



ENERGY PROFILE: KOTZEBUE

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²⁰²² **Kotzebue, Alaska** Energy Profile



Kotzebue, Alaska (Kikiktagruk Inupiat Corporation, 2020)

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Introduction	3
Community Appropriate Sustainable Energy Security (CASES)	3
Kotzebue, Alaska	3
Regulation and Governance	4
Ownership Structure	4
Institutional Arrangements	5
Regulatory Commission of Alaska (RCA)	5
Power Cost Equalization Program	5
Village Improvement Fund	5
Policy Environment	5
NANA Region Strategic Energy Plan	5
Northwest Arctic Borough 2030 - Planning for our Future Comprehensive Plan	6
City of Kotzebue Comprehensive Plan	6
Alaska Energy Pathway Toward energy independence	6
United States Energy Policy Act	6
Historic Shift and Embeddedness	6
Relationships	7
Local Capacity and Innovation	7
Community Energy Plan	7
Community Energy Champion	7
Human Capital	7
Community Investments	8
Energy Programs and Incentives	9
Community Energy Source Potential	10
Priorities	10
Vulnerabilities and Security	11
Power Disruptions	11
Fuel Supply	11
Infrastructure	11
Renewables Integration	11
Economic Vulnerability	11
Security	12
References	13

Introduction

Community Appropriate Sustainable Energy Security (CASES)

The Community Appropriate Sustainable Energy Security (CASES) Partnership is an international research initiative involving 15 northern and Indigenous communities and public and private sector project partners from Canada, Alaska, Sweden, and Norway.

Hosted by the University of Saskatchewan, the overarching goal of the CASES initiative is to reimagine energy security in northern and Indigenous communities by co-creating and brokering the knowledge, understanding, and capacity to design, implement and manage renewable energy systems that support and enhance social and economic values.

The CASES Partnership facilitates the sharing of experience so that not all communities have to experience the same challenges or recreate solutions, thereby expediting the learning experience and accelerating renewable energy innovation.

In Alaska, the CASES project activities are led by the Alaska Center for Energy and Power at

the University of Alaska Fairbanks with collaboration from the Institute of Social and Economic Research at the University of Alaska Anchorage.

Kotzebue, Alaska

Kotzebue, or Qikiqtaġruk, is a city in northwestern Alaska. It is located on a gravel spit in the Kotzebue Sound, 33 miles north of the Arctic Circle (Kikiktagruk Inupiat Corporation, 2020). Kotzebue is a hub for the region, providing services and access to multiple communities in Alaska's Northwest Arctic Borough.

Of Kotzebue's population of 3,270+ people, over 75 percent are Inupiat, who have inhabited the region for over 600 years. The site has been a trading center throughout history due to its central location. Kotzebue's economy today consists of both subsistence and private and public sector activities.



Regulation and Governance

Ownership Structure

This section describes the current energy system ownership structure in Kotzebue, including utilities and other services providers.

Electricity in Kotzebue is provided by the Kotzebue Electric Cooperative (KEA). KEA was formed in 1949 through a loan provided by the Rural Electrification Administration (Kotzebue Electric Association, n.d.). The utility is a cooperative owned by 840 members in the community.



KEA Wind and Solar (Amanda Byrd, 2021)

In addition to electricity, the community's energy system also includes heating fuel, aviation fuel, diesel fuel, propane, and gasoline. These services are all provided by Crowley, a private company (Crowley, n.d.). Vitus, another private company, provides heating fuel for which they lease space at the KEA tank farm.

Institutional Arrangements

This section outlines the key regulations and standards currently in place that impact energy in Kotzebue. This includes programs, policies, and regulations from various levels of government.

Regulatory Commission of Alaska (RCA)

Utilities in Alaska are regulated by the Regulatory Commission of Alaska (RCA). Most utilities in the state providing services to ten or more customers require a certificate issued by the RCA to operate (Regulatory Commission of Alaska, n.d.). The RCA then regulates the rates, services, and practices of the utilities.

Power Cost Equalization Program

For communities in Alaska, a program of interest is the Power Cost Equalization (PCE) program. The PCE is a state subsidy program that provides economic assistance to residents in communities in rural Alaska where the cost of electricity is three to five times higher than for customers living in urban areas of the state such as Fairbanks, Anchorage, and Juneau (Alaska Energy Authority, n.d.-a). The PCE is administered by the Regulatory Commission of Alaska and the Alaska Energy Authority. In Kotzebue, there are 1,084 residential customers and 26 community facility customers in the PCE program (Alaska Energy Authority, 2022). In fiscal year 2021, the average annual PCE payment per eligible customer in Kotzebue was \$713, with an effective residential rate of \$0.23 per kWh.

Village Improvement Fund

At the borough level, the Northwest Arctic Borough administers the Village Improvement Fund (VIF) to villages including Kotzebue. The funds from this program are provided by payments made by the Red Dog Mine. The fund is intended to support villages in undertaking capital projects and improvements in service (Northwest Arctic Borough, n.d.). In 2020, Kotzebue was awarded \$475,000 for KEA to undertake renewable energy design and permitting (Northwest Arctic Borough, 2021a).

Policy Environment

This section outlines key overarching policies or plans in the region that influence the direction of Kotzebue's energy system.

NANA Region Strategic Energy Plan

Published in 2009, the NANA region's Energy Plan was developed by the Northwest Arctic Borough, Northwest Inupiat Housing Authority, Alaska Village Electric Cooperative, Manilaaq Association, Kotzebue Electric Association, NWAB School District, and IRA/Traditional Councils. The objective of the plan is to improve "NANA Region energy security through strategic energy planning and improved understanding of available energy options" (Northwest Arctic Borough et al., 2008). The plan describes the region's energy vision, and outlines the results of a community survey and energy options analysis. As Kotzebue is a part of the NANA region, this plan provides overarching guidance to the community's energy system. The NANA region Energy Steering Committee is currently in the process of developing an updated regional energy plan.

Northwest Arctic Borough 2030 - Planning for our Future Comprehensive Plan

Updated most recently in 2021, the NWAB Comprehensive Plan outlines the region's goals and strategies moving towards 2030. Topics covered in the plan include land use and subsistence, culture and health, transportation, community facilities, infrastructure, and housing, economic development, and borough management, administration, and finance (Northwest Arctic Borough, 2021b). This plan is of importance for Kotzebue's energy future as the community's plans will likely have to align with the overarching goals and directions set out in the NWAB plan for the region.

City of Kotzebue Comprehensive Plan

Adopted by Kotzebue City Council in 2013, the City of Kotzebue Comprehensive Plan covers planning and implementation strategies for a wide range of sectors such as transportation, employment, housing, waste, and land use (Glenn Gray and Associates, 2013). The plan notes the importance of alternative energy, energy conservation, and energy efficient buildings as priorities for improving sustainability in the community.

Alaska Energy Pathway Toward energy independence

Alaska's state energy plan was published in 2010. Its objective is to provide Alaskans with affordable power, to achieve 20% energy efficiency improvements by 2020, and generate 50% of its electricity from renewables by 2025 (Alaska Energy Authority, 2010). This plan outline's the state's overall energy policy, therefore has implications for what is done at the community level.

United States Energy Policy Act

At the federal level, the Energy Policy Act covers energy production in the United States including energy efficiency, renewable energy, oil and gas, coal, Tribal energy, nuclear, motor fuels, hydrogen, electricity, climate change technology, and energy tax incentives (US EPA, 2013).

Historic Shift and Embeddedness

Little information about historic shifts and embeddedness could not be found during the document review. It is recommended that this topic be researched in further detail through interviews with those in the community.

Key milestones for Kotzebue's energy system include the first wind installation in 1997, and the first solar PV installation in 2015 (Kotzebue Electric Association, n.d.).

Relationships

Detailed information on the relationships between governments, organizations, entities, and the community of Kotzebue is not found in documents and websites reviewed for this report. It is recommended that this topic be covered in future interviews and discussions with those representing the various organizations in the region.

Organizations and entities relevant to energy in Kotzebue:

- Kotzebue Electric Association
- NANA Regional Corporation
- Kikiktagruk Inupiat Corporation
- Northwest Arctic Borough
- City of Kotzebue
- Native Village of Kotzebue
- University of Alaska Chukchi Campus
- Maniilaq Health Center
- Other NWAB Villages
- Federal and State government agencies

Local Capacity and Innovation

Community Energy Plan

Kotzebue does not currently have a community energy plan.

Community Energy Champion

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Human Capital

The Alaska Technical Center (ATC) is located in Kotzebue and provides a variety of training programs including some related to energy:

- Oil Fired Burners Installation and Troubleshooting;
- Toyostove Maintenance and Repair;
- Remote Maintenance Operator;
- Residential Electric;
- Water Plant Operators Training;
- Weil McLain's Boiler Installation and Troubleshooting;
- SEI PV Training (Alaska Technical Center, n.d.).

To gain a deeper understanding of the human capital in Kotzebue, it is recommended that interviews be conducted with key stakeholders in the community with expertise on the local skills related to energy systems.

Community Investments

This section outlines recent energy investments made in Kotzebue. Information on the projects listed below comes from a community profile put together by Deerstone Consulting (2022).

- Wind/Diesel Microgrid (2005)
 - KEA installed 15 AOC 66 kW wind turbines, 1 Vestas V15 65 kW wind turbine, 1 Northwind 100 kW wind turbine, and integrated the turbines with the microgrid. This project was funded by the US Department of Energy (\$4 million awarded in 1996), and was the first successful cold temperature wind-diesel integration in the US.
- Wind/Diesel Microgrid Expansion (2012)
 - KEA installed two EWT 900 kW wind turbines which were integrated into the microgrid. They also installed a 450 kW electric boiler at the hospital through an agreement with Maniilaq to buy excess wind power. This project was funded by the Alaska Energy Authority's Renewable Energy Fund. A total of \$8 million was awarded between 2008 and 2010.
- Water Plant Solar PV (2015)
 - A 21.06 solar PV system was installed. This project was funded with \$168,156 awarded by the Coastal Impact Assistance Program.
- Grid Stabilization Technology Upgrade (2012)
 - To enhance microgrid stabilization, an ABB PCS 100 STATCOM 1MVAr was installed.
- LED Streetlight Retrofit Borough-Wide (2015)
 - 275 LED streetlights were installed in Kotzebue. This project will provide the community with approximate savings over 25 years of \$30 million and 11.6 million gallons of diesel. This Northwest Arctic Borough project was funded by the State of Alaska's Grants to Municipalities.
- Biomass Feasibility Study (2017)
 - The opportunity to generate power from solid waste was evaluated and determined to be financially and technically feasible. If implemented, this could displace 30,000+ gallons of diesel fuel annually and divert 300 tons of waste from the landfill.

- Solar PV Array and Battery (2020)
 - 576 kW bifacial solar PV and inverters were installed along with a 950 kWh/1,130 kW battery storage system. This project was funded by the Department of Energy, the Village Improvement Fund, and Kotzebue Electric Association.
- National Park Service Wind-to-Heat (2022)
 - A 108 kW electric boiler was installed so that excess wind energy can power the National Park Service building.
- Battery Storage System Design (2022)
 - This design project of a 4 MW/MWh battery storage system aims to integrate battery storage with the microgrid to achieve diesel-off operation. This project is funded by the Alaska Energy Authority and Kotzebue Electric Association.

Energy Programs and Incentives

This section outlines energy programs and incentives available to Kotzebue for renewable energy projects, energy efficiency, or capacity building.

- Northwest Arctic Borough
 - Village Improvement Fund (VIF) The VIF is available to NWAB villages for capital projects and improvements to services (Northwest Arctic Borough, n.d.).
- US Department of Energy
 - The US DOE provides various funding opportunities for capital projects as well as training and capacity building (U.S. Department of Energy, n.d.).
- Kotzebue Electric Association
 - The local cooperative utility has capital funds available to support projects such as solar PV (Alaska Business Magazine, 2021).
- NANA Regional Corporation
 - NANA also has funding available for infrastructure projects such as Kotzebue's solar PV system (Alaska Business Magazine, 2021)
- National Rural Electric Cooperative Association (NRECA)
 - KEA has received funding from the NRECA Rural Electric Research program (NRECA Business & Technology Advisory, 2021)
- State of Alaska
 - The State government provides various programs for energy such as the Renewable Energy Fund (Alaska Energy Authority, n.d.-b).

- National Science Foundation (NSF)
 - KEA has also received NSF funding for it's wind turbines (NRECA Business & Technology Advisory, 2021).

Community Energy Source Potential

This information was not found during the document review. It is recommended that future research involves connecting with the utility to determine whether community energy source potential has been assessed, or can be done in the future.

Priorities

This section outlines community priorities for the future of energy in Kotzebue. Information below was sourced from an energy profile put together by Deerstone Consulting (2022). It is recommended that future research includes interviews and community meetings to further identify priorities.

- Affordability
 - Reducing the cost of residential space and water heating is a priority. Pathways to achieve this include constructing a bulk fuel storage system to be owned by the City/Tribe, expanding the renewable energy microgrid to incorporate the use of excess wind for heating, and the use of electric heating and/or heat pumps.
 - Implementing energy efficiency measures for buildings and replacing aging appliances can also be used to improve affordability.
- Diesel Reduction
 - Reducing the use of diesel is a priority. To achieve diesel-off operation of the energy system, additional battery storage and renewables should be installed. Exploring the possibility of installing new wind turbines at Cape Blossom Port contributes to the diesel reduction priority.
- Improve existing renewables
 - Reducing wind curtailment and optimizing the performance of the solar installation are priorities.
- Partnerships
 - Partnerships and engagement between NANA, the Native Village of Kotzebue, the City of Kotzebue, and Kikiktagruk Inupiat Corporation are priorities to improve community resilience, support cost reductions, and offer training opportunities.

Additional priorities identified in the City of Kotzebue's 2013 Comprehensive Plan include:

- Expand opportunities to develop support services for oil and gas and mining exploration and development in the region;
- Explore options for reducing fuel costs through bulk fuel purchases and market competition;
- Support efforts to develop alternative and renewable energy sources;
- Develop an Alternative Energy/Energy Conservation Plan for the city

Vulnerabilities and Security

Power Disruptions

Data on power disruptions was not found during the document review. Future research should include connecting with the utility to determine if this information is available.

Fuel Supply

Data on fuel supply was not found during the document review. Future research should include connecting with the utility to determine if this information is available.

Infrastructure

Data on infrastructure was not found during the document review. Future research should include connecting with government agencies who may have infrastructure data for Alaskan communities.

Renewables Integration

Data on renewables integration was not found during the document review. Future research should include connecting with the utility to determine if this information is available.

Economic Vulnerability

This section outlines potential aspects of economic vulnerability for Kotzebue. The City of Kotzebue's Comprehensive Plan from 2013 provides some information on this topic, however it should be supplemented through more detailed research in the future.

- High Cost of Living
 - The high cost of living, lower than average incomes, and high unemployment and poverty rates are of concern for Kotzebue's economy (Glenn Gray and Associates, 2013).
- Role as a Regional Hub
 - Kotzebue is a hub for the surrounding Northwest Arctic Borough Villages. This role is fundamental to Kotzebue's economy for several reasons:

- it serves as the transportation hub connecting the region to Anchorage for both freight and passengers;
- borough, state, and federal agencies use Kotzebue as a base for the region;
- it is a regional hub for the U.S. Postal Service;
- health care and education for the region are provided in Kotzebue; and
- goods and services for the region are centered in Kotzebue.
- To continue with its role as a regional hub, Kotzebue will need to provide adequate services and adapt to the changing climate, increases in tourism, fisheries, shipping, and potential oil and gas and mining development.
- Mining
 - The Red Dog Mine contributes to the region's economy both through employment as well as royalty payments. The future of the mine's presence in the area should be considered in terms of its impact on Kotzebue's economy.
- Commercial Fisheries
 - Kotzebue is home to a large commercial fishery for chum salmon, and a smaller one for sheefish. Overall harvest has been declining in recent years, therefore the role of commercial fisheries in Kotzebue's economy should be examined further.

Security

The City of Kotzebue's Comprehensive Plan outlines several natural and human caused hazards that pose risk to the community. Detailed information on the hazards identified below can be found in hazard and emergency plans that have been prepared by the City and the Northwest Arctic Borough.

- Natural Hazards:
 - Severe weather
 - Flooding
 - Erosion
 - Ice ridging, pileup, gouging, and storms
 - Thawing permafrost
 - Wildfires
 - Earthquakes
- Human Caused Hazards
 - Oil spills

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