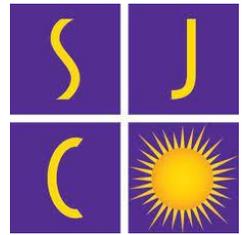


Phase One Final Report | Detailed Chapter

Case Study

Workforce Transition in the Four Corners



About this report

The Intermountain West Energy Sustainability & Transitions (I-WEST) initiative is funded by the U.S. Department of Energy to develop a regional technology roadmap to transition six U.S. states to a carbon-neutral energy economy. I-WEST encompasses Arizona, Colorado, Montana, New Mexico, Utah, and Wyoming. Each state is represented in this initiative by a local college, university, or national laboratory. Additional partners from beyond the region were selected for their expertise in applicable fields. In the first phase of I-WEST, the team built the foundation for a regional roadmap that models various energy transition scenarios, including the intersections between technologies, climate, energy policy, economics, and energy, environmental, and social justice. This chapter presents work led by an I-WEST partner on one or more of these focus areas. A summary of the entire I-WEST phase one effort is published online at www.iwest.org.

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Introduction

The Four Corners region encompasses Colorado, Utah, Arizona, and New Mexico. For generations, fossil fuel production and generation and related supportive industries have been vital to the overall prosperity and growth of the region. Partners and stakeholders, ranging from tribal nations, private companies and state and federal agencies, have played roles in the supplying of reliable energy to the Western United States for decades. Due to the region's unique dependency on fossil fuels, efforts to shift energy production



away from traditional sources and systems will have significant impacts on area tribes, the regional workforce, and regional economy. In terms of ceasing coal generation, the proposed changes will prematurely shutter San Juan Generating Station, San Juan Mine, the Four Corners Power Plant, and Navajo Mine. More importantly thousands will be forced to find new careers.

Established in the early 1970s, the San Juan Generating Station is a coal-fired facility that was built with four units in Waterflow, New Mexico, and upon completion in 1982, generated 1,848 megawatts of base load power for western states, primarily California and Arizona. Its operations have been and are currently overseen by the majority owner, Public Service Company of New Mexico (PNM). Due to changing energy interests, only two units remain in operation with complete closure scheduled for September 2022. The co-located San Juan Mine, providing a mine-mouth operation, was initially an open-surface mine, but transitioned to underground long-wall mining in 2001. The mine was originally owned and operated by BHP and was sold to its current operator, Westmoreland Coal in 2016.

The Four Corners Power Plant is a 1,540 megawatt coal-fired facility located on the Navajo Nation near Fruitland, New Mexico. Upon its completion in 1970, the plant operated five units and generated 2,100 megawatts of base load power. In 2013, three of the five units were decommissioned, their sites reclaimed, and the generation capacity reduced to its current level. Then, in 2016 the two remaining units underwent a major environmental upgrade bringing it in line with the current federal emissions regulations. The Four Corners Power Plant remains largely owned and operated by the Arizona Public Service Company. It is noteworthy that Navajo Transitional Energy Company, a tribally owned autonomous entity, owns a minority share in Four Corners Power Plant and wholly owns the Navajo Mine.

Since the 1960's, these facilities have provided steady employment, economic support, and significant energy production. At the peak of employment, the two coal-fired power plants and the associated coal mines employed over 2,000 workers, a large percentage of whom are members of the Navajo Nation.

Following the approval of the Energy Transition Act in 2019, coal-fired power generation can no longer meet the emissions threshold specified in the law, and therefore operate, without equipping the facilities with some means of capturing the excess CO₂. Contained within the law are provisions for the employer to provide substantial monetary resources that would support and encourage the separating employees to seek re-training and education assistance. However, due to pending lawsuits, the financial resources have yet to be established.

Upon the release of PNM's Integrated Resource Plan in 2017, a local economic development organization, Four Corners Economic Development, commissioned a third-party economic impact report to forecast the negative impact to the region. Additionally, the organization worked closely with PNM and Westmoreland Coal to extract anonymous employee data which would provide an accurate and clear picture of the workers facing termination. The results of the study and the employee details appear below and only focus on San Juan Generating Station and San Juan Mine.

As you will see, transition efforts will have significant and lasting impacts on the Four Corners region and its diverse workforce that includes Native Americans and Hispanics. This report will detail the impacts of the closure of the San Juan Generating Station on the region, local workforce, and economy. We also discuss the rise of new technology and the shift of the energy industry, as well as efforts by San Juan College to mitigate these effects.

Impacts of the closure

The implementation of the Energy Transition Act and previous efforts to move from a coal economy to a green economy will result in the elimination of hundreds of jobs from the San Juan Generating Station, San Juan Mine, Four Corners Power Plant, and Navajo Mine. The closure will also result in the significant loss of property tax revenue that benefits San Juan County, New Mexico, San Juan College, and the Central Consolidated School District. In order to best mitigate the impacts, it is absolutely critical to understand the impending losses and the demographics of the workforce to create a path towards a sustainable future.

Based on the 2018 impact report from Four Corners Economic Development, the following data was gathered from employees from the San Juan Generating Station and the San Juan Mine:

Average Employee Salary	\$86,000 Per Year
Average Employee Age	47 Years Old
Average Years of Service	14 Years
Percentage of Tribal Employees	40%
Percentage with Healthcare from Employment	96%

The following employee information is gathered from the Four Corners Power Plant:

Average Employee Salary	\$84,650 Per Year
Average Employee Age	49 Years Old
Average Years of Service	11 Years
Percentage of Tribal Employees	80%

The closure of the San Juan Generating Station and the San Juan Mine will impact the following entities:

San Juan County, New Mexico

Lost Wages	\$56.6 Million Per Year
Lost Benefits	\$20 Million Per Year
Direct Impacts	1,600 San Juan County Residents (minimum)
Indirect Impacts	5,000 Residents

Governments (Loss of Taxes)

San Juan County	\$3.8 Million Per Year
NM State	\$1.9 Million Per Year

Local School Districts

Central Consolidated*	Loss of \$1.5 Million in Student Funding
Farmington Municipal	Loss of \$1.7 Million in Student Funding
Aztec Schools	Loss of \$165,000 Million in Student Funding
Bloomfield Schools **	Loss of \$77,000 Million in Student Funding

*Central Consolidated serves at 91% Native American student population and a reported rate of 72% of students being financially disadvantaged

**Bloomfield Schools serves 100% financially disadvantaged students

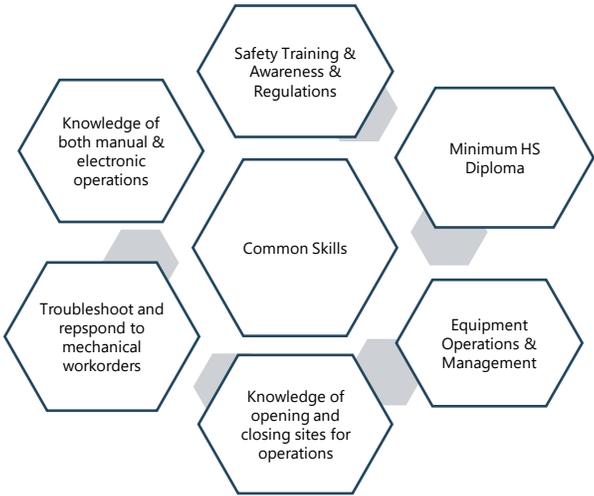
Based on a six-county report from the Four Corners with a focus on the closure of the San Juan Generating Station by the Economic Modeling Specialist Inc in 2017 concludes:

Annual Loss in Earnings	\$117,212,94.00
Total Jobs Lost	1,586
Loss of NM Taxes	\$20.8 Million Annually
Loss of Local Taxes	\$24 Million

Based on the data above, San Juan Generating Station, San Juan Mine, and the Four Corners Power Plant employs their staff on average for a minimum of ten years with successful retention. This can be attributed to high salaries, comprehensive employee benefits, and the ability for employees to remain in the region. It is noteworthy that three entities employ majority Native Americans. During hearings pertaining to the results of the 2017 PNM Integrated Resource Plan, time and again, Native American and Hispanic workers, male and female, told their story of supporting extended family on their salary and being able to send their children to college and university. Many want to stay on the lands in which they were raised but know that if they are unable to find comparable work with comparable salaries, they will have to leave and seek work in copper and other mines.

Translating skills

The impending closure of each entity will result in a large pool of displaced workers many of whom have the following skills most commonly associated with the roles of an underground miner, surface miner, operator, distributors, dispatchers, laborer:



The San Juan College School of Energy has trained generations of plant operators, engineers, mechanics, and instrumentation technicians for the local fossil fuel facilities and continues to provide the necessary safety training. Due to the nature of their education, the skills trained power plant workers possess are skills that can be leveraged into a new economy based upon carbon capture, hydrogen, and helium with the addition of short-term stackable credentials.

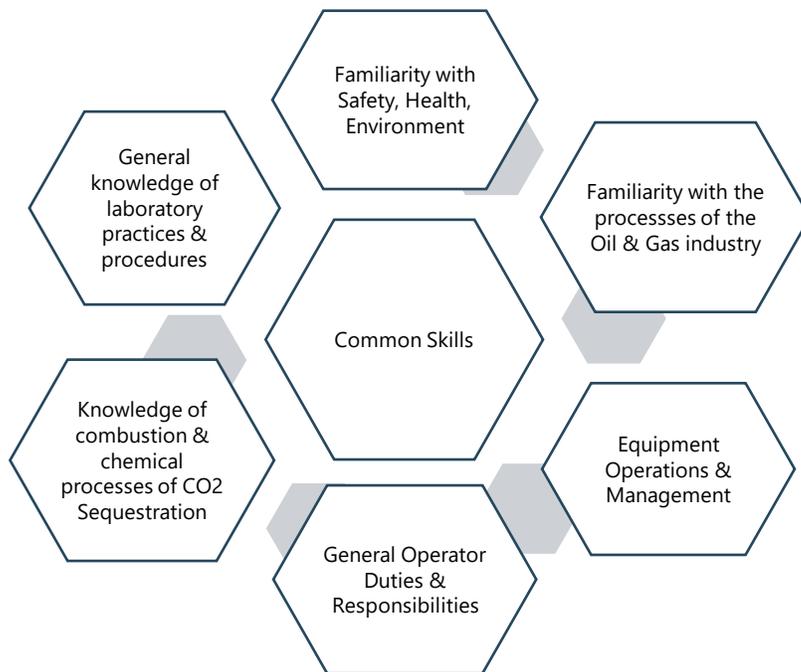
A case in point is the proposed large-scale carbon capture island by Enchant Energy Corporation. Enchant Energy is an energy company focused on carbon capture and storage (CCS) based in Farmington, New Mexico. The goal of Enchant Energy is to repurpose the San Juan Generating Station with carbon capture technology and extend the life of the plant thereby providing time for other clean energy solutions to emerge or evolve. This technology will allow for the CO₂ emissions to be captured then either sequestered or sold for enhanced oil recovery or other purposes.

These pioneering efforts will improve sustainability and mitigate the loss of unemployment by ideally retaining and upskilling current San Juan Generating Station employees. While the front-end engineering and design (FEED) study continue to progress, San Juan College is actively partnering with Enchant Energy and Farmington Electric Utility System via a Memorandum of Understanding to ensure that career pathways are available for current workforce to migrate into expanded roles which will include in carbon capture and either sequestration or transportation. It is anticipated that the existing training that teaches the fundamental skills of carbon capture will be augmented to encompass all the needed abilities.

In the event that sequestration is selected as the means of disposing the CO₂, workers employed in the local oil and gas industry can once again receive training that will close any skills gaps that are unique to Class 6 wells. The local college, San Juan College, is working closely with industry partners as they prepare to drill a test well near the San Juan Generating Station.

If the captured carbon is sold for use in the Permian Basin, it is anticipated that an existing pipeline will be utilized. Existing workforce once again is capable of maintaining the line.

In comparison with the existing workforce abilities, carbon capture technicians are likely to require the following skills:



As you can see, there are significant overlaps in the attributes making a transition by means of stackable credentials a logical progression.

An early coal mitigation effort

Recognizing the need to shift the energy industry, the federal government under the Obama administration had created the Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative to help communities that would be negatively impacted by the closure of coal industries. The initiative’s goal was to invest nearly \$10 billion into coal-dependent communities, workforce, and technology. In order for an entity to receive funding, the entity must use the funding to:

1. Diversify their local economy
2. Create jobs in new or existing industries
3. Attract new sources of job-creating investment
4. Provide a range of workforce services and skills training for high-quality, in-demand jobs

Securing POWER funding was highly competitive, and funds were awarded to projects designed to produce significant economic diversity and provide workforce development.

San Juan College and the POWER initiative

San Juan College is a majority-minority serving institution recognized as a regional leader in education throughout the Four Corners. Educating approximately 10,000 students annually, it consistently ranks in the top 10 institutions of higher education for the awarding of degrees and certificates to Native American students.

An early adopter of the American Association of Community Colleges Guided Pathways Project, the College has worked in collaboration with local school districts to introduce seven defined pathways into K-12 education and get students on track early. One of the pathways is Energy, Manufacturing and Transportation and is the most relevant to this transition. This pathway contains Career Technical Education that is based upon employer feedback either from advisory committees or small groups, thereby ensuring that the skills employers need are the skills the graduates possess.

As an example, in the School of Energy, curriculum has often been and continues to be developed in partnership with industry to ensure that necessary workforce skills are delivered just in time. The degrees and certificates contain broadly based, adaptable skills that are applicable in many energy, manufacturing, and industrial careers.

Associates of Applied Science degrees or certificates are offered in the following fields:

- Instrumentation, Controls, and Electrical Technology
- Industrial Process Operator
- Industrial Maintenance Mechanic
- Advanced Petroleum Production Operations
- Natural Gas Compression
- Tribal Energy Management
- Occupational Safety
- Commercial Construction Safety

Perhaps because of the extensive relationship with industry and the impact of coal in the community, San Juan College was awarded \$1.4 million for the Four Corners POWER Initiative (FC-POWER-I) in 2015. The initiative objectives were to provide the opportunity for cross-training and re-training through a short-term certificate leading to direct employment and a long-term approach to obtaining a degree. The initiative included the following efforts:

- Purpose One: Four Corners POWER Initiative Liaison
- Purpose Two: Transitional Employment and Educational Needs

- Short-Term Training Certification
 - Commercial Driver's License
- Long-Term Certification and Degrees
 - School of Energy Programs
- Purpose Three: Center of Excellence in Information Assurance

This report will focus on the outcomes of Purpose Two, which provided full funding of a certificate program. At that time, the Instrumentation, Controls, and Electrical Technology program was the sole certificate option in the School of Energy. Therefore, the majority of displaced mine workers enrolled in and successfully completed this program during academic years 2016-2017 and 2017-2018.

- In academic year 2016/2017, 185 students enrolled in the Instrumentation Program. 17 students were female and 44% of students identified as Native American. The success rate for this cohort, with success being defined as earning a C grade or higher, was 87%.
- During the following academic year, 2017/2018, a total of 148 students enrolled in the Instrumentation program. Nine of the students were female and 47% of the students identified as Native American. This cohort achieved a success rate of 93%.

Data is not available that indicates their current job status or industry of employment. However, most indicated that they were positioning themselves for a time in which they would not be employed at San Juan Mine. Instrumentation technicians are currently in high demand and graduates from this program work across varied industries including aerospace, pharmaceuticals, energy, semi-conductors and many others.

However, one particular student for whom the outcome is known was displaced due to the reduction of the staff at San Juan Mine. He enrolled in the Instrumentation, Controls, and Electrical Technology certificate program and graduated in 2017. This graduate is currently employed at a local natural gas exploration and operation company as a Horizontal Specialist.

Another area pursued by five workers was cyber security. Students enrolled in an intensive series of non-credit CompTIA courses. The complete training package consisted of six modules. After each module was completed, students took the associated CompTIA assessment and upon passing, received a corresponding industry certification. Prior to completing all six modules, each student became successfully employed in cyber security in other parts of the Southwest US with just the certifications they held at that time.

In both fields of study, workers demonstrated their ability to re-train successfully and at least position themselves to continue high-wage careers, if not pursue them immediately.

Clean hydrogen

As stated in other parts of this report, clean hydrogen is likely to play a significant role in a new energy economy. Whether the clean hydrogen begins as green hydrogen or blue hydrogen, there will be roles for workers currently working in fossil fuel industries to play.

In the case of blue hydrogen, current natural gas related careers will still be needed. The School of Energy has been working closely with BayoTech, Inc., a New Mexico on-site hydrogen production company, via a Memorandum of Understanding to determine and then provide the necessary skills for their technicians. Once again, the broad-based skills gained in the first five programs listed as School of Energy programs are the same skills needed for the production of hydrogen utilizing steam methane reformers with the addition of a stackable Hydrogen Safety credential which is under development. In order to provide blue hydrogen or be deemed clean hydrogen, the units must be equipped with carbon capture equipment, the basics of which graduates from the School of Energy Industrial Process Operator Program possess. With an augmented carbon capture curriculum contained within a stackable CCS credential, current oil and gas workers will be able to support blue hydrogen.

With respect to the production of green hydrogen, large amounts of water are required. With continuing and severe drought conditions in the West, there are efforts underway to clean produced water that results from the extraction of oil and natural gas. One application under investigation by the New Mexico Produced Water Consortium as an industrial application is the use of cleansed produced water for the production of green hydrogen. Industrial water technicians will be needed in this aspect of the process. Once again, existing workforce involved in the treatment of industrial water can be trained through an advanced credential to address the unique aspects of this process.