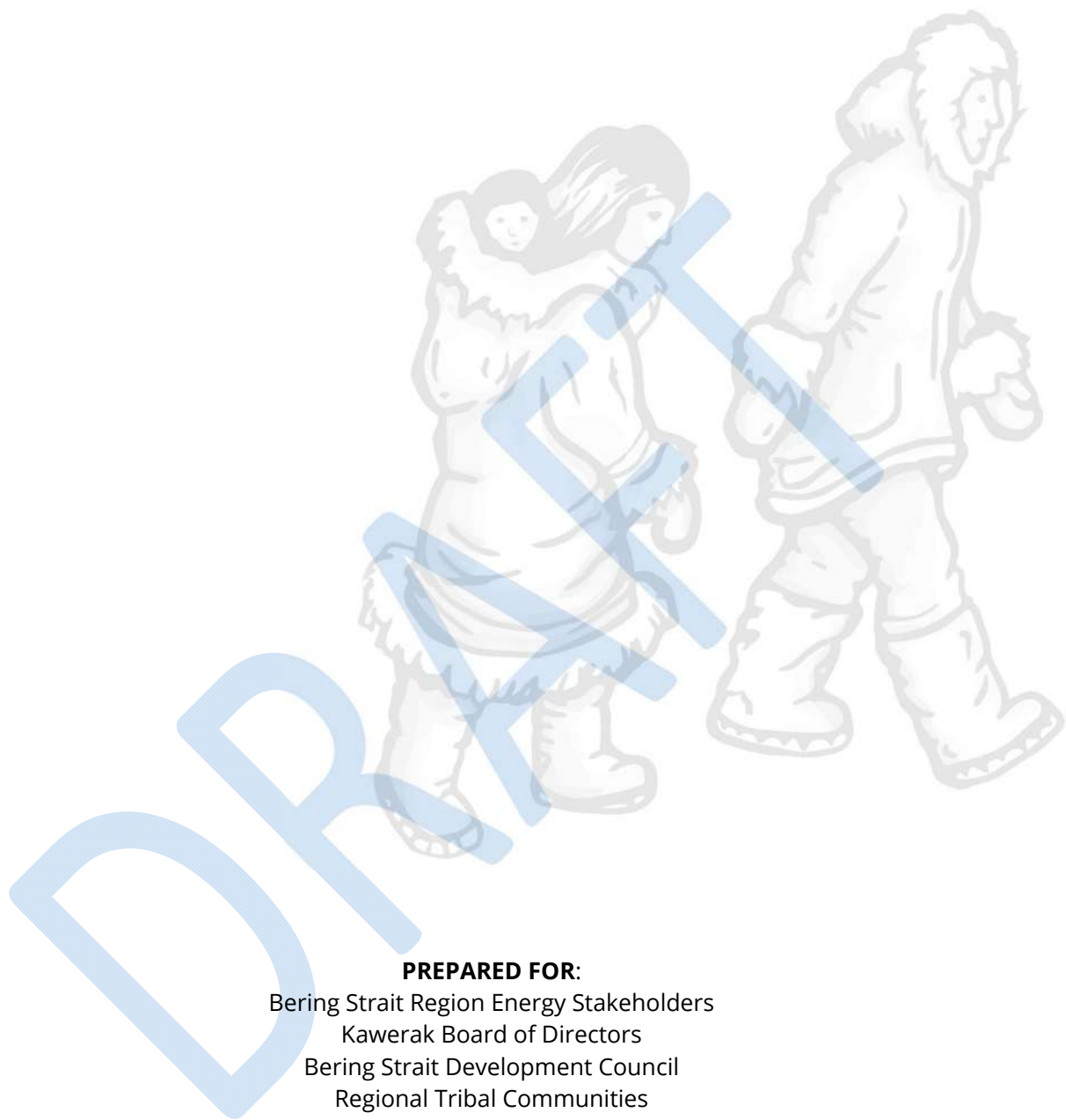




KAWERAK, INC.

Bering Strait Regional Energy Plan

2026



PREPARED FOR:

Bering Strait Region Energy Stakeholders
Kawerak Board of Directors
Bering Strait Development Council
Regional Tribal Communities
Residents of the Bering Strait Region

PREPARED BY:

Kawerak Energy Program
DeerStone Consulting, LLC

Bering Strait Regional Energy Plan Communities



Figure 1: Bering Strait Region Map

English Name	Iñupiaq Name	English Name	Iñupiaq Name
Brevig Mission	Sitaisaq	Saint Michael	Taciq
Council	Akauchak	Savoonga	Sivungaq
Diomede	Injaliq	Shaktoolik	Saktuliq
Elim	Neviarcurluq	Shishmaref	Kigiqtaq
Gambell	Sivuqaq	Solomon	Anjuutaq
Golovin	Chinik	Stebbins	Tapraq
King Island	Ugiuvak	Teller	Tupqaḡruk / Iḡaluṇniagvik
Koyuk	Kuuyuk	Unalakleet	Uḡalaqliq
Mary's Igloo	Qawiaraq	Wales	Kinigin
Nome	Sitṇasuaq	White Mountain	Iḡaluik / Natchirsvik

Table of Contents

Acknowledgements	iv
Table of Contents	iv
Table of Figures	vii
Table of Tables	vii
Appendices	viii
1. Executive Summary	2
2. Purpose & Methodology	4
2.1. Purpose.....	4
2.2. Methodology	4
2.3. Geographic Scope	5
3. Regional Background	8
3.1. Bering Strait Region	8
3.2. Demographics	9
4. Energy Landscape	15
4.1. Regional Energy Production & Consumption	15
4.1.1. Heating Fuel	16
4.1.2. Electricity.....	18
4.1.3. Transportation	20
4.1.4. Bulk Fuel Storage.....	21
4.2. PCE Subsidy by Community	23
5. Regional Alternative Energy Analysis	26
5.1. Energy Efficiency.....	26
5.1.1. Residential Energy Efficiency.....	26
5.1.2. Community and Commercial Building Efficiency	27
5.1.3. Utility System Efficiency	27
5.1.4. Priority Actions – Energy Efficiency	28
5.2. Heat Recovery	28
5.2.1. Existing Systems and Needs	29
5.2.2. Challenges	29
5.2.3. Opportunities.....	30
5.2.4. Priority Actions – Heat Recovery.....	30
5.2.5. Status of Heat Recovery in Each Community	31
5.3. Wind	31
5.3.1. Wind System Types	32

5.3.2.	Wind-to-Heat.....	33
5.3.3.	Implementation Readiness	33
5.3.4.	Priority Actions – Wind.....	33
5.3.5.	Status of Wind in Each Community.....	34
5.4.	Solar	36
5.4.1.	Primary Components of a Solar PV and Battery Energy Storage System.....	37
5.4.2.	System Sizing Methodology	38
5.4.3.	Status of Solar in Each Community.....	39
5.4.4.	Priority Actions - Solar.....	40
5.5.	Biomass	41
5.5.1.	General.....	41
5.5.2.	Other Technologies	42
5.5.3.	Community Benefits of Biomass	43
5.5.4.	Wood Resources	43
5.5.5.	Priority Actions.....	45
5.5.6.	Community Scale Heating Systems.....	45
5.6.	Geothermal	46
5.6.1.	Commercial vs. Non-Commercial Geothermal Applications	47
5.6.2.	Pilgrim Hot Springs.....	47
5.6.3.	Geothermal Potential in Elim and White Mountain.....	48
5.6.4.	Priority Actions - Geothermal.....	49
5.7.	Hydroelectric	50
5.7.1.	Community-by-Community Scan: Micro-Hydro Potential.....	50
5.7.2.	Priority Actions - Hydroelectric	51
5.8.	Other.....	52
5.8.1.	Marine Energy (Tidal and River Current)	52
5.8.2.	Oil and Natural Gas Opportunities	54
5.8.3.	Energy Infrastructure Linked to Remote Mining Development	54
5.8.4.	Micro Nuclear Energy (Small Modular Reactors).....	55
6.	Project Development & Funding Opportunities.....	57
6.1.	Project Development	57
6.2.	Grant Funding.....	57
6.3.	Other Funding.....	61
6.3.1.	Loans.....	61
6.3.2.	Tax Incentives.....	61
6.3.3.	Local Funding & Cost Share	62
7.	Acronyms and Abbreviations.....	64



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Table of Figures

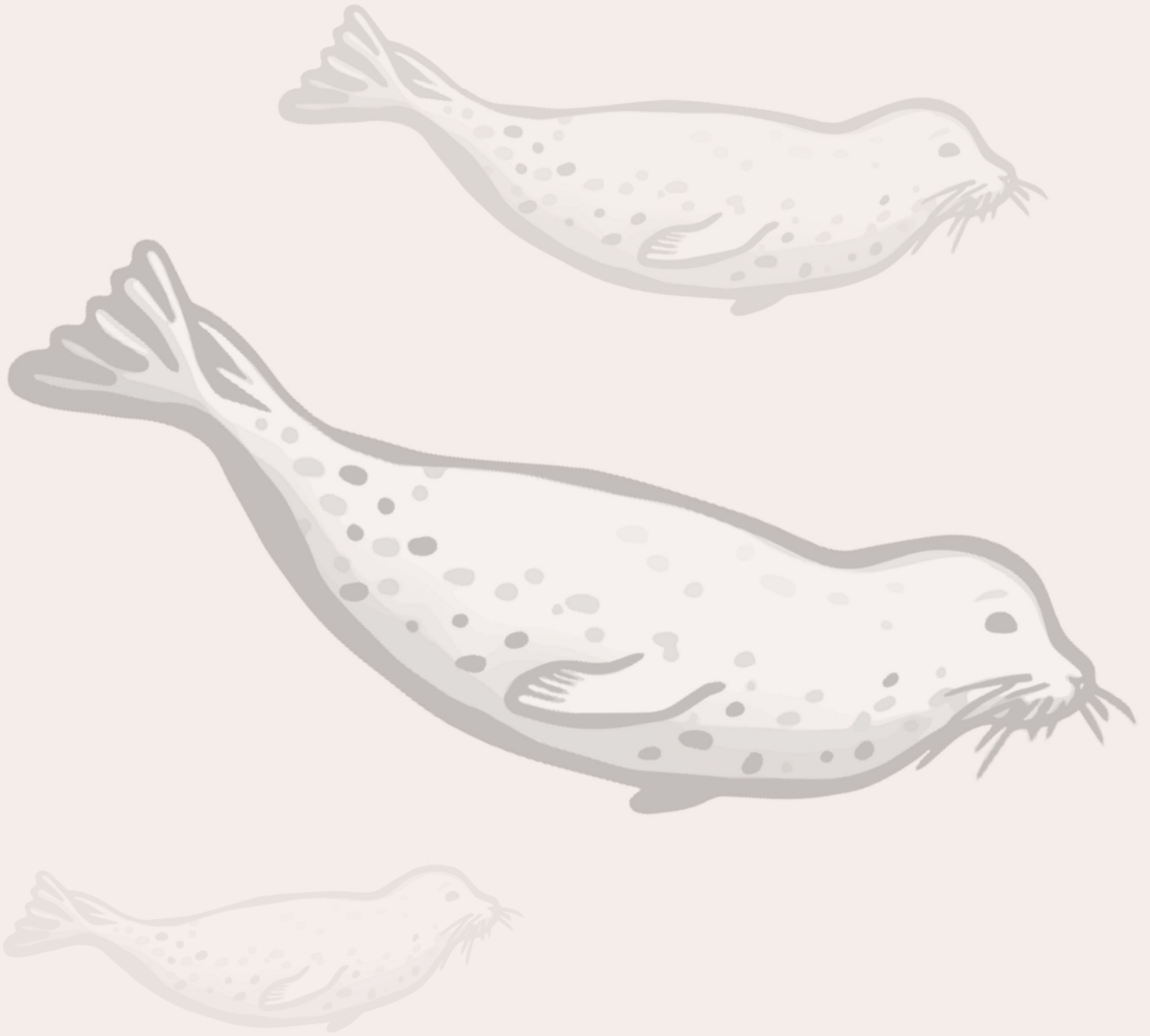
Figure 1: Bering Strait Region Map	iii
Figure 2: Bering Strait Region Map	6
Figure 3: Nome Census Area Total Population 2010-2024	10
Figure 4: Percent Population Change 2014-2024.....	10
Figure 5: Nome Census Area Age Range (2023 ACS 5-year Estimates).....	11
Figure 6: Nome Census Area Race Demographics (2023 ACS 5-year Estimates).....	11
Figure 7: Gallons of Fuel Used by Sector.....	15
Figure 8: Percent of Diesel and Non-Diesel Electricity Generation in Communities Using Renewable Energy	19
Figure 9: Energy Efficiency Methods (Agnew::Beck Consulting).....	26
Figure 10: Heat Recovery Process (DeerStone Consulting, LLC and Agnew::Beck Consulting)	29
Figure 11: Wind Energy System (Agnew::Beck Consulting).....	32
Figure 12: Solar Resource Comparison of Alaska and Germany (NREL).....	36
Figure 13: Community-Scale and Facility-Scale Solar (Agnew::Beck Consulting).....	37
Figure 14: Biomass (DeerStone Consulting, LLC and Agnew::Beck Consulting)	41
Figure 15: 2013 Heat Flow Map of Alaska	46
Figure 16: Non-Commercial Geothermal	47
Figure 17: Commercial Geothermal Power (Image Credit: GreenSea).....	47
Figure 18: ORPC RivGen System in Igiugig	53
Figure 19: Stebbins Tank Farm (STG Inc.).....	54
Figure 20: Microreactor Concept Image (Microreactor Program)	55

Table of Tables

Table 1: Bering Strait Region Population 2010-2024.....	9
Table 2: Income vs. Energy Costs in Selected Communities	13
Table 3: Community Energy Costs; Source: AEA, 2023; and DCRA, 2024.	16
Table 4: Estimated Fuel Usage for Space Heating by User Type (Gallons/Year).....	17
Table 5: Electricity Generation and Customer Summary, Bering Strait Region (2023)	18
Table 6: Estimated Fuel Use for Transportation	20
Table 7	22

Table 8	28
Table 9	30
Table 10	31
Table 11	33
Table 12	34
Table 13	39
Table 14	39
Table 15	40
Table 16	44
Table 17	49
Table 18	50
Table 19	51
Table 20	58

Appendices



Executive Summary



1. Executive Summary

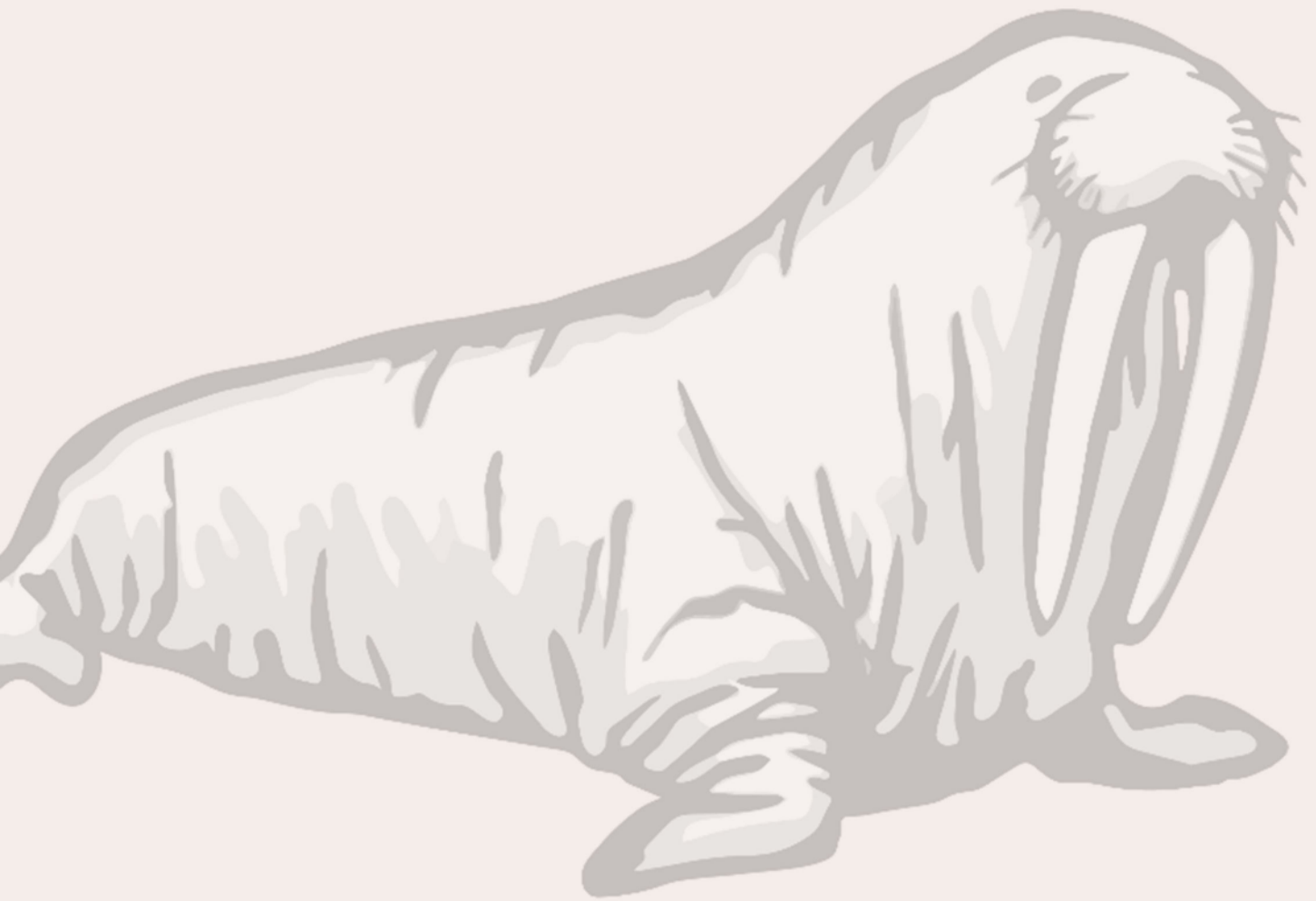
The 2026 Bering Strait Regional Energy Plan reflects a shift: away from extractive, top-down energy development and toward a future shaped by community-led vision, ancestral knowledge, and shared purpose. Built in partnership with Tribes, energy champions, regional leaders, and utility partners, this living plan addresses the structural inequities and diesel dependencies that have long defined the region’s energy landscape.

Rooted in local wisdom and powered by collaboration, the plan identifies clear actions to increase energy independence, reduce costs, and expand renewable energy—while preserving the Power Cost Equalization (PCE) program, protecting cultural lifeways, and upholding Tribal self-determination.

It draws from the voices and visions of all regional communities and reflects decades of planning, advocacy, and today’s priorities: resilience, energy security, and economic self-sufficiency. The Bering Strait faces urgent challenges—from rising fuel costs and aging infrastructure to climate disruption—but holds powerful momentum and deep community knowledge. Emerging models of Tribal-led Independent Power Producers (IPPs), community energy planning, and local workforce development offer a strong path forward.

This plan is a tool for community leaders, utilities, funders, and policymakers—to guide grants, investments, and advocacy, and to co-create a just, affordable energy future for the Bering Strait. It centers the following shared regional goals:

Pursuing & strengthening long-term resilience.	Reducing rural energy costs.	Utilizing collaboration between stakeholders and policy makers.	Finding creative financial solutions.
Offering quality education & workforce development.	Diversifying transportation options & access.	Increasing access to affordable, efficient housing.	Improve mechanical and operational capabilities.



Purpose & Methodology



2. Purpose & Methodology

2.1. Purpose

The *Bering Strait Regional Energy Plan* is a dynamic living document intended to guide and support locally driven energy planning and decision-making across the region. It provides practical, accessible information for communities, energy champions, tribal and city leaders, utilities, developers, and funders. The plan identifies current energy conditions, recent progress, and emerging opportunities to improve energy affordability, reliability, and sustainability.

This document also serves as a tool to support project development and grant writing by providing updated data, community-level context, and clearly stated priorities. It builds on the foundation of the 2015 Regional Energy Plan and is intended to be periodically reviewed and updated as projects are completed, technologies evolve, and new information becomes available.

The Energy Plan is intended to:

- Provide regional and community energy profiles including systems, costs, needs, and opportunities
- Offer up-to-date information useful for securing funding and other support
- Identify and prioritize actionable energy projects
- Catalyze long-term cost savings through local and regional energy improvements

The primary users of this plan include:

- Tribal councils, city governments, and community leaders
- Community energy champions and residents
- Utilities and regional organizations
- Energy developers, funders, and technical partners
- State and federal agencies involved in rural energy systems

2.2. Methodology

This plan was developed using a combination of research, data analysis, and direct community engagement. The planning phase was led by DeerStone Consulting and focused on compiling and analyzing:

- The 2015 Bering Strait Regional Energy Plan
- The 2025–2030 Comprehensive Economic Development Strategy (CEDS)
- AHFC's 2018 Nome Census Area Housing Assessment
- The Alaska Energy Authority's Power Cost Equalization (PCE) Statistical Report for FY2023
- Updated community-level energy cost data
- A compiled list of completed energy projects across the region since 2015

To ensure that the plan reflects current conditions and community priorities, Kawerak has also conducted stakeholder meetings, outreach and interviews with Tribes, city governments, and utilities in each community. This outreach fills in critical local details, identifies new or shifting priorities, and incorporates community perspectives into the planning process. Community perspectives were gained during the following:

- 2025 ANSEP Youth Engagement Session
- 2026 Bering Strait Regional Energy Summit
- Community Microgrid Assistance Partnership Meetings
- Energy Workforce Interviews

- Community Member Interviews
- 2026 Kawerak Board of Directors Meeting

By building on past actions, current data, and local knowledge—while keeping space for new technologies and evolving priorities, this plan is intended to remain a practical, usable document that supports real-world energy solutions in the Bering Strait Region.

2.3. Geographic Scope

The Bering Strait Regional Energy Plan includes 20 Tribal Villages that span the remote and culturally rich landscapes of northwestern Alaska. These villages reflect a deep connection to the land, sea, and traditional ways of life, and each plays a unique role in the region's energy, cultural, and community landscape.

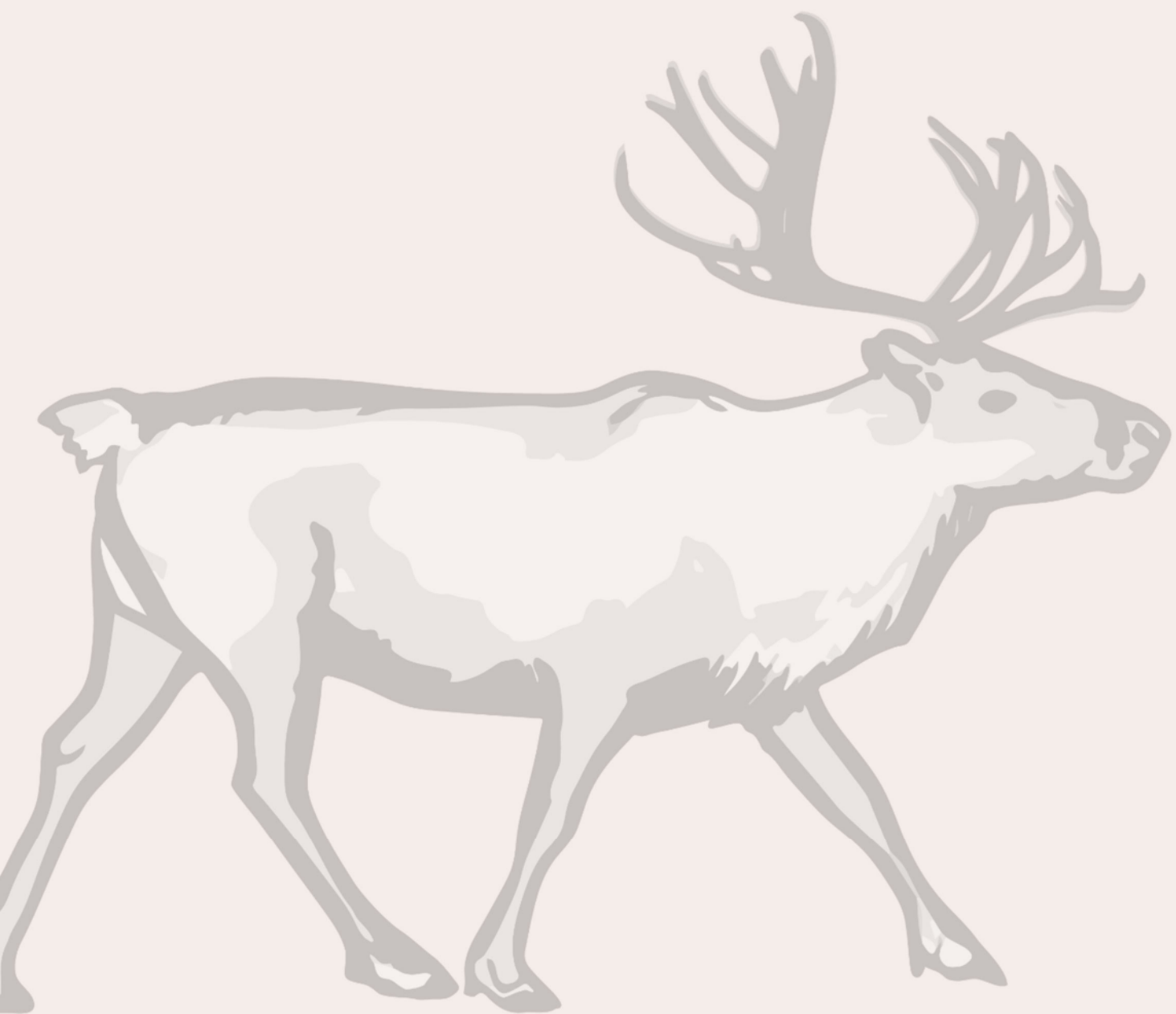
Of these 20 villages, 16 are currently inhabited year-round, while 4 are traditional villages with no full-time residents, included in the plan due to their historical, cultural, and regional significance. These traditional villages remain important gathering sites, seasonal use areas, and hold ancestral value for many residents throughout the region. Some Tribal communities also have re-establishment plans for their traditional lands.

Currently inhabited Tribal Villages: Brevig Mission, Diomedes, Elim, Gambell, Golovin, Koyuk, Nome, Savoonga, Shaktolik, Shishmaref, Saint Michael, Stebbins, Teller, Unalakleet, Wales, White Mountain.

Traditional villages (no full-time residents): Council, King Island, Mary's Igloo, Solomon. However, it should be noted that both Mary's Igloo and Solomon currently have plans to reestablish their communities and bring back residents.



Figure 2: Bering Strait Region Map – Energy Projects in Communities



Regional Background



3. Regional Background

3.1. Bering Strait Region

The Bering Strait Region lies in northwestern Alaska, encompassing a vast and rugged landscape that stretches across the Seward Peninsula, coastal lands along Norton Sound, and three offshore islands—St. Lawrence Island, Little Diomedé, and King Island. Covering more than 23,000 square miles, the region includes 570 miles of coastline along the Bering Sea, Chukchi Sea, and Norton Sound. The region is home to 20 Tribal Villages, some without full-time populations and others ranging in population from fewer than 100 residents in Little Diomedé to over 3,500 in Nome, the regional hub. Most residents are Iñupiat, Central Yup'ik, or Siberian Yupik Alaska Native people whose ancestral ties to the area span thousands of years.

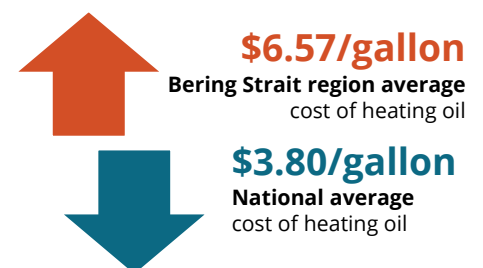
The Bering Strait landscape is defined by tundra, mountains, permafrost, wetlands, and a sparse distribution of isolated villages. The terrain ranges from low-lying marshes to rugged mountains exceeding 4,000 feet. Continuous permafrost underlies much of the region, creating significant challenges for construction and infrastructure maintenance. The region experiences a transitional climate, with summer temperatures averaging 30–50°F and winter temperatures commonly dropping below -30°F. Sea ice and storm-driven erosion pose increasing risks to community infrastructure.

Remoteness shapes nearly every aspect of life in the region. No road network connects the communities, and transportation relies heavily on air service and summer barge deliveries. The brief shipping season—generally from June through October—is the only window to deliver fuel and bulk goods by sea. Outside this period, all cargo, including heating oil and food, must be flown in, significantly increasing costs. This isolation, combined with harsh weather and logistical constraints, makes energy development and project implementation especially complex.

The population of the Bering Strait Region is approximately 9,600 residents, with about three-quarter (76%) identifying as Alaska Native. Many communities are small and tight knit, with populations under 500. Over the past five years, most villages have experienced population decline, reflecting broader statewide rural outmigration trends. The region's age distribution skews young, but like many parts of Alaska, the working-age population is slowly declining, and the proportion of residents over 65 is increasing.

Each community is governed by a combination of city governments, tribal councils, and Alaska Native village corporations. Local leadership plays a critical role in economic development, energy planning, and infrastructure management. Despite economic challenges, subsistence activities—such as fishing, hunting, and gathering—remain a cornerstone of life, both culturally and economically.

The Bering Strait Region faces some of the highest energy costs in the United States. Residents and businesses alike rely almost entirely on diesel fuel for electricity generation and heating. Most (12 of 16) communities in the Bering Strait region reported into the Alaska Division of Community and Regional Affairs (DCRA) “Alaska Fuel Price Report: Winter 2025.” The highest cost of heating oil reported among these communities was St. Michael at \$7.99/gallon; the lowest was Brevig Mission at \$5.48/gallon. The average cost of heating oil for these twelve Bering Strait communities was \$6.57/gallon. This regional average indexes very closely with the DCRA statewide average heating oil price of \$6.58/gallon. For comparison, at the time the data was collected, the



national average price of heating fuel was just less than 60% of that average, at \$3.80/gallon. Electricity rates, even after Power Cost Equalization (PCE) support, remain high and limit the viability of electrification or expanded economic activity.

Aging infrastructure is another critical challenge. Many power plants, distribution systems, homes, and public buildings are outdated, inefficient, and vulnerable to extreme weather. The cost of maintaining and upgrading energy systems is exacerbated by logistical barriers and limited availability of trained personnel in rural communities. In many villages, the lack of a skilled local energy workforce leads to high turnover and delayed maintenance, increasing operational costs and the risk of system failure.

3.2. Demographics

Understanding the demographics of the Bering Strait Region is essential to shaping appropriate, efficient, and sustainable energy strategies. Demographic data provides insight into how energy is used, what infrastructure is needed, and how best to deliver services in a way that supports affordability, equity, and long-term resilience. Population size, household characteristics, economic conditions, and cultural traditions all influence energy demand, system design, and community readiness for new energy technologies or efficiency initiatives.

Population Statistics

The Bering Strait Region has a population of approximately 9,600 people across 16 inhabited communities, with Nome as the regional hub. Community sizes range from fewer than 100 residents (e.g., Diomede) to over 3,500 in Nome. More than three-quarters (76%) of the region's residents identify as Alaska Native, primarily Iñupiat, Central Yup'ik, and Siberian Yupik. Most communities have seen gradual population decline over the past decade, following broader trends of rural outmigration in Alaska. Specific populations in 2010, 2020, and 2024 are as follows:

Table 1: Bering Strait Region Population 2010-2024

	2010	2020	2024
Nome Census Area	9,492	10,046	9,651
Brevig Mission	388	428	432
Diomede	115	83	66
Elim	330	366	341
Gambell	681	640	645
Golovin	156	175	186
Koyuk	332	312	329
Nome	3,598	3,699	3,422
St. Michael	401	456	472
Savoonga	671	835	816
Shaktolik	251	212	205
Shishmaref	563	576	583
Stebbins	556	634	676
Teller	229	249	233
Unalakleet	688	765	697
Wales	145	168	109
White Mountain	190	185	212
Other	174	263	227

Source: [Alaska Population Estimates](#), Alaska Department of Labor and Workforce Development (DOLWD)

The Nome Census Area grew from 2010 to 2016, after which the population declined until 2023 when it started to flatten out, as seen in the graph below:

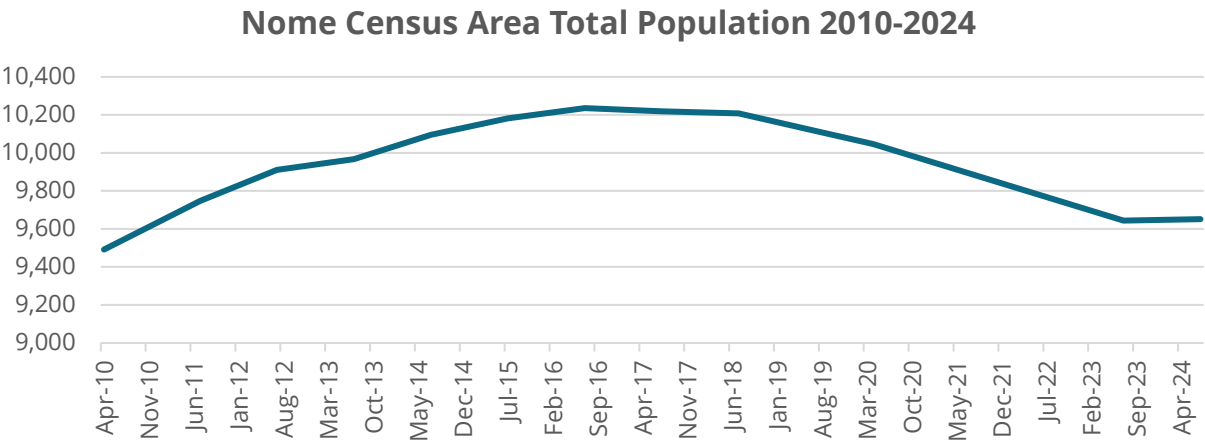


Figure 3: Nome Census Area Total Population 2010-2024

Although the overall census area population declined by 4% in the past decade, population trends vary by individual community. The communities that have experienced the largest overall population declines from 2014-2024 are Diomedede, Shaktoolik, and Wales, with 20-37% declines, followed by Teller, Unalakleet, Nome, and Gambell, with 8-11% declines. The only community in the region that experienced significant population growth during this period was Stebbins, with 9% population growth, as seen in the below chart:

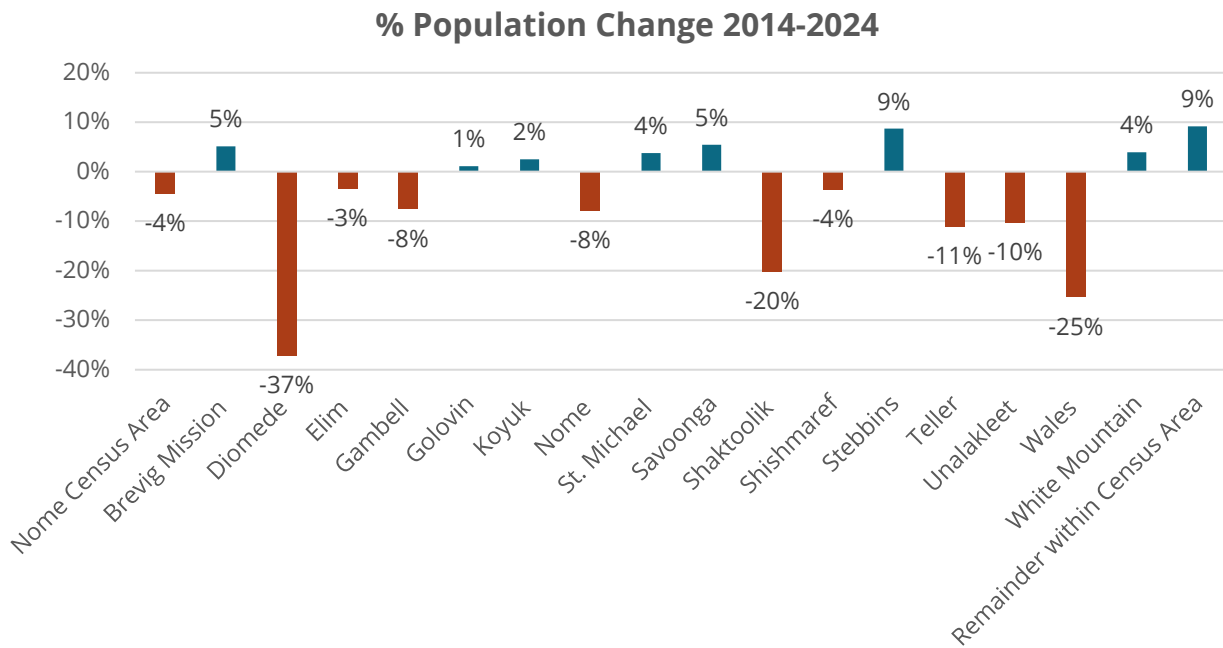


Figure 4: Percent Population Change 2014-2024

Nome census area age range

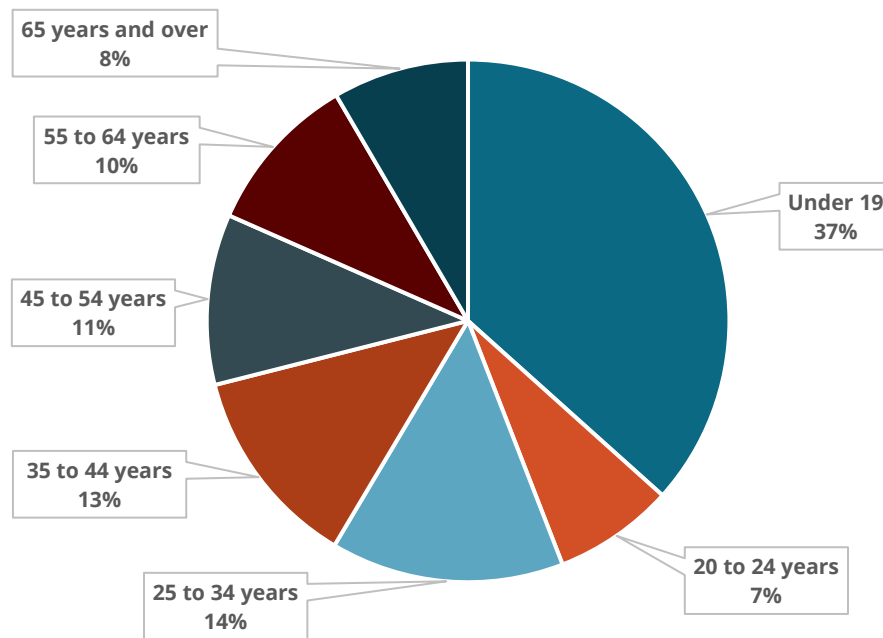


Figure 5: Nome Census Area Age Range (2023 ACS 5-year Estimates)

Youth make up a large share of the population, with more than a third (about 35%) of residents under the age of 19, while the senior population is growing. This age distribution has direct implications for workforce development and long-term energy resilience planning. Though the region is predominantly Alaska Native, the next largest racial demographic is White (14.1%) followed by Two or More Races – White and American Indian/Alaska Native (5.1%). All other racial demographics represent less than 1% of the region's population.

Nome census area race demographics

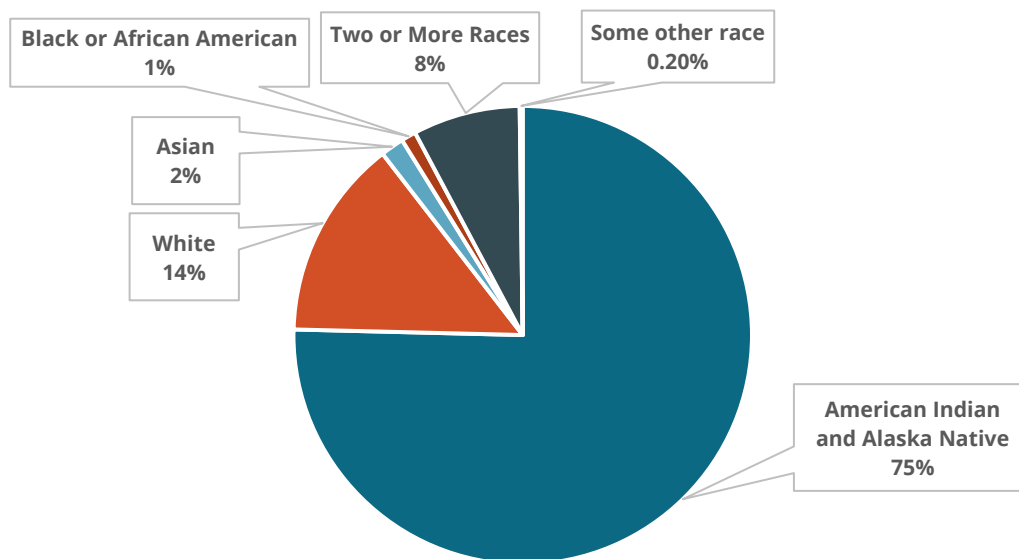


Figure 6: Nome Census Area Race Demographics (2023 ACS 5-year Estimates)

Household Characteristics

The Bering Strait Region faces a complex intersection of demographic pressures and housing conditions that significantly impact energy use and planning. With nearly 30% of households experiencing overcrowding, the region ranks among the most overcrowded in Alaska. Non-hub communities face especially high rates of overcrowding and severe overcrowding. Overcrowded homes typically require more heating and lighting per square foot, resulting in higher overall energy consumption.

Housing stock across the region is largely outdated and inefficient. Over 40% of homes were built before 1980 and have not received energy retrofits, and about 11% of homes are classified as “1-star”—using up to four times more energy than homes built to modern standards. Energy costs are among the highest in the state and nation, with average annual home energy expenses reaching \$6,420, which is 1.5 times the Alaska average and nearly triple the national average. Combined with a lower-than-average median household income and high energy burden, these demographic and structural factors underscore the urgent need for targeted energy efficiency upgrades, housing weatherization, and culturally appropriate energy planning.

Overcrowding and aging housing stock lead to elevated energy consumption per square foot and amplify the need for energy-efficient design, retrofits, and heating systems that can accommodate multiple occupants in extreme cold.

Economic Indicators

Economic conditions in the Bering Strait Region make energy affordability a central concern. With high fuel prices, expensive imports, and aging housing stock, the cost of living is significantly higher than in most other parts of Alaska. While regional programs like Power Cost Equalization (PCE) help offset electricity costs, many residents still pay a disproportionate share of their income on energy—especially for heating fuel and transportation, which are not covered by the PCE program (AHFC, 2018; CEDS, 2025–2030). In the Nome Census Area, the median household income was approximately \$63,977 in 2022 (ACS 2022 5-Year Estimates, as cited in CEDS, 2025–2030). Despite this, about 30% of households are considered cost burdened, spending more than 30% of their income on housing-related expenses, including utilities (AHFC, 2018). The average annual home energy cost in the region was estimated at \$6,420 in 2018—2.8 times the national average at the time (AHFC, 2018). For lower-income households in particular, this translates into an energy burden of up to 20-30%, meaning a substantial portion of income is required just to maintain basic energy needs (calculated from AHFC 2018 energy costs and ACS 2022 income data, as cited in CEDS, 2025–2030).

The impacts of high energy costs are not evenly distributed across the region. Smaller and more remote communities often have lower household incomes but face similar or higher energy costs compared to larger hub communities like Nome. The table below illustrates this disparity by comparing median household income and estimated annual energy costs in several communities across the region. It also shows the estimated energy burden—defined as the percentage of household income spent on energy—which highlights the disproportionate impact on lower-income households. This is compared to the average U.S. household, which spends about 3-4% of its income on energy costs.

Table 2: Income vs. Energy Costs in Selected Communities

Community	Median Household Income (2023)	Est Annual Household Energy Cost (2023-24)*	Est Energy Burden (% of income)
Brevig Mission	\$55,000	\$7,609	14%
Golovin	\$63,750	\$6,510	10%
Koyuk	\$34,250	\$8,173	24%
Nome	\$113,561	\$5,326	5%
St. Michael	\$56,250	\$2,012**	4%
Savoonga	\$51,875	\$7,842	15%
Shishmaref	\$56,875	\$6,380	11%
Stebbins	\$48,333	\$7,817	16%
Teller	\$42,500	\$6,059	14%
Unalakleet	\$86,250	\$4,146	5%
Wales	\$38,125	\$15,777	41%
White Mountain	\$56,563	\$5,027	9%
Regional Avg.	\$58,611	\$6,890	14%

*(Effective Residential Rate (per kWh) x Residential kWh sold) + (Average Price of Fuel x Fuel Used (gallons)) / Residential Customers. Source: Alaska Energy Authority, "FY 2024 Power Cost Equalization Program Statistical Report"

**Only electricity (no fuel data for St. Michael)

Implications for Energy Planning

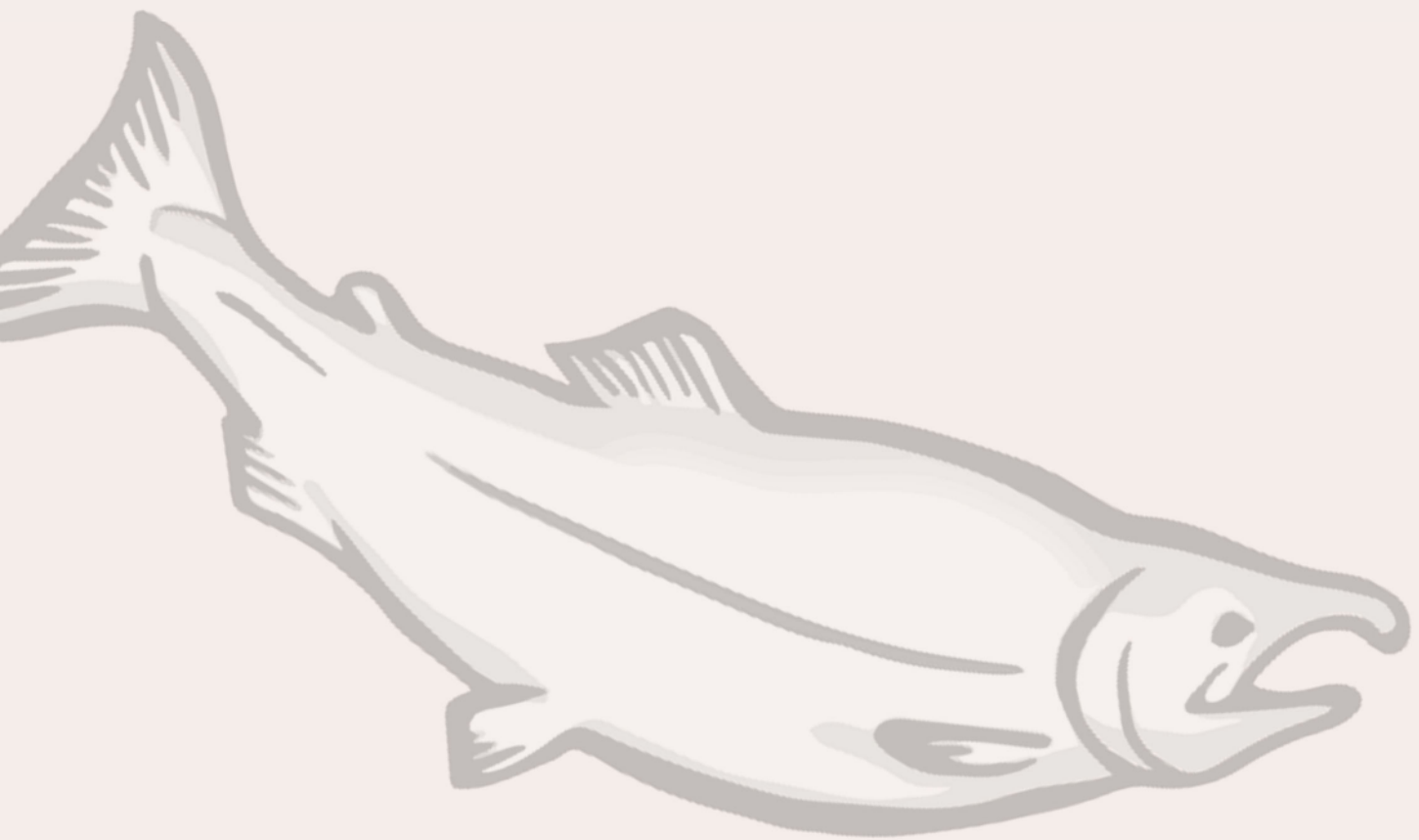
Demographic and economic conditions in the Bering Strait Region present both challenges and opportunities for energy planning. High energy burdens, overcrowded and aging housing, and limited incomes make affordability and efficiency critical concerns. At the same time, a young population, strong local governance, and cultural knowledge offer a foundation for developing community-led, resilient energy systems.

Population trends highlight the need for right-sized, modular energy infrastructure—especially in communities with stagnant or declining populations. A growing senior population increases the need for efficient, healthy housing. Overcrowding and housing shortages drive up energy use and reinforce the need to integrate energy planning with housing development.

The region's youth population presents an opportunity to build a local energy workforce. Training in efficiency, operations, and clean energy technologies can create jobs and reduce reliance on outside contractors.

Energy planners should consider:

- **Population shifts and climate change:** Smaller, modular and mobile systems for shrinking communities and to protect against climate change impacts, and efficient housing for seniors.
- **Workforce potential:** Invest in training local youth for energy-related jobs.
- **Energy burden and equity:** Prioritize low-income, high-cost communities for retrofits and subsidies.



Energy Landscape



4. Energy Landscape

4.1. Regional Energy Production & Consumption

Energy use in the Bering Strait Region is dominated by three primary sectors: power generation, space heating, and transportation. Each of these is heavily reliant on imported fossil fuels, particularly diesel. Diesel is used almost exclusively for electricity generation and heating, while gasoline is commonly used for light-duty vehicles, snowmachines, and boats. Although renewable energy sources—such as wind, solar, and heat recovery—have begun to offset a small share of diesel use in several communities, overall reliance on diesel remains high.

Understanding how much diesel fuel is used across the region is essential for identifying and quantifying opportunities to reduce consumption, lower costs, and transition to more sustainable energy alternatives. Of the three major uses, diesel fuel consumption for electricity generation is the most well-documented. This is due to the reporting requirements tied to the State of Alaska's Power Cost Equalization (PCE) program, which requires utilities to submit monthly fuel use and generation data to receive reimbursement.

Heating fuel accounts for nearly two thirds of diesel usage in the Bering Strait region, as measured by total gallons used. Electricity generation from diesel accounts for approximately one quarter of energy use, with the remainder used for transportation. This breakout is represented in the chart below:

Gallons of Fuel Used by Sector

 = 1 million gallons

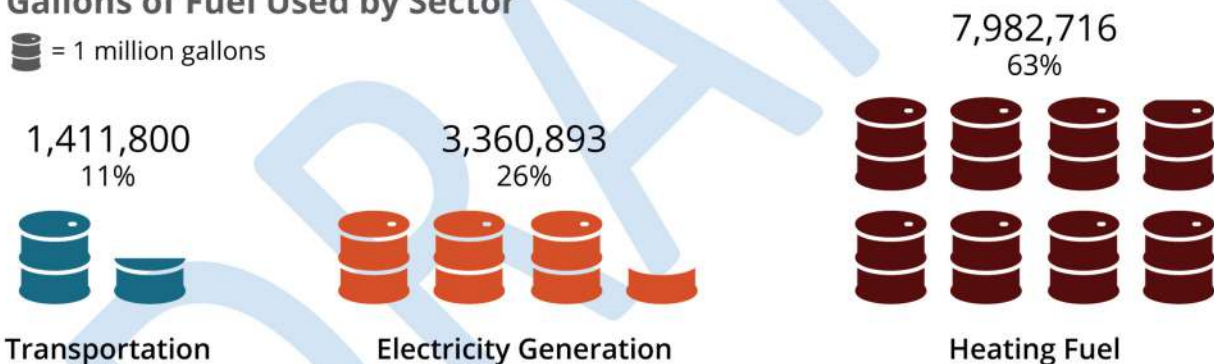


Figure 7: Gallons of Fuel Used by Sector

The table below presents a snapshot of community-level energy costs across the Bering Strait Region for 2023 and 2024. It includes electricity rates both before and after PCE subsidies, along with the most recently reported prices for heating fuel and unleaded gasoline. These figures illustrate the significant variation in energy costs across communities. Pre-PCE electricity rates range from \$0.46 to \$0.72 per kilowatt-hour, and heating fuel prices vary from \$4.45 to over \$8.00 per gallon. This variation reflects logistical challenges such as barge access, fuel storage capacity, and delivery costs, which are often higher in remote or hard-to-reach communities. These persistent cost disparities are a major driver of household energy burden in the region and serve as a critical factor in prioritizing energy projects, planning for infrastructure improvements, and targeting funding to the communities with the greatest need.

Table 3: Community Energy Costs; Source: AEA, 2023; and DCRA, 2024.

Community	Electric Cost – Pre PCE (\$/kWh)	Electric Cost – Post PCE (\$/kWh)	Heating Fuel (\$/gallon)	Unleaded Gasoline (\$/gallon)
Elim	\$0.72	\$0.26	N/A	N/A
Shishmaref	\$0.70	\$0.25	\$4.94	\$5.29
Gambell	\$0.68	\$0.27	\$6.70	\$6.70
Savoonga	\$0.68	\$0.25	\$6.70	\$6.90
Wales	\$0.68	\$0.25	\$6.38	\$6.89
Koyuk	\$0.67	\$0.25	\$6.34	\$5.68
Shaktoolik	\$0.66	\$0.27	N/A	N/A
Diomede	\$0.65	\$0.27	N/A	N/A
Stebbins	\$0.63	\$0.25	\$8.09	\$7.02
St. Michael	\$0.63	\$0.25	\$7.99	\$7.02
Unalakleet	\$0.63	\$0.32	\$6.03	\$5.74
Golovin	\$0.56	\$0.33	\$5.85	\$5.95
White mountain	\$0.55	\$0.22	\$5.78	\$5.25
Teller	\$0.70	\$0.26	\$7.16	\$6.44
Brevig Mission	\$0.51	\$0.25	\$4.45	\$4.75
Nome	\$0.46	\$0.28	N/A	N/A

4.1.1. Heating Fuel

Space heating is the largest single end-use of energy in the Bering Strait Region and one of the most significant contributors to high household energy costs. Heating fuel—primarily diesel (No. 1 fuel oil)—is used almost universally across the region for residential and community building heat. The majority of households rely on small, direct-vent oil heaters such as Toyostoves, which are cost-effective to install but can be inefficient in older, drafty homes.

According to the 2015 Bering Strait Regional Energy Plan, approximately 75% of space heating in the region is fueled by oil, 23% by wood, and only 2% by electricity. Wood use, particularly driftwood and spruce, supplements heating in communities with access to forest or beach resources. However, logistical constraints limit the feasibility of using alternative fuels at scale.

Fuel costs remain a central concern. The 2024 DCRA Fuel Price Survey reports that heating oil prices in the region range from \$4.45 per gallon in Brevig Mission to \$8.09 per gallon in Stebbins, with an overall trend of increasing prices across communities. These high prices are driven by multiple factors: shallow harbors requiring fuel to be transshipped from Nome, the need for multiple transfers from bulk tanks to homes (each adding cost), and limited economies of scale in purchasing and delivery. Alaska’s Low Income Home Energy Assistance Program (LIHEAP) is crucial due to these exorbitant costs in a region with extreme weather.]

Accurate fuel use data for heating is often difficult to collect because it is not measured when it is consumed, and fuel providers do not publicly share their delivery data. Surveys across the state have concluded that a “typical” rural Alaska village energy distribution is approximately twice as much fuel consumed for heating as compared to electricity. Using this methodology, we estimate that diesel fuel for heat for the entire region is approximately 3.2 million gallons annually.

Data from the AHFC 2018 Nome Census Area Housing Assessment confirms the high energy intensity and cost of heating:

- The average single-family home consumes 161 million BTUs/year, with annual energy costs averaging \$6,420—the highest in the state.
- The cost of heat, normalized per unit of energy, averages \$37.48 per million BTUs, which is 2.4 times the statewide average and 1.7 times the national average.

These challenges are compounded by aging housing stock, limited insulation, and high rates of overcrowding, all of which contribute to higher per capita fuel use. Strategies to reduce heating fuel dependence include weatherization, heat recovery systems, and exploration of community-scale renewable heat systems where viable.

The below table presents estimated annual fuel use for space heating across Bering Strait Region communities, broken down by residential use, community facilities, and other non-residential or institutional buildings. These estimates were developed using proxy calculations based on PCE residential customer counts and standard planning assumptions. Residential fuel use is calculated using a baseline of 1,163 gallons per household per year, derived from energy intensity data in the AHFC 2018 Nome Census Area Housing Assessment. Fuel use for community facilities and other buildings is estimated based on 2 times the amount of diesel fuel required to produce electricity for these customer classes, using utility-reported data as a proxy for relative energy demand. While exact heating fuel use varies by building age, condition, and heating system type, these estimates provide a useful basis for understanding the overall scale of diesel demand for heating in the region. Total estimated heating fuel use across the region exceeds 7.9 million gallons per year, with Nome accounting for more than half of that total.

Table 4: Estimated Fuel Usage for Space Heating by User Type (Gallons/Year)

Community	Residential	Community Facilities	Other
Brevig Mission	98,855	37,480	52,632
Diomedede	36,053	2,756	52,336
Elim	103,507	34,235	53,899
Gambell	194,221	47,752	82,589
Golovin	56,987	25,832	76,776
Koyuk	97,692	32,543	55,090
Nome	2,058,510	416,705	2,109,862
Savoonga	187,243	99,322	109,778
Shaktoolik	76,758	18,430	38,188
Shishmaref	177,939	55,639	102,779
Stebbins & St Michael	163,983	100,953	123,872
Teller	81,410	28,662	46,082
Unalakleet	320,988	53,142	216,384
Wales	34,890	30,818	27,547
White Mountain	80,247	20,041	61,309
Subtotals	3,769,283	1,004,311	3,209,122
Total			7,982,716

4.1.2. Electricity

All communities in the Bering Strait Region operate as isolated microgrids, with no connection to a larger transmission network. Only two communities – Stebbins and St. Michael – are connected by an approximately 10 mile long intertie. These microgrids are typically powered by diesel generators, which provide nearly all the region's electricity. Despite increasing interest in renewable energy, diesel remains the dominant generation source due to its reliability and the lack of alternative infrastructure.

Electricity generation and fuel use vary by community, but most systems are community-scale, managed by a municipal or cooperative utility. Each utility is required to report electricity production and fuel consumption data through the Power Cost Equalization (PCE) program, which helps lower the effective cost of electricity for residential and community facility users in eligible rural communities.

The table below summarizes key electricity metrics for communities in the region, including gallons of diesel used for electricity generation, total electricity generated (kWh), non-diesel generation (where applicable), and the number of customer accounts across residential, community facility, and non-PCE users.

Table 5: Electricity Generation and Customer Summary, Bering Strait Region (2023)¹

Community	Diesel Fuel Used (Gal)	Total Generation (kWh)	Non-Diesel Generation (kWh)	Residential Customers	Community Facility Customers	Other Customers
Brevig Mission	85,031	1,311,665	0	85	8	32
Diomedea	42,342	398,824	0	31	2	13
Elim	77,504	1,283,789	0	89	10	42
Gambell	117,414	2,383,607	263,534	167	14	36
Golovin	78,998	891,267	0	49	11	48
Koyuk	75,770	1,231,774	0	84	9	38
Nome	1,878,311	30,496,479	1,866,796	1,770	82	391
Savoonga	185,776	2,448,001	6,909	161	10	55
Shaktolik	54,822	1,074,903	210,702	66	4	34
Shishmaref	146,956	1,825,251	0	153	9	47
Stebbins & St Michael	226,347	1,681,280	0	141	11	40
Teller	62,724	877,597	0	70	7	35
Unalakleet	215,274	3,744,793	639,194	276	24	89
Wales	41,072	857,260	0	30	5	31
White Mountain	72,552	848,618	0	69	8	28
Total	3,360,893	51,355,108	2,987,135	3,241	214	959

¹ AEA PCE Statistical Report FY2023

Diesel and Non-Diesel Electricity Generation in Communities Using Renewable Energy

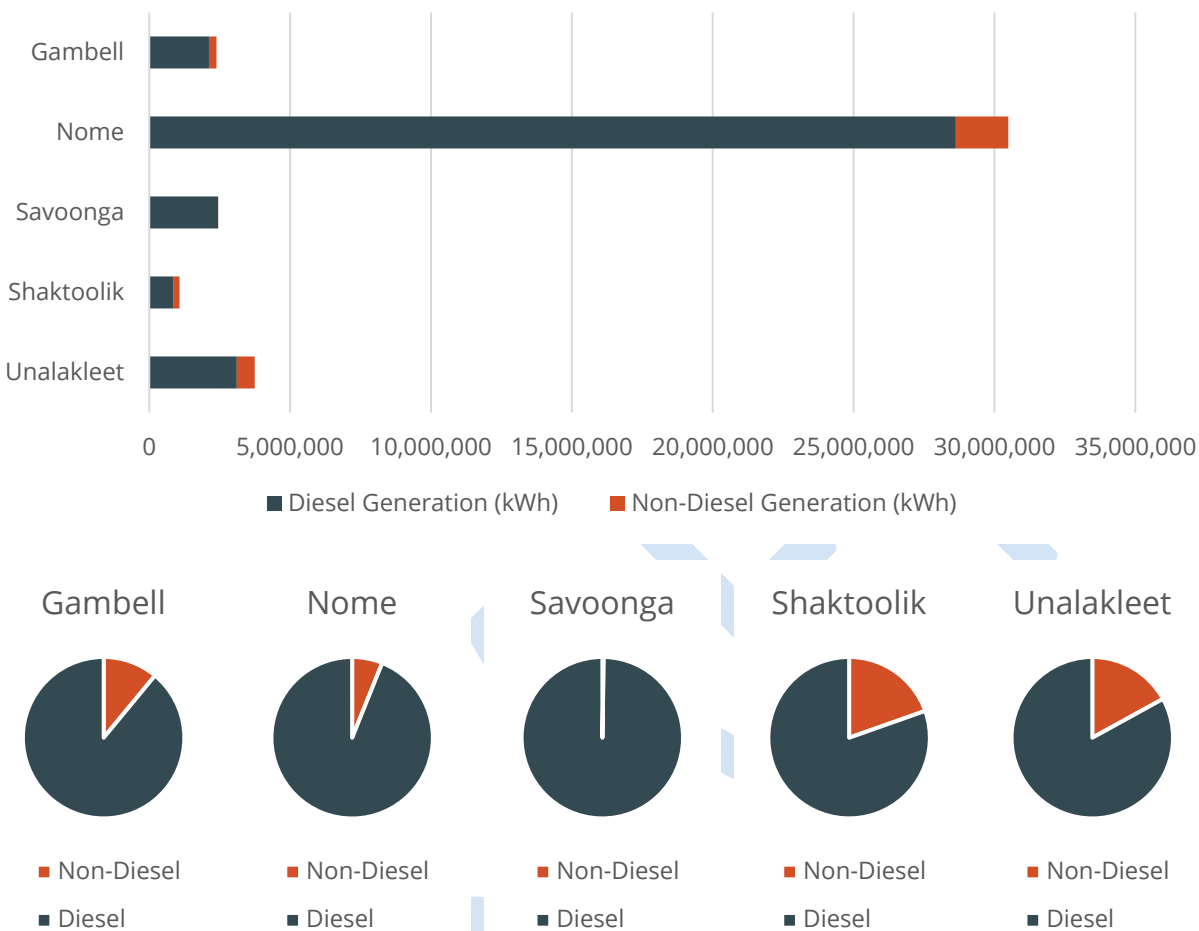


Figure 8: Percent of Diesel and Non-Diesel Electricity Generation in Communities Using Renewable Energy

While diesel generation continues to dominate, six communities have incorporated renewable energy systems. For example, Unalakleet and Nome have integrated wind generation, contributing over 600,000 and 1.8 million kWh respectively of non-diesel electricity in 2023. Similarly, Shaktoolik and Gambell also reported measurable non-diesel generation through wind or hybrid systems. While these contributions remain a small share of the total generation, they demonstrate the region's growing ability to implement clean energy technologies.

In addition to residential loads, communities have substantial demand from public and institutional users such as schools, clinics, water plants, and washeterias. These are categorized as community facility customers, with electricity use often exceeding that of residential users in smaller villages. There is also significant electricity demand from non-PCE-eligible customers, such as stores, local businesses, and some tribal operations.

While detailed energy usage profiles are provided in the community dashboards in the appendices, this summary provides a regional overview of electricity production, fuel use, and customer

structure that informs both cost analysis and planning for renewable integration and energy efficiency opportunities.

4.1.3. Transportation

Transportation is one of the three primary energy use sectors in the Bering Strait Region, alongside power generation and space heating. Unlike road-connected areas, transportation in the region is largely local and seasonal, relying on snowmachines, boats, all-terrain vehicles (ATVs), and limited use of light-duty trucks. These modes are critical for everyday mobility and subsistence activities such as hunting, fishing, and inter-village travel. Gasoline and diesel are the primary fuels used for these purposes, all of which must be imported into the region.

To estimate fuel used for transportation, this plan applies a standard per capita use rate of **150 gallons per person per year**, based on rural Alaska benchmarks supported by the Denali Commission and other energy planning efforts. This estimate captures typical household and subsistence-related use across roadless communities. Using this method and 2023 population data (DOWLD, 2019-2023), total transportation fuel use across the region is estimated at approximately **1.41 million gallons per year**. The figures in the table below represent an approximation of personal and subsistence-related fuel use and help illustrate the scale of fuel demand across communities of different sizes and access conditions. While actual usage may vary, this planning-level estimate offers a useful reference point for understanding energy.

Table 6: Estimated Fuel Use for Transportation

Community	Population	Estimated Fuel Use (Gal/Year)
Brevig Mission	428	64,200
Council	0	-
Diomedede	75	11,250
Elim	358	53,700
Gambell	630	94,500
Golovin	184	27,600
King Island	0	-
Koyuk	308	46,200
Mary's Igloo	0	-
Nome	3506	525,900
Savoonga	838	125,700
Shaktoolik	207	31,050
Shishmaref	579	86,850
Saint Michael	435	65,250
Solomon	0	-
Stebbins	631	94,650
Teller	225	33,750
Unalakleet	685	102,750
Wales	112	16,800
White Mountain	211	31,650
Total		1,411,800

In addition to personal transportation fuel, other forms of transport—including aviation and marine shipping—are also major fuel users in the region. Regular passenger and cargo flights contribute to significant aviation fuel demand, particularly in hub communities, though precise usage data is limited. Marine vessels, including fuel barges and freight deliveries, also consume large amounts of diesel in transit to and within the region, but these quantities are typically not captured in local energy reporting.

While less data is available for these commercial or infrastructure-related fuel uses, their contribution to the region's overall energy footprint is substantial. Improving data collection in future planning cycles could support more complete assessments and identify new opportunities for fuel efficiency or alternative technologies in both personal and freight transportation.

4.1.4. Bulk Fuel Storage

Reliable bulk fuel storage is essential to the energy security of the Bering Strait Region. With nearly all heating, electricity generation, and transportation dependent on imported diesel or gasoline, communities must carefully manage fuel deliveries, storage capacity, and fuel quality throughout the year. Seasonal access—limited primarily to ice-free summer months—requires careful logistical coordination to ensure that communities have enough fuel to last through the long, isolated winters.

Most communities in the region receive their bulk fuel shipments via barge during the summer. In some cases, fuel is first shipped to Nome and then transferred to smaller vessels capable of navigating shallow village harbors. Every transfer point adds cost; in addition, any delays in delivery or problems with fuel quality can have serious impacts on heating and power reliability.

Larger communities and utilities with greater purchasing power can sometimes negotiate lower rates or take advantage of early-season pricing. However, smaller or more isolated villages may be locked into high prices due to smaller fuel orders, late deliveries, or limited bargaining leverage. Price volatility in global fuel markets also makes it difficult for communities to budget or plan ahead, especially when prices fluctuate between the time of order and delivery.

Collaborative purchasing and shared storage infrastructure—such as a utility collaborative—could help drive down fuel costs by pooling demand and improving access to bulk rates. However, aligning timing, governance, and infrastructure remains a challenge. Some villages are exploring regional partnerships to increase negotiating power and reduce freight costs through coordinated fuel purchasing.

Across the region, many fuel tank farms are aging and in need of repair or replacement. Piping systems, containment berms, and loading/unloading infrastructure are often outdated, increasing the risk of spills, contamination, or failure. Several storage facilities are also vulnerable to climate change impacts, including erosion and thawing permafrost, which threaten their foundations and structural integrity. Identifying and addressing these vulnerabilities will be essential for maintaining energy security and reducing fuel-related risks in the coming decades. Expanded storage capacity may also enable communities to take better advantage of seasonal pricing or bulk orders—particularly when paired with strong financial and operational management.

In the table below, for context, Alaska Energy Authority's best facility score statewide is 45, and their worst score is 930. AEA's facility score is a score used to compare utility facility needs, the higher the score, the highest the needs for improvement.

Table 7

Community	Ownership	Capacity (gal)	Total Facility Score	Notes
Elim	Native Store Tank Farm	147,000	255	
	City Tank Farm	27,000	230	
	School Tank Farm	45,000	195	
	AVEC Tank Farm	162,000	95	
Shishmaref	AVEC Power Plant	162,117	370	Rank 35
	Native Store Tank Farm	150,000	250	
	School Tank Farm	54,000	230	
Gambell	AVEC	231,831	185	
	School Tank Farm	40,722	180	
Savoonga	Savoonga City Bulk Fuel Tank Farm	303,000	290	
	Savoonga School Tank Farm	84,000	275	
Wales	Native Village of Wales	97,500	540	Rank 10: Replacement and Upgrade Project (AVEC, ANTHC) 2026 - 2027
	School Tank Farm	48,400	385	
	AVEC Power Plant	71,375	245	
Koyuk	Koyuk Tank Farm	432,000	285	
Shaktoolik	School Tank Farm	53,500	270	
	AVEC Tank Farm	98,327	215	
	Shared Tank Farm	178,996	150	
Diomedea	N/A	N/A	N/A	Maintenance and improvement project - Summer 2025
Stebbins	Tapraq Fuel Company Tank Farm	370,000	215	
	AVEC Power Plant	410,000	135	
Saint Michael	ARUC WTP Tanks and City Fleet	25,000	530	Native Corp. planning new facility
	School & AVEC Backup Gen.	90,000	235	
Unalakleet	N/A	N/A	N/A	
Golovin	City Tank Farm	199,600	210	
White Mountain	White Mountain Tank Farm	276,000	45	
Teller	Native Fuel Depot Tank Farm	61,000	400	Rank 23 M&I Planned AEA
	James C. Isabell School Tank Farm	63,000	355	
	AVEC Power Plant	108,000	140	
Brevig Mission	Corporation Tank Farm	195,429	340	M&I Planned AEA
	Water Plant	32,053	270	
	City of Brevig Mission Tank Farm	6,000	170	
	School Tank Farm	54,014	145	
	Head Start Program	5,000	145	
	AVEC Tank Farm	135,000	110	
Nome	N/A	N/A	N/A	

Source: Alaska Energy Authority, **Chris McConnell**, AEA Rural Programs Manager, email to curtis@agnewbeck.com dated May 7, 2025. Updated September 2026 Kawerak Energy program.

4.2. PCE Subsidy by Community

The Power Cost Equalization (PCE) program plays an important role in reducing the cost of electricity for residents and community facilities across the Bering Strait Region. Administered by the Alaska Energy Authority (AEA), the PCE program subsidizes rural electric utilities to lower the price of electricity for eligible users, including households and certain public institutions.

Most Bering Strait communities rely heavily on PCE to offset the high cost of diesel-generated power. However, the degree to which communities benefit from the program depends on how well utilities report customer classifications, fuel usage, and power generation. Inaccurate or incomplete reporting can result in underutilization of the available subsidy.

Opportunities for Maximizing PCE

Recent audits and technical assistance efforts have identified areas where communities can improve PCE outcomes. For example, in 2018, Kawerak and DeerStone Consulting worked with the City of Brevig Mission to identify unreported community facilities and clarify PCE-eligible accounts. These changes resulted in annual savings of more than \$10,000 in electricity bills for the community.

Other communities, such as Diomedes, have received technical support to improve their utility management and PCE reporting processes. These efforts underscore the importance of continuous utility training and external support to maximize PCE benefits.

Improving PCE Reporting Regionwide

Several villages in the region may still be missing out on PCE benefits due to:

- Misclassified customers (e.g., community facilities listed as commercial)
- Incomplete monthly fuel usage reporting
- Lack of technical support for small or volunteer-run utilities

Improved training, data management, and third-party technical assistance could help close these gaps and increase the flow of subsidies into the region, helping to lower energy burdens for households and public services.

Integrating Renewables and IPP Models

As more communities explore renewable energy and Independent Power Producer (IPP) models, ensuring compatibility with PCE will be essential. Historically, PCE has only covered eligible costs from utilities, but future changes may allow IPPs (such as those operating solar, wind, or heat recovery systems) to participate while still preserving subsidies for ratepayers. AEA and the Regulatory Commission of Alaska (RCA) are actively reviewing rule changes to support evolving utility models and energy innovations. A recent example of this evolution is the EPA Community Change Grant, which funded feasibility and conceptual design for community-scale solar PV and battery energy storage (BESS) systems in five communities: Brevig Mission, Teller, Elim, Koyuk, and Savoonga. These systems are designed to be owned and operated by Tribes as IPPs, generating local revenue through power purchase agreements with AVEC. The project supports a just transition by reducing diesel reliance, stabilizing electricity costs, improving grid reliability, and redirecting energy dollars into community services like water and sewer. It also builds Tribal capacity through workforce development and technical training. Although the grant is currently funded, the Trump Administration has targeted the program for cancellation—threatening to halt progress on innovative, community-led models that build energy independence and climate resilience in Alaska's most economically distressed villages. The EPA Community Change grant was terminated in 2024, however the communities have continued to plan for these systems through the Community



Microgrid Assistance Partnership program, and the Native Village of Elim was awarded the Alaska Renewable Energy Fund Round 18 funding to support their program.

Impacts of Heat Recovery on PCE

Some communities that sell recovered heat from power plants or other facilities must balance those revenues with PCE eligibility rules. In some cases, recovered heat sales have reduced the utility's electricity sales, inadvertently reducing their PCE payments. Ongoing discussions with the RCA may lead to policy updates that better reflect the role of integrated systems like heat recovery, and regional energy leaders—including Connie Fredenberg—are helping to clarify these dynamics and advocate for supportive regulations.

DRAFT



Regional Alternative Energy Analysis



5. Regional Alternative Energy Analysis

5.1. Energy Efficiency

Improving energy efficiency across the Bering Strait Region remains the single most cost-effective strategy for lowering energy costs, reducing greenhouse gas emissions, and enhancing energy resilience. Diesel fuel powers almost all electricity and heating systems, and the region's reliance on aging and inefficient infrastructure results in high energy consumption and high energy burden for households and community institutions.

Energy efficiency measures are not only technically feasible but have been clearly prioritized in both Regional Energy Planning Efforts and the 2024 Priority Climate Action Plan (PCAP).

Behavioral energy efficiency programs, such as EnergyWise or community energy challenges, can yield 10–15% reductions in electricity use through simple changes in household habits. These efforts are especially effective when paired with hardware upgrades and community outreach. Integrating energy education into schools and tribal programs builds long-term awareness and supports energy culture change.

A persistent barrier to broader energy efficiency implementation is the limited availability of trained retrofit crews in the region. The PCAP recommends building a regional weatherization team or partnering with Bering Strait Regional Housing Authority to deliver coordinated, cross-community retrofits. Investment in workforce training, equipment procurement, and project management capacity is essential to scale efficiency improvements and reduce reliance on fly-in contractors.

5.1.1. Residential Energy Efficiency

Residential buildings are the largest single contributor to community energy use for both heating and electricity. According to the 2024 PCAP, most rural homes use 815–1,163 gallons of heating oil per year and rely on diesel-generated electricity. Retrofitting these homes with improved insulation, air sealing, heating system upgrades, LED lighting, and efficient appliances can reduce heating fuel use by up to 20% and electricity use by 10% or more, according to estimates based on AHFC data and retrofit performance in other regions.

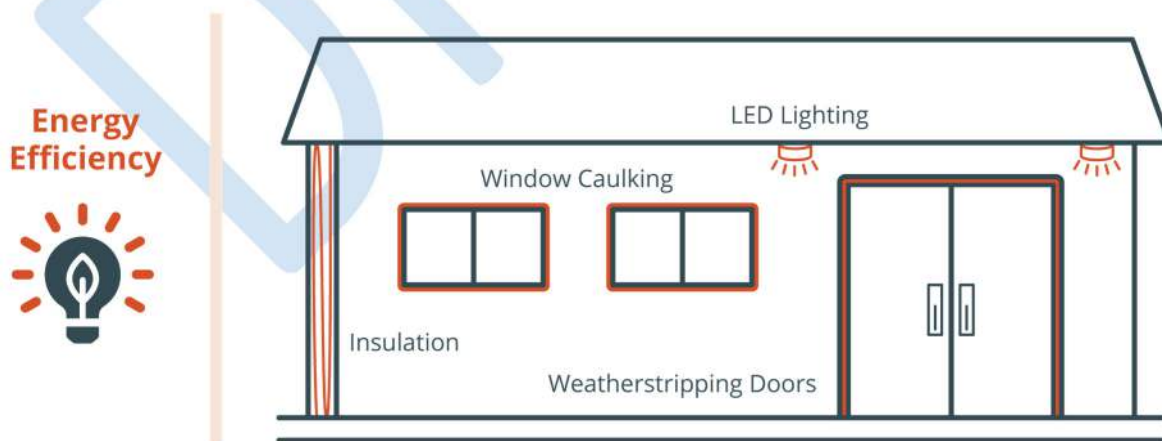


Figure 9: Energy Efficiency Methods (Agnew::Beck Consulting)

Key statistics from the PCAP include: Average retrofit cost: \$36,000 per home (2024 estimate including inflation); simple payback ranges from 12–15 years depending on energy prices; only 10% of homes in the region have received weatherization support since 2008.

The PCAP projects over 2,600 MTCO₂e in annual GHG reductions from residential retrofits alone if implemented regionwide, highlighting the climate mitigation benefits alongside cost savings.

add info on: RuralCAP weatherization program stats in the region

add info on: Village of Solomon, Nome-based Tribal Member weatherization program

5.1.2. Community and Commercial Building Efficiency

Public infrastructure—washeterias, schools, tribal offices, clinics, and water treatment plants—also consume large amounts of energy, particularly for space heating. Many facilities are large, aging, and operate with limited automation or outdated boilers and HVAC systems.

Energy efficiency retrofits in community buildings could **reduce electricity use by 10% and heating fuel by 20%**, based on statewide retrofit data

Estimated implementation cost: **\$20–25 per square foot**, or \$500,000–\$1,000,000 per village, depending on building size and scope

The PCAP estimates **1,162 MTCO₂e in annual GHG reductions** from this sector alone

5.1.3. Utility System Efficiency

Improving efficiency within the utilities themselves—through right-sized generators, updated switchgear, and better controls—can reduce diesel consumption and improve system reliability.

Utility efficiency is generally evaluated by a key metric: the number of **kilowatt-hours (kWh) generated per gallon of diesel consumed**. State benchmarks established through the Power Cost Equalization (PCE) program recommend minimum efficiencies based on the size of the system:


10.5 kWh/gal
for systems generating
<500,000 kWh annually


11.5 kWh/gal
for 500,000–
999,999 kWh


12.5 kWh/gal
for systems generating
>1,000,000 kWh annually

However, the **optimal target efficiency is 14 kWh/gal or higher**, which can be achieved through modern equipment, automation, and skilled operations.

Common issues include:

- Oversized or underloaded generators, which waste fuel during low-load operation
- Outdated switchgear and manual dispatch, limiting the ability to match generation to real-time demand
- Deferred maintenance, often due to staffing gaps or lack of parts
- High line loss in distribution systems due to aging infrastructure, oversized transformers, or metering errors.

5.1.4. Priority Actions – Energy Efficiency

The Bering Strait Region’s energy efficiency strategy encompasses three key areas: residential housing, community and commercial buildings, and utility systems. Together, these areas represent the greatest opportunity for reducing energy costs, lowering diesel fuel consumption, and improving energy resilience across Tribal Villages. The following table outlines targeted priority actions that support efficiency improvements at every scale—from homes and public facilities to microgrid infrastructure and utility operations.

Table 8

Priority Action	Description	Target Communities/Sites
Fund residential energy retrofits	Provide financial support for insulation, heating systems, lighting, and appliances in homes	Region-wide; prioritize low-income and high-energy burden villages
Develop regional retrofit implementation model	Create a mobile team or shared energy coordinator to streamline weatherization efforts	All communities, coordinated via Kawerak and BSRHA
Integrate audits into planning	Include energy audits in local energy action plans and funding proposals	Communities applying for grants or energy projects
Coordinate bundled retrofits	Combine housing, tribal, and city energy efficiency projects to lower costs	Multi-partner villages (e.g., Elim, Shishmaref, Stebbins)
Track retrofit savings	Use utility and household data to measure fuel and cost savings	Communities with recent or upcoming retrofit projects
Retrofit public buildings	Upgrade schools, clinics, washeterias, and offices for better energy performance	All villages with aging public infrastructure
Improve utility generation efficiency	Replace oversized generators, modernize controls, and reduce diesel use	Communities below PCE efficiency benchmarks
Reduce distribution losses	Address line loss, outdated transformers, and metering inaccuracies	Villages with high line loss (based on PCE data)
Build local utility O&M capacity	Train operators in monitoring, preventive maintenance, and fuel-saving operations	All utility-managed villages; start with pilot sites
Promote behavioral efficiency programs	Encourage EnergyWise-style campaigns and school-based outreach	Communities with school partners or tribal education programs

5.2. Heat Recovery

Heat recovery systems are a proven, underutilized strategy for reducing diesel heating fuel demand in the Bering Strait Region. These systems capture waste heat produced by diesel generators at community power plants and repurpose it to heat public buildings, such as schools, water treatment facilities, washeterias, and tribal or city offices. In remote, high-cost fuel environments, the impact of

displacing even modest amounts of heating oil is significant—resulting in cost savings, lower emissions, and extended fuel reserves during long winters.

How Heat Recovery Works

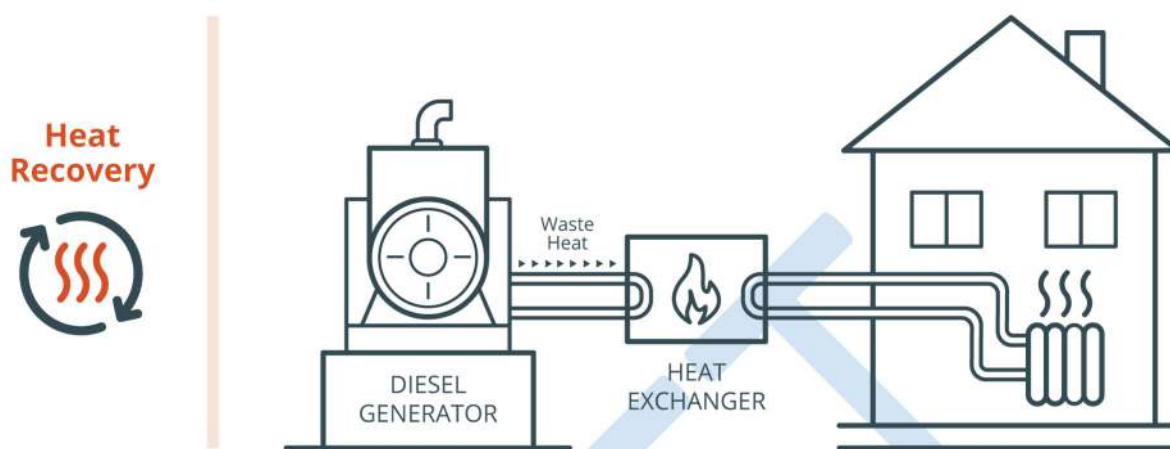


Figure 10: Heat Recovery Process (DeerStone Consulting, LLC and Agnew::Beck Consulting)

In most rural Alaska communities, diesel generators produce large amounts of waste heat as a byproduct of electricity generation. Instead of venting this heat to the outside air, heat recovery systems:

- Capture thermal energy from generator cooling systems (typically glycol-based)
- Pump heated fluid through insulated piping to nearby buildings
- Use heat exchangers to transfer energy into building heating systems

This captured energy is “free” in that it utilizes a byproduct of electricity generation, thereby reducing the need for additional fuel for space heating.

5.2.1. Existing Systems and Needs

Many Bering Strait communities already have some form of heat recovery infrastructure in place, yet a significant number of these systems are outdated, inefficient, or incomplete. In several villages, the systems do not extend piping to all viable buildings, limiting their impact. Others require maintenance or recommissioning to function effectively, and many lack the monitoring equipment needed to track system performance and verify fuel savings.

The 2024 Bering Strait Priority Climate Action Plan (PCAP) identified both the challenges and opportunities associated with heat recovery in the region. While feasibility studies have been completed for most communities, forming a strong basis for future project development, implementation remains uneven.

NJUS has a heat recovery system that heats various utility facilities and the water treatment storage tank. NJUS also plans to use waste heat off the power plant to increase their power output with an ORC unit.

5.2.2. Challenges

Key challenges include limited technical support for locally managed systems, deferred maintenance due to staffing or funding constraints, and a lack of spare parts. Some older systems do not include flow meters or BTU tracking, making it difficult to measure and verify energy savings. Seasonal or

intermittent system operation—often due to limited building connections—also reduces overall efficiency and fuel displacement potential.

5.2.3. Opportunities

Despite these barriers, there are substantial opportunities to expand and improve heat recovery across the region. Targeted investments in controls, circulation pumps, and insulated piping can significantly improve system performance. The use of real-time monitoring tools can enable remote diagnostics and better system management. Training local operators in basic operation and maintenance (O&M) tasks will enhance long-term reliability and reduce dependence on external technicians. Additionally, bundling heat recovery upgrades with other infrastructure improvements—such as diesel generator replacements or distribution system upgrades—can lower costs and increase the overall impact of energy investments.

5.2.4. Priority Actions – Heat Recovery

Heat recovery offers a cost-effective and underutilized strategy for reducing diesel fuel consumption for space heating in the Bering Strait Region. By capturing waste heat from diesel power generation and redirecting it to heat public buildings, these systems can significantly reduce heating fuel costs, emissions, and reliance on imported fuel. While several Tribal Villages have existing heat recovery infrastructure, many systems require upgrades, recommissioning, or expansion to maximize their benefits. Others have strong potential but lack operational systems or updated feasibility studies. The table below outlines targeted actions to expand, improve, and support heat recovery throughout the region.

Table 9

Priority Action	Description	Target Communities/Sites
Complete or update feasibility studies	Identify technical and economic viability for new or recommissioned heat recovery systems	Council, Diomed, Golovin, King Island, Mary's Igloo, Solomon, Unalakleet, White Mountain
Develop a heat recovery retrofit toolkit	Create standardized scopes of work, budgeting templates, and O&M training materials for local teams	Regional use via Kawerak and technical partners (e.g., ANTHC, AVEC)
Identify and pursue grant funding	Target programs such as EPA CPRG, DOE Office of Indian Energy, and Denali Commission to support system upgrades or installations	All villages with outdated, underused, or planned systems (e.g., Brevig Mission, Saint Michael, Koyuk, Wales)
Recommission or expand existing systems	Address operational issues, connect additional buildings, or upgrade components in partially used systems	Stebbins, Shishmaref, Shaktoolik, Teller, Nome
Track and report fuel displacement	Use BTU meters and monitoring tools to document heat recovery performance and emissions reductions	Savoonga, Shishmaref, Wales, Teller (and others with functioning systems)

Coordinate with utilities on integration

Work with AEA and AVEC to align heat recovery with powerplant operations, PCE reporting, and future renewable projects

All AVEC-served communities; especially those with generator or microgrid upgrades planned

5.2.5. Status of Heat Recovery in Each Community

Table 10

Community	Heat Recovery
Brevig Mission Council	No heat recovery. Designs for the system by ANTHC are available.
Diomedea	
Elim	No heat recovery. The powerplant is too far from end-users.
Gambell	No heat recovery. The powerplant is far from the WTP.
Golovin	
King Island	
Koyuk	Heat recovery installed as of 2025; needs efficiency improvements.
Mary's Igloo	
Nome	Heat recovery system in place and working well.
Stebbins	System in place but in need of efficiency upgrades.
Saint Michael	No heat recovery. A wind-to-heat system is planned to be installed in the WTP in summer 2025.
Savoonga	There's a system installed which serves the WTP. ARUC reports that the system is working well as of 2025
Shaktoolik	The system ties into a water distribution loop. It works well, though limited capacity to accept heat and more is available. The community could consider expanding heat recovery to other end users.
Shishmaref	A newer heat recovery system (2022-2023) serves the pumphouse, firehouse, city office.
Solomon	
Teller	Fairly new HR system that serves the washeteria, clinic, old city office, city garage.
Unalakleet	
Wales	VSW built a new HR system to the old WTP and multi-use building. Commissioning is planned for summer 2025. Note: AVEC plans to build a new powerplant near the new WTP in the next 3 years or so.
White Mountain	

5.3. Wind

Wind energy represents one of the most promising renewable resources in the Bering Strait Region, with several communities already demonstrating successful wind integration. High average wind speeds, particularly in coastal and island communities like Wales, Shishmaref, Savoonga, and Gambell, make wind a strong candidate for reducing reliance on diesel fuel for electricity generation—and in some cases, for space heating through “wind-to-heat” systems.

While the technology is well-established and suitable for Arctic climates, effective wind deployment requires long-term planning, careful siting, and investment in storage and control systems to maximize the benefit of intermittent generation.

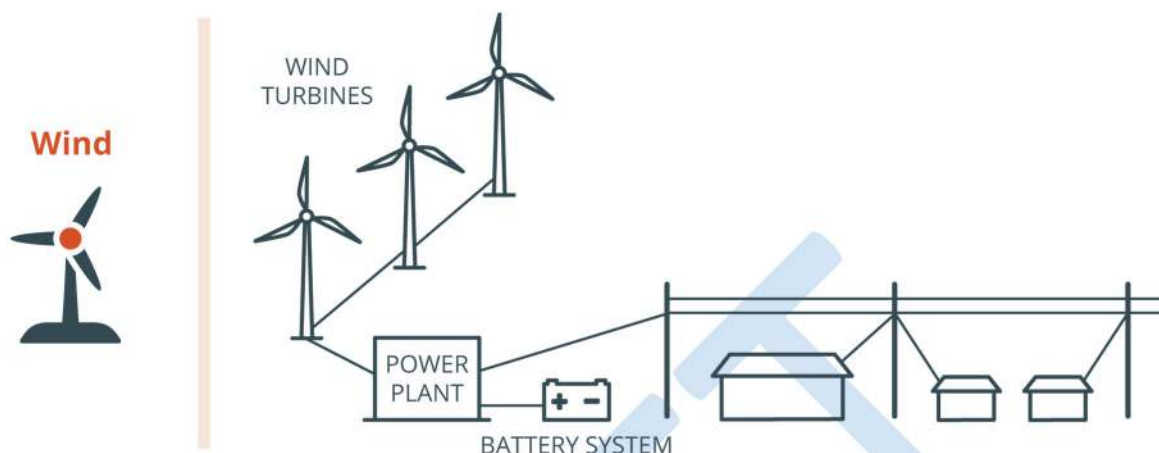


Figure 11: Wind Energy System (Agnew::Beck Consulting)

Most Bering Strait communities with existing wind energy resources have low- to moderate-penetration systems that provide a limited share of electricity when wind is available. While some systems include battery storage or have the potential for greater diesel displacement, they often lack the advanced dispatch controls, inverter upgrades, or grid integration necessary to operate in “diesels-off” mode. Shaktoolik is a notable exception—following recent grid modernization and control upgrades, it became the first community in the region to routinely shut down diesel generators and operate fully on wind and storage during favorable conditions. Across the region, additional investments in control systems, battery optimization, and turbine restoration have been identified as critical steps to improve performance and increase the contribution of renewable energy.

The 2024 Priority Climate Action Plan (PCAP) assessed wind resource potential and project feasibility across the region. Using wind resource maps and project screening tools, it identified 13 communities with Class 4 or higher wind regimes, indicating strong potential for viable projects.

5.3.1. Wind System Types

1. Low-Penetration Wind

- Displaces diesel only during operation (no storage)
- Typically offsets <15% of diesel fuel
- Lower capital cost and complexity

2. High-Penetration Wind with Storage

- Uses batteries or resistive heating loads (e.g., electric boilers)
- Enables diesels-off operation during periods of strong wind
- Can offset up to 40% of community diesel use for power
- Some systems are **oversized intentionally** to support heat displacement (wind-to-heat)

5.3.2. Wind-to-Heat

Several Alaska communities outside the region have piloted **wind-to-heat systems** that divert excess wind energy to electric boilers or thermal storage when the grid does not need it. These systems are a strong fit for Bering Strait villages where:

- Diesel heating costs exceed \$6–8/gallon
- There is year-round demand for space and water heating
- There are insulated tank systems or washeterias that can serve as thermal sinks

This dual-use model improves the economics of wind projects and may justify larger turbine installations than electric load alone would support.

5.3.3. Implementation Readiness

While many communities have favorable wind conditions, few have completed bankable feasibility studies, which are required for grant readiness and construction. Additionally:

- Systems must be carefully **integrated into diesel microgrids**, requiring modern controls and automation
- **O&M requirements** are high due to harsh weather and salt air
- **Storage systems** (battery or thermal) are key to maximizing fuel displacement and economic return

5.3.4. Priority Actions – Wind

Wind energy presents one of the most promising renewable energy opportunities in the Bering Strait Region, particularly in coastal and island communities with strong wind resources. While several Tribal Villages have installed wind turbines over the past decade, many systems are aging, underutilized, or lack integration with energy storage and heat systems. To maximize the value of wind power, communities would benefit from updated feasibility studies, modernized equipment, and better alignment with broader utility upgrades. The following table outlines targeted priority actions to expand wind energy use, enhance system reliability, and support long-term operation and maintenance across the region.

Table 11

Priority Action	Description	Target Communities/Sites
Update or Conduct Wind Feasibility Studies	Complete or refresh feasibility studies for communities with Class 4+ wind regimes, outdated turbines, or no previous analysis.	Council, Diomedes, Elim, Golovin, Koyuk, Teller, White Mountain, others as identified in PCAP
Wind-to-Heat Projects	Consider wind-to-heat projects in communities with year-round heating loads and high fuel costs to implement wind-to-heat systems using resistive loads or thermal storage.	Nome (school campus), Shishmaref, Wales, Stebbins, St. Michael, Gambell

Priority Action	Description	Target Communities/Sites
Repower or Replace Aging Turbines	Replace aging or unsupported turbine models (e.g., NPS A-models, Entegritty) with modern, serviceable alternatives.	Gambell (repowering NPS A-models - funded), Nome (retired Entegritty turbines), others as needed.
Coordinate with Utility Upgrades	Align wind investments with planned diesel plant, bulk fuel, or thermal upgrades to improve overall system efficiency.	Wales (new powerplant/WTP integration), Nome, Stebbins, St. Michael
Secure Funding and Technical Assistance	Pursue support from DOE Office of Indian Energy, AEA Renewable Energy Fund, Denali Commission, and Tribal set-aside programs.	All communities pursuing wind modernization
Build Local O&M Capacity	Train local operators and invest in monitoring systems to improve turbine uptime and long-term system performance.	All communities with installed or planned wind systems

5.3.5. Status of Wind in Each Community

Table 12

Community	Wind Project Opportunities Update
Brevig Mission Council	
Diomedede	
Elim	
Gambell	Has wind-to-heat at WTP but they have very little excess wind and the system experiences communications issues often. They have 3x 100kW NPS 100A wind turbines. As of 2025, AVEC was awarded funding for turbine repower – to replace NPS100 A-model turbine nacelles and blade sets with new B-model nacelles/blades.
Golovin	Pre-Feasibility study completed by ANTHC & ACEP in 2018
King Island	
Koyuk	
Mary's Igloo	
Nome	Two operating EWT 90kW currently. Nome Joint Utility Systems (NJUS) has had a total of 20 wind turbines, of which the 2 large EWT 90kW turbines generate the most power. The utility phased out 16 older Entegritty 20kW wind turbines, as it was difficult to service them, and they no longer make replacement parts for the model. The Banner Wind to Heat feasibility study was completed in 2019. The study evaluated the opportunity to provide excess wind power as heat for a community facility, likely the Nome-Beltz Junior/Senior High campus. If

Community Wind Project Opportunities Update	
	pursued, this project has the potential to save \$849,000 over the life of the system for the school.
Stebbins & Saint Michael	Stebbins has 1 x 900kW EWT turbine (2024), recent integration of 720kW/864kWh BESS, installing wind-to-heat in Stebbins PP and St. Michael WTP in 2025.
Savoonga	Wind turbines were installed in 2011. AVEC is pursuing an upgrade/replacement project that would give the turbines another 25 years of life (2026).
Shaktoolik	Has 2x 100kW NPS100B turbines, recently integrated new 360kW/432kWh BESS. As of 2025 was able to go "diesels off."
Shishmaref	
Solomon	
Teller	
Unalakleet	Has operating wind turbines and currently working on maintenance and improvements project .
Wales	No wind currently but had turbines in 2009-2011 (one of the first installations in Alaska in partnership with DOE NREL)
White Mountain	

5.4. Solar

The Bering Strait Region has a moderate but valuable solar resource that can provide significant diesel displacement during spring, summer, and early fall.

Solar irradiance averages 2.5–3.5 kWh/m²/day, with strong generation potential between March and September, aided by snow reflection during late winter and early spring.

Although solar production declines sharply in the dark winter months, integrating solar photovoltaic (PV) systems with battery energy storage systems (BESS) and modern microgrid controls allows for optimized year-round performance and cost savings.

Field-proven systems in Alaska demonstrate that solar PV can operate reliably in extreme cold, and spring solar performance can exceed rated capacity by up to 15% due to cold, clear conditions and high albedo from snow. In some parts of Alaska, the solar resource is comparable to that of Germany, a global leader in solar energy, which had installed over 38,500 megawatts (MW) of photovoltaic (PV) capacity as of October 2015.

Solar energy projects can generally be grouped into two categories: **facility-scale** and **community-scale** systems. **Facility-scale solar** refers to systems designed to offset the electric load of a single building or small cluster of buildings, such as a school, water plant, tribal office, or clinic. In contrast, community-scale solar systems are designed to integrate directly into the larger community microgrid, providing power to the entire village and interacting with existing diesel generation assets. Facility-scale solar systems are typically smaller, simpler, and directly interconnected behind a single utility meter. They offer a cost-effective way to reduce diesel fuel use for key facilities, stabilize operating budgets, and improve energy resilience for critical infrastructure. Because they are limited to offsetting specific loads, facility-scale solar does not usually require large battery systems, new grid controls, or major coordination with utility operations beyond the point of interconnection.

In very small communities without a centralized distribution grid, such as Solomon, facility-scale solar systems present a strong opportunity to reduce energy costs and improve energy resilience. Facility-scale solar systems are well-suited for serving individual buildings or small clusters of critical infrastructure, such as tribal offices, community centers, or schools, without requiring major changes to existing electrical systems.

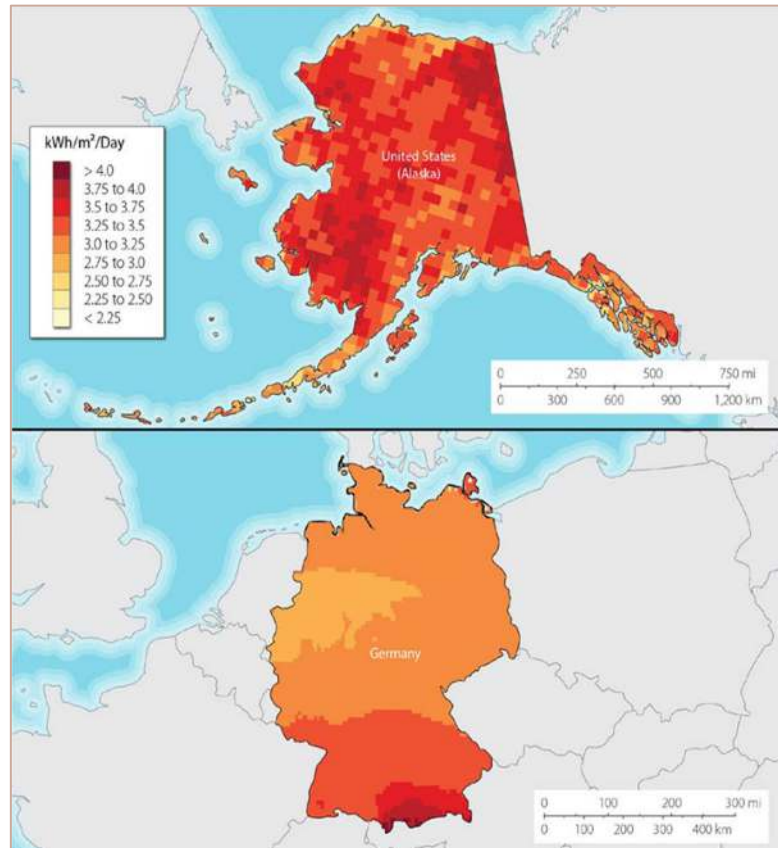


Figure 12: Solar Resource Comparison of Alaska and Germany (NREL)

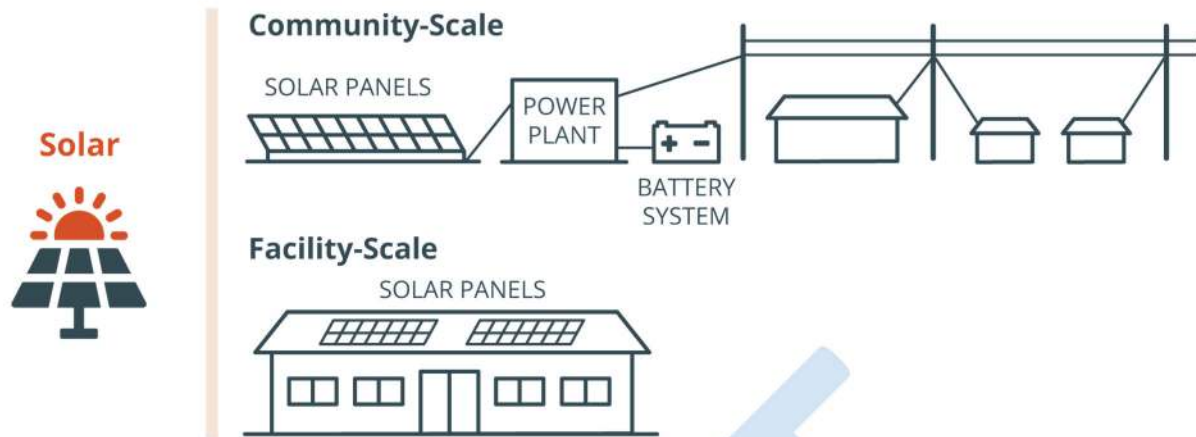


Figure 13: Community-Scale and Facility-Scale Solar (Agnew::Beck Consulting)

Facility-scale systems are also valuable for **remote or seasonally used buildings**, such as fish camps, cultural camps, or subsistence cabins, where connection to a year-round diesel system is not practical.

Solar installations in these locations can provide essential electricity for lighting, refrigeration, water systems, or communications equipment, improving quality of life and supporting subsistence activities.

Because facility-scale solar is generally simpler and lower-cost than community-scale systems, it can be a flexible and effective way for small communities to achieve meaningful energy savings while building local experience with renewable energy technologies.

Community-scale solar projects, by contrast, require careful integration with the diesel power plant, often include large-scale battery energy storage systems (BESS), and involve comprehensive microgrid control systems to manage power flow and maintain system stability. These projects can displace a much larger portion of diesel consumption but are more complex to design, operate, and maintain. The sections below focus on community-scale projects in more detail.

5.4.1. Primary Components of a Solar PV and Battery Energy Storage System

A typical community-scale solar photovoltaic (PV) and battery energy storage system (BESS) includes several key components, each selected to perform reliably in northern and remote conditions.

Each community's solar and battery system must be tailored to its unique conditions, priorities, and available resources. Final component selection — including choices such as panel type, battery chemistry, inverter models, and system control strategies — should be based on detailed engineering assessments, local utility coordination, and community input during project development.

The descriptions provided in this section offer examples of commonly used technologies based on recent successful projects in rural Alaska; however, they are not intended to prescribe specific equipment or system configurations for every project. Major components for a typical community-scale solar PV and BESS system include:

- **Solar Panel** - A device made of photovoltaic (PV) cells that converts sunlight directly into electricity. Monofacial panels capture sunlight on one side, while bifacial panels use both sides — ideal in Alaska, where snow boosts rear-side reflection and energy output.

- **Solar Photovoltaic (PV) Array** – Multiple solar panels connected together to produce electricity for larger energy needs. The solar PV system typically consists of ground-mounted, solar panels installed on helical piers or ground screws to minimize permafrost disturbance. Arrays are oriented primarily south-facing, with some southeast and southwest tilt, and designed with a steep angle (40 degrees or greater) to maximize winter and spring generation and aid in snow shedding.
- **Solar Inverters** - Solar inverters convert the direct current (DC) electricity generated by the solar panels into alternating current (AC) electricity compatible with local microgrids. High-voltage string inverters are selected to minimize wiring losses and enable production even during low-light periods.
- **Battery Energy Storage System (BESS)** - The BESS consists of insulated and climate-controlled containers housing lithium iron phosphate (LFP) battery banks and bi-directional inverters.
The BESS allows excess solar energy to be stored for later use, enables diesels-off operation, supports frequency and voltage stability, and provides backup power during outages.
- **Microgrid Controller** - A supervisory microgrid controller is the “brain of the microgrid.” It continuously monitors load, generation, and battery state-of-charge. It optimizes system dispatch by balancing diesel, solar, and battery resources in real time, and enables diesel generators to be turned off when conditions allow. The controller also maintains system protections, provides real-time and historic monitoring, and supports remote troubleshooting.
- **Block Heater Use During Diesels-Off Generator Warmth Management** - Even when diesel generators are shut down during diesels-off operation, it is critical to maintain block heater operation to keep engines warm and prevent cold start damage. System designs must ensure that critical thermal loads are supported either by solar production or battery backup during all diesel-off periods.
- **Utility Interconnection and Controls Upgrades** - Solar and battery systems must be safely integrated with the existing diesel microgrid. Upgrades to switchgear, transformers, and generator control systems are often required to ensure seamless communication and safe, efficient operation under hybrid conditions.

5.4.2. System Sizing Methodology

General sizing practices for Solar PV and Battery Energy Storage Systems (BESS) have become widely adopted across rural Alaska based on lessons learned from successful microgrid projects.

Solar arrays are typically sized to meet the community's daytime summer load, with an additional margin of approximately 30% to account for system losses, non-optimal orientation, and anticipated future load growth.

Battery systems are designed to provide about two hours of full community load, with additional capacity to account for expected degradation over a 15-year operational life.

Diesel generators are retained and sized to meet peak demands, with operational strategies to ensure they run efficiently above 30% of rated capacity to avoid underloading and maintenance issues.

These sizing methodologies are widely used because they enable communities to maximize diesel displacement, extend generator lifespan, improve system reliability, and optimize grant funding and investment value.

Table 13

Component	Typical Sizing Approach
Solar PV Array	Match summer daytime load + ~30% margin
Battery Energy Storage System (BESS)	Provide ~2 hours of full load, upsized 20–30% for degradation
Diesel Generators	Sized to operate efficiently; maintain >30% loading during operation

5.4.3. Status of Solar in Each Community

Table 14

Community	Solar status by community
Brevig Mission	Funded/then terminated grant for community-scale solar & BESS project (EPA Community Change Grant 2024; Partners: ANTHC & Kawerak) Part of Community Microgrid Assistance Partnership (CMAP) – looking at opportunities for more solar funding; has feasibility study done.
Council	
Diomedea	
Elim	Funded for community-scale solar & BESS project (EPA Community Change Grant 2024; Partners: ANTHC & Kawerak) EPA grant terminated, but Elim funded for the REF in FY25 round.
Gambell	
Golovin	Has explored solar in a feasibility study; currently working to relocate power plant out of the flood zone
King Island	Installing solar on their community building in Nome – in partnership with Village of Solomon & NJUS
Koyuk	Funded/Terminated for community-scale solar & BESS project (EPA Community Change Grant 2024; Partners: ANTHC & Kawerak) Part of Community Microgrid Assistance Partnership (CMAP) – looking at opportunities for more solar funding; has feasibility study done.
Mary's Igloo	Interested in solar (Teller)
Nome	Applied for.... REF in 2026 for the 1MW solar farm
Saint Michael	
Savoonga	Funded/Terminated for community-scale solar & BESS project (EPA Community Change Grant 2024; Partners: ANTHC & Kawerak) Part of Community Microgrid Assistance Partnership (CMAP) – looking at opportunities for more solar funding; has feasibility study done.
Shaktolik	
Shishmaref	
Solomon	2021 – Installed 21 solar panels on community building. Funded in 2024 – EPA CPRG for expanding solar to other facilities.
Stebbins	
Teller	Funded/Terminated for community-scale solar & BESS project (EPA Community Change Grant 2024; Partners: ANTHC & Kawerak) Part of Community Microgrid Assistance Partnership (CMAP) – looking at opportunities for more solar funding; has feasibility study done.

Community	Solar status by community
Unalakleet	Solar resource assessment conducted; no confirmed funded project yet for community solar. Community has multiple residential solar installations.
Wales	
White Mountain	Community has expressed interest in solar power.

5.4.4. Priority Actions - Solar

As Solar + BESS systems continue to develop in the Bering Strait Region, there are several opportunities that communities may consider to maximize the chances of project success, build local capacity, and maximize long-term benefits:

Table 15

Priority Action	Description	Target Communities/Sites
Advance Deployment in Additional Communities	Pursue feasibility studies, system designs, and grant applications in communities without current solar funding.	Council, Diomed, Gambell, Golovin, King Island, Mary's Igloo, Nome, Saint Michael, Shaktoolik, Shishmaref, Stebbins, Wales, White Mountain
Support Implementation in Funded Communities	Assist with technical review, design finalization, commissioning plans, and community engagement for EPA-funded projects.	Brevig Mission, Elim, Koyuk, Savoonga, Teller
Expand Off-Grid Installations	Develop plans to install facility scale systems on off-grid buildings, similar to Solomon's approach.	Off-grid facilities, homes
Follow Up on Resource Studies in Key Sites	Advance system development in communities like Unalakleet where solar resource assessments have already been conducted.	Unalakleet
Standardize Designs and Components	Align funded projects on common inverters, BESS types, and controllers to reduce long-term costs and simplify training.	All EPA-funded and upcoming solar + BESS projects
Strengthen Commissioning Requirements	Ensure all funded projects include thorough, enforceable commissioning and training to prevent post-construction issues.	All new and in-progress solar + BESS projects
Build Local Capacity	Invest in regional workforce training and mentorship to operate and maintain solar + BESS systems.	Tribal operators, schools, utilities in all communities

Priority Action	Description	Target Communities/Sites
Explore Community-Owned IPP Models	Develop ownership frameworks that allow communities to earn revenue while preserving Power Cost Equalization (PCE).	All communities implementing community-scale renewable energy development

5.5. Biomass

5.5.1. General

Woody biomass is fuel that is derived from wood and has been an important energy source for home heating throughout the history of Alaska. In the last two decades as fossil fuel prices have increased, biomass heating has been utilized more frequently to heat residences and community/commercial buildings. This potential use of wood as fuel is particularly appropriate in rural Alaska, where many communities depend on fuel oil for home heating and electrical generation. According to AHFC (FIND SOURCE), 25% of residential heating needs in Alaska are met with wood. In the last 20 years, more than 50 wood heating systems have been installed in community buildings in Alaska (source: Alaska Energy Authority).

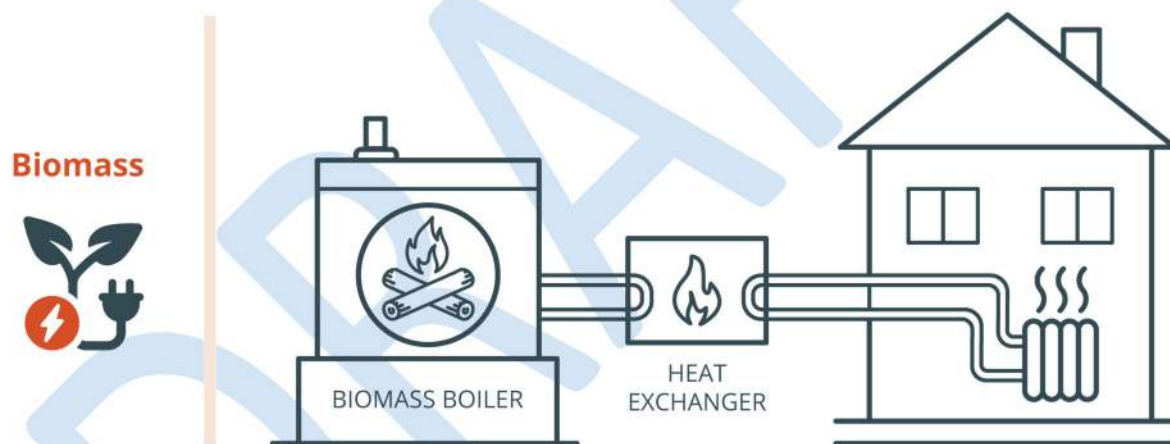


Figure 14: Biomass (DeerStone Consulting, LLC and Agnew::Beck Consulting)

The type of biomass fuel that is used for a heating project is based on local resource availability, the size of the buildings to be heated, and the community goals and values. There are three technologies for wood heating systems that have proven to be effective in Alaska: cordwood, chips, and pellets. The following paragraphs give a brief description of each of these technologies.

Cordwood comes from trees that are cut, bucked into length, split, and dried. When selecting a cordwood boiler, look for clean burning, high efficiency systems from established companies and speak with other users of the boilers to learn about maintenance requirements and customer satisfaction. Typically, cordwood boilers cost less than boilers that burn other forms of biomass. However, the operation of the boiler is more labor-intensive. Logs must be cut to length, stored, and dried. The boiler will need to be manually stoked with the cordwood daily and the ash has to be removed from the combustion chamber every few days. Cordwood systems usually create 2 or more part-time jobs in a community for boiler operation and maintenance and the harvest of the wood fuel.

Wood chips are made from whole trees or sawmill slabs that are run through a chipper or a grinder, resulting in postage stamp-sized pieces of wood. Wood chip heating systems have some upfront costs that cordwood systems do not, including the chipper and a storage unit to hold the chips. However, the labor requirements for operating the boiler are lower. Chips are fed into a boiler automatically with auger conveyors, eliminating the need for daily manual stoking. Chip biomass boilers are suitable for large heating loads, usually for buildings more than 10,000 square feet or about 800,000 Btu/hr, but smaller systems have recently been introduced in the market, some as small as 150,000 Btu/hr.

Pellets are a highly processed wood-based fuel that is manufactured from a variety of biomass products such as sawdust, lumber mill scrap, and trees determined unsuitable for lumber. Their uniform, small shape allows pellets to work well in automated feeding systems and smaller size boilers. Because the pellet is a manufactured product, they are the most expensive biomass fuel. They are only available from a pellet plant and require a dry storage location. On the other hand, pellets contain more energy in the same volume than other biomass fuels.

Pellet boiler tend to be highly automated, requiring less labor for operations and maintenance. Pellet systems are available in a wide range of sizes, designed to heat buildings ranging from 1,000 square feet to those over 100,000 square feet. There are no large-scale pellet manufacturer currently operating in Alaska. Most pellets are imported from the lower 48 or Canada, and the majority of pellet heating takes place on the Railbelt and Southeast Alaska. Shipping costs to remote communities have made the economics of pellet projects challenging, however, Nome has been able to leverage scale by shipping in containers of pellets for local use. (IS this program still operational). A number of small communities have investigated the development of small-scale pellet mills, but only one is currently operating in Alaska in Dry Creek.

5.5.2. Other Technologies

Biomass combined heat and power (cogeneration) is the simultaneous production of electricity and useful heat from a biomass fuel source. This technology, which includes steam turbines, biomass gasification units, and organic Rankine cycle generators, can be cost effective in large scale operations. The technology for small scale systems that would be appropriately sized for a remote Alaska village (25 kw to 500 kw) are still in the demonstration phase to prove that the technology can be reliable and financially viable. This technology is not yet recommended for small or remote Alaska communities.

Waste-to-Energy (WTE) is a process that converts municipal solid waste (MSW) into usable forms of energy, typically electricity or heat. The most common methods are:

- Incineration: Burning waste at high temperatures to produce steam, which drives turbines to generate electricity.
- Gasification/Pyrolysis: Heating waste in a low-oxygen environment to produce syngas, which can be used as a fuel.
- Anaerobic Digestion: Breaking down organic waste using microbes in the absence of oxygen to produce biogas (mainly methane).
- Landfill Gas Recovery: Collecting methane from decomposing waste in landfills and using it for energy.

In Alaska, there is interest in this technology due to limited landfill capacities and large columns of shipping waste. Modular or Mobile WTE Units are an emerging technologies that are targeting communities with populations in the 5000 to 10,000 people range. To date, there has not been a

successful Waste to Energy project operating in remote Alaska, but Stage biomass personnel are continuing to monitor the technology development.

5.5.3. Community Benefits of Biomass

There are many high efficiency wood heating systems on the market and they can reliably provide the space heating and domestic hot water needs for buildings while providing the following benefits:

- Lower cost heating fuel compared to heating oil and propane,
- Slower rate of price escalation over time (wood fuel prices have historically escalated at a slower rate than fossil fuel prices),
- Greater price stability over time (fossil fuel prices tend to swing dramatically and make long-term energy budgeting difficult),
- Support of local fuel supply can lead to increased economic opportunity in the community and the region by keeping energy dollars in the local economy and developing jobs in the forestry and forest products industries,
- Increased demand for advanced wood heating helps create vital markets for low-grade wood, which improves the economic viability of sustainable forest management, such as creating fire breaks and removing dead and cull logs.
- Support of local economies can contribute to the overall fiscal health of the community through additional purchases and jobs,
- Reduced environmental risks. Advanced wood heating systems can help mitigate environmental risks by reducing the need for onsite fossil fuel storage. Failing underground tanks can pose a threat to ground and surface waters. Aboveground tanks can pose fire hazards as well as the risk of dislodging in the event of a flood,
- Reduced carbon footprint. Fossil fuel combustion takes carbon that was locked away underground (as crude oil and gas) for millions of years and transfers it to the atmosphere as CO₂. When wood is burned, however, it releases carbon that was recently absorbed from the atmosphere and mimics the natural cycling of carbon between forests and the atmosphere. Consequently, the net effect of burning wood fuel is that little or no new CO₂ is added to the atmosphere, as long as the wood is harvested from forests that are sustainably managed.

It should be noted that the operation and maintenance of wood heating systems require significantly more commitment than operating an oil boiler. System owners find that the wood supply is an ongoing challenge to find reliable suppliers, and operator turnover can be an issue. The communities that are most successful pay a fair rate for wood fuel and train multiple operators to manage their boiler system.

5.5.4. Wood Resources

When considering a local wood supply for community-scale cordwood heating systems, the first priority is to protect the personal use wood harvest for residential heating. The fuel is either supplied by personal use harvest or purchased from a firewood harvester. Community scale wood heating systems should not be considered if the wood resource in an area can only meet the demand of residential heating.

The Bering Straits region lacks large-scale wood resources like the forests common in interior Alaska. This limited wood resource is the largest hurdle for the utilization of biomass for residential and commercial heating systems. Four communities in the Bering Straits region have the potential to support residential wood heating and a community scale heating system. Additionally, some communities along the coastline, particularly coastal and riverine communities, have traditional

access to **driftwood** that could provide fuel for **small residential wood stoves**. Note: By products of the combustion of driftwood could reduce the life of wood stoves with increased corrosion.

There have been limited forest resource assessments in the region, so wood availability decisions have largely been based on satellite photos and local knowledge. The following table uses satellite photos and the Alaska Energy Authority Community Profile Resource estimates to gauge the availability of wood for community scale wood heating systems. This table should be updated with community specific knowledge.

Estimated Wood Resource in Each Community

Table 16

Community	Biomass Project Opportunities Update
Brevig Mission	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Driftwood potential for residential scale (wood stove)
Council	Potential for biomass on satellite photos. Need field verification.
Diomedes	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile
Elim	Sufficient Wood Resources
Gambell	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile
Golovin	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Driftwood potential for residential scale (wood stove)
King Island	Driftwood Potential
Koyuk	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Satellite Photos indicate potential to support very small systems. Driftwood Opportunity.
Mary's Igloo	Potential for biomass on satellite photos. Need field verification.
Nome	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Small Scale Waste to energy could be an opportunities as this technology matures.
Savoonga	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile
Shaktoolik	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Driftwood potential for residential scale (wood stove)
Shishmaref	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile
Stebbins & Saint Michael	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Driftwood Potential.
Teller	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Driftwood Potential
Unalakleet	Insufficient wood resource for community scale projects per Alaska Energy Authority Community Energy Profile. Driftwood Potential
Wales	Driftwood Potential
White Mountain	Sufficient Wood Resources

5.5.5. Priority Actions

Residential Wood Stoves

Due to the limited wood resources available in the Bering Strait region, residential and small community building wood stoves are the best use for the limited resource. New wood stove installations or upgrading to existing units could reduce heating costs and improve emissions. Wood stove technologies have made significant progress in improved efficiency and emissions in the last two decades. The Environmental Protection Agency's Burn Wise website (<https://www.epa.gov/burnwise>) contains helpful information on currently available wood stoves.

Residential and small community building wood stove changeout programs could be an option to reduce costs for communities who desire to upgrade multiple aging wood stoves with more efficient technology. Beginning in 2021, consumers buying highly efficient wood or pellet stoves, or larger residential biomass heating systems, can claim a tax credit that is uncapped and based on the full cost (purchase and installation) of the unit. The credit has been extended through the Inflation Reduction Act, but the current status of this program is unknown.

Entities in communities could commit various levels of support for changeout programs, from coordinating bulk purchases and bulk shipping to communities to providing economic incentives for changeout programs. High Efficiency wood stoves cost between \$2,000 and \$5,000 (2024 pricing) depending on the manufacturer and the size of the unit. Shipping an individual stove to a remote community costs between \$800 and \$1,500 shipping from Anchorage. Bulk purchase of stoves can reduce the price from 10% to 20%, depending on the volume. Bulk shipping from Anchorage can be as low as \$6,000 for a container of 60 to 70 stoves, making the shipping cost per stove as low as \$85 per stove.

5.5.6. Community Scale Heating Systems

Elim is the only community in the region that has installed a community scale cordwood system. This system heated with water treatment plant for about 5 years before maintenance and operations issues caused the system to fail. A new cordwood boiler system was recently installed by the City of Elim to heat the Water Treatment Plant.

Other communities with a potential wood resource that are interested in community-scale systems should first work with the State of Alaska Division of Forestry and the Forest Stewardship Program to conduct a wood resource assessment to understand the allowable wood harvest surrounding their community. The wood resource for a community scale system should be above and beyond the usage of wood for residential users. If a resource assessment finds a sufficient wood resource to support a community scale system, feasibility studies for the heat system are provided at no cost by the Alaska Wood Energy Development Task Group.

5.6. Geothermal

Most of Alaska is thought to have elevated heat flow. However, only very localized areas will have all the necessary conditions for cost-effective geothermal development.

Geothermal energy represents a promising but underutilized renewable energy source in the Bering Strait region. While the region is located within the Central Alaska Hot Springs Belt, most communities have not yet explored or developed geothermal resources beyond informal assessments or historical notes. The presence of geothermal features, such as warm springs or shallow geothermal gradients, is mostly unverified in individual villages across the region. However, interest has periodically emerged due to the potential for low-temperature direct-use applications (e.g., space heating, greenhouses) and the precedent set by regional geothermal work.

The most prominent and well-studied geothermal resource in the region is Pilgrim Hot Springs, located approximately 60 miles north of Nome. In addition to Pilgrim, smaller geothermal features or warm springs have been identified anecdotally or in USGS maps in areas such as Serpentine Hot Springs and other parts of the Seward Peninsula, but these have not been subject to significant scientific exploration.

- Geothermal energy could benefit communities in the region by offering:
- Stable, local baseload energy to reduce diesel dependence.
- Heat for community buildings, greenhouses, and fish processing facilities.
- Cultural and tourism opportunities tied to hot springs.

However, significant barriers remain, including high upfront costs, regulatory burdens (e.g., geothermal permitting overseen under oil and gas standards), and the remote, permafrost-laden terrain that complicates drilling and infrastructure development

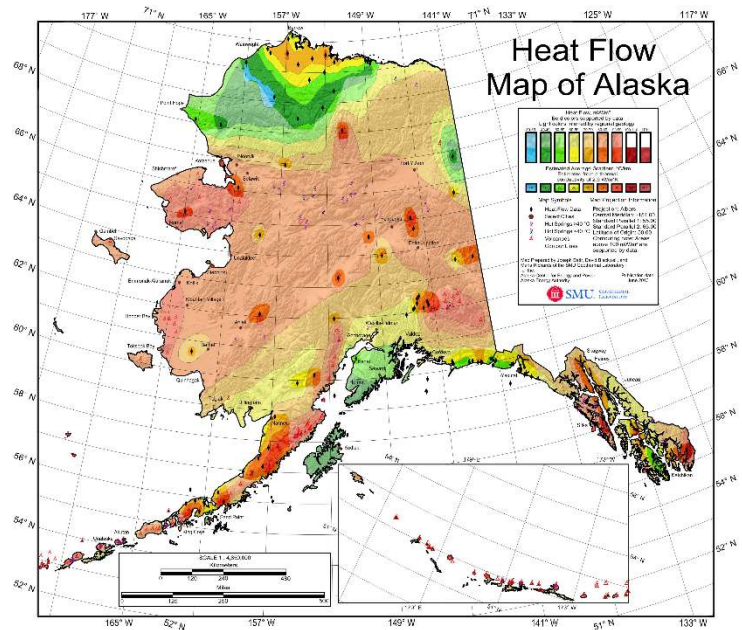


Figure 15: 2013 Heat Flow Map of Alaska

5.6.1. Commercial vs. Non-Commercial Geothermal Applications

Geothermal energy systems can be broadly categorized into two types: commercial-scale systems intended for utility-scale power generation and non-commercial systems designed for direct-use heating and community infrastructure. Non-commercial systems typically tap into near-surface geothermal heat using boreholes less than a few hundred feet deep or horizontal ground loops above the water table. These systems are well-suited for direct-use applications such as greenhouse heating, district or residential heating, aquaculture, and seasonal or subsistence infrastructure like bathhouses and fish drying facilities. They tend to be lower cost, require less permitting, and are appropriate for small, rural communities with localized energy needs. Pilgrim Hot Springs has a long history of non-commercial geothermal use, including its past as a thriving agricultural site using geothermal heat to grow food in permafrost-free soil.

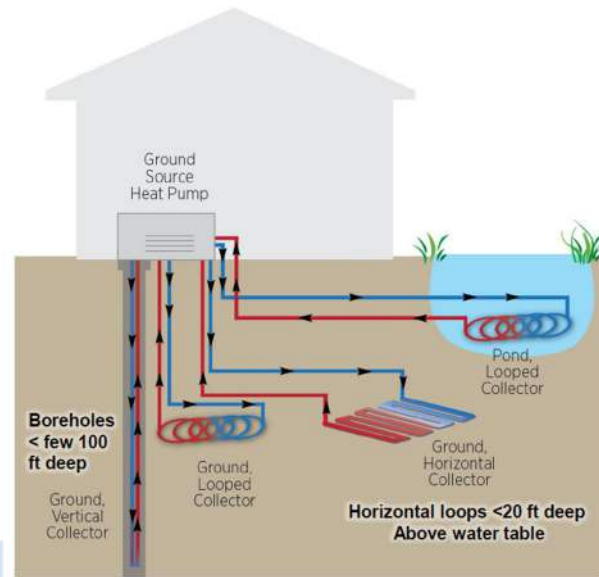


Figure 16: Non-Commercial Geothermal

In contrast, commercial geothermal systems require deep wells—often several thousand feet—to access high-temperature, non-potable geothermal fluids suitable for electricity generation. These systems typically support binary-cycle geothermal power plants and are often connected to microgrids or export lines. While modeling at Pilgrim Hot Springs has suggested the potential for 2 to 5 megawatts of power generation, high capital costs, uncertainty around the precise location of the geothermal upwelling, and the prohibitive cost of constructing transmission infrastructure (e.g., a 60-mile line to Nome) have so far limited development. As a result, while commercial geothermal remains technically possible, its viability hinges on sustained investment, regional planning, and major permitting efforts. Non-commercial, distributed systems may offer a more realistic path forward for near-term energy resilience and self-determination in remote Alaska communities.

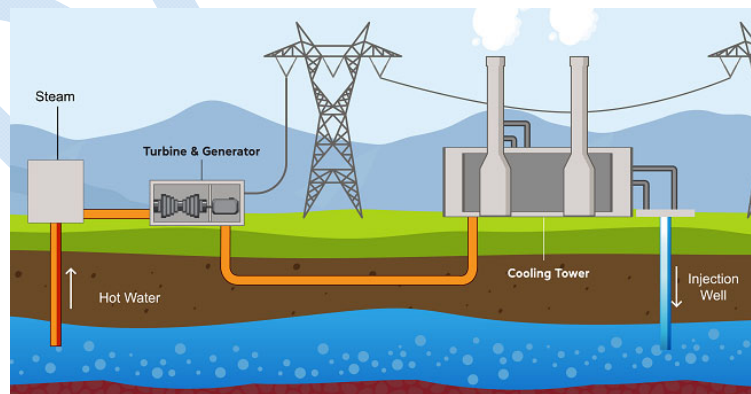


Figure 17: Commercial Geothermal Power (Image Credit: GreenSea)

5.6.2. Pilgrim Hot Springs

Pilgrim Hot Springs is the one of the most extensively studied geothermal resources in rural Alaska and has been the focus of multiple development efforts over the past several decades. The site is owned by Unaatuq, LLC, a consortium of regional Alaska Native organizations, and is situated on the traditional lands of the Kauweramiut, surrounded by Mary's Igloo Native Corporation lands.

Resource Characterization and Exploration

- **First exploration began in the early 1900s**, with test wells drilled in the 1970s and 1980s that recorded temperatures up to 190°F (88°C).
- **Between 2010 and 2014**, the Alaska Center for Energy and Power (ACEP) and project partners conducted extensive drilling and modeling, identifying maximum recorded temperatures of 196°F (91°C) and suggesting system temperatures could reach up to 293°F (145°C).
- **Up to 2–5 MW of potential power production** has been estimated depending on the success of locating the main thermal upwelling and the efficiency of generation technologies.

Development Challenges

Although the geothermal system is proven and has multiple viable wells, challenges have included:

- Difficulty in precisely locating the upwelling zone, which may lie in a swampy area inaccessible to existing drill rigs.
- High costs of building a 60-mile transmission line to Nome, which currently makes large-scale export of power economically infeasible.

Current Development Focus

The site is now focused on **on-site energy use**, including:

- A 75 kW Organic Rankine Cycle (ORC) system for heating and limited power to support food production, housing, and tourism infrastructure. Installation planned for 2027.
- Direct-use applications such as domestic hot water, building heat, cooling for food storage, and greenhouse heating.
- Integration with diesel backup and battery storage for hybrid reliability, mirroring successful models like Chena Hot Springs.

5.6.3. Geothermal Potential in Elim and White Mountain

The communities of **Elim** and **White Mountain** are located within the geothermally active Seward Peninsula and are situated near known thermal features that may hold promise for future renewable energy development. While neither community currently uses geothermal energy, interest has grown due to the presence of nearby hot springs and the potential for reducing diesel dependence through direct-use geothermal systems.

Elim

Elim is located near two identified geothermal resources: Clear Creek Hot Springs, approximately 17 miles away, and Elim Hot Springs, about 11 miles from the village. Clear Creek features surface temperatures of 145–153°F and subsurface temperatures estimated up to 196°F, with a natural flow rate of approximately 211 gallons per minute. Elim Hot Springs is somewhat cooler, with surface temperatures in the 104–122°F range. Both sites have been considered for direct-use applications such as greenhouse heating, aquaculture, and space heating.

In 2014, the Alaska Center for Energy and Power (ACEP) hosted a community meeting in Elim to explore geothermal opportunities. More recently, in 2024, Elim participated in the U.S. Department of Energy’s Geothermal Collegiate Competition. A team from Columbia and Princeton Universities worked with the Native Village of Elim to propose an ocean-based closed-loop geothermal system

for heating and cooling. Their feasibility analysis estimated a 14-year payback period and projected fuel savings of over 2.3 million gallons of fuel oil and 70 million pounds of wood over 30 years.

Although development has not yet moved forward, these initiatives demonstrate that Elim is among the most promising communities in the region for direct-use geothermal deployment.

White Mountain

While White Mountain lies within the same geothermal region, there are currently no confirmed geothermal prospects in close proximity to the community. It is, however, situated in a geologic zone that may warrant further exploration, particularly for shallow, low-enthalpy resources. Community-scale geothermal heating or bathing facilities, similar to historical uses at Pilgrim Hot Springs, could be feasible if thermal features are identified nearby.

Given White Mountain's location and traditional land use knowledge, a first step would be a community-engaged geothermal reconnaissance, including field surveys, thermal imagery, and shallow well temperature logging. If a viable resource is identified, White Mountain could benefit from non-commercial direct-use geothermal systems for heating public buildings, homes, or greenhouses.

5.6.4. Priority Actions - Geothermal

To guide future geothermal development in the Bering Strait region, the following priority actions are recommended. These strategies aim to advance both near-term direct-use opportunities and long-term planning for more complex systems, while addressing regulatory, technical, and community engagement barriers.

Table 17

Priority Action	Description	Target Communities/Sites
Conduct Feasibility Studies for Direct-Use Applications	Carry out reconnaissance (thermal imagery, field surveys, shallow wells) to identify viable shallow geothermal resources. Prioritize low-temperature uses like space heating and greenhouses.	White Mountain, Elim, other communities with anecdotal geothermal activity
Advance Pilgrim Hot Springs Development	Finalize installation and monitoring of the 75 kW ORC system; continue exploration of upwelling zone; support geothermal-powered greenhouses, housing, and tourism infrastructure.	Pilgrim Hot Springs
Improve Permitting Pathways	Support implementation of HB 74; develop permitting toolkits and outreach materials for non-commercial and Tribal-scale geothermal systems.	Regionwide, especially communities pursuing direct-use
Integrate Traditional Knowledge and Local Leadership	Establish community-led geothermal working groups; center local input in design and use case development (e.g., fish processing, bathhouses, housing heat).	Elim, White Mountain, Pilgrim Hot Springs

Priority Action	Description	Target Communities/Sites
Leverage Funding and Technical Partners	Pursue grants (DOE, USDA, Tribal Energy programs); partner with ACEP and universities for studies and implementation support.	All Bering Strait Region communities with geothermal potential

5.7. Hydroelectric

Hydroelectric power is a reliable, renewable energy resource that has long played a role in Alaska’s energy landscape, particularly in Southeast and Southcentral regions. In the Bering Strait region, hydroelectric potential is more limited due to flatter terrain, freeze-up conditions, and limited year-round flow in most river systems. However, some communities are located near streams or small rivers that may offer seasonal or low-head hydroelectric opportunities, especially during spring and early summer.

No communities in the Bering Strait region currently operate hydroelectric systems, and there are no funded hydro projects as of 2025. However, there is community interest in exploring hydro for fish camps or remote seasonal cabins, where river flow could support micro-hydro systems. Hydroelectric energy in this region is best considered as a supplemental energy source for specific off-grid applications rather than a primary village-scale solution.

Opportunities:

- **Seasonal hydro for fish camps or remote cabins**, particularly where diesel delivery is costly or unreliable.
- **Micro-hydro systems** (<100 kW) for individual buildings or clusters near consistent year-round flow.
- **Pumped hydro storage** may have theoretical potential near topographically diverse areas, though this would require further geological study and is unlikely to be cost-effective in the near term.

Barriers:

- **Freeze-up and icing** make year-round hydro challenging.
- **Remote siting** and limited road access complicate installation and maintenance.
- **Low, intermittent flows** limit potential for grid-scale production.
- **Environmental and permitting constraints**, particularly around fish-bearing streams, must be carefully navigated.

5.7.1. Community-by-Community Scan: Micro-Hydro Potential

While no community in the Bering Strait region currently uses hydroelectric energy, certain communities may merit further investigation for micro-hydro development, particularly for seasonal or direct-use applications such as powering fish camps or off-grid cabins. The following table provides an initial scan based on known hydrologic features, topography, and traditional use knowledge.

Table 18

Community	Potential for Micro-Hydro	Rationale
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Elim	Moderate	Elim sits near the Tubuktulik River and other small tributaries; seasonal micro-hydro for camps may be feasible.
White Mountain	Moderate	Located near the Fish River, with potential for seasonal flow-based systems; may support direct-use loads.
Teller	Moderate	Adjacent to the Imuruk Basin and rivers draining from the Kigluaik Mountains; elevation change may support micro-hydro.
Council	Moderate	Seasonal streams and traditional camps nearby; terrain may allow for small-scale, seasonal hydro.
Shishmaref	Low	Low topography and freeze-up limit hydro potential.
Diomede	Low	Steep terrain but limited freshwater flow; logistical and environmental challenges.
St. Michael / Stebbins	Low	Small streams nearby, but no known hydro assessments; tidal study (via ORPC) may present stronger opportunity.
		Stebbins is also considering a marine power study with AVEC and ORPC partners.
Nome	Moderate-High (historic)	Nome had historical hydro operations at Dexter Creek and may support re-investigation for small-scale hydro.
Wales	Low-Moderate	Limited stream flow but elevated terrain could merit reconnaissance for seasonal hydro or pumped storage.
Unalakleet	Moderate	The Unalakleet River is sizable; historical interest in hydro; potential for fish camp or seasonal cabin power.

5.7.2. Priority Actions - Hydroelectric

While large-scale hydroelectric development is not likely to be widely adopted across the Bering Strait region, small, seasonal, or site-specific micro-hydro systems may provide meaningful energy benefits in select communities. To explore these opportunities, coordinated next steps are needed to identify viable sites, assess technical feasibility, and align with local energy needs and traditional land use. The table below outlines recommended actions to support future micro-hydro development in the region.

Table 19

Priority Action	Description	Target Communities/Sites
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Conduct Reconnaissance Studies	Initiate community-led surveys to identify viable micro-hydro sites near rivers, creeks, or camps. Include traditional knowledge and stream flow mapping.	Elim, White Mountain, Teller, Council, Nome, Unalakleet
Evaluate Seasonal Use Cases	Explore micro-hydro for spring/summer-only use at fish camps, cultural camps, or off-grid cabins.	Communities with known seasonal land use patterns (e.g., Elim, White Mountain, Unalakleet)
Integrate with Energy Storage	Assess pairing micro-hydro with small battery banks to extend use or enable diesels-off for specific buildings.	Pilot projects in moderate potential sites
Review Historic Hydro Data	Revisit historical hydro records (e.g., Dexter Creek in Nome) to inform modern feasibility.	Nome
Engage State and Federal Partners	Work with agencies like NREL, ACEP, and USACE to fund and support hydrologic assessments and pre-feasibility studies.	Regionwide
Incorporate Hydro into Energy Planning	Ensure hydro is considered alongside solar, wind, and thermal in community-level energy planning and grant applications.	All communities with moderate potential
Monitor Regulatory Developments	Track any changes in FERC and State permitting pathways for small-scale or “non-jurisdictional” hydro systems.	Developers and planners working with Tribal entities

5.8. Other

Several emerging or complementary technologies may offer future benefits depending on site-specific conditions, community priorities, and technology maturity. These include marine energy, heat recovery, and biomass — each with its own niche potential for improving energy resilience and reducing diesel reliance.

5.8.1. Marine Energy (Tidal and River Current)

Marine energy refers to technologies that generate electricity from the natural movement and properties of water. Alaska, with its long coastline, powerful tidal currents, and wide, fast-moving rivers, is considered a national leader in marine energy potential. Although most marine energy systems are still in early commercial deployment, several promising technologies are under active development or demonstration in Alaska. The following subsections outline the primary types of marine energy and their relevance to the Bering Strait region.

Tidal Energy

Tidal energy systems generate electricity from the predictable rise and fall of ocean tides. These systems typically use underwater turbines placed in channels or straits where water moves swiftly during tidal changes. Because tides follow a known, repeating cycle, tidal energy offers a highly predictable and stable source of baseload power — a significant advantage for remote microgrids.

In Alaska, the Yukon-Kuskokwim Delta and parts of the Aleutians and Cook Inlet are known to have strong tidal currents. For the Bering Strait region, communities such as St. Michael, Stebbins, Wales, and Diomedes may be situated near areas with sufficient tidal flow to warrant future study. While no tidal systems are deployed in the region today, the Alaska Village Electric Cooperative (AVEC) has proposed adding St. Michael and Stebbins to a 10-community tidal feasibility study being led by Ocean Renewable Power Company (ORPC), which specializes in underwater current technologies.

River Current (In-Stream Hydrokinetic) Energy

River current energy, sometimes called in-stream hydrokinetic energy, involves turbines placed in the natural flow of rivers to generate electricity without the need for dams or reservoirs. These systems are particularly attractive for communities located along large rivers where year-round flow is available, and where traditional hydroelectric systems are infeasible due to environmental or topographic constraints.



Figure 18: ORPC RivGen System in Igiugig

ORPC's RivGen® system, for example, has been deployed in the village of Igiugig along the Kvichak River and has demonstrated successful year-round operation under Arctic conditions. While many rivers in the Bering Strait region freeze solid in winter, spring and summer use at fish camps or seasonal infrastructure may still be possible. Communities like Unalakleet and Elim, located near significant rivers, could be candidates for future river current feasibility assessments.

Wave Energy

Wave energy systems harness the motion of surface waves to produce power. Technologies in this category include floating buoys, hinged pontoons, or submerged pressure devices that move with ocean swells. While Alaska has enormous theoretical wave energy potential along its southern coasts, the Bering Strait region experiences highly variable sea conditions and seasonal ice, making wave energy technically challenging in the near term.

Wave energy may offer long-term promise as technology matures and ice-resilient devices are developed, but it is not currently considered feasible for deployment in the Bering Strait region without significant innovation.

Although no systems are currently deployed in the Bering Strait region, there is active exploration under way:

- St. Michael and Stebbins have been proposed by AVEC for inclusion in a 10-community tidal energy feasibility study being conducted by Ocean Renewable Power Company (ORPC). This effort seeks to assess whether emerging tidal technologies could provide reliable baseload power in coastal locations with high diesel dependence.
- Marine energy remains in early stages of deployment but may become increasingly viable with further R&D, particularly for communities with constrained access to fuel delivery and strong interest in local energy sovereignty.

5.8.2. Oil and Natural Gas Opportunities

Diesel fuel remains the primary energy source for electricity and heating in the Bering Strait region. While many communities are working toward renewable energy integration, diesel is likely to remain part of the energy mix for years to come. As such, improving the cost, reliability, and efficiency of diesel and fuel-based systems remains a high priority.

Modernizing existing diesel systems can offer immediate benefits. Upgrading to high-efficiency generators, integrating battery storage for hybrid operation, and implementing advanced microgrid controls can reduce diesel consumption and extend equipment life. Additional savings can be achieved through waste heat recovery, which captures heat from generators and uses it to warm community buildings or water systems — especially valuable in cold climates.

Beyond generation equipment, there are other opportunities to lower the cost of fuel itself. Communities may benefit from forming or joining regional fuel purchasing cooperatives, which allow multiple villages to coordinate bulk fuel purchases, negotiate better shipping rates, and reduce per-gallon costs. Some regions in Alaska have piloted successful co-op fuel models that have stabilized pricing and improved delivery timelines.

Investing in better fuel storage infrastructure is also key. Many communities rely on aging or undersized tanks, leading to missed deliveries, fuel degradation, or costly emergency shipments. Expanding or modernizing tank farms — including bunding, heating, and monitoring systems — can improve safety and reliability while enabling communities to take advantage of favorable pricing or delivery schedules. In some cases, coordinated delivery infrastructure, such as shared barge routes or centralized regional staging points, may reduce costs and improve logistics.



Figure 19: Stebbins Tank Farm (STG Inc.)

While large-scale natural gas development is unlikely in the region, small-scale propane or liquefied natural gas (LNG) systems could be feasible for targeted uses like heating schools or clinics, if transport and storage challenges can be managed. However, the infrastructure needs are substantial, and costs remain high compared to diesel, particularly in non-hub communities.

Taken together, these strategies represent practical, incremental improvements that can help reduce energy costs and improve reliability — even as longer-term renewable and emerging technologies continue to develop.

5.8.3. Energy Infrastructure Linked to Remote Mining Development

While no active oil or gas fields currently serve the Bering Strait region, proposed mining developments across Western Alaska have raised the possibility of large-scale energy infrastructure — such as pipelines or advanced microgrids — that could indirectly benefit nearby communities. For example, the Donlin Gold Project includes plans for a 315-mile natural gas pipeline from Cook Inlet to the Kuskokwim River to fuel mining operations. Similarly, discussions around the Graphite One Project near Teller and the Ambler Access Project in Northwest Alaska have included evaluations of dedicated energy systems, including the potential use of modular nuclear reactors (microreactors) to power isolated mine sites.



Project Development & Funding Opportunities

6. Project Development & Funding Opportunities

6.1. Project Development

Securing funding for energy projects requires a clear, well-supported, and technically sound project development process. Most state and federal funders require applicants to demonstrate that their projects are viable, needed, and community-driven, with a strong likelihood of long-term success. This means that even before a grant application is submitted, communities must complete a series of critical development steps that build confidence in the project's design, readiness, and sustainability.

One of the most important early steps is conducting a **feasibility study** or **resource assessment**, which verifies that the proposed technology (e.g., solar, wind, heat recovery, hydrokinetic) is technically appropriate for the community. Funders want to see that energy resources have been measured and validated using accepted methods, and that the site conditions support installation and long-term operation.

Closely tied to this is a **techno-economic analysis**, which examines the cost-benefit profile of the project. This includes capital costs, projected savings or revenue, lifecycle operations and maintenance costs, and return on investment. A strong application will explain how the project reduces diesel use, supports energy resilience, and aligns with community goals — while showing that the costs are justified and competitive compared to alternatives.

Community consultation and demonstrated local support are also essential. Funders increasingly prioritize community-driven projects that reflect local priorities and have visible support from tribal councils, city governments, utility operators, and other local organizations. Letters of support, resolutions, and evidence of community engagement (e.g., surveys, meetings, planning sessions) strengthen a proposal by showing that the project isn't being imposed from outside — it is being built from within.

Just as important is showing a **realistic plan for operations and maintenance (O&M)**. Funders want to know who will run the system, how they will be trained, and whether there is a financial model in place to cover upkeep, repairs, and eventual system replacement. Projects that fail to plan for O&M often become stranded assets. Funders are looking for proactive plans that include local workforce training, remote support partnerships, and budgeting for future needs.

Additional development elements that increase competitiveness include:

- Preliminary or conceptual **engineering designs** (e.g., one-line diagrams, site plans)
- A **load analysis** or fuel usage profile to show current energy demand
- Clear **project management structure**, including partners and their roles
- Site control documentation (e.g., leases, land agreements, or MOU with landowners)
- Identification of all **required permits or agency approvals**, even if not yet secured

The strongest applications are those that have moved beyond the idea stage and have done the groundwork needed to show that the project is technically feasible, financially sound, locally supported, and operationally sustainable.

6.2. Grant Funding

Most energy and infrastructure projects in the region rely on a combination of grant funding and community contributions to move from concept to construction. In Alaska's rural and Tribal communities, the cost of logistics, materials, and labor make it nearly impossible to pursue capital

projects without external support. As a result, **federal and state grants remain the primary pathway for funding energy resilience and renewable energy development.**

The section that follows outlines key grant programs and agencies that fund energy-related work across planning, design, and construction phases. Many of these opportunities are competitive, meaning applicants must demonstrate not only need and readiness, but also strong alignment with program goals, technical feasibility, and local leadership. Tribal applicants, in particular, may be eligible for set-aside funding or special provisions that prioritize Indigenous-led projects — an advantage in a high-demand funding landscape.

A common requirement for many federal grants is a non-federal match, which refers to the portion of project funding that must come from non-federal sources. Match requirements typically range from 10% to 50%, depending on the program. The purpose of a match is to show that local or regional stakeholders have a direct investment in the project’s success, and to ensure that federal dollars are leveraged effectively alongside other financial resources.

Fortunately, the range of **eligible match sources is diverse**, giving applicants flexibility in building a complete funding package. These may include:

- **System or Building Owner Contributions:** Local utilities, Tribes, or other infrastructure owners may provide matching funds through capital budgets or in-kind services.
- **Regional Partnerships:** Partnerships with neighboring communities, regional nonprofits, or development organizations can strengthen both the project’s case and its funding base.
- **State Funding:** State grants, such as those offered by the Alaska Energy Authority (AEA), can often be used as match for federal dollars.
- **Non-federal Grants or Loans:** Foundations, philanthropic funds, and mission-aligned private sector partners may contribute to energy resilience efforts, particularly when projects demonstrate innovation, equity, or replicability.

Successfully navigating the grant landscape requires not just identifying available funding, but also aligning project timing, readiness, and development documentation to meet program requirements. The table below summarizes key funding sources relevant to energy projects in the Bering Strait region.

Table 20

Funding Opportunity	Eligible Projects
Department of Energy’s Office of Energy Efficiency and Renewable Energy (EERE) Tribal Energy Program Various grants available for energy efficiency and renewable energy projects: https://www.nrel.gov/docs/fy13osti/54396.pdf http://www.energy.gov/indianenergy/office-indian-energy-policy-and-programs	Biomass, energy efficiency, geothermal, hydropower, solar photovoltaics, solar water heat, wind, and other renewable energy projects.

Funding Opportunity	Eligible Projects
Department of Energy Office of Indian Energy (DOE-OIE) Federal agencies provide grant, loan, and technical assistance programs to support Tribal energy projects: https://www.energy.gov/indianenergy/current-funding-opportunities	Weatherization, technical assistance, economic development, community facilities, community water, energy audits, renewable energy development, and energy efficiency.
Department of Energy (DOE) – Other Grants available for energy efficiency, renewable energy, technical assistance, pilot projects, and Tribal government energy projects: https://www.energy.gov/energy-economy/funding-financing	Weatherization, biomass, energy efficiency, geothermal, hydropower, solar photovoltaics, solar water heat, wind, other renewable energy projects, and education & outreach.
Denali Commission Grants Improve the effectiveness and efficiency of government services, to develop a well-trained labor force employed in a diversified and sustainable economy, and to build and ensure the operation and maintenance of Alaska’s basic infrastructure: https://www.denali.gov/grants/ https://www.denali.gov/funding-requests/	Energy reliability, bulk fuel safety, infrastructure protection, transportation, sanitation, health facilities, housing, broadband, and economic development.
Alaska Energy Authority (AEA) Supports the State’s communities and energy infrastructure by administering grant funding programs and a loan program: http://www.akenergyauthority.org/What-We-Do/Grants-Loans AEA Renewable Energy Grant Fund: http://www.akenergyauthority.org/What-We-Do/Grants-Loans/Renewable-Energy-Fund	Solar water heat, photovoltaics, landfill gas, wind, biomass, hydroelectric, geothermal electric, fuel cells, geothermal heat pumps, combined heat and power/cogeneration, hydrothermal, waste heat, transmission or distribution infrastructure, anaerobic digestion, tidal energy, wave energy, fuel cells using renewable fuels, and geothermal direct-use.
Alaska Housing Finance Corporation (AHFC) Financing for permanent energy-efficient improvements to public buildings owned by regional educational attendance areas, by the University of Alaska, by the state or by municipalities in the state: Alaska Energy Efficiency Revolving Loan Program: https://www.ahfc.us/efficiency/non-residential-buildings/energy-efficiency-revolving-loan-fund-aeerlp/	Borrowers obtain an Investment Grade Audit as the basis for making cost-effective energy improvements, selecting from the list of energy efficiency measures identified.

Funding Opportunity	Eligible Projects
USDA Rural Development High Energy Cost Grant: https://www.rd.usda.gov/factsheet/high-energy-cost-grants	Funds may be used to acquire, construct, extend, upgrade, or otherwise improve energy generation, transmission, or distribution facilities and to establish fuel transport systems that are less expensive than road and rail.
Rasmuson Foundation Capital projects and technology upgrades for eligible Alaska organizations: Tier 1 Grants: https://www.rasmuson.org/grants/tier-1-grants/	Capital projects, technology updates, capacity building, program expansion and creative works, including building construction/renovation/restoration, technology upgrades in community facilities, and capacity building grant support.
Housing and Urban Development (HUD) http://portal.hud.gov/hudportal/HUD?src=/topics/grants	Energy efficiency and housing weatherization.
Bureau of Indian Affairs (BIA) Energy and Mineral Development Program Grant (EMDP): https://www.bia.gov/service/grants/emdp/what-energy-and-mineral-development-program-emdp-grant	Resource assessment, exploration studies, feasibility studies, market studies, engineering studies, economic evaluation, and defining potential targets for development.
Bureau of Indian Affairs Tribal Energy Development Capacity Grant (TEDC): https://www.bia.gov/service/grants/tedc	Developing the legal infrastructure to create any type of Tribal energy business. Establishing an energy-focused corporation under Tribal or state incorporation codes. Establishing an energy-related Tribal business charter under federal law.
Bureau of Indian Education http://bie.edu/Programs/index.htm	School energy programs.
The Honnold Foundation Grid Alternatives Tribal Program: https://www.honnoldfoundation.org/	Unrestricted grant funding to organizations or projects that use solar energy to increase social and economic equity and reduce environmental impact.
USDA Rural Development Many various grants. Listed below. www.rd.usda.gov/ak	Diverse eligible activities.

The grant landscape is constantly shifting as new programs are introduced and funding priorities evolve. To stay competitive, communities and project partners should actively monitor open opportunities and upcoming deadlines.

Grants.gov is the primary source for federal funding announcements and allows users to search by keyword, agency, or eligibility, and to set up alerts. It's also helpful to **subscribe to listservs** from agencies like DOE, BIA, USDA, EPA, AEA, and the Denali Commission for updates on grant openings, webinars, and deadline changes.

For non-federal and philanthropic opportunities, platforms like **Instrumentl** offer consolidated search tools that can help identify matching funds and complementary grants.

6.3. Other Funding

In addition to grants, communities and project developers in the Bering Strait region may need to consider a mix of loans, tax incentives, and local cost-share strategies to fully finance energy and infrastructure projects. These options can help close funding gaps, provide required match for grants, and support long-term sustainability of energy systems

6.3.1. Loans

While grant funding is often preferred, **low-interest loans** can be a useful tool for covering up-front costs or providing bridge funding during multi-year construction efforts. In some cases, loans are necessary to meet non-federal match requirements or to demonstrate project readiness when applying for competitive grants.

Potential loan sources include:

- **U.S. Department of Agriculture (USDA)** loan programs for rural energy, community facilities, and utility infrastructure.
- **Department of Energy Tribal Energy Financing program**, which supports Tribal investment in energy-related projects by providing loan guarantees and direct loans to federally recognized Tribes, and other Tribal entities.
- **Alaska Energy Authority's Power Project Fund**, which offers long-term, low-interest loans for qualifying energy infrastructure.
- **Clean energy financing programs** operated by green banks or mission-driven financial institutions.
- **Community Development Financial Institutions (CDFIs)**, which were established to provide loan capital for underserved and marginalized populations and communities who have historically faced substantial barriers to accessing capital through traditional financial institutions.

Loan funding can be especially appropriate for projects with clear savings or revenue streams, such as diesel displacement through solar or heat recovery systems.

6.3.2. Tax Incentives

Tax incentives can reduce the effective cost of renewable energy projects, but their applicability in the Bering Strait region depends on project ownership structure.

While Tribes and nonprofits are **tax-exempt entities** and cannot use tax credits directly, they may benefit from federal tax incentives through **third-party ownership models** or partnerships with taxable entities. With the passage of the Inflation Reduction Act, many tax credits — including the **Investment Tax Credit (ITC)** and **Production Tax Credit (PTC)** — are now available as **direct pay** (cash) for Tribal governments and other tax-exempt entities, expanding access to these incentives.

Tax incentives, like grants, can change quickly. Developers should work with legal and financial advisors to determine if tax equity, leasing, or transferability provisions can help finance their projects.

6.3.3. Local Funding & Cost Share

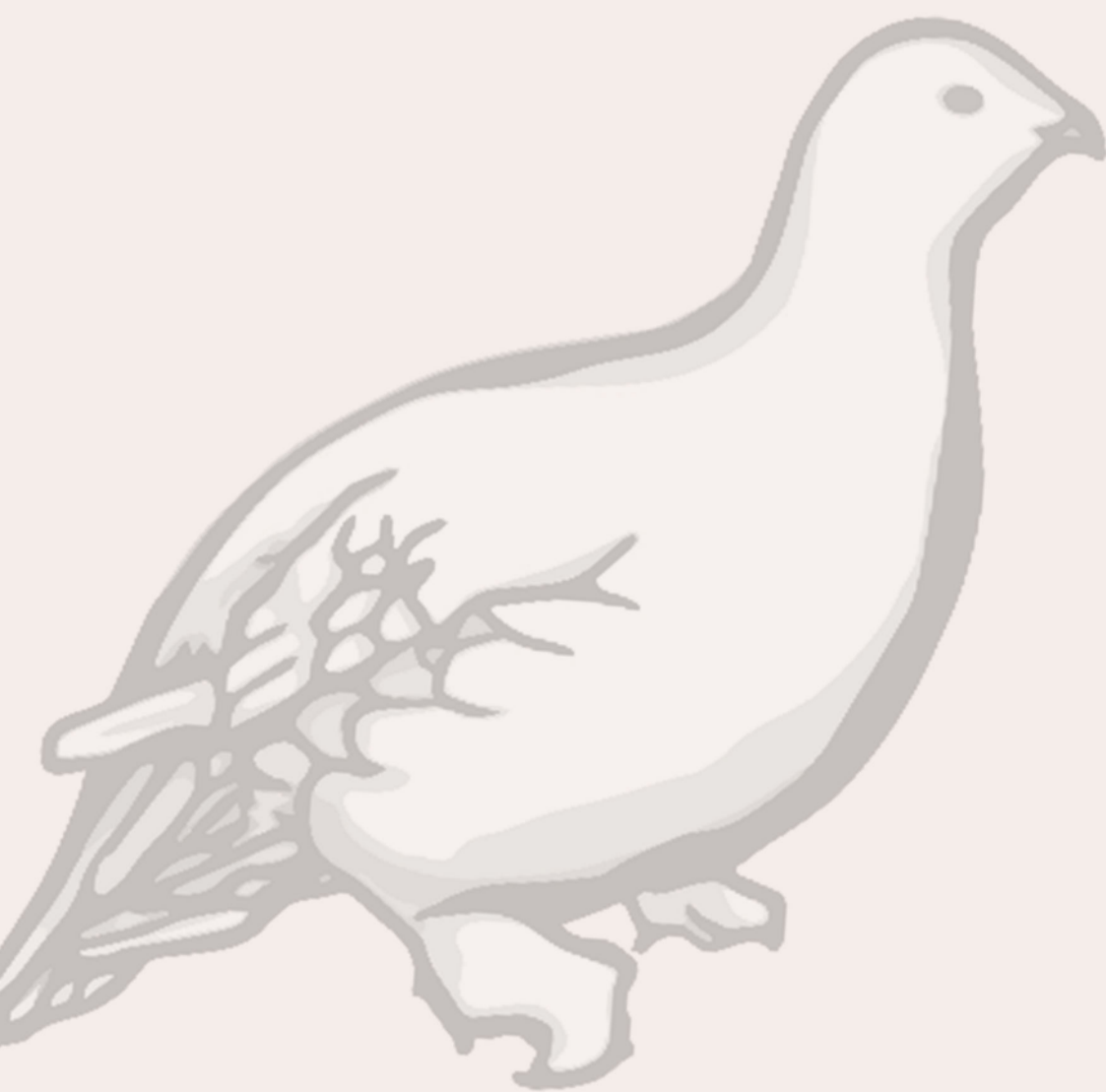
In many cases, local contributions are a key part of assembling a complete project funding package — especially when required to meet federal or state **cost share** or **match** requirements. These local investments demonstrate buy-in and long-term commitment to the project, and they can come in the form of cash, in-kind contributions, or shared use of existing assets.

Alaska Native Village Corporations and Regional Corporations are important potential partners in the Bering Strait region. These entities may contribute cash or in-kind support to energy and infrastructure projects that benefit their shareholders or community landholdings. Their involvement can also strengthen project alignment with long-term economic development goals.

The **Norton Sound Economic Development Corporation (NSEDC)** is another potential source of support. As a Community Development Quota (CDQ) organization serving 15 member communities in the Norton Sound region, NSEDC provides funding for infrastructure, workforce development, and energy-related projects. In recent years, NSEDC has funded facility upgrades, equipment purchases, and small-scale renewable energy efforts. Communities may apply for funding or in-kind contributions (such as equipment or materials) through NSEDC's existing programs or in partnership with broader regional initiatives.

Local cost share can also come from:

- City or Tribal contributions of labor, land use, or equipment
- Use of existing infrastructure or facilities
- Volunteer time or community-led site preparation
- Donated services, such as legal review, hauling, or administrative support



Acronyms and Abbreviations



7. Acronyms and Abbreviations

Acronym	Full Meaning
ACEP	Alaska Center for Energy and Power
AEA	Alaska Energy Authority
AHFC	Alaska Housing Finance Corporation
AIDEA	Alaska Industrial Development and Export Authority
AMR systems	Automated Meter Reading systems
ANCSA	Alaska Native Claims Settlement Act
ANGDA	Alaska Natural Gas Development Authority
ANTHC	Alaska Native Tribal Health Consortium
ARDOR	Alaska Regional Development Organizations
ARECA	Alaska Rural Electric Cooperative Association
ARIS	Alaska Retrofit Information System
ARRA	American Recovery and Reinvestment Act
ARUC	Alaska Rural Utility Collaborative
AVEC	Alaska Village Electric Cooperative
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BSDC	Bering Straits Development Company
BSNC	Bering Strait Native Corporation
CDR	Conceptual Design Report
CETF	Community Energy Task Force
CFL	Compact Fluorescent Light
CIAP	Coastal Impact Assistance Program
CIP	Capital Improvement Program
EfW	Energy From Waste
DCCED	Department of Commerce, Community and Economic Development
DOE	U.S. Department of Energy
DOL	Alaska Department of Labor (and Workforce Development)
DOT&PF	Alaska Department of Transportation and Public Facilities
EEM	Energy Efficiency Measures
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ETF	Energy Technology Fund
EUI	Energy Use Index
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
HUD	U.S. Department of Housing and Urban Development
HVDC	High Voltage Direct Current
ICDBG	Indian Community Development Block Grant
IGA	Investment Grade Audit
IPP	Independent Power Producer

Acronym	Full Meaning
ISER	Institute for Social and Economic Research
kW	Kilowatt
kWh	Kilowatt hour
Mcf	One thousand cubic feet
MWh	Megawatt hours
NAHASDA	Native American Housing and Self Determination Act
NIST	National Institute for Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NRECA	National Rural Electric Cooperative Association
NREL	National Renewable Energy Laboratory
ORC	Organic Rankine Cycle
PFD	Permanent Fund Dividend
PCE	Power Cost Equalization
PD&R	Policy Development and Research
PV	Photovoltaic
PWS	Prince William Sound
PWSEDD	Prince William Sound Economic Development District
REAP	Renewable Energy Alaska Project
RUBA	Rural Utility Business Advisor
SNC	Sitnasuak Native Corporation
TED	The Energy Detective
UAF	University of Alaska Fairbanks
UCG	Underground Coal Gasification
USACE	United States Army Corps of Engineers
WtE	Waste to Energy
WTP	Water Treatment Plant



Appendices





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