	0.6	3%
Information (primarily telecommunications)	-17%	-10%	0.9	156	178	1%	14%	0.4	1%
Finance and insurance	27%	51%	1.2	(D)	200	1%	N/A	0.1	0%
Real estate and rental and leasing	62%	69%	1.3	663	621	2%	-6%	0.5	0%
Professional, scientific, and technical services	33%	41%	0.9	331	397	1%	20%	0.2	1%
Management of companies and enterprises	40%	69%	0.8	0	0	0%	0%	0.0	0%
Administrative and support and waste management and remediation services	24%	27%	1.3	374	517	2%	38%	0.3	1%
Educational services	57%	148%	0.9	744	619	2%	-17%	0.9	2%
Health care and social assistance	44%	77%	1.0	1,199	2,780	10%	132%	0.9	13%
Arts, entertainment, and recreation	37%	45%	1.0	157	208	1%	32%	0.3	0%
Accommodation and food services	33%	35%	1.1	1,023	1,371	5%	34%	0.7	2%
Other services (except public administration)	25%	38%	0.9	689	733	3%	6%	0.4	2%
Government and government enterprises	5%	12%	1.0	13,095	10,820	38%	-17%	3.1	61%

Source: Bureau of Economic Analysis Regional Accounts. Note that some jobs data are from other years than 2001 to 2016, as sometimes data in those years were not disclosed by BEA due to confidentiality reasons.

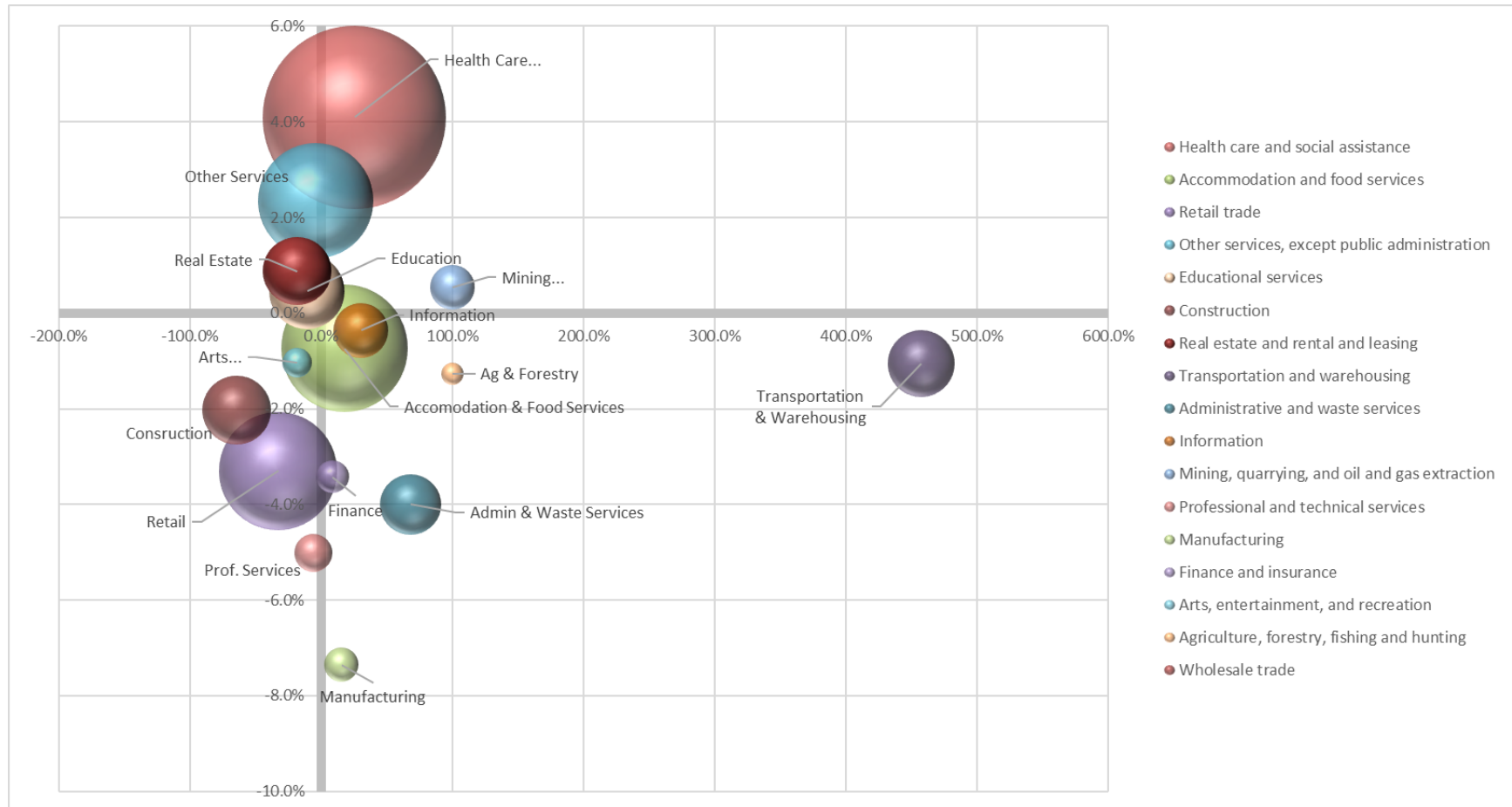
1/ Note that 2016 data come from the BLS Quarterly Census of Employment and Wages.

Table 2-11: Employment Growth and Concentration in the Region vs. the Nation and State: Navajo County

Description	US	Arizona		Navajo County					
	% Growth since 2001	% Growth since 2001	LQ	2001	2016	% 2016 Jobs	% Growth since 2001	Jobs LQ	% 2016 Earnings
Farm Employment	-14%	53%	0.7	556	3,950	9%	610%	6.9	0%
Forestry, fishing, and related activities	14%	-11%	0.9	317	281	1%	-11%	1.4	1%
Mining, quarrying, and oil and gas extraction	75%	71%	0.8	896	535	1%	-40%	1.7	3%
Utilities	-2%	16%	1.1	74	118	0%	59%	0.9	1%
Construction	3%	-13%	1.0	2,534	2,397	6%	-5%	1.1	7%
Manufacturing	-23%	-17%	0.7	1,034	573	1%	-45%	0.2	1%
Wholesale trade	11%	12%	0.9	421	595	1%	41%	0.4	1%
Retail trade	6%	23%	1.1	4,561	5,026	12%	10%	1.2	8%
Transportation and warehousing	31%	48%	0.9	1,289	1,352	3%	5%	0.9	8%
Information (primarily telecommunications)	-17%	-10%	0.9	568	1,104	3%	94%	1.5	5%
Finance and insurance	27%	51%	1.2	771	874	2%	13%	0.4	1%
Real estate and rental and leasing	62%	69%	1.3	1,153	1,638	4%	42%	0.8	1%
Professional, scientific, and technical services	33%	41%	0.9	922	1,084	3%	3%	0.4	2%
Management of companies and enterprises	40%	69%	0.8	235	184	0%	0%	0.3	1%
Administrative and support and waste management and remediation services	24%	27%	1.3	811	1,247	3%	54%	0.5	2%
Educational services	57%	148%	0.9	641	867	2%	35%	0.8	2%
Health care and social assistance	44%	77%	1.0	2,428	4,402	10%	81%	0.9	14%
Arts, entertainment, and recreation	37%	45%	1.0	507	571	1%	13%	0.6	0%
Accommodation and food services	33%	35%	1.1	2,837	3,621	9%	28%	1.2	5%
Other services (except public administration)	25%	38%	0.9	1,859	2,030	5%	9%	0.8	3%
Government and government enterprises	5%	12%	1.0	11,232	9,723	23%	-13%	1.8	35%

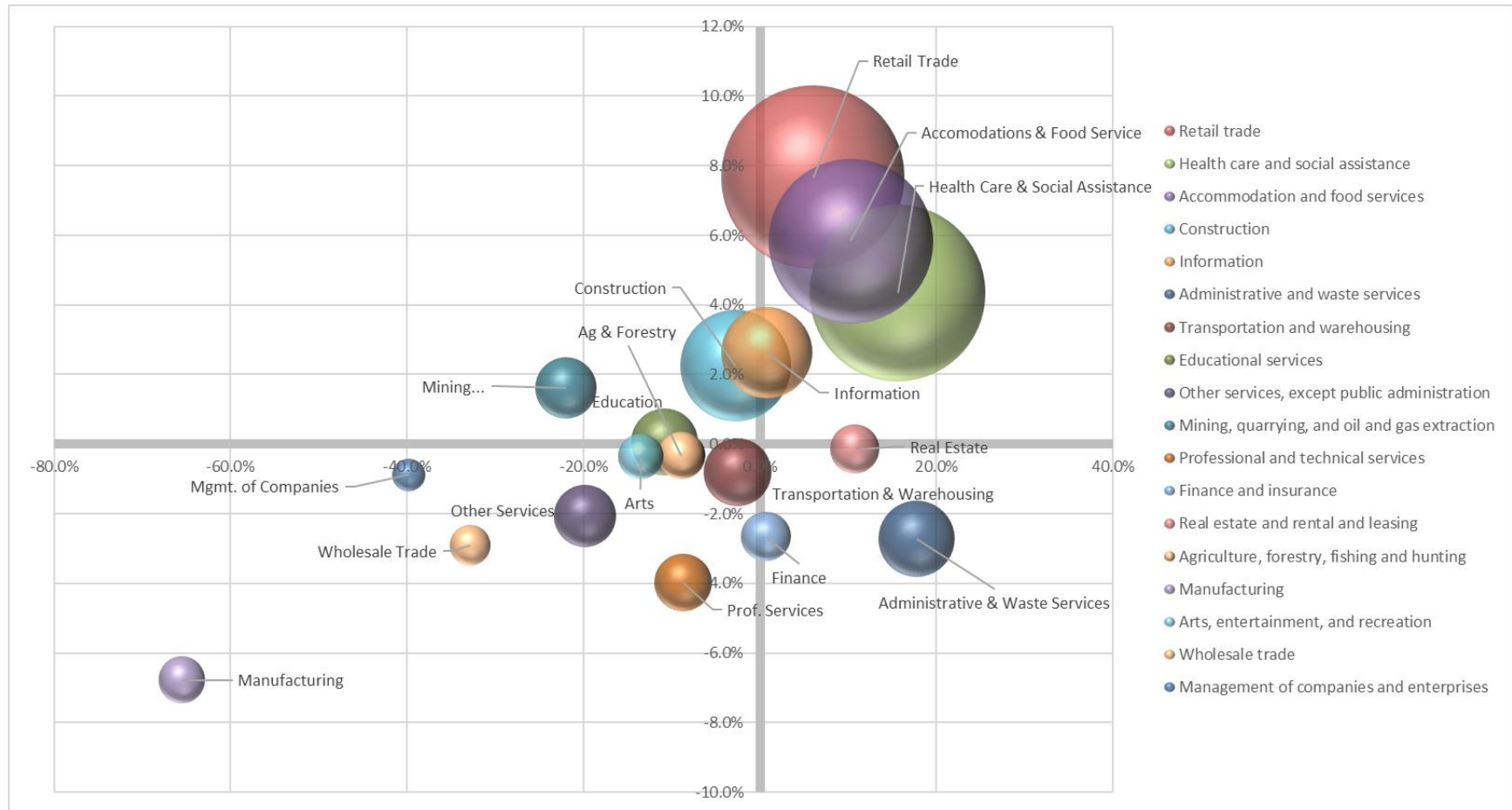
Source: Bureau of Economic Analysis Regional Accounts

Figure 2-10: Comparative Analysis, Apache County, 2008-2016



Source: (Bureau of Labor Statistics, 2018)

Figure 2-11: Comparative Analysis, Navajo County, 2008-2016



3 ECONOMIC IMPACTS OF COAL MINING AND COAL-FIRED POWER GENERATION

As highlighted in the previous section, the utility sector (and in particular, coal-fired power generation) as well as coal mining, have been an economic strength in Northeast Arizona. These industries have provided the area with a consistent level of high-paying jobs. They have also supported county governments and public services in the area through sales taxes of purchases and a steady property tax contribution due to the high value of infrastructure associated with power generation.

This section reviews and builds upon existing economic impact analyses to estimate the economic impacts of current and potential future changes in power plant activity and coal mine production in Northeast Arizona. The assessment provides information on the direct economic impacts in these sectors, and also estimates how this reduction in economic activity translates into total job and income impacts on the regional economy (including direct, indirect, and induced impacts). This section also provides discussion on the level of certainty of estimates.

Quantifying the current contribution of coal-related industries, particularly in the context of the size of the regional economy, helps to ‘diagnose’ the level of reliance on these industries in Northeast Arizona. This, in turn, will inform the level and type of response required to mitigate potential downturns in this sector in the future. A key purpose of the Assistance to Coal Communities (ACC) initiative is to help communities that have historically coal-dependent economies adapt to change in evolving energy markets. This assessment focuses on the effects of power plant downsizings/shutdowns and consequent reduction in regional coal demand. However, as discussed in later sections of this report, changes in energy markets also may present opportunities for Northeast Arizona in the renewable energy sector.

As discussed in the previous section, even before a downturn in coal mining and coal-fired power generation, much of Northeast Arizona has historically experienced relatively high unemployment and poverty levels. Thus, the current and potential future adverse impacts related to coal that are highlighted in this chapter are compounding existing economic challenges (unrelated to coal mining and power generation).

Key findings include:

- 1) **Direct employment and income in the coal mining and power generation sectors in the two county region is currently estimated at approximately 1,170 jobs and \$151.8 million in employee compensation (including wages and benefits) annually.** For Apache County, there are an estimated 650 jobs and \$83.6 million in employee compensation, representing 3.6 percent of county employment and 3.8 percent of total county personal income (including non-wage income). For Navajo County, there are an estimated 520 jobs and \$68.2 million in employee compensation, representing approximately 1.4 percent of county employment and 2.1 percent of county personal income. Approximately 30 percent of employee compensation is benefits (pensions, medical insurance, and payroll taxes paid by the employer); after accounting for this portion, average wages in the coal mining and power generation sectors are approximately \$91,000 annually. This is more than three times higher than the \$28,100 in average annual wages per job in Apache County and \$28,800 in average annual wages per job in Navajo County.

- 2) **Total employment supported is estimated to range from approximately 2,200 to 4,300 jobs, with approximately 55 percent of these jobs in Apache County and 45 percent in Navajo County. Total income impacts are estimated to range from approximately \$215 million to \$365 million, with approximately half of this income in Apache County and half in Navajo County.** This represents approximately three to five percent of the Navajo County economy, and approximately four to eight percent of the Apache County economy. However, impacts are not evenly distributed throughout the counties – the Reservations and communities immediately surrounding the power plants and mine will be much more significantly impacted.
- 3) **Current tax receipts to all levels of local and tribal government from the power plants and mine are estimated to be at least \$69 million annually.** Of this an estimated \$9.4 million supports public entities in Navajo County, at least \$19 million supports public entities in Apache County and approximately \$40 million supports Navajo/Hopi tribal governments.

3.1 REDUCED POWER GENERATION & COAL DEMAND IN NORTHEAST ARIZONA

There are three coal-fired power generating plants in Northeast Arizona: Cholla Power Plant (Navajo County), Springerville Generating Station (Apache County), and Coronado Generating Station (Apache County). Kayenta Mine is located on Reservation lands in Navajo County. Coal from Kayenta Mine is used at Navajo Generating Station, which is located in neighboring Coconino County. Prior to the 2016 partial shut-down at Cholla of Unit 2, the combined capacity of these four generating plants was 4,238 MW, as summarized in **Table 3-1**. Total combined capacity now at the three power plants is 4,010 MW (shutting down Unit 2 at Cholla removed 228 MW of capacity). This section describes the change in current and future production from coal-fired power plants, and associated demand for coal, in Northeast Arizona.

The timing of shut-downs, or partial shut-downs, vary by power plant and coal mine. The first power plant in the region to be affected by a partial shut-down was Cholla Power Plant. In 2016, the plant's owner, Arizona Public Service (APS), shut down Unit 2 of the plant (with 305 MW of capacity). APS has noted that the future of Cholla is uncertain given the economics of cheap natural gas and the environmental regulations on air emissions that affect when and how coal-burning plants operate. While the plant has a coal contract through 2025, APS has indicated that the operation of the remaining units at Cholla is not guaranteed through 2025.

Kayenta Mine in Navajo County is expected to cease operating when Navajo Generating Station (NGS) shuts down, as NGS is the only customer for the coal from the mine. The current operator of the NGS is preparing to close it in December 2019. So unless the Navajo Nation finds a new buyer for NGS or the Kayenta mine finds a new buyer for its coal, both of which appear unlikely, the Kayenta mine will cease operation in December 2019. A 2017 report found that, due to declining demand for coal, the Kayenta mine is not likely to find new customers or markets once NGS closes (Institute for Energy Economics and Financial Analysis, 2017). Shutdown of Navajo Generating Station and Kayenta Mine will particularly affect the Navajo Reservation and the Hopi Reservations. The vast majority (up to 90 percent) of Navajo Generation Station employees are Navajo (Salt River Project, n.d.), and the mine supplying the power station, Kayenta Mine, is located on Reservation lands and supports tribal employment as well as tribal government revenues.

For Coronado and Springerville generating stations in Apache County, there is no imminent closure. Both generating stations say that they have no plans for reduced operations anytime in the near future. (Note: as an increased economic opportunity, the fly ash waste product from burning coal is not currently marketed or used by Springerville, indicating a potential opportunity for the local material or construction industry.)⁷ However, given the accelerating pace of coal-fired power plant shutdowns throughout the Western United States, environmental regulations on emissions from fossil fuels, and the continued low price of alternative energy sources (including natural gas and renewable energy), it is wise for the region to start planning now for reduced coal power plant activity as economic development and diversification take time and planning.

Although the focus of this analysis is Northeast Arizona, it is important to note that similar power plant shutdowns, and associated adverse economic impacts, are occurring elsewhere within the broader Four Corners region. Partial shutdowns are occurring in Northwest New Mexico at two large coal-fired power plants, San Juan Generating Station and Four Corners Power Plant. These shutdowns will result in reduced generation capacity in the region by one-third to 2,606 MW (a reduction of 865 MW). The rest of the San Juan Generating Station may shut down as early as 2022 (a further reduction of 847 MW), while the coal contract for Four Corners Power Plant expires in 2031, which may mark the end of operations for the remaining 819 MW there.

⁷ Fly ash, a by-product of burning pulverized coal, is a fine powder that is rich in alumina and silica. The use of fly ash is predominantly in the material and construction industry: bricks, portland cement and engineering fills. The global fly ash market is expected to grow markedly through 2025, both in terms of value and volume.

Table 3-1: NE Arizona Coal-Fired Power Plants/Coal Mines

Plant	Location	Capacity (MW or Tons)
Power Plants		
Navajo County		
Cholla Power Plant (Post-Shut down of Unit 2)	Joseph City, AZ	855 MW
Apache County		
Coronado Generating Station	St. Johns, AZ	1,560 MW
Springerville Generating Station	Springerville, AZ	1,683 MW
<i>Subtotal, Apache County</i>		<i>3,243 MW</i>
Total, Northeast Arizona		4,098 MW
Coconino County		
Navajo Generating Station	Page, Arizona	2,250 MW
Coal Mines		
Navajo County		
Kayenta Coal Mine	Kayenta, AZ (Tribal lands)	6.2 million tons ¹

Note: Totals may not sum due to rounding.

1/ Coal mined in 2017 (Peabody, 2018).

3.2 ECONOMIC IMPACTS OF COAL MINING AND COAL-FIRED POWER GENERATION IN NORTHEASTERN ARIZONA

This section describes the current level of employment and income at coal mines and coal-fired power plants in the two-county area. After describing the direct changes in employment and income at coal mines and coal-fired power plants in Northeast Arizona, this report provides a review of existing studies of the total economic impacts, including ripple effects, of power plant generation and coal mining activities in Arizona and elsewhere in the Four Corners region. Economic impacts are modeled using an IMPLAN model of the regional economy. To the extent feasible, this analysis also presents the distribution of these impacts amongst the two counties in the region.

3.2.1 Direct Employment and Income Impacts in Coal and Coal-Power Generation Sectors

As of December 2017, there were approximately 170 APS employees at the Cholla Power Plant. However, there are also approximately 25 support workers in accounting, supply chain, and transportation (many of whom may be located elsewhere), as well as between 30 to 70 contractors working on-site doing such activities as maintenance support and cleaning (Nicosia, 2017). These contract workers are included in the indirect and induced impacts described in the next section below. Data on employment at Coronado Generating Station and at Springerville Generating Station are from an Arizona State University study of the economic contribution of these power plants, as well as personal communication with plant managers (Evans & James, 2014; Davis & Fahey, 2017; Navarro & Biever, 2017). Employment at Kayenta Mine is from the Peabody website, and is cited as 2018 employment (Peabody, 2018).

Data for employee compensation is less certain than total employment data. The Arizona State University study of Coronado and Springerville generating stations included data on employee compensation, while income data for Cholla is from a 2014 news article (Pinnacle West, 2014). Data for Kayenta employee compensation is based on the employee compensation per job reported in a different Arizona State University study that analyzed the economic contribution of the Navajo Generating Station and the Kayenta Mine (Evans, James, Gamez, & Madly, 2013). We used these data, adjusted for inflation, and cross checked with information on wages and salaries in these industries published by the Bureau of Labor Statistics. These wage rates are considerably higher than average wages in other industries in the two-county region.

As shown in **Table 3-2**, in Navajo county, there were an estimated 350 jobs in 2017 at Kayenta Mine and an average of 170 jobs (APS employees not including contract workers) at Cholla Power Plant. Annual wages and salaries of Kayenta Mine employees are estimated to average approximately \$97,000 per employee, with total annual compensation package including all benefits estimated at approximately \$138,000 per employee. Average annual wages of Cholla Power Plant employees are estimated at approximately \$84,000 per job, with a total annual compensation package of approximately \$121,000 per employee. At Springerville and Coronado generating stations in Apache County, employment is estimated at approximately 650 jobs, with average annual wages per job estimated at approximately \$90,000 (and annual total compensation at approximately \$129,000 per employee).

Table 3-2: NE Arizona Coal-Fired Power Plants/Coal Mines

Site	Jobs	Total Employee Compensation ¹ 2018\$	Average Compensation ¹ / Job	Estimated Average Wages / Job
Navajo County				
Cholla Power Plant	170	\$20.0	\$120,600	\$84,400
Kayenta Mine	350	\$47.7	\$138,300	\$96,800
<i>Subtotal</i>	<i>520</i>	<i>\$68.2</i>	<i>\$132,400</i>	<i>\$92,700</i>
Apache County				
Coronado Generating Station	430	\$27.0	\$122,800	\$86,000
Springerville Generating Station	220	\$56.6	\$131,500	\$92,000
<i>Subtotal</i>	<i>650</i>	<i>\$83.6</i>	<i>\$128,600</i>	<i>\$90,000</i>
Total	1,170	\$151.8	\$130,300	\$91,100

Sources: Personal communication with Springerville Power Plant and Coronado Power Plant (2018), and Peabody (2018), Arizona State University (2013), Arizona State University (2014), (Pinnacle West, 2014)

1/ Total compensation includes fringe benefits such as pension plans, health insurance, and contributions to social insurance programs (such as social security and Medicare) on behalf of employees. In order to estimate the average salary or wage rates, we assume 30 percent of total employee compensation is benefits.

3.2.2 Total Regional Employment and Income Impacts

In addition to direct jobs and income at the mine and power plant, coal mining and power generation support economic activity in other sectors of the economy. For example, coal mines and power plants purchase goods and services such as equipment, fuel, maintenance and repair services. Such purchases increase economic activity in other sectors, supporting additional, indirect job and income. Employees of

both directly and indirectly impacted sectors then re-spend their earnings on household goods and services, such as housing, food, retail stores, and entertainment. These purchases by households generate additional economic activity, known as induced economic impacts. In sum, the direct, indirect, and induced impacts comprise the total economic impact of the production at coal mines and power generation plants. The relationship between the direct economic impact and the total economic impact is often referred to as the multiplier. For example, if one job in coal mining supports 1.5 other jobs in other economic sectors, for total jobs of 2.5, then the employment multiplier is 2.5 for coal mining (2.5 jobs supported in total for every job in the coal mining sector).

Total economic impacts are often mistakenly believed to be solely based on the size of the industry or industries under consideration (in this case, coal mining and power generation). While it is true that the direct economic impacts are determined by the level of direct industry production in coal mining and power generation, the ripple effects and impacts in other economic sectors are determined by the size, structure, and diversity of the local economy. In general, the greater the extent to which the local economy is diverse and self-dependent, the greater the multiplier effect throughout the local economy. In other words, the more that a local area can supply its own needs versus importing goods, labor, or services from elsewhere, the less “leakage” of dollars and economic benefit to other areas there will be.

Thus, the total economic impact depends on the following variables:

1. Magnitude of direct economic activity in coal mining and power generation (determines size of direct economic impact);
2. Proportion of coal and power generation inputs (including materials, services, and labor) that are purchased from local households and businesses versus imported from other areas (determines size of indirect economic impact); and,
3. Ability of the local economy to meet other local business and household needs, including those related to retail purchases, wholesale trade, services, banking, and insurance (determines size of indirect and induced economic impacts).

In interpreting economic impact information, particularly indirect and induced impacts, it is very important to realize that the job and income impacts estimated are not likely to be permanent, long-term losses. Rather, these are jobs and income that are currently supported by economic activity associated with coal mining and electric power generation. To the extent that people can adjust by: a) establishing new businesses, b) finding other, productive work (albeit likely, at least in the short-term, less appealing in terms of compensation), or c) increasing demand for their current services from other sources or markets, the job and income impacts will not be as severe as estimated.

A final cautionary note: total economic impact estimates are based on models of the size and inter-relationships in local economies, including estimates of the average proportion of spending that goes to local businesses and households. Many of the data in these models are derived, and as such, there is a fairly high degree of uncertainty associated with total economic impact results. This is highlighted in the first section below that presents some results from previous studies in the region.

Following this review of previous studies, this section discusses estimates of the potential total economic impact of projected reductions in coal mining and power generation in Northeast Arizona.

3.2.2.1 Previous Studies

The energy and mining sector in the Four Corners region has been the subject of a number of economic studies. We found eight studies completed in the last decade that are particularly pertinent; these studies are summarized in **Table 3-3**. The studies include both *ex ante* and *ex post* analyses; some estimating economic impacts that had already occurred and others projecting economic impacts that would happen in the future if activities continue or projects are completed. The studies include examinations of specific power generation facilities (including the Navajo Generating Station and the Four Corners Power Plant), specific mines (including the Kayenta and Navajo coal mines), and entire industries, such as the mining industry in Arizona. This section presents these results to highlight how estimated multiplier effects vary significantly across studies, indicating that there is uncertainty in how changes in mining and power generation activities translates into total economic impacts.

First, in comparing economic impact estimates, it is important to understand that results are expected to differ depending on geographic area analyzed. Geographic areas analyzed vary, with some studies focusing on specific counties or Indian Reservations and some studies focusing on statewide impacts. In general, the larger the economic area analyzed, the larger the expected multiplier (as a larger economic area typically has a larger and more diverse economy with less “leakage” or imports from other areas). As observed in a 2014 study of the Coronado Generating Station, job multipliers were estimated at 3.8 for Apache County but at the state level were estimated at 5.5 (i.e., for every job at Coronado, there were 2.8 other jobs supported elsewhere in Apache County, and an estimated 1.7 other jobs supported in the state, for a total of 5.5 jobs supported statewide) (Evans & James, 2014). This implicitly indicates that a sizable portion of the materials and services that are purchased by the power plant and its suppliers/workers come from elsewhere in Arizona, supporting an additional 1.7 jobs elsewhere in Arizona for every 3.8 jobs supported in A County.

However, even for the same geographic area, studies of similar types of economic activity provide very different multiplier estimates. For example, the finding from the 2013 study of the Navajo Mine that the job multiplier is 4.0 for all areas in the State of New Mexico is 67 percent higher than the finding of a 2009 study of coal mining throughout New Mexico that estimated a state-wide job multiplier of 2.4 (Peach, Delgado, & Starbuck, *The Economic Impact of Oil and Gas Extraction in New Mexico*, 2009; Peach & Starbuck, *The Economic Impact of Coal Mining in New Mexico*, 2009). Similarly, findings regarding the income multiplier also differed, though not quite as drastically. The 2013 study of the Navajo Mine found a statewide income multiplier of 2.1, which is 40 percent higher than the finding from the 2009 study that estimated a statewide income multiplier from coal mining of 1.5. Both of these studies used the same modeling data and software (from IMPLAN) to model impacts.

In sum, in comparing the multipliers from past studies, there is fairly extensive variability among studies, especially in the jobs multiplier. We focus on the economic impact studies of county-level impacts, and use a conservative range of multiplier values (shown in bold in **Table 3-3**) to estimate the likely range of total economic impacts supported by the three power plants and Kayenta Mine.

**Table 3-3: Review of Previous Economic Impact Studies of Four Corners
Coal Mining and Coal-Fired Power Plants**

Analyzed Economic Activity	Geographic Scope of Economic Impact	Multipliers		Source
		Job Multiplier	Income Multiplier	
Coal-Fired Power Generation				
Fossil Fuel Power Generation	Apache County	1.9	1.3	2016 IMPLAN multiplier data
Navajo Generating Station	Navajo Nation	1.4*; 3.4	1.1*; 1.9	Evans <i>et al.</i> Arizona State University, (2013a) ¹
Coronado Generating Station	Apache County	3.8	1.9	Evans <i>et al.</i> Arizona State University, (2014) ¹
Coronado Generating Station	State of Arizona	5.5	2.6	
Springerville Generating Station	Apache County	5.8	2.4	
Springerville Generating Station	State of Arizona	8.4	3.4	
FCPP (Units 1-5 in operation)	State of New Mexico	2.9	1.5	Evans <i>et al.</i> Arizona State University, (2013b) ²
FCPP (Units 1-5 in operation)	San Juan County	2.7	1.4	
Estimated Multiplier Range for Power Plants	Navajo County / Apache County	1.9 – 3.8	1.3 – 2.4	Estimate, based on above range of values
Coal Mining				
Coal Mining	Navajo County	2.0	1.4	2016 IMPLAN multiplier data
Kayenta Mine	Navajo Nation	1.9*; 3.5	1.2*; 1.9	Evans <i>et al.</i> Arizona State University, (2013a) ¹
Non-Copper Mining (primarily coal)	State of Arizona	5.1	2.4	Arizona State University (2011)
Coal Mining	State of Arizona	N/A**	3.8	National Mining Association (2015)
Coal Mining	State Average for the 50 States	3.3	2.8	National Mining Association (2015)
Coal Mining	State of NM	2.4	1.5	Peach and Starbuck (2009)
Navajo Mine (Units 1-5 in operation)	State of NM	4.0	2.1	Evans <i>et al.</i> Arizona State University, (2013b) ²
Navajo Mine (Units 1-5 in operation)	San Juan County	3.0	1.7	
Estimated Multiplier Range for Kayenta Mine	Navajo County / Apache County	1.9 – 3.5	1.7 – 2.4	Estimate, based on above range of values

¹ Findings list the projected impacts in 2020 for the Navajo Generating Station and the Kayenta Mine combined

² Findings list the impacts for the Four Corners Power Plant and Navajo mine combined

* This is the multiplier excluding effects associated with mine production royalties and taxes paid to the Navajo Nation.

**The values in this report implied a multiplier of 7.8, which is very high; this value may have included the impact associated with power plant generation, or may have been an error.

3.2.2.2 Estimated Total Economic Impacts

Table 3-4 summarizes the potential regional economic impacts to the two-county economy of the three coal-fired power plants and the Kayenta Mine in Northeast Arizona. Total economic impacts are based on the multiplier range shown in **Table 3-3**. As shown in the table, a range of impacts are estimated based on a combination of new analysis conducted for this study (using a 2016 IMPLAN model of the region) as well as findings from previous studies. **Total employment supported is estimated to range from approximately 2,200 to 4,300 jobs, with approximately 55 percent of these jobs in Apache County and 45 percent in Navajo County. Total income impacts are estimated to range from approximately \$215 million to \$365 million, with approximately half of this income in Apache County and half in Navajo County.** This represents approximately three to five percent of the Navajo County economy, and approximately four to eight percent of the Apache County economy. However, impacts are not evenly distributed throughout the counties – the Reservations and communities immediately surrounding the power plants and mine will be much more significantly impacted.

Table 3-4: Summary of Economic Impacts of Coal Mining and Coal-Fired Power Plants: Apache and Navajo Counties

Power Plant / Mine	Direct Jobs/Income		Total Economic Impact Apache/Navajo Counties				Total Impacts, % County Economy			
	Jobs	Income (Millions 2018\$)	Jobs		Income (Millions 2018\$)		Jobs		Income (Millions 2018\$)	
			Low	High	Low	High	Low	High	Low	High
Navajo County										
Cholla Power Plant	170	\$20.5	323	646	\$26.7	\$49.2	1%	2%	1%	2%
Kayenta Mine	345	\$47.7	656	1,208	\$81.1	\$114.5	2%	3%	3%	4%
<i>Subtotal</i>	<i>515</i>	<i>\$68.2</i>	<i>979</i>	<i>1,854</i>	<i>\$107.8</i>	<i>\$163.7</i>	<i>3%</i>	<i>5%</i>	<i>3%</i>	<i>5%</i>
Apache County										
Coronado Power Plant	220	\$27.0	418	836	\$35.1	\$64.8	2%	5%	2%	3%
Springerville Power Plant	430	\$56.6	817	1,634	\$73.5	\$135.7	5%	9%	3%	6%
<i>Subtotal</i>	<i>650</i>	<i>\$83.6</i>	<i>1,235</i>	<i>2,470</i>	<i>\$108.6</i>	<i>\$200.5</i>	<i>7%</i>	<i>14%</i>	<i>5%</i>	<i>9%</i>
Total, 2-County Area	1,165	\$151.8	2,214	4,324	\$216.4	\$364.3	4%	8%	4%	7%

3.3 DIRECT FISCAL IMPACTS ON LOCAL, TRIBAL, AND STATE GOVERNMENTS

This section examines the direct fiscal impacts on local governments from Cholla, Springerville, and Coronado power plants and the Kayenta Mine. The power plant and mine owners pay taxes to Apache and Navajo counties, and to other local jurisdictions, which include school, community college, public health, library, flood, and fire districts. The direct fiscal impacts are the taxes paid to these entities, which consist primarily of property taxes at the local level, as well as sales taxes and Transaction Privilege Taxes (TPT) at the state level. For facilities that are expected to close in the near future, such as the Kayenta Mine, these direct impacts represent an impending loss to local jurisdiction budgets. For facilities that are not expected to close in the foreseeable future, such as the Springerville and Coronado Generating Stations, the direct fiscal impacts reveal the level of dependency of these local jurisdictions on these facilities.

In addition to these direct impacts, it is also important to note that these facilities support other, indirect taxes. These taxes are generated through the plants' purchase of goods and materials, and property and sales taxes paid by plant employees who live and spend money in the local area. For any employees who do not find alternative sources of income and any suppliers that do not find replacement sources of demand, the indirect taxes from these sources would decline with decreased economic activity in the energy sector.

Direct fiscal impacts are based on existing analyses, as well as personal communication with the counties and property tax records provided by Apache County. Direct sales tax benefits to the county were only available for Kayenta Mine, so are underestimated for other entities. As laid out in the section below, direct fiscal impacts related to property taxes, royalties, and sales tax reductions are projected, at a minimum, to be as follows:

- **Navajo County:** Cholla's closure would result in approximately \$7.5 million in reduced property tax revenue for the County and local taxing districts. The largest losses would be to the Joseph City School District, the Northland Pioneer Community College, and the County. These jurisdictions will lose roughly 12 percent of their property tax revenue. In addition, if people leave the area due to reduced employment opportunities, and school enrollment falls, Joseph City School District could lose additional funding. The County estimates that closure of the Kayenta Mine would result in the further loss of \$1.9 million in tax revenue to the County, which, along with Cholla's closure, would represent a combined loss of approximately \$9.4 million to Navajo County taxing entities.
- **Apache County:** Based on tax records provided by the county, it appears that the Coronado and Springerville Generating Stations provide the County and its local jurisdictions at least \$19 million in tax revenue annually. In 2014, ASU estimated that the plants represent about 56 percent of Apache County's property value, 75 percent of St. Johns Unified School District's property value, 38 percent of the White Mountain Health Care District's property value, and 66 percent of Round Valley Unified School District's property value.
- **Tribes:** The Kayenta Mine and associated power generation generate roughly two-thirds to over three-quarters of the Hopi Tribe's annual tax revenues, equating to \$12 million or more annually (Craft, 2018; Randazzo, 2017; Rainey, 2017). Kayenta Mine provided the Navajo Nation with

approximately \$37.7 million⁸ in royalties and taxes in 2011. The mine also supports approximately 400 tribal jobs and \$39.6 million⁹ in annual wages. These impacts would compound the concurrent adverse impacts from other regional mine and power plant closures affecting the Reservation economies.

3.3.1 Navajo County Fiscal Impacts

The Cholla Power Plant and the Kayenta Mine are located in Navajo County. Since 2014 when it was announced that the Cholla Power Plant would eventually be closing, the County and Arizona Tax Research Association (ATRA), an independent tax research organization, have separately estimated the impending fiscal impacts of the closure. In 2017, as part of their five-year plan, Navajo County assessed the fiscal impacts of the plant closing by examining the property taxes paid by the plant's owners in 2016. The property tax payments in this assessment were at least partially based on the plant's value prior to the shutdown of Unit 2 in April 2016, which resulted in a \$30-million reduction in total property value (Madden, 2017). For that reason, the 2016 property tax payments listed in **Table 3-5** are roughly 20 percent higher than current property tax payments (and 20 percent larger than the future reductions in taxes that could be expected after a full shutdown).

Navajo County estimated that property taxes paid by Cholla directly to the County totaled roughly \$1.08 million in 2016, while the taxes paid to local jurisdictions within the County (such as schools and libraries) totaled about \$8.33 million (Peterson, 2018). **Table 3-5** breaks down the various jurisdictions and the property tax payments for fiscal year (FY) 2016. As shown in the table, aside from the county itself, the local jurisdictions in the county receiving the largest tax payments are the Joseph City School District (\$4.5 million), Northland Pioneer Junior College (\$2.3 million), State School Equalization Fund (\$0.6 million) and Navajo County Public Health (\$0.3 million). Because these tax payments include the value of Unit 2 in operation, the fiscal impacts of a complete shutdown are likely around 20 percent lower, or \$7.5 million in total.

⁸ This was presented as \$40 million in 2020 dollars, we deflated this to 2018 dollars assuming a three percent annual inflation rate was used in the ASU study.

⁹ This was presented as \$42 million in 2020 dollars, we deflated this to 2018 dollars assuming a three percent annual inflation rate was used in the ASU study.

Table 3-5: Property Tax Payments by Cholla Plant Owners to Navajo County Entities for Fiscal Year 2016

Jurisdiction	Property Tax Payment
Navajo County	\$1,079,562
Joseph City School District	\$4,545,732
Northland Pioneer Junior College	\$2,279,174
State School Equalization	\$638,485
Navajo County Public Health	\$318,605
FDAT	\$127,442
Navajo County Library	\$127,442
Minimum School Tax	\$103,610
Northern AZ VIT	\$63,721
Joseph City Fire	\$59,780
Navajo County Flood District	\$42,946
Little Colorado River	\$25,955
Joseph City Street Lights	\$2,025
Total	\$9,414,481

Source: (Peterson, 2018)

ATRA's analysis of the direct fiscal impacts of the Cholla plant closing examined six jurisdictions: Navajo County, the Public Health Services District (PHSD), the Library District, County Flood Control District, Northland Pioneer Community College (NPCC), and Joseph City School District. Their analysis was based on a \$100-million loss in Net Assessed Value in FY 2019 resulting from Cholla closing its remaining units, and includes property taxes and state TPT shared with Arizona counties. The estimated impacts in the ATRA analysis are roughly 22 percent lower than those estimated by Navajo County, likely because ATRA conducted their study after Unit 2 shutdown, which removed approximately 22 percent of the NAV. The ATRA analysis also considered potential adjustments the jurisdictions can make to their tax rates in order to compensate for revenue lost as a result of the Cholla closure.

The ATRA analysis found that if Navajo County did not change their property tax rate under a closure scenario, revenues would fall by \$846,700 from FY 2018 to FY 2019. ATRA also estimated that the Public Health Services District (PHSD) in the county could expect to lose around \$250,000 when the power plant closes, while the Library District would likely lose \$100,000 if it did not raise its tax rate. This represents a reduction of roughly 12 percent of total property tax revenues for each of the jurisdictions. The County Flood Control District was not expected to be adversely affected because its tax is levied only on real property (as opposed to personal property). Similarly, Navajo County's share of the state's TPT revenue was expected to remain unchanged because the power plant's value does not impact the County's share of TPT.

ATRA's analysis assumes NPCC would increase its tax rate to its levy limit (an increase of 2.02 percent) as it has done regularly in the past. While this would increase revenues to the college, the loss of property tax revenue from Cholla would remove a significant portion of the college's tax base, which ATRA estimates would cause total revenues to drop by \$1.57 million (roughly 11 percent). This amount could

be slightly offset by state equalization aid. However NPCC budget could also be adversely impacted if student enrollment decreases due to the closure.

The fiscal impacts to the Joseph City School District are much more complex, as they will trigger a potential mix of funding decreases and increases. If plant employees are unable to find other work near the school district, it may lead families to move away from the area. Any loss of students from the school district could cause a reduction in funding; however, state aid programs could offset these losses. The ATRA analysis explored the consequences of a 25-percent reduction in students and a 50-percent reduction in students. If student enrollment were to decline by 25 percent, ATRA predicted that the overall district budget would fall by 10 percent, most of which would arise from the loss of state aid with local taxpayers would pay roughly the same rate. If student enrollment declined by 50 percent, ATRA predicted that the overall budget was expected to fall by 27 percent, with local taxpayers paying a slightly higher tax rate than the year prior, and most of the drop resulting from reduced state aid.

Navajo County will also face a loss of revenue with the projected Kayenta Mine closure in 2019. The County currently collects both property tax and sales tax revenues from the mine. While the exact fiscal impacts of the mine's closure are uncertain, the County estimates that annual County property taxes would fall by about \$300,000 and annual sales taxes would fall by around \$1.6 million, for a total revenue impact of \$1.9 million (Peterson, 2018). Combining the property tax and sales tax impacts from Cholla and the Kayenta Mine closures, in total the County and its local jurisdictions could face a loss of around \$9.4 million in tax revenue (\$1.9 million from Kayenta Mine and \$7.5 million from Cholla).

3.3.2 Apache County Fiscal Impacts

Springerville and Coronado Generating Stations are located in Apache County. Springerville is owned by three companies: Unisource/Tucson Electric Power (TEP), Tri-State Generation and Transmission, and Salt River Project (SRP). Coronado is owned solely by SRP. County tax records indicate that these companies generate large amounts of tax revenue for tax districts in Apache County. The table below shows the amounts paid by SRP to Apache County entities for FY 2016. These payments totaled over \$12.5 million, with the largest payments going to the St. John Unified School District (\$4.97 million), Round Valley United School District (\$1.28 million), Apache County General Expense fund (\$1.1 million), and State School Equalization fund (\$1.05 million).

Table 3-6: Tax Payments by SRP to Apache County Entities for Fiscal Year 2016

Jurisdiction	Tax Payment
General Expense	\$1,185,120
St. John's USD #1	\$4,971,906
Round Valley USD #10	\$1,282,201
State School Equalization	\$1,052,366
Apache County Library District	\$651,375
Junior College	\$627,009
Apache County Jail District	\$420,106
Public Health Service District	\$411,914
White Mountain Health Care District	\$375,510
Round Valley USD #10 Min School Tax	\$333,207
Post-Secondary Education	\$294,074
Apache County Library Construction Bond	\$258,996
Juvenile Jail District	\$188,838
Fire District Assist	\$171,193
Round Valley Bonds	\$130,289
Norther Arizona Vocational Institute of Technology	\$104,748
Concho ESD	\$29,755
Apache County Flood Control	\$17,865
Apache County Vehicle Contribution	\$13,439
Concho Bonds	\$2,482
Norther Health Care District	\$1,702
Puerco Fire District	\$1,465
NE AZ Technology Institute of Vocational Education	\$23
Total	\$12,525,583

Source: (Apache County Treasurer, 2017)

A comparable breakdown was not available for the other owners of Springerville (Unisource/TEP/ Tri-State Generation and Transmission), however, tax records indicate that Unisource/TEP paid nearly \$6.6 million to Apache County entities for FY 2016. This may be an underestimate of taxes paid by Unisource/TEP/Tri-State Generation and Transmission, as these entities own approximately 50 percent of the generation capacity, so their combined taxes may be approximately equivalent to the taxes paid by SRP (and as shown in **Table 3-6**, this equals \$12.5 million). In terms of the \$6.6 million paid by Unisource/TEP, the county tax records indicate that the largest portions of the company's tax payments go to the Round Valley Unified School District, Apache County, the County School Equalization fund, the Library District, the Junior College, and the St. John's Unified School District. Unisource/TEP also pays taxes to the other local taxing districts listed in the table above (Apache County Treasurer, 2017).

A 2014 study by Arizona State University on the economic impacts of Coronado and Springerville Generating Stations stated that Coronado and Springerville provide 56 percent of Apache County's property tax value, 75 percent of St. Johns Unified School District's property tax value, and 38 percent of

the White Mountain Health Care District's property value. Additionally, the Springerville Generating Station accounts for 66 percent of Round Valley Unified School District's property value (Evans & James, 2014).

Given the information above, Apache County entities appear heavily reliant upon the tax revenues derived from these two power stations, with revenues to all sources totaling at least \$19 million annually. While there are currently no plans to close the facilities, there has been a trend in the region of coal-fired power plants shutting down due to a combination of regulation and conversion to natural gas and renewable energy sources.

3.3.3 Tribal Fiscal Impacts

The shutdown of energy production facilities in the region will have proportionately greater fiscal impacts on Tribal governments. The Kayenta Mine is located in the Navajo Nation on the border of the Hopi Reservation. The mine provides the Tribes with revenue (from leases and royalties), a source of demand for local vendors, and well-paying jobs. According to a study by Arizona State University, in 2012 the Kayenta Mine employed 411 workers of Native American origin (95 percent of its total workforce), and paid roughly \$39.6 million¹⁰ in wages to these workers (Evans, James, Gamez, & Madly, 2013). Two-thirds of the Hopi's total revenue comes from the mine (Wyloge, 2017). The mine was estimated to provide the Navajo Nation nearly \$37.7 million¹¹ in tribal royalties and taxes in 2011 (Evans, James, Gamez, & Madly, 2013).

The effect of losing these economic benefits will be substantial, and will compound losses the Tribes are already experiencing due to other coal-related shutdowns. In 2014, three units of the Four Corners Generating Station were shut down, reducing the economic output of a plant that provided the Navajo with nearly \$50 million in Possessory Interest Tax (PIT) and another \$14 million in other tribal taxes in 2011 (Evans, James, & Madly, 2013). The San Juan Generating Station will close completely by 2022. In 2011 it provided roughly 213 Navajo jobs and almost \$16 million in Tribal royalties (Navajo Nation Environmental Protection Agency, 2012). When the Navajo Generating Station closes in 2019, the Navajo Nation will lose roughly one-quarter of its current revenue, and the Hopi Tribe will lose up to 75 percent of their 75 percent of their budget (from the combined impact of power plant and the Kayenta Mine closing) (Wyloge, 2017; Craft, 2018). Taken together, the closure of energy producing facilities will have significant impacts on the Tribal economies in the region.

¹⁰ This was presented as \$42 million in 2020 dollars, we deflated this to 2018 dollars assuming a three percent annual inflation rate was used in the ASU study.

¹¹ This was presented as \$40 million in 2020 dollars, we deflated this to 2018 dollars assuming a three percent annual inflation rate was used in the ASU study.

4 BEST PRACTICES CASE STUDIES

This chapter describes the economic conditions and economic transition experiences of areas across the United States (with one case study region from abroad). The purpose of the chapter is to identify best practices and lessons learned to meet the economic and social challenges of transitioning from an economy reliant on one or a few industries to a more diversified and resilient economy. Most of the examples are drawn from rural areas, but a few are more urban. These case studies highlight how communities can successfully diversify through forward-looking leadership that emphasizes economic diversification and resiliency.

We begin by focusing on a case study of rural areas in Queensland Australia that describes how rural regions can attract and retain a quality workforce, and the important role that the community and the region plays in supporting and enhancing quality of life and infrastructure desired by today's workforce. We then move to Bend, Oregon, which has focused on transitioning to a 21st century economy through a combination of quality of life investments, downtown revitalization, support for entrepreneurs, and regional partnerships. This is followed by a description of a public-private partnership formed in Columbia, Ohio that leverages the skills, contacts, and strategies of business leadership and political leaders to further economic development in the city.

We then highlight a series of locations that have successfully targeted individual industries: first the outdoor apparel manufacturing industry in Ogden Utah, the gun manufacturing industry in Wyoming, the nature tourism industry in rural Pennsylvania, and renewable energy development in Gila Bend, Arizona. While these case studies focus on efforts to attract individual industries, all of which are applicable to Northeast Arizona, the lessons they provide are broadly applicable to developing and fostering many other local industries, including: developing a shared vision, branding and marketing that vision within the industry, fostering and leveraging regional partnerships to promote the industry, designating lead industry contacts, providing small business funding or training, and fostering links and support between regional businesses and local leadership.

Finally, this review ends with the experience of forest communities throughout the Pacific Northwest that were readily dependent on natural resource extractive activity (timber harvests). We describe the way that community economies have transitioned, and in some cases, thrived. Studies of the diverse communities affected, and the identification of the qualities and strategies of those who have thrived, provides several best practice lessons for Northeast Arizona. These include the importance of focusing on a broad spectrum of industries to diversify the economy, developing community cohesiveness and civic leadership, connecting to regional economies, and developing the infrastructure and amenities to provide a high quality of life for residents and a high quality experience for visitors.

4.1 RURAL QUEENSLAND, AUSTRALIA: LABOR ATTRACTION

A case study analysis of two rural regions in Queensland Australia highlights the factors that can affect the attraction and retention of labor in rural areas, and the subsequent economic performance of individual companies and the regions as a whole (Becker, Hyland, & Soosay, 2013). The two regions, Central Highlands and Gulf Savannah, were experiencing a shortage of skilled workers. In Central

Highlands, shortages were reportedly due to increasing demand and high wages for workers brought about by a rapid growth in coal mining and associated support industries, while in the Gulf Savannah region, regional isolation was the underlying reason given for a shortage of skilled labor. The case study analysis highlights several factors that affect the two regions' abilities to attract skilled labor and the strategies that the two regions developed to attract workers.

Communities that were successfully attracting new employees were doing so by promoting their community from an employment and lifestyle perspective as opposed to a tourism perspective, and they were careful to manage the expectations of potential new employees. They had recognized that information about schools, shopping, medical services, religious facilities and sporting clubs was necessary to provide a realistic expectation of life in their community.

These factors and associated strategies are as follows:

1. **Marketing a region to the entire family (and not just individual employees) in both regions was critical.** One of the most common factors creating difficulty in employee attraction was dual-career couples, where employment was required for both individuals. An effective strategy for this issue was a community network approach to finding work for both partners in order to facilitate relocation to the region. Integration of other family members is also important: both at the business level (actively involving families and spouses in the recruitment process), and the community level. At the community and regional level, marketing includes providing information about the town and region (focused on residents who will live and work in the community, not information geared for tourists), a developed community approach to attract and retain new residents, and managing expectations from the point of view of the employee, the family and the community.

"As one recently appointed school principal in the Gulf Savannah indicated, he had searched the internet for information about the town, and made enquiries with the local school, hotel, and shop to try to get information, without success. As he was quick to point out, 'when you cannot find information or pictures, you tend to think the worst'. The picture of many remote communities from the outside is often worse than the reality."

2. **Education was an important aspect for families considering location to these regions in Queensland.** Central Highlands had the advantage of providing education at all levels (primary, secondary, vocational and tertiary) while education in the Gulf Savannah region was problematic with secondary schooling available in only one community. To overcome this problem, parents in other communities and isolated farming properties sent children to attend boarding schools in large metropolitan centers. As such, schooling was reported as one of the major issues creating retention problems'. On the other hand, as a successful strategy (as reported both by local businesses and newer residents), in one community studied the primary school had partnered with a large local employer to produce a video about the school and the community for families considering relocating to their town.
3. **Availability of housing was an issue in both regions.** Shortages in housing and high costs of housing due to high worker wages in the nearby mines deterred workers in other sectors from

relocating to the Central Highlands region. In Gulf Savannah a shortage of skilled builders was creating a housing shortage.

4. **Geographic isolation was an issue in one of the regions.** Local communities and governments were attempting to address some of the issues related to feeling isolated in the Gulf Savannah region. For example, one town installed fiber-optic cable so that all households had access to cable television and the internet. In contrast, the Central Highlands had local access to most services and goods and adequate access to a transport network with scheduled daily flights to the state capital and regular passenger bus and train services. This access could, however, be overstated by locals, with residents promoting that they were close to local beaches or towns when such resources were three to four hours' drive away.

The key finding from these case studies is that regional economic development entities and local policy makers need to emphasize the lifestyle issues of the regional community and provide access to realistic information about local amenities, community activities, available shops and facilities, and services such as schools, medical care, and childcare. Furthermore, promotional and marketing efforts should be focused and targeted at the needs of specific groups to highlight the specific community attributes that contribute to the positive aspects of working and living in the regional community.

4.2 BEND, OREGON: QUALITY OF LIFE AND BUSINESS ECOSYSTEM

Bend, Oregon has its roots in the logging industry; at its peak in the 20th century, there were 4,000 people employed in the timber industry and Bend was the leading manufacturer of secondary wood products. In the early 1980's this industry crashed, leaving Bend with high unemployment. **In 1981 the region formed a non-profit organization, Economic Development for Central Oregon (EDCO) to diversify its economy. EDCO focused some effort on attracting specific industries, but focused most of its effort on creating an attractive and thriving downtown center, enhancing quality of life, and developing cultural, historic, recreation, and entertainment resources.** These efforts were the focus of the city's downtown development plan and its general plan. These plans included remediation and redevelopment of former industrial sites, re-purposing of historic buildings, and development of attractive areas for shopping, recreating, and working.

These efforts, in combination with the area's relatively low cost of living, sunny weather, and outstanding recreation amenities has succeeded in attracting retirees and others. With the housing market crash and associated decline in construction in 2008, along with a simultaneous decline in several other local industries, EDCO continued to focus on quality of life and downtown development. EDCO simultaneously focused on recruiting and supporting entrepreneurial industries that are attracted to vibrant towns with cultural and recreational activities; these include microbrewing, biosciences, recreation equipment manufacturing, and technology companies.



Source: EDCO

Finally, as with so many other successful small towns and cities, EDCO attracts and nurtures entrepreneurs by providing a supportive environment for start-ups and growing companies. For example, EDCO supports entrepreneurship by hosting monthly 'pub talks' where companies can network and pitch ideas. EDCO also hosts the Bend Venture Conference, which is a venue for investors, entrepreneurs, and business leaders which includes a competition where entrepreneurs compete for startup capital funding and is a forum for coaching, mentoring and exposure for young businesses. Per its website, EDCO's goals for 2013 to 2015 were (EDCO, n.d.):

1. Support local traded-sector employers with a robust **Business Retention & Expansion (BRE)** Program that catalyzes \$100 million in new capital investment; 800 new, well-paying jobs; and at least 36 "done deals" by the end of 2015.
2. Recruit 36 new companies to the region that will create 1,000 new, well-paying jobs and invest \$200 million in new capital investment by the end of 2015. **Target marketing and recruitment efforts geographically and by industry for greatest effectiveness.**
3. **Develop an ecosystem in Central Oregon that supports and attracts entrepreneurs to establish the next generation of employers and jobs.** Catalyze creation of 200 new jobs via 24 early stage companies that successfully raise \$50 million in growth capital by 2015.
4. **Quarterback industry development initiatives and strategic projects** that will pave the way for private sector employment growth.
5. **Advocate and champion improvements to the region's business climate and competitiveness.**

In another partnership, in 2011, the Bend City Council chartered the 13-member Bend Economic Development Advisory Board, which includes nine industry/business leaders and four staff of the city's partner economic development organizations. This board advises the city council to help promote a supportive and innovative business environment to foster business development and economic growth. In terms of results, largely because of Bend's success, Central Oregon has some of the best job growth in the State of Oregon. By leveraging its quality of life and natural resource amenities, Bend has succeeded

in attracting entrepreneurs to the city. As of 2014, the city had at least 95 startups across multiple technology sectors (Blank, Bigger in Bend - Building a Regional Startup Cluster, 2014).

Another asset in Bend is a pool of Silicon Valley transplants who are either retired or commuting to the Bay Area. They include retired CEOs, senior executives, and successful entrepreneurs. These individuals have gotten involved with the local business community as mentors, advisors, entrepreneurs, or investors. Bend is also a bedroom community for Silicon Valley, with a daily direct flight to the Bay Area. Commuters to the Bay Area also facilitate the transfer of important information and skills and can be advocates and marketers of a community (Blank, Bigger in Bend - Building a regional startup cluster part 1 of 3., 2014). This is directly relevant to Northeast Arizona that can tap into the second-home community that can serve similarly as mentors, advisors, and investors to businesses in Northeast Arizona, and can also provide valuable connections to businesses in the Phoenix metropolitan area.

4.3 COLUMBUS OHIO: PUBLIC PRIVATE PARTNERSHIPS FOR ECONOMIC DEVELOPMENT

Formed in 2002, the Columbus Partnership (Partnership) is a non-profit organization that seeks to improve the economic vitality of the City of Columbus and Central Ohio. What started as a group of eight chief executive officers (CEOs) has since grown into an organization of 65 CEOs from Columbus's leading businesses and institutions. The Partnership brings these leaders together to discuss the economic issues facing the area and form plans to make the region a better place to live and work. Since its formation, the organization has become actively engaged in projects involving downtown development, education, leadership development, philanthropy, and arts and culture (Columbus Partnership, 2018). The partnership brings a business perspective and business acumen to public policy and works closely with civic and political leadership to bring about positive change that supports economic development in the region.

One of the Partnership's major accomplishments was its role in helping Columbus win the U.S. Departments of Transportation's (DOT) Smart City Challenge (Challenge), which included a \$50-million grant. Upon learning about the opportunity, the city's leadership recognized that it had the potential to improve many aspects of the city: jobs, education, childcare, food access, and connections between the city's diverse communities. They also recognized that the city's infrastructure was reaching the end of its useful life, and would have to be updated in order to keep the region competitive (Fischer, 2017). The city's application to the Challenge became a collaborative effort involving the Partnership, major private firms and public institutions, and the mayor's office. With the constant support of the Partnership, the mayor's office conducted lobbying and development while a team at Battelle worked on grant-writing (Mahoney, 2016).

As part of their bid for the Smart City Challenge, a group of Partnership members and the mayor of Columbus traveled to Washington, D.C. It was during this trip that they realized how unique and valuable their public-private partnership was, and it made them stand out as a candidate while meeting with the Secretary of the DOT. Shortly afterwards, the city was selected as one of the finalists in the Challenge (Mahoney, 2016). In the subsequent months, the team refined and developed their plan, and in 2017, Columbus won the Smart City Challenge (Fischer, 2017).

Since the award, the city's leadership built on the momentum developed during the Challenge application process. By seeking additional public and private funding, it has turned the \$50 million award

into a \$500 million effort (Fischer, 2017). Leaders involved in the effort cite the excellent working relationships between the Partnership and public and private leadership as the key ingredient to the city's successful collaboration on the project. **The Partnership was described by one leader as "the oil that lubricates the engine for smooth and efficient operation," and that they "make sure there's the right dialogue with the right people at the right level"** (Mahoney, 2016). **These factors are important for any private-public partnership, no matter the scale or size of the local community.**

The success of the Partnership's approach has led the Harvard Business School to hold it up as a national model of public-private cooperation (Yost, 2016). Members involved with the Partnership have shared a number of lessons for developing similarly successful public-private partnerships. **Some of the lessons learned were to keep their initiatives simple, stay focused on the issues they decide are important, and learn from the success of others.** These lessons were reinforced after one of their initiatives, a city school levy, was overwhelmingly defeated. The Partnership believes that investment in local education and schools is critical to continued business success and prosperity in the region. As such, rather than give up on the issue, the Partnership helped to form another public-private initiative that went on to study education best practices around the world, including in Singapore and Finland, which could be adopted in Columbus (Yost, 2016). The Partnership's work towards bettering education continues today (Columbus Partnership, 2018).

Another lesson gained by the Partnership is to develop their leadership status organically, and handle their leadership position responsibly. **They have learned that legitimate leadership is gained through earning the respect of the community, which comes after proving that the organization is working in the best interests of the area. Staying on task and focused on results helps the Partnership maintain its credibility. Avoiding taking credit for the accomplishments helps it retain legitimacy as an organization whose primary purpose is to better the community, rather than its own position** (Yost, 2016).

Curiosity is one of the key ingredients to success for the Partnership's leaders. Being actively curious has driven Partnership members to seeking out creative solutions and ideas in places they did not expect to find them. A visit to Silicon Valley in the fall of 2015, labeled the "Curiosity Trip," provided the group with potential solutions for bettering central Ohio, but also an approach to finding those solutions that involved asking questions arising from genuine curiosity. **Fostering a culture of curiosity within the Partnership is seen as one reason for their success** (Yost, 2016).

Other ingredients for success are a collaborative culture that encourages inclusion. The Partnership works to bring together governmental leaders at all levels (city, county, state), and businesses both large and small. As put by one of its members, "being inclusive of all parts of the community within that thought process is not only the right thing to do but important as to our ability to execute on the strategies we have." Involving young leaders is one aspect of inclusion effort, which is why the Partnership has become involved in a number of organizations focused on young leaders and leadership development. Bringing together diverse leaders to collaborate allows the Partnership to have more thoughtful and robust dialogues, and address a wider range of issues (Yost, 2016).

One final lesson that has come out of the Partnership's experience has been to leverage city power. Members of the organization have found that local government leaders are often much more able to make meaningful improvements than are state and federal governments. While politics at higher levels

often result in political gridlock, cities are able to be ‘innovative, creative, and effective’ at addressing their issues. Because of this, Partnership member have been motivated to work even closer with local officials (Yost, 2016).

While there is an urban-rural disparity between Columbus and Northeast Arizona, this case study still offers valuable lessons for fostering public-private partnerships. The ability to bring together public and private community leaders, foster an environment of collaboration, and work towards common goals is fundamental regardless of differences between urban and rural areas. Strong public-private partnerships could be a particularly effective means of helping Northeast Arizona reach its goals.

4.4 OGDEN, UTAH: OUTDOOR MANUFACTURING INDUSTRY

Historically, Ogden Utah’s economy was sustained by the railroad, which for decades brought travelers through the town. When railroad traffic slowed after World War II, economic activity suffered and the city degraded into an undesirable place to live and work. Using a combination of strategies, including branding and marketing, enhancing the local business climate and local quality of life, and using financial incentives, Ogden has transformed itself. Today, Ogden has been named one of the best places to raise a family by *Forbes Magazine*, “the center of outdoor sports gear in the U.S.” by the *Wall Street Journal*, a “Top 10 Emerging Ski Town” by *National Geographic*, and one of the “Best Towns in America” by *Outside Magazine* (Ogden City Business Development, 2018; Bowsher, 2014).

Ogden’s transformation began in 2002 when the city hosted events for the Winter Olympic Games. This offered a chance to market its outdoor recreational opportunities to the world, provided by nearby mountains, rivers, and reservoirs. While the Winter Games offered a valuable opportunity to the city, it was the actions of Ogden’s leadership afterwards that ultimately delivered change. As the remainder of this section shows, Ogden’s multi-faceted approach to attracting the outdoor industry allowed it to transform into an award-winning place to live and recreate.



Ogden is experiencing a major renaissance, built around the city’s identity as an outdoor recreation mecca.

Photo Source: Why Ogden? City Website

The city’s first step towards reform was deciding to rebrand itself as a “mecca for high adventure outdoor recreation,” as the city’s former Mayor Matthew Godfrey put it. Recognizing the outdoor recreational opportunities they had to offer, the Mayor and his team started making efforts to market them. One of their strategies involved hosting major outdoor recreation events and competitions, focusing primarily on running (trail and marathon), kayaking, and bicyclists (Outdoor Industry Association, 2012). The events brought participants and spectators, allowing the city to market their opportunities while also benefiting from tourism spending, and also attracted gear and apparel companies, offering Ogden leadership the chance to actively recruit the target industry.

Trade shows offer another good opportunity to market to the target industry. The gathering of a representatives from the target industry provides a chance to reach a large number of companies in a short amount of time. Mayor Godfrey used this strategy to recruit outdoor recreation companies to Ogden (Kuta, 2011).

Successfully growing and attracting the outdoor industry also depends heavily on the local quality of life. According to Gordon Seabury, the Chief Executive Officer (CEO) of Toad&Co (an outdoor apparel company with annual revenues over \$10 million), some of the most important qualities in attracting the outdoor recreation industry (and many other industries) are: having a sense of place, accessible recreation opportunities, desirable quality of life, and good business infrastructure. Seabury described how the talent needed to drive the outdoor industry comes from young, creative professionals who prefer a 'mixed life' where the line between work and recreation is blurred. To attract and retain this talent, an area must present a desirable place to live, work, and recreate (Seabury, 2018).

One effective way of creating an attractive place to live and work is to improve access to recreational opportunities within and close to population centers. This can bring multiple advantages:

- Improves the area's quality of life, making it a more attractive place to live;
- Increases participation in recreational activities, reinforcing the area's image as an outdoor recreation destination;
- Allows outdoor companies to quickly and easily test prototype products; and
- Enhances tourism appeal.

Ogden used this approach as part of its multi-faceted strategy to attract the outdoor recreation industry. With the help of a government investment of over \$6 million, the city restored the polluted Ogden River that runs through the heart of the city. The city built three kayak parks and a water ski park in order to take advantage of the newly-restored waterways. The Ogden River Parkway was created as a system of trails and recreational venues connect the waterways to downtown, providing recreating opportunities to runners, bicyclists, and hikers. Ogden also invested in the Solomon Recreation Center, a 125,000 square-foot facility that offers indoor skydiving, rock climbing, and surfing, among other activities (Outdoor Industry Association, 2012). This not only improved Ogden's quality of life, but helped to reinforce its brand as a center for outdoor recreation.

Convenient access to recreational opportunities is a critical ingredient to fostering outdoor industry growth. Toad&Co's CEO cited it as one of the most important factors in attracting companies (Seabury, 2018). Amer Sports' General Manager said it was one of the main reasons for expanding in Ogden (Outdoor Industry Association, 2012). Any initiative that can expand recreational opportunities or make access to them more convenient will help the area become more attractive to the outdoor industry.

While there are a number of ways to create an attractive place to live, a low cost of living is one important component to the quality of life outdoor companies want (Seabury, 2018). This allows young families to buy homes and live comfortably, and typically gives smaller and more remote cities an advantage over large cities in attracting the outdoor industry. Mike Dowse, general manager of Amer Sports, listed Ogden's low cost of living as one of the primary reasons his company chose to expand in Ogden rather than Portland or Seattle (Outdoor Industry Association, 2012). Other cities have used a

lower cost of living as a selling point to attract outdoor recreation companies away from Boulder, Colorado, a traditional hub for the outdoor industry (Kuta, 2011).

Another effective way to create a fertile environment to grow the outdoor recreation industry is to develop the infrastructure the industry needs. Because manufacturing in this industry is often done overseas to keep costs low, the typical infrastructure required for other types of manufacturing (such as access to materials, warehousing, and transportation networks) are not as important. According to Toad&Co's CEO, two important infrastructure needs are 21st century office capacity (e.g. high-speed internet) and convenient air transportation (Seabury, 2018). Amer Sports' General Manager also stated that airport access was an important factor in determining location (Outdoor Industry Association, 2012). These are two infrastructure areas that are weaknesses in Northeast Arizona.

Business accelerators are another kind of beneficial infrastructure to the outdoor recreation manufacturing industry. These facilities can help innovators develop their ideas by providing guidance and access resources. Last year, Ogden launched their LIFT startup accelerator program for entrepreneurs in the outdoor recreation industry. Created as a partnership between Utah's economic development organization and the city, this eight-week program provides selected entrepreneurs with mentoring and training from startup experts, prototyping and design specialists, and industry mentors. Participants were given \$15,000 to aid in the development of their ideas. The program concluded with a public release of the products, which would help the participants obtain additional funding from investors (Utah Business, 2016). Initiatives such as these can help to grow an industry in local area organically.

In making a concerted effort to develop an industry locally, it can help to assign overall responsibility of the efforts to a single person. Creating a new position, or explicitly adding additional duties to an existing position, can ensure that efforts to attract and develop the industry are coordinated and receive the required attention. This was one strategy Utah's governor used to facilitate the outdoor recreation industry. He created an outdoor recreation director position that serves as the liaison for sportsmen and athletes, and connects industry and tourism representatives with city, state and congressional officials (Broudy, 2016). Ogden has also made organized efforts to connect public officials with industry representatives. Mike Caldwell, the city's current mayor, holds annual meetings with Ogden's outdoor recreation companies. These meeting are a valuable means of retaining companies that have moved to the city (Outdoor Industry Association, 2012).

Finally, Ogden uses financial incentives to attract the outdoor manufacturing industry. Through its Business Information Center, Ogden offers small business loans up to \$90,000 with interest rates up to 12 percent and terms up to 10 years (Ogden City Business Development, 2018). Ogden also publicizes and markets state financial incentives. Many of the incentives listed on Ogden's economic development website promote Utah's business incentives rather than the city's own incentives (Ogden City Business Development, 2018). Northeast Arizona could benefit from a similar strategy. According to the Arizona Commerce Authority, the state's corporate income tax is among the lowest in the nation. Arizona offers tax credits for creating new jobs, locating and expanding manufacturing-related research & development facilities, and offers tax exemptions for machinery and equipment used in manufacturing (Arizona Commerce Authority, 2018). Such programs could be a useful selling point to companies in the outdoor recreation industry.

4.5 WYOMING: GUN MANUFACTURING INDUSTRY

Wyoming's Governor, Matt Mead, is actively working to attract the gun industry to Wyoming and diversify its economy. In 2016, he began hosting a national shooting competition as part of a larger effort to brand Wyoming as a state that is friendly to the firearms manufacturing industry (Ballard, 2017). Wyoming has also been actively marketing to gun manufacturing industry at trade shows, which provides a chance to reach a large number of companies in a short amount of time. Governor Mead used this strategy early this year at the SHOT Show in Las Vegas. In addition to marketing his state to the event's attendees, the Governor also used the event to announce the move of one firearms manufacturer, Weatherby, from California to Wyoming (Moen, 2018). Publicizing the relocation allowed the Governor to further brand his state as being favorable to the industry.

In addition to actively recruiting, Governor Mead has used other strategies at branding that are instructive. First, he uses public statements to explicitly brand the state as pro-gun. In his 2017 state of the state address, he said that "In Wyoming we don't just want to be known as a firearm state, we want to be known as *the* firearm state" (Keane, 2018). Such public statements are a clear example of using a leadership position to foster a brand. In the gun industry, these statements have the added benefit of welcoming companies at a time when some see their home states as becoming more hostile towards guns. In addition to Weatherby, this may have played a part in the decision for six other gun companies to expand or relocate outside of their native states (Keane, 2018). The Governor's other branding efforts include increasing access to shooting ranges and recognizing the top 100 shooters in the state (Ballard, 2017). These initiatives expand interest in the target industry and serve to further define the desired image of the state.



Photo Source: Weatherby website.

Regarding its decision to relocate to Wyoming, Weatherby's President, Adam Weatherby, cited Wyoming's quality of life, including low cost of living as one reason the company chose to relocate from California (Keefe, 2018). While it is difficult for local leadership to directly change the cost of living in their area, places that already have a low cost of living have a strong asset to attract industry. Convenient access to recreational opportunities is a critical ingredient to fostering outdoor industry

growth. Weatherby also cited proximity to outdoor opportunities as one of the company's primary reasons for relocating to Wyoming (Smith, 2018).

Further, as part of its decision to relocate, Weatherby's President stated that Wyoming's tax-friendly environment would help the company grow in the future (Keefe, 2018). The comment likely refers to the fact that Wyoming has no corporate state income tax, no personal income tax, and no inventory taxes. This stands in contrast to California where Weatherby moved from, which is known as being a state with high taxes. Wyoming's tax environment may have also played a role in a decision by Magpul (a gun accessory manufacturer) to relocate to Wyoming from Colorado. Wyoming also offered Magpul a \$13 million grant and loan package as part of a combined local and state economic development effort (Kinney-Lang, 2014).

4.6 PENNSYLVANIA WILDS: OUTDOOR RECREATION

The Pennsylvania Wilds region includes 12 counties in north central Pennsylvania. More than half of the counties are impacted by coal industry contractions. Since 2000, the region has experienced a loss of 744 coal jobs, with 434 of those jobs occurring in the last five years (Pennsylvania WILDS, 2016). The region has historically been subject to the boom and bust cycles of extractive industries, including logging, oil and gas, and coal mining. Recently the Pennsylvania Wilds Center for Entrepreneurship, Inc. (PA Wilds Center) received a three-year, \$500,000 grant from ARC through the POWER Initiative to assist with nature tourism cluster development. This will build on the Pennsylvania Wilds initiative that was initiated by the Pennsylvania governor in 2003 to provide economic development to the region through nature tourism.

The region has experienced consistent declines in population, an aging population as young people leave for better opportunities, and a decline in income, despite significant economic growth elsewhere in Pennsylvania (Patricia Patrizi, 2009). However, the weak economic conditions in the area are set against a backdrop of natural resource attractions with diverse appeal. The area has two million acres of public land including 29 state parks, eight state forests, 50 state game lands, and the Allegheny National Forest (Patricia Patrizi, 2009). The region also includes two National Wild and Scenic Rivers, the largest wild elk herd in the Northeast, populations of bald eagles and river otters, and the largest block of natural lands between New York City and Chicago. **This case study highlights how approximately a decade of collaboration between local, regional, and state public and private organizations has leveraged the natural resource assets in the region to enhance local businesses, based primarily on nature tourism and improving quality of life to attract and retain other types of businesses.**

In 2003, the Governor of Pennsylvania established a task force of state departments, regional organizations, and congressional and county governments, and charged the Department of Conservation and Natural Resources with organizing the Pennsylvania Wilds Initiative. The Initiative has developed into a broad coalition of a vast alliance of partners including state and federal agencies, county and local governments, visitor bureaus, legislators, businesses, heritage areas, economic development agencies and other nonprofits. The Initiative has been successful in driving investment in the region, including in communities, infrastructure, and parks and forests in the region. Initially the focus was on drawing visitors for elk viewing, but then it was recognized that it was necessary to establish a Recreation Plan for developing diverse activities that would appeal to a broad range of

visitors and attract them for a multi-day stay, increasing economic development opportunities in the area (Patricia Patrizi, 2009).

Elements of the Initiative have included:

- **Marketing of Pennsylvania Wilds as a distinct brand** by the Department of Community and Economic Development and the Office of Tourism, Film, and Marketing, with more than \$5 million invested. The goal has been to develop a unified approach to tourism marketing and a unified regional identity for the Pennsylvania Wilds. The first step was to develop a brand and a logo; the second step was to create a more unified region-wide umbrella organization to market the region. This has enabled larger-scale marketing of the region, including a website, a visitor's guide, a discover map, and a fishing guide. They have also advertised in national publications.

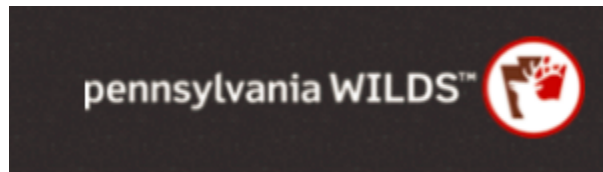


Photo Source: Pennsylvania WILDS website.

- **Development of visitor amenities and the visitor experience.** This included development of an Elk Scenic Drive and a Pennsylvania Wilds Gateway Welcome Center with assistance from the Pennsylvania Department of Transportation, development of amenities at state parks including new visitor facilities and major interpretive centers, and a Pennsylvania Lumber museum. The Recreation Plan for the region has focused on enhancing the visitor experience through better directional signs, more and better information, maps, and improved and expanded recreational opportunities. Building trails in the region, particularly those that linked towns to each other or those that linked towns to special natural features, have a particularly high priority in the plan.
- **Development of local businesses** to serve visitors, organized through the Wilds Cooperative of PA, which focuses on growing and clustering local businesses that serve the tourism industry, including food and accommodation, guiding, and other services. A big focus on this cooperative is linking and developing local arts and craft producers and connecting their products with the regional brand; the result has been a network of juried artisans, trading posts, public art, and host sites. The Initiative has recognized that both demand and supply are critical to address: demand for experiences, services, and products from the region; and supply of diverse and sufficient infrastructure and local businesses that can cater to visitors.

A challenge to the Initiative has been overcoming opposition and skepticism from some parts of the region who fear commercialization or suspect that it is anti-hunting, or that officials want to turn the area into pure wilderness (Patricia Patrizi, 2009). **Consistent and meaningful public engagement has been key to increasing support for the Initiative and over time residents are increasingly seeing it as beneficial to the region.** Another challenge has been maintaining communication and a collaborative relationship between public lands staff and local businesses that use public lands such as outfitters and concession operators.

As the initiative has progressed, the lead state agency has increasingly reviewed the ‘readiness’ of a community to engage in the effort, as engagement and interest in partnering are key to success.

Readiness has been gauged on such factors as: “natural or economic assets, interest among community stakeholders about the environment and economy, political will of local elected officials, political skills and ability to work on teams and in partnerships, access to funding pools to generate matching funds for grants, planning and technical capacity, and a long-term perspective toward achieving goals” (Patricia Patrizi, 2009).

4.7 GILA BEND, ARIZONA: RENEWABLE ENERGY

Gila Bend is a small municipality (2,000 residents) at the intersection of Interstate 8 and State Route 85. The community’s economy is largely tied to the transportation corridor (it is considered the gateway to Sonoran Desert National Monument), as well as to a natural gas power plant built in 2002, and a small paper mill. In the last decade, Gila Bend determined to diversify its economy through renewable energy projects. Wind and solar projects provide a variety of financial benefits to a community including temporary construction and some permanent jobs, demand for local good and services, landowner payments, and annual sales and property taxes.

To encourage economic diversification, specifically, in the renewable energy sector, Gila Bend created a streamlined process for permitting solar projects. The impetus for this land use planning initiative was that it took the local Solana project (by Abengoa) two years to get through the land use permitting process. Gila Bend leaders decided they ‘could do better’ and in 2010 created a streamlined process for permitting solar projects, referred to as the Solar Field Overlay Zone (SFOZ). By 2012 the city had attracted two solar developments, experienced a 100 percent increase in sales tax revenues, and brought in 200 additional jobs (Trabish, 2012). Today, Gila Bend is home to five solar power developments, of which four have benefitted from the SFOZ permitting process. At Gila Bend, the creation of the SFOZ program are credited with attracting two Arizona Public Service (APS) solar power developments (Gila Bend Chamber of Commerce, 2018).

In evaluating Gila Bend’s actions since 2010 we find a template for how solar (and wind) developments can proceed smoothly and quickly. This process increases the attractiveness of an area to renewable energy developers. This section details how the SFOZ has helped pave the way for renewable energy development in Gila Bend., as well as highlighting the importance of an industry ombudsman.



Source: (Gila Bend Chamber of Commerce, 2018)

It is important for prospective energy developers to know where wind and solar projects would be compatible with county land use plans and existing uses. Directly addressing renewable energy development in land use plans or creating specific exclusion areas can be beneficial. Generally, the renewable energy industry prefers to know where projects cannot be built (exclusion areas), rather than where they have to go (designated zones). To encourage solar development Gila Bend developed the SFOZ where they designated the best land for solar development and provided incentives if located in these areas (Gila Bend Chamber of Commerce, 2018). Further, the SFOZ program streamlines permitting of solar power developments by the following:

- Conducting the ordinance approval simultaneous with the review of the engineered site plan. Because the overlay zone includes solar power development as an existing designation, the only review is really the engineered site plan, which can take six to eight weeks.
- Limited time required for archeological surveys. Archeology surveys are generally conducted in a couple of weeks, and because most of the land in the SFOZ has been in agriculture for 70 years, there are no archeological issues anticipated –increasing certainty for the industry applicant.
- Civil plans are reviewed within a week of receipt (by the city’s engineering consultant). Trenching and grading are also included in the civil permit, instead of requiring separate permits as in many other areas.
- Building plans may be submitted along-side civil plans, essentially allowing developers to “piecemeal their plan submittal”, allowing the developer to keep moving through the process.
- Developers must meet the 2006 National Building Code and the 2005 National Electrical Code but allows developers to use newer codes if it will benefit the project (Trabish, 2012).

Investment in a community is encouraged by having clearly defined rules and regulations for development. As wind structures and solar fields are unique, permitting ordinances that are specific to these types of infrastructure support development. Similarly, having a clearly delineated project approval process and timeline provides certainty and cost-savings to developers. Counties may specify

approval, construction, operation, decommissioning and project mitigation guidelines for wind or solar as part of Conditional Use/Special Use Permits, Building Permits, or transportation Oversize/Overweight Permits.

Another important approach to encouraging renewable energy development (or development in other target industries) is to designate a lead/contact person (or people). This person can ensure that activities within the counties (or other geopolitical area) are coordinated, as well as providing consistency for developers and the public. The lead contact person should have knowledge of the development steps for solar and wind energy, as well as an understanding of the county's preferred development areas and strategies. The county and contact person should also understand the tax implications for a project and commonly used tools such as "payments-in-lieu-of-taxes," at the onset of negotiating project taxes with the developer. Plentiful educational material, webinars, and conferences are available from the U.S. Department of Energy, its national laboratories, and the wind and solar industries to educate staff.

4.8 NEW MEXICO, LAND OWNER WIND ENERGY ASSOCIATIONS

Landowner Wind Energy Associations (LWEAs), are formed by individual property owners with contiguous tracts of land holdings. LWEAs work to attract wind development to their area, bringing economic development to the community. LWEAs are also commonly referred to as Landowner Wind Associations and Renewable Energy Landowner Associations. Though these associations may take different forms, they have some elements in common:

- Landowners organize in an association;
- Fees are collected from landowners;
- RFPs are collectively sent out to developers;
- Landowners collectively negotiate with developers, but there is no obligation to sign leases with developers.

If renewable energy development is being pursued as an economic development strategy in Navajo and Apache counties, officials can promote this activity in a variety of ways including:

- Discussion with the local utility about county's interest in renewable development, opportunity for re-purposing unused transmission, and utility plans for renewable energy purchase in the future.
- Inform elected state legislative representatives and Arizona Corporation Commission (ACC) Commissioners and staff about development interests. The ACC regulates the utilities in Navajo and Apache Counties and can have an effect on future energy choices of electric utilities.
- Develop educational information for web and print and consider hosting webinars or in-person meetings for elected officials, developers, utility personnel, citizens and other stakeholders.

County efforts can be augmented and enhanced by engaging stakeholders in development efforts. In New Mexico landowners formed the Coalition of Renewable Energy Landowner Associations (CRELA) to support appropriate development (Coalition of Renewable Energy Landowner Association (CRELA),

2018). The Coalition of Renewable Energy Landowner Associations, or CRELA, was formed in 2009 by a group of landowners in northeast New Mexico to empower them to speak to policymakers and energy developers with one united voice. CRELA is a 501(c)(6) nonprofit organization, funded entirely by annual membership fees. CRELA engages in a range of renewable activities, including lobbying policymakers, hosting conferences, and educating community members and industry representatives. CRELA members have worked with energy transmission developers to increase transmission capacity in the region and have reached out to renewable energy developers to discuss resource availability and landowner interest for wind projects in the area (Wilkinson, 2017).

4.9 UPPER VERDE RIVER WATERSHED PROTECTION COALITION: UNDERSTANDING FOREST RESOURCES

The link between watershed health and removal of biomass, along with the associated demand for that biomass has been a central issue to ecological health of Northeast Arizona. The Upper River Watershed Protection Coalition provides an example of how bolstering the understanding of the ecological resource can be an important link for the forest product manufacturing industry.

The mission of the Upper Verde River Watershed Protection Coalition is to ‘protect the Upper Verde River base flow while balancing the reasonable water needs of residents who live and businesses that operate within the watershed boundaries’ (Upper Verde River Watershed Protection Coalition, 2018). Based on several interviews with forest product manufacturers, this group has received funding to evaluate the biomass inventory of the Upper Verde River watershed and conduct feasibility assessments of various biomass utilization technologies (Mills L. , 2018; White, 2018).

The need for the biomass inventory arose out of several inquiries related to Pinon Juniper. In addition, there were questions about the transportation infrastructure, labor market and existing harvesting and processing capabilities (Rifesnyder, 2018). The coalition, comprised of Yavapai County, Yavapai-Prescott Indian Tribe, City of Prescott, and City of Chino Valley, sponsored staff and resources to conduct the biomass inventory. Through combining resources, these participants were able to compile the information being sought by interested parties.

In many ways the forest product manufacturing industry is much more established in Navajo county than the Yavapai County due to the existing stewardship contracts, and existing private investment in this sector. However, the coordinated effort to bolster information about forest resource inventories and the link this provides to potential economic development is missing in Navajo County. A coordinated group of entities working to provide information to potential developers, while promoting existing forest product manufacturers in the area could possibly improve the viability of existing entities in this sector while attracting new investment that could possibly alleviate the biomass bottleneck. Services this coalition could assist in providing industry may include: inventory of biomass (including Pinon Juniper); enhance understanding and marketability of the wide range of forest products coming from the area; identifying economic values of services provided by sustainable forestry practices (e.g. carbon sequestration, reduced fire risk, etc.); promoting policies that would incentivize additional forest restoration; educate public about the link between forest health and forest product manufacturing / biomass power.

Following the Upper Verde River Watershed Protection Coalition's example, one strategy for establishing such an effort would start with a local entity (such as the Little Colorado River Resource Conservation District or Eastern Arizona Counties Organization) who is in position to coordinate with relevant entities, secure financing or funding for studies, and promote results of the study to the public and key stakeholders.

4.10 PACIFIC NORTHWEST TIMBER COMMUNITIES: RECREATION, FOREST RESTORATION, REMOTE WORKERS

Historically, timber production has been a major economic driver throughout the Pacific Northwest, particularly in Oregon. While modernization, industry restructuring, and global competition were transforming the industry and community economic dependence on it in the latter half of the twentieth century, a major shock to the industry occurred in the early 1990's (Doghue, 2007). In 1991, a court injunction halted new sales of federal timber on federal lands in much of the Pacific Northwest to protect the habitat of the northern spotted owl. Primary wood products employment dropped by 30,000 jobs between 1990 and 2000. However, this occurred across a backdrop of a regional economy that gained 1.4 million jobs over the same period. **The experience of communities throughout the Northwest in response to reduced natural resource extractive activity (timber harvests), and the way that community economies have transitioned, and in some cases, thrived, also provides several best practice lessons for Northeast Arizona.**



Logging Crew in early 1900s in Pacific NW

To meet Endangered Species Act requirements while mitigating impacts to forest communities, the federal government developed the Northwest Forest Plan (Plan). The Plan included elements intended to maintain a certain level of timber harvest, as well as assistance strategies for affected communities, including the Economic Adjustment Initiative (EAI) that invested \$1.2 billion to provide loans to businesses, develop local infrastructure, retain workers, and fund ecosystem restoration projects (Doghue, 2007). However, the initiative elements to fund ecosystem restoration did not “create sustainable local jobs comparable to the number and quality of jobs lost” (Doghue, 2007). Rather, economic transition stemmed from action by community leaders and residents to transition to other regional strengths and to position their communities as attractive to location-neutral workers.

Effects of the Plan differed dramatically among communities. Specifically, socioeconomic monitoring of the 1,314 forest-dependent communities revealed that between 1990 and 2000 the socio-economic well-being (as measured by six indices related to education, employment levels and diversity, poverty, income equality, and travel time to work) increased in approximately one-third of communities, decreased in another one-third, and remained approximately steady in the remaining one-third. Socioeconomic well-being was not as dependent on timber flows as previously thought, many other factors affected well-being. Factors that determined community ability to transition included:

1. Community cohesiveness
2. Civic leadership and community capacity to seek help and respond to economic stress
3. Connection to regional economies
4. Size and sophistication of the communities
5. Availability of alternatives and the infrastructure and capacity to develop those alternatives.

Communities that successfully transitioned often employed the following strategies:

1. Adapting to reduced timber harvest by **developing and depending on the following in industries: agriculture, recreation and tourism, regional trade, and tribal business and administration;** and
2. Re-defining and re-focusing forestry jobs on fuel reduction (such as through thinning), manufacturing wood products from small diameter wood, and using biomass for energy generation; and
3. **Focusing on developing infrastructure and amenities to attract location-neutral workers** (including small businesses, commuters, and amenity-seekers).

However, even in communities that have adapted well, the transition involved outmigration of workers who were displaced, and the economic dislocation of former timber workers who are now in lower paying or seasonal jobs in the service, construction, or tourism sectors (Doghue, 2007). The transition also often entailed in-migration of new residents seeking recreation and scenic amenities provided by forests, who often have a different perception of natural resource management that may conflict with traditional views held by long-time residents. For example, Coos Bay, located near the Oregon Coast, is a former timber and fishery dependent community that has done relatively well in transitioning into a more diversified economy. Thriving economic sectors include retail trade, real estate, medical care, and tourism. However, not all residents have welcomed the transition that to some have altered the identity of the town, and “to the regret of some long-time residents, it’s not the place it was.” (Doghue, 2007). Development of a shared vision of the future that meets residents’ needs and addresses community concerns, as well as demonstrating the positive impacts of the vision, is critical to limit the challenges of transition and to facilitate success.

5 STRATEGIES FOR NORTHEAST ARIZONA

This section identifies and recommends strategies for enhancing rural economic development that have been successful in other areas. Many of the strategies in this chapter were highlighted in the case studies in the previous section that showcased communities and regions that had successfully transitioned from resource extraction or reliance on a single industry to a more diversified and resilient economy. As highlighted in the preceding chapter, rural regions that have diversified their economies have commonly employed the following strategies:

- Engaging the community, including engaging with each Native community (recognizing the diverse viewpoints among and between tribes) in order to develop a shared vision for the path forward; and
- Enhancing quality of life, including investments in downtown redevelopment and other infrastructure, services, and amenities to attract businesses, residents, and visitors;
- Nurturing local regional networks, state partnerships, and leveraging these to obtain funds and support;
- Investing in regional branding initiatives to market regional products and regional strengths to benefit local businesses and/or attract visitors, residents, and new businesses;
- Developing other industries that draw on the region's strengths, with the following diversification elements showing success across many other similar regions: local food systems, recreation/tourism, and entrepreneurship.

Apart from the last point, on developing or enhancing other industries, addressed in later sections of this document when economic diversification opportunities are discussed, each strategy is separately addressed in the sections below.

As a finding from an EPA study of successful economic development in small towns concluded:

“While most economic development strategies involve some recruitment activities, many successful small towns and cities complement recruitment by emphasizing their existing assets and distinctive resources. Even if the community has lost its original or main economic driver, it has other assets that it can use to spur the local economy and rebuild its economic foundation.”

This section identifies several strategies for how Northeast Arizona can build on its assets to invest in the business environment and position the region for economic growth.

5.1 SHARED COMMUNITY VISION

Throughout the case study examples, there is a common thread that a shared community vision is central to a successful economic transition. Communities need to decide what they want to be strong in and what their economic identity is, and then focus their infrastructure investments, quality of life efforts, workforce training, marketing and branding, and business attraction/retention/expansion efforts accordingly. What does Northeast Arizona want as its economic identity? What are its goals for

growth? For quality of life? Which industries does it want to excel in? For example, Oden, Utah (as described in section 4.2) determined to become an outdoor recreation mecca – and identified investments and marketing strategies to attract outdoor recreation tourists as well as the outdoor recreation manufacturing industry. Bend, Oregon is cultivating an image of a town for young, active entrepreneurs and knowledge workers, and is developing the cultural, historic, recreation, and entertainment resources that are attractive to this population.

The Northeast Arizona region and its communities have limited resources to devote to economic development; a clear, strong vision of the future will help to prioritize its economic development efforts. As noted in the ASU Morrison Institute’s 2001 Five Shoes report regarding the state’s economy, Arizona as a whole has a “Fuzzy Economic Identity” which it must clarify to define a clear set of goals that matches the high-potential opportunities of the future. Defining that vision and identify requires answering two fundamental questions: 1) what are Northeast Arizona’s most important assets? and 2) Where does Northeast Arizona want to go? Answer these questions, and the region can decide which opportunities are good for its future and which are not. Given the strength of the outdoor recreation environment in the region, developing the brand associated with this asset, and investing in related amenities and activities (whether the focus be hunting, biking, hiking, high altitude training, archery, etc.), will likely play a prominent role in this vision.

Defining a vision with strong buy-in from community leaders and residents is important. Economic transition can involve not just economic dislocation but also social challenges. Transition often includes new residents, visitors, or industries that may influence the identity of a community and a region – so it is important to articulate that future identify clearly and have strong community support for the vision. Development of a shared vision of the future that builds on the region’s assets, addresses its weaknesses, and also meets residents’ needs and addresses community concerns is critical for communities to successfully navigate and embrace economic transition.

Several lessons can be drawn from the experience of the West Virginia Hub, which specializes in working with communities to develop a post-coal vision of a diversified local economy. In their experience the following steps are critical to developing a vision and generating community buy-in:

1. Ensure input from diverse mix of people, including elected leadership, volunteers, leaders of community organizations, tribal nations, and business leaders. Attaining the right mix of attendees merits substantial time and effort investment.
2. Create a welcoming and neutral space where all people are comfortable speaking and participating. Churches and community centers are often good meeting locations. The venue should avoid stages that focus attention on one speaker or group of speakers, and should also provide tables for small group productivity.
3. Avoid political discussions about reasons for economic decline, and stress benefits of diversification even if there is a resurgence in existing sector activity.
4. Demonstrate the positive changes that can come from economic transition to mitigate fear and confusion. Peer sharing programs and examples from other communities can be effective.

Specific questions that the region may want to address include: Does Northeast Arizona want to first and foremost be known as a retirement, tourism, and second home destination? Does it want to be known for an active, rural lifestyle with strengths in sports, athletic training, outdoor recreation, and the outdoor recreation manufacturing industry? Does it want to be known as an entrepreneurial rural area with strong small businesses and opportunities for families wanting a rural, high quality of life lifestyle?

5.2 QUALITY OF LIFE: ATTRACTING WORKERS, RESIDENTS, COMPANIES

As highlighted throughout the case studies, economic growth in many areas is closely related to a high local quality of life. Put simply, people from business Chief Executive Officers to retirees to millennials are drawn to live and to recreate in areas with nice amenities – including cultural, natural, and built environment amenities. With the digital revolution, and the freedom it provides to work anytime anywhere, more and more people, particularly those working in the ‘knowledge economy’ can choose to live where they want. In this world, quality of life, and the associated image of a region to prospective residents, really matter. As noted throughout the case studies section, whether it is Bend, Oregon or Ogden Utah or timber communities in the Pacific Northwest, investing in an attractive, high quality of life environment is critical to attracting creative and highly skilled workers who can drive economic development.

In general, the factors influencing quality of life include cost of living, transportation infrastructure, educational opportunities, easy access to work/shopping/retail/recreational destinations, healthcare accessibility, housing choices, recreational amenities, and cultural and social opportunities. For some of these factors, rural regions such as Northeast Arizona face specific challenges because small communities often lack the capital investments to improve their infrastructure and support diverse cultural and social amenities. As such, Northeast Arizona needs to compete in different ways, focusing on quality of life factors such as a strong sense of community, access to open space, proximity to recreational amenities, weather, and small town culture. The area also has an advantage in its relatively low cost of living, and in the relative proximity of neighborhoods and communities with diverse housing costs.

We first discuss general findings from the literature and case studies on quality of life attributes and strategies; we then discuss specific findings relevant to three types of residents: workers new to the area, workers returning back home to the area, and retirees. As highlighted in the section below, mobile professional workers, self-employed individuals, and entrepreneurs like to live in areas with high quality of life, and high quality of life partly depends on having professionals such as doctors and teachers that provide desired services. Furthermore, a higher quality of life and a more diverse economy with more diverse services can in turn attract industrial and manufacturing employers. **A quality of life development strategy thus can benefit and aid in developing all sectors of an economy, and thus generate a more diversified, self-reliant, and resilient economy less subject to and dependent upon outside market forces driving changes in the energy industry.**

Northeast Arizona has numerous quality of life assets to build upon. Natural environment amenities, such as the climate, sense of community, low cost of living, and diverse recreation opportunities are strong assets in the region. Cultural attractions related to Native American lands, art, and culture are also strong assets. Weaknesses include relative geographic isolation, limited retail shopping

opportunities, and infrastructure gaps, particularly related to broadband (addressed in section 6). Some of these, such as geographic remoteness, the region cannot change. But there are other weaknesses that the area can address. Two primary weaknesses associated with economic development (as highlighted in the previous section's case studies) that the counties and cities in the region could collectively and individually address:

1. Increasing offerings in terms of arts, entertainment and recreation (a sector that is currently under-represented across the region) that are appealing both to workers and to visitors, and
2. Enhancing the attractiveness and vibrancy of downtown core areas.

By addressing these two elements areas, which often go hand and hand, the region may be better able to attract and retain professionals, creative workers, small business owners, and remote workers. Such workers can provide services to the community, and also add to the regional economy and provide momentum for an increasing quality of life for all residents.

Downtown redevelopment and revitalization is at the core of many successful community economic rejuvenations.¹² An attractive and vibrant downtown attracts new businesses and customers, new residents, serves as a tourist attraction, and can also provide social value by providing public gathering spaces and reflecting civic pride and community identity. Investments in downtown areas tend to have ripple effects throughout communities as it often inspires investments to enhance properties elsewhere in the community by other community members and businesses. Many communities motivate investment by making the process easier for developers and community members: streamlining the development process, providing technical assistance, giving tax relief or tax credits, and creating information guides.

Downtown redevelopment is most successful when it is based on a shared community vision, and when it builds on the specific historical, cultural, and geographic assets of the downtown area. Specific steps for downtown redevelopment may include:

- Cataloguing downtown buildings,
- Advertising community to developers,
- Promoting pedestrian and bike friendly areas,
- Developing greenspace connections,
- Recruiting businesses downtown and providing relocation services to reduce vacancy and provide infill,
- Subsidizing rent (one town, Paducah Kentucky, identified a dilapidated area of town for development into an artist enclave by establishing an Artist Relocation Program and sold or rented space to artists for as little as \$1, and provided the artists business and marketing support; the result has been a thriving neighborhood with galleries, shops, and restaurants),

¹² Downtown renewal was identified specifically as a strategy by the Arizona Department of Commerce in an interview for this study regarding development Northeast Arizona.

- Developing quality housing,
- Financing façade improvement programs,
- Increasing tree cover and landscaping, and
- Advertising the community to developers.

Additionally, the region should consider engaging in a concerted effort to identify key, quantitative quality of life indicators to measure current conditions, community quality of life goals, and measurement of progress in achieving those goals. Identifying key indicators makes it possible for policymakers and interested citizens to look at a more manageable set of numbers when assessing changes in quality of life over time. The process of choosing key indicators also helps citizens and policymakers realize gaps in their current information.

Considerations in quality of life indicator selection:

- 1) What is quality of life to the community – which factors are important to the community?
- 2) Which factors are locally influenced? (Climate and geography may play a role, but are static and not locally influenced. Similarly, coal prices play a role, but are not locally influenced)
- 3) What is the relationship between different factors?
- 4) What indicators will reflect not just the ‘average’, but the community as a whole?
- 5) What indicators will we be able to collect and analyze long-term?
- 6) What area(s) is/are our benchmark?

These criteria for indicator selection include clarity, availability, reliability, policy relevance, and reflection of community values. As an example for the region, **Table 5-1** provides some sample indicators that are readily available from Census and other data sources. Data shaded in dark grey identify areas in which the jurisdiction within Northeast Arizona has a higher quality of life compared to the United States as a whole (based on the assumptions that more education, higher income, more income equality, higher employment rates, and greater housing affordability lead to higher quality of life). As shown in the table, a key strength for the area is the relatively low cost of living, diversity of housing and community choices at different price points, and relatively short commute times. It is important to note that these data are from 2016, as this is the most recent data at the time of analysis that is available for the communities in the study area to allow for within-region comparison. Several economic characteristics have changed since then, notably unemployment which is much lower in 2018 than it was in 2016. (As of April, 2018 Apache County unemployment has dropped to 9.2 percent while Navajo County unemployment in April 2018 was 6.9 percent; these are still higher than the state and national unemployment rates—not seasonally adjusted—in April 2018 of 4.4 percent and 3.7 percent, respectively.)

However, apart from generally faring well on measures regarding commute time, income inequality, and housing affordability, the region as a whole has work to do to attain the national average on several aspects of quality of life. Communities with quality of life indicator projects that can serve as resources if

the region decides to undertake a quality of life indicators project include Austin, Texas; Seattle, Washington; and Jacksonville, Florida.

Apache and Navajo Counties Economic Assessment & Strategy

Table 5-1: Example Quality of Life Indicators for Northeast Arizona

Metric	US	AZ	Flagstaff	Apache County	Navajo County	Show Low	Pinetop-Lakeside	Taylor	Holbrook	Winslow	St. Johns	Eagar	Springer-ville
Education													
% Population 25+ Years with High School Diploma or Equivalent	87%	86%	92%	78%	82%	91%	92%	85%	87%	78%	91%	89%	82%
% Population 25+ Years with Post-Secondary Degree (Associates or More)	38%	36%	54%	18%	22%	29%	34%	29%	20%	17%	17%	39%	23%
Income													
% Families with Children under 18 Receiving Social Assistance such as Food Stamps	22%	25%	25%	38%	45%	46%	20%	21%	42%	48%	18%	14%	43%
% Poverty Level	10%	12%	23.3%	24%	20%	12%	14%	9%	14%	13%	11%	8%	21%
Income Inequality: Ratio of Highest Quintile to Lowest Quintile Income	16.34	15.27	17.92	25.28	18.60	12.44	15.45	12.66	9.69	20.57	11.69	8.68	11.37
Median household income (\$1,000s)	\$55K	\$51K	\$59.7	\$32K	\$37K	\$45K	\$58K	\$45K	\$51K	\$34K	\$42K	\$58K	\$37K
Employment													
Labor Force Participation Rate	63.5%	59.5%	67.1%	40.4%	48.8%	52.9%	47.6%	63.0%	56.6%	45.7%	56.5%	53.2%	57.6%
Unemployment Rate, 2016, Age 16 Years and Older	7.4%	8.0%	7.0%	15.8%	18.5%	7.6%	6.9%	12.8%	6.6%	16.8%	3.2%	7.3%	15.3%
Housing Affordability													
% Renting Population Paying more than 30% of Income in Rent	51%	50%	59%	30%	48%	53%	42%	53%	37%	57%	70%	49%	54%
% Homeowners with mortgage with more than 30% of income housing cost	31%	31%	27%	30%	30%	28%	27%	32%	21%	23%	38%	13%	44%
Median Home Value (\$1,000s)	\$185K	\$177K	\$280K	\$78K	\$106K	\$137K	\$193K	\$124K	\$78K	\$82K	\$88K	\$163K	\$123K
Median rent	\$949	\$937	\$1,090	\$503	\$681	\$810	\$816	\$827	\$680	\$612	N/A	\$777	\$629
Commute Time													
Less than 25 minute commute to work	57%	57%	88%	58%	71%	85%	78%	55%	78%	91%	79%	59%	70%

Sources: US Census Bureau and Uniform Crime Reporting Statistics (UCR Data Online).

Note: Values in grey indicate that the measure indicates a more desirable attainment level (i.e., higher quality of life) in this area than the Nation as a whole.

5.2.1 New Workers

Much economic development effort focuses on attracting firms; however, focusing on attracting talent to the local area is another approach. This approach, often complementary to attracting firms, focuses on attracting workers who are self-employed, own their own professional firms, or have the flexibility to work anywhere. Attraction efforts are aimed at local investments in quality of life, and then marketing positive images of the community to prospective workers.

The attraction and retention of workers can be key challenges for individual business, communities, and entire regions. There is a competitive market for mobile, skilled labor. Attracting and retaining sufficient skilled workers enables businesses to thrive and grow, and creates a more productive and positive work environment for the entire labor force. For the community, the presence of skilled workers is necessary for the provision of quality healthcare, education, and other professional services. A shortage of skilled workers and a lack of the associated services can lead to a downward spiral in rural and remote regions especially, with more people departing the region and jeopardizing the sustainability of individual communities. Regions may be better able to compete for skilled labor if employers and communities work together to develop approaches to attract and retain workers in rural and remote areas (Becker, Hyland, & Soosay, 2013).

The competitiveness and attractiveness of a region depends on such factors as location, weather, available infrastructure, quality of life, cost of living, and cultural/social/recreational amenities; improving these factors facilitates the attraction and retention of skilled and highly mobile workers. In turn, attracting retirees and skilled workers seeking these amenities supports the process of regional growth and rejuvenation, including enhancements to economic and social activity (Boschma, 2004) (Jessop & Sum, 2000). In order to attract and retain residents and highly skilled and mobile workers, regions need to focus on enhancing these services and amenities, and marketing these qualities.

Rural and remote communities in particular, need to promote their attractiveness to potential visitors, residents, and employees. Such marketing should target specific groups such as mid-career or end-of-career employees and should include developing a positive image, as well as focusing on specific actions to enhance the quality of life and local infrastructure desired by these groups (Malecki, 2004). To effectively market, it is important to identify and enhance the inherent strengths of the local community, and to effectively emphasize and communicate the positives of living and working in the community.

5.2.2 Former Residents

A specific type of worker that can be a target of economic development efforts are individuals who left the area after high school. There are many potential positive effects of attracting young to mid-career workers back the region, many of whom may have left to obtain college degrees or other specialized training as well as get valuable work experience. The benefits of people in their 20s and 30s returning home to Northeast Arizona include adding to the labor force, increasing school enrollment, diversifying the local knowledge and experience base, and increasing the pool of individuals capable of taking on key, long-term social and economic leadership roles in businesses and community organizations.

Throughout the course of this study, several individuals noted that outmigration of young people (sometimes referred to as 'brain drain') is an issue in Northeast Arizona. While most people cited the

lack of jobs as a reason, there are likely other factors affecting these decisions, some of which can be addressed at the community level. Also, it is important to note that some researchers believe that “Return migration strategies may prove more effective than attempts to retain young people in the years right after high school. For talented and motivated youth, leaving rural communities is a necessary, inevitable, and highly encouraged rite of passage from adolescence into adulthood” (Cromartie, von Reichert, & Arthun, 2015). It may also be more beneficial to the community – by leaving the community, return migrants often bring back skills and experiences acquired elsewhere. This, in addition to their commitment to their ‘home’ region, enables them to start businesses, fill highly skilled local jobs, and be leaders in their community that positive impact their communities (Cromartie, von Reichert, & Arthun, 2015).

Relatively little research has been done on the strategies and potential for rural areas to attract home former residents, but one nationwide study by the United States Department of Agriculture (USDA) sheds light on factors affecting return migration. In this study, researchers conducted interviews at high school reunions (with current residents, out-migrants, and return migrants) in geographically isolated, non-metro counties throughout the nation that were experiencing outmigration between 2000 and 2007. These counties also had low-to-moderate natural amenities, and thus were at a disadvantage compared to Northeast Arizona; Northeast Arizona counties are also relatively advantaged as they have generally experienced population growth since 2000. However, the study findings on the factors affecting return migration decisions are likely relevant to Northeast Arizona.

Findings indicate that in this age group (20- to 30-somethings), the most important demographic characteristic determining whether they may return home to where they grew up is whether they have a family or are planning a family. Amongst this young family group, the most common reasons to return are: 1) the desire to be near family, often parents, and the desire of the returnees to raise their children near family, 2) the close community feel (in contrast to relative anonymity in large, urban areas – though on the other hand, too much familiarity can be a reason not to return a well), 3) and ability to take on community leadership roles and meaningful volunteering, 4) shorter commute times to work and shopping, 5) the familiarity of their home area, 6) increased diversity and proximity to outdoor recreation opportunities, and 7) their children’s ability to participate in school sports in smaller schools. Perception of school quality is a primary differentiator amongst return migrants versus other migrants - those who return positively perceive local, more rural schools, while those who do not return often decided not to because of their perception that rural schools would not meet their children’s needs as well as more urban/suburban schools. The availability and quality of other public community facilities, such as swimming pools, parks, and bike paths were also cited as factors in return migration decisions. Similarly, the availability of cultural events, and retail and entertainment options were also factors determining location decisions.

Likely the case in Northeast Arizona (based on anecdotal comments), the USDA study suggests that the most important factors for young people who did *not* return home were perception of low wages and lack of career opportunities in their home region (cited by most non-returnees). Those who did return filled a variety of public and private sectors jobs (von Reichert, Cromartie, & Arthun, 2011). However, creative strategies for employment was often required for those to their rural home region. **Numerous returning individuals were self-employed, mostly in the service sectors, or had started internet-based businesses or worked remotely for firms located elsewhere. These types of jobs require excellent,**

high-speed internet service – a critical piece of infrastructure for Northeast Arizona, as discussed in the next section. A number of interviewees noted that they had made some sacrifices in their career in order to raise their family in a familiar, small-town environment (von Reichert, Cromartie, & Arthun, 2011).

These study findings indicate that return migration can be encouraged through specific types of family-oriented investments in schools and community facilities, as well as through investment in services and facilities (such as high speed internet and co-working spaces) conducive to remote workers and entrepreneurs (Cromartie, von Reichert, & Arthun, 2015) (von Reichert, Cromartie, & Arthun, 2011). It is also facilitated by developing a strong community ‘welcoming’ culture to new migrants, so that such new migrants can develop the social ties that strengthen their connection to the community and long-term prospects for staying. Focusing on enhancing the community characteristics desired by return migrants, and marketing specifically to this group may be a high potential strategy for Northeast Arizona. Reaching this demographic to communicate the benefits of the community (and succeeding in convincing them to relocate) is likely much easier than attracting other types of workers, and upon moving, this group’s roots in the community and existing social network may enable them to make a more immediate and stronger contribution socially and economically.

5.3 BRANDING AND MARKETING

One strategy used to attract target industries and residents is to create a reputation, or brand, and then marketing that brand and associated positive images to prospective industries and workers. In all branding efforts, the environment and quality of life are likely the region’s most important asset and differentiator.

5.3.1 Industries

Across all case studies, regional marketing has been a critical component of success. Regional marketing, simply by virtue of covering a greater area and more businesses, increases visibility and effectiveness. Also, by pooling resources, regional marketing can enable larger-scale marketing of an area. For example, in the Pennsylvania Wilds, regional marketing has enabled them to advertise in national publications and enabled them to develop a sophisticated website, a visitor’s guide, a discover map, and a fishing guide. This would not have been possible for each of the 12 counties, much less individual communities, in the region. A marketing plan proceeds naturally out of a visioning process that identifies the region’s strengths that the region envisions as the foundation for growth in target industries. For Ogden, Utah, marketing of recreation and tourism is closely related to its marketing of itself as a great location for outdoor recreation manufacturing; this connection is also directly relevant to Northeast Arizona.

Another important element in marketing to industries and developing an image is active participation and support at the state level. For example, in the Wyoming example of attracting gun examples (highlighted in Section 4.3), the governor attended industry trade shows and gave speeches about Wyoming as a gun-friendly state. The governor also hosts a national shooting competition as part of a state-wide effort to brand Wyoming as a state that is friendly to the firearms manufacturing industry. In the case of the Pennsylvania Wilds (Section 4.4), the Governor of Pennsylvania established a task force

across state departments, regional organizations, and congressional and county governments to support the nature-based tourism initiative in the Pennsylvania Wilds region.

A regional marketing plan can identify and include such elements as:

- Regional identity and key destinations, events, or products to highlight, such as astro-tourism, or outdoor recreation, or high altitude athletics, or firearm competitions.
- Regional brand and logo that highlights the regional identity.
- Businesses in the region that can be active participants in the marketing, or businesses currently not in the region who should be a target for the marketing campaign.
- Signage design and grant programs for businesses and community centers and gateways
- Regional 'trails' that link cultural, historic, natural, or retail attractions. For example, an astro-tourism trail, or a hit list of key high-altitude training locations.

5.3.2 Attracting Workers and Residents (Returning and Otherwise)

People who are interested in relocating usually find a community in two ways: through recommendations from family or friends (or personal experience in an area) or through a community website (Burkhart-Kriesel et al., 2007). However, both of these strategies can be challenging. In the first information pathway (through family or friend networks), current residents often don't understand the importance of their network of family and friends as a potential recruitment tool, or know which community features to highlight to portray a positive image of the local quality of life. A similar challenge for local community websites is determining which local assets, opportunities, and links to regional resources to include to best highlight the local quality of life (Burkhart-Kriesel, 2013). Both of these challenges can be met by the first strategy discussed in this section - defining a clear community vision and identify what the community offers that is attractive to returning residents.

Developing a marketing strategy specific to attracting back workers and families who have roots in the area may include the following four step process (Burkhart-Kriesel, 2013):

- New Resident Research. What factors and community characteristics brought back recent returnees? What skills/expertise did they bring? Is this the same demographic that the community wishes to attract, or does the community need to reach out to other new groups?
- Identify Target Residents. Which demographic groups would likely find appealing the assets of the community? Also, identify the residents that the community wishes to attract, and what weaknesses of the community need to be addressed to meet the needs of that group. For example, if a target market is young families, then a key asset would be an excellent school system. A weakness that might need to be addressed is quality and affordable childcare.
- Develop and Deliver the Message to the Target Market. Communicate what the community can promise to new residents. What are the key sound bites and messages? Is there an associated slogan/graphic or community brand that can be used? How is the message going to be delivered- what are the key media and contacts for this target group?

- Develop an Action and Evaluation Plan. Identify the details of who, what, when, where, and how to guide the implementation of the plan, and identify milestones to evaluate progress.

5.4 BUSINESS ENVIRONMENT

The business environment is another factor influencing the establishment and growth of local businesses, and the attraction of new businesses. As highlighted in the case study section, factors affecting business climate include: skillsets and education level of local workforce; level of support for innovation and entrepreneurship; availability of investment funds and business advice; formal and informal networks and venues that facilitate the transfer of business and industry knowledge and skills, infrastructure (including transportation, broadband, educational institutions, hospitals, utilities), tax structure and incentives; and the level of local and regional collaboration between the government, businesses, and educational institutions. This section explores some of the strategies associated with the community's role in cultivating a positive business environment that is conducive to economic development.

5.4.1 Entrepreneurial Culture and Small Business Support

Developing an entrepreneurial community includes two elements 1) developing the capacity of entrepreneurs themselves – their ability to develop the necessary skills to grow their businesses, and the 2) building the capacity of the community to support entrepreneurs (Markley, Lyons, & Macke, 2017).

As highlighted in several of the case studies in the preceding chapter (such as the technology start-up industry in Bend, Oregon and nature-based tourism in the Pennsylvania Wilds), many of the challenges associated with developing small businesses are related to the level of skills and capacity in the workforce and with business owners. Other challenges may include finding entrepreneurs, and helping people discover that they can be an entrepreneur. Once people are excited about starting a business, addressing human capital needs is critical for establishing and growing businesses. However, business owners' and entrepreneurs' capacity is also affected by the capacity of their community – their ability to access the resources (financial, technical, infrastructure, etc.) the need is often influenced by their larger community and its commitment to entrepreneur-focused economic development.

For example, in the Bend case study (see **Section 4**), development of the start-up technology industry faced numerous challenges associated with labor and management, including: shortage of business owner and manager skills in finding funding, marketing, customer relations, and product development; limited industry understanding of regulations; struggles with access to capital, and lack of business owner previous experience with the technology industry. Other difficulties were encountered in the Pennsylvania Wilds case study, in which economic development from tourism was hindered by a lack of supporting businesses as well as a lack of retail infrastructure and marketing skills for products and services produced by existing businesses and artisans.

Different types of entrepreneurs and small businesses need different levels and types of support. For example, self-employed workers may need limited community support. Even these workers, however, often desire a 'coffee shop' culture that provides a space to work outside of their homes, or may desire

co-working spaces that also provide some networking and information sharing benefits. These same amenities benefit remote workers.

Businesses of all types benefit from improved infrastructure, such as enhanced broadband services (see discussion in the next section). Many also rely on access to an airport, so continued service at the Show Low airport is an important piece of the region's infrastructure.

Based on the experience in other regions, successful elements of an entrepreneurial ecosystem may include:

- Developing mentorship programs and economic networks that connect existing business leaders and advisors with entrepreneurs and small business owners. This is likely the most important aspect of developing a growth environment for small businesses and entrepreneurs. This is a huge opportunity for Northeast Arizona – with the second home owners in the area, the potential to tap into the business experience and skillsets of this population may be a tremendous asset to the region in developing an entrepreneurial culture. These individuals may provide mentorship, capital for investing in startups, and connections to related businesses and advisors in Phoenix and beyond.
- Training workshops through local extension programs, federal or state agencies, or educational institutions that focus on small business skills, opportunities in local industries, and entrepreneurship.
- Developing a guide for starting and growing a business that provides information on local resources, permitting and zoning, tax policies, and steps and resources to get business loans.
- Pooling resources regionally to leverage collective assets, and providing one-stop small business support services at the county or regional level. These may include libraries of entrepreneurial and small business resources, one-one-one technical assistance and mentoring, downtown relocation services, and loan/funding programs.
- Funding a small business ombudsman or industry outreach specialist (as created for the Pennsylvania Wilds initiative and for the Ogden outdoor industry), who helps market the region and assists small businesses leverage the benefits of regional initiatives.
- Developing support facilities for small businesses, such as shared office spaces for remote workers or incubator spaces that can be shared by multiple new businesses.
- Investing in workforce development programs geared at developing the workforce for target industries.
- Developing sources of seed capital for entrepreneurs. This could be tied into a business support network and review board that could oversee a loan fund and provide continued mentorship and business development advice to the fledgling businesses.

5.4.2 Incubators and Shared Remote Work Spaces

Business incubators provide educational and resource support to entrepreneurs and businesses. Support resources include trainings, funding, work spaces, and networking opportunities. There are many community-wide benefits to business incubators. Businesses that have been through an

incubation program stay in business longer and within the community longer than businesses that haven't been through an incubation program (Downey). In addition, Incubator programs have a high rate of return. On average, for every dollar of public investment, \$30 dollars of local tax revenue is generated (Knopp, 2012). There are likely many residents of Northeast Arizona with skills that could be turned into a profitable businesses – provided the right level of financing, business skills support, and mentorship were available.

Communities with a high proportion of residents with small business licenses (at least 10 percent) would be a good fit for a business incubator, especially when these businesses are run from home. According to the Director of the Maricopa Center for Entrepreneurship (MCE, an incubator in Maricopa, Arizona), successful business incubators are often grass roots-based, with local business people developing the process of contributing to other entrepreneurs with regular meet-ups (Baker, 2018). The most successful incubator programs have well developed regional networks, which increase staff efficiencies while expanding incubator resources and potential markets (Sills Ventures). Incubator formation relies on the following four factors: entrepreneurial climate, availability of start-up capital, and information networks and innovation, which can sometimes be difficult in rural regions (Downey). New programs should reach out to local politicians for potential support and introductions as well as identify key players in the local business landscape interested in participating in the incubator program (Baker, 2018).

In the experience of the MCE, for a new incubator program, consistency and presence are key, with a brick and mortar location being secondary (Baker, 2018). Program policies and procedures are the largest influence on incubator success rather than location, whether urban or rural (Sills Ventures). Rural incubators do face unique challenges with fewer local resources and potential clients. Additionally, rural incubator programs have better outcomes when they use client advisory boards with at least one incubator graduate and/or when they have program managers who are highly skilled in business development (Sills Ventures).

For early funding needs, local businesses may help support the incubator, together with financial institutions for sponsorships. Clear measures of business advancement are important for business incubators, so it is important to create or purchase a curriculum program with clear measures of progress for entrepreneurs. In the experience of MCE, doing so creates order, practice, and reliability, important measures to potential funders (Baker, 2018).

Business incubator programs face numerous challenges. Political tension can arise due to funding sources and goal alignment. The city of Maricopa funds MCE, and differences between Maricopa goals and MCE goals can create undue tension for the small MCE staff (Baker, 2018). Another challenge to business incubator programs can simply be to get the word out about the existence of the program. For example, MCE is a free and successful program without a marketing budget, so much of the entrepreneur recruitment has been word of mouth (Baker, 2018). Rural incubators can face additional problems ranging from low education levels amongst residents, lack of available land for business use, resistance to change, and different economic and community goals (Downey).

There are many such programs currently available to entrepreneurs in Arizona, with differing goals and types of businesses served. Maricopa Center for Entrepreneurs (MCE) is a city-funded incubator program to support small businesses from idea to exit. The original funding for MCE came from

Maricopa City with a minor portion coming from Northern Arizona Center for Entrepreneurship and Technology (NACET). The city of Maricopa funds MCE ongoing operations with \$150,000 a year. MCE is part of three business innovation centers around Arizona. The other two include the NACET center in Flagstaff, which serves technology businesses in search of funding, and Chandler Innovation Center, which serves scalable technology companies (Baker, 2018).

MCE on the other hand serves primarily small family-owned lifestyle businesses, in search of growth while maintaining family ownership. MCE provides performance programs, co-working spaces, mentoring opportunities, business events, and training resources to its members. MCE served 187 entrepreneurs in 2017 and has served 66 so far this year. Only two or three entrepreneurs rent a desk from the five available co-working desk space. Some entrepreneurs served by MCE drop in for support, while others are located in very distant locations (e.g. Oregon, Texas), and phone in for help and advice but don't come to the physical office (Baker, 2018).

A key part of an incubator/accelerator strategy in Northeast Arizona could be to develop partnerships and links between the business community and the population of second home owners in the area. As noted in Section 4.2, the case study on Bend Oregon, a network of retired or active business leaders in the area can serve as a tremendous asset to the region. These second home residents, many of whom have had successful business careers, are a resource to the local business community and may be valuable mentors, advisors, and investors to businesses in Northeast Arizona. They may also be able to facilitate the transfer of important information and skills, be advocates and marketers of the region to potential workers and businesses, and can also provide valuable connections to businesses in the Phoenix metropolitan area that may be looking for services or supplies that could be sourced from Northeast Arizona businesses.

5.4.3 Broadband

Over the last 25 years, internet access has become a vital component of a modern society and economy, and it is vital to the viability and growth of many businesses. Within a community, access to the internet and the speed of the internet connection can determine the viability of industries, the markets available to businesses, the productivity of employees, the quality and availability of educational resources, and cultural participation. Galloway, Sanders, and Deakins (2011) examined firms in rural Scotland and found that a sufficient internet source allows rural small businesses to provide a heightened level of service and reach customers in local and global markets. Broadband can also allow rural areas to overcome limited labor markets by providing internet-based education and job training. This can also help rural areas reduce a trend of young people move to urban areas for higher paying jobs (Hupka, 2014). Put simply, broadband enables access to markets, education, job training, and remote work possibilities, and also enhanced quality of life for residents.

This section highlights the economic development benefits of implementing a regional strategy (as is already being undertaken) to increase the availability and adoption of high-speed internet. As cited below, numerous studies indicate that access to and adoption of high-speed internet (which we use interchangeably with the term "broadband") is a productive strategy for employment growth and business formation.

Numerous studies have shown that in areas where broadband access increased, there were associated (although not necessarily causal) benefits to household income, the number of businesses, employment and population growth, and productivity. For example, a study of zip codes across the U.S. found that areas with available broadband were associated with a 1.0 to 1.4 percent higher employment growth 0.5 to 1.2 percent higher growth in the number of businesses established over a four-year period (Gillett, Lehr, Osorio, Sirbu, 2006). Another study found that gaining access to broadband in a county is associated with 1.8 percentage points in higher growth employment over an eight-year period, and found the impact to be larger in rural and isolated areas (Atasoy, 2011). Still another study (Kolko, 2010) found that zip codes with at least one provider of broadband access had 6.4 percent higher employment growth and 2.4 percent higher population growth over a seven-year period than those with no broadband providers, and that the relationship is stronger in areas with lower population densities (Hupka, 2014).

While these studies show correlation between broadband expansion and employment growth, it is harder to prove that broadband caused the employment growth. However, one study aimed to show causation by comparing rural counties across the U.S. both before and after broadband was adopted. This study's results showed that total employment growth was lower for counties that had a low broadband adoption rate when compared with otherwise similar counties. Higher levels of adoption resulted in higher growth in median household income and slower growth in unemployment rates (Whitacre, Gallardo, & Strover, 2015). Moreover, this study identified that adoption of broadband is the important variable, not just access to broadband. Other studies have found that adoption is the key variable (as opposed to just increased availability): Koutroumpis (2009) studied 22 countries and found that the higher the broadband adoption by households (as opposed to availability), the greater impact on gross domestic product (GDP) (Centre for the Study of Living Standards, 2013). Whitacre *et al.* (2015) found that broadband availability only improved employment growth in a single industry; others did not benefit unless broadband adoption rates were higher.¹³

5.4.3.1 Broadband Adoption Strategies

Case studies highlight a variety of approaches to expanding broadband in their areas. These range from public-private partnerships to utilizing existing infrastructure in new ways. In this section, we examine these case studies to show a variety of possible approaches Northeast Arizona could take to expanding broadband access.

One method is a mix of charging fees to users and public borrowing. This was the approach Concord, Massachusetts took to building its 100-mile fiber optic network. At the turn of the millennium, residents suffered from inadequate internet access, with dial-up being the only available service for most of the city. In 2009, voters authorized the town's municipally-owned utility to build the \$3.9-million network, which would be paid for by electric ratepayers. In 2013, the town borrowed \$600,000 to fund the startup of an internet access business. The network serves a dual function: It provides the town with smart grid capability and offers residents the chance to have high-speed internet. At the end of 2016, the town's utility was serving roughly 750 customers, who can pay \$89 per month for service up to 200 Mbps under a two-year agreement. The city's smart grid debts will be paid off after 15 years, after which

¹³ The authors found that growth in creative class employment was larger when very high download speeds (>10 Megabits per second, or Mbps) were available (Whitacre, Gallardo, & Strover, 2015).

the system will still provide benefits for another 15 years. These benefits include savings of \$108,000 in annual communications costs and \$88,000 in leasing revenue. By one estimate, a further \$125,000 could be earned annually by further integrating with New England's energy transmission system (Talbot, Warner, Crawford, & White, 2017).

Marathon County, Wisconsin offers useful case study in how to expand a broadband network in a rural area while minimizing the amount of public investment and new infrastructure. In 2009, most rural areas in the county had very slow internet access or none at all. Recognizing the problem, the county made a goal to supply fiber connections wherever possible and provide wireless signals of at least 5-10 Mbps. To meet the goal, the county encouraged providers to apply for grants and offered to match their funding. They used existing infrastructure such as wireless towers and water towers to expand the network while saving on costs, and provided incentives to build new towers where necessary. Marathon County's example provides a realistic model for utilizing existing businesses and infrastructure to expand the broadband network while minimizing public investment (Hupka, 2014).

Dublin, Ohio, offers another useful example of a city using public-private partnerships to expand broadband access while avoiding infrastructure costs. In 1999, the city entered into a franchise agreement with Fischel to install a fiber optic network using the city's existing sewer system, avoiding a \$70-million streetscaping investment. Dublin has named its 125-mile fiber optic network Dublink, which was a partnership between the City of Dublin, the Fishel Company, and HighSpeedAir. HighSpeedAir deployed and manages the city-owned Wi-Fi network. As of 2014, the city had spent roughly \$5.5 million to build and upgrade Dublink, but had received an estimated \$35 million on the investment, which included: avoided connectivity costs, revenue from leasing to telecoms and other entities, and gains in employment and tax revenue that resulted from businesses expanding or relocating to the area to take advantage of the connectivity. To pay for the investment, city uses funds from its capital improvements budget, which is supported by a two percent income tax. Dublink was also bolstered by nearly \$1.4 million in local, state, and federal grants (Community Networks, 2014). Dublin's efforts earned the city a place as one of the "Top Seven Intelligent Communities" according to the Intelligent Community Forum in 2010 (Site Selection, 2010).

These examples demonstrate that a combination of public investment, utilizing existing infrastructure, leveraging public-private partnerships, and tapping government resources can offer a means to expand high-speed internet access.

5.4.4 Streamlining Resources for Businesses

Another aspect of creating the right environment is to make it easy on businesses and workers considering relocating to the area by providing easily accessible information and making resources readily available. This can include developing shovel-ready sites at industrial parks and other locations that are primed and ready for new businesses, and providing easy to navigate, comprehensive websites with photos, resources on the area, and potentially informational videos on the area and its amenities and key infrastructure (such as the quality of local schools and healthcare systems, as done for example in the case study of rural Queensland, described in **Section 4.1**). It can also take the form of streamlining land use and permitting processes, such as was done by Gila Bend in Arizona (see case study in **Section 4.6**) to make development less costly and time-consuming for the renewable energy industry.

5.5 REGIONAL PARTNERSHIPS

Developing relationships within a community and across community, county, and tribal boundaries can enhance economic development efforts in many ways. Specifically, partnerships can benefit all parties by:

- Leveraging assets that each entity brings to the table,
- Increasing likelihood of obtaining funding from outside sources,
- Limiting counterproductive competition,
- Increasing networks and cluster effects,
- Enhancing efficiency and reducing redundancy of efforts and investments, such as market research applicable across the region;
- Facilitating communication across industries and agencies to coordinate and enhance mutually beneficial efforts;
- Strengthening and coordinating a unified message for marketing of regional attractions and products.

These partnerships and networks are particularly important in rural areas, to pool the available knowledge, financial, and technology resources. The Pennsylvania Wilds case study highlighted in **Section 3.3** provides an example of a region that benefited from extensive partnerships at every level of government and across private and non-profit entities. Through that partnership, a comprehensive plan was developed to meet the goal of enhancing nature based tourism over a large geographic area. The development and coordinated implementation of that plan, including substantial investment, would not have been feasible without the diverse staff, funds, and resources from disparate local, state, and federal sources. The region's partnerships have also been able to leverage funding, similarly to how Northeast Arizona has levered funding, through the ACC grant.

Both in the case of nature tourism in the Pennsylvania Wilds and in the case of the outdoor manufacturing industry in Ogden, Utah, partnerships between local businesses have also been critical. Development of networks and clusters of local businesses, has connected their products and with the regional brand and enabled collaboration and information sharing amongst related businesses. Businesses can work together to support and promote each other.

Opportunities for partnership abound in promoting the recreation and tourism industries in Northeast Arizona. Specific ideas for such partnerships include the following:

- Marketing of astro-tourism with the Flagstaff region (world-renown for Lowell Observatory and the world first International Dark-Sky City – awarded to cities and towns with commitment to dark sky preservation and restoration. Astro-tourism is a growing 'thing', with dark skies a novelty as most Americans live in areas where they can't even see the Milky Way due to light pollution. Such a regional partnership could work towards additional designations of public lands and parks as 'dark sky parks', developing websites, trails, brochures, and fostering businesses that provide tourism amenities and facilities themed and geared to astro-tourists, as

well as marketing of other regional natural history (the National Monuments for example) or cultural offerings that would appeal to these tourists. Such coordination could include joint marketing with Native American tribes in the area in their tourism development efforts.

- Development, marketing, and small business growth related to a high-altitude training center in Show Low. This high-altitude training center has huge growth potential for the area – both in terms of directly drawing people into the region for events held at the center, but also for projecting an image and marketing the region to people who may not have otherwise visited. With strong regional support, such a center could be a cornerstone of the region’s identity and future, with numerous spin-off enterprises centered on the image of the region as an athletic and outdoor recreation hotspot. Related opportunities could include athletic sports foods-focused small businesses; health food restaurants; athletic events (tournaments, marathons); and related recreational offerings such as family sports camps, youth outdoor camps, spas, and guiding of outdoor excursions and experiences– focusing on recreational or Native American cultural experiences.

5.5.1 Public Private Partnerships

As highlighted in the Columbus Ohio case study, a special form of partnerships, those between public and private organizations, can be source of transformative economic growth. By combining human capital and financial resources, public-private partnerships can help to foster new industries, address community quality of life issues, and develop a positive work and business environment in a region more effectively than governmental efforts alone. The approach to this case study example, and the lessons learned from its leadership, can help Northeast Arizona develop its own successful public-private partnerships. These lessons include:

1. Be inclusive in membership. Include civic, public, political leaders at all levels (city, county, state), and businesses both large and small, and leaders young and old. This leads to more diverse and effective discussion and the ability to address a wider range of issues from a broader perspective, resulting in more diverse and effective solutions.
2. Focus on developing strong inter-personal relationships among the private and public members of the partnership and the partnership and public/political officials. Excellent working relationships can be the key ingredient to successful collaboration on initiatives.
3. Target a key issue that needs addressing in the region. Then focus on that initiative. By keeping initiatives simple, stay focused on the issues the partnership (and the region) has determined are important, there is a greater likelihood of success.
4. Gain the respect of the community at large. Ensure that the initiatives undertaken benefit the community as a whole, and not just the individual interests of people active in the Partnership. Then stay on task and focused on results for that initiative to maintain credibility within the region. Also, spread credit for accomplishments, to further increase trust.
5. Be curious and learn from the success of others. See what other regions are doing on similar issues. Maybe take an exploratory trip to these regions, or bring in leaders from these other regions, to better understand their success and approach.

One step in building regional public-private partnerships would be to consider restructuring the leadership composition of the existing Real Corridor Arizona regional economic development organization. The current leadership is comprised primarily of local government leaders. The organization may be strong and more effective with a more inclusive structure with good representation of business leaders and private companies as well as educational institutions.

As noted above, another key partnership opportunity is developing stronger ties between the second home community and local businesses and institutions. These second home residents, many with diverse and deep business experience and connections, are a resource to the local business community and may be valuable mentors, advisors, and investors to businesses and local institutions in Northeast Arizona.

6 INFRASTRUCTURE

The single greatest infrastructure gap in Northeast Arizona that affects the viability of many potential economic development strategies and several target industries is broadband availability and reliability. This adversely affects the region's ability to grow and attract small business, entrepreneurs, remote workers, while also limiting the market and development opportunities for existing businesses. This recognized gap is being addressed through several partnerships, such that the outlook is positive for increased broadband access in many parts of the region. Additionally, natural gas capacity is insufficient to meet all potential economic development needs and may be a key factor in preventing siting of a large-scale industrial facility in the region. However, no key strategy (as discussed in **Section 5**) or target industry (as discussed in **Section 6**) is expected to rely on significant natural gas capacity, so it may not be a high-priority strategic investment in the region's future. Furthermore, positive infrastructure assets in the region include access to the Apache Rail spur and the Burlington Northern-Santa Fe main rail line, interstate access (I-40), reasonably priced and reliable electricity, and a regional airport with daily passenger flights in Show Low. Other types of social and community infrastructure, such as the social and community networks and institutions that can fully support the business environment and an entrepreneurial ecosystem, are discussed above in **Section 5**.

6.1 INFRASTRUCTURE GAPS

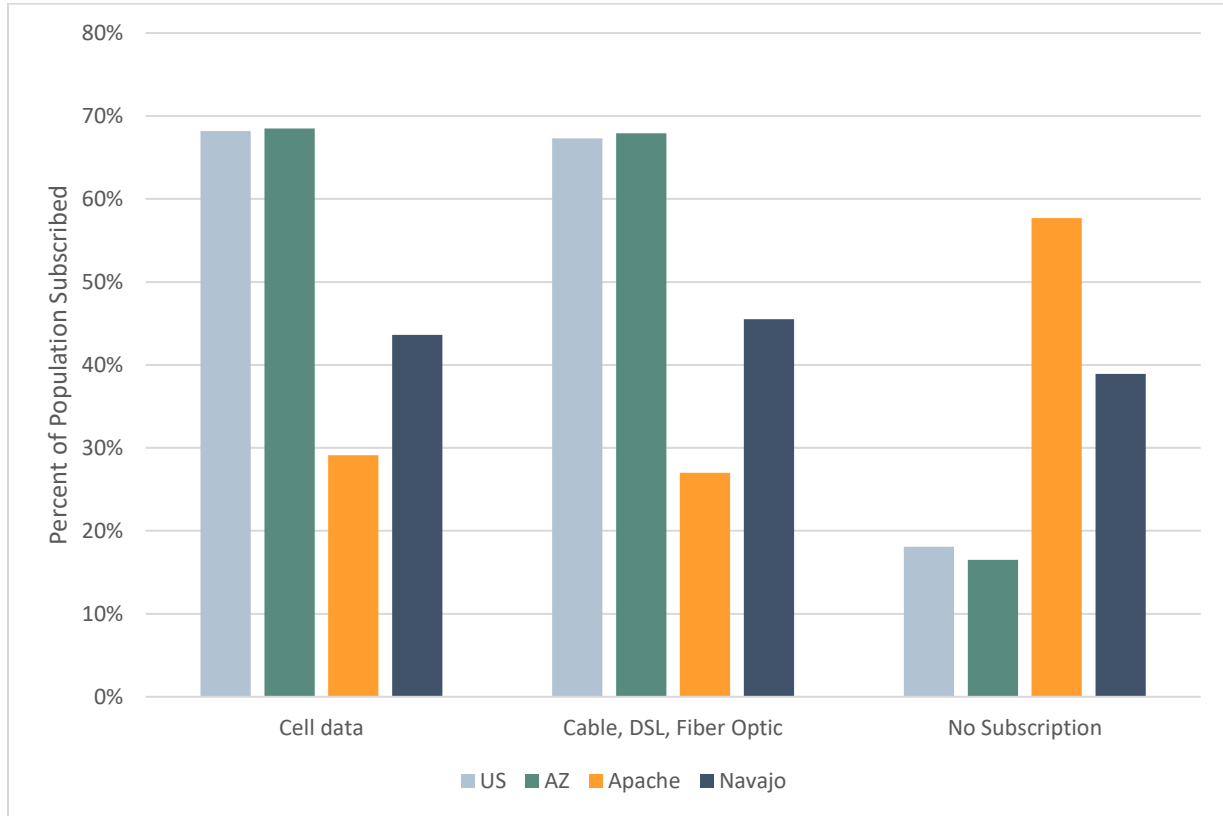
In this section we describe the broadband and natural gas infrastructure in the region, and current weaknesses in this infrastructure. Broadband is a gap that affects many potential economic development strategies in the region – including attraction of residents, growth of small businesses, development of an entrepreneurial ecosystem, and providing access to strong educational and workforce training programs.

6.1.1 Broadband

According to the most recent Census data, Northeast Arizona lags behind both Arizona and the U.S. in terms of access to internet and access to high-speed internet. The figure below illustrates these differences. The U.S. and Arizona are very similar in terms of the percentage of the population with subscriptions to cell data and faster internet connections (i.e. cable, DSL, and fiber optic), with almost 70 percent of the population subscribing to these internet services. However, Apache County's subscription

rate for cell data and high-speed broadband are less than half that. Navajo County fares better but still lags the state by over 20 percent points in both categories. The region also has much higher rates of residents who have no internet subscription at all. In Navajo County, this group accounts for nearly 40 percent of the population, more than twice the rate of the state and country. In Apache County, about 58 percent do not have an internet subscription, a rate over three times higher than Arizona or the U.S. (U.S. Census Bureau, 2016). These figures suggest that Northeast Arizona has a great deal of room to improve its internet access.

Figure 6-1: Internet Subscription Rates in the Region, State, and Country in 2016



Source: (U.S. Census Bureau, 2016)

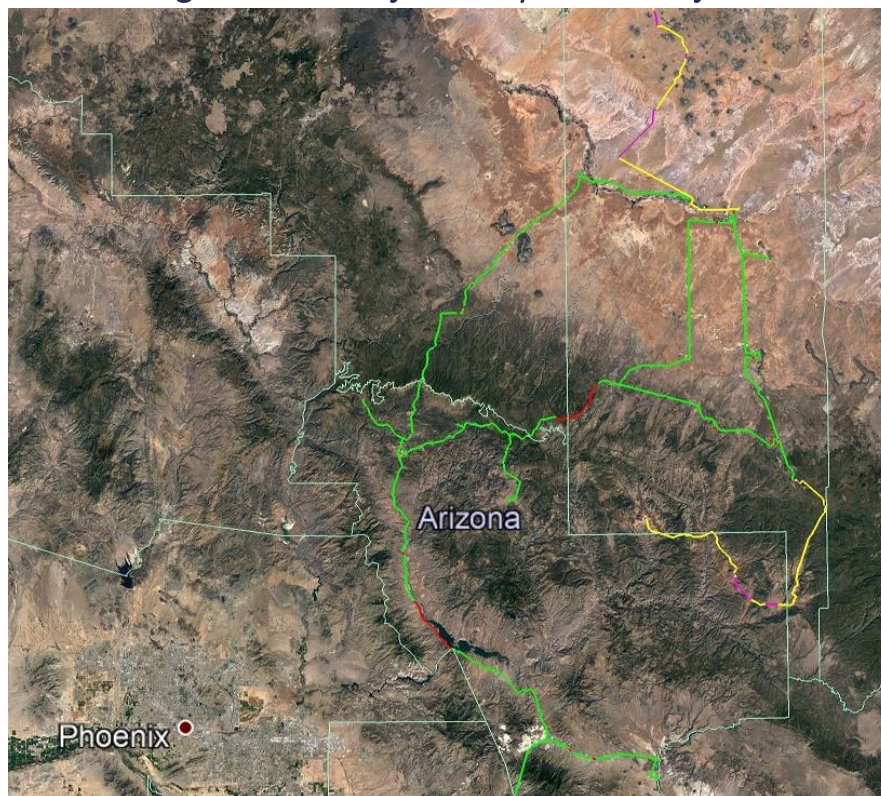
Frontier and Cable One are the two main providers of broadband internet in the area. While these service providers claim the service is comparable to what is available in the Phoenix area, many of the interviews conducted as part of this analysis revealed difficulties in: obtaining the speed of service purchased (e.g. speed of 15 megabit per second (Mbps) purchased but speed tests reveal only being able to obtain 7 Mbps); reliability of service (several service interruptions, and need for duplicity in service); and minimal ability to solve customer service complaints (e.g. when complaints about speed were voiced customers were told to “take it or leave it” without viable solution to problem.¹⁴ Published data on internet availability and speed in Show Low suggests the average speed of internet connections

¹⁴ Residential customers in rural areas of the study have access to internet service via satellite and point to point service providers.

is 14 Mbps, and in Springerville the average download speed is only 2.64 Mbps. These speeds are far below both the state average (26 Mbps) and the national average (30 Mbps) (Broadband Now, 2018).

In light of these challenges and difficulties with the existing infrastructure in the area, and the opportunities for grant funding (specifically the E-Rate program for Schools and Libraries through Universal Service Administration Company (USAC)), several consortiums have formed to address this issue. One consortium involves 51 entities across Navajo and Gila counties. The project proposed by the Navajo and Gila consortium covers over a thousand miles of fiber, at an anticipated cost of \$60 million. Red Rock Telecommunication was the service provider chosen through the selection process, and is expected to begin installation of the fiber network in the fall of 2018, see the figure below (Dewitt, 2018).

Figure 6-2: Navajo County E-Rate Project



Source: (Dewitt, 2018)

Apache County has a separate E-rate consortium, the Apache County School Business Consortium (ACSBC) that covers schools in Red Mesa, Vernon, Sanders, St. Johns, Round Valley and McNary. The proposed project will lay 174 miles of fiber at a total cost of \$11 million (Singleton, 2018).

Historically, the E-Rate program through USAC provided payback for telecommunication services, based on a percentage of operating costs. However, in 2015 it was announced that a two-year program offering capital cost reimbursements would be offered in a competitive award to eligible entities. The State of Arizona further incentivized eligible entities with a state contribution of up to 10 percent of

capital costs. This is the last year of the program and the local consortiums recently found out they've been awarded funding for a broadband improvement project to schools and libraries.

Once installation of the fiber is complete (expected fall of 2019), schools and libraries participating in this program will have more reliable, and faster internet service at a cost per megabit of speed at a fraction of what is was previously paying. Further, because Red Rock Telecommunication is laying 96 pair fiber (and only 12 is needed at the current time to serve the consortium) it is expected the 'middle' mile of fiber infrastructure can be tapped into for other types of customers (hospitals, county administration, commercial, etc.).¹⁵ Due to the connection cost to take it the "final mile" it is unlikely that residential users would purchase service from this network initially.

Another new development in the final mile of broadband service in the area is by Red Rock Telecommunications (the firm selected for the Navajo – Gila consortium E-rate project), which is in the process of filing patents for technology that will deliver broadband over power lines (BPL). BPL is not new, but previously telecommunications companies had difficulties with interference from transformers. Red Rock has reported that they've found a solution to this problem, and once patents and permits are obtained, they plan to begin offering this service to customers in Snowflake, Arizona. The service would provide 2 gigabits per second of download speed, and would be essentially the fastest internet in the nation (Dewitt, 2018). BPL requires that fiber is laid to the substation. Thus, Red Rock's connection to the region through the E-Rate program will begin benefitting residential users in the area as well.

6.1.1.1 Industrial Demand Drivers

The broadband internet economy is what economists refer to as a 'virtuous circle' in which new uses of the network such as new content, applications, services, and devices lead to increased end user demand for broadband, driving network improvement, and leading to further innovative network uses. As broadband investment grows, broadband usage increases as well, creating demand for still faster broadband, and so on (US Telecom Association, 2016).

There have recently been big investments in delivering high-speed internet services to U.S. businesses of all sizes. Ten years ago, only an estimated 11 percent of the buildings with 20 or more employees had fiber, but in the past decade that has almost quadrupled to more than 42 percent, with significant expansion underway (US Telecom Association, 2016). Widespread fiber deployment has both facilitated and been driven by rising demand for new higher-capacity services that rely on high speed internet services. Businesses increasingly use these high-speed services for applications like data center interconnection, disaster recovery, video services, and access to cloud services.

6.1.1.2 Future Strategies

Navajo and Apache counties will be experiencing a significant upgrade in broadband infrastructure in the near term, as described above. As fiber is installed in the future, there will be additional opportunity to capture synergies with other funding and financing programs to expand the fiber to other multi-tenant structures such as colleges, hospitals, business buildings, industrial parks, emergency service

¹⁵ The telecommunications industry refers to the 'first' mile is the source of the internet service; the 'middle mile' is the infrastructure between the source and the region to be served; and the 'last mile' is how it is delivered to an individual residence (Dewitt, 2018).

headquarters, and elsewhere. It appears as if Apache and Navajo counties are already coordinating this effort through their planning stage, and anticipate continued coordination necessary to capture these synergies that will eventually benefit other business and residential areas of the study area (Dewitt, 2018) (Singleton, 2018).

6.1.2 Natural Gas

The source of natural gas for northeastern Arizona is the Blanco Hub in the Four Corners region, which collects and distributes natural gas from the San Juan basin. The El Paso Natural Gas pipeline owned by Kinder Morgan is the main line that runs through the region and into California. The line runs east to west approximately 35 miles north of Interstate 40. There are two main lateral pipelines running south from this main line, both connecting with the main line at Dilkon. One is a 4-inch pipeline that splits near I-40 and serves Winslow (west of the split), and Joseph City and Holbrook (east of the split), generally following the I-40 corridor. The other is an 8-inch pipeline that extends southward to the Pinetop Country Club (approximately 73 miles). Both lines are owned and operated by Kinder Morgan; then UniSource Energy Services (UES) infrastructure connects to these pipelines and provides the final conveyance to the actual gas customers. All of the natural gas infrastructure is located in Navajo County (Conboy, 2018). The peak demand of the 4 inch lateral running along I-40 is at near capacity (in terms of both physical and contractual capacity). Improvements to the line were conducted recently with federal funding received by the City of Winslow.

The overall physical capacity of the 8-inch line is slightly more than one million cubic feet of gas per hour, depending on the pipeline pressure at Dilkon (where the laterals and mainline meet). One advantage of the gas infrastructure in this area is that there is relatively high pressure in the lateral lines due to a compressor station located just upstream of the takeoff location.

The other factor that influences operation of the line is contractual capacity (both of the El Paso main line and the lateral). The contractual capacity of the El Paso Natural Gas mainline was not available at the time of this study unknown, and the contractual capacity of the 8-inch lateral has changed significantly since it was built. The 8-inch gas pipeline was originally installed to serve the forest product manufacturing sector in Snowflake, but has since transitioned to largely serve residential purposes. This change in demand has significantly altered usage patterns (specifically peak gas demand). Instead of peak demand coinciding with industrial use (firm, year-round peak during operating hours), gas peak demand is now highly seasonal with peaks at morning and early evening periods of the day and occurring in the winter months only.

UES policy places residential use above other uses in the hierarchy of gas users to be supplied in times of shortage (Conboy, 2018). Thus, the capacity to meet additional industrial demand can best be described as questionable, with new industrial users at risk of curtailment, mostly during peak residential demand times.¹⁶

¹⁶ The risk of curtailment would lessen if industrial operations needed gas during summer months or outside of the residential peak demand hours.

6.1.2.1 Industrial Gas Demand Drivers

In the next decade energy experts expect that much of the growth in natural gas demand will come from the power generation sector; while this may impact the El Paso Natural Gas pipeline, these types of development are not expected in the study area due to the high altitudes reducing the efficiency of natural gas power generation.¹⁷

The second largest demand increases are expected (and currently being felt) in the industrial sector, which uses natural gas as a fuel and a feedstock to meet a variety of energy requirements. The manufacturing sector accounts for 80 percent of total industrial natural gas demand, with the remaining 20 percent coming from agriculture, construction and mining. The manufacturing sectors' consumption of natural gas is concentrated in a few mature sectors, including (in descending order of consumption): chemicals, petroleum and coal, food, primary metals, paper, non-metallic minerals, fabricated metals, wood products and textile mills (IHS Economics, 2016). In the study area, future industrial demand is most likely to be in the wood product manufacturing sector given the infrastructure in place, and access to forestry resources.

General Infrastructure Requirements for Manufacturing Plants

Transportation

- Easy access for workers
- Highways or interstates for freight

Energy

- Transmission of electricity and gas
- Potential energy generation capabilities

Telecommunications

- Telephone
- Broadband
- Satellite

Water

- Storage
- Distribution
- Wastewater System

Solid Waste

- Collection
- Disposal

A third factor influencing regional demand is pipeline exports to Mexico from Arizona, which are anticipated to increase significantly in the near term. These factors are anticipated to put more pressure on contractual capacity of the main natural gas pipelines running through the region. Ultimately, this could lead to a mismatch in supply and demand in the near term for the southwestern region, where the sum of exports, power and industrial demand will exceed supply capacities; creating demand for new natural gas infrastructure to serve these increasing demands (IHS Economics, 2016). At the same time, increased efficiencies of residential appliances and residential heating systems has resulted in reduced residential peak demand. This, coupled with more mild winter time temperatures the past few years, has resulted in a downward trend in peak residential natural gas demand in the study area (Conboy, 2018).

6.1.2.2 Future Strategies

Currently, there is no clear answer to the question, how much natural gas capacity is available in the region? The answer lies at the intersection of the available contractual obligations El Paso Natural Gas pipeline (covering thousands of miles) and available physical capacity of the UES pipelines. This can lead

¹⁷ At high altitudes the air pressure drops with can negatively affect the performance of natural gas generators.

to confusion for economic development agencies, and requires UES and Kinder Morgan evaluate the contractual and physical capacity of natural gas lines for individual inquiries from a new industrial users (e.g. manufacturer). There has been at least one large industry inquiry recently that could not be served with natural gas demand.¹⁸ However, it is noted that natural gas is not a major constraint to any of the specific target industries identified in Section 7.

One recommended activity for local government is to convene a meeting with representatives from both Kinder Morgan (El Paso natural gas pipeline) and UES to determine if there could be developed a more refined parameter on the access to natural gas for industrial purposes. The authors of this report attempted to do so, but it became clear that information from both entities is necessary to have a more complete understanding of capacity; and to date only UES has returned our request for information.

There are many potential funding sources, other than revenue from ratepayers to support the expansion of natural gas service. However, obtaining funds from these sources requires action from outside the Arizona Corporation Commission (ACC). Potential funding sources set out below were originally developed by a Working Group in Oregon, charged with evaluating potential natural gas expansion opportunities:

- Economic development grants (USDA Rural Development)
- Local taxes and bonds
- Utility shareholder funds
- Lottery revenue
- Community in-kind contributions
- Local and county funds to comply with federal and state air-shed standards
- Partial funding by industrial customers or pipelines
- State General Fund

A general rule of thumb used by Kinder Morgan in estimating costs for new gas pipelines is that for every inch mile of pipe (that is for every mile of 1-inch diameter pipe) the cost will be approximately \$100,000. So, for example, to replicate the 73 miles of eight-inch pipeline running south through Navajo County would cost approximately \$58.4 million in 2017 dollars (Conboy, 2018).

6.2 OTHER INFRASTRUCTURE

This section briefly discusses other important infrastructure including electricity, rail, airports, and access to the interstate.

6.2.1 Electricity

The electrical transmission network in the area transmits power from generating stations to nodes across the western grid. Lower voltage electric lines serve customers in the study area through Arizona

¹⁸ This particular industrial demand would have used approximately 25 percent of the total physical capacity of the eight inch pipeline.

Public Service (APS) (which has a service area in the mid-section of Navajo County) and through Navopache Electric Cooperative (which serves most other locations in the two-county area). Throughout interviews conducted for this project, there were no issues raised regarding the adequacy or reliability of electricity service providers in the area.

Electricity prices in Arizona are competitive with the rest of the country. The Energy Information Administration (EIA) reports that average prices for commercial and industrial users across Arizona is 5 to 12 percent lower than the national averages, respectively (Energy Information Administration, 2018).

Economic development and electricity use have been positively correlated in the past (i.e., when economic development increases, electricity demand increases, and vice versa). However, since the mid 1950's, this relationship has been lessening in the United States. In other words, the growth of electricity demand has been significantly slower than the growth of Gross Domestic Product (GDP) for the United States (EIA, 2013).

With regard to local economic development opportunities, electricity prices are most relevant in large industrial and commercial developments where electricity represents a major component of operating costs. While the local area offers competitive rates, it is not expected to be a critical factor in attracting large industrial or commercial development.¹⁹

6.2.2 Rail

6.2.2.1 Apache Railway

Apache Railway is a short line railroad that operates in connection with Burlington Northern Santa Fe (BNSF) Railway. Apache Railway's route runs from the BNSF line at Holbrook, Arizona south to the Snowflake Mill near Snowflake, Arizona (a distance of 38 miles). The BNSF Railway is one of North America's leading freight transportation companies, operating 32,000 route miles of track in 28 states and 2 Canadian provinces. The access to BNSF rail provides important commerce connections, including to the large markets in southern California, central Texas and northern Mexico.

Apache railway has a long history in the region, serving as a passenger service and excursions railway in the 1950's and 1960's, as well as a primarily logging railroad during the 1970's and 1980's. The line was essentially abandoned in the early 1980's and in 2012 the owner of the railway (Catalyst Paper) announced the mill and railroad would be shut down and sold. After a series of acquisition attempts a group including Aztec Land & Cattle Company and Midwest Poultry Producers purchased the railway out of bankruptcy from Hackman Capital, who was planning to dismantle the railway (Brophy, 2018).

Today, the railway serves primarily 1) the Snowflake Pig Farm (owned by Smithfield) which uses the rail line for shipments of animal feed, 2) the Apache Railway Shops that performs maintenance on BNSF rail cars; and 3) forest product manufacturers (such as Novo Star) that ship lumber via rail on a limited basis.

Current challenges with the railway involve coordination with BNSF due to the priority that BNSF places on unit trains (also called a block train or a trainload), whereby all cars carry the same commodity and

¹⁹ Low cost power is a critical factor in development for areas such as the Columbia Basin where cheap hydropower is available. The power costs in the study area are not anticipated to be a constraint or significant influence for attracting development.

are shipped from the same origin to the same destination without being split up or stored en route. The prioritization is due to the fact that handling these cars is cheaper and faster, which allows the railroad company to compete on price with transportation via road or waterway. However, as a short line operator dealing with individual cars, the Apache Railway can experience challenges (from a timing and service response perspective) when rail car pickups or deliveries are low priority for BNSF and fall below the hierarchy of unit trains (Brophy, 2018).

Another challenge of operating any short line track is keeping operating and maintenance costs manageable, both in terms of price paid by customers to cover these costs and the viability of the railway itself. As additional economic development occurs between Holbrook and Snowflake to utilize Apache Railway's services, potential economies of scale or scope may allow for key fixed expenses to be spread further, potentially increasing the viability of operating the railway service and / or reducing the price paid for rail service in the area (CloudMoyo, 2018).

6.2.2.2 TEP Line

There is also a BNSF spur in Apache County that serves the power generating station in Springerville. This spur is controlled by TEP, and is used for bringing in coal shipments for their coal power generation. However, the company appears open to the concept of setting up a holding company that would allow access to this private rail line to other industries (e.g. manufacturing) (Balcom, 2016).

6.2.3 Airports

As noted in several case studies, and in the literature on rural economic development, proximity to an airport can be an important factor for economic development and locational decisions of many businesses. The Show Low Regional Airport is located one mile east of the town of Show Low. The airport was dedicated in 1946, as a result of a US Forest Service Special Use Permit, and now includes two runways with parallel and connecting taxiways, and a 6,400 square foot terminal building which opened in 1999 (City of Show Low, 2018). Currently Boutique Air is the only commercial airline operating out of this space. Boutique Air offers service out of Show Low to Phoenix Sky Harbor (three flights on most days).

There were 4,139 total enplanements (passengers boarding airplanes) at Show Low Regional Airport in 2016; representing an 83.7 percent increase from 2015 (2,253 enplanements) (Federal Aviation Administration, n.d.). This level of enplanements places Show Low airport in the "Non-Primary" Commercial Regional Airport category. The airport also provides general aviation services such as fuel and oil, aircraft jumpstarting, light towing, ground power, and engine preheating. In addition, an automated weather observation system is available along with a pilot briefing room with internet for flight plan filing, and other services (City of Show Low, 2018).

Other publicly owned airports in the study area include the Cibecue Airport, Winslow-Lindberg Airport, Holbrook Municipal Airport, Taylor Municipal Airport, Whiteriver Airport, Kayenta Airport, Polacca Airport, and Rocky Ridge Airport in Navajo county as well as Chinle Municipal Airport, Springerville Municipal Airport, St. Johns Industrial Air Park, and Window Rock Airport in Apache county. There are also several private airstrips (e.g. Mogollon Airpark) in the two county area. Most of these are either categorized as providing general aviation services only (no commercial airlines serve these airports) (Federal Aviation Administration (FAA), 2018). A review of the Federal Aviation Administration (FAA)

statistical database reveals that over 80 percent of airports in the US are categorized as General Aviation only (less than 2,500 annual enplanements) (Federal Aviation Administration, n.d.). These airports rely on serving professionals who fly their own planes as well as private jet bookings; both of which are an increasing trend in air travel (Stratosjets, 2018) and could be an important link for future population growth and economic development in the area.

6.2.4 Interstate Access

The region is accessed by Interstate 40 (I-40) that runs in an east-west direction through the northern half of the two counties, encompassing (from west to east) the towns of Winslow, Joseph City, Holbrook and the census designated places (CDPs) of Sanders and Houck. I-40 is a major interstate highway running through the south-central portion of the United States, from Barstow, California in the west to Wilmington, North Carolina in the east. The section of I-40 in the study area overlays the historic US Route 66 which became part of American popular culture due to several songs and television shows in the 1960's. This US Route 66 originally served as a major path for people migrating west, especially during the Dust Bowl era of the 1930's (National Historic Route 66 Federation, 2018).

Other US Routes are also integral to the area, including US Route 60 which passes through Globe, Show Low and Springerville before exiting the state at the border with New Mexico. US Route 191 runs in a north – south direction from the southern part of Apache County, south of Springerville and north through Many Farms and other communities on the Navajo Reservation before entering Utah near Bluff. These roads allow for most of the study area to be within a half day's drive (4 hours) to either Phoenix, Arizona or Albuquerque, New Mexico. Similarly, most of the study area is also within a day's drive (8 hours) of Los Angeles, California; Las Vegas, Nevada; and El Paso, Texas.

7 ECONOMIC DIVERSIFICATION

In recent years rural and urban economies have differed in many ways. The Great Recession hit harder and lasted longer in rural communities, and economic recovery in rural communities has not matched that in urban areas (Heinrich, 2017). This is the case for both Navajo and Apache counties; as shown in Section 2, above, both counties have total employment that is still behind what it was in 2008 (beginning of the Great Recession).

In Navajo and Apache Counties, the utilities sector has been an important industry, reflecting the power generation and electricity transmission capabilities in the region. As discussed in **Section 3**, in Navajo County a decline in coal-related economic activity is already occurring, and is projected to increase in the near future; coal-fired power generation in Apache County is not expected to decline in the immediate future. In the long-term the region's power generation sites would be well-suited to other types of coal processing (e.g. gasification or liquefaction), but the pilot scale nature of these processes makes them unlikely for development in the foreseeable future. For coal power generating stations, there is the continuous need to increase viability through reducing costs or increasing revenue to ensure the ability to weather future downturns. At a regional level, minimizing the impacts of these structural changes occurring in the coal mining and power production sectors involves diversifying and expanding the economic base. Currently, Navajo and Apaches counties are reliant on a relatively small handful of sectors, as described in **Section 2**.

This concentration of employment or limited diversification makes a community more vulnerable to an economic downturn in one of its key sectors. By diversifying, an economy has broader sources of employment and income. In the event that one sector should decline, the diversified economy has greater economic stability and resiliency in the face of change from business cycles, shifting competition nationally or internationally, new technologies, government policies, and shifts in demography.

This section focuses on the growth potential for several industries that were identified as target industries for Navajo and Apache Counties.²⁰ The targeted industries were selected based on the region's strengths and assets, particularly its natural resource base and a high amenity environment. Specifically, it presents information on the potential for: renewable energy, forest product manufacturing, animal feeding operations, food processing, potash mining and processing, helium extraction, carbon dioxide pipeline, outdoor and recreation manufacturing, tourism, and remote-work industries.

In the United States, the share of manufacturing as a part of total employment has dropped significantly and at a steady rate over the past six decades, largely due to automation and off-shoring of manufacturing. Meanwhile, service sector jobs have grown significantly in this period. In rural areas in the US, where labor costs can off-set transportation costs (from foreign markets), there are opportunities for manufacturers that can gain a competitive cost advantage. However, unlike Northeast Arizona, the rural regions that are able to compete successfully in manufacturing tend to be adjacent to urban centers, have higher than average population densities, and greater access to services. In general,

²⁰ The project team worked closely with Navajo County economic development leadership in narrowing the analyzed industry list to those presented in this section.

rural regions such as Northeast Arizona tend to be stronger in resource-dependent manufacturing industries and traditional manufacturing clusters such as processed food, automotive, forest products, furniture making and motor driven products (USDA, 1999) (Headwaters, 2017). Based on its assets and its location, target manufacturing industries for Northeast Arizona are thus identified as resource dependent manufacturing (such as forest products) or as tied to the natural amenities of the region (such as outdoor recreation equipment manufacturing).

Our evaluation presented in this section considered the current market conditions and expected trends in the target industries considered, the key characteristics and input needs, whether these needs could be met in the study area, and potential economic impacts if the venture were to be developed (jobs, income, and other). Where possible, we identify specific recommended actions along with key players in the industry for recruitment and/or retention efforts. Each sub-section begins with a table identifying the Strengths, Weaknesses, Opportunities and Threats (SWOT) for the type of development considered. Strengths and weaknesses are internal to the region (Apache and Navajo counties) whereas opportunities and threats are external (or in some cases new concepts) to the region.

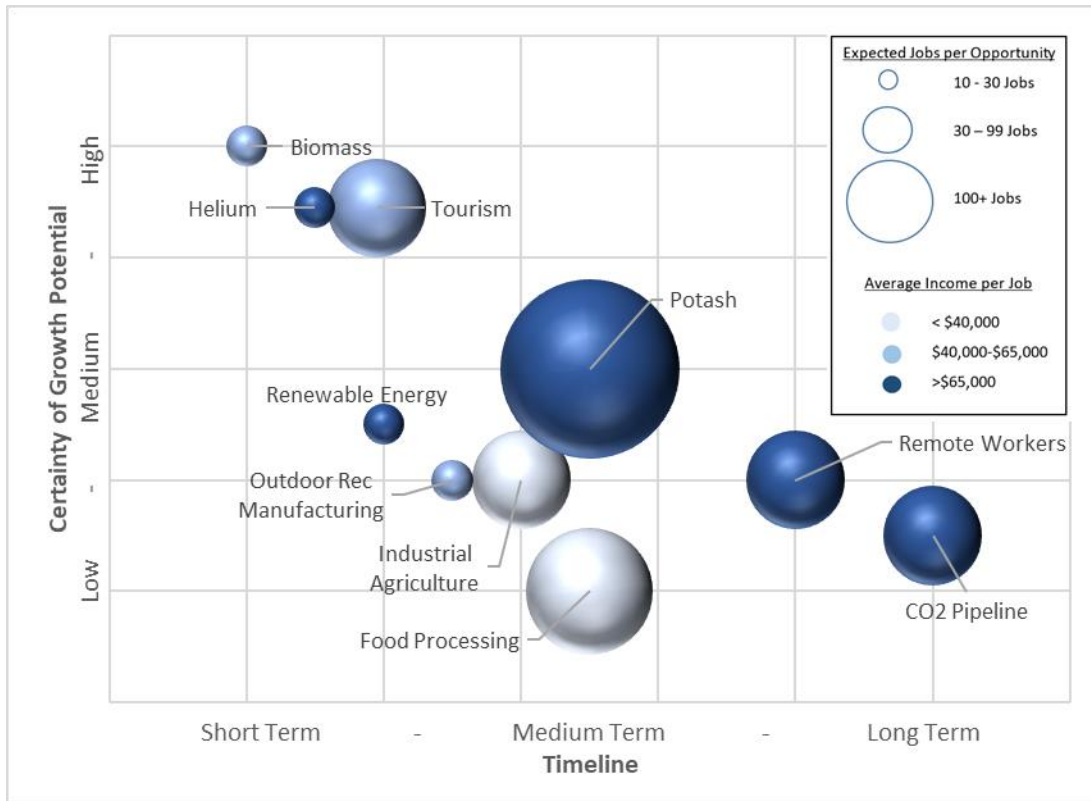
In general, we find that there are several industries that would provide a good match for the resources, infrastructure, and workforce available in the area. The reasons for this are varied, as described below, but generally the most compelling cases for future growth are due to one or more of the following factors:

- Forest resources, including stewardship contracts in place
- Other natural resource amenities (namely quality of and access to outdoor recreation)
- Strategic location to major markets
- Transportation infrastructure in place
- Growth and interest in renewable energy
- Competitive cost of doing business²¹

The following graph depicts our findings in terms of the certainty of growth potential (vertical axis) and expected timeline for development to occur (horizontal axis) for analyzed industries. The size of the bubble for each analyzed industry indicates the potential number of jobs for each industry, while the color represents the average income expected per job.

²¹ There are two published lists that compare the cost of doing business across states, Forbes and CNBC. Arizona ranks 23rd and 26th in these publications, respectively (Forbes, 2017; CNBC, 2017).

Figure 7-1: Economic Diversification Summary



As shown in the figure, the conditions for additional development of the forest product manufacturing sector (specifically with regard to biomass) are favorable given the abundance of that resource available in the area. Another type of manufacturing that has strong potential in the area is outdoor recreation and equipment manufacturing, as there is strong cohesion between this type of manufacturing and the potential image or brand of the region. Other sectors that are expected to experience growth in the region in the near-term are renewable energy and tourism. Dependent on continued high commodity prices, helium and potash, show good growth potential in the region. These natural resource extractive industries have the highest wages by sector (relative to most of the other sectors evaluated) but these jobs are at risk of boom and bust cycles. In addition to potash, the industrial agriculture and food processing sectors have the largest employment opportunities associated with them. However, these jobs tend to have lower wages, relative to jobs in the other industries considered here.

7.1 RENEWABLE ENERGY DEVELOPMENT

Due to dramatic cost declines in wind and solar energy over the past few years these resources are routinely being procured by utilities in the West at or below the cost of natural gas generation; the main competitor to renewable energy. Customer interest in renewable energy is growing as solar and wind resources are stable in price, do not consume water, can be built in many locations in the state and have no emissions.²²

Figure 7-2: Renewable Energy SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> Solar and wind development potential is high Transmission capacity (345 and 500 kV lines) Substations for interconnection of power to western grid State Renewable Energy Portfolios Dry Lake Wind Farm, successful example of project developed on combination of private, state and federal lands 	<ul style="list-style-type: none"> Not a large job creator over long term Possible negative public perception (lights on wind turbines, sight of solar arrays) regarding impact on aesthetics
Opportunities	Threats
<ul style="list-style-type: none"> 6 to 14 jobs for every 60 MW of energy developed (O&M) Identify community interest in renewable energy Educate personnel on development steps & economic impacts Identify development exclusion areas (e.g. Gila bend solar field overlay zone) Have clearly identified permitting ordinances specific to wind and solar infrastructure Promote interest in renewable energy Encourage community participation (e.g. New Mexico's Coalition of Renewable Energy Landowner Association (CRELA)) 	<ul style="list-style-type: none"> House Bill 2003 repealing coal tax; artificially props up coal industry, delaying other investments that could utilize transmission and intertie infrastructure Tariff on imported solar panels (although impact anticipated to be small)

Solar and wind energy are naturally-variable resources requiring utilities to modify their operations to accommodate clean energy. Additionally, solar and wind located far from load centers requires transmission availability to bring energy to where it is consumed. Wind and solar development may be able to take advantage of existing transmission infrastructure that will be available when coal plants retire. This transmission serves Arizona and provides access to other Western customers. Proximity of renewable energy farms to these transmission lines is an important consideration for cost effectiveness.

Typically, renewable energy development does not proceed without a guaranteed buyer (often through a Purchase Power Agreement). Historically, purchasers have been electric utilities. In Arizona and nationally, there is growing interest for companies and public entities to buy renewable energy but in

²² Geothermal resources were also explored as part of this study, but identified geothermal systems in Arizona are not expected to produce high temperatures suitable for large power plants; some resources have been identified as feasible for distributed generation of small-scale power units (e.g. 750 kW) (Fleischmann, 2006).

Arizona energy can only be purchased through the monopoly utility; Arizona Public Service Company and Arizona Electric Power Cooperative.

In January, 2018 the Trump Administration imposed a tariff on importing solar panels from outside the U.S. A 30% tariff is imposed in the first year, declining to 15% in the fourth year. Trade Journals are reporting that the impact of this tariff may be slight as developers stockpiled product in anticipation of enactment. And, while the tariff puts upward pressure on solar prices, the recent corporate tax cuts and continuing price declines in solar project costs may partially or completely offset the tariff impacts.

We are in a period of tremendous change for electric utilities as fossil fuels, the mainstay of the industry, are becoming more expensive than clean alternatives. Currently, the viable energy sources focused on to power Arizona's growth are wind, solar and natural gas. Natural gas development may be impacted by a lack of pipeline import capacity, no gas storage facilities and price volatility of the fuel. Combining attractive pricing with increasing demand creates a long term positive outlook for solar and wind development. However, the state's electric utilities have not yet embracing the new reality and are favoring natural gas development over wind and solar, dampening the short term (2-5 year) prospect for significant development. The state does have a renewable mandate for utilities but the standard is so low it is not compelling significant action.

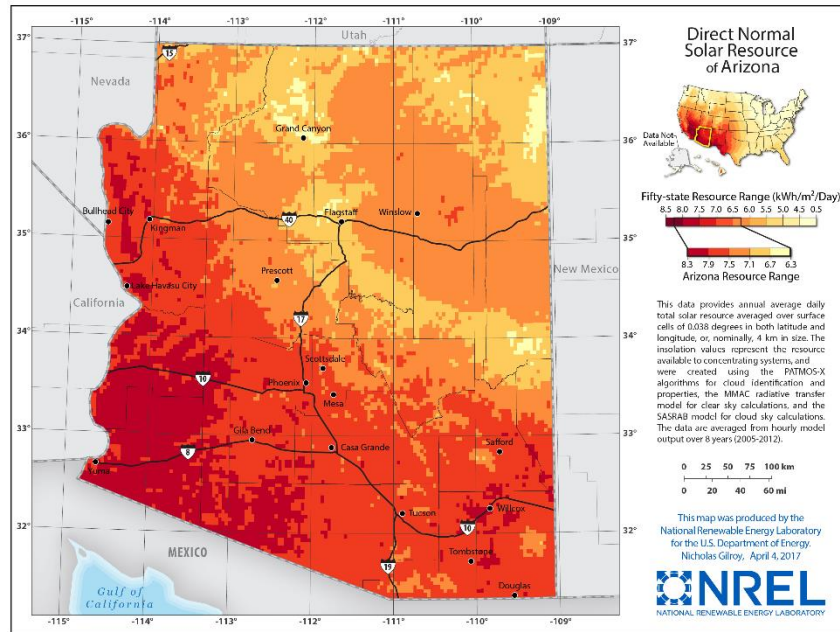
7.1.1 Resources

Arizona is fortunate to have one of the best solar resources in the U.S., as well as a commercially viable wind energy resources. While Apache and Navajo Counties have substantive raw wind²³ and solar²⁴ resources there several key factors that need to be considered for resource development.

²³ The U.S. Department of energy has a number of different wind maps: <https://windexchange.energy.gov/maps-data>.

²⁴ See <https://www.nrel.gov/gis/solar.html>

Figure 7-3: Solar Resource Potential in Arizona



Land

Determining the amount of developable land involves a process of identifying exclusion lands that are not appropriate for development. Exclusion categories include land with a slope of greater than 20% for wind and 5% for solar energy; environmental exclusions such as national, state or other designated park lands and archeological sites; existing land uses such as urban development, airports, tribal lands, and lakes and streams. Landownership must also be considered.

Typically developers prefer to site projects on private land where there are fewer environmental regulation, which can add cost and time to development. The Dry Lake Wind Farm, the first utility-scale wind project in Arizona is a successful example of developed on a combination of private, state and federal lands.

Transmission

Transmission is the highway that allows solar and wind energy to reach markets. Apache and Navajo Counties have a significant number of 345 kV and 500 kV transmission lines crisscrossing the counties delivering power from coal power plants to the four corners trading hub, Phoenix metropolitan area and beyond (Kryzkos, 2008). If transmission capacity becomes available as the result of retiring coal plants this can be used for solar and wind development. However, the solar and wind plants must be of sufficient size to warrant the cost of interconnecting to these high voltage transmission lines and to pay for project "tie lines" to reach existing transmission.

Developers and Buyers

Solar and wind farms are almost exclusively built by developers with renewable expertise.

Developers may sell only the energy to a buyer, sell the physical plant to a buyer and be responsible for operation and maintenance of the plant, or a project may be developed and sold in its entirety to a purchaser. Arrangements depend on buyer preferences and economics.

While there is an appetite for purchasing renewable energy by companies and municipalities, Arizona has a regulated energy market that requires energy be purchased directly and only from the utility serving the area. This monopoly constructs can severely limit the development of renewables as the utility has total control of energy that is purchased and interconnection to their transmission system. There have been several regulatory efforts in the state to allow for direct purchase of clean energy but such efforts have had limited success.

Turning Point Solar Project

- 49.9 MW solar project planned
- 650 acres on reclaimed coal strip mine land in Ohio
- Several hundred construction jobs were anticipated
- ~\$250 capital cost project
- Project discontinued because Public Utilities Commission of Ohio found the utility “did not prove that the project was needed” preventing the utility from funding the project through charges to consumers.
(USDA, RD, 2011; OMA, 2013)

Apache and Navajo Counties do have significant transmission high voltage transmission in the area and retiring coal plants that can provide access to a wide range of customers and markets.

7.1.2 Industry and Key Players

The solar and wind industries have matured in the past decade from companies with limited experience to national and multi-national corporations with deep development experience and capital to finance multi-million dollar projects. It is increasingly common to find companies that develop both wind and solar. Companies historically engaged in fossil fuel development are also entering the renewable energy development space. In short, renewable energy has become big business with a robust set of industry players.

The largest wind and solar developers include: Ameresco, Avangrid, EDF Renewables, EDPR, Enel, E.On, First Solar, Invenergy, NRG Energy, Pattern, Recurrent Energy, SunPower, Tesla, Vestas, Vivint Solar and 8-min Energy. Many of these companies offer storage options as well. The only Arizona-based company is First Solar.

Transmission reuse

As mentioned above, transmission may become available with retirements of coal plants. Utilities owning transmission that is not used are required to list transmission availability on an electronic platform (OASIS) to allow developers and other to know of its availability. Project developers are expert in negotiation with transmission owners to access transmission.

When planning a new project developers are required to go through a multi-stage interconnection study process run by the transmission owner. Interconnect studies determine if a project can be added to the transmission system, if there are any impacts of doing so, and any upgrades needed to support the project.

Market demand

Nationally leading corporations such as General Motors, Bank of America, Microsoft, Visa, Walmart, Nestle, Apple, Anheuser Bush and many more have set goals to power their operations with 100% renewable energy²⁵. Corporations are increasingly turning to wind and solar for its price stability and commitment to reduce carbon emissions associated with Climate Change. The U.S. Department of Defense has a goal to obtain 20% of its energy for all service branches by 2020. The military is pursuing renewable energy for its energy security potential and self-sufficiency and cost benefits. The cities of Flagstaff and Phoenix have council-approved 100% renewable energy goals and the city of Tempe is considering a similar standard. Citizen support for clean energy could not be stronger. APS's Informed Perception Project Report²⁶ in 2011 that found "94% [of surveyed APS customers] wanted an increase in the use of solar as a part of the energy portfolio and 82% wanted an increase in the use of wind power."

As mentioned above, viable future energy sources include wind, solar and natural gas. International and national trends make clear that solar and wind will continue to outpace natural gas development. At present, Arizona utilities are not building, purchasing or planning significant amounts of utility-scale wind and solar. Demand for locally-produced clean energy in the future will depend on the state's utilities implementing aggressive, near-term plans for procurement of renewable energy.

²⁵ See RE100 at there100.org/ for a full list of companies that have 100% renewable energy corporate goals.

²⁶ https://morrisoninstitute.asu.edu/sites/default/files/content/products/APSFinal_Final%202.pdf

7.2 FOREST PRODUCT MANUFACTURING

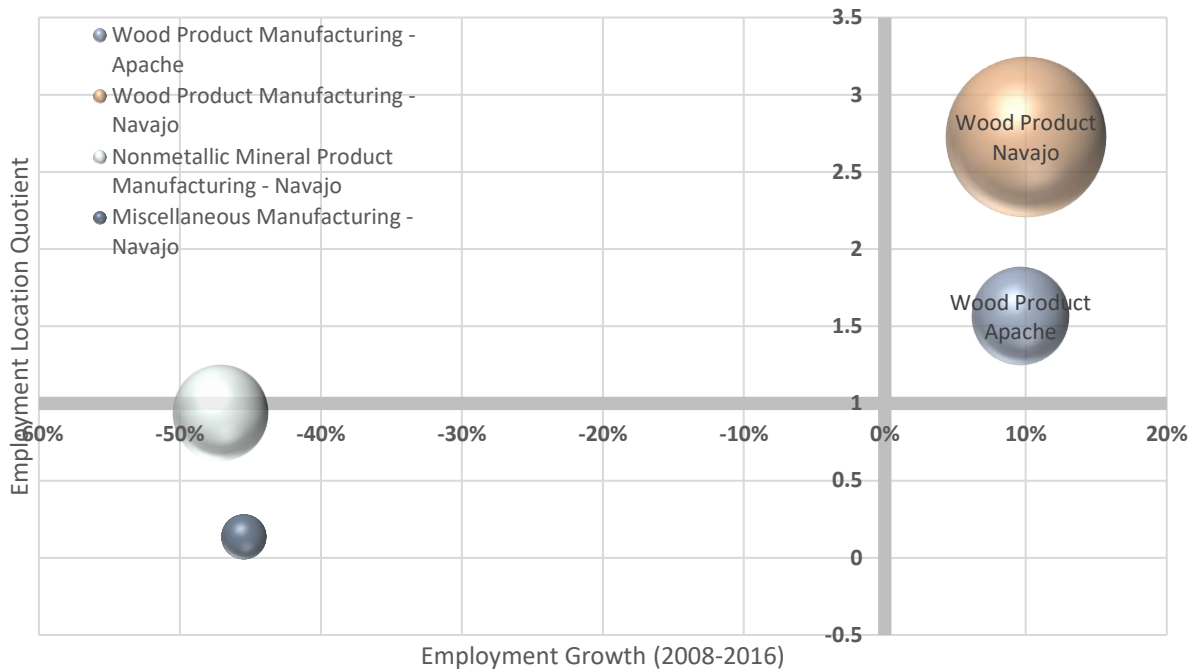
The region has significant forest resources (marketable timber and biomass) through forest stewardship contracts as part of Four Forest Restoration Initiative (4FRI), and the tribally managed forest on Fort Apache. 4FRI is a collaborative effort to restore the forest ecosystem in portions of Coconino, Kaibab, Apache-Sitgreaves and Tonto forests along the Mogollon Rim in Northern Arizona. It is the largest forest stewardship contract in the Forest Service agency's history.

Figure 7-4: Forest By-Product SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> • 4FRI; social license to harvest up to 50,000 acres annually (15,000 to 20,000 in Navajo / Apache Counties). • Investments in infrastructure made (or being made) e.g. Novo Star, Novo Power, New Life, Forest Energy, White Mountain Apache Timber Company. • Support from SRP regarding social benefits provided by biomass power. 	<ul style="list-style-type: none"> • Biomass bottleneck; in order to make commercial forestry more viable need a market for an additional 150 to 200 dry ton daily of biomass • Biomass is generally used in low margin products, difficulty in attracting investment. • Forestry management practices over past several decades
Opportunities	Threats
<ul style="list-style-type: none"> • Investments that manufacturing processes that utilize biomass, such as: wattles; bio coal; mulch • Coal to biomass conversion Torrefaction (PGE tests) • Coordinated effort for promoting policies, education and valuation of social benefits to benefit industry. • 2018 Farm Bill Programs for Biomass and Bio-based product manufacturing 	<ul style="list-style-type: none"> • Catastrophic fire • House Bill 2003 repealing coal tax; artificially props up coal industry, making other investments less attractive (bio-coal)

Private investment in the region that processes forest resources harvested from these contracts include Novo Power Biomass plant (27 megawatt biomass power plant located in Snowflake); Novo Starr lumber mill; New Life mill; Fort Apache Timber Company (FATCO); and Forest Energy pellet manufacturing. The Overview section above describes how the manufacturing sector in the study area has experienced a decline in Navajo County since the beginning of the Great Recession. However, a more thorough review of the data reveals the wood product manufacturing employment has actually increased approximately 10 percent in both Navajo and Apache counties over that time period, see figure below.

Figure 7-5: Manufacturing Subsectors in Apache & Navajo Counties



4FRI contracts require removal of all woody biomass from the contract area. While there is immediate market for the marketable pine and other mixed conifers for production of sawlogs, posts, and poles; the biomass removed with these high valued products has a very limited market. This biomass residue often includes other species (including pinyon juniper along with the mixed conifers), and currently the only markets for this residue are mulch to Scotts (Maricopa) or Gro-Well (Phoenix), or fuel for Novo Power. This has created a ‘bottleneck’ of markets for forest thinning contractors. The resource of biomass supply should be abundant in the study area in the near future due to forest restoration and harvest rates ramping up.

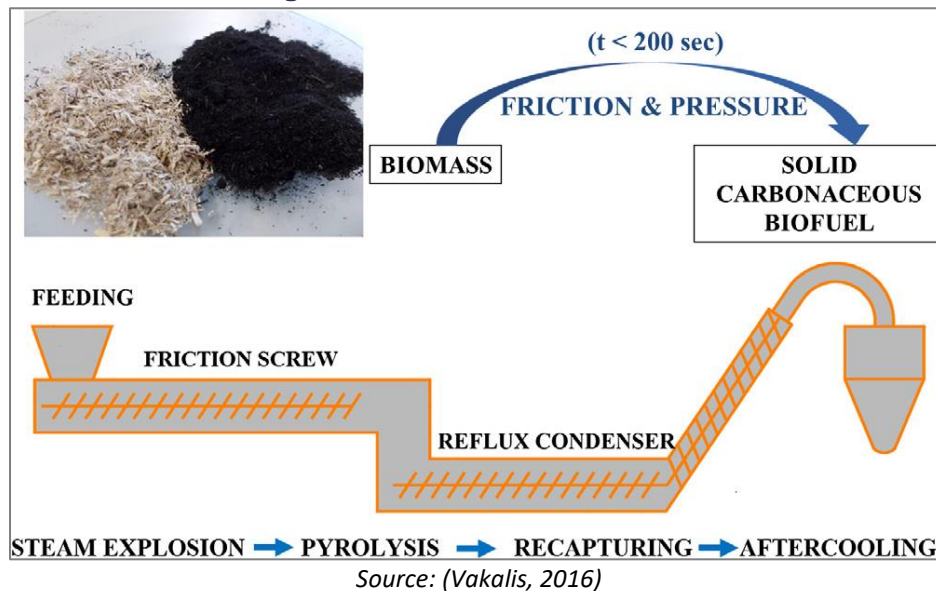
This access to biomass provides opportunities to attract new economic activity in the area. Opportunities for new investment in manufacturing processes that would require biomass as a key input, identified through existing contacts for the area include the following:

- Wattles (Donnie White)
- Bio Coal and essential oil byproduct from Pinyon Juniper (Engenuity)
- High quality syngas and bio char by-product (Concord Blue Energy)

Wattles are large net socks filled with biomass and used as erosion and sediment containment. Currently, Donnie White is involved in manufacturing wattles in Texas and markets these to clients with oil and gas sites for sediment containment. Pinyon Juniper and other forest residues from 4FRI contracts would be ideal for this process. The anticipated demand for biomass for wattles is in the magnitude of 100,000 cubic yards per year, and would employ a small number of people (approximately 6) (White, 2018).

Bio coal is a product created through either extrusion, pyrolysis or torrefaction of biomass. One such product, produced through an extrusion process called frictional pyrolysis, has been developed by Engenuity. The process creates a higher btu content product with lower moisture content than wood pellets alone, that can be used to replace (fully or partially) coal as a feedstock in a coal power generation unit with limited modifications to the plant. The technical feasibility of using bio coal has been proven recently at Pacific General Electric (PGE's) Boardman, Oregon plant (Nowling, Successful Torrefied Biomass Test Burn at a Coal Power Plant, 2018). When using Pinyon Juniper as a feedstock, a valuable by-product from the manufacturing process is an essential oil which is used in aromatherapy and personal care products. The major constraint to transitioning from coal to biocoal feedstock in an existing coal power generating stations is cost; and the lack of mandate or incentive. Currently, the coal power plants in the region are in compliance with emission regulations; and APS is already meeting the current Renewable Portfolio Standard (RPS) for Arizona. However, if a mandate or incentive could be provided for these generating stations to transition to coal, even a small replacement of coal, would mean a significant market demand for biomass from 4FRI (Mills L. , 2018). To put this into perspective, a complete conversion (from coal to biocoal) of the Springerville generating station feedstock would require around two million ton of biomass per year (more biomass than what is currently available in the immediate area). So, if biocoal were to be introduced at an existing coal fired power generating facility it would likely be as a small portion of the existing feedstock (Nowling, Professor, U. of Missouri, 2018). A biocoal extrusion facility would also employ a small number of people (Mills L. , 2018).

Figure 7-6: Biomass to Biocoal



Syngas production from biomass is something that Concord Blue has been considering and planning development at Eagar since 2013. The process envisioned by Concord Blue would be to use biomass as a feedstock for production of high quality syngas, which would then be an input for chemical or plastic manufacturing. The biomass demand would be small (roughly 12 ton per day) relative to other demands described above, and would employ up to 12 people (Knoll, 2018).

The weakness of this resource is that is that the forests have been managed in such a way over the past decades that fuels have built up on the forest floor. A catastrophic fire could eliminate the timber and biomass from the forests in a short period of time. Another weakness is lack of a mandate (discussed above) or other incentive related to biocoal transition for coal power plants.²⁷ So, job creation would likely not be the main benefit of forest product manufacturing development, especially related to biomass, but rather additional development would improve profitability or revenue streams from forest stewardship contracts and have a positive impact on fire risk reduction (societal benefits).

While the Forest Product Sector is generally experiencing growth in the study area, there are additional opportunities for industry and agencies to coordinate on efforts to more fully explore the link between protection of the forest (forest ecological health) and the forest product manufacturing sector. The Upper Verde Watershed Coalition provides a relevant case study in how a coalition of separate entities came together to conduct the technical studies needed for furthering economic development possibilities in the area. There appears to be need for organization like this in the area, to take the lead on facilitating information gathering on forest health issues, promoting policies that would support this sector, and collaborating between industry players in the region. In Navajo and Apache counties entities such as the Little Colorado River Resource Conservation District, and/or Eastern Arizona Counties Organization could play a major role in a coordinating and collaborating with private entities, cities, counties and Extension (Patrick Rappold) to secure financing or funding for studies, and promote biomass use to the public and key stakeholders.²⁸

²⁷ The possible exception to this is Salt River Project coal power generation; as SRP is focused on water supply and quality. Thus, reduction of forest fuels would have a direct positive impact on their main resource of concern (water). SRP also holds the Power Purchase Agreement (PPA) with Novo Power.

²⁸ Current funding opportunities exist in both the draft 2018 Farm Bill (just released); In addition the Department of Forestry and Fire Management (State of Arizona) with funding provided by USDA Forest Service has solicited cost-share project proposals for woody biomass utilization in the past, and is expected to re-issue these in the future.

7.3 LIVESTOCK AND / OR POULTRY FEEDING OPERATIONS

Geographic remoteness is generally a weakness for most industrial scale economic development opportunities, with an exception being industrial scale agriculture and animal feeding operations in particular. The Smithfield hog farm near Snowflake is sited here partially due to this remoteness, along with the mild climate and access to Apache Railway for importing feed inputs by rail car. If additional development of specific animal feeding operations were to happen in the area, it would likely benefit from synergies with Smithfield's operation.

Figure 7-7: Livestock and/or Poultry Feeding Operation SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> Remoteness of the middle sections of the counties. Apache Rail for bringing in feed inputs. Potential synergies with Smithfield Hog operation (reduced input cost for larger train cars of feed, nutrient management process in place already) 	<ul style="list-style-type: none"> Limited in type of developments (e.g. another large hog operation adjacent to Smithfield could be problematic due to disease spread potential) Generally low paying jobs Possible environmental issues (although risk seems minimal)
Opportunities	Threats
<ul style="list-style-type: none"> Attract contract farmers from elsewhere (Smithfield) Coordinate beginning farmer program (Smithfield contracts or Many Farms) Recruit poultry operation (e.g. Demler Egg and Smithfield in California) Value-added potential or synergy with nutrient management program 	<ul style="list-style-type: none"> Potential for NIMBY stance Additional environmental regulations, conflicts with adjacent landowners (see DEQ actions with Smithfield operation proposed in Yuma County)

A brief review of agriculture statistics in the study area reveals Apache county has the largest number of farms in the state (5,591) followed by Navajo County (3,846); covering just over 9.9 million acres total. Navajo and Apache counties combine for nearly half of the farms in the state; and nearly 40 percent of the acreage in farms in the state. However, the sales from these farms is relatively low, accounting for only 2 percent of agricultural sales in the state (Rice, 2014). Of these farms nearly all of them are operated by American Indians; 90 percent in Navajo county and 95.5 percent in Apache County. Further, roughly half of these operators are female; which is much higher than the national average of just under 14 percent (Rice, 2014).

Investments to ensure on-farm viability is often an economic development strategy employed in developing countries as a way to increase the prosperity of rural areas, and shrink the disparity in income relative to urban areas. Focusing on the on-farm viability and the requisite infrastructure needed (e.g. roads, rail, market areas and other) will also create demand for industrial products and the development of the commercial sector in a developing country. Finally, the diversion of labor from agriculture to non-agricultural sectors is important from an economic development perspective as it eases the burden of surplus labor force (Macatta, 2016). See the Overview section for a description of the underemployed workers in the study area. While not the focus of this section, the strategy of

ensuring on-farm viability would likely have significant impacts for portions of the study area that are largely composed on agricultural producers, such as Navajo Nation communities like Many Farms and smaller communities on Fort Apache.

There is no obvious direct link between the large number of farms in the study area and the hog farm (owned by Smithfield) in Snowflake, Arizona. The existing operation is part of a much larger supply chain of meat production for Smithfield. The Snowflake farm encompasses 3,800 acres containing 130 buildings set in clusters according to stage of pig development: birthing, weaning and finishing. The main feed ingredients being railed into the farm are corn and soy. Excrement from the animals flows from the buildings to evaporation lagoons outside (Wagner, 2007).

There are approximately 12,000 sows at this operation, with a total hog inventory of around 160,000 at one time (Reddick, 2018). The infrastructure supporting the farm along with the mild climate and remoteness of the region make this an ideal geography for additional large scale feeding operations. However, due to disease spread risk another hog farm nearby would not be ideal. Further, large scale cattle feedlots tend to be concentrated in locations within close proximity to the processing facilities such as southern California and Colorado (near Greeley). Therefore, the most logical large-scale animal feeding operation to site near the existing hog farm would be either a dairy or poultry operation (for meat or egg).

7.3.1 Dairies

Dairy is Arizona's highest grossing agricultural sector. There are 180 dairies across the state²⁹ that milk 177,000 cows, and bring in \$871 million annually in gross revenue. The size of dairies in Arizona is large relative to other areas, with most farms at 1,500 to 2,000 head of cows. The climate in Arizona is ideal for dairies eight months out of the year, but extreme heat in the valley over the summer time can decrease milk production and danger a cow's health (Arizona Experience, 2018). Dairies in the valley implement misters and state of the art ventilation systems to keep cows cool during the summer. The lower summer temperatures in the study area relative to the valley may provide a competitive advantage. The likely constraint to dairy growth is the lack of irrigated land for alfalfa production in the region.³⁰

7.3.2 Poultry Operations

Large scale poultry operations are either operated for meat production (broilers) or egg production (layers). Both types of development have been going through consolidation in the United States; whereby flocks are getting larger and production has been concentrated in a smaller number of firms. In 2017 there were 201 egg producing companies with flocks of over 75,000 birds, representing 99 percent of all layers in the US (Agricultural Marketing Resource Center, 2018). Almost half of the layer birds in the US are found in the top five producing states of Iowa, Ohio, Indiana, Pennsylvania and Texas. Increased attention on consumer health, on environmental concerns and in issues from animal welfare groups there has been increased attention to designer and specialty eggs, including characteristics such

²⁹ A brief review of Census of Agriculture indicates these dairy farms are concentrated in Maricopa, Pima and Pinal counties. There were only 15 dairies identified in the two county region in 2012 Census of Agriculture.

³⁰ National Agriculture Statistics Services (NASS) Quick Stats reports less than 4,000 acres of irrigated hay were produced in the two county area as of the last Census of Agriculture.

as: organic, range, cage-free, and omega 3. Eggs with these characteristics or marketing labels have experienced the most growth lately (Agricultural Marketing Resource Center, 2018). Cage-free, in particular, has received a lot of attention from the market, with many grocery outlets and food manufacturers pledging to only purchase 'cage-free' eggs. In a USDA Analytics Division report it is estimated that the size of the nation's cage-free flock will need to expand by 139.5 million birds by 2030 to meet this demand, representing a 900 percent increase from 2016 levels (Alonzo, 2016).

In regard to boiler farms the five largest companies (Tyson Foods, Pilgrim's Pride, Perdue, Sanderson Farms, and Koch Foods) control over 75 percent of production (Poultry Industry Overview, n.d.). These companies generally use corn and soy (same ingredients as hog farm) in a proprietary feed mix that they deliver to contract farmers. Breeder companies (often subsidiaries of the parent) develop unique breeds of chickens that are often then used in breeder farms to produce fertilized eggs, that then are hatched at a hatchery before being shipped to a broiler farm (usually contract farm) for finishing. There is growth anticipated in the poultry meat market in the near term, with USDA anticipating record high disappearance of poultry in 2018 and 2019 (Meat + Poultry Staff, 2018).

The main factors that could attract large scale industrial agriculture are availability of primary inputs, water, energy and labor. The bullets below describe these factors in more detail relative to the study area:

- **Primary inputs:** As noted above, the access to Apache Railway is useful for transporting soy and corn into the region from the Midwest in rail car units, at cheaper rates than truck transportation. This could provide a competitive advantage in the large industrial agriculture sector.
- **Water:** This is a factor on two fronts. First, access to an adequate volume of potable water for the animals is necessary. For an average sized animal feeding operation of poultry or dairy farm the water use requirements would be 20 to 115 acre feet per year (Bilby, 2010).³¹ The existing aquifers in the study area can support this level of additional withdrawal. Secondly, the waste streams from these operations is closely monitored so as not to interfere with local water quality impacts. The existing hog farm in Snowflake uses evaporation ponds but other options are available for containing and dealing with waste streams.
- **Energy:** While energy (via natural gas or electricity) is necessary for heating or cooling these operations; there are also opportunities to capture methane through anaerobic digesters or covered lagoons and use this as an energy source (for larger operations) and operate closed

Poultry Farm Operations
General Siting Requirements

- 40 acres of land minimum
- 100,000 sq. ft. of houses
- Capital Investment: \$1 million +
- Water Needs: 20 - 115 AF
- Waste management key to viability; potential for additional revenue stream

³¹ This represents total water use (drinking and cleaning).

loop systems. The determination of this type of investment comes down to the highest and best use of nutrients from the waste stream (Sutton - Vermeulen, 2017).

- **Labor:** This requirement varies significantly between the types of operation. For example, a 2,000 head dairy would likely employ 15 people (University of Kentucky, College of Ag, 2018); whereas a large laying operation (with millions of hens) would employ up to 300 people (Gomez, 2018). These jobs generally are on the lower end of the wage-earning scale. Further, the sentiment from employers has been that domestic workers are not willing to perform farm duties necessary on these animal feeding operations, and thus these employers often rely on an immigrant workforce.³²

An example of a Smithfield hog farm existing in unison with a poultry operation nearby is found in Kern County, California where Demler Egg Enterprise is located adjacent to the Smithfield hog farm. It is speculated that there are synergies and cost savings with purchase of feed rations that benefit both entities (Reddick, 2018). If the local governments chose to pursue this type of economic development for the land near Snowflake, there are a couple companies that would be logical to begin recruiting, including:

- Hickman Family Farms has egg operations in Tonopah, Arlington and Maricopa. In the summer of 2017 three lawsuits against Hickman Family Farms were filed in Maricopa County Superior Court from a total of 40 residents who allege Hickman Family Farms of nuisance (impacting nearby businesses); and land developers who contend the egg farm hinders plans for residential and commercial development. While these cases have been consolidated into one, it is clear that there is growing friction between the farm and residents of Tonopah and Arlington. Hickman Family Farm has countersued and is fighting these cases in court. There is no indication that Hickman Family Farms intends to move their Tonopah or Arlington plants, but given the legal battle with neighbors it would be a good time to begin recruiting this operation to the area if industrial agricultural developments are a priority for the region.
- Midwest Poultry Producers is a co-owner of the Apache Railway. Given the investment and commitment in the region this firm made in late 2015 it would be logical to think they intend to utilize the rail in some fashion for poultry operation. Understanding the timeline of their plans, and expected employment needs will be useful for planning related to county services and infrastructure planning (utilities, roads, etc.).

³² This sentiment was reported from Extension reports and at the annual Farm Foundation meetings, to name a few.

7.4 FOOD PROCESSING

Food processing includes any procedure that takes raw agricultural products and modifies it to be more marketable to consumers or other food manufactures. When evaluating the potential for expanding food processing in the area, the critical factors are similar for other manufacturing industries: Access to inputs (i.e. raw agricultural goods), access to consumer markets, and local infrastructure. In the study area, there is linkage between the industrial animal feeding operations and possibility for food processing.

Figure 7-8: Food Processing SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> One day access to markets in California, Texas and New Mexico Apache Rail for bringing in inputs, and shipment of products Potential synergies with industrial agriculture Navajo and Apache traditional foods provide a unique marketing angle 	<ul style="list-style-type: none"> Lack of existing processing companies (food processing cluster) US labor costs can make food products more expensive than products imported from international regions
Opportunities	Threats
<ul style="list-style-type: none"> Processors and retailers with emphases on regionally sourced foods could significantly increase economic impacts regionally Entrepreneurship opportunities in the form of business incubator Large scale food processors employ a large number of people 	<ul style="list-style-type: none"> Other areas (e.g. California) have established food processing clusters Large scale food processors internationally may hold a cost advantage due to labor

Food processing development strategies can take many forms; from small scale entrepreneurship focused strategies such as food incubators to recruiting large scale food processing companies (possibly integrated with industrial animal operation development). This section briefly addresses both ends of the spectrum.

Small to Mid-Scale Food Processing

In recent years rural communities and economies, federal and state agencies, private foundations and development organizations have been working toward strengthening regional food systems. This is one of USDA's four pillars of agriculture and rural economic development. Between 2009 and 2015, the USDA invested over \$1 billion in more than 40,000 local and regional food system projects. Even though the rationale to support funding and promotion of local and regional food systems stems from their ability to support positive rural economic development outcomes, there is evidence suggesting this investment has been concentrated in urban (or metro) locations. These systems predominantly involve rural or urban-adjacent farms and ranches selling into urban markets. In this light, local food systems have become regional economic development strategies focused on strengthened rural-urban linkages through market interactions (Federal Reserve Bank, 2017). Opportunities for strengthening regional food linkages with small to mid-scale processors in the region and urban consumers in Phoenix,

Albuquerque, El Paso, Los Angeles and Las Vegas makes the study area attractive for this scale of food processing development.

An entrepreneurship focused strategy that local economic development opportunities could implement related to food processing is to invest in or develop a food venture incubator. There are several examples of food incubators across the country.³³ The advantage that incubators provide processors is lower overhead costs through offering commercially licensed food processing space. Thus, small startups can avoid the costly and often time consuming process of investing in their own space and going through the licensing and permitting process individually. This could be particularly useful for small startups, food trucks, and food caterers. The impact of a food business incubator will likely be felt in terms of jobs or income but also supporting crop production sectors, further recirculation of money in the local economy that would have been spent outside the region, and reducing the environmental impact (mainly in the form of energy used to transport) of food products consumed regionally.³⁴

Large Scale Food Processing

Large scale food processors typically locate where raw commodities grow (or are raised) and where transportation infrastructure allows for efficient goods movement to ports and foreign markets (Area Development, 2015). In the study area, this would indicate food processing around pork and possibly poultry in the future (see Industrial Agriculture section above). Currently the Snowflake Smithfield hog farm ships hogs to the processing plant in Los Angeles to be processed. Smithfield has no plans for future meat processing development in the area.

Poultry processing could be a key development area, especially in the event that Midwest Poultry Producers were to site a broiler facility in the area.

Poultry processing plants are generally large employers. Most (more than half) of the poultry processing plants comprising NAICS code 311615 employ more than 500 employees, as depicted in the following graph.

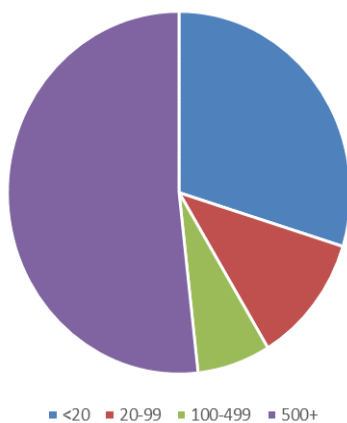
Large Scale Food Processing General Siting Requirements

- 500 – 700 acres of land
- 90,000 to 180,000 sq. ft. of plant
- 500 employees with average wage of \$32,000 / year
- Capital Investment: ~\$20 million
- Water Needs: 300 AF +
- Wastewater generally high Biochemical Oxygen Demand (BOD) levels

³³ A few examples include: Appalachian Center for Economic Networks; Lake County Community Development Corporation; and South Valley Incubator.

³⁴ An additional opportunity for processing of high valued medical marijuana and related products is likely to occur in Navajo county due to the development and expansion of Copperstate Farms.

Figure 7-9: Percent of Entities in Poultry Processing, by Number of Employees



7.5 POTASH MINING & PROCESSING

The Holbrook Basin of Northeast Arizona contains approximately 0.7 to 2.5 billion tons of potash (U.S. Geological Survey, 2017). The center of the deposit is located roughly 20 miles east of the City of Holbrook and lies between 700 and 2,000 feet below the ground surface. Approximately 20 percent of the deposit lies under the Petrified Forest National Park, which is closed to mining. Another 30 percent of the deposit lies under land included in the Petrified Forest Expansion Act of 2004, which may make it difficult to build mining infrastructure on the surface. The remaining 50 percent lies under a combination of private, State Trust, and Native American Tribal lands (Rauzi, Potash and Related Resources of the Holbrook Basin, Arizona, 2008).

Figure 7-10: Potash Mining & Processing SWOT

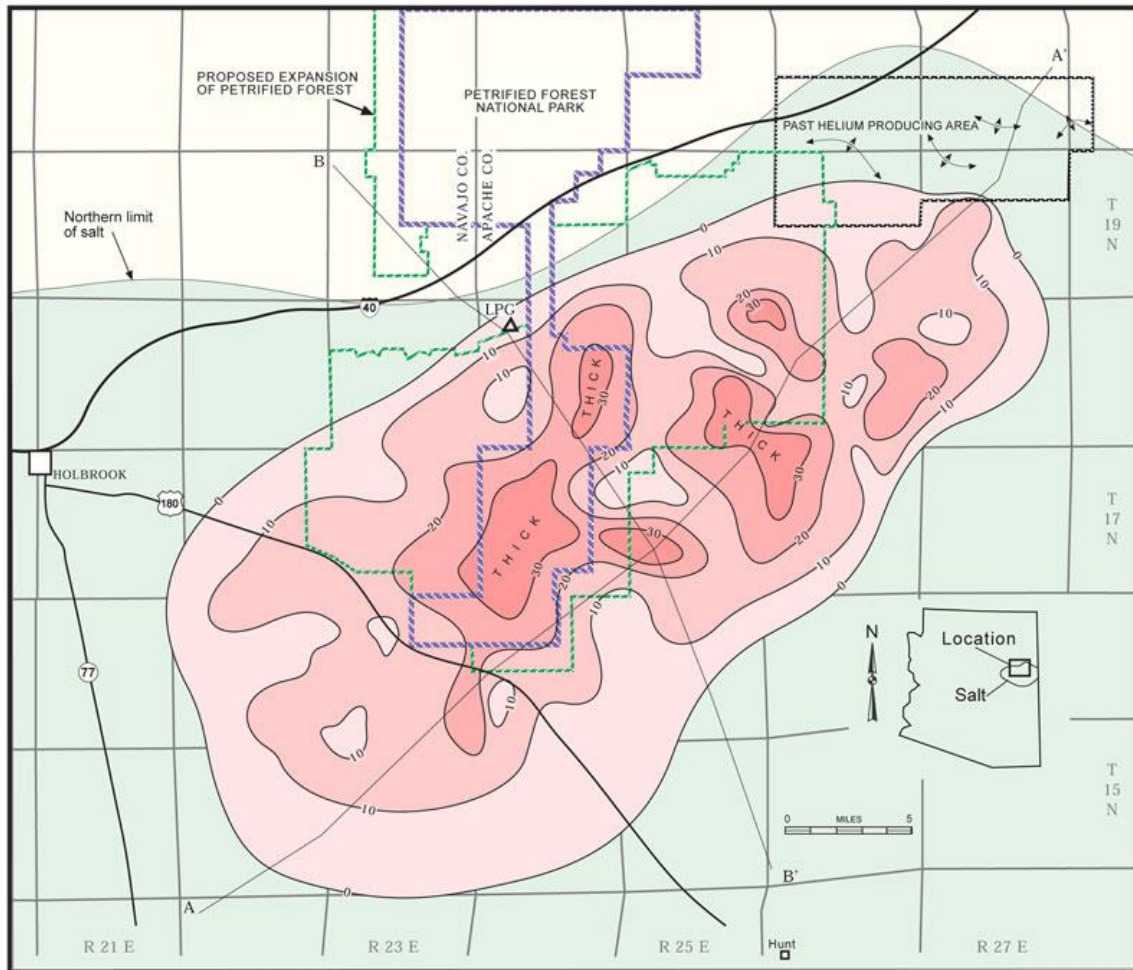
Strengths	Weaknesses
<ul style="list-style-type: none"> The Holbrook basin has 0.7 - 2.3 billion metric tons of potash. The deposit is located very close to major highway and railroad networks. 	<ul style="list-style-type: none"> Much of the area's resources lie beneath the Petrified Forest National Park, limits the type of mining that can take place and the locations where infrastructure can be built. A constrained water supply limits the viability of solution mining in the area, which is cheaper than underground mining.
Opportunities	Threats
<ul style="list-style-type: none"> At least two companies have pursued potash interests in the area in recent years. The most recent and available feasibility study estimated production costs would be far below recent prices for potash, indicating profit potential. Global demand for potash is expected to increase in the short-term, which would increase prices. 	<ul style="list-style-type: none"> The price of potash has been volatile in recent years, which may deter investment. The global supply of potash is expected to increase in the short-term, which would suppress prices. Neighboring states have large and well-established potash industries, making them a direct source of competition for local mines.

Potash resources can be developed using conventional underground mining or solution mining, which pumps heated water into the ore to dissolve the potash and then pumps the brine solution to the surface for processing. In general, solution mining is cheaper than underground mining, however, the chemical composition of the potash (specifically, the presence of carnallite) can make solution mining untenable (Mills R.). Solution mining also requires roughly 1,300 gallons of water per ton of potash extracted, which could make it unfeasible in water-scarce areas. An assessment by the Arizona Geological Survey indicates that about 30 percent of the Holbrook Basin's potash resource could be recovered through solution mining, while underground mining would be required for the rest due to insolubility (Rauzi, Potash and Related Resources of the Holbrook Basin, Arizona, 2008).

In the U.S., 85 percent of demand for potash comes from the fertilizer industry, whose products are purchased mainly by farmers. In 2016, 90 percent of domestic potash consumption was satisfied by imports, and of that, Canada supplied 85 percent. Domestic sources of potash are primarily in New Mexico and Utah (U.S. Geological Survey, 2017). This means that if the region's potash resources were developed, its biggest competitors would be in neighboring states. Analysts predict that global demand for potash will increase in the short-term, which will tend to push up potash prices, however, global supply is also expected to increase, which will tend to push prices down. These countervailing forces

make it difficult to predict which direction potash prices will go in the future. The average price of potash on February 1, 2018 was \$336 per ton (Agricultural Marketing Service, 2018).

Figure 7-11: Potash Resources in the Area



Source: (Rauzi, *Potash and Related Resources of the Holbrook Basin, Arizona*, 2008)

There has been interest as recently as 2016 in developing the potash resources in the Holbrook Basin. In 2013, the Karlsson Group conducted a pre-feasibility study on the local resources and planned to develop an underground mine with a processing plant that would have average annual production of 1.3 million tons and employ 850 people at full production. The study estimated that each ton of potash would cost roughly \$172 to mine, process, and transport (The Karlsson Group, 2013). The fact that this is far below recent prices for potash suggests such a mine could be highly profitable. Passport Potash also had intentions to develop a potash mine in the Holbrook Basin, with plans to produce 2.5 million tons per year and employ 1,770 people at full production (State Geologist of Arizona, 2013). However, there

appears to be no current developments in the area, and there are some indications that both companies are no longer in business (Blokland, 2016).³⁵

If the region's potash resources could be developed, it could have significant economic impacts. According to 2015 data from New Mexico, a potash mine employs roughly 1 person for every 1,200 tons of annual production (New Mexico Energy, Minerals & Natural Resources Department, 2016). Based on this, a mine of the size proposed by the Karlsson Group in the Holbrook basin (1.3 million tons/year) would employ approximately 1,080 people. New Mexico potash mines employed 1,194 people in 2015 and doled-out almost \$96 million in payroll (not including benefits). When adjusted for inflation, this averages-out to an annual salary of almost \$84,000 per employee. Underground mining would tend to employ more people than solution mining, however, exact estimates of the difference are not available.

The market price of potash is the most important factor in whether or not a mine is developed, so growth in this industry is largely outside the control of local government. However, interviews with officials in Eddy County, a large potash producing area in New Mexico, have revealed some strategies to support the industry once it arrives. One way is to ensure that county services and infrastructure are funded to meet the needs of the industry and the influx of residents that accompanies industry growth. Roads and emergency services are two areas that tend to be over-burdened. Another way to support the industry is to set up public/private committees with representatives from the industry to ensure county leadership is aware of their needs and can collaborate on solutions (Hooper, 2018).



Potash Solution Mining Operation

³⁵ Attempts to contact the companies were met with disconnected phone lines and emails that received no response.

7.6 HELIUM

Historically, Northeast Arizona has been home to some of the richest helium deposits in the world. Located in the Pinta Dome and Navajo Springs fields roughly 35 miles northeast of Holbrook, the deposits provided high-concentration helium (averaging eight percent) during the 1960's and 1970's (Rauzi, Review of Helium Production and Potential in Arizona, 2003). A recent estimate has placed the size of the remaining deposit at 2 billion cubic feet (State Geologist of Arizona, 2016).

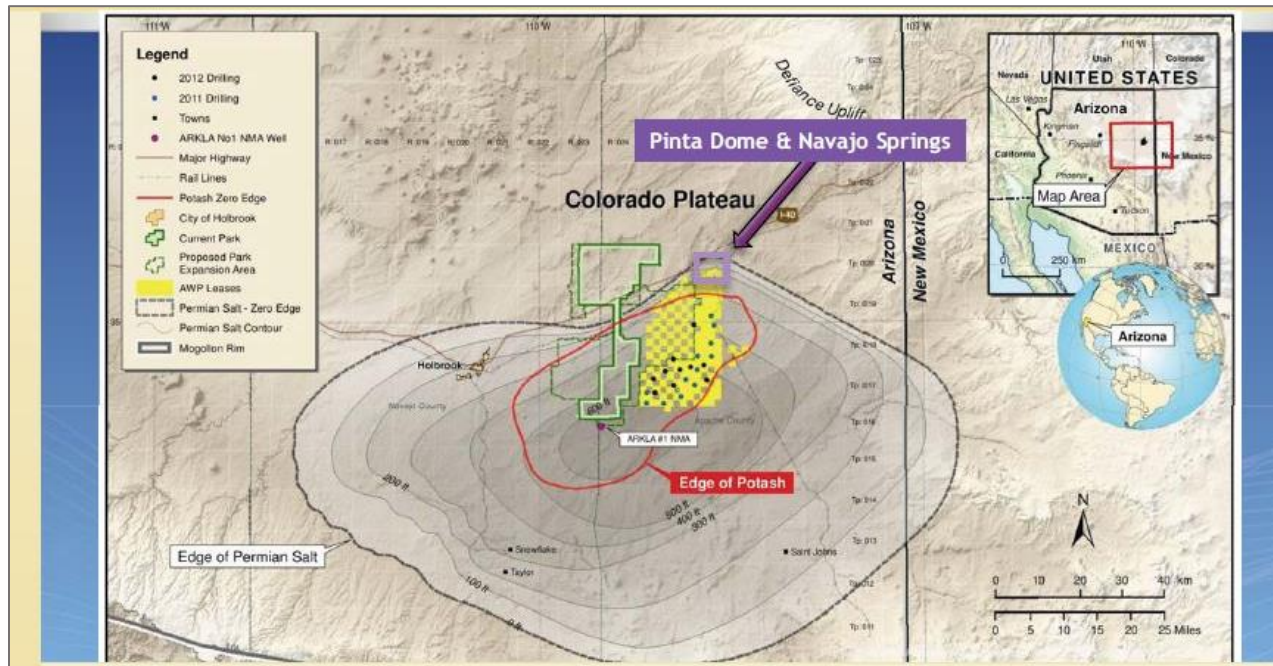
Figure 7-12: Helium SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> The Holbrook basin has historically been one of the world's best helium-producing areas, known for exceptionally high concentrations of the gas. Recent estimates place the area's deposits at 2 billion cubic feet of gas. Deposits lie close to major highway and rail networks. 	<ul style="list-style-type: none"> The nearest refining facility is nearly 300 miles away in Utah. The largest trading market for helium is almost 600 miles away in western Kansas, Oklahoma, and northern Texas.
Opportunities	Threats
<ul style="list-style-type: none"> Three companies have taken steps in recent years to assess and extract helium resources from the area. Prices for helium have been on the rise in recent years due to limited supply and inelastic demand. Further supply shortages are expected in the next few years as the BLM stops selling helium. 	<ul style="list-style-type: none"> If the economic blockage of Qatar is lifted, it could result in a large supply increase and suppressed helium prices.

The special chemical properties of helium make uniquely useful in space exploration, national defense, physics experimentation, and medicine. In many cases, helium is the only substance capable of fulfilling its role safely, essentially guaranteeing a market for helium for some specialized products and uses. In the U.S., most of the helium produced is extracted from natural gas wells in Wyoming, Utah, Colorado, New Mexico, Kansas, Oklahoma, and Texas (Olukoga, 2016). The U.S. is the largest supplier of helium in the world, supplying about 41 percent in 2016, followed by Qatar, who supplied 32 percent in 2016 (US Geological Survey, 2017). However, this changed in 2017 when Middle Eastern countries implemented an economic blockade of Qatar, which effectively cut 30 percent of the world's global supply of helium (Reisch, 2017). If the blockade is lifted and the global supply increases, it could cause global helium prices to fall.

Changes in the U.S. will also disrupt the helium market in the next few years. Historically, the federal government has managed a large reserve of crude helium, but in 2013 after a change of policy, it began auctioning off its helium stockpile. Sales to private industry will cease by September 2021. The resulting supply cut is expected to create a global helium deficit by 2020 (Helium One, 2018). This could imply that the next few years will be opportune time to start developing helium resources, as prices will likely increase. Helium prices have been on a steady rise since 1998, and recent prices have reached \$200 per thousand cubic feet (Mcf) for Grade-A helium (Bureau of Land Management, 2017; US Geological Survey, 2017).

Figure 7-13: Helium Resources in the Area



Source: (State Geologist of Arizona, 2016)

The location of Northeast Arizona's helium deposits offer both advantages and disadvantages. The proximity to major highways is certainly a benefit to the region, as helium is often transported by truck where pipelines are not available (National Research Council, 2010). One disadvantage is the distance from a processing facility. The nearest one lies 220 miles away in Doe Canyon, Colorado (Air Products, 2016).

Three companies have taken steps recently to develop helium resources in the Pinta Dome and Navajo Springs fields. Ranger Development, a Texas-based joint venture, has conducted exploratory drilling and planned to construct a processing plant capable of handling two million cubic feet of gas per day (State Geologist of Arizona, 2016). While it is unclear where this development stands today, the company was meeting with the Arizona Oil and Gas Conservation Commission as recently as February 2017 to facilitate continued development of helium resources (State of Arizona Oil and Gas Conservation Commission, 2017). Blackstone Exploration is also working to develop the region's helium, in addition to oil and gas. As of 2015, the company had four permits to drill in and around the Holbrook Basin, at least two of which had a primary interest in helium (Arizona Oil and Gas, 2015). As recently as July 2016, Blackstone was working on a program to produce helium in the area (Buckley, 2016). A third company, which is likely Rare Earth Exploration, was getting ready to file drilling permits in 2016 (State Geologist of Arizona, 2016).

Helium production in the area could be highly profitable. The CEO of Rare Earth Exploration estimated that, using new technologies, helium could be produced at a break-even price around \$1 per Mcf (Cision, 2016). This is far below recent prices of \$200 per Mcf, indicated large profit potential. The likely economic impacts of helium production are uncertain as data on employment and compensation are not widely available. However, helium is extracted in the same way as (and often as a byproduct of)

natural gas. For that reason, the economic impacts of helium extraction are likely to be similar to those of natural gas. Based on the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) data from 2016, a natural gas well drilling establishment in Arizona employs an average of 7-8 people and provides an average annual salary of \$85,000 (2018 dollars) (Bureau of Labor Statistics, 2016). If all three companies that have shown interest in the region's helium eventually develop those resources, it could directly support roughly 23 jobs and nearly \$2 million in annual wages (assuming the operations were of average size). The possibilities for the County to encourage industry development are similar potash: The most important factor (commodity price) is out of the hands of local leadership. However, similar measures to support the industry by fostering public/private partnerships and providing essential infrastructure and services could be just as useful as with the potash industry.

7.7 CARBON DIOXIDE PIPELINE

Among other industrial, scientific, and medical uses, carbon dioxide (CO₂) is valued for enhanced oil recovery (EOR), as it helps to improve the efficiency of extraction (National Energy Technology Laboratory, 2010). It was for this purpose in 2013 Kinder Morgan, a large developer and owner of pipelines, proposed to build the \$1-billion Lobos Pipeline to connect CO₂ deposits in from the St. Johns field in Apache County to the existing Cortez Pipeline in Torrance County New Mexico. The proposed pipeline was 213 miles long, and would allow CO₂ produced in Apache County to be used in the EOR fields of the Permian Basin in southeastern New Mexico and west Texas (Pulsinelli, 2014). In the U.S., roughly half of the EOR operations using CO₂ are located in this region, making it an attractive market for CO₂ producers (Leroux, 2012). Kinder Morgan estimated that over 1.3 trillion cubic feet of CO₂ is recoverable from the St. Johns field (Brock, 2014).

Figure 7-14: Carbon Dioxide Pipeline SWOT

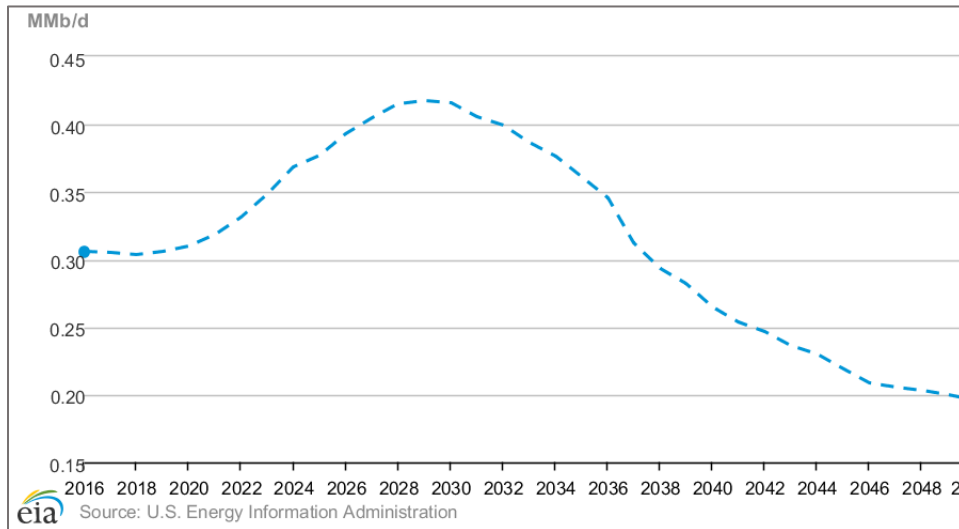
Strengths	Weaknesses
<ul style="list-style-type: none"> The St. Johns - Springerville area has large CO₂ deposits; 1.3 trillion cubic feet are recoverable, according to one industry estimate. Kinder Morgan, a large company involved in the extraction and transmission of CO₂, has already done extensive planning to construct a pipeline in the area. The NE AZ is close enough to supply the largest source of demand for CO₂: the oil fields in the Permian Basin in New Mexico. 	<ul style="list-style-type: none"> To make CO₂ export economical, a 200-mile pipeline would have to be constructed at a cost of over \$300 million. The scope and expense of pipeline construction restricts its execution to a smaller number of large companies.
Opportunities	Threats
<ul style="list-style-type: none"> The growth of enhanced oil recovery (EOR), the primary source of demand for CO₂, has been stymied due to an insufficient supply of CO₂. Demand for CO₂ for EOR is projected to increase 25% in the next decade. Congress recently expanded a tax credit for the use of CO₂ in EOR, which could increase the demand for CO₂ and make more local deposits economically viable. 	<ul style="list-style-type: none"> The demand for CO₂ in oil extraction is highly-dependent upon the price of oil, making this industry potentially volatile. A long CO₂ pipeline is likely to face opposition from environmentalist groups. It is projected that captured CO₂ from industrial sources will grow in coming years, reducing the need for CO₂ from natural sources.

In 2015, Kinder Morgan puts its plans for the pipeline on an indefinite hold, citing a significant decline in oil prices. However, it left open the opportunity to follow-through on the proposed development given more favorable market conditions (Passut, 2015). The company's reversal illustrates the importance of oil prices to the demand for CO₂ and the economic feasibility of projects to supply CO₂. The cost of CO₂ itself can add up to \$30 per barrel of oil produced, making oil price a critical determinant in whether EOR operations are economically viable (Budzik & Van Wagener, 2014). With recent oil prices around \$67 per barrel, the cost of CO₂ could consume nearly half the revenues of a barrel of oil.

The Energy Information Administration forecasts EOR oil production in the U.S. that uses CO₂. Their most recent estimates predict that, under the Reference case, production using CO₂ EOR will rise by

roughly 35 percent between 2016 and 2029, after which it will fall steadily through 2050 (see figure below).

Figure 7-15: Oil and Gas Production (Lower 48 Onshore)



Source: (U.S. Energy Information Administration, 2018)

This could foreshadow an increase in the demand for CO₂ in the next decade. Some analysts are already claiming that the current supply of CO₂ for EOR is inadequate and has stymied growth in EOR operations, and therefore an attractive market exists for further CO₂ suppliers (Williams, 2018). If accurate, these conditions could indicate an opportunity to develop the CO₂ resources in the St. Johns field. However, such development would be likely to encounter competition. The Cortez Pipeline already connects established CO₂ resources in Colorado to the Permian Basin. Two additional pipelines also connect Colorado and New Mexico CO₂ resources to the Basin. While CO₂ from natural sources (i.e. underground) such as these are the most commonly used, CO₂ from industrial sources have also been gaining more attention in recent years. The Century Gas Plant in Pecos County, West Texas currently supplies the Permian Basin EOR operations with CO₂. Supplies from industrial sources are expected to increase in the coming years, although not necessarily near the Permian Basin (National Energy Technology Laboratory, 2015).

One potential boon to the industry's prospects comes from a recent tax policy change. In February 2018, Congress approved a budget that included an expanded tax credit for CO₂ used in EOR. The new incentive increases the credit from \$10 to \$35 per metric ton of CO₂ used (Williams, 2018). This could change the economics of using CO₂ in EOR and further increase demand for CO₂.

One threat to a CO₂ pipeline in Northeast Arizona comes from land owners and environmental groups. When the Lobos Pipeline was proposed, the group "Resistiendo/Resist the CO₂ Pipeline" formed in Torrance County, New Mexico to oppose the project. They voiced concerns over environmental damage and disturbance to historical and cultural areas (Maxwell, 2015). Any future pipeline development could meet with similar opposition, potentially lengthening the regulatory approval process.

If the proposed pipeline was reinitiated, it could bring significant economic benefits to the region, both from extraction operations and pipeline construction. As with helium, CO₂ is extracted in much the same way as natural gas, so the employment impacts could be similar: Around 7-8 employees per establishment with average annual salaries of \$85,000. According to the same QCEW data, oil and gas pipeline construction firms in Arizona employ an average of 25 people and pay an average annual salary of roughly \$58,000 (Bureau of Labor Statistics, 2016). Kinder Morgan claimed that the proposed Lobos Pipeline would generate approximately \$2.3 million per year in tax revenue for schools, counties, and the state; employ approximately 1,200 contractors during peak construction; and employ six full-time workers to operate the pipeline (Kinder Morgan). As the vast majority of the pipeline would lie in New Mexico, it is unclear whether these construction benefits would accrue in Northeast Arizona.

As with potash and helium, the leadership in Northeast Arizona can do little to influence the commodity prices that primarily drive development in this industry. However, creating public/private partnerships with companies like Kinder Morgan and providing essential infrastructure and services could be helpful to supporting the industry in the event development occurs.

7.8 OUTDOOR AND RECREATION MANUFACTURING

Nationwide, outdoor recreation direct generates almost \$887 billion in retail spending each year, which has been growing steadily around five to seven percent per year (Outdoor Industry Association, 2017; Seabury, 2018). The outdoor recreation industry in Arizona directly employs 201,000 people and generates over \$21 billion in consumer spending, \$5.7 billion in wages and salaries, and \$1.4 billion state and local taxes (Outdoor Industry Association, 2017).

Figure 7-16: Outdoor and Recreation Manufacturing SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> Outdoor culture of the area Public perception of White Mountains and Mogollon Rim Actively recruiting and welcoming manufacturing companies 	<ul style="list-style-type: none"> Decision to locate is often not influenced by business climate. Manufacturers locate business in spite of county or local attractiveness; but instead develop where their 'home' No empty large warehouses with old apparel equipment in it (see Portland)
Opportunities	Threats
<ul style="list-style-type: none"> Manufacturers leaving California & Colorado due to high employment costs, anti-gun sentiment, and new regulations on gun purchasing (Weatherby and Magpul) Local, niche apparel companies Enhance / maintain livability of communities, quality of life to attract people to consider Navajo and/ or Apache counties home 	<ul style="list-style-type: none"> Anti-gun regulations (see Colorado) or sentiments Wyoming is actively recruiting gun and ammo manufacturers and have landed two recently

Northeast Arizona offers a number of advantages in attracting the outdoor industry. First, there is a strong outdoor culture in the area, which is a key ingredient to growing the industry. Arizonans are more likely to participate in off-roading and day hiking than the average American (Outdoor Industry Association, 2017). Second, there are a wide variety of outdoor resources in relatively close proximity, which provides companies the opportunity to quickly test out prototype products. The White Mountains, Petrified Forest National Park, and the Mogollon Rim are just a few the nearby resources that could attract firms producing products for mountain biking, hiking, camping, skiing, and hunting.

Low cost of living is another potential advantage of drawing companies from the outdoor industry. A low cost of living helped to convince Amer Sports (owner of many large brand names including Wilson and Salomon) to expand in Ogden, Utah rather than Portland or Seattle (See "Case Study" section for more information on Ogden's strategy for attracting the recreation manufacturing sector) (Outdoor Industry Association, 2012). It was also one of the reasons Weatherby, a gun manufacturer, chose to relocate to Wyoming from California (Keefe, 2018). Other cities have marketed their low cost of living as a way to lure outdoor companies away from Boulder, Colorado, which has a strong industry cluster (Kuta, 2011). Northeast Arizona could use a similar strategy.

The political climate of the region could also be an advantage in attracting some industries. Recently, firearms manufactures have been leaving their native states and relocating to more "gun-friendly" environments. While not stated explicitly by the companies' owners, it is suspected to have influenced

the recent decision of Weatherby to leave California and Magpul to leave Colorado. Both relocated to Wyoming, where the governor has been actively recruiting the gun industry and touting Wyoming's fit for the industry. Four other firearms companies have made similar moves recently (Keane, 2018). If Northeast Arizona distinguished itself as being especially supportive of the firearms industry, it could succeed in attracting firms from the industry. However, actions at the state level, such as recently proposed gun restrictions, could undermine such efforts (Gardiner, 2018).

A number of factors will make it more challenging for Northeast Arizona to foster growth in the outdoor industry. Two key needs of the industry, according to one CEO, are high-speed internet access and good access to air transportation. Public data indicate that broadband adoption in the two-county region is far below the state and national averages (see Section 6 for more details). However, this may not be an issue in the near future with additional investments in fiber optic cable being made. While the area does have a regional airport, it is several hours of driving away from a large airport with access to most domestic and international destinations. This could be a deterrent to industry employees who expected to travel conveniently both for business and pleasure. The region also lacks other infrastructure that gives competing areas an advantage, such as the large, empty warehouses in Portland that have helped to grow the outdoor apparel industry.

In addition to expanding high-speed internet access, leadership in Northeast Arizona could help to attract the outdoor industry by improving quality-of-life in general. Companies in the industry tend to locate and grow in areas that are desirable places to live, work, and recreate (Seabury, 2018). More details on strategies to attract this industry can be found in the section dedicated specifically to this topic. While there are a number of actions the region can take to attract the outdoor industry, one potential difficulty in fostering this industry is that companies tend to locate based on where their founders live rather than where benefits, such as the business climate, are greatest. This could limit industry growth to firms that startup in the area.

Economic impacts from this industry tend to affect a small number of people but can produce relatively large amounts of revenue. Startups typically require only five to 10 people but can generate roughly \$1 million in revenue per employee. Manufacturing is often done outside of the U.S. where labor costs are low, which can draw some of the economic benefits away from the local area. Entry-level employees generally get paid between \$30,000 and \$50,000 per year, while higher-skilled positions can garner \$50,000 to \$500,000 per year (Seabury, 2018).

7.9 “REMOTE WORK” INDUSTRIES

Figure 7-17: Remote Workers SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> • Lower cost of living • Outdoor recreation amenities and open space • Sense of community • Show Low airport • Northland Pioneer College 	<ul style="list-style-type: none"> • Distance to metropolitan area and major airport • Limited co-working / gathering spaces (formal facilities or coffee shops) for remote workers / entrepreneurs • Limited social structure (organizations / partnerships) to support remote work / entrepreneurship • Broadband reliability and speed • Limited existing professional/technical/financial services industry
Opportunities	Threats
<ul style="list-style-type: none"> • Remote work (telecommuting) on the rise • ‘Diaspora’ with interest in returning home • Second home community as a source of remote workers as well as advisors/mentors • Remote workers are often knowledge workers with higher than average salaries • Remote works / knowledge workers attracted to areas with high quality of life • IT domestic outsourcing on the rise 	<ul style="list-style-type: none"> • Competing against locations everywhere

Traditionally, regional economic development has have often focused on attracting new industries and businesses to a region and retaining/growing existing businesses. As discussed in **Section 4**, directly attracting workforce talent through high quality of life and good business infrastructure is another worthwhile economic development strategy. In particular, a strategy is to focus on attracting individual workers who can ‘work anywhere’. These are workers who are self-employed, who own small firms, or who work remotely and have the flexibility to live nearly anywhere.

The proportion of people who fall into this category of ‘work anywhere’ employees is increasing. The number of people working remotely continues to grow, as does the proportion of time they work remotely. Gallup data shows that in 2016, 43 percent of employees worked remotely (i.e., in a location different than their coworkers) for some portion of their workweek (Gallup, 2017). Of these employees, 31 percent were working 80 percent or more of their time remotely. In other words, approximately 13 percent of all American employees are working remotely over 80 percent of the time.

The qualities that attract these workers include low cost of living, high quality of life, and good telecommunications infrastructure, such as high-speed, reliable broadband access. Other infrastructure, such as good transportation connections (such as a nearby major airport), can also be a factor, as can co-working spaces, and small business owner or remote worker social networks.

One industry that also fits into the category of ‘work-anywhere’ employees that may be a good fit for Northeast Arizona is the domestic information technology outsourcing industry. Domestic outsourcing, or rural outsourcing, is a growing industry providing information technology support such as software

programming, software testing, customer support, Help Desks, and other business and data services. Previously, these services were often outsourced internationally to other countries. Rising labor costs internationally abroad make domestic outsourcing more attractive to businesses. Ten years ago, American software developers cost six times more than Indian Developers, now that margin has shrunk to just two times.

With domestic outsourcing, these jobs are kept in the United States, often in rural regions. The advantage of rural regions is the lower cost of living (and associated relatively lower wage rates) but without the time zone, cultural, and locational issues that come with international outsourcing and without the price tag of large, primarily urban, domestic technology service firms. Domestic outsourcing has experienced significant growth over the past several years, growing as fast as companies can find employees (Wuorio, 2010). Currently, domestic only providers in the United States are serving less than one percent of the global outsourcing contracts (Hochstein, 2015).

Domestic sourcing suppliers are looking for lower cost locations with a sustainable supply of workers, where the supplier may be the lone company in the field (and therefore, generally protected from competition from other service providers). Preferences on the population size for business location vary within the industry, with some providers locating in cities with populations around 500,000 people, others in communities of 75,000 to 250,000 and, pertinent to northeast Arizona, other companies preferring rural communities with fewer than 25,000 people (Hochstein, 2015).

Some firms that have located in smaller cities include CrossUSA, which operates 100-employee facilities in Sebeka, Minnesota with a population of 700 and Eveleth, Minnesota with a population of 3,000. By recruiting experienced, older IT workers nearing retirement for these facilities, CrossUSA has a low turnover rate while older workers are able to continue working in a lower cost location that allows them to stretch their money prior to retirement. As another example, Rural Sourcing has a 60-person center near Booneville, Arkansas with a population of approximately 5,000 and another center in Jonesboro, Arkansas, with a population of approximately 71,000 (Alsever, 2010). Another rural outsourcer, Onshore Technology Services, recruits workers from minimum-wage jobs and gives them intensive training in IT specialties. Sixty-five people work in Onshore IT centers in the rural Missouri towns of Macon (population 5,500), Lebanon (population 14,500), and Joplin (population 50,800).

Companies are often seeking communities with established partnerships between educational institution(s), economic development organizations and government. Community colleges and local universities open to cooperating with domestic sourcing agencies play a major role in attracting these employers, allowing for the sustainable flow of skilled resources into the company and by training the initial workforce. Companies are also looking for cooperation within the local community, including the availability of grants and incentives that will allow quick start up with minimal front-end investment.

Domestic outsourcing provides reliable and relatively high paying IT jobs. The region, with its high quality of life and relatively low cost of living, may be well suited to attract or build its own rural IT outsourcing business if it 1) invests in consistent, reliable broadband, 2) works closely with its community colleges on linking educational and apprenticeship programs with potential IT rural outsourcing opportunities, and 3) leverages its business contacts and expertise from the second home

community to build and connect a local rural IT industry to businesses with demand for such services in Phoenix.

7.10 OUTDOOR RECREATION AND TOURISM

Figure 7-18: Tourism SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> • White Mountains outdoor recreation • Diverse and plentiful wildlife • Desirable climate • Petrified National Forest NP / Canyon de Chelly NM (~800,000 visitors annually) / numerous historic sites • Route 66 • 3 hours from Phoenix, proximity to I-40 • Native American cultures • Water-based recreation • High tourist visitation to broader region • Dark skies (astro-tourism) • Sunrise Park Ski Resort 	<ul style="list-style-type: none"> • There does not seem to be one unifying brand to market the region • Narrow array of visitor services to cater to tourists in many areas of the region • Limited visitor information/signs/interpretation • Availability of private or tribal land sites for new development of lodging or other tourism venues • Lack of coordination intra-regionally and inter-regionally to market tourism • Greater distance to Phoenix than many other tourist/recreation destinations in Arizona
Opportunities	Threats
<ul style="list-style-type: none"> • High tourist interest in outdoor recreation, historic destinations, cultural experiences • Growing astro-tourism market • 42 million domestic and international visitors to Arizona annually • Investments in recreation opportunities and facilities benefits residents and tourists alike, benefitting nearly all industries and overall regional economic development 	<ul style="list-style-type: none"> • Many other locations with cultural, historic, and outdoor recreation offerings in the Arizona / Southwestern market • Nearby well-known and well-marketed outdoor recreation destinations such as Flagstaff, Sedona, Prescott, Grand Canyon • National forests closer to Phoenix (Tonto)

Interest in outdoor-based recreation is high. Outdoor recreation is immensely important to tourists and residents alike. The Arizona Statewide Comprehensive Outdoor Recreation Plan (SCORP) notes that one in five visitors to Arizona visit a state or national park and 17 percent go hiking or backpacking (Arizona State University, 2018). After shopping and fine dining, outdoor recreation activities are the top experiences desired by Arizona visitors. Arizona residents similar enjoy outdoor recreational activities: 59 percent of Arizona adults actively participate in outdoor recreation, with hiking (27 percent participation), bicycling (27 percent participation), camping (25 percent participation) and wildlife viewing (24 percent participation) the most popular activities (Outdoor Industry Foundation, 2005). There are a plethora of outdoor recreation opportunities Northeast Arizona for these and other activities.

Tourism in general is a sizable industry in the region. **Table 7-1** below shows the current tourism economy in Navajo and Apache counties – supporting approximately 10 percent of employment and 2.5 percent of income. Given the size of the tourism industry, targeting even a five percent growth rate would result in increased employment of 285 jobs and increased annual income of \$6.7 million. While the relative income per job is currently relatively low in Northeast Arizona, the region can aspire to generate higher paying tourism jobs – as shown in the average income for tourism jobs in the State of Arizona is nearly 50 percent higher than the average income in Northeast Arizona. As noted in **Section**

2, employment in the accommodations and food services sectors is relatively high in the region, while employment in arts, recreation, and entertainment is relatively low, indicating an opportunity for growth in those areas (which typically have higher wage earning potential).

Table 7-1: Tourism Economy in NE Arizona, 2016

Location	% of Jobs in Region	Total Jobs (Direct, Indirect, Induced)	% of Income in Region	Total Tourism Industry Income (Millions \$, 2016)	Income Per Job
Apache County	9.6%	1,700	1.7%	\$36	\$21,176
Navajo County	10.5%	4,000	3.0%	\$98	\$24,500
NE AZ Region	10.2%	5,700	2.5%	134	\$23,509
State of Arizona	6.1%	186160	2.3%	\$6,464	\$34,723

Source: Highland Economics Analysis of 2017 Arizona Office of Tourism report on the Economic Impact of Tourism Spending in Arizona

This is also consistent with visitation data from the National Forest Service. **Table 7-2** shows national forest visitation and spending in Apache-Sitgreaves National Forest (located in the southern portion of Navajo and Apache Counties, as well as in parts of Coconino and Greenlee counties) as well as for Coconino National Forest, Kaibab National Forest, and Tonto National Forest. In terms of spending associated with national forest visits, the average spending per person per day (\$22) is much lower compared to Coconino and Kaibab National Forests (\$77 and \$162, respectively), but slightly higher than for Tonto (\$12). However *median* (50th percentile) spending for visitors is more similar between visitors to the national forests, indicating that there is just a portion of visitors to the Coconino and Kaibab National Forests that are spending a lot more in the regional economy. Marketing the diversity of recreational and tourist offerings, and increasing the choices available to tourists in terms of visitor services and amenities could help to capture more tourist dollars in the region.

Table 7-2: National Forest Visitation and Spending in Northeast Arizona

Visitation Metric	Apache-Sitgreaves NF (2014)	Coconino NF (2015)	Kaibab NF (2015)	Tonto NF (2016)	Arizona State Total
Acreage in Arizona	2,632,350	1,855,955	1,560,165	2,872,876	10,779,331
National Forest Visits	520,473	4,390,257	371,561	2,580,450	9,678,000
Total Spending, Millions \$*	\$74.8	\$2,361.2	\$210.2	\$114.1	\$1,722.7
Average Per Person/Day Spending*	\$22	\$77	\$162	\$12	\$35
Median Per Person/Day Spending*	\$14	\$17	\$40	\$4	\$5

Source: Highland Economics Analysis of US Forest Service National Visitor Use Monitoring (NVUM) data.

*Estimates derived using average and median total trip spending per party, average party size, and mean number of nights per visit spent within 50 miles of the national forest.

The region could benefit from additional investment in recreation facilities and visitor amenities. A strategy of investing in recreation facilities and other outdoor recreation opportunities, many of which would be complementary to the planned high-altitude sports complex in Navajo County, would contribute to regional economic development in a number of ways. These include: attracting and retaining families, workers, and employers; supporting regional physical and mental health; and attracting visitors and tourists. One key investment being made in many communities is trail systems that link destinations and serve recreators, visitors, and commuters. Many of the more populous cities in Arizona are expanding their existing trail systems at the request of residents and smaller towns are beginning to seek assistance in planning local trails and OHV routes that connect their towns to the surrounding public lands (Arizona State Parks, 2015). Northeast Arizona could follow a similar strategy, as well as increasing and diversifying its offerings related to outdoor recreation. For example, outdoor recreation enterprises in the area could offer recreation and outdoor education outfitting, environmental education programs to adults and / or youth, as well as potential overnight trips with lodging accommodations. Accommodations could cater to a more diverse set of travelers or to niche tourist markets seeking unique cultural or outdoor adventure experiences. Additional athletic or sports events that tie into the high-altitude theme (or other regional brands) also have economic development potential.

Several other Arizona communities, such as Bisbee, Seligman, and Tombstone, market outdoor recreation together with historic and cultural tourism, using a combined strategy of capitalizing on historic and cultural assets such as Historic Route 66, historic sites, and “Wild West” destinations (Arizona State University, 2018). All of these communities support and attract a broad array of travelers through providing accommodations in their communities, offering sites to visit and learn about the area’s past, linking towns to outdoor recreation opportunities, and giving visitors reasons to stay longer in their respective regions. Northeast Arizona can employ a similar strategy, as it has outdoor recreation opportunities, its share of historic and cultural sites, while also having the advantage of cultural tourism associated with visitor opportunities on the area’s Native American Reservations.

Collaboration with public lands management agencies is a key marketing and development opportunity. For example, in Sedona, Arizona, the city has actively encouraged the development of itself as a mountain biking destination. The community has worked collaboratively with the Forest Service to retrofit old trails to better suit cyclists needs and also worked with riders and the city to build 60 miles of

new trails (Gulley, 2016). Sedona also just established the Annual Sedona Mountain Bike festival; such festivals are often very effective marketing tools that draw mountain bikers not just for the event but also for return visits. Strategies to develop outdoor recreation tourism should be coordinated with the cultural tourism development strategies discussed above: a unifying regional brand, collaborative planning and marketing within Northeast Arizona, development of visitor services and information, and targeted marketing.

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