McKINLEY RESEARCH GROUP, LLC

Energy and Economic Impacts of Coal in Interior Alaska

JANUARY 2025

PREPARED FOR

UCM USIBELLI COAL MINE

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Executive Summary

Usibelli Coal Mine (UCM) contracted with McKinley Research Group to analyze the economic impact of coal in Interior Alaska and describe coal's role in the regional energy infrastructure. As the state's only operating coal mine, UCM produces approximately 1 million tons of coal annually, all of which helps power Interior Alaska. The mine near Healy, Alaska, is about 115 miles south of Fairbanks and 10 miles north of the entrance to Denali National Park.

Benefits of Coal in Interior Alaska

Coal provides several important benefits that align with energy needs in Interior Alaska:

- **Ultra-low sulfur coal resources** are plentiful in Alaska, with hundreds of years of forecasted availability.
- **Infrastructure is well established** to transport, store, and generate energy from coal.
- Coal is a **low-cost source of energy**.
- Coal **prices are stable** relative to more volatile pricing associated with heating oil, naphtha, or natural gas.
- The ability to stockpile coal augments regional **energy security**, as does the close proximity of Golden Valley Electric Association's (GVEA's) plants to the mine.
- Recent **technological improvements** offer more efficient ways to use coal resources.

Role of Coal in Interior Alaska Energy Systems

Coal plays a pivotal role in electricity and heat generation in Interior Alaska, an area with some of the most expensive energy costs in the nation.

Coal-fired power plants are an important source of both Interior electricity and heat.

- Electricity produced in the Interior is generated mainly from fossil fuels, such as coal, diesel, and naphtha. Coal accounted for 45% of generation in 2023.
- Coal-fired plants in the Interior are typically cogeneration plants that generate electricity as well as heat (heating Eielson Air Force Base, Fort Wainwright Army Base, and the University of Fairbanks, as well as some homes and businesses in downtown Fairbanks).

Coal-Fired Power Plants in Interior Alaska

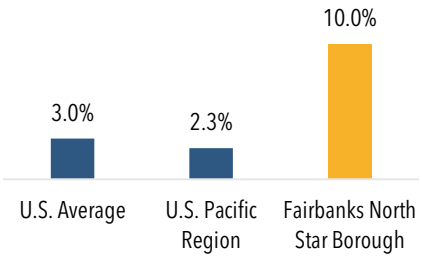
- Aurora Energy, Chena Power Plant
- Eielson Air Force Base
- Doyon Utilities, Fort Wainwright
- GVEA, Healy Units 1 & 2
- University of Alaska Fairbanks

Coal helps stabilize energy rates in the Interior.

Interior Alaska's cold climate and remote location drive high energy demand and costs.

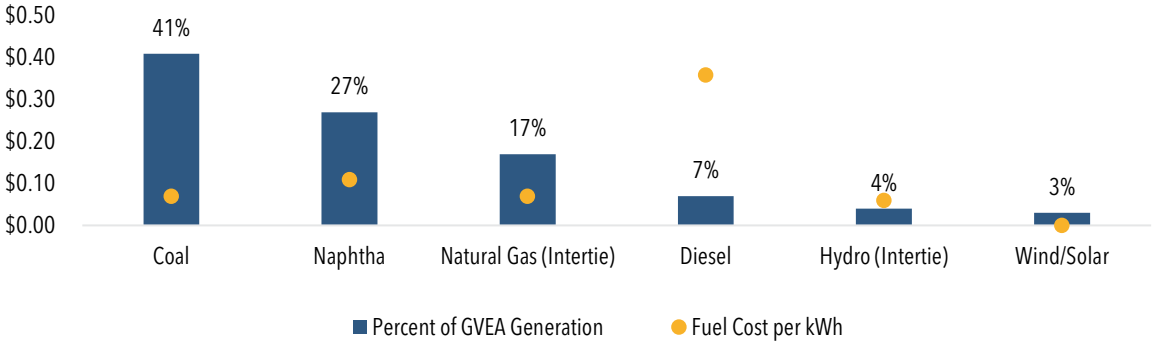
- Interior Alaska residential electricity rates per kWh in 2024 were more than 1.5 times the national average.
- Residents face an average annual energy cost burden quadruple that of the U.S. Pacific region, and three times the national burden.
- Coal is a lower-cost source of electrical energy compared to naphtha or diesel. The price advantage of coal over other fuels stabilizes energy rates in the region.
- In 2023, GVEA's electricity generation fuel costs averaged $0.07 per kilowatt hour (kWh), compared to $0.36/kWh for diesel.

Average Energy Cost Burden



Source: Kaczmarski, J. et. al., 2024. Burden calculated as % of gross household income).

Estimated Percentage of GVEA Electricity Generation and Fuel Cost/kWh by Energy Source, 2023



Source: GVEA Cost of Power Adjustment filings and McKinley Research Group calculations.

Replacement of coal would significantly increase energy costs in the Interior.

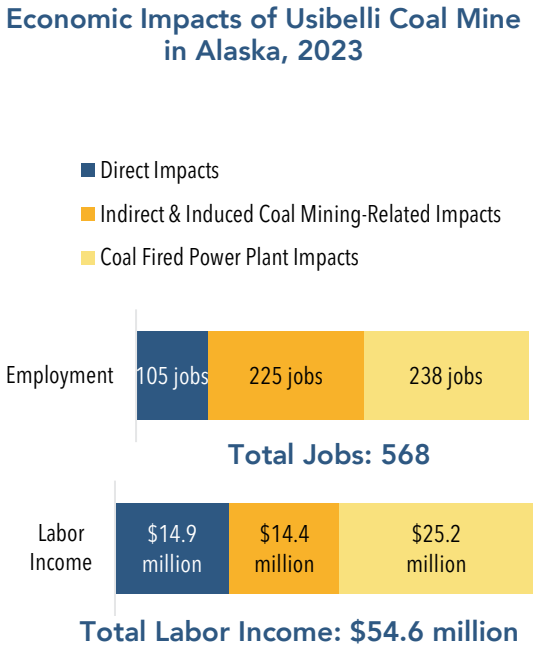
Energy costs in the Interior would rise without coal. This cost would likely be passed on to consumers.

- At current energy demand, replacing energy generated by coal in Interior Alaska with alternate fuels (i.e., naphtha, diesel, and natural gas) could increase annual costs by more than $273 million in fuel costs alone.
- A switch away from coal requires additional investment in heat and electricity-generation infrastructure, especially for facilities with no alternative source of heat.
- While piped natural gas could present a cheaper source of fuel than diesel, naphtha, or trucked natural gas, this source is still more expensive than coal or district heat. Additionally, the cost to convert from diesel to natural gas for residential heat remains a barrier to adoption of this fuel source in Interior Alaska.

Economic Impacts of Usibelli Coal Mine

Coal generates 45% of the region's electricity and offers cost advantages over alternative fuels such as diesel and naphtha. Stockpiling coal enhances energy security, particularly in Interior Alaska's remote and harsh climate. In 2023, UCM supported 568 jobs and generated $54.6 million in wages statewide.

Transitioning away from coal would result in an estimated $273 million more in fuel costs, increased reliance on fuel sources with higher price volatility, and significant infrastructure investments. This report, commissioned by UCM, examines coal's economic contributions, its role in stabilizing energy costs, and the implications and challenges of transitioning to alternative energy sources.



Introduction

Energy costs in Interior Alaska, which includes the Denali Borough, Fairbanks North Star Borough (FNSB) and nearby areas along the Parks and Richardson Highway, are some of the most expensive in the nation. Residential electricity rates in the region average $0.27 per kilowatt hour (kWh). This compares to $0.22 in Anchorage, $0.12 in Juneau, $0.28 in Alaska and an average of $0.17 across the country.[1]

While costly petroleum sources keep energy prices high in the Interior, relatively low-cost coal supplies reduce rates for about half of electricity generation in the region.[2] Coal is also used for heat production at some large facilities, though much of Interior business and residential heat is generated from heating oil. Heating oil prices are volatile and can spike considerably when oil prices are high.[3] In January 2024, heating fuel prices in Fairbanks were $4.53 per gallon, with summer rates at $3.83 in July 2024. Unlike other fuels, coal provides a steady, low-cost source of energy for Interior Alaska.

This report profiles Alaska's only active coal mine, Usibelli Coal Mine (UCM), which operates in the Interior. The report includes an overview of the mine's role in meeting Interior Alaska's energy needs. Economic impacts of UCM operations are estimated, as well as the downstream economic impacts of coal energy use in the Interior. Potential costs associated with replacing coal with alternative fuels in the region are also explored.

Overview of Usibelli Coal Mine

Usibelli Coal Mine (UCM), Alaska's only active coal mine, supplies coal for electricity and heat generation in Interior Alaska. In operation since 1943, the mine is in Healy, 115 miles south of Fairbanks and 10 miles north of Denali National Park.

Annual coal production at UCM ranged from 875,000 to 1.5 million tons over the past 10 years, remaining over 1 million annually since

[1] Based on residential utility rates per kWh from Golden Valley Electric Association (June 2024), Chugach Electric South District (July 2024), Alaska Electric Light & Power (July 2024), and U.S. Energy Information Administration (August 2024).
[2] Szumigala, D.J., 2024, Alaska's mineral industry 2021: Alaska Division of Geological & Geophysical Surveys Special Report 77, 97 p. https://doi.org/10.14509/31272.
[3] Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs. *Alaska Fuel Price Report – updated 8/16/2024*. Based on Fairbanks price.

2020. About 35% of UCM coal production is consumed at two power plants near the mine. The remainder is shipped to Fairbanks-area power plants via the Alaska Railroad Corporation (ARRC). Historically, the mine exported coal via ARRC's coal-loading facility in Seward, to Chile, South Korea, and Japan. However, no coal exports from the Seward facility have occurred since August 2016, and exports are not expected to resume in the near future because the ARRC sold the train cars that hauled coal and dismantled the coal loading facility in Seward.

Table 1. Alaska Coal Production and Transportation, 2014-2023 (thousand short tons)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alaska Coal Production										
UCM	1,500	1,177	930	873	934	983	1,021	1,042	1,014	1,009
Coal Shipped by Alaska Railroad										
In-state (Healy-Fairbanks area)	766	796	698	696	647	669	690	665	650	660
Export (Healy-Seward)	513	137	72	0	0	0	0	0	0	0

Sources: Usibelli Coal Mine; Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys; U.S. Energy Information Administration; Alaska Railroad Annual Report 2023.

Methods and Sources

Data sources for this report include publicly available information, data provided by UCM, and information gathered directly through executive interviews. UCM provided data on direct employment, wages, benefits, goods and services purchases, and tax payments. Other secondary data sources include the U.S. Energy Information Administration; U.S. Bureau of Economic Analysis; the Alaska departments of Labor and Workforce Development, Natural Resources, and Commerce, Community, and Economic Development; and the Regulatory Commission of Alaska. McKinley Research Group conducted interviews with energy producers in Interior Alaska and other stakeholders. IMPLAN, an industry-standard input-output economic modeling tool, was used to assess the mine's multiplier effect on Alaska and the local economy.

Organizations interviewed for this research follow:

- Alaska Gasline Development Corporation (AGDC)
- Aurora Energy
- Alaska Railroad Corporation (ARRC)
- Doyon Utilities, LLC (DU)
- Interior Gas Utility (IGU)
- United States Air Force – Eielson Air Force Base (EAFB)
- Golden Valley Electric Association (GVEA)
- University of Alaska Fairbanks (UAF)

Chapter 1: Interior Alaska's Existing Energy Infrastructure and Supply

Interior Alaska depends on coal, diesel, heating oil, and an array of other energy sources to produce electricity and heat.

Coal, naphtha, and diesel are the region's primary sources of electrical generation, others being wind and solar power, as well as purchased power transmitted through electrical interties. Golden Valley Electric Association (GVEA) provides electricity to most Interior homes and businesses.

Heating oil accounts for almost three-fourths of home heating in the Interior. Other sources include electricity, wood, and gas. Commercial heating is provided by heating oil, natural gas, steam or hot water heat from coal cogeneration plants, or alternative fuel sources.

Military bases in the Interior and the University of Alaska Fairbanks (UAF) produce their own electricity and heat through coal-fired cogeneration plants.

What is a cogeneration plant?

A cogeneration plant, also known as a combined heat and power plant (CHPP), captures heat during electrical generation so it can be used for space heat in nearby homes and businesses.

The following section describes the region's power producers and fuel sources in more detail.

Utilities

Primary electricity and heat producers in Interior Alaska include GVEA, Doyon Utilities, Eielson Air Force Base, Aurora Energy, UAF, and Interior Gas Utility.

- **Aurora Energy** operates the coal-fired Chena Power Plant, a combined heat and power plant. Steam and hot water produced at the plant are distributed for heat to about 200 residential and commercial customers in downtown Fairbanks. Aurora Energy also sells 20-28 megawatts (MW) of electricity annually to GVEA[4].
- **Doyon Utilities (DU)** provides electricity and heat for three military bases: Fort Wainwright and Fort Greely Army bases in the Interior and Joint Base Elmendorf-Richardson in Anchorage. The utility supplies both heat and electricity for Fort Wainright through a coal-fired cogeneration plant. Heat and backup electricity for Fort Greely are supplied with a

[4] Aurora Energy, LLC, website 2024.

diesel-fired plant. Doyon Utilities operates under a 50-year contract with the U.S. Department of Defense to supply energy at the military bases.[5]

- **Eielson Air Force Base (EAFB)** produces more than 380,000 pounds of steam per hour through a coal cogeneration plant. Two-thirds of that energy heats the base and one-third provides electricity. The U.S. Air Force is planning to build a small, 5-megawatt nuclear reactor that would generate about one-third of the base's demand in the winter, with more reactors to come if the initial project is successful.[6] The nuclear reactor is expected to be operational in 2028 or 2029, at the earliest.
- **Golden Valley Electric Association (GVEA)**, a member-owned, not-for-profit electric cooperative, provides electricity to about 40,0000 homes, 6,700 small businesses, 500 medium-sized businesses, and 70 large commercial or industrial operations in the Fairbanks area.[7] The cooperative maintains 3,300 miles of transmission and distribution lines, nine power-generating facilities, and 35 substations in a service area of nearly 6,000 square miles. GVEA's Healy plants use coal, while its other plants use diesel, naphtha, wind, solar, hydroelectric, and purchased power.[8] The Fort Knox Gold Mine, owned by Kinross Alaska, is GVEA's largest customer, accounting for about 16% of GVEA's system load and 14% of revenue.[9]
- **Interior Gas Utility (IGU)**, the Interior's only natural gas utility, is a public corporation that provides natural gas to 2,800 households and businesses in the Fairbanks North Star Borough.[10] IGU previously trucked gas from a Southcentral liquefication plant, though a looming shortage of Cook Inlet gas caused IGU to seek a more reliable gas supply. By early 2025, the utility will start receiving North Slope gas, trucked via the Dalton Highway. This change marks the first time North Slope natural gas will be sold in Alaska.
- **University of Alaska Fairbanks (UAF)** supplies all heat and electricity to the campus through a coal-fired cogeneration plant, completed in 2020.[11] The university uses only a small amount of diesel and natural gas for backup.

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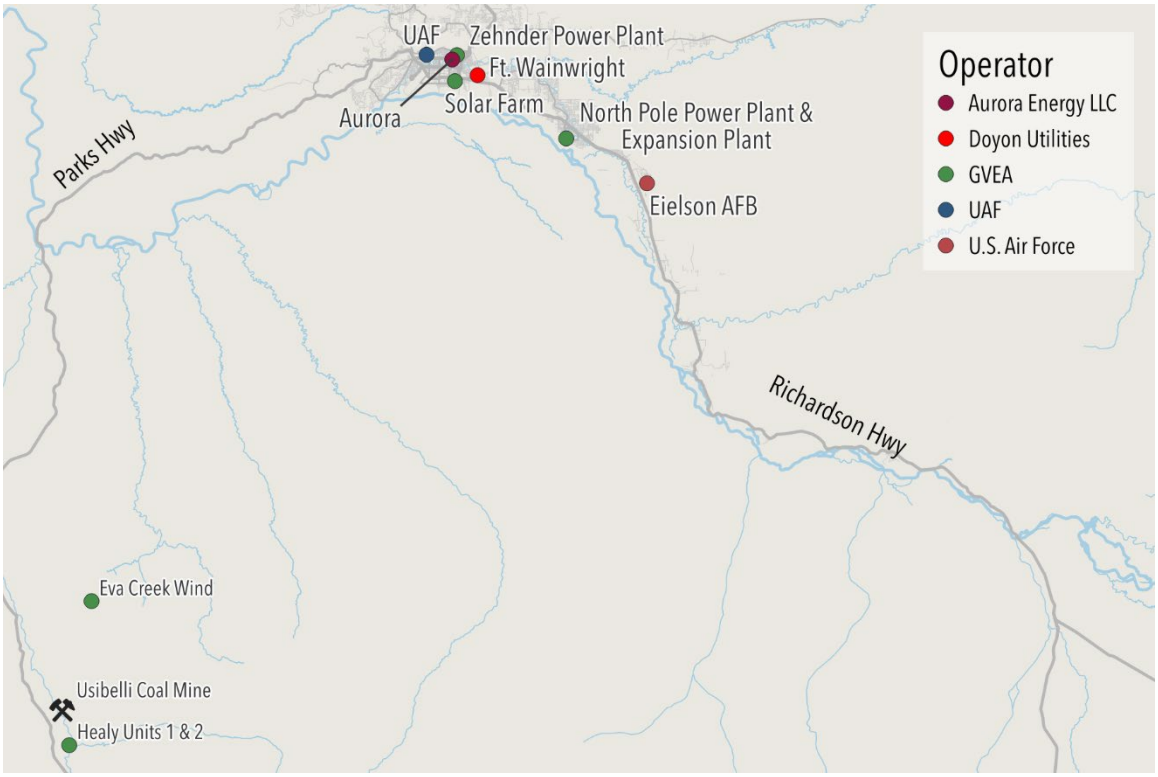
[5] Doyon Utilities, *Welcome to Doyon Utilities*, https://www.doyonutilities.com/, accessed August 27, 2024.
[6] Tim Ellis, *Work on Eielson microreactor project may resume this summer*, KUAS, Alaska Public Media, March 26, 2024.
[7] GVEA, *Golden Valley Electric Association (GVEA) Annual Report 2023*, June 14, 2024, p. 72.
[8] Golden Valley Electric Association, *Sources of Power,* https://www.gvea.com/services/energy/sources-of-power/, accessed August 27, 2024.
[9] Ashley Bradish, Director of External Affairs & Public Relations, GVEA, phone interview September 26, 2024.
[10] Alex Bengel, *Interior Gas Utility to acquire all its natural gas from North Slope starting in October 2024*, KTVF/KXDF, March 8, 2024.
[11] University of Alaska Fairbanks, *Combined heat and power plant*, https://www.uaf.edu/campusmap/for-visitors/buildings/combined-heat-and-power-plant.php, accessed August, 27, 2024.

Figure 1. Interior Alaska Energy Generation Infrastructure



Sources: McKinley Research Group and © OpenStreetMap contributors

Electrical Generation

Electricity produced in the Interior in 2023 was generated mainly from fossil fuels such as coal, diesel, and naphtha. Hydroelectric- and natural gas-generated electricity transmitted from Southcentral Alaska accounted for one-fifth (20%) of Interior electricity in 2023. Wind and solar resources accounted for 2% of generation.

Table 2. Summary of Utility-Scale Interior Electricity Generation Infrastructure, 2023

Fuel	Number of Plants	Capacity (MW)	Percent of Total Capacity	Percent of Total Generation
Diesel	4	196	37%	7%
Coal	6	177	33%	45%
Intertie	-	70	13%	20%
Naphtha	1	62	11%	25%
Wind/Solar	2	26	5%	2%
Total	**13**	**531**	**100%**	**100%**

Source: McKinley Research Group estimates based on data from U.S. Energy Information Administration, GVEA, and other power producers.

Fuel sources for electricity generation in the region are described by type below.

Coal

Six major coal-fired plants operate in the Interior:

- **Aurora Energy's Combined Heat and Power Plant**, in downtown Fairbanks, provides a steam heating system for the city core. Electricity generated at the plant is sold to GVEA.
- **Eielson Air Force Base Plant** produces steam for the base, two-thirds of which provides heat and one-third that provides electric power.[12]
- **Fort Wainwright Central Heat and Power Plant** is the U.S. Armed Forces' largest coal-fired power plant in terms of power produced. The facility produces both electricity and steam heating for the base.
- **GVEA's Healy Unit 1 and 2 Plants,** about 6 miles from the Usibelli Coal Mine, provide power throughout the region. GVEA is investing $26.1 million into Healy Unit 1 to add emission controls by the end of 2024 for continual operation.[13] The GVEA board of directors planned to decommission Healy Unit 2 by the end of 2024. However, GVEA decided to keep Healy Unit 2 operational for an undetermined amount of time until an alternative source of lower-cost energy is found.[14]
- **UAF Power Plant**, completed in 2020, is the only coal-fired plant built in the United States in recent years. The new plant uses cleaner, more efficient technology than the university's decommissioned plant and is designed to handle at least 25 years of projected growth on campus.[15]

Each of these facilities, except for the Healy operations, are cogeneration plants. Coal consumption totaled 994,000 tons in 2023.

Table 3. Coal-Fired Power Plants in Interior Alaska, 2023

Plant	Operator	Capacity (megawatts)	Annual Coal Consumption (tons)
Chena Power Plant	Aurora Energy	25	176,000
Eielson Air Force Base	U.S. Air Force	25	161,000
Fort Wainwright	Doyon Utilities	20	204,000
Healy Unit 1 and Unit 2	GVEA	90	342,000
UAF	UAF	17	111,000
Total Annual Coal Consumption			**994,000**

Sources: GVEA; U.S. Air Force; U.S. Energy Information Administration, and University of Alaska.

[12] Eric Girard, Power Plant Superintendent, and Ivan Young, Operations Supervisor, for Eielson Air Force Base, phone interview on September 19, 2024.
[13] GVEA, *GVEA Board Takes Action on Future Generation & Healy Unit 1*. https://www.gvea.com/news-releases/gvea-board-takes-action-on-future-generation-healy-unit-1/, accessed September 16, 2024.
[14] Patrick Gilchrist, *GVEA to extend use of Healy power plant*, KTVF/KXDF, March 4, 2024.
[15] University of Alaska Fairbanks, *Combined heat and power plant*, https://www.uaf.edu/campusmap/for-visitors/buildings/combined-heat-and-power-plant.php, accessed August 29, 2024.

Diesel

GVEA operates three plants that use diesel to produce electricity:

- **Zehnder Power Plant,** established in 1972 in downtown Fairbanks, generates 38 MW of electricity.
- **Delta Power Plant**, in the Delta Junction area, was owned by the Fairbanks Municipal Utility System until 1997, when GVEA purchased it. The plant produces 27 MW of electricity.
- **North Pole Power Plant**, built in 1976 in North Pole, generates 120 MW of power.

GVEA burned about 10.0 million gallons of diesel in 2023.[16]

Naphtha

GVEA's North Pole Expansion Power Plant runs on naphtha, a petroleum fraction supplied by a 600-foot pipeline from the neighboring Petro Star refinery. The plant used about 26.0 million gallons of naphtha in 2023, generating about 288,000 MWh of electricity. Another turbine can be added to double generation at the North Pole Expansion Plant in the event of increased demand. The plant can also be retrofitted to burn natural gas if a steady supply becomes available.[17]

Natural Gas and Hydroelectric Power

GVEA can purchase up to 70 MW of power generated from Southcentral natural gas and hydroelectric power using the Northern and Alaska interties. The Alaska Intertie, built in the mid-1980s, runs from Willow to Healy. The Northern Intertie, completed in 2003, transmits this power from Healy to Fairbanks. These lines can transmit an average of about 70 MW of power in either direction.

In 2023, GVEA purchased about 10MW of natural gas-generated electricity from Chugach Electric Association. Beginning in 2023, GVEA entered into a purchase agreement with Enstar Natural Gas, a Southcentral natural gas supplier. Natural gas purchased under this agreement is transferred to Chugach Electric Association for electricity generation in Southcentral facilities before transmission to the Interior via transmission lines. GVEA's agreement with Enstar expires in January 2025.[18]

In addition to natural gas, GVEA purchases hydroelectric-generated electricity from the 120-MW Bradley Lake Project. Located near Homer, the project is owned by the Alaska Energy Authority

[16] U.S. Department of Energy, Energy Information Administration (EIA), *Monthly Generation and Fuel Consumption Time Series*, EIA-923 and EIA-860 reports for 2022 and 2023.
[17] Ibid.
[18] Ashley Bradish, Director of External Affairs & Public Relations, GVEA, phone interview September 26, 2024.

(AEA) and generates power for six utilities. GVEA is allocated 17% (20 MW) of the dam's output, which is transmitted via the Intertie connecting Southcentral and Interior Alaska.

Renewable Energy

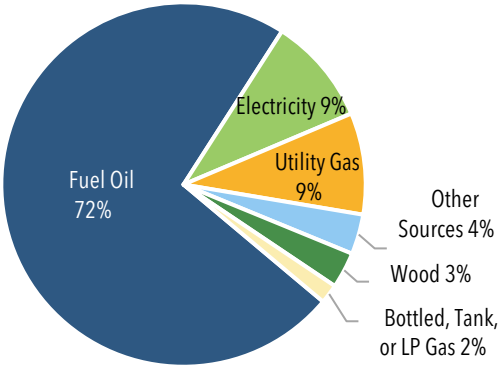
In 2019, the GVEA Board of Directors adopted strategies and goals to reduce carbon emissions 26% by 2030. The association is meeting this goal through hydroelectric power, energy conservation, and power produced by wind and solar farms, and its Sustainable Natural Alternative Power (SNAP) program. Specific sources include:

- **Eva Creek Wind Farm**, completed in 2012, has 12 turbines and can generate up to 25 MW of electricity. In 2023, Eva Creek generated about 30,800 MWh of electricity, an estimated 2% of GVEA generation.
- **A solar farm** with 1,760 panels that can produce 660 kilowatt hours (kWh), which is enough to power 71 homes in a year. The farm was completed in 2018 and provided less than 1% of total GVEA generation in 2023.
- The **SNAP program** allows GVEA members with small-scale renewable energy systems (mostly solar) to sell excess power to the grid, known as "net metering." As of January 2023, 681 members participated in SNAP, with 4,010 kilowatts of combined capacity.[19] These systems provided less than 1% of total GVEA generation in 2023.

Heat Generation

Interior Alaska's cold climate drives intense heating energy needs.[20] The amount of heat required in a region can be expressed in terms of heating degree days (HDD). This is a measurement of the amount of energy required to maintain a comfortable temperature (65˚F) inside a building relative to outside temperatures. A region like Hawaii requires 0 HDD, because the average daily temperature is above 65˚F, while Seattle requires 5,000 HDD. Across Alaska, annual HDD requirements range from lows of 7,000 in Southeast Alaska up to 20,000 on the North Slope.[21] With Interior Alaska at 14,000 HDD

Figure 2. Home Heating Fuel in Fairbanks North Star Borough, 2022



Source: U.S. Census Bureau, American Community Survey.

[19] GVEA, *SNAP/Net Metering*, https://www.gvea.com/services/programs-services/snap-net-metering/#:~:text=In%202010%2C%20SNAP%20Plus%20was,of%204%2C010%20kilowatts%20(kW), accessed September 3, 2024.
[20] Alaska Housing Finance Corporation. *Alaska Housing Assessment*. 2018.
[21] Alaska Housing Finance Corporation. *Alaska Housing Assessment*. 2018.

each year, a building in Fairbanks would require almost three times the heat to maintain a comfortable temperature compared to a similar building in Seattle.

Heating oil provides heat for almost three-quarters (72%) of Interior Alaska homes, followed by electricity, utility gas, wood, and other sources.[22] In the last three years, utility gas increased from 6% to 9% of total use and wood decreased from 6% to 3%.

For commercial and public buildings, primary heat sources include heating oil, steam and hot water heat from coal-fired facilities, and natural gas. However, no centralized data is available for heat sources for commercial and public buildings, such as schools and government offices. Sections below identify major sources for commercial, public-sector, and residential heat generation.

Heating oil

About 71% of Interior Alaska homes use heating oil as a primary heating source.[23] While no specific data are available for public and commercial buildings – such as schools, stores, and office buildings – the percentage relying on heating oil is likely to be lower than that for homes. Doyon Utilities burns heating oil in three boilers at Fort Greely, heating the base with steam heat. The boilers, installed in 1954, can produce 150,000 pounds of steam per hour. The heating system also protects water and sewer lines from freezing.

Natural Gas

Interior Gas Utility (IGU) provides natural gas to 2,800 residential and commercial customers in the Fairbanks area.[24] In 2023, IGU installed 535 new service lines in the Fairbanks North Star Borough, with another 640 new service lines planned for 2024.

Coal

Coal-fired plants in the Interior are typically cogeneration plants that produce steam, which is run through a turbine to generate electricity as well as heat distributed via underground pipes to nearby buildings. Coal cogeneration plants heat Eielson Air Force Base, Fort Wainwright Army Base, and the University of Fairbanks.

In addition, Aurora Energy's cogeneration plant heats about 216 homes and businesses in downtown Fairbanks. This type of piped heating is both affordable and convenient for building owners, who have little to maintain except the heat exchanger.[25]

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[22] U.S. Census Bureau, American Community Survey. *House Heating Fuel, 2022: ACS 1-Year Estimates*.
[23] U.S. Census Bureau, American Community Survey. 2018-2022 5-Year estimates.
[24] Interior Energy Project. *Quarterly Report to the Alaska State Legislature*: Fourth-Quarter 2023.
[25] Phillip Begley, Aurora Energy Power Plant Superintendent, Interview, September 26, 2024.

Other Sources

Wood and pellets are used by many homeowners to supplement heat and reduce heating oil consumption. Some homeowners also use electricity, solar thermal, and propane. A few home and business owners use coal- or wood-burning outdoor boilers. In FY 2023-2024, 37 boilers in the FNSB were granted exemptions, known as No Other Adequate Source of Heat (NOASH) waivers from burn bans in place to improve air quality. However, many residents or business owners eligible for such an exemption do not apply.[26] These exemptions are only for those who can verify they have no other affordable way to heat their home or business.

[26] Cory McDonald, Environmental Program Specialist, Alaska Department of Environmental Conservation, phone interview September 10, 2024.

Chapter 2: The Cost of Energy in Interior Alaska Today

Interior Alaska's remote geography, limited energy infrastructure, harsh climate, and older homes contribute to high energy costs in the region. In the FNSB, the residential energy cost burden (including heat and electricity) averages 10.0% of gross household income.[27] This burden compares to a 3.0% average nationally and 2.3% average in the U.S. Pacific region, which includes Alaska.

Electricity rates across Alaska are generally high, with the state average electricity rate 65% higher than the U.S. average. In Interior Alaska, residential rates in 2024 were more than 1.5 times higher than the average national rate.

Table 4. Average Residential Electricity Rate per kWh, Selected Areas, 2024

Location	Cost per kWh	% Difference from National Average
Hawaii	$0.42	+147%
Alaska Statewide	$0.28	+65%
Interior Alaska	**$0.27**	**+59%**
Anchorage (North District/South District)	$0.21/$0.22	+24%/+29%
U.S. Average	$0.17	-
Juneau (Nov.-May Peak/June-Oct. Off-Peak)	$0.12/$0.12	-29%
Washington State	$0.12	-29%

Sources: GVEA, September 2024; Chugach Electric, October 2024; AEL&P, October 2024; U.S. EIA, August 2024.

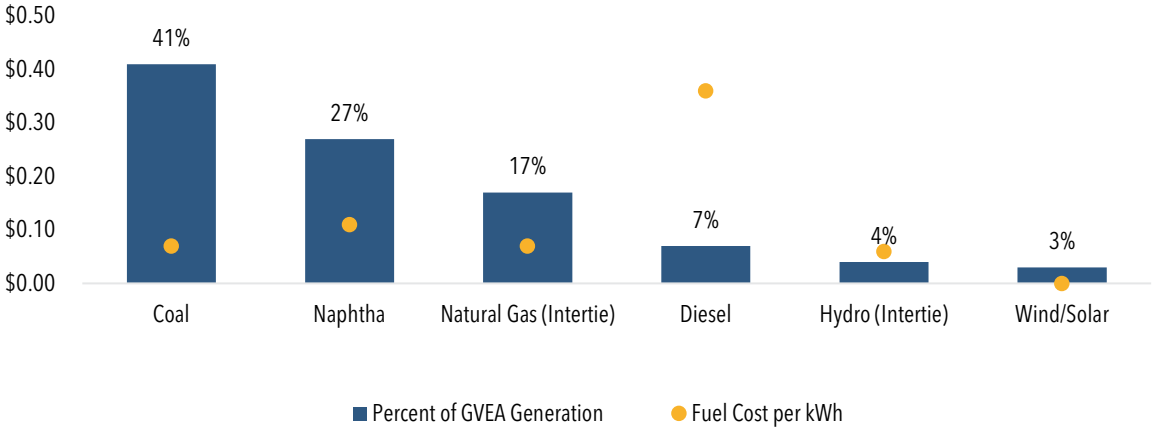
GVEA actively manages its generation and power purchase options to meet demand while minimizing costs. Fuel price (or purchased power price in the case of the Intertie) is the driving factor in these decisions, as other fixed costs are incurred regardless. Cheaper fuel sources, such as coal and naphtha, are used first, followed by more expensive fuel sources, such as diesel, as demand increases. Some diesel power is required to facilitate integration of variable power sources (wind, solar) into GVEA's grid.[28]

Coal is a substantially lower-cost source of electrical energy compared to other nonvariable sources of power produced in Interior Alaska. Hydroelectric- and natural gas-generated energy transmitted to the Interior from Southcentral are the only energy sources with comparable

[27] Kaczmarski, J. et. al., *Spatial Energy Burden Analysis of the Fairbanks North Star Borough*. Alaska Center for Energy and Power. June 2024.
[28] Other GVEA electricity sources are too slow to adjust to fluctuations in wind or solar production, as coal plants take longer to ramp up and power purchases via the Intertie must be scheduled a day in advance.

prices, yet their supply is limited by capacity of transmission infrastructure and availability of natural gas. While variable energy sources, such as wind and solar, have no fuel costs, these sources cannot currently supply the level of stable energy required in the region.

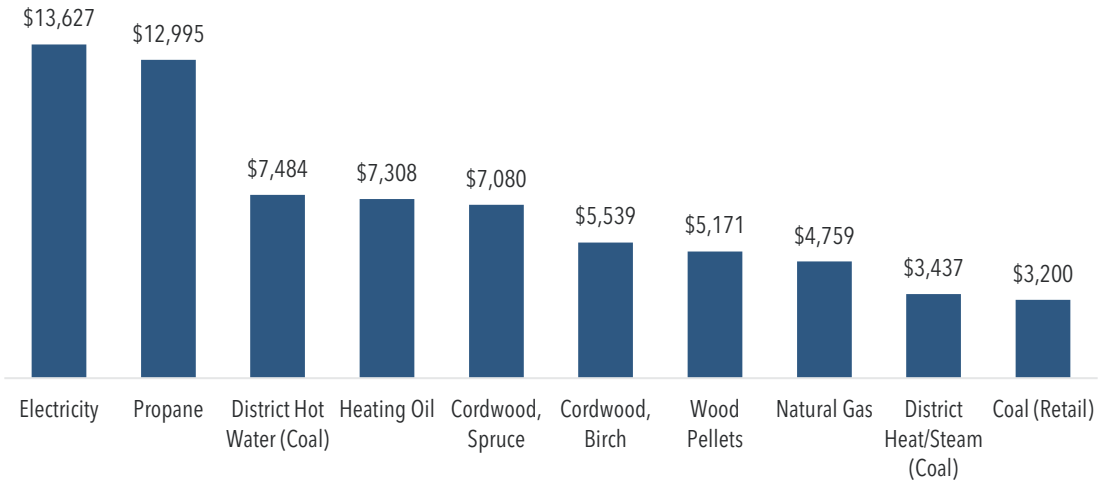
Figure 3. Estimated Percentage of GVEA Electricity Generation and Fuel Cost/kWh by Energy Source, 2023



Sources: GVEA Cost of Power Adjustment filings and McKinley Research Group calculations.

The least expensive sources of heat such as district steam heat and natural gas are available in limited areas in the Interior. However, heating oil is the next cheapest source for space heat and is widely available in the region. Home heating conversion from heating oil requires homeowner investment and can be cost-prohibitive without specialized programs or incentives.

Figure 4. Estimated Annual Residential Heating Cost by Fuel Type, Fairbanks North Star Borough, Fall 2023



Source: Fairbanks North Star Borough *Community Research Quarterly*, Fall 2023.
Note: Based on average single-family home heating use of 238 MMBtu/year from AHFC *2017 Alaska Housing Needs Assessment*.

Table 5. Residential Heating Costs by Fuel Type, Fairbanks North Star Borough, Fall 2023

Fuel	Average Price/Unit	Heat Content per Unit (Btu)	Appliance Efficiency (Percent)	Cost per Million Btu	Estimated Annual Cost
Electricity	$0.25/kWh	3,413	100%	$72.87	$13,627
Propane	$5.40/gallon	91,333	85%	$69.49	$12,995
District Hot Water (Coal-generated)	$40.02/MMBtu	1,000,000	100%	$40.02	$7,484
Heating oil	$4.48/gallon	135,000	85%	$39.08	$7,308
Cordwood, Spruce	$398/cord	15,000,000	70%	$37.86	$7,080
Cordwood, Birch	$425/cord	20,500,000	70%	$29.62	$5,539
Wood Pellets	$376/ton	16,000,000	85%	$27.65	$5,171
Natural Gas	$21.85/mcf	1,010,000	85%	$25.45	$4,759
District Heat/Steam (Coal-generated)	19.59/1,000lbs	1,066,000	100%	$18.38	$3,437
Coal (Retail)	**$143/ton**	**15,200,000**	**55%**	**$17.11**	**$3,200**

Sources: *Fairbanks North Star Borough Community Research Quarterly, Fall 2023.*
Note: Based on average single-family home heating use of 238MMBtu/year from AHFC 2017 Alaska Housing Assessment.

Chapter 3: Interior Energy in the Future

High heating costs, limited fuel options, and a desire to improve the area's air quality incentivize existing energy providers in the Interior to develop long-term power generation strategies. Such strategies include altering their energy source mix, new projects to harness renewable energy, and tapping into North Slope natural gas. Coal's role in the future of Interior energy generation should be considered within the context of the following energy development projects.

Energy Generation and Storage Projects

The following projects could impact the energy generation mix in Interior Alaska.

Golden Valley Electric Association

In 2022, the GVEA Board of Directors adopted a strategic generation plan, which includes a new emission control system for Healy Unit 1 and retirement of Healy Unit 2. This strategy relied heavily on securing an additional 30-50 MW of power from Southcentral Alaska, as well as alternative energy sources to compensate for Healy Unit 2. However, the Southcentral power supply is uncertain due to an impending natural gas shortage.[29] In February 2024, the GVEA Board decided to keep Healy Unit 2 open until reliable baseload generation can be identified.[30]

In addition to seeking reliable baseload generation, GVEA is pursuing alternative power sources. GVEA is in negotiations to purchase wind power from Alaska Renewables (see section below).[31] Critical to bringing new wind power generation online is replacement of GVEA's aging Battery Energy Storage System (BESS) and other infrastructure.

In June 2024, GVEA was awarded a $100 million federal Powering Affordable Clean Energy (PACE) loan. The loan is intended to capitalize a 46 MW BESS in Fairbanks, substation upgrades to support a 16 MW solar power purchase agreement with Nenana Solar Farm, and installation of a half-mile-long circuit to connect the solar farm to the Nenana substation.[32] In September 2024, the federal Empowering Rural America (New ERA) program also awarded GVEA $206 million in interest-free loans and $67 million in grants, including funding for another 46 MW

[29] GVEA, *Strategic Generation Plan – Adopted June 2022* and *GVEA Board Votes to Modify Strategic Generation Plan*, https://www.gvea.com/strategicgeneration/, June 27, 2022, and February 27, 2024.
[30] Ibid.
[31] Ashley Braddish, Director of External Affairs & Public Relations, GVEA, phone interview, September 26, 2024.
[32] GVEA, *Golden Valley Electric association Awarded $100 million Loan from USDA Powering Affordable Calen Energy Program, with $60 million in Loan Forgiveness*, https://www.gvea.com/news-releases/golden-valley-electric-association-awarded-100-million-loan-from-usda-powering-affordable-clean-energy-program-with-60-million-in-loan-forgiveness/, June 26, 2024.

BESS and stranded asset refinancing for Healy Unit 2.[33] Commission of both BESS facilities is anticipated around 2028.[34]

GVEA, in partnership with Westinghouse Electric Company, received a $50 million federal grant in September 2023 to deploy a Long-Duration Energy Storage (LDES) system in Healy. The project aims to demonstrate whether LDES at large utility scale can reliably provide 10 or more hours of energy storage, enabling more reliable use of variable energy sources such as wind.[35] The project will be the largest LDES in the United States.[36]

These new GVEA projects provide variable power, upon which GVEA cannot solely rely. Non-variable, baseload fuel sources such as coal, naphtha, diesel, natural gas, or others will continue to play a critical role in GVEA's fuel mix.

Shovel Creek Wind Project

Alaska Renewables is working to develop the Shovel Creek Wind Project near Murphy Dome, about 20 miles northwest of Fairbanks. Alaska Renewables intends to build 25 to 55 turbines to produce 100 to 210 MW of power. Project plans include a transmission line extension, new substation, maintenance buildings, and an access road between turbines. The company aims to launch operation of the wind farm in 2027.[37]

In December 2023, the Alaska Department of Natural Resources (DNR) proposed to move forward with a lease agreement to allot Alaska Renewables 450 acres of land for 40 years and a public access easement to build and operate the wind farm. The total project area would be about 3,800 acres.[38] DNR has not made a final decision on the land lease.[39]

Eielson Air Force Base

In 2021, the U.S. Air Force announced plans to build a 5 MW nuclear reactor to provide electricity at Eielson Air Force Base. The reactor would fulfill about half of the base's electric demand in the

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[33] Tim Ellis, KUAC, Federal agency selects GVEA for renewable-energy grants, loans, https://fm.kuac.org/energy-and-the-environment/2024-09-06/federal-agency-selects-gvea-for-renewable-energy-grants-loans, September 6, 2024.
[34] Ashley Braddish, Director of External Affairs & Public Relations, GVEA, phone interview, September 26, 2024.
[35] GVEA, "Golden Valley Electric Association Partnering with Westinghouse for Department of Energy Long Duration Energy Storage Demonstration Project," https://www.gvea.com/news-releases/golden-valley-electric-association-partnering-with-westinghouse-for-department-of-energy-long-duration-energy-storage-demonstration-project/#:~:text=We%20are%20excited%20about%20the,Shell%20Global%20Solutions%20US%2C%20Inc., accessed January 17, 2023.
[36] Westinghouse Electric Company, "Westinghouse Long Duration Energy Storage Solution Selected for Department of Energy Program in Alaska," https://info.westinghousenuclear.com/news/westinghouse-long-duration-energy-storage-solution-selected-for-department-of-energy-program-in-alaska, September 22, 2023.
[37] Alaska Renewables, *Phase 1 Projects*, https://www.alaskarenewables.com/projects, accessed October 23, 2024.
[38] Patrick Gilchrist, KTVF, *DNR proposes to issue land lease for Shovel Creek Wind Project*, https://www.webcenterfairbanks.com/2023/12/30/dnr-proposes-issue-land-lease-shovel-creek-wind-project/, December 29, 2024.
[39] Alaska Department of Natural Resources, staff records search on ADLs 421704 and 421869, phone interview November 22,2024.

summer and about a third of winter demand.[40] The Air Force has twice awarded a contract to build the reactor then revoked the contracts due to bidding protests.

Originally, the reactor was scheduled to be online in 2027. The current outlook is for it to be operational in 2028 or 2029, at the earliest, with the timeline unclear until a final contract is awarded. Even if the reactor is ready for operation by that time, nuclear energy is unlikely to fully replace coal use at the base for many years. The reactor is part of a 30-year pilot program, in which data will be gathered to determine whether additional reactors should be installed.

Fort Wainwright

For about five years, the U.S. Army has discussed alternatives to the Fort Wainwright coal-fired cogeneration plant, which has provided heat and power since 1955. In 2023, the Army selected a plan for a decentralized system of natural gas boilers for heat, with electricity to be purchased from GVEA.

The proposed natural gas boiler system would cost an estimated $117 million to construct, according to a 2023 Final Environmental Impact Statement (EIS). The system would consume 150,000 gallons of liquefied natural gas per day. If natural gas were not available, the boilers could also be powered by diesel. The Army would purchase all electricity from GVEA and construct a 20 MW backup generation plant, probably fueled by diesel, if GVEA could not supply electricity.[41] Geothermal energy is also being considered as a potential backup energy source.

No record of decision (ROD) has been made. Until the ROD is announced, a timeline for this new system is unknown. In the meantime, the existing coal-fired plant can be maintained with modest investment for 15 to 20 years.[42]

Energy Transmission

The following energy transmission changes are planned or underway to improve energy delivery to Interior Alaska.

Railbelt Upgrades

In May 2022, Alaska Energy Authority (AEA) and Railbelt utilities announced a plan to spend more than $200 million on transmission line upgrades.[43] These upgrades are designed to

[40] Eric Girard, er plant superintended, Eielson Air Force Base, phone interview September 29, 2024.
[41] Federal Register, *Final Environmental Impact Statement Addressing Heat and Electrical Upgrades at Fort Wainwright*, Alaska, Volume 88, Issue 28, February 10, 2023, https://www.govinfo.gov/app/details/FR-2023-02-10/2023-02861.
[42] Tim Jones, Vice President of Administration, Doyon Utilities, phone interview October 4, 2024.
[43] GVEA, *AEA, Railbelt Utilities Unveil More Than $200 Million in Transmission Upgrades,* https://www.gvea.com/news-releases/aea-railbelt-utilities-unveil-more-than-200-million-in-transmission-upgrades/, May 25, 2022.

increase capacity, improve power delivery from the Bradley Lake Hydroelectric Project, reduce line losses, and prepare for a shift to more renewable energy use.[44]

AEA described the transmission line upgrades as the biggest project tackled by the utilities in 30 years. The project is expected to be funded by the utilities' payments that previously covered bonds for construction of the Bradley Lake project. Those bonds were retired in 2021, though payments until 2050 will cover the cost of the upgrades.[45]

GVEA Upgrades

The $206 million federal loan package GVEA received in September 2024 includes funding for construction of 64 miles of transmission lines, two new substations, and upgrades to the North Pole Industrial Substation. These transmission lines and substations are needed to integrate large-scale renewable energy into the electrical grid, enabling GVEA to purchase up to 150 MW of wind power.[46]

Leveling Power Costs

Passed in July 2024, Alaska House Bill 307 was designed to unify and modernize the Railbelt's electric transmission system and improve energy availability.[47] Key provisions of the law include:

- Eliminate wheeling and pancaking, which refer to added charges imposed for energy that runs through certain segments of the system. This will presumably reduce costs to the Fairbanks area, which, at the end of the transmission lines, has paid higher rates due to additional fees charged along the system.[48]
- Create the Railbelt Transmission Organization (RTO), which will manage the transmission line and establish a transmission cost recovery system that does not discriminate against any utilities involved.
- Include renewable energy producers, such as solar farms, in the existing tax exemption for utilities.[49]

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[44] Ibid and Yereth Rosen, Alaska Beacon, *Utilities in Alaska's Railbelt announce $200 million transmission upgrade project*, https://alaskabeacon.com/briefs/railbelt-utilities-announce-200-million-upgrade/, May 25, 2022.
[45] Rosen, Alaska Beacon, May 24 2022.
[46] GVEA, Golden Valley Electric Association Awarded over $206 Million in Loans and Grants from USDA Empowering Rural America Program, https://www.gvea.com/news-releases/golden-valley-electric-association-awarded-over-206-million-in-loans-and-grants-from-usda-empowering-rural-america-program/, September 5, 2024.
[47] Office of the Governor, State of Alaska, Governor Mike Dunleavy Signs Alaska Energy Bills, https://gov.alaska.gov/governor-mike-dunleavy-signs-alaska-energy-bills/#:~:text=HB%20307%20eliminates%20wheeling%20rates%20on%20Alaska%E2%80%99s%20Railbelt%2C,nondiscriminatory%20open%20access%20to%20the%20Railbelt%20transmission%20system, July 31, 2024.
[48] Yereth Rosen, Alaska Beacon, *Alaska House approves bill designed to unify Railbelt electric transmission system*, https://alaskabeacon.com/2024/05/15/alaska-house-approves-bill-designed-to-unify-railbelt-electric-transmission-system/, May 15, 2024.
[49] Ibid.

Fuel Supply

A desire to reduce Alaskans' high energy costs fueled multiple pipeline proposals and efforts to bring natural gas to the Interior over several decades. Currently, the Interior Energy Project (IEP) is making natural gas available to a growing number of Interior homes and businesses. This gas was delivered from Southcentral and instead will soon be trucked from the North Slope. In addition, the Alaska Gasline Development Corporation (AGDC) continues to seek funding for its Alaska LNG project, which would establish a pipeline to deliver natural gas to the Interior, as well as other parts of the state and international markets.

Interior Energy Project

The IEP, established in 2013 to provide financial tools needed to bring natural gas to the Interior, was overseen by the Alaska Industrial Development and Export Authority (AIDEA) and received extensive state funding. In 2018, Pentex Alaska Natural Gas Company and the Interior Gas Utility (IGU) were consolidated under IGU. As Southcentral natural gas supplies declined, IGU sought natural gas resources from other regions. In 2023, IGU entered into a 20-year agreement with Hilcorp to purchase natural gas from Alaska's North Slope.

Additionally, IGU entered into a 20-year contract to purchase liquified natural gas from a new LNG plant constructed by Harvest Midstream in Deadhorse Alaska. Once complete, the plant will produce 150,000 gallons per day. IGU's contract with Harvest Midstream gives the utility the right to purchase the plant's entire capacity and construct two additional 150,000 gallon per day LNG trains, liquification units required to convert natural gas to LNG. LNG from the new North Slope plant is expected to be available in January 2025 following plant construction. About six trailers of LNG will be trucked from the North Slope to the Interior daily.[50]

As mentioned previously in this report, in 2023, IGU installed 535 new service lines in the Fairbanks North Star Borough. By the end of June 2024, the utility installed almost two-thirds of the 640 new service lines planned for the year. To date, a total of about 235 miles of natural gas distribution lines have been installed in Fairbanks and North Pole.[51]

In addition to the 2,800 households and businesses currently served, IGU has infrastructure in place which could serve up to 8,500 customers in Fairbanks and 3,000 in North Pole.[52] In 2023, the Fairbanks North Star Borough received a $10 million federal grant to improve air quality. Grant funds will be used in part to expand access to natural gas and replace oil heating systems with natural gas or propane systems.[53]

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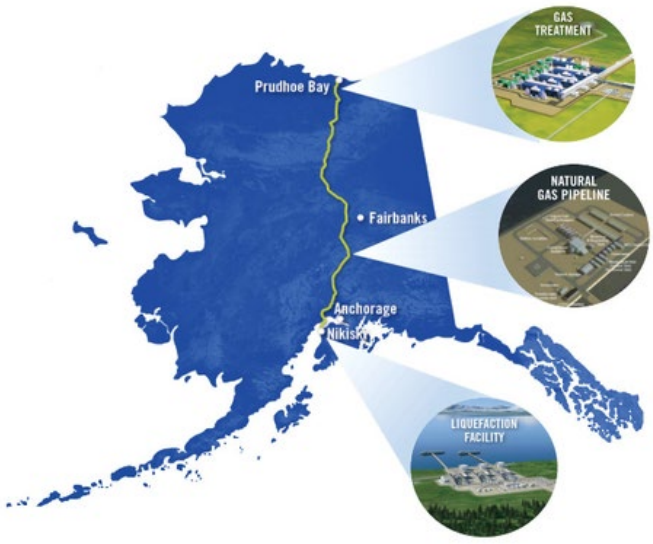
[50] Interior Energy Project, AIDEA, *Quarterly Report to the Alaska State Legislature: Second Quarter 2024*, August 7, 2024.
[51] Ibid.
[52] Ibid.
[53] U.S. Environmental Protection Agency, *State of Alaska, Fairbanks North Star Borough receive $10M EPA grant to improve air quality*, State of Alaska, Fairbanks North Star Borough receive $10M EPA grant to improve air quality | US EPA, October 23, 2023.

Alaska LNG

For about a decade, AGDC has worked to develop an 800-mile, 42-inch diameter pipeline from the North Slope to a Nikiski plant. At Nikiski, the gas would undergo liquefication before export to international markets. Spurs along the main pipeline would provide natural gas to Alaska communities. The $43 billion project received federal approval for construction and operation, though private funding is still being sought so the project can move forward.

Recent concerns that Alaska may need to import natural gas, which would increase consumer costs significantly, led AGDC to reshape its plans. The agency now would like to develop the pipeline to provide natural gas to Alaska communities first and international markets second. Building the pipeline and providing natural gas to Alaskans would cost $10.8 billion – about one-fourth of the project's full price tag.

Figure 5. Alaska LNG Project Map



Source: Alaska Gasline Development Corporation.

The AGDC Board of Directors would like to move into the Front End Engineering Design (FEED) phase in 2025 and is seeking a $50 million financial "backstop" for the project from the State of Alaska or private investors. This backstop would provide financial protection while a private company completes the work necessary to prepare the pipeline for construction. If the private company moves ahead with a final investment decision (FID), then the $50 million backstop is unused. If the private company does not move ahead with the project, it turns the FEED package over to AGDC so it can use it with another investor and the pipeline company is reimbursed for its costs, up to $50 million.[54]

[54] Alaska Gasline Development Corp., *Alaska's Energy Future: The Alaska Gas Pipeline*, presentation to AIDEA Board, chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.aidea.org/Portals/0/Meeting%20Docs/2024 BoardMeeting/102324/6._F_Alaska_Gas_Pipeline_AIDEA_Public_Presentation_10232024.pdf, October 23, 2024.

Chapter 4: Coal's Role in Present and Future Interior Energy Production

Coal remains a critical component of Interior Alaska's heat and power generation, offering affordability, price stability, and energy security. Regional energy producers depend on coal due to its reliable, local production, established supply chain, and stockpiling capabilities, which ensure consistent energy availability. Without coal, energy costs in the Interior would rise significantly. Key considerations for future energy infrastructure:

- **Cost-Effectiveness and Price Stability:** Coal provides cost-effective energy at stable, affordable rates in Interior Alaska. Power producers in the Interior generally maintain long-term coal purchase contracts, providing price certainty to producers. This price certainty contrasts with considerable volatility in petroleum-based fuel costs over the last decade.

- **Reliable Long-Term Supply:** Coal is well-situated to continue meeting the near- and mid-term electrical generation and heating needs of the Interior. Usibelli Coal Mine currently has hundreds of years of coal resources available based on current production levels. The stability of this fuel source supply contrasts with other fuel sources, such as natural gas, currently used in energy generation elsewhere along Alaska's Railbelt and not readily available on a large scale in Interior Alaska.

- **Established Infrastructure:** Interior Alaska benefits from existing, robust coal transportation, storage, and energy generation infrastructure. This infrastructure provides strong energy security to the region, given Usibelli's proximity to power producers, the efficiency of transporting coal by rail, and the relative ease of coal storage. According to one Interior energy producer interviewed for this research, "[Our] goal for energy security is at least 14 days of energy available. [We] have well in excess of that. We could have energy security for weeks if the supply chain were interrupted."

Despite these benefits, as public pressure builds and federal funding becomes available to pursue other energy options, an examination of the financial and logistical implications of moving away from coal is imperative.

Impact of Coal on Energy Costs

The following sections describe the short-term cost impacts of a hypothetical scenario in which coal is no longer available in Interior Alaska. These scenarios assume that, in the absence of coal, power producers would shift fuel consumption to another source already in use or planned for use in the near term. In reality, the short-term impacts of a "no coal" scenario are complex and dependent on availability of power from Southcentral Alaska, natural gas availability and prices, and other factors. Despite this complexity, the scenarios below offer insight into the magnitude of variable cost differences between coal and other fuels.

The degree to which fuel costs would increase in the absence of coal in the Interior depends on petroleum product prices, which are highly variable year to year. Prevailing fuel rates paid by Interior power producers in 2023 were used to estimate costs associated with removing coal from the region's fuel mix.

Other costs — including capital, debt service, and nonfuel production/administration — are considered fixed costs for purposes of this analysis. In the longer term, new infrastructure projects would be needed to meet the level of energy demand required to replace coal generation. These investments could include new in-region generation capacity, Railbelt transmission line upgrades or enhancements, or new generation capacity in Southcentral.

Golden Valley Electric Association Fuel Costs

If coal were not available in the Interior, GVEA would need to generate almost 90 MW of power, which is currently generated by Healy Units 1 and 2, and the Aurora Power Plant.[55] These plants currently produce about 41% of GVEA's net power generation.[56]

If coal is not available, GVEA might increase power purchases from Southcentral Alaska via the 70 MW transmission lines linking the two regions. The amount of energy needed would far outstrip energy available for purchase due to the transmission line's limited capacity alone. The uncertain availability of purchased power due to Cook Inlet natural gas supply constraints would also impact GVEA's ability to supplant coal-fired generation with fuel from Southcentral Alaska.

Given uncertain availability of purchased power, it is assumed coal-fired generation would shift to other available GVEA capacity, mainly the North Pole Expansion Plant and the North Pole Power Plant; fuel costs at these facilities were an estimated $0.11 and $0.36 cents per kWh,

[55] Ashley Braddish, Director of External Affairs & Public Relations, GVEA, phone interview, September 26, 2024.
[56] McKinley Research Group estimates based on GVEA Cost of Power Adjustment filings.

respectively, in 2023.[57] Assuming increased costs are passed to consumers, GVEA ratepayers would collectively pay about $153 million more annually for electricity under this scenario.

In practice, a "no coal" scenario in Interior Alaska may result in higher demand for electricity generated by GVEA from lost Healy Units 1 and 2, Aurora Energy, University and military installation capacity, further impacting GVEA's energy mix.

University Energy Costs

UAF consumed about 111,000 tons of coal to heat and power its Fairbanks campus in 2023, spending an estimated $7.5 million on coal purchases. In addition, UAF pays transportation costs for the Alaska Railroad to deliver coal to the university.

If coal were not available, UAF would likely turn to natural gas for generating campus heat.[58] While the cost of conversion to natural gas would be high, possibly $15 million to $20 million, operational maintenance costs could be reduced if the conversion was completed. However, a reliable source of natural gas is currently difficult to obtain due to impending Southcentral natural gas shortages. UAF could potentially purchase North Slope natural gas from IGU, though the University's current supply from IGU is interruptible. For electricity, the University would likely need to purchase electricity from GVEA in the absence of coal.

If UAF was able to generate the level of heat and electricity required by the university with a mix of natural gas (heat) and heating oil (electricity), fuel costs would likely quadruple. Based on 2023 market prices ($3.04/gallon for diesel, $20.48/mcf of natural gas), UAF would pay about $34.9 million in fuel costs under this hypothetical scenario – an increase of about $27 million.

Military Energy Costs

Coal is the backbone of energy generation at Fort Wainwright and Eielson Air Force Base and has been for decades. Combined, these installations use about 366,000 tons of coal annually, providing about 5.5 million MMBtu of energy. The bases spent an estimated $24.7 million on coal consumed in 2023.

If coal were removed from the energy mix, Fort Wainwright reports they would turn to natural gas for heat and purchase electricity from GVEA, a plan that the U.S. Army selected after a public environmental review process. The plant conversion to natural gas was estimated to cost $117 million in 2020 and would likely now be far more expensive given rising construction costs. This does not include system installation costs to convey heat generated by natural gas to buildings.

The Air Force is pursuing nuclear power as a coal alternative at Eielson. A microreactor is estimated to cost about $60 million to build and another $3 million per year to operate and

[57] McKinley Research Group estimates based on GVEA Cost of Power Adjustment filings between November 30, 2022, and November 9, 2023.
[58] Kurt Knitter, Director of Utilities, University of Fairbanks, phone interview, September 26,2024.

maintain. Depending on that reactor's performance, at least one more reactor may be needed to heat and power the installation.

In the near-term, the loss of coal for these bases would have profound effects. While both bases could generate electricity using another fuel source or purchase limited power from GVEA, Fort Wainwright has no means of alternative heat generation and Eielson's diesel-fired auxiliary heating plant is not sized to heat the entire installation.[59] If the bases could switch from coal to other fuel sources, energy costs would likely more than quadruple. Based on market prices in 2023 ($3.04/gallon for diesel, $20.48/mcf of natural gas), the bases would pay an estimated $118.1 million – an increase of about $93 million in fuel costs.

Overall Fuel Cost Increase Without Coal

About one million tons of coal are consumed annually by heat and power plants in Interior Alaska. If replacing energy generated by coal with other fuel sources were possible, energy costs in the Interior would increase by at least $273 million, based on fuel costs alone.

These calculations consider only coal consumed based on 2023 energy demand and the difference between the price of coal and the prices of natural gas, heating oil, and naphtha.

This analysis simplifies the changes that would occur in the Interior's fuel mix in the absence of coal. Replacement would include a combination of power purchases and fuel sources not modeled in detail. Ability of Interior power plants to replace all current generation with alternative fuel sources given existing infrastructure is not certain, and the cost of constructing new infrastructure is not included.

Table 6. Cost Implications of Alternative Fuel Substitutes for Coal in Interior Alaska

Plant	Tons of Coal Consumed	Million Btus	Cost of Coal	Alternative Fuel Source and Price	Additional Fuel Cost
UAF	111,000	1,664,000	$7.5 million	Diesel ($3.04/gallon) Natural Gas ($20.48/mcf)	$27 million
Military Bases	365,000	5,537,000	$24.7 million	Diesel ($3.04/gallon) Natural Gas ($20.48/mcf)	$93 million
GVEA & Aurora Energy	518,000	7,733,000	$36.4 million	Naphtha ($160/gallon) Diesel ($3.50/gallon)	$153 million
Total	**994,000**	**14,934,000**	**$68.6 million**	-	**$273 million**

Source: McKinley Research Group, GVEA Cost of Power Adjustment filings, US Energy Information Administration, and personal communications with UAF, Doyon Utilities, and Eielson AFB personnel.
Notes: Estimates based on:

a. Average coal, diesel, and naphtha prices paid by GVEA in 2023 (from GVEA's Cost of Power Adjustments reports to the Regulatory Commission of Alaska) and prevailing market rates.
b. GVEA's alternative fuel cost estimate includes maximizing capacity at the naphtha plant and shifting the additional capacity to available diesel generation.
c. Military fuel cost estimates include using natural gas for heat generation at Fort Wainwright per U.S. Army preferred alternative to install a natural gas boiler system.

[59] Based on interviews with Doyon Utilities and Eielson Air Force Base personnel.

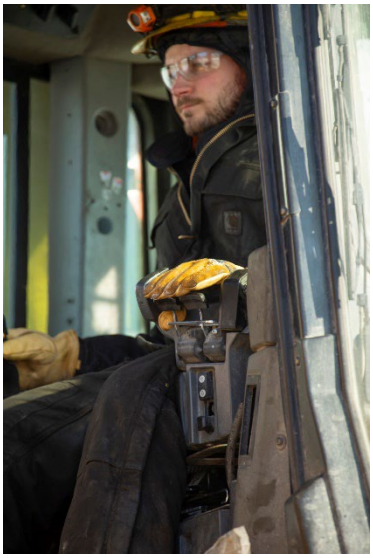
Chapter 5: Economic Impact of Coal in Interior Alaska

Usibelli Coal Mine impacts the Interior Alaska economy directly and through a range of multiplier effects. The mine creates direct jobs and pays wages to UCM workers who then spend money in the local, regional, and state economies. The operation generates more economic impact when UCM purchases services and supplies. Additionally, UCM operations contribute to employment at Interior coal-fired heat and power plants.

Direct Impacts

Jobs

UCM is an important source of stable employment for the region. In 2023, UCM employed an average of 105 workers, all Alaska residents. About 90% of employees are based in Healy, making UCM the community's largest year-round employer. The mine employed more than one in 10 Healy residents in 2023. The remaining UCM employees work at offices in Fairbanks and Palmer.



Healy is in the Denali Borough, an area characterized by large fluctuations in seasonal employment. The visitor industry is Denali Borough's largest seasonal employer; 51% of jobs in the borough in 2023 were in leisure and hospitality. Employment in UCM's year-round operation directly accounted for 5% of jobs in the Denali Borough in 2023.[60]

Wages

UCM wages to Alaska resident employees totaled $14.9 million in 2023. In addition to wages, UCM paid $5.5 million in employee health benefits and pensions. Mining jobs pay relatively high wages, averaging $123,000 in 2023, almost double the Alaska average for all industries ($68,000), as well as average wages in the FNSB ($65,000), and Denali Borough ($63,000).[61]

[60] Alaska Department of Labor and Workforce Development, Research and Analysis. *Quarterly Census of Employment and Wages*. 2023; Direct Employment and Wages from UCM.
[61] Ibid.

UCM wages stay in Alaska more than many other industries in the interior. All UCM employees are Alaska residents, while only 34% of all workers in the Denali Borough are Alaska residents (including 17% who live in the Denali Borough and another 17% who live elsewhere in the state).[62]

Measuring Indirect and Induced Impacts

The direct employment and wage impacts of UCM are one component of the mine's full economic impact. The operation's employment and wage impacts also include:

- *Indirect impacts* – the jobs and income supported by UCM's spending on the wide variety of goods and services required to operate the mine and move coal to customers.
- *Induced impacts* – the jobs and income supported as UCM employees spend their wages in local and regional economies.

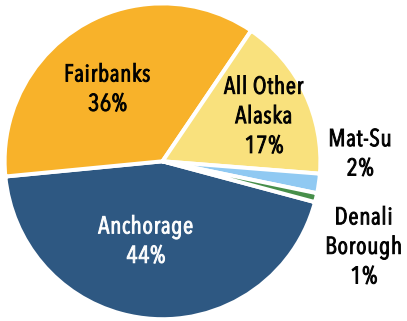
Indirect and induced jobs and wages are estimated using IMPLAN – an input-output model of local and state economies that is widely used across the country to measure the economic impact of industries and industrial/commercial development.[63] IMPLAN uses borough and statewide employment and wages data to measure linkages between industries and produce multipliers to estimate the impact of an economic stimulus. For Alaska, IMPLAN typically requires modification to account for nonresident labor and/or supply constraints.

IMPLAN only captures economic impacts resulting from purchases made by UCM and its employees. It does not capture jobs or income at power plants that rely on UCM coal (discussed separately below).

Indirect Impacts

In 2023, UCM spent more than $32.0 million with 288 Alaska-based vendors on goods and services in support of mine operations. Most spending (80%) occurred with Anchorage or Fairbanks vendors.

Figure 6. UCM Spending with Alaska Vendors by Community, 2023



Source: Usibelli Coal Mine.

This spending creates jobs in the regional and Alaska economy across a wide range of industries. Of note, significant job creation occurs at ARRC.

[62] Alaska Department of Labor and Workforce Development, Research and Analysis. 2024.
[63] http://www.implan.com/company/.

Alaska Railroad Impacts

UCM contracts with ARRC, headquartered in Anchorage, to deliver coal to mine customers. As the railroad's second largest customer in terms of tonnage, UCM transported 660,000 tons of coal in 2023. This was almost one-fifth (19%) of the railroad's total freight tonnage.[64]

Freight makes up about 60% of ARRC's operating revenue.[65] Of this freight revenue, coal was responsible for about 10% in 2023.[66] Coal is an anchor commodity for the railroad, providing consistent revenue and allowing the railroad to use hopper cars year-round.

The ARRC workforce totals about 770 employees, including 590 year-round.[67] Almost all ARRC employees are Alaska residents, aside from a few who work with the barge in Seattle,. Though a detailed accounting of ARRC jobs that depend on coal (from an operational or revenue perspective) is not available, an estimated 30-35 ARRC employees are directly or indirectly supported through ARRC coal operations.[68] This is a conservative estimate, meaning at least this many ARRC personnel would no longer be employed if UCM coal were not transported by the railroad.

The employment implications of running a railroad without coal as a source of freight revenue may be much greater than ARRC jobs, as coal plays a critical role in generating operating revenue for ARRC and, therefore, in the railroad's continued viability.

Induced Impacts

UCM employment averaged 105 jobs in 2023. In total, 119 individuals worked for UCM during the year, earning $14.9 million in wages. These workers and their families spend money within their local and regional economies, including at retail stores, gas stations, recreational facilities, and a range of other places.

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[64] ARRC, *100 Years: Alaska Railroad 1923-2023 Annual Report 2023*. https://www.alaskarailroad.com/sites/default/files/Communications/Alaska_Railroad_Annual_Report2023Web.pdf.
[65] ARRC, Alaska Railroad: Just the Facts, June 17, 2024. https://www.alaskarailroad.com/sites/default/files/Communications/FACT-SHEET_2024_ARRC_Quick-Facts.pdf
[66] Michelle Renfrew, Senior Account Manager, ARRC, phone interview October 3, 2024.
[67] Ibid.
[68] Ibid.

Downstream Impacts of Coal-Based Energy Generation

Another way UCM operations generate economic impacts is through provision of coal to Alaska power plants. Coal production has significant downstream economic impacts which occur when buyers of a product (such as crude oil, coal, or fish) add value through some form of processing. Most resources extracted in Alaska, such as crude oil, metallic mineral resources, or seafood, are sold to out-of-state buyers. This generates limited downstream impacts for the state, whereas all UCM's coal production was sold and consumed in Alaska in 2023.

Downstream jobs, referred to as forward linkages, related to UCM include jobs at power plants using UCM coal. In total, employment at Interior Alaska coal-fired power plants was an estimated 238 jobs in 2023. Based on the $106,000 statewide average annual wage in the power generation sector, these employees earned an estimated $25 million in annual wages in 2023.[69]

Table 7. Alaska Coal-Fired Power Plant Jobs, 2023

Facility	Estimated Number of Jobs
GVEA Healy Unit 1	35
GVEA Healy Unit 2	35
UAF	33
Aurora Energy	32
Fort Wainwright (operated by Doyon Utilities)	44
Eielson AFB	59
Total	**238**

Source: GVEA, Aurora Energy, Doyon Utilities, Eielson AFB, and UAF.

Unlike the upstream jobs supported by UCM, not all of these power plant jobs would be foregone in the absence of an in-state coal supply. If the plants were to generate power using alternative fuel sources (natural gas, diesel, and others), a number of jobs would be maintained. However, generation using other fuel sources may require less manpower compared to coal generation and therefore would likely account for fewer jobs in the region.

Additionally, as previously demonstrated, replacing coal with other fuel sources for power generation in Interior Alaska would likely come at a steep cost to power producers. Such costs would likely result in higher costs to end-users of energy.

[69] Alaska Department of Labor and Workforce Development, Research and Analysis. *Quarterly Census of Employment and Wages*. 2023.

Total UCM-Related Economic Impacts

In total, UCM economic impacts on local, regional, and state economies in Alaska are generated from coal mining - including direct, indirect, and induced - along with the downstream impacts from coal-based energy generation.

UCM is the foundation of the Healy economy, generating stable, year-round employment and high wages. Without the jobs provided by UCM, the local economy would be significantly smaller. Beyond the immediate local impacts, UCM economic impacts extend to Interior Alaska and statewide through UCM spending on wages, goods, and services - and circulation of that money in the economy. This activity supported 240 jobs in Interior Alaska, part of 330 total jobs statewide in 2023. Combined annual wages of these UCM-generated jobs totaled $22.9 million in Interior Alaska, and $29.3 million statewide.

Including all impacts of UCM operations and downstream impacts of coal-fired energy generation, UCM supported 568 jobs and $54.6 million in wages in the Alaska economy in 2023.

Table 8. Total Employment and Wage Impact of Usibelli Coal Mine, 2023

Impact	Interior Alaska	Statewide
Economic Impacts of Coal Mining		
Jobs		
Direct	105[a]	105
Indirect/Induced	135	225
Total Coal Mining-Related Jobs	**240**	**330**
Wages ($millions)		
Direct	$14.9[a]	$14.9
Indirect/Induced	$8.0	$14.4
Total Wages ($millions)	**$22.9**	**$29.3**
Downstream Impacts of Coal-Based Energy Generation		
Coal-fired power plant employment	238	238
Coal-fired power plant wages ($millions)	$25.2[b]	$25.2
Total UCM-Related Impacts		
Total jobs	478	568
Total wages	$42.8	$54.6

Source: Usibelli Coal Mine and McKinley Research Group estimate.
Notes:
a. One UCM jobs is based in Anchorage/Matanuska-Susitna Borough but is included in the Interior Alaska category for confidentiality reasons.
b. Downstream wage impacts are estimated based on employment at coal-fired power plants and average annual statewide power sector wages in 2023.

UCM's statewide employment multiplier is about three – meaning, for every job created at the mine, there are two indirect and induced jobs created elsewhere in the Alaska economy. These multipliers do not include jobs at power plants that use coal purchased from UCM.

In Alaska, multipliers are rarely above 2.0. For example, 100 direct jobs would typically be linked to no more than 100 indirect and induced jobs, equaling a total employment impact of 200. UCM's multiplier is high for several reasons, though mainly because of a high level of in-state spending on goods and services relative to the number of direct jobs at the mine. In 2023, UCM's in-state spending on goods and services was $30.0 million. The mine's high average wages also place more money into the economy compared to lower wage jobs, increasing UCM's multiplier impact.

UCM Charitable Giving

UCM's economic impact includes support of more than 100 nonprofit organizations through contributions by UCM and The Usibelli Foundation (TUF). In 2023, UCM directly donated $350,000 to charitable and educational organizations. Founded in 1991, TUF has distributed more than $2.5 million over its 30-year history of supporting local charitable organizations. This giving includes $150,000 in 2023. TUF provides grants for nonprofit education, health and social services, youth programs, the arts, and civic organizations and activities. TUF also matches employee donations to United Way of the Tanana Valley, as well as several other community organizations in Healy. Combined, UCM and TUF contributed $500,000 to regional charitable organizations and education institutions in 2023.

The Usibelli Foundation provides funds to:

- **Facilitate** learning by supporting education.
- **Preserve** Alaska's uniqueness by supporting its heritage.
- **Strengthen** communities.

As part of this 2023 giving, UCM and TUF donated more than $368,000 to various educational programs and organizations. TUF donated more than $35,000 to education organizations including the Denali Preschool and Learning Center, the Denali Borough School District, and Alaska Resource Education.

UCM is a long-time supporter of the University of Alaska system, donating more than $5.5 million to UAF over the mine's history.[70] In 2017, UAF named the Usibelli family "Philanthropist of the Century". In 2020, UCM provided major support to the UAF's first annual Giving Day. The mine also established scholarship programs within the Homeland Security and Emergency Management and Bachelor of Applied Management programs, and the Usibelli Coal Mine Nanook Athlete endowed scholarship fund.[71] In 2023, UCM donated $322,500 to UAF.

[70] University of Alaska Fairbanks, School of Management. *Usibelli Coal Mine: Generations of Support Inspires Others to Give*. December 2020.
[71] University of Alaska Fairbanks, School of Management. https://givingday.alaska.edu/giving-day/29792/department/30538.

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