



THE ALASKA LNG PROJECT

GASLINE WORKFORCE PLAN

**By The Alaska Department of Labor
and Workforce Development**

April 2018

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Governor Bill Walker
STATE OF ALASKA

March 7, 2018

Dear Alaskans,

For decades, Alaskans have aspired to build a pipeline that will deliver stranded North Slope natural gas to Alaskan homes and businesses on its way to world markets. Now, Alaska is closer than ever before in realizing that long-held goal. Alaska signed a Joint Development Agreement in November 2017, which marks the first time that all of the required partners formally committed to work together to build an Alaska gas pipeline.

The Alaska LNG Project will be one of the largest construction projects on the continent. Thousands of direct jobs will be created during its construction, along with thousands more indirect jobs resulting from the associated economic activity. Our guiding principle as we prepare to build this project is simple: Alaskans first. Alaska's workforce will have jobs during and after construction.

The Alaska LNG Project Gasline Workforce Plan identifies the workforce needed to build and operate the project, and it provides a framework to maximize Alaska Hire on this project. Aligning Alaska's robust statewide training network and making smart investments to expand training for in-demand occupations is critical to ensuring Alaskans are first in line for these jobs. This workforce development plan is meant to be a living document and will be updated as additional details about the project become available.

Alaskans are ready to build this project. We've been ready for decades, and now is the time to prepare our workforce for this exciting opportunity.

Sincerely,

Handwritten signature of Bill Walker in blue ink.

Governor Bill Walker

Handwritten signature of Heidi Drygas in blue ink.

Commissioner Heidi Drygas

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Introduction

The State of Alaska, through the Alaska Gasline Development Corporation, plans to commercialize its natural gas resources on the North Slope by building the Alaska Liquefied Natural Gas Project, the nation's largest energy export project.

Recent developments have heightened this project's potential. In November 2017, AGDC and the state signed a joint development agreement with Sinopec, China Investment Corporation, CIC Capital Corporation, and the Bank of China to advance the Alaska LNG Project. AGDC has also signed a letter of intent with Tokyo Gas Co., Ltd. and memoranda of understanding with PetroVietnam Gas, Korea Gas, and Tokyo Gas. The multi-state Interstate Oil and Gas Compact Commission has recommended prioritizing construction of the project.

Building and maintaining this large project will require more workers than Alaska's small labor force can deliver, but there is much we can do now to prepare. We can bring all partners together to focus on workforce needs and training, expand career and technical program capacity for occupations that labor studies indicate will be needed, seek ways to increase support for secondary and postsecondary training programs, and develop policies to maximize Alaska Hire through methods such as project labor agreements and procurement preferences.

This publication details strategies for preparing Alaskans to fill these jobs, provides an overview of the project, identifies current labor market conditions and anticipated workforce needs, and summarizes Alaska's training capacity. We produced this report to inform the public and policy makers of the challenges in developing a workforce for one of the largest construction projects Alaska has ever undertaken, and recommend ways to train and educate an Alaskan workforce to build and operate the Alaska LNG Project.

The Project: Alaska LNG

The Alaska LNG Project, estimated at \$43 billion, would involve an 807-mile pipeline, along with a gas treatment plant and LNG liquefaction plant, designed to move more than 20 million tons of natural gas per year from



Alaska Governor Bill Walker signs a historic Joint Development Agreement with China on November 9, 2017. Photo courtesy of Alaska Governor Bill Walker's Office, Brice Habeger, photographer

Alaska's North Slope to tidewater to be shipped by sea to Asian markets. Construction could begin as early as 2019, with gas delivered by 2024-2025.

The Need: A Trained Workforce

Independent studies and department research show the Alaska LNG Project's labor needs will considerably outstrip the current supply of skilled Alaskan workers. The project will require a range of occupations, some requiring years of education and others a year or less of postsecondary training. Many workers will be in a construction trade occupation where they will be trained as apprentices. Regardless, everyone employed will need short-term occupational certificate training to meet federal and state environmental, health, and safety regulations.

The Promise: Put Alaskans to Work

This project will create an estimated 12,000 direct jobs during construction and 1,000 long-term operations jobs once completed. We also expect the project's economic impact to generate 6,000 indirect jobs during construction and 500 indirect jobs during operations. Indirect

jobs are those created through the additional purchases of goods and services related to the pipeline (and the additional taxes paid) during construction and operation. Examples include jobs in retail, transportation, banking, and state and local government.

Alaska has the highest unemployment rate in the nation, and the state continues to struggle with budget shortfalls and job losses. These jobs should be available to Alaskans first, and Alaskans must be trained and ready to fill them. Successful construction and operation of the Alaska LNG Project will provide a foundation for the future prosperity of our state.

The Planning: Public Input, Industry Plans, Research

A variety of other publications, research, and public input went into developing this report.

In 2015 and 2016, the Alaska Department of Labor and Workforce Development held three “Framing the Alaska Gasline Workforce Plan” public meetings to discuss the Alaska LNG Project with stakeholders and gathered input for a workforce plan. Pipeline construction firms, oil and gas support contractors, trade unions, apprenticeship sponsors, educators, and workforce developers attended these events.

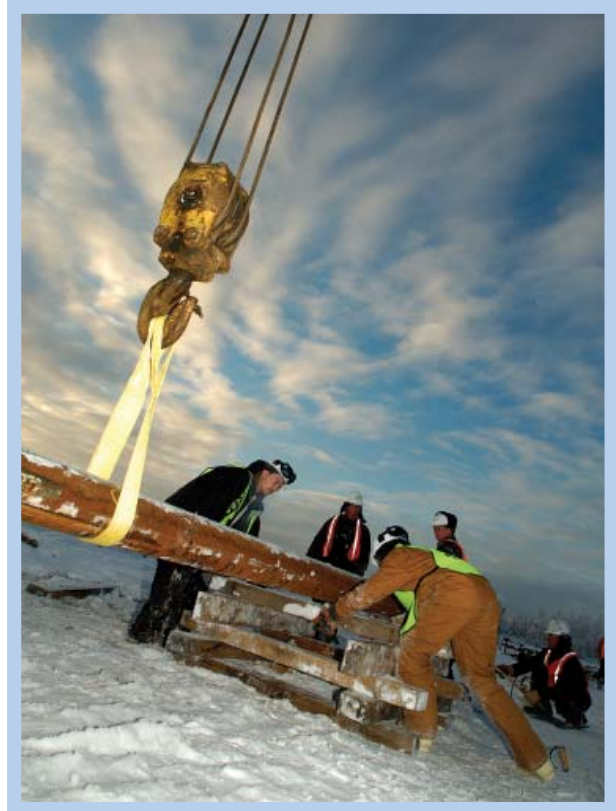
Three recent reports provided valuable workforce information: 1) the *2016 Alaska LNG Integrated Labor Report* by Bechtel Corporation,¹ 2) the *2017 Alaska LNG Resource Report No. 5* by Northern Economics,² and 3) the *Cross-Industry Workforce Development Priorities Report* by McDowell Group.³

This plan also draws heavily from other Alaska workforce plans, including the Alaska Gasline Inducement Act Training Strategic Plan,⁴ the Alaska Career and Technical Education Plan,⁵ and sector workforce development plans for construction,⁶ health care,⁷ maritime,⁸ oil and gas,⁹ and mining.¹⁰

Finally, AGDC shared their Alaska LNG Project information and workforce estimates and the Department of Labor and Workforce Development’s Research and Analysis Section provided current labor market and economic information.

“We have waited long enough to bring our gas to Alaskans and world markets. It’s time to put Alaskans to work constructing the Alaska LNG Project.”

Governor Bill Walker



Part I: Project Workforce Plan

The Goal: Train and educate an Alaskan workforce with the skills necessary to build and operate the Alaska LNG Project

Six Key Areas and Recommended Action Steps

Six themes emerged as key to training Alaskans for the Alaska LNG Project. What follows are these six themes and the steps we recommend to accomplish each.

Leadership

The Department of Labor and Workforce Development will create a leadership committee to draw from the expertise of industry, organized labor, educators, and trainers. Members of the committee will include the University of Alaska, the Alaska Gasline Development Corporation, the Department of Education and Early Development, and the Alaska Workforce Investment Board (AWIB). The committee will:

1. Create policy and resource recommendations for the governor and the legislature.
2. Assess private and public sector training capacity.
3. Review the project and workforce plan status and report to the governor and legislature on progress, challenges, and future plan directions.
4. Develop an annual detailed action agenda and designate staff and resources to implement these steps.
5. Develop metrics to measure outcomes for students, workers, and employers.

Focus

The following steps are necessary to meet the challenge of supplying thousands of Alaskans for jobs building and operating the Alaska LNG Project:

1. Update the 2010 Alaska Career and Technical Education Plan and the 2006 Alaska Construction Workforce Plan.
2. Prioritize education and training for project occupations.



3. Continue to implement AWIB-approved industry workforce plans.
4. Prioritize resources to continue partnership with the U.S. Department of Labor's Alaska Office of Apprenticeship to promote and expand registered apprenticeship.

Quality Education and Training

These steps are essential to expanding Alaska's Career and Technical Education (CTE) system to provide the services and programs necessary to prepare a workforce to build and operate the Alaska LNG Project:

1. Develop Alaska LNG career planning resources and activities to inform students, parents, teachers, counselors, and administrators.
2. Increase the number of registered apprentices in construction, transportation, maritime, and oil and gas occupations.
3. Increase the number of programs that help high school students transition to postsecondary education or training, including dual credit opportunities and work-based learning programs such as internship and school-to-apprenticeship.

“This new demand for trained workers is a once-in-a-generation opportunity for Alaskans to enter into the oil and gas construction industry.”

From Joint Development Agreement with Sinopec, China Investment Corporation, CIC Capital Corporation, and Bank of China

4. Increase the number of students in engineering, management, and process technology fields.
5. Increase the number of qualified career and technical education instructors for secondary, postsecondary, and apprenticeship training.
6. Increase the number of students and employers in career and technical education programs in Alaska’s secondary and postsecondary education and training institutions.
7. Ensure all Alaska students have basic employability skills by the time they enter the workforce.

Alaskans First

To give Alaska’s contractors, businesses, and residents a competitive advantage, these steps are necessary:

1. Negotiate a project labor agreement with pipeline and construction trade unions, project contractors, and project owners.
2. Apply Alaska Bidder, Offeror, and Alaska Hire procurement preferences and apprentice utilization goals to the project.
3. Increase the number of registered apprentices in construction, transportation, maritime, and oil and gas occupations.
4. Update online occupational information tools that inform the public about job openings and training opportunities.
5. Increase workforce diversity by reaching out to all

regions and serving all populations, including Alaska Natives, Native corporations, and regional nonprofit tribal entities; women; people with disabilities; other minorities; veterans; and former prisoners.

Resources

To use today’s resources and raise additional public and private funds as the project advances, we must:

1. Increase support for career and technical education programs in secondary schools, the University of Alaska, Fairbanks Pipeline Training Center, Alaska Vocational Technical Center, and Alaska Construction Academy.
2. Seek federal funding to develop the Alaska LNG Project workforce.
3. Seek contributions from industry, foundations, and others for implementing recommendations in this document.

Results

Alaska will measure success by the extent that Alaska’s students, workers, employers, and businesses participate in building and operating the Alaska LNG Project. To achieve those results, the Alaska LNG Workforce Plan Leadership Committee will implement or delegate the recommendations in this document, and each year will prioritize specific action steps that support their goals. In addition to publicizing a detailed action agenda, each agency represented on the committee will determine how to best leverage its own resources.

Part 2: Project Workforce Report

2015-2017	2016	2017	2018-2019	2019-2024	2024-2025
Engineering and design	Pre-Front-End-Engineering Design and Federal Energy Regulatory Commission resource reports complete	AGDC takes over Alaska LNG Project	Final investment decision and detailed design	Construction	Commercial operations begin, first gas to Alaskans, revenue to Alaska, and LNG to Asian-Pacific Partners

Workforce Overview

Construction Components and Workforce

Access to a stable, long-term supply of low cost natural gas will spur new economic development, and gas interconnects built along the pipeline will allow in-state deliveries. The Front-End Engineering and Design work identified five offtake valves to serve Alaska communities, including Milepost 441 to serve Fairbanks, Milepost 763 to serve the Matanuska-Susitna Borough and Anchorage, and Milepost 807 to serve the Kenai Peninsula. The project requires three major phases of construction:

- North Slope gas treatment plan and infrastructure, 2,200 jobs
- 807-mile, 42-inch gas pipeline from the North Slope

to Nikiski and eight compressor stations, including five or more interconnect gas takeoffs along the pipeline, 3,750 jobs

- LNG liquefaction plant, tanks, and marine facility in Nikiski, 5,900 jobs

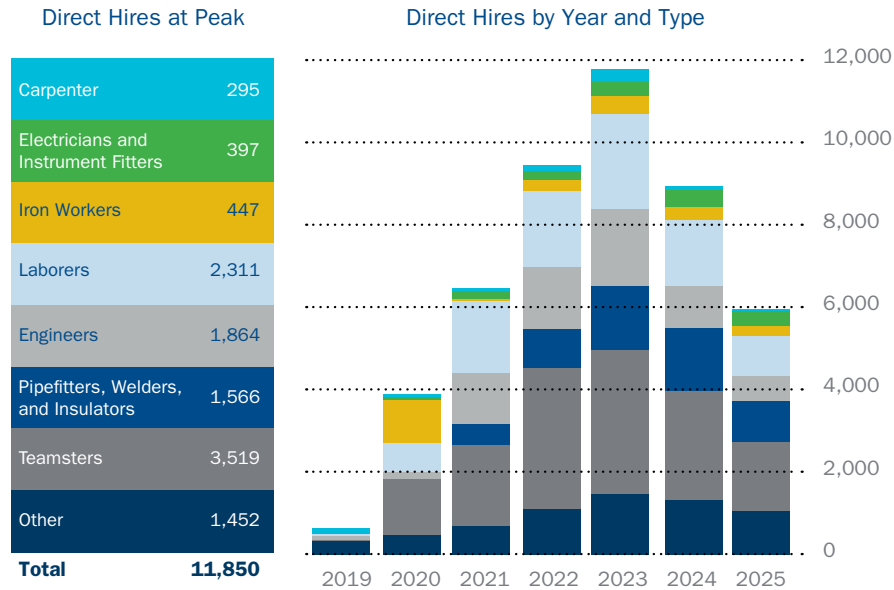
Operations and Shipping Components and Workforce

The project will create about 1,000 long-term operations and facility maintenance jobs. Operation and shipping employment would begin as early as 2023 and peak around 2027 with various start-up activities leading to full production and facility operation. Operations and shipping jobs and locations:

- Project headquarters in Anchorage, 350-400 jobs
- LNG liquefaction facility and marine terminal in Nikiski, 240 jobs

PROJECT SNAPSHOT		Alaska LNG
SPONSORS		State of Alaska, AGDC
OBJECTIVE		Commercialization of North Slope natural gas for export and access for Alaskans, construction from 2019 to 2025
ESTIMATED COST		\$43 billion
CONSTRUCTION TIMELINE		2019 to 2025
ESTIMATED WORKFORCE NEEDS		Peak: 12,000, Operations: 1,000, Indirect: 6,000, Secondary: 500
FACILITIES	Gas Treatment Pipeline Liquefaction Plant, Storage, Terminal	Prudhoe Bay: Gas treatment plant (GTP) and 8 compressor stations 807-mile, 42-inch mainline to Nikiski Nikiski: LNG Plant, 3 LNG trains, 2 storage tanks, 2 loading berths
TERMINUS		Nikiski (Kenai Peninsula)
ESTIMATED PIPELINE CAPACITY		3.3 billion cubic feet per day from GTP 20 million tons per year from liquefaction facility

Startup, Peak, and Legacy Jobs



Source: Alaska Gasline Development Corporation

- North Slope gas treatment plant, 85 jobs
- Operation and maintenance of pipeline, meter, and compressor stations along the route, 330 jobs

Project Labor Needs

Overall Labor Demand

The Alaska LNG Integrated Labor Study² by Bechtel Corporation suggests workforce needs will outstrip the available supply of skilled residents. The exhibit above shows the numbers of startup, peak, drawdown, and legacy jobs after construction.

Some occupations will be in high demand. Labor projections indicate the project will require approximately 3,500 truck drivers, 1,300 heavy equipment operators, 2,300 laborers, 1,500 pipefitters and pipeline welders, 1,600 culinary and camp support personnel, 400 electricians, and several hundred ironworkers, boilermakers, carpenters, specialty trade workers, safety officers, and technicians. Hundreds of engineers, surveyors, and construction managers will be hired during construction.

Ongoing shipping operations will require a variety of trained maritime workers. Shoreside operations will require dock operators and longshore workers. Tugboats will be crewed by mates, engineers, and qualified members of the engine department while LNG ships will need a full complement of licensed and unlicensed crew in the deck, bridge, steward, and engine departments.

Key Industries and Challenges

The industries most affected by construction and operations of the Alaska LNG Project will include oil and gas; construction; transportation (including maritime); and professional, scientific, and technical services. Each industry has been hit in recent years by the decrease in oil prices and the state's budget deficit. Future challenges will include the aging of the workforce and the need for a continuous supply of qualified job applicants.

Oil and Gas

The oil and gas sector is the largest private economic driver in the state and includes companies engaged in oil and gas extraction as well as support for oil and gas operations.

Oil and gas jobs reached a high of 14,800 in March 2015 before falling in the wake of a dramatic drop in oil prices. Alaska North Slope crude prices, which had been well above \$100 per barrel in 2014, fell to as low as \$26 per barrel in 2016 before climbing back to nearly \$70 by early 2018. By November 2017, the workforce was about 10,000, roughly 33 percent lower than its March 2015 peak.

Construction

The construction industry is one of Alaska's largest industries, employing about 6 percent of workers.

Total construction spending dropped by roughly 18

“Construction of the Alaska LNG Project is hugely important to Alaska’s economy. Not only will construction provide thousands of jobs for Alaskans, but operating the Alaska LNG project will keep Alaskans working for decades to come.”

Commissioner Heidi Drygas

percent in 2016, to \$7.2 billion, and another 10 percent in 2017, to \$6.5 billion. Oil-related construction spending, by far the biggest component, was \$2.9 billion in 2016 and fell to \$2.4 billion in 2017, a 15 percent decline.¹¹

Construction began to shed jobs in summer 2015, at the same time as the oil and gas sector, falling from an average of 17,600 jobs in 2015 to 16,300 jobs in 2016, a decline of 8.5 percent. The industry’s current labor force is 15,000, which is a loss of 7.4 percent from the previous year.

Transportation

Alaska’s transportation industry encompasses air, water, rail, and truck transportation and employs 6 percent of all workers in the state.

Transportation plays a critical role in Alaska’s economy and in the Alaska LNG Project. Moving workers, construction materials, equipment, and facility modules, and shipping LNG to market will affect all parts of Alaska’s transportation industry.

Air transportation, with about 6,300 jobs statewide, accounts for almost a third of all transportation employment. The Ted Stevens Anchorage International Airport will serve as a hub for Alaska LNG Project air transportation for the North Slope, Anchorage, and the Kenai Peninsula. The airport is Alaska’s largest and one of the busiest cargo airports in the world. An estimated one in 10 jobs in Anchorage is directly or indirectly related to airport operations. LNG activity will significantly increase air transportation jobs during project construction and over the life of the Alaska LNG Project operations.

Maritime transportation handles the greatest tonnage of freight coming into the state. The Port of Anchorage handles 90 percent of all consumer goods sold in Southcentral Alaska and serves 80 percent of the state’s population. Alaska LNG facility modules will be shipped to Alaska ports, and LNG will be shipped from a port in Nikiski to markets in Asia. More ship pilots and tugboat crew will be needed to handle the increased ship traffic in Cook Inlet during operations.

Alaska has a large number of trucking companies with the

heavy haul capabilities needed for building LNG facilities. These companies account for nearly 4,000 jobs. Trucks will deliver most project construction materials, smaller facility modules, and equipment to construction sites, and buses will transport construction personnel from regional airport hubs to road-accessible construction camps and from the camps to construction sites. Daily truck demand is estimated at 250 to 270 trucks during peak construction years.

Professional, Scientific, Technical Services

The professional, scientific, and technical services include businesses providing architectural, engineering, and drafting services; legal advice; permitting support; accounting and bookkeeping; management; and a variety of scientific and technical consulting services. Many firms with different skill sets will participate in construction and operation of the Alaska LNG Project.

Need for steady supply of projects

Alaska’s unemployment rate was 7.3 percent at the end of 2017. The top concern among oil industry support and construction contractors has been a steady supply of projects until gasline work begins so they can maintain their businesses, keep workers, and be ready for the project.

The lack of construction work today is the industry’s biggest challenge. The severe drop in construction over the past four years has also reduced contributions to private sector training funds and halted the growth of trade apprenticeship programs.

Job losses in the construction and oil industry sectors are expected to bottom out in 2018 and these industries are expected to begin adding jobs again by 2019. Projected job growth through 2024 is low for many of the occupations key to project construction, but replacement needs will be significant because of an aging workforce and new oil and gas projects on the horizon:

- Conoco Phillips will invest \$2 billion to add one billion barrels of oil to their reserves with new wells in the Colville River Unit and develop CD5 Alpine-Greater Moose’s Tooth 1 and 2 in the National Petroleum Reserve.
- Hilcorp is building a \$75 million gas and oil pipeline in the Cook Inlet and will spend \$1.25 billion to tap 50 million barrels of oil at the Milne Point Liberty field.
- Exxon will invest \$1 billion to move natural gas from Point Thomson to Prudhoe Bay for reinjection and will produce 50,000 barrels of oil condensates per day.
- Eni S.p.A. will drill six miles under-sea from Spy Island to potentially reach 180 million barrels of oil.
- In December 2017, Congress approved leasing for

Priority Occupations

Pipefitters, welders, and related	Pipeline welders, structural welders, plumbers and pipefitters, insulators, sheet metal workers, ironworkers
Other skilled trades and crafts	Skilled laborers, carpenters, painters, masons, millwrights, electricians, heavy equipment operators, mechanics
Technical, managerial, operations	Construction managers, gas liquefaction technicians, compressor operators, gas field operators, industrial hygienists, occupational safety specialists, LNG plant operators, boilermakers, process technicians, facility operators
Engineers and surveyors	Surveyors and civil, mechanical, chemical, and environmental engineers
Transportation workers	Truck drivers, longshore workers, warehouse and dock operators, maritime operations managers, marine captains, pilots, mates, able seamen, stewards, deck hands, engineers, tug and other boat crews
Other	Cooks, telecom installers, security professionals, bookkeepers, accountants, career and technical education instructors, information technologists

exploration in the Alaska National Wildlife Refuge, which could tap an estimated 10 billion barrels of recoverable oil.

In addition, more than \$1 billion will be spent on military construction at Eielson Air Force Base to house two new squadrons of F-35 jets, and the Department of Defense will expand missile defense at Fort Greely and radar capabilities at Clear Air Force Base.

Priority Occupations

The table above lists occupations that will be in high demand during the Alaska LNG Project and for which demand is expected to outstrip the supply of resident workers.

Many Alaska LNG occupations, such as engineers, require a degree with years of education and training. Other key occupations require postsecondary training of one year or less. Most construction trades and crafts workers learn on the job through an apprenticeship, which entails several thousand hours of paid on-the-job training and completing technical courses over two to five years, depending on the trade. Ship crew members will need short-term LNG-specific training in addition to required U.S. Coast Guard licenses or endorsements. Everyone on the project will need to complete one or more occupational safety certificate courses.

The “Openings and Demand” graph on the next page shows a subset of Alaska LNG trade occupations and the projected number of new jobs, the number of replacement openings to replace those who retire, and the number of nonresidents in those occupations that could

be replaced with trained Alaskans.

Resident Worker Shortages

The *2016 Cross-Industry Workforce Development Priorities*³ report by McDowell Group found that mining, oil and gas, construction, maritime, and health care have common occupational and skill needs. These industries directly and indirectly employ (through contractors) welders, equipment operators, pipefitters, skilled laborers, truck drivers, electricians, carpenters, technicians, engineers, safety specialists, information technology and communication technicians, culinary workers, and security personnel.

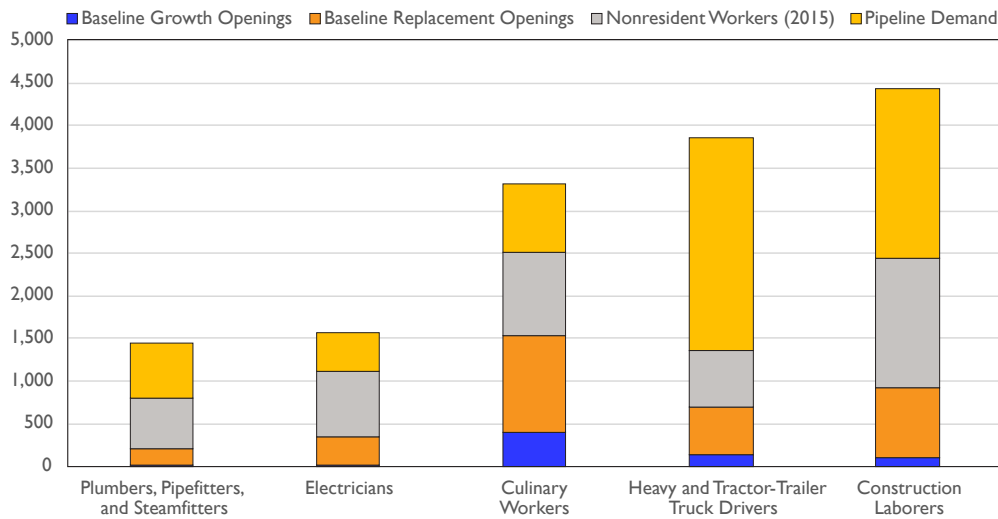
The report noted a lack of Alaskans who are pursuing careers in these industries, which will directly affect the availability of trained workers for the LNG project. Multiple industries need these occupations today, and they will be necessary in much greater numbers to build a gas pipeline.

These industries also have aging workforces and need a continuous supply of qualified job applicants. Most employers rely on nonresidents to fill unmet labor needs, and all of these industries will continue to face a shortage of resident workers as the economy grows. Industries must diversify by hiring more Alaska Natives, other racial and ethnic minorities, women, veterans, and those with disabilities.

Education and Training Capacity

Alaska’s Career and Technical Education (CTE) providers

Openings and Demand for Select Occupations, 2014 to 2024



Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

have a good track record of placing thousands of youth and adults in high-paying jobs and careers. Employers, labor unions, parents, teachers, instructors, apprentice sponsors, and private sector trainers have a long tradition of working together. Alaska's youth get an early start through academic and technical education in high school and can connect to pathways as they transition to postsecondary education — for example, technical school, apprenticeship training, or a university degree or certificate program.

In the years leading up to the state's current budget deficits, the Alaska Legislature significantly increased public career and technical education investment, making additional investments in:

- High school CTE programs
- Alaska Youth First grants
- Alaska Vocational Technical Center dormitory construction and programs in welding, diesel/heavy equipment, alternative energy, and maritime
- University of Alaska degree and certificate programs
- The Fairbanks Pipeline Training Center
- Other regional training centers
- The Alaska Construction Academies

Creation or expansion of these programs followed the *Alaska Gasline Inducement Act (AGIA) Training Strategic Plan*,⁴ adopted to help prepare to build a gas pipeline similar to the Alaska LNG Project.

Because of budget constraints, the legislature ended

some of these CTE programs in 2015, which has dampened efforts to attract and train students for in-demand jobs and careers. As the LNG project progresses, legislators should strongly consider bringing them back to ensure the maximum rate of resident hire on this project.

University of Alaska

The University of Alaska (UA) is an open enrollment institution with education and training programs including pre-apprenticeship and apprenticeship programs and hands-on competency based training. UA also has traditional learning labs and classrooms leading students to industry recognized certifications, endorsements, and degrees. At UA, students may be eligible for credit for prior learning through the military or work experience, and dual enrollment opportunities are available for high school students.

UA has three independently accredited universities in Anchorage, Fairbanks, and Juneau as well as 13 community campuses that offer distance learning courses. The community campuses support regional economic growth by training people for local jobs.

UA enrolls approximately 28,000 full-time and part-time students annually through about 400 degree, certificate, and occupational endorsement programs.

Related to the oil and gas industry, UA offers 13 occupational endorsements, 19 certificates, 20 associate degrees, 19 bachelor's degrees, three graduate certificates, 23 master's degrees, and five doctorates. Some of the programs include career and technical training and advanced degrees in occupational health and safety, welding, process

technology and instrumentation, diesel heavy-duty equipment, accounting, environmental sciences, construction management, aviation, business administration, and culinary arts. For a complete list of UA's oil and gas related programs, visit <https://www.alaska.edu/research/wp/plans/oil-and-gas/>. For locations and links to UA universities and community campuses, see Appendix B.

Regional Training Centers

Alaska's regional training centers offer education and training linked to job opportunities in their respective regions and serve about 4,500 people annually. These centers include the Alaska Technical Center in Kotzebue, Amundsen Educational Center in Soldotna, AVTEC in Seward, Fairbanks Pipeline Training Center in Fairbanks, Galena Interior Learning Academy in Galena, Ilisagvik College in Utqiagvik, Northwestern Alaska Career and Technical Center in Nome, Partners for Progress in Delta Inc. in Delta Junction, Southwest Alaska Vocational Education Center in King Salmon, and Yuut Elitnaurviat in Bethel. For locations and links to these providers, see Appendix B.

Of these regional training centers, the Fairbanks Pipeline Training Center and AVTEC in particular offer programs almost exclusively focused on training for anticipated Alaska LNG project jobs.

Fairbanks Pipeline Training Center

The Fairbanks Pipeline Training Center was developed in 2003 with support from the Alaska congressional delegation, through the Alaska Pipeline Act, to prepare Alaskans for work planned in Prudhoe Bay and other oil fields.

Other training center partners include the State of Alaska, the Fairbanks North Star Borough, the Fairbanks North Star Borough School District, the University of Alaska, and construction apprenticeship programs.

The center has 88,400 square feet of training yard, several shops, multiple classrooms, and a camp to house trainees. It is managed by a board of trustees consisting of pipeline construction industry employers and pipeline construction unions and is the only comprehensive pipeline industry training site in the nation.

Each year, several hundred people complete more than 4,000 occupational certificate courses through trainings for apprentices, skilled workers, women, rural Alaskans, and military including transitioning service members, veterans, reservists, and National Guard members. For more information on Fairbanks Pipeline Center and its facilities, see Appendix B.

Average earnings for 18-to-34-year-old apprenticeship completers: **\$80,000**

Average earnings for all 18-to-34-year-olds: **\$51,000**

Alaska Vocational Technical Center

Alaska Vocational Technical Center (AVTEC) in Seward is the state's largest campus dedicated to postsecondary career and technical education and the only statewide postsecondary technical training center with student housing operated by the state. AVTEC's mission is to train a diverse and effective workforce that supports the economic growth and stability of Alaska. AVTEC gives residents the means to begin an entry-level career in under a year.

The center houses the Alaska Maritime Training Center and Alaska Culinary Academy and offers programs in applied technologies including diesel mechanics, welding, energy and building technology, and information technology. AVTEC offers occupational credentials, certifications, apprenticeship training, and pathways for careers in Alaska's industries. All AVTEC courses are compatible with Alaska LNG priority occupations. For more information on AVTEC, please see Appendix B.

Registered Apprenticeship

Alaska has a long history of employers training their workforce through registered apprenticeship programs. Alaska has about 300 employer sponsors and 2,200 registered apprentices in more than 60 occupations.

Registered apprenticeships allow job seekers to earn while they learn through a combination of on-the-job training and classroom instruction and to achieve a nationally recognized certificate with journey-level status.

Over 80 percent of registered apprentices are in construction. The recent economic downturn in construction employment has stalled the number of new apprentices, as sponsors are cautious about their ability to employ and train new apprentices on future construction projects. For more information on registered apprenticeship, see Appendix D.

Alaska Construction Academy

The Alaska Construction Academy (ACA) is a state funded job training program operated by the Alaska Department of Labor and Workforce Development that has existed for more than a decade. Academy courses for students and adults are available in Ketchikan, Juneau, Anchorage, Wasilla, Kenai, and Fairbanks. More than 2,000 high school students and adults complete one or more basic construction skills courses annually.

In 2017, the legislature expanded ACA opportunities to three regional training centers: Alaska Technical Center



in Kotzebue, Northwestern Alaska Career and Technical Center in Nome, and Southwest Alaska Vocational Education Center in King Salmon.

Secondary CTE

Alaska has 54 school districts, including a statewide boarding school, most of which have at least one career and technical education program leading to an Alaska LNG occupation. Many districts have articulation agreements with a UA program so students can earn concurrent secondary and postsecondary credits. High school CTE programs are aligned to industry, academic, and employability skills, and to school-to-apprenticeship standards.

The recent economic downturn and state budget cuts have hindered CTE across the K-12 spectrum, and Alaska's share of federal Carl D. Perkins CTE funding has remained stagnant for more than two decades. Districts are trying to keep CTE programs viable by forming consortiums with other districts or programs, offering alternative delivery models such as intensive academies, using equipment simulators for training, or partnering with local employers or other agencies to share facilities or instructors. For more on high school CTE courses and participating districts, see Appendix C.

Economic and Workforce Development

Economic development and workforce development are inextricably linked. The U.S. Department of Commerce notes that "sustainable economic growth begins with a skilled workforce."¹²

Northern Opportunity: Alaska's Economic Strategy

In 2017, the Alaska Department of Commerce, Community, and Economic Development released *Northern Opportunity: Alaska's Economic Strategy*,¹³ a five-year economic development plan for the state created by stakeholders from every region and industry in Alaska. Among these were tribes, nonprofits, Alaska regional development organizations, chambers of commerce, industry associations, the University of Alaska, and local governments. The plan has six goal components: business development, finance and investment, economic development infrastructure, entrepreneurship and innovation, economic development and capacity building, and quality of life.

Alaska's Economic Strategy was written to capitalize on Alaska's strengths and mitigate challenges to economic resilience in our state. Planners recognized the need to use industry workforce strategies to strengthen the economy. It calls for stronger alignment between workforce development and economic development programs and services, and for strong links among secondary school CTE programs, apprenticeships, and work-based learning programs. Such ties will be an integral part of training Alaska's workforce for the Alaska LNG Project.

Alaskans First

We can increase Alaska business and resident worker participation in the Alaska LNG Project by including Alaska Bidder and Alaska Hire preference procurement policies similar to those implemented for state procurements in the 1980s, such as AS 36.10, Employment Preference, and AS 36.30.321, Alaska Bidder and Related Preferences.

“Alaskans know how to build infrastructure, and state funding for public projects should employ Alaskans first.”

Governor Bill Walker

The project should include Governor Bill Walker’s 2015 Administrative Order 278 establishing an apprentice utilization goal of 15 percent of all hours of work performed by registered apprentices. The order could be amended to offer opportunities for students in work-based learning and internship programs for engineering, process technology, and other technical service sector occupations.

LNG project work will be performed under a project labor agreement with Alaska’s pipeline and construction trade unions. Such an agreement will help maximize Alaska Hire and ensure qualified trades and crafts workers perform the work. It will also ensure that apprentices learn their skills to the standards industry expects. The agreement should include language recognizing priority training programs such as the Alaska Construction Academies, Alaska Native regional tribal designated entities, and school-to-apprenticeship and registered apprenticeship programs sanctioned by the U.S. Department of Labor Alaska Office of Apprenticeship.

Because data show that Alaska apprentices generally earn significantly more than their nonapprentice counterparts, increasing the number of registered trade apprentices leading up to the project and during construction will significantly boost resident income and the economy.

Alaska’s Workforce Investment Board

The Alaska Workforce Investment Board (AWIB) guides public workforce development and provides oversight for publicly funded workforce programs. The AWIB oversees the development of the state’s Career and Technical Education Plan and has adopted several industry sector workforce plans to build Alaska’s workforce.

AWIB involvement builds a strong foundation for implementing this plan. Alaska must continue its commitment to high quality career and technical education and training to ensure a well-trained workforce is ready for the project.

As the project continues, Alaska will need to revise

this workforce plan for changes in timelines, workforce numbers, and occupations. The leadership committee will work closely with AGDC, industry, and education and training partners to ensure Alaska’s workforce will have the necessary skills to build the Alaska LNG Project, based on the most current and detailed information available.

Notes

¹Bechtel Alaska LNG Project Integrated Labor Study, December 2015

²Alaska LNG Draft Resource Report No. 5: http://ak-lng.com/wp-content/uploads/2016/08/USAI-PE-SRREG-00-000005-000_0-Resource-Report-No-5.pdf

³McDowell Group, Cross-Industry Workforce Development Priorities: <http://apicc.org/wp-content/uploads/2016/07/McDowell-Cross-Industry-Workforce-Final-Formatted-4.28.16.pdf>

⁴AGIA Training Strategic Plan: http://www.labor.state.ak.us/AGIA_teams/docs-combined/agiaweb.pdf

⁵Alaska Career and Technical Education Plan 2010: http://www.alaskacteplan.com/uploads/2/6/8/6/26865794/ak_cte_plan_aug2010.pdf

⁶Building Alaska’s Construction Workforce: A Comprehensive Workforce Development Plan, 2006: <http://labor.alaska.gov/awib/AWIB%20Building%20Alaska’s%20Construction%20Workforce%20Plan.pdf>

⁷Alaska Health Workforce Plan: http://labor.alaska.gov/awib/forms/Healthcare_Workforce_Plan.pdf

⁸Alaska Maritime Workforce Development Plan: <http://www.alaska.edu/research/wp/plans/maritime/>

⁹Alaska Oil and Gas Workforce Development Plan 2014 to 2018: <http://www.alaska.edu/research/wp/plans/oil-and-gas/>

¹⁰Alaska Mining Workforce Development Plan: <http://www.alaskacteplan.com/uploads/2/6/8/6/26865794/mining-plan.pdf>

¹¹Institute of Social and Economic Research, University of Alaska Anchorage, 2017 Alaska’s Construction Spending Forecast: <http://www.iser.uaa.alaska.edu/Publications/2017-AKConstructionForecast.pdf>

¹²U.S. Department of Commerce: <https://www.commerce.gov/news/blog/2016/11/sustainable-economic-growth-begins-skilled-workforce>

¹³Alaska Department of Commerce, Community and Economic Development, 2017 Northern Opportunity: Alaska’s Economic Strategy: <https://northernopportunity.com/>

In addition to the sources cited above, this publication draws from current economic and labor market data analysis by the department’s Research and Analysis Section and input from more than 60 stakeholders who attended three “Framing the Alaska Gasline Workforce Plan” meetings held in Fairbanks (October 2015), Anchorage (November 2015), and Kenai (May 2016).

Summary Statistics for All Gasline Occupations

- ❖ Percent Nonresident Workers¹ 23.3%
- ❖ Percent of Workers Age 50+⁶ 30.1%

Education Levels⁸

Any	HS	COLL	VOC	AA	BA	MA	PHD
5	38	0	4	6	10	0	0

Architecture and Engineering

	Alaska Worker Data (2016) ¹			Estimated Demand (2014-2024) ²			Potential Supply (2016)			Alaska Employment Projections (2014-2024) ²			Age/Wage		Education/ ⁸ Work Experience/ ⁹ On the Job Training ¹⁰		
	Total Number of Workers	Number of nonresident Workers	Percent nonresident Workers	Annual Openings due to Growth	Annual Openings due to Replacement	Total Annual Openings	Qualified, but working in another occupation ³	Workers currently employed in lower paid occupations ⁴	UI Claimants previously working in occupation ⁵	Estimated Employment (2014)	Projected Employment (2024)	Growth Rate (Percent)	Percent Resident Workers Age 50+ ⁶	Average Hourly Wage (May 2016)	Education ⁸	Work Experience ⁹	On the Job Training ¹⁰
Civil Engineering Technicians	740	59	8.0	0	16	16	93	14	92	643	646	0.5	22.0	34.47	AA	None	None
Civil Engineers	908	48	5.3	3	32	34	101	54	39	1,063	1,088	2.4	35.4	57.97	BA	None	None
Electrical and Electronic Engineering Technicians	261	78	29.9	0	7	7	81	18	31	285	286	0.4	37.2	38.53	AA	None	None
Electrical Engineers	256	45	17.6	1	7	8	59	37	35	302	314	4.0	41.1	58.68	BA	None	None
Engineering Technicians, Except Drafters, All Other	752	210	27.9	1	13	14	119	46	50	510	524	2.7	32.1	35.40	AA	None	None
Environmental Engineering Technicians	244	30	12.3	2	5	6	51	9	26	185	202	9.2	23.6	28.63	AA	None	None
Environmental Engineers	312	26	8.3	1	10	10	72	35	17	331	338	2.1	39.7	59.57	BA	None	None
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	288	90	31.3	0	8	8	67	47	54	259	249	-3.9	39.9	56.07	BA	None	None
Mechanical Engineers	363	90	24.8	1	10	11	64	42	59	324	329	1.5	25.3	66.52	BA	None	None
Surveying and Mapping Technicians	229	52	22.7	0	3	3	49	13	28	242	243	0.4	21.7	28.92	HS	None	MT/OJT
Surveyors	422	80	19.0	0	14	14	96	67	108	471	450	-4.5	40.0	37.86	BA	None	Int/Res

Construction and Extraction

Boilermakers	166	88	53.0	0	1	1	19	7	33	76	66	-13.2	21.0	n/a	HS	None	App
Carpenters	3,580	747	20.9	13	31	44	818	507	1,065	2,616	2,750	5.1	28.0	33.64	HS	None	App
Cement Masons and Concrete Finishers	324	100	30.9	1	2	3	69	15	132	186	193	3.8	25.2	32.43	Any	None	MT/OJT
Construction and Building Inspectors	360	113	31.4	0	9	9	57	23	57	315	317	0.6	57.0	41.57	HS	5 plus yrs ⁹	MT/OJT
Construction Laborers	6,581	1,287	19.6	11	82	93	1,898	580	2,476	4,046	4,156	2.7	18.2	23.88	Any	None	ST/OJT

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, January 2018.

The "n/a" means data are not available.

Gasline Occupations

Summary Statistics for All Gasline Occupations

- ❖ Percent Nonresident Workers¹ 23.3%
- ❖ Percent of Workers Age 50+⁶ 30.1%

Education Levels⁸

Any	HS	COLL	VOC	AA	BA	MA	PHD
5	38	0	4	6	10	0	0

	Statewide Labor Force Indicators																
	Alaska Worker Data (2016) ¹			Estimated Demand (2014-2024) ²			Potential Supply (2016)			Alaska Employment Projections (2014-2024) ²			Age/Wage	Education/ Work Experience/ On the Job Training			
	Total Number of Workers	Number of nonresident Workers	Percent nonresident Workers	Annual Openings due to Growth	Annual Openings due to Replacement	Total Annual Openings	Qualified, but working in another occupation ³	Workers currently employed in lower paid occupations ⁴	UI Claimants previously working in occupation ⁵	Estimated Employment (2014)	Projected Employment (2024)	Growth Rate (Percent)	Percent Resident Workers Age 50+ ⁶	Average Hourly Wage (May 2016)	Education ⁸	Work Experience ⁹	On the Job Training ¹⁰
Electricians	2,624	665	25.3	2	33	35	364	212	764	2,139	2,161	1.0	28.5	39.23	HS	None	App
Hazardous Materials Removal Workers	623	123	19.7	0	11	11	171	81	187	498	490	-1.6	21.6	30.19	HS	None	MTOJT
Insulation Workers, Mechanical	126	28	22.2	0	3	4	37	14	43	101	103	2.0	22.4	29.70	HS	None	App
Operating Engineers and Other Construction Equipment Operators	4,301	964	22.4	0	57	57	871	379	1,558	3,489	3,390	-2.8	39.8	33.49	HS	None	MTOJT
Painters, Construction and Maintenance	749	179	23.9	2	7	9	148	58	172	432	454	5.1	30.8	27.30	Any	None	MTOJT
Paving, Surfacing, and Tamping Equipment Operators	145	26	17.9	0	2	2	42	7	54	83	86	3.6	25.8	n/a	HS	None	MTOJT
Pile-Driver Operators	142	53	37.3	0	2	2	34	26	69	89	86	-3.4	32.1	33.29	HS	None	MTOJT
Plumbers, Pipefitters, and Steamfitters	1,894	434	22.9	1	20	21	346	220	583	1,509	1,521	0.8	26.4	34.15	HS	None	App
Sheet Metal Workers	441	46	10.4	2	9	11	68	37	124	387	407	5.2	24.4	37.68	HS	None	App
Structural Iron and Steel Workers	255	54	21.2	0	4	4	81	45	115	226	230	1.8	24.3	30.46	HS	None	App
Healthcare Practitioner and Technical																	
Occupational Health and Safety Specialists	410	105	25.6	0	8	8	125	78	83	402	394	-2.0	39.7	41.73	BA	None	None
Occupational Health and Safety Technicians	144	46	31.9	1	3	3	47	13	32	122	127	4.1	37.2	32.04	HS	None	MTOJT
Installation, Maintenance, and Repair																	
Bus and Truck Mechanics and Diesel Engine Specialists	943	159	16.9	3	14	17	237	66	120	795	824	3.6	31.8	30.15	HS	None	LTOJT
Industrial Machinery Mechanics	470	184	39.1	0	8	8	111	63	76	315	310	-1.6	44.6	29.53	HS	None	LTOJT
Maintenance Workers, Machinery	432	120	27.8	2	6	8	143	41	62	370	386	4.3	40.4	25.83	HS	None	LTOJT
Millwrights	182	77	42.3	1	4	5	118	69	42	197	209	6.1	26.6	29.17	HS	None	App

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, January 2018.

The "n/a" means data are not available.

Gasline Occupations

Summary Statistics for All Gasline Occupations

- ❖ Percent Nonresident Workers¹ 23.3%
- ❖ Percent of Workers Age 50+⁶ 30.1%

Education Levels ⁸							
Any	HS	COLL	VOC	AA	BA	MA	PHD
5	38	0	4	6	10	0	0

Mobile Heavy Equipment Mechanics, Except Engines

Telecommunications Equipment Installers and Repairers, Except Line Installers

Life, Physical, and Social Science

Environmental Science and Protection Technicians, Including Health

Environmental Scientists and Specialists, Including Health

Management

Construction Managers

Production

Gas Plant Operators

Inspectors, Testers, Sorters, Samplers, and Weighers

Welders, Cutters, Solderers, and Brazers

Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders

Transportation and Material Moving

Captains, Mates, and Pilots of Water Vessels

Crane and Tower Operators

Excavating and Loading Machine and Dragline Operators

Gas Compressor and Gas Pumping Station Operators

Heavy and Tractor-Trailer Truck Drivers

Statewide Labor Force Indicators

	Alaska Worker Data (2016) ¹		Estimated Demand (2014-2024) ²				Potential Supply (2016)		Alaska Employment Projections (2014-2024) ²			Age/ Wage		Education/ Work Experience/ On the Job Training			
	Total Number of Workers	Number of nonresident Workers	Percent nonresident Workers	Annual Openings due to Growth	Annual Openings due to Replacement	Total Annual Openings	Qualified, but working in another occupation ³	Workers currently employed in lower paid occupations ⁴	UI Claimants previously working in occupation ⁵	Estimated Employment (2014)	Projected Employment (2024)	Growth Rate (Percent)	Percent Resident Workers Age 50+ ⁶	Average Hourly Wage (May 2016)	Education ⁸	Work Experience ⁹	On the Job Training ¹⁰
Mobile Heavy Equipment Mechanics, Except Engines	1,003	354	35.3	1	25	26	236	95	165	1,049	1,063	1.3	34.4	31.35	HS	None	LTOIT
Telecommunications Equipment Installers and Repairers, Except Line Installers	845	48	5.7	7	9	16	133	42	60	944	1,012	7.2	34.2	35.44	VOC	None	MTTOIT
Life, Physical, and Social Science																	
Environmental Science and Protection Technicians, Including Health	236	36	15.3	1	10	11	56	23	39	236	246	4.2	26.5	26.26	AA	None	None
Environmental Scientists and Specialists, Including Health	724	69	9.5	1	21	22	132	58	47	672	680	1.2	27.6	41.71	BA	None	None
Management																	
Construction Managers	1,325	261	19.7	1	17	18	234	176	155	1,216	1,223	0.6	48.4	61.45	BA	None	MTTOIT
Production																	
Gas Plant Operators	97	14	14.4	0	6	6	51	45	22	158	154	-2.5	36.3	31.87	HS	None	LTOIT
Inspectors, Testers, Sorters, Samplers, and Weighers	358	154	43.0	7	12	19	287	21	51	457	525	14.9	30.0	30.17	HS	None	MTTOIT
Welders, Cutters, Solderers, and Brazers	1,031	330	32.0	0	21	21	262	56	334	725	709	-2.2	25.7	34.11	HS	None	MTTOIT
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	29	13	44.8	0	1	1	4	0	6	32	32	0.0	52.6	n/a	HS	None	MTTOIT
Transportation and Material Moving																	
Captains, Mates, and Pilots of Water Vessels	1,100	650	59.1	4	25	29	88	78	166	614	658	7.2	42.0	34.73	VOC	Under 5 yr	None
Crane and Tower Operators	142	56	39.4	0	4	4	44	16	49	111	107	-3.6	35.0	40.04	HS	Under 5 yr	MTTOIT
Excavating and Loading Machine and Dragline Operators	266	50	18.8	1	3	4	62	15	101	263	268	1.9	38.3	28.89	HS	Under 5 yr	MTTOIT
Gas Compressor and Gas Pumping Station Operators	117	9	7.7	1	6	7	40	33	23	113	120	6.2	27.2	n/a	HS	None	MTTOIT
Heavy and Tractor-Trailer Truck Drivers	3,724	677	18.2	15	55	69	800	306	950	3,147	3,292	4.6	40.6	25.71	VOC	None	STOIT

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, January 2018.

The "n/a" means data are not available.

Gasline Occupations

Statewide Labor Force Indicators

Summary Statistics for All Gasline Occupations

<ul style="list-style-type: none"> ❖ Percent Nonresident Workers¹ 23.3% ❖ Percent of Workers Age 50+⁶ 30.1% <p>Education Levels⁸</p> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>Any</td> <td>HS</td> <td>COLL</td> <td>VOC</td> <td>AA</td> <td>BA</td> <td>MA</td> <td>PHD</td> </tr> <tr> <td>5</td> <td>38</td> <td>0</td> <td>4</td> <td>6</td> <td>10</td> <td>0</td> <td>0</td> </tr> </table>	Any	HS	COLL	VOC	AA	BA	MA	PHD	5	38	0	4	6	10	0	0	Alaska Worker Data (2016) ¹		Estimated Demand (2014-2024) ²		Potential Supply (2016)		Alaska Employment Projections ² (2014-2024)		Age/ Wage		Work Experience/ On the Job Training	
	Any	HS	COLL	VOC	AA	BA	MA	PHD																				
5	38	0	4	6	10	0	0																					
Total Number of Workers Number of nonresident Workers Percent nonresident Workers Annual Openings due to Growth Annual Openings due to Replacement Total Annual Openings Qualified, but working in another occupation ³ Workers currently employed in lower paid occupations ⁴ Workers currently working in occupation ⁵ UI Claimants previously working in occupation ⁵ Estimated Employment (2014) Projected Employment (2024) Growth Rate (Percent) Percent Resident Workers Age 50+ ⁶ Average Hourly Wage (May 2016) Education ⁸ Work Experience ⁹ On the Job Training ¹⁰	5,482	1,136	20.7	18	110	127	1,805	206	895	3,596	3,773	4.9	21.2	17.73	Any	None	STOJT											
Sailors and Marine Officers	1,333	651	48.8	4	19	23	232	118	220	722	760	5.3	31.2	22.96	Any	None	MTOJT											
Ship Engineers	432	270	62.5	1	9	10	52	39	48	338	344	1.8	51.5	29.81	VOC	Under 5 yr	None											

Gasline Occupations

NOTES

1. Number of Workers/Residency Alaska wage records identify workers in private sector, state and local government covered by unemployment insurance within Alaska. Workers are assigned to the occupation in which they earned the most money in 2016, so a person will be counted only once, even if they worked in multiple occupations. The duration of a worker's employment is not a factor in the count of workers – a person is counted as a worker once they earn any wages covered under Alaska's unemployment insurance system. Alaska worker residency is determined by matching the Alaska Department of Revenue Permanent Fund Dividend (PFD) file with the Alaska Department of Labor and Workforce Development wage file. The PFD file is a list of Alaskans who either applied for or received a PFD. Workers included in the wage file are considered Alaska residents if they applied for a 2016 PFD or 2017 PFD. This data is methodologically different than the employment data. For more information on how the worker and the employment data differ, please contact the Research and Analysis Section of the Alaska Department of Labor and Workforce Development at 907.465.6039.
2. Estimated Demand/Employment Projections Ten year occupational employment projections are produced biennially, and provide the data for Estimated Demand and the Alaska Employment Projections. Estimated and projected employment data do not include self-employed workers in that occupation. Growth openings occur when new jobs are created in the economy. Replacement openings occur when workers leave an occupation. Replacement openings can occur for many reasons, including retirement, leaving the state, or changing careers. Total openings are the sum of growth and replacement openings, and may not total due to rounding. Some occupational projections will fall outside of statistical error measurement guidelines or will disclose confidential information about an employer, and are therefore suppressed. Because of suppressed data, overall totals cannot be calculated. This data is methodologically different than the Alaska worker data. For more information on how the worker and the employment data differ, please contact the Research and Analysis Section of the Alaska Department of Labor and Workforce Development at 907.465.6028.
3. In Another Occupation Workers were considered qualified for the listed occupation if they had four quarters of prior experience in the years 2014 through 2016 in that occupation. Workers may be considered qualified for more than one occupation.
4. In Lower Paid Occupation Each worker's primary occupation in 2016 was compared with all occupations in which they had four quarters of prior experience in the years 2014 through 2016. If the worker had four quarters of experience in an occupation, but was employed in 2016 in an occupation with a national mean wage that was more than 15% less, then they are counted as potential supply since they are currently "underemployed".
5. UI Claimants Unemployment insurance claimants with an active claim in 2016. Claimants were matched with 2014 through 2016 UI wage records to determine their primary prior occupation.
6. Age Worker age is determined by matching 2016 workers with historical PFD files. Only those workers with age data are used to determine the percent of workers older than age 50. Occupations with a significant number of nonresident workers will have less reliable age information since age data is not available for nonresident workers.
7. Average Hourly Wage Average Hourly Wage data comes from the Research and Analysis Section of the Alaska Department of Labor and Workforce Development, through the Occupational Employment Statistics Survey, a cooperative agreement with the U.S. Bureau of Labor Statistics, and represent statewide average wages for the occupation.

Gasline Occupations

NOTES

8. Education Levels Entry level education requirements are based on the U. S. Department of Labor's Bureau of Labor Statistics data. The education groups are as follows:
- Any – No formal educational credential.
 - HS – High school diploma or equivalent.
 - COLL – Some college, no degree.
 - VOC – Postsecondary non-degree award.
 - AA – Associate's degree.
 - BA – Bachelor's degree..
 - MA – Master's degree.
 - PHD – Doctoral or professional degree.
9. Work Experience Work experience in a related occupation is based on the U. S. Department of Labor's Bureau of Labor Statistics data. The work experience groups are as follows:
- None – No work experience required.
 - Under 5 yrs – Less than five years.
 - 5 plus years – Five or more years.
10. On-the-Job Training Typical on-the-job training needed to attain competency in the occupation is based on the U. S. Department of Labor's Bureau of Labor Statistics data. The groups are as follows:
- None – No on-the-job training is required.
 - STOJT – One month or less of informal on-the-job experience.
 - MTOJT – One to twelve months of informal on-the-job experience.
 - LTOJT – Training that lasts more than twelve months and either occurs on the job or combines work experience with formal classroom instruction.
 - App – An apprenticeship is required. An apprenticeship combines paid on-the-job training and occupation-specific instruction. Most programs last between three and five years.
 - Inf/Res – Internship/residency is required. Internships and residences provide supervised training in a professional setting. They may be paid or unpaid, and usually occur after completion of a degree program or required coursework.

Appendix B: More Information on Training Centers

University of Alaska

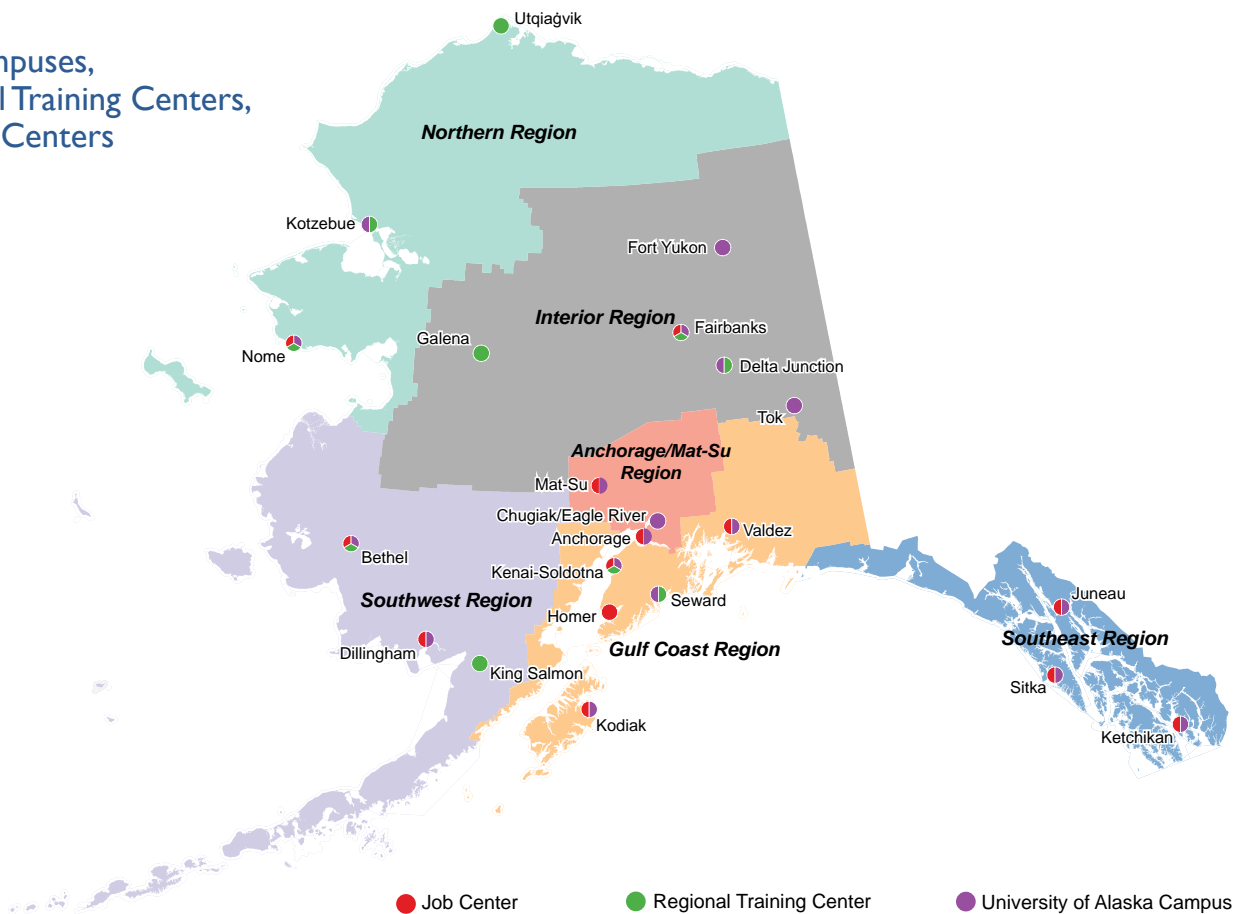
University of Alaska has three independently credited universities and multiple community campuses.

- University of Alaska Anchorage: <https://www.uaa.alaska.edu/>
- University of Alaska Fairbanks: <http://www.uaf.edu/>
- University of Alaska, Southeast, Juneau Campus: <http://www.uas.alaska.edu/>
- Kenai Peninsula College: <http://www.kpc.alaska.edu/>
- Kodiak College: <http://www.koc.alaska.edu/>
- Matanuska-Susitna College: <https://matsu.alaska.edu/>
- Prince William Sound College: <http://pwsc.alaska.edu/>
- Bristol Bay Campus: <http://www.uaf.edu/bbc/>
- Chukchi Campus: <http://www.uaf.edu/chukchi/>
- Chugiak Eagle River Campus: <http://www.uaa.alaska.edu/eagleriver/>
- Interior Alaska Campus: <http://www.uaf.edu/iac/>
- Northwest Campus: <http://www.nwc.uaf.edu/>
- Kuskokwim Campus: <http://www.bethel.uaf.edu/>
- Sitka Campus: <http://www.uas.alaska.edu/sitka/index.html>
- Ketchikan Campus: <http://www.uas.alaska.edu/ketchikan/index.html>
- Community and Technical College: <https://www.ctc.uaf.edu/>

Regional Training Centers

- Alaska Technical Center, Kotzebue: <http://www.nwarctic.org/atc>
- Amundsen Educational Center, Soldotna: <http://www.aecak.org/>
- AVTEC, Seward: <https://avtec.edu/>
- Fairbanks Pipeline Training Center, Fairbanks: <http://www.fptcalaska.com/>
- Galena Interior Learning Academy, Galena: <https://www.galenaalaska.org/GILA/>
- Ilisagvik College, Utqiagvik: <https://www.ilisagvik.edu/>
- Northwestern Alaska Career and Technical Center, Nome: <http://www.nacteonline.org/>
- Partners for Progress in Delta, Inc., Delta: <http://www.partnersforprogressindelta.org/>
- Southwest Alaska Vocational Education Center, King Salmon: <http://www.savec.org/>
- Yuut Elitnaurviat, People's Learning Center, Bethel: <https://yuut.org/>

UA Campuses, Regional Training Centers, and Job Centers



Fairbanks Pipeline Training Center, Fairbanks

Cartwright Campus

The Cartwright campus has five instructional buildings.

1. Process Technology and Administration Building, which houses the University of Alaska Fairbanks Community and Technical College programs: Associate of Applied Science in Process Technology, Certificate in Instrumentation Technology, Power Generation, Safety — Health and Environmental Awareness, and Mill Operating Certification.
2. Construction Trades Building, which houses Alaska Works Partnership training programs: Women in the Trades, Helmets to Hardhats, and Fairbanks Construction Academy. The building supports portable welding booths and modules for teaching energy efficiency and weatherization.
3. Pipeline and Welding Building, a 9,560-square-foot building with 16 welding booths, classrooms, offices, and a large pipe fabrication area to train mainline pipeline welders to meet quality and production standards required by the oil and gas industry for shielded metal arc welding, flux core arc welding, metal inert gas, tungsten inert gas, and submerged arc welding.
4. Central Learning Center, which has four large classrooms, a warehouse and shop, and a large meeting hall to accommodate training, exhibits, lectures, and assemblies. The center makes this building available for industry, government, and local community conferences, hearings, and career fairs.
5. Student Housing, a 12,000-square-foot residential camp that is similar to construction and facility operation camps. It can house 24 students and has separate accommodations for men and women. It has a full kitchen, a dining area, a computer learning center, laundry facilities, and an apartment for a resident manager.

Tria Road Pipeline Construction Field Site

The Tria Road Pipeline Construction Field Site has a 45-acre parcel featuring access roads, work pads, a pipe storage yard, and a 12-acre parcel for heavy equipment storage. The field site has a “mainline” pipeline right-of-way, access roads, pipe laydown yard, heavy equipment shop, and truck shop.

The site is designed for teaching safe construction of large-diameter cross-country pipelines, trucking, trenching, and surveying to industry standards. The heavy equipment shop is used for training heavy equipment

mechanics and maintaining heavy equipment used for instruction. The shop is equipped with a 10-ton bridge crane and portable welding booths. It includes a commercial truck driving course classroom, truck wash station, and truck maintenance bay.

Alaska Vocational Technical Center, Seward

AVTEC offers several programs that would directly support the Alaska LNG Project, from maritime to culinary.

Alaska Maritime Training Center at AVTEC

The Alaska Maritime Training Center at AVTEC specializes in training a domestic maritime workforce in Alaska’s challenging operational environment, including the Arctic. Its goal is to promote safe marine operations by effectively preparing captains and crew members.

AMTC is a United States Coast Guard-approved training facility and offers Coast Guard-compliant courses. Training also meets the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers. In addition to the standard courses, customized training is available to meet the specific needs of maritime companies.

Courses are delivered via a world-class ship simulator, state-of-the-art computer-based navigational laboratory, and classrooms equipped with the latest technologies. AMTC delivers 42 courses ranging from entry-level to advanced and supporting the marine deck and engineering career pathways.

AMTC has the simulation capabilities and professional expertise for research and development for all phases of port and harbor construction, pipeline construction material staging, and shipping operations. AMTC is also a leader in ice navigation training and is currently the only maritime training school in the nation that delivers both basic and advanced training for polar operations courses.

AMTC certifies 900 mariners each year and has the capacity to certify an additional 300 with minimal additional investment. Although they may sail all over the world, most mariners who train at AMTC are Alaska residents and employed in Alaska.

AMTC was vetted by several Alaska LNG stakeholders and heavily utilized for training and research during the project’s pre-FEED stage in 2015. The project moving into the operations stage will significantly affect two areas of the maritime industry.

The first is the marine pilots who will bring ships to port. Pilots are highly skilled mariners with detailed local

knowledge and exceptional ship handling skills, and it takes many years of training to become a qualified pilot. In Cook Inlet, the Southwest Alaska Pilots Association is the group mandated to bring ships safely into port. The addition of the large LNG carriers entering Cook Inlet will require many more trained pilots, and even tenured pilots will need additional ship handling training because these carriers will be some of the largest ships to ever work in the region. Much of this training is in a full mission bridge simulator, and AMTC has the area databases and most of the ship models required for simulator training.

The second area is the tugboat industry. Most of the large ships that come to port in Cook Inlet require from one to three ship-assist tugs to get them to and out of their berths. Typically the larger ships require more tugboat help, and environmental conditions may also dictate more assistance. The additional shipping traffic in the area will require stationing more tugs in Cook Inlet, and more tugboats mean more crew. Crew will need to understand the unique characteristics of this area, training in which AMTC specializes.

The LNG carrier crews may not be Alaskan, as the ships will most likely be foreign-flagged with foreign crews. The ships' officers will likely require some area familiarization, especially at the beginning of Alaska LNG shipping operations. AMTC has the simulation database and ship models to support this training.

Other AVTEC programs are poised to support construction and operation of the Alaska LNG Project.

Energy and Building Technology Department

AVTEC's Energy and Building Technology programs focus on producing the technical generalists that make up the core of Alaska's industrial and commercial workforce. Courses range from basic use of common hand tools to intermediate skills for construction or maintenance to the advanced technologies required for designing, building, and troubleshooting industrial automated process control systems. Programs include:

- Construction Technology: Construction, installation, maintenance, service, diagnostics, and repair of Alaska structures and facilities
- Industrial Electricity: Industrial safety and health, in-

dustrial technology, physics for technicians, AC and DC circuits, electrical machines, national electrical code and projects, industrial mechatronics, and power generation

- Plumbing and Heating: Construction, installation, maintenance, service, diagnostics, and repair of Alaska's industrial, commercial, and residential plumbing and heating facilities
- Refrigeration: Installation, maintenance, service, diagnostics, and repair of automated refrigeration systems
- Power Plant Operation: Maintenance, service, diagnostics, and repair of typical rural Alaska power plant systems
- Custom short courses:
 - » Bulk Fuels Operator course, three weeks
 - » Water Treatment Plant Operator courses, three weeks
 - » Energy Efficiency for Plant Operators courses, three weeks
 - » Electrical and Instrumentation Technician courses, one to three weeks

Alaska Culinary Academy at AVTEC

Culinary workers will be needed for construction camps and operations facilities and to fill the anticipated increase in demand for the hospitality industry as a whole.

The Culinary Academy at AVTEC has long provided skilled and creative cooks and bakers for the hospitality and food services industry. The demand for trained, qualified professionals far exceeds supply, and the job prospects for graduates are excellent. Program content, staff, and facilities meet the standards for culinary programs all over the United States.

The academy already provides two-week galley cook training as part of the maritime program and is prepared to add classes as necessary for meeting Alaska LNG Project needs, such as "boot camps" for camp cooks.

For more detailed information about all AVTEC programs, please visit <https://avtec.edu/training-program-summary>.

Appendix C: Alaska's Secondary Career and Technical Education Programs

The Alaska Department of Education and Early Development administers the federal Carl D. Perkins Career and Technical Education Improvement Act program, which provides supplemental funding to secondary career and technical education programs. The purpose of Perkins is to give students the academic and technical skills to succeed in a knowledge-and-skills-based economy. Perkins supports career and technical education that prepares its students both for postsecondary education and the careers of their choice.

Forty of Alaska's 54 school districts participate in Perkins, which is a voluntary, formula-driven funding program meant to supplement existing career and technical education programs. Districts must report annually to DEED on their Perkins-funded CTE courses and outcomes.

CTE courses are organized and reported based on

career clusters. According to Advance CTE, the national association of state CTE leaders, there are 16 career clusters in the National Career Clusters Framework, representing more than 79 career pathways. The framework provides the essential knowledge and skills for each cluster and its associated pathways and is used in developing programs of study bridging secondary and postsecondary curriculum and for creating individual study plans for a range of career options.

The table below shows the Alaska school districts that offer a Perkins-funded CTE course in selected clusters that are most closely aligned with Alaska LNG Project occupations.

For more information on CTE, visit <https://education.alaska.gov/CTE>. For more information on career clusters, see: <https://careertech.org/career-clusters>.

Districts With Perkins-Funded CTE Courses, Select Clusters

Career Cluster	# of Districts* Reporting One or More Programs in the Cluster
Agriculture, Food, and Natural Resources	15
Architecture and Construction	43
Business Management and Administration	12
Education and Training	7
Health Science	19
Hospitality and Tourism	13
Information Technology	6
Law, Public Safety, Corrections, and Security	7
Manufacturing	14
Science, Technology, Engineering, and Mathematics	9
Transportation, Distribution, and Logistics	16

*Districts that do not participate in Perkins may also have CTE programs, and districts that do participate in Perkins may offer additional CTE programs that are not Perkins-funded. In those cases, DEED does not collect that information.

Appendix D: Registered Apprenticeship

Trades supported by registered apprenticeship are heavily represented in the priority occupations listed in the Alaska LNG Project Workforce Plan. Apprenticeship is a flexible, employer-driven workforce development program that combines on-the-job learning with related technical instruction and paid work experience.

Registered apprenticeship supports the following priority occupations for the Alaska LNG Project Workforce Plan, identified on page 11 of this report:

- Welders
- Plumbers and Pipefitters
- Insulators
- Sheet Metal Workers
- Ironworkers
- Laborers
- Carpenters
- Painters
- Masons
- Millwrights
- Electricians
- Boilermakers
- Operators
- Truck Drivers
- Maritime Workers (deck, engine, galley)
- Surveyors
- Mechanics

The U.S. Department of Labor Office of Apprenticeship sets the standards and oversees registered apprenticeship programs in Alaska. For more information about registered apprenticeship and opportunities in Alaska, visit <https://www.dol.gov/apprenticeship/>.

Alaska's Job Center Network is also a resource for information on registered apprenticeship programs. See the list of job center locations at <http://jobs.alaska.gov>.

In Alaska, construction apprenticeship is often managed through joint administered apprenticeship and training committees (JATCs), which comprise representatives from unions and contractor's associations. JATCs ensure program standards and are responsible for apprenticeship program operations. The Alaska Apprenticeship and Training Coordinators Association (AATCA) comprises JATCs representing more than 16 union construction trades. For more information on AATCA's associated construction registered apprenticeship programs, program locations, and more, visit <http://aatca.org>.

Appendix E: Additional Resources

Online Career and Training Information and Labor Market Resources

Alaska maintains a suite of resources for Alaskans, youth and adult, to create and update a personal career plan, find and apply for job openings, and locate training programs.

Department of Labor and Workforce Development

- **Alaska's Training Clearinghouse:** <http://live.laborstats.alaska.gov/atc/index.cfm>
The Research and Analysis Section maintains this database of postsecondary and occupational training programs offered by 130 training providers, with courses for most of Alaska's occupations.
- **Alaska Labor Exchange System (ALEXsys):** <https://alexsys.dol.alaska.gov/>
ALEXsys is the statewide online job seeker and workforce services system. Users can create and save multiple resumes, find job openings and apply online, track job search efforts, research labor market information, and apply for services and benefits such as unemployment benefits. Employers may post job openings, search for qualified candidates, and communicate with job seekers and staff through the system's message center.
- **WIOA Eligible Training Provider List:** http://labor.alaska.gov/bp/forms/ETPL_List.xlsx
The Eligible Training Provider List includes all training programs eligible for federal training funding through the Workforce Innovation and Opportunity Act.

Alaska Commission on Postsecondary Education

- **Alaska Career Information System (AKCIS):** <https://acpe.alaska.gov/PLANNING/AKCIS>
AKCIS is a career guidance system that helps users plan their training and careers. Users can maintain a portfolio, create resumes, find scholarships, and create and manage learning and career plans. AKCIS is free to Alaska residents.
- **Alaska Postsecondary Institutions List:** <http://acpe.alaska.gov/Alaska-Postsecondary-Institutions>
Postsecondary institutions operating in Alaska must be authorized by ACPE or deemed exempt from that requirement.

University of Alaska

- **Career Coach:** <https://alaska.emsicc.com/>
In addition to career coaching, Career Coach includes an assessment tool to match Alaskans' career interests with the education and training opportunities they need to reach their goals.

