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Kotzebue Strategic Energy Plan

Rebecca Meadows, Dana Truffer-Moudra,
and Weston Eaton

National Laboratory of the Rockies

The National Laboratory of the Rockies is a national laboratory of the U.S. Department of Energy, Office of Critical Minerals and Energy Innovation, operated under Contract No. DE-AC36-08GO28308.

Technical Report
NLR/TP-5700-97123
February 2026

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List of Acronyms

ACEP	Alaska Center for Energy and Power
AEA	Alaska Energy Authority
ANTHC	Alaska Native Tribal Health Consortium
ETIPP	Energy Technology Innovation Partnership Project
EV	electric vehicle
IPP	independent power producer
KEA	Kotzebue Electric Association
LCOE	levelized cost of electricity
NLR	National Laboratory of the Rockies
NVOK	Native Village of Kotzebue
NWAB	Northwest Arctic Borough
PCE	Power Cost Equalization (program)
PV	photovoltaics
REAP	Renewable Energy Alaska Project

Executive Summary

Kotzebue (Qikiqtarjuaq) is a resilient Arctic community in Alaska of 3,200 predominantly Iñupiat residents. Despite its subarctic climate and lack of road access, Kotzebue has steadily diversified its power system since 1995, reducing annual diesel fuel use for electricity by 20% through a combination of wind, solar, battery storage, and energy efficiency projects (Alaska Energy Authority 2025).

In 2024–2025, the Native Village of Kotzebue partnered with the Kotzebue Electric Association, the City of Kotzebue, the Northwest Arctic Borough, and NANA Regional Corporation to develop a strategic energy plan with support from the U.S. Department of Energy’s Energy Technology Innovation Partnership Project program. The planning process (Figure ES-1) included a baseline energy assessment, two community workshops, a resident questionnaire, and technical analysis to develop a strategic energy roadmap for the next five years.

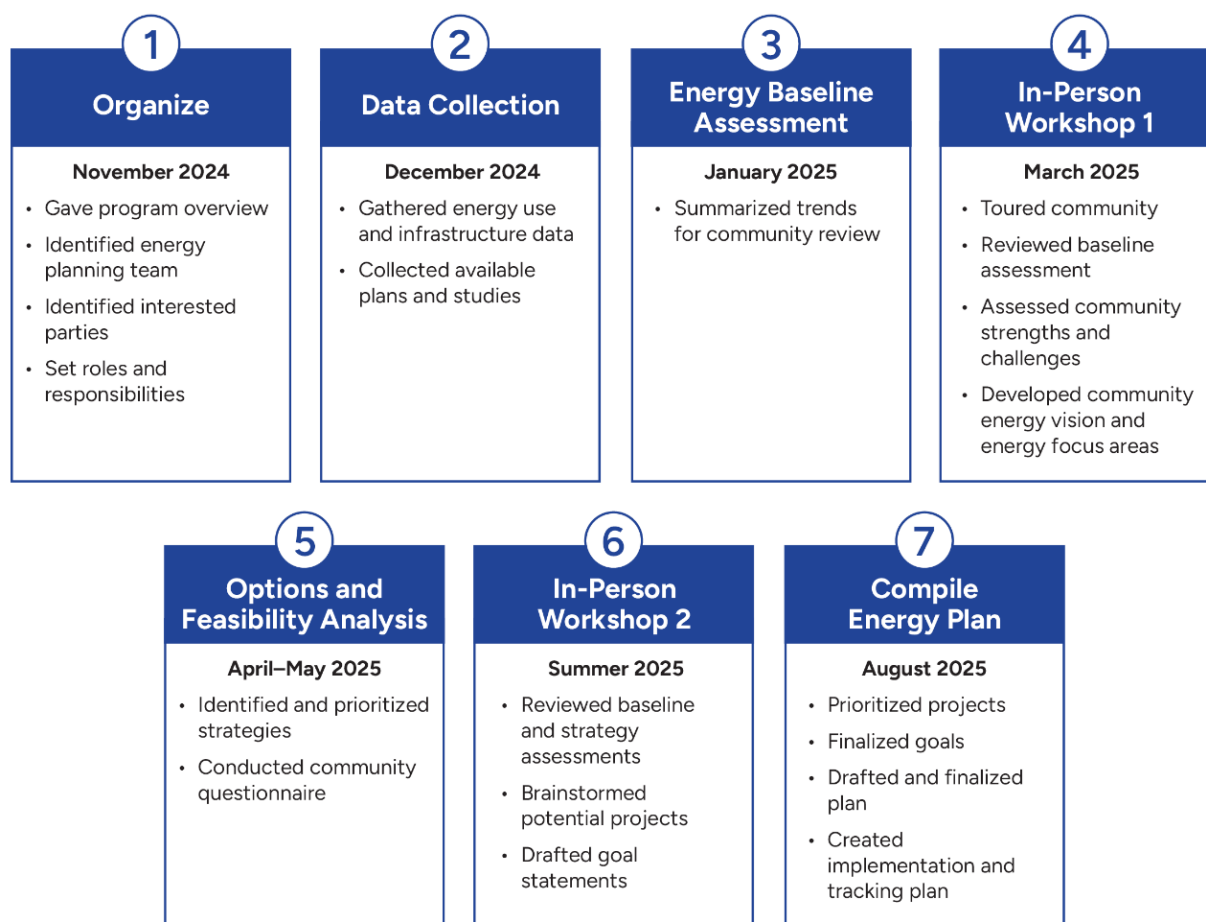


Figure ES-1. Kotzebue’s strategic energy planning process and timeline

Kotzebue’s top energy challenges include continued dependence on imported diesel, driven by the high cost and logistical complexity of shipping and storing fuel in a remote Arctic community as well as exposure to volatile global fuel prices. Diesel use is especially significant for heating, which accounts for nearly twice the community’s diesel use compared to electricity.

A majority of homes rely on fuel oil for heat, and nearly half were built before 1980 and require energy upgrades. The region has the highest home energy costs in the state with the cost of heating fuel creating a significant cost burden. Electricity costs also remain high, with residents paying some of the highest rates in the state, despite Power Cost Equalization¹ program subsidies.

Community input gathered through the 2025 questionnaire (172 responses) confirmed widespread concern over energy affordability and strong support for locally-generated energy—particularly wind and solar. Residents also expressed interest in workforce development, energy sovereignty, and increased community involvement in decision-making.

Kotzebue’s Strategic Energy Vision, developed through the in-person workshops, focuses on creating a reliable, affordable, and locally driven energy future. Six focus areas for the strategic energy plan emerged from community input: workforce development, community outreach and collaboration, existing energy generation technologies, economic and infrastructure development, new energy technologies, and energy-efficient housing.

During the second community workshop participants built on the initial planning work completed in the first workshop by reviewing results from the residential questionnaire and the options and feasibility analysis. They further refined project ideas and participated in a prioritization exercise to assess each project’s potential impact on the community’s energy vision and goals. The identified project opportunities, summarized in Figure ES-2, were grouped into six strategic focus areas that now guide the structure of the plan.

An options and feasibility study conducted by the National Laboratory of the Rockies synthesized recent analyses from Launch Alaska, Alaska Native Tribal Health Consortium, and Alaska Center for Energy and Power, all of which confirm that near-term planned projects by Native Village of Kotzebue and Kotzebue Electric Association provide a clear and cost-effective pathway to reducing expensive, imported fuel use for electricity by 50%. However, funding for these planned projects is uncertain, highlighting the need for diversified funding sources to support the near-term expansion of Kotzebue’s energy infrastructure.

Launch Alaska also identified that it is not possible to get to higher than 80.9% clean energy generation with large amounts of existing technologies (solar, wind, and storage) and identified small modular nuclear reactors as the best fit for maximizing clean energy contributions. While small modular nuclear reactors show long-term promise, their near-term deployment is constrained by high costs, public acceptance, and complex regulatory and permitting processes. The study concluded that hydrogen was not viable as a near-term solution for Kotzebue due to the need for surplus localized energy generation and a lack of hydrogen infrastructure in Alaska. However, it noted the long-term potential for hydrogen to play an economic development role in remote coastal communities, particularly through maritime exports (Launch Alaska 2023).

¹ The Power Cost Equalization (PCE) program applies to residents and community facilities in rural Alaska who do not have access to lower-cost, state-subsidized electricity like people in urban or road-connected areas



Figure ES-2. Results of project prioritization exercise in Workshop 2

A project prioritization matrix, developed through the workshops and subsequent discussions within the Community Energy Planning Team,² outlines immediate (2025–2027) and midterm (2028–2030) priorities (Table ES-1). In the short term, weatherization, energy efficiency, and

² The Energy Planning Team included members from the Native Village of Kotzebue, Kotzebue Electric Association, Northwest Arctic Borough, NANA Regional Corporation, Renewable Energy Alaska Project, and National Renewable Energy Laboratory as well as one local resident (see Table 1 in Section 1.3).

conservation is the most impactful strategy for reducing diesel usage and related household energy burdens.

Table ES-1. Kotzebue’s Project Priority Matrix

Category	Immediate: 2025–2027	Midterm: 2028–2030
Existing Energy Technologies	1a. Expand solar, wind, and battery energy storage 1b. Implement IPP Model 1c. Diversify potential funding sources	1d. Increase powerhouse and transmission efficiency and capability 1e. Conduct analysis to map road to 100% renewable energy microgrid
New Energy Technologies	2a. Investigate natural gas feasibility	2b. Investigate long-term energy storage technology feasibility to avoid curtailment of wind energy
Energy-Efficient Housing	3a. Reduce home energy costs through weatherization, energy efficiency, and conservation	3b. Increase energy efficiency awareness
Workforce Development	4a. Get kids involved and educated	4b. Evaluate Alaska Technical Center school offerings for needed trades
Community Outreach and Collaboration	5a. Enhance involvement of community and regional organizations in energy planning	5b. Expand community outreach and collaboration around energy topics
Economic and Infrastructure Development	6a. Explore local ownership of bulk fuel storage	6b. Resiliency planning

The Energy Planning Team developed an implementation roadmap outlining near-term actions and associated funding opportunities for each high-priority project identified in the strategic energy plan. To maintain momentum, an Energy Planning Steering Committee will continue meeting quarterly to advance priority projects, coordinate implementation, and pursue diversified funding sources.

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1 Introduction

The U.S. Department of Energy’s Energy Technology Innovation Partnership Project (ETIPP) provides strategic energy planning and technical assistance for remote and island communities to address local energy needs and enhance the long-term resilience of their energy systems. In 2024, the National Laboratory of the Rockies (NLR) and the Renewable Energy Alaska Project (REAP) partnered with the community of Kotzebue, Alaska, to provide strategic energy planning support as part of ETIPP’s fifth cohort of communities.

1.1 Community Overview

Kotzebue, known in Iñupiaq as Qikiktagruq, meaning “almost an island,” is located 26 miles north of the Arctic Circle in northwest Alaska. Serving as a regional hub, Kotzebue is home to approximately 3,100 residents, predominantly of Iñupiat descent (Northwest Arctic Borough [NWAB] n.d.). The community maintains a strong Iñupiat cultural presence, with deep ties to traditional practices and a continued emphasis on preserving the Iñupiaq language and way of life.

Kotzebue’s subarctic climate brings long, cold winters (–12°F to 10°F) and short, mild summers (40°F to 60°F). With no road access, the community is reached primarily by air, with seasonal barge service for goods and supplies. As a regional hub for the NWAB, Kotzebue provides essential healthcare, education, transportation, and administrative services to surrounding villages (DeerStone Consulting 2022).

Despite its isolation, Kotzebue has developed vital infrastructure to support its residents. The community hosts the Maniilaq Health Center, schools, a community college, and a range of local businesses and services. Historically reliant on diesel generators for electricity, Kotzebue began efforts in 1995 to diversify its energy sources and incorporate localized energy generation to reduce dependence on expensive, imported fuel.

The local economy is rooted in subsistence activities such as fishing, hunting, and gathering—traditions that continue to sustain families and cultural identity. Additional employment comes from government jobs, healthcare, education, mining, and some tourism. With an average household size of 3.36 people and around 845 households, Kotzebue’s median household income is approximately \$87,000, reflecting both the challenges and resilience of living in this unique Arctic community (NWAB n.d.).

1.2 Energy Accomplishments

Kotzebue has been an early adopter of diversified energy generation resources. Figure 1 highlights the community’s steady progress in expanding energy generation, improving efficiency, and building strong local partnerships. These milestones demonstrate the community’s commitment to reducing reliance on imported fuels and lowering energy costs. As of 2024, the community has reduced its annual electricity generation from diesel fuel by approximately 20% through a combination of wind, solar photovoltaics (PV), battery energy storage and energy efficiency projects.

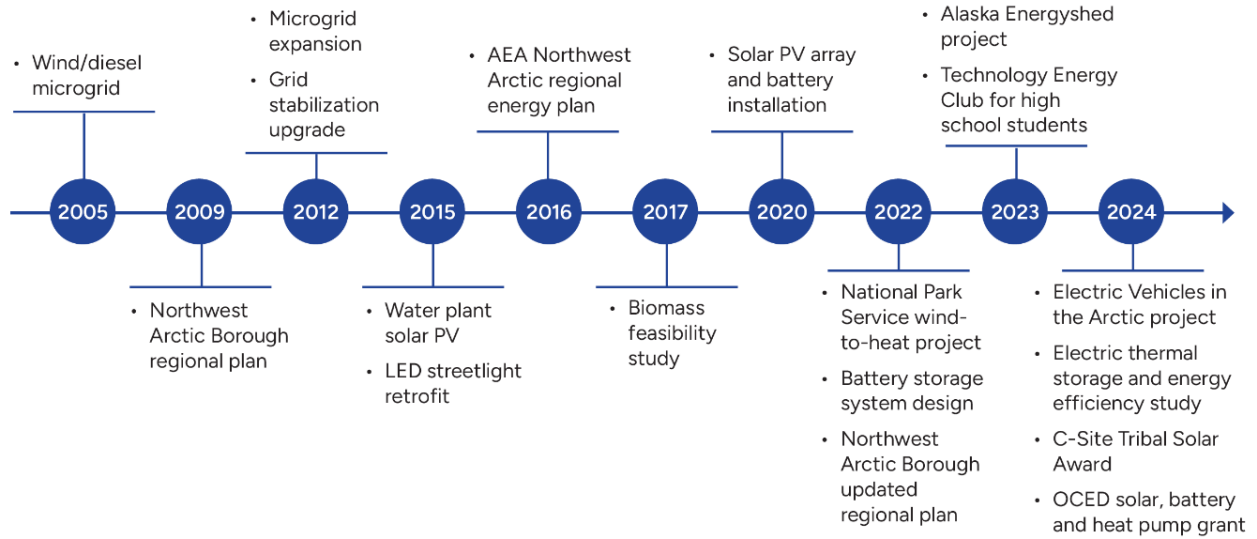


Figure 1. Kotzebue’s energy milestones, 2005–2024

1.3 Community Energy Planning Process

The Native Village of Kotzebue (NVOK) collaborated with local partners—including the Kotzebue Electric Association (KEA), the City of Kotzebue, the NWAB, and NANA Regional Corporation—to develop this unified strategic energy plan. Figure 2 outlines the timeline and process followed by the Community Energy Planning Team (Table 1), which met biweekly from November 2024 through August 2025. The planning process began with the collection of energy-related data and recent studies to complete a baseline energy assessment. Through a series of community workshops and technical assistance, the team evaluated energy options and prioritized strategies aligned with local priorities. The process concluded with a finalized strategic energy plan that includes an implementation roadmap connected to future funding and technical support opportunities.

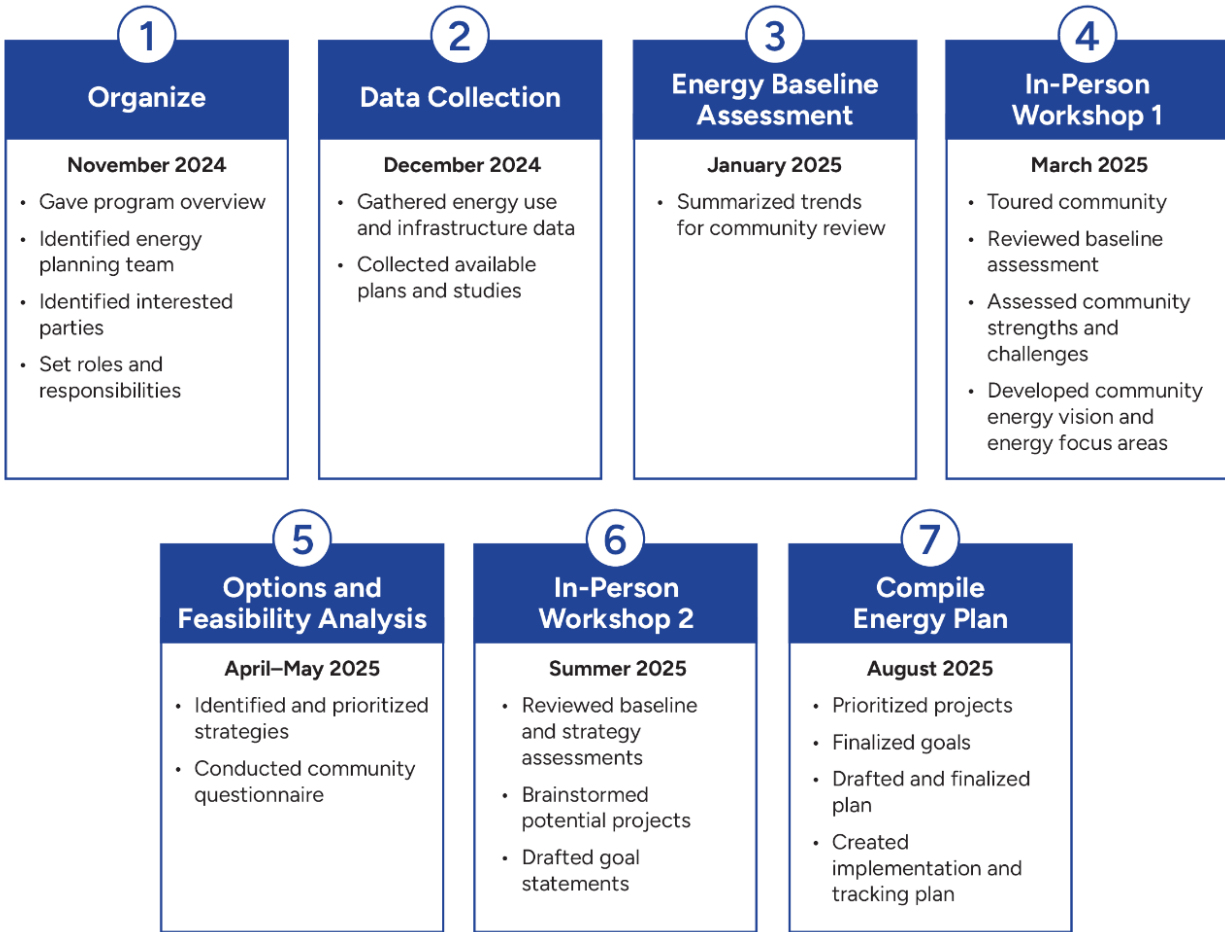


Figure 2. Kotzebue's strategic energy planning process and timeline

Table 1. Community Energy Planning Team

Name	Organization
Chad Nordlum	Native Village of Kotzebue (NVOK)
Saima Chase	NVOK
Frank Sollecito	Kotzebue Electric Association (KEA)
Tom Atkinson	KEA
Peter Sun	KEA
Ingemar Mathiasson	Northwest Arctic Borough (NWAB)
Shauntai Shroyer	NWAB
Sonny Adams	NANA Regional Corporation
Matthew Bergan	Resident
Haleigh Reed	Renewable Energy Alaska Project (REAP)
Savannah Crichton	REAP
Becki Meadows	National Laboratory of the Rockies (NLR)
David Martinez Biro	NLR
Dana Truffer-Moudra	NLR
Wes Eaton	NLR

2 Baseline Assessment

A baseline assessment was completed using a combination of energy data provided by KEA and publicly available reports, including the NWAB Regional Energy Plan (DeerStone Consulting 2022).

2.1 Electricity Infrastructure and Consumption

Kotzebue’s electric power system is owned and operated by KEA. The system includes a mix of diesel generators and other energy technologies, forming a hybrid microgrid designed to meet the community’s energy needs. The major components of the power system are summarized in Table 2.

Table 2. Electric Power Plant Description

Asset	Description
Diesel generators	Six diesel generators: Caterpillar 1135 kW, Caterpillar 725 kW, EMD 1441 kW, EMD 2865 kW (x2), and EMD 3080 kW
Solar PV	A 1,076-kW bifacial solar array installed in 2020 and 2023, along with a 20-kW behind-the-meter system installed at the water plant in 2015
Wind turbines	Two functional EWT DW 54-900 wind turbines (900 kW each, installed in 2012); additional turbines in need of repair include one Vestas V15 (65 kW, installed 2005), one Northwind (100 kW, installed 2000), and 15 AOC 15/50 turbines (66 kW each, installed between 1997 and 2005)
Battery storage	A 1,225-kW / 950-kWh SAFT lithium-ion battery system installed in 2015 provides spinning reserve and frequency regulation
Heat recovery system	A circulating water main system adds heat at the power plant, increasing water temperature from 38°F to 50°F during winter months
Electric boilers	Includes a 450-kW unit at Maniilaq Health Center (installed in 2014) and a 108-kW unit at the National Park Service (installed in 2022)
Other	Grid stabilization technology upgrade completed in 2012

Looking ahead, KEA and NVOK have several planned initiatives aimed at expanding energy capacity and improving system resilience. These include the installation of two 1-MW wind turbines and 700 kW of new solar PV. To increase energy storage capacity, the KEA plans to install a 4-MW lithium-ion battery system with 8–12 MWh of storage. A new wind-to-heat electric boiler is planned for installation at the community’s water treatment plant. In addition, KEA is promoting the adoption of electric vehicles (EVs) powered by surplus wind energy. However, uncertain funding for these planned projects remains a primary obstacle for meeting diesel reduction goals.

In 2024, Kotzebue generated a total of 21,659,492 kWh of electricity, with 20% of that generation coming from non-diesel energy sources (Figure 3), including wind and solar. Despite this progress, diesel fuel remains a critical part of the energy mix, with approximately 1,219,298 gallons consumed for electricity generation in 2024 (Alaska Energy Authority [AEA] 2025). According to the most recent demand data, the average electrical load in 2020 was 2.5 MW, with a peak load of 3.4 MW (NWAB n.d.).

In 2024, KEA achieved a diesel generation efficiency of 14.26 kWh/gal, surpassing the AEA benchmark of 13 kWh/gal for larger utilities and 12.5 kWh/gal for smaller utilities (AEA n.d.[a]). Additionally, KEA reported line losses of 8.1%, which is well below the maximum 12% threshold required to qualify for full reimbursement under the Power Cost Equalization (PCE) program (AEA 2019).

Electricity costs in Kotzebue remain high due to the significant expense of importing fuel and maintaining energy infrastructure in a remote Arctic environment. In 2024, diesel fuel was priced at \$3.27 per gallon (Figure 3), contributing to a retail electricity rate of \$0.47/kWh. Residential customers benefit from the PCE program,³ which lowered the residential effective rate to \$0.24/kWh for eligible households (AEA 2025). Despite this subsidy, energy affordability continues to be a primary challenge.

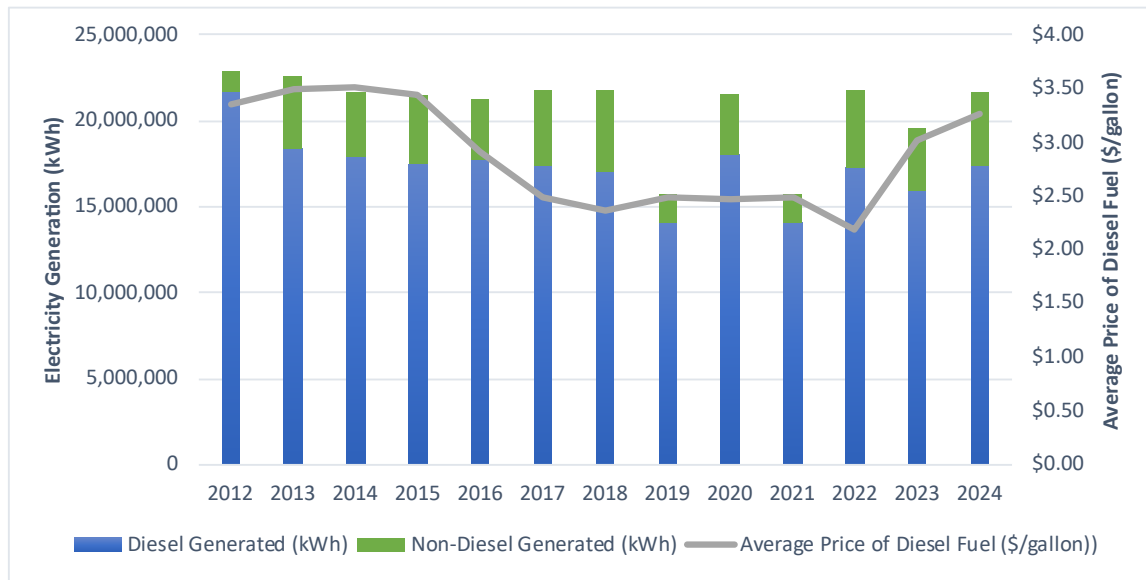


Figure 3. Electricity generation source and diesel fuel costs, 2012–2023

Data compiled from PCE annual statistical reports (AEA n.d.[b])

Figure 4 illustrates electricity consumption in Kotzebue by premise type, including residential, community, and non-PCE-eligible facilities. Facilities that do not qualify for PCE make up most of the total energy use, while residential users represent the second largest share of consumption. In rural Alaska, the PCE program provides subsidies only to specific customer types. Residential customers are eligible but only for the first 750 kWh per month—any usage beyond that is billed at the full retail rate (AEA 2025). Commercial customers, government facilities, and any community building for which operation is not paid for by the state or federal government or a private commercial organization are not eligible for PCE support (AEA 2019).

³ The Power Cost Equalization (PCE) program applies to residents and community facilities in rural Alaska who do not have access to lower-cost, state-subsidized electricity like people in urban or road-connected areas

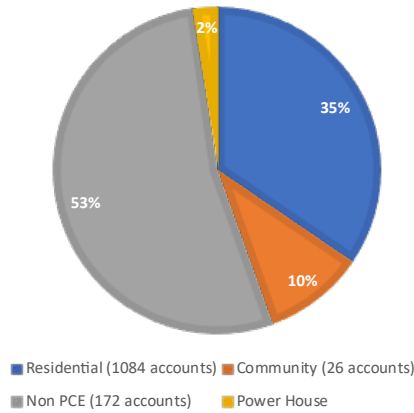


Figure 4. Electricity use by premise type

Data source: AEA (2025)

2.2 Thermal Infrastructure and Consumption

Figure 5 shows that Kotzebue uses nearly twice as much diesel fuel for heating as for electricity generation, highlighting the community’s continued dependence on fuel oil for space heating (DeerStone Consulting 2022). Approximately 93% of homes in Kotzebue use diesel as their primary heat source (Alaska Housing Assessment 2014). Heating fuel reached \$9.60 per gallon in 2024.

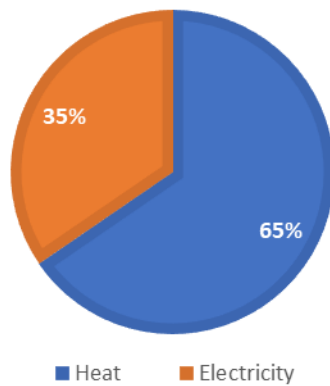


Figure 5. 2020 diesel fuel used for heating and electricity in Kotzebue

Data source: DeerStone Consulting (2022)

2.3 Additional Infrastructure

Fuel is delivered seasonally via tanker to Kotzebue Sound, then transferred by barge to a 6.1-million-gallon storage tank farm owned by Crowley at the city dock. This facility acts as primary storage for heating fuel and diesel used both locally and in regional villages (Crowley 2021).

Kotzebue’s bulk fuel system is owned and managed by several different entities—including KEA and private fuel distributors (Table 3). This fragmentation creates discrepancies in fuel pricing and maintenance processes, making cohesive energy planning more challenging.

Table 3. Kotzebue’s Bulk Fuel Storage Infrastructure

Data source: NWAB (n.d.)

Owner	Fuel	Capacity (gallons)
KEA	Diesel	2,150,000
Vitus	Ultra-low-sulfur diesel	650,000 (leased from KEA)
Vitus	Gasoline	300,000
Crowley ⁴	Diesel, gasoline, ultra-low-sulfur diesel, aviation gasoline, jet fuel	6,132,000

2.4 Energy Efficiency and Conservation

Approximately 47% of homes in the NWAB were built before 1980 and have not been retrofitted—higher than the state average of 39%—indicating a substantial opportunity for targeted upgrades (Alaska Housing Assessment 2014). This need is especially urgent given that space heating accounts for 68% of the average household's annual energy use (Figure 6), underscoring that energy efficiency and weatherization remain critical strategies for reducing diesel fuel usage and residential energy burden.

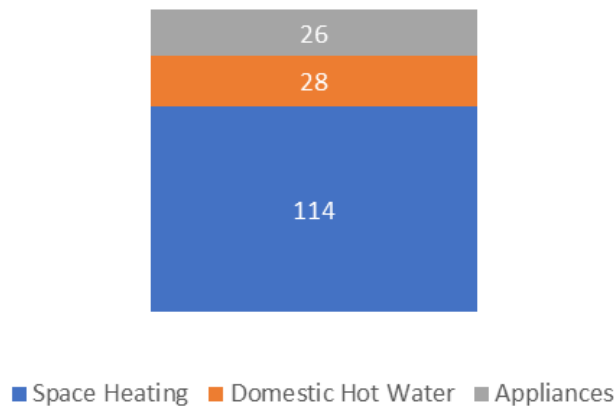


Figure 6. Kotzebue residential average annual energy by end use (million Btu)

Data source: 2014 NWAB Alaska Housing Assessment

2.5 Key Findings

Kotzebue consumes nearly twice as much diesel for heating as for electricity, with 93% of homes relying on diesel fuel oil for heating—a major cost burden that contributes to the highest home energy costs in the state. Space heating alone accounts for approximately 68% of household energy use. Compounding these costs, the housing stock in Kotzebue varies widely in terms of quality of construction, heating appliances, and related energy burden. Weatherization and energy efficiency upgrades offer immediate cost savings, particularly for heating. Greater local

⁴ Crowley serves the City of Kotzebue and surrounding northwest Arctic villages.

ownership and coordination of bulk fuel infrastructure presents another opportunity to reduce fuel pricing.

Current planned wind, solar, and storage projects through NVOK and KEA establish a clear and cost-effective path to 50% reduction in imported fuels used for electricity. Funding to install these projects is now uncertain, and diversifying future funding sources is a high priority.

3 Community Questionnaire

3.1 Methodology

The community questionnaire was designed to better understand which energy issues matter most to Kotzebue residents to guide the Community Energy Planning Team in finding the best solutions for Kotzebue. The goal was for as many residents as reasonable to complete the questionnaire to ensure the results reflected Kotzebue residents' attitudes and beliefs about energy. The ETIPP team and community partners set a target of obtaining 100 responses to achieve reasonable confidence in the results. The full survey results are included in Appendix B.

In May 2025 the ETIPP team mailed letters to every addressee in Kotzebue explaining the purpose of the questionnaire, how to access the questionnaire online, and how to obtain a paper copy alternative. The questionnaire closed July 1, 2025. Respondents had the option of opting in to a raffle for vouchers for credit on their household electricity bill. The questionnaire received a total of 172 responses, surpassing the team's initial goal.

The questionnaire included six sections: home energy concerns, home heating and energy efficiency, attitudes toward renewable energy projects and beliefs about outcomes, familiarity with energy programs, energy goals, demographics and participation. Each section utilized 5-point agreement scales or related metrics, multiple choice options, and write-in options. The online form was designed to require respondents to answer each question (excluding written comments, which were optional) before moving to the next section.

3.2 Findings

3.2.1 Home Energy Concerns

As Figure 7 highlights, the strongest home energy concerns in Kotzebue are related to energy costs—electricity, heating, and water. This is supported by write-in comments from several respondents. For example, written responses included: “I wish we didn’t have to pay so much to live here,” and “The high cost of living in Kotzebue drives locals into urban cities where it is more affordable.” Concerns may also drive an interest in participating in the energy planning process. For example, one respondent wrote, “I would like to get involved and keep the prices down.”



Figure 7. Home energy concerns as reported in the Kotzebue community questionnaire

3.2.2 Home Heating and Energy Efficiency

Most respondents report using diesel Toyo stoves, diesel boilers, wood, or electric baseboards or space heaters. Toyo stoves and boilers were the most common sources for home heat (Table 4).

Table 4. Number of Reported Heat Sources Utilized and Primary Heat Sources

Heat Source	Number Reported as Using	Number Reported as Primary Heat Source
Diesel Toyo stove	83	55
Diesel boiler	53	38
Wood	36	5
Electric baseboards	25	16
Electric space heater	21	6
Diesel furnace	17	9
Heat pump	3	1
I don't know/other ^a	23	24

^a This could include above categories

The most reported energy efficiency applications are the installation of efficient appliances in the past 10 years and LED lighting (Table 5). The most prevalent obstacles for installing energy efficiency applications include the availability of materials or service, costs, not owning one's home or building, and not knowing enough about options. These obstacles may indicate an opportunity for education or technical assistance.

Table 5. Number of Reported Energy Efficiency Installations and Obstacles to Installing Energy Efficiency Options

Energy Efficiency Installations	Number Reported as Using	Obstacles for Energy Efficiency Installation	Number Reported as Obstacles
Efficient appliances installed in the past 10 years	91	Availability of materials or service	81
LED lighting	86	Up-front cost is too high	72
Programmable thermostat	44	Don't own home or building	53
Updated insulation or other weatherization	43	Don't know enough about my options	43
Heat pump	12*	Have not found the time	16
I don't know	30	Not interested/not my responsibility	10

3.2.3 Attitudes Toward Local Energy Generation and Other Energy Projects

Respondents were asked to indicate their attitude, from very negative to very positive, toward local energy generation, including solar, wind, biomass, and biogas. Respondent attitudes were overwhelmingly positive for local energy generation, with solar and wind reporting over 90% positive or very positive attitudes (Figure 8). Biomass and biogas have more variable results. The percentages of positive or very positive attitudes reported for biomass (55%) and biogas (70%) were notably less than for solar, wind, or local energy generation in general. Additionally, 18% and 21% of responses were “I don’t know” for biomass and biogas, respectively, which can signal an opportunity for education.

What is your attitude toward adding or expanding these particular renewable energy projects in Kotzebue?

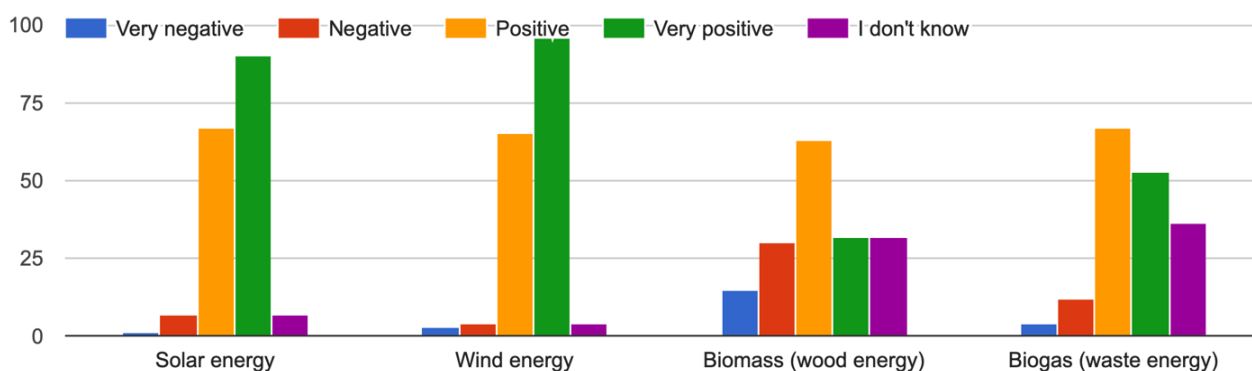


Figure 8. Attitudes toward varied energy technology options in Kotzebue as reported in the community questionnaire

Respondents were also asked to indicate their attitude toward other energy options, including adding or upgrading diesel generators, a small nuclear reactor, battery energy storage, electrification, thermal energy sources, heat pumps, and a heat oil buying group. Of these, diesel generator upgrades had the highest agreement (87%). Other technologies received a notable level of disagreement: small nuclear reactor (41%) and additional diesel generators (28%). “I don’t know” is an important category throughout the questionnaire results as it may reflect an opportunity for community education. Most all the other energy options included in the questionnaire received at least 15% “I don’t know” responses; the highest percentages of “I don’t know” responses were for small nuclear reactor (27%) and electrification (28%).

3.2.4 Beliefs About Energy Outcomes

The questionnaire also measured beliefs about positive energy outcomes. Overall attitudes about energy options in Kotzebue can be interpreted from the responses. Most respondents agreed or strongly agreed that local energy projects in Kotzebue would lead to positive outcomes like reduced electricity bills (87%), improved quality of life (87%), more reliable electricity (84%), improved air quality (84%), improved water quality (70%), job creation (89%), revenue creation (72%), benefits for wildlife (77%), and benefits for natural areas (72%). Uncertainty, reflected in “I don’t know” responses, as well as disagreement that local energy generation would provide these benefits was highest for three outcomes: improved water quality, benefits for wildlife, and benefits for natural areas.

3.2.5 Familiarity With Energy Programs

Level of familiarity (never heard of it, somewhat familiar, familiar, very familiar) with three key energy programs in Kotzebue were included in the questionnaire. Of these, the Alaska PCE Program was the most familiar for respondents (41% report being familiar or very familiar), followed by the NVOK Energy Project (16%). The independent power producer (IPP) model was by far the program that respondents were the least familiar, with 66% of respondents reporting “never heard of it.” These findings suggest opportunities for education and outreach on these energy programs.

3.2.6 Energy Goals

The questionnaire included scale items measuring level of importance (not at all important, somewhat important, important, very important, I don’t know) for five goals for energy planning in Kotzebue. Of these, “making energy affordable for all users” received the highest percentage of very important (80%) responses, followed by “Kotzebue’s right to decide how our energy resources and lands will be used or developed” (energy sovereignty) (69%); “reducing Kotzebue’s reliance on fossil fuels to address climate change” (67%); “managing threats or disruptions to affordable and reliable energy (energy security)” (65%); and “reducing reliance on energy sources from outside our local area (energy independence)” (56%). Written comments aligned with these responses. One respondent wrote, “I would like to see an independent, sustainable, and reliable source for Kotzebue’s future energy.” Another comment emphasized Kotzebue’s role as a leader in diversified energy generation in rural Alaska: “Kotzebue has been a model for what renewable energy looks like in rural Alaska. I think it is important that we continue that path.”

3.2.7 Demographics and Participation

Demographic questions help with evaluating the extent to which respondents reflect the broader community in Kotzebue. Most respondents live in Kotzebue year-round (96%). Respondents reflect a range of levels of education, including high school graduate (25%), some college (21%), trade school (11%), associate's degree (6%), bachelor's degree (18%), and graduate degree (11%). With respect to age, 38% of respondents were under 45 years old, and respondents were nearly equally female (52.4%) and male (47.6%). About two-thirds of respondents report Tribal membership while one-third report not being a Tribal member. Overall, these demographics suggest that the questionnaire reflected a wide range of age and education levels and captured perspectives from male, female, and Tribal and non-Tribal Kotzebue residents.

Finally, the questionnaire queried respondent interest in participating in the energy planning process in two ways. First, the questionnaire asked, "Are you interested in joining community meetings to review questionnaire results and help plan Kotzebue's energy future?" which provides an indicator for level of motivation to support the energy planning process. Over half—58% of respondents—indicated "yes." A second item asked whether respondents wanted to receive email updates about community meetings and other opportunities to participate in planning Kotzebue's energy future. About two-thirds indicated "yes." Together, these results suggest strong opportunity for community involvement in the energy planning process going forward.

4 Energy Vision and Goals

As part of Kotzebue’s strategic energy planning process, the Community Energy Planning Team convened two workshops to engage residents, share information, and gather input on future energy priorities. The first workshop, held in Kotzebue on April 24, 2025, introduced the ETIPP strategic energy planning process, reviewed the baseline energy assessment, and led participants through a collaborative brainstorming exercise (Appendix A).

Workshop 1 participants (Figure 9) identified key community energy strengths, including forward-thinking leadership, a strong culture of mutual support and resilience, and the trilateral partnership between NVOK, the City of Kotzebue, and Kikiktagruk Iñupiat Corporation. Kotzebue’s early adoption of energy generation technologies and ongoing reputation for energy innovation were also cited as key assets.

Participants also identified several persistent energy-related challenges. These included high and volatile energy costs, dependence on imported diesel, aging infrastructure, limited access to funding for upgrades, and gaps in local workforce capacity. Fragmented ownership of bulk fuel storage tanks was seen as a barrier to coordinated planning and more consistent fuel pricing.



Figure 9. Community Energy Planning Team and Workshop 1 participants

Photo from Haleigh Reed, REAP

Participants articulated a shared vision for Kotzebue’s energy future. This vision centers on reducing reliance on imported fuels, improving energy affordability, and fostering self-sufficiency through local energy generation, efficient housing, and local workforce development. Community members emphasized the importance of cultural continuity, food and energy security, and creating conditions that inspire younger generations to return and thrive in Kotzebue. This shared vision is summarized in the following statement:

The community of Kotzebue will create a reliable, affordable, growth-minded energy future. Local stakeholders and regional partners will collaborate to invest in appropriate energy technology, intelligent workforce development, and locally driven business development to

generate economic growth, build a sustainable future, and improve the quality of life for residents.

In addition to developing this vision, participants discussed strategic project goals and considered alignment with the broader NWAB regional energy priorities. The Energy Planning Team agreed to adopt the regional goals for this plan, which call for the following reductions in diesel use for heat and electricity:

- 25% decrease in imported fuel by 2030
- 50% decrease in imported fuel by 2050.

Identified project opportunities were grouped into common themes that now serve as the six strategic focus areas of this plan: workforce development, community outreach and collaboration, existing energy generation technologies, economic and infrastructure development, new energy technologies, and energy-efficient housing.

The second community workshop, held on June 24 in Kotzebue built on the first. It included a recap of Workshop 1, a review of results from the community energy questionnaire (Section 3), and a presentation of the options and feasibility analysis (Section 5). The workshop team is shown in Figure 10. Participants further developed project opportunities and took part in a prioritization exercise to evaluate each project's expected impact on the community's energy vision and goals (Figure 11).



Figure 10. Community Energy Planning Team and Workshop 2 participants

Photo from Haleigh Reed, REAP



Figure 11. Results of project prioritization exercise in Workshop 2

The project list and initial ranking were used by the Community Energy Planning Team to finalize a list of high-priority projects and actions when compiling the implementation plan.

5 Options and Feasibility Study

This section compiles a range of recent technical studies and modeling efforts—which were conducted independently of ETIPP—to provide a comprehensive view of Kotzebue’s energy options. By reviewing these existing analyses, the ETIPP team sought to understand the community’s full range of technological possibilities, economic implications, and implementation challenges. These findings served as a foundation for community discussions, helping participants assess what is achievable, prioritize potential projects, and shape the strategic goals of this energy plan.

5.1 Existing Energy Generation Technologies

Kotzebue’s hybrid power system includes six diesel generators, 1.8 MW of wind, 1,076 kW of solar PV (Figure 12), a 950-kWh lithium-ion battery system, and two electric boilers. Together, these technologies have reduced annual diesel fuel use for electricity by approximately 20% (AEA 2025).



Figure 12. Kotzebue’s wind and solar projects

Photo by Amand Byrd, Alaska Center for Energy and Power

To support KEA’s goal of cutting diesel fuel use for electricity by 50%, Launch Alaska conducted a HOMER[®] Pro modeling study in 2021. The study analyzed multiple scenarios incorporating additional wind, solar, and battery storage to determine the technical and economic viability of further diesel displacement. In all scenarios modeled, there were extended periods—up to 27% of the year—when diesel generators could be completely shut down due to sufficient local energy generation and storage capacity. The analysis showed that a 50% diesel reduction is technically achievable while maintaining a levelized cost of electricity (LCOE) comparable to the current system (Table 6). Cost savings are further improved if capital investments are grant-funded or if diesel prices increase (Launch Alaska 2021).

Table 6. Summary of Technical and Economic Results of 2021 Launch Alaska Study

Data source: Launch Alaska (2021)

Configuration	Wind Capacity [kW]	Solar Capacity [kW]	Storage Capacity [kWh]	Excess Generation [%]	Renewable Contribution [%]	LCOE [\$/kWh]
Base Case	2 x 900	500	950	0	22.3	0.175
Configuration 1	2 x 900 + 2,000	500	4,500	3.1	44.9	0.175
Configuration 2	2 x 900 + 2,000	1,500	9,000	2.9	48.6	0.190
Configuration 3	2 x 900 + 4,000	500	9,000	15.4	55.4	0.204

In parallel, the Alaska Native Tribal Health Consortium (ANTHC) led a study with NVOK and KEA to evaluate a 2–4-MW wind project under an IPP model. The analysis concluded that two 1-MW EWT wind turbines could reduce diesel use by an additional 28%, generate \$842,000 in annual net revenue for NVOK, and provide annual household subsidies between \$700 and \$1,000. Adding 4 MWh of storage along with two 1-MW EWT wind turbines could increase diesel displacement to 33%, raise net revenues to \$970,000, and enable slightly higher household energy subsidies (ANTHC 2022).

Leveraging these recent studies, KEA and NVOK are planning to expand the power system with 2 MW of wind, 700 kW of solar PV, and 4–12 MWh of battery storage. Together, these projects offer a clear and cost-effective pathway to achieving a 50% reduction in diesel use for electricity. The 700-kW solar array—led by NVOK and structured through a power purchase agreement with KEA—is expected to be installed within 2 years. However, securing capital for the wind and battery components remains a critical challenge, highlighting the need for diversified funding sources to support the near-term expansion of Kotzebue’s energy infrastructure.

5.2 New Energy Technologies

Recent studies—including the 2025 Alaska Center for Energy and Power (ACEP) Earnest Study (McKinley, Wilbur, and Whitney 2025), the 2023 Launch Alaska Roadmap to 100%, and several technology-specific assessments have evaluated a range of emerging energy generation and use technologies to identify pathways beyond a 50% reduction in imported fuel for Kotzebue.

5.2.1 Wind and Battery Storage

Similar to the 2021 Launch Alaska and 2022 ANTHC studies, modeling conducted by the ACEP Earnest Study found that deploying 2 MW of wind capacity and 4–16 MWh of lithium-ion battery storage could enable Kotzebue to achieve a 50% annual renewable energy contribution at a lower net present cost than the current diesel-dominated base case. Medium-term scenarios targeting 75% renewable generation were evaluated, indicating that 5 MW of solar PV, 5.8 MW of wind, and 16 MWh of battery storage could reduce net present cost by approximately 1.1% compared to the base case, which is the existing power system summarized in Table 2 (McKinley, Wilbur, and Whitney 2025).

5.2.2 Hydrogen

Hydrogen has been evaluated across multiple recent studies as a potential long-duration energy storage solution to complement intermittent energy generation technologies in high-variable energy penetration scenarios. In the ACEP Earnest Study, medium-term modeling scenarios explored a hybrid configuration consisting of 4.7 MW of solar PV, 5.8 MW of wind, 12 MWh of battery storage, and a pilot-scale hydrogen system—including an 800-kW electrolyzer, 500-kW fuel cell, and 840 kg of compressed hydrogen. This scenario produced a net present cost only 1.3% higher than the base case (McKinley, Wilber, and Whitney 2025). However, higher renewable penetration targets ($\geq 90\%$) would require significantly more infrastructure, resulting in steep capital costs that are economically infeasible under current conditions.

The 2024 ACEP *Alaska Hydrogen Opportunities Report* (Whitney et al. 2024) reinforced these findings by identifying green hydrogen as a long-term but not near-term opportunity for rural communities like Kotzebue. While Alaska possesses abundant renewable resources capable of supporting hydrogen production, the report emphasized that hydrogen is unlikely to be cost-effective at village scale in the short term due to the lack of regional supply chains, hydrogen-ready infrastructure, and scalable markets (Whitney et al. 2024). Instead, it positioned hydrogen as a strategic future export commodity—especially for communities with strong wind resources and access to marine transportation—highlighting potential markets in ammonia, methanol, and maritime fuels, provided the right infrastructure and policy conditions emerge.

Similarly, the Launch Alaska Roadmap to 100% concluded that hydrogen was not viable as a near-term solution for Kotzebue. The study cited the same barriers—such as the need for surplus renewable generation, costs of compression and storage systems, and a lack of hydrogen infrastructure in Alaska—as reasons for excluding hydrogen systems from its final modeling scenarios. However, it also noted the long-term potential for hydrogen to play an economic development role in remote coastal communities, particularly through maritime exports (Launch Alaska 2023).

5.2.3 Small Modular Nuclear Reactors

To exceed 80% renewable energy, Launch Alaska identified small modular nuclear reactors as a potentially viable option. The modeling found that even with aggressive solar, wind, and storage deployment, approximately 80% diesel reduction was the upper limit without significantly overbuilding renewable capacity. Small modular nuclear reactors could bridge this gap by offering dispatchable, compact, and reliable baseload power. However, the roadmap noted implementation challenges: high capital costs, complex permitting, uncertainty with operations and maintenance, waste disposal, and potential public opposition (Launch Alaska 2023).

5.2.4 Tidal Energy

Tidal energy was evaluated in the *Kotzebue Channel Marine Energy Resource Assessment* as a potential resource for local electricity generation. The study found that water velocities in the Kotzebue Channel typically reach up to 1.5 m/s, a level suitable only for hydrokinetic devices designed to operate in low-flow environments (Brown et al. 2023). The authors recommended surface-mounted or buoyant devices to access faster-moving surface currents but noted that such systems would require robust anchoring and maintenance strategies. Numerous challenges to development remain, including the presence of debris and sediment, which could impair device

reliability, and permitting hurdles, which are often lengthy and expensive for marine energy projects⁵. Overall, while tidal energy remains theoretically feasible for Kotzebue, practical and economic limitations make it a lower priority compared to other renewable options.

5.2.5 Biomass From Municipal Solid Waste

Biomass energy sourced from municipal solid waste was evaluated as a viable strategy to reduce diesel consumption for space heating in Kotzebue. According to the 2012 feasibility study conducted by Tetra Tech (2012), a gasification system could convert local waste streams into usable thermal energy, offsetting over 30,000 gallons of diesel annually for city-owned facilities. Two high-potential applications were identified: providing district heat to the city's public works campus and preheating raw water in the distribution system to mitigate freeze-up risk. In addition to displacing fossil fuels, the system would divert approximately 300 tons of waste per year from the landfill.

5.2.6 Offshore Wind

The 2023 NLR (formerly NREL) and BOEM feasibility study (Meadows et al. 2023) on Alaska offshore energy potential found that while community-scale offshore wind systems were not economical for small, remote Alaskan communities like Kotzebue, larger utility-scale installations (≥ 1 GW) could be cost-competitive under the right market conditions. The study specifically cited hydrogen production as a potential value stream that could make offshore wind more viable for remote communities in the future. In this vision, offshore wind farms could generate excess electricity for green hydrogen production, which could then be stored, used locally, or exported via maritime infrastructure—creating a new economic role for communities like Kotzebue as hydrogen production and export hubs (Meadows et al. 2023).

5.2.7 Electric Vehicles

EV adoption in Kotzebue faces significant constraints due to cold-weather performance limitations, lack of charging infrastructure, and the region's high electricity rates. EV efficiency declines sharply in subarctic temperatures: studies show that in conditions below -18°C (0°F), energy consumption per mile can double compared to mild climates, primarily due to battery thermal regulation and cabin heating loads (Wilber and Schmidt 2024). This reduced efficiency leads to shorter range, longer charging times, and increased operating costs. Additionally, NLR's cold-weather EV assessment found that charging in remote Alaska communities like Kotzebue would likely occur at nonsubsidized rates exceeding $\$0.40/\text{kWh}$, since PCE benefits typically do not apply to EV loads. Under these conditions, EV fueling costs can surpass the equivalent cost of gasoline on a per-mile basis, especially during winter months (Esparza, Truffer-Moudra, and Hodge 2025).

Despite these challenges, EVs may still be suitable for limited, in-town use—particularly if locally owned or shared vehicle fleets are paired with dedicated charging infrastructure at homes, businesses, or municipal facilities. Public education, rate design reforms, and charger deployment could help overcome some barriers, but widespread EV adoption will remain

⁵ Lessons learned collected in June 2025 conversation with Jon Salmon of Igiugig Village Corporation.

constrained without significant improvements in cold-weather battery performance, affordable fast-charging systems, and community-scale infrastructure planning.

5.2.8 Heat Pumps

Cold-climate heat pumps (Figure 13) are gaining attention as a viable space heating technology for the NWAB, offering dual benefits of winter heating and summer cooling, along with improved indoor air quality (DeerStone 2022). Although historically limited by performance drops below -5°F , recent advances are expanding their operational range, enabling functionality in Arctic climates with appropriately sized systems and backup heating (NWAB 2023). The Alaska Housing Finance Corporation’s 2019 *Weatherization Program Impacts Report* noted that heat pumps—when paired with weatherization upgrades—can significantly reduce fuel oil use and improve energy affordability in rural homes, provided local electricity costs remain low relative to fuel prices (Alaska Housing Finance Corporation 2019).

However, cost-effectiveness remains sensitive to the ratio between fuel and electricity prices. Heat pumps only provide meaningful savings where heating fuel is expensive, and electricity is comparatively affordable (NWAB 2023). Additionally, widespread adoption without coordinated planning could stress Kotzebue’s electrical grid. If many systems run simultaneously during cold snaps, they could increase peak demand beyond current capacity, underscoring the need for integrated resource planning (NWAB 2023).

To evaluate these trade-offs, a cold-climate heat pump was installed for testing at a Community Energy Planning Team member’s home in Kotzebue (Matt Bergan). This demonstration is part of an ongoing heat pump installation initiative by the NWAB, which also includes community outreach, housing stock analysis, and data collection to identify suitable retrofit candidates. A regional installer training was planned at the Alaska Technical Center in July 2025 to build local capacity for deployment and maintenance. With thoughtful planning and support, heat pumps could become an important part of the region’s strategy to reduce reliance on fuel oil and improve household resilience.



Figure 13. Heat pump demonstration in Kotzebue

Photos from Ingemar Mathiasson, NWAB

5.3 Energy-Efficient Housing

Kotzebue is advancing energy-efficient housing solutions to reduce reliance on diesel and lower home heating costs. A multi-year home heating field study—led by ACEP in partnership with KEA and NWAB—is piloting the use of electric thermal storage heaters powered by excess wind energy. The project aims to evaluate the technical and economic feasibility of using locally-generated electricity for space heating in Arctic homes. As of fall 2024, seven electric thermal storage heaters were installed and eight home retrofits completed, with ongoing monitoring of fuel and electricity use to assess system performance and cost savings. Preliminary findings are expected in 2025, with the potential to inform broader deployment across the region (University of Alaska Fairbanks 2024).

In parallel, through the State of Alaska’s Weatherization Assistance Program, approximately 32% of occupied homes in the NWAB have been weatherized. These retrofits typically achieve heating energy savings exceeding 30% while also delivering co-benefits such as improved indoor air quality, carbon monoxide protection, and safer living environments through ventilation upgrades and combustion safety measures (Alaska Housing Finance Corporation 2019; DeerStone 2022). Together, these efforts highlight the potential for integrated energy efficiency and locally-generated heating strategies to reduce household energy burdens and enhance community resilience.

5.4 Economic and Infrastructure Development

Kotzebue is pursuing broader economic development opportunities, such as completing the Cape Blossom Road and a proposed deep-water port. These investments could improve freight logistics and enable bulk fuel storage. Diversification of the local economy is a priority considering the planned Red Dog Mine closure in 2031. Related projects include fish processing facilities and natural gas exploration, with dual-use community infrastructure—like a shared armory—offering additional value.

There has been ongoing discussion around the future of the Cape Blossom port and road project, but no major updates were reported around the time of writing. The project could have a substantial impact on the community’s energy infrastructure. In particular, the project presents a key opportunity to establish a community-owned tank farm and establish local control over fuel pricing and storage. The City of Kotzebue secured a \$2.45 million federal grant in late 2023 through the U.S. Department of Transportation’s Port Infrastructure Development Program to fund the feasibility and design phases of the Cape Blossom port (Naiden 2023; City of Kotzebue 2024). To move this vision forward, a comprehensive feasibility study is needed to explore infrastructure design and ownership models (Northwest Arctic Leadership Team 2025).

6 Implementation Roadmap

The project priority matrix in Table 7 was developed collaboratively by the Kotzebue Energy Planning Team through a series of discussions, guided by insights from both community workshops as well as available funding pathways.

Table 7. Kotzebue’s Project Priority Matrix

Category	Immediate: 2025–2027	Midterm: 2028–2030
Existing Energy Technologies	1a. Expand solar, wind, and battery energy storage 1b. Implement IPP Model 1c. Diversify potential funding sources	1d. Increase powerhouse and transmission efficiency and capability 1e. Conduct analysis to map road to 100% renewable energy microgrid
New Energy Technologies	2a. Investigate natural gas feasibility	2b. Investigate long-term energy storage technology feasibility to avoid curtailment of wind energy
Energy-Efficient Housing	3a. Reduce home energy costs through weatherization, energy efficiency, and conservation	3b. Increase energy efficiency awareness
Workforce Development	4a. Get kids involved and educated	4b. Evaluate Alaska Technical Center school offerings for needed trades
Community Outreach and Collaboration	5a. Enhance involvement of community and regional organizations in energy planning	5b. Expand community outreach and collaboration around energy topics
Economic and Infrastructure Development	6a. Explore local ownership of bulk fuel storage	6b. Resiliency planning

To support implementation of the strategic energy plan, the Community Energy Planning Team developed a 2-year roadmap that outlines specific actions and identifies potential funding opportunities for each high-priority project. It serves as a guide for advancing Kotzebue’s energy goals in a coordinated and practical manner. To ensure continued progress, an Energy Planning Steering Committee will meet on a monthly basis to track developments, support project execution, and pursue additional funding sources as new opportunities arise.

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Appendix A. Results of Workshop 1 Brainstorming Exercise

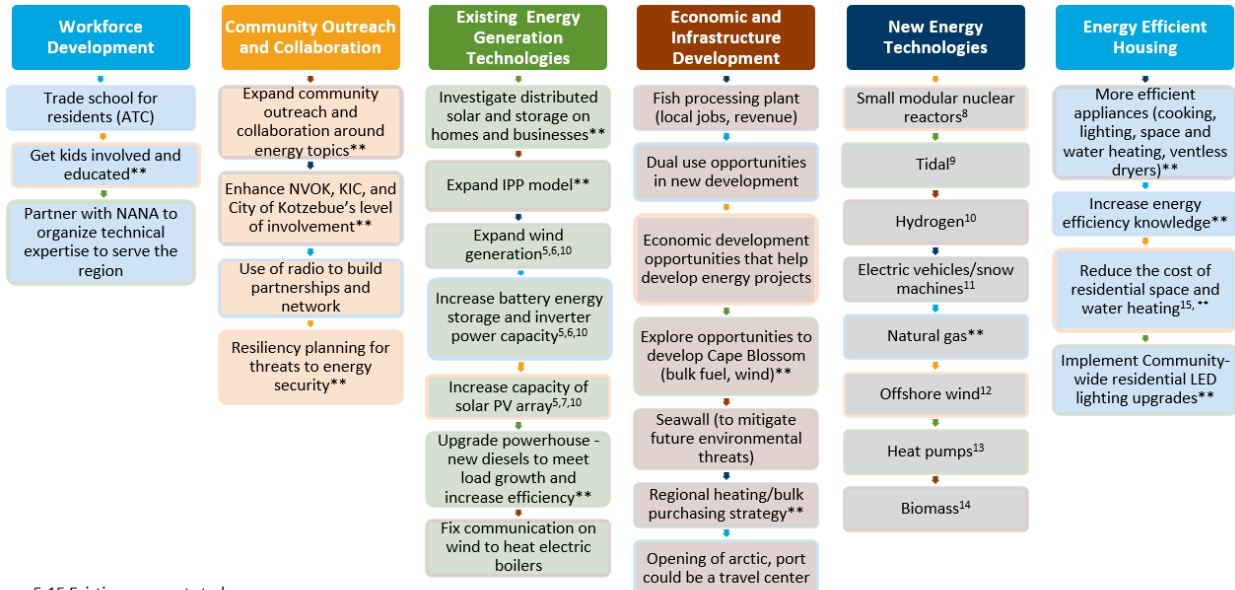
Workshop 1 Brainstorming: Community Energy Strengths

Leadership	Resource
<ul style="list-style-type: none"> • Forward thinking leaders • Tri lateral group: NVOK, City of Kotzebue, and Kikiktagrak Inupiat Corp. • Tribal leadership 	<ul style="list-style-type: none"> • 24-hour daylight/solar resource during summer • Wind resource • Solar and wind infrastructure in place
Culture	Remote Location
<ul style="list-style-type: none"> • Community that helps each other • Resilient people • Willingness to work together/unity • Willingness to innovate • Native values instill collaboration • Community events strengthen collaboration 	<ul style="list-style-type: none"> • High costs allow room for innovation • Testing in arctic helps other communities
Partnerships	Past projects
<ul style="list-style-type: none"> • Partnerships with outside organizations because of innovation reputation Hub community, cheaper than down river, center of exchange • State, Manilaq church proved energy assistance to those in need • Mental health study being conducted • Arctic programs available/Arctic research hub 	<ul style="list-style-type: none"> • Early adopter of renewable energy • Reduced diesel fuel usage by 25% through existing wind, solar and storage projects • Reputation of energy innovation/leadership • Diesels have run at KEA since the 50s and run efficiently

Workshop 1 Brainstorming: Community Energy Challenges

High Cost of Living	Bulk Fuel Storage
<ul style="list-style-type: none"> • High and volatile cost of diesel fuel • Shipping and logistics • Residents sometimes need to decide between food, heat, and light • Home heating costs • Not enough high paying jobs • Residents are an endangered species getting priced out of existence • Potential rate increases from KEA 	<ul style="list-style-type: none"> • No community owned tank farm but expensive to maintain • Difficult to collaborate to move things forward (KIC, City, Tribe, NANA, Manilaq)
Workforce Development	Community Collaboration
<ul style="list-style-type: none"> • Knowing about and accessing training • Local resources to install and maintain solar projects • Locals trained on renewable energy but then there are no job opportunities • Lack of trades people • Need for grant writers • Getting youth engaged 	<ul style="list-style-type: none"> • Siloed organizations (tribe, city, KIC not always working together) • Leadership changes results in starting over on initiatives • Community outreach - not everyone has facebook or radio • Clarity on what energy projects to move forward on
Building Resources	Electric Load Growth
<ul style="list-style-type: none"> • No local gravel resource, gravel is very expensive • Lack of building supplies makes it difficult for home improvements • New tribal building can't afford energy upgrades 	<ul style="list-style-type: none"> • Ability to expand powerhouse to meet demand • Replacement of outdated diesel equipment and aging infrastructure • Increasing residential electricity demands • Keeping up with new/unknown technology • Lack of EV charging infrastructure • Electric snow machine range • Knowing how and when to use electronics • Estimating and meeting new load growth
Housing	Climate Adaptation
<ul style="list-style-type: none"> • Low quality housing/Cost barriers affect home quality • Many residents in one home reduces income qualifying programs • Homelessness/lack of housing • Not all homes have water and sewer (over 100 homes) • Heating during power outages 	<ul style="list-style-type: none"> • Melting permafrost • Flooding • Evacuation road to higher ground needed (Cape Blossom) • Access to land is changing • Environmental concerns with diesel use
	Available Funding
	<ul style="list-style-type: none"> • Need to improve request for funding from State of Alaska • Lack of funding

Workshop 1 Brainstorming: Community Energy Opportunities



- 5-15 Existing or recent study
- ** Potential for follow-on ETIPP support

Workshop 1 Brainstorming: Community Energy Vision



Appendix B. Kotzebue Survey Results Summary

B.1 Purpose and Methods

The community questionnaire was designed to understand what energy issues matter most to Kotzebue residents to guide the Community Energy Plan in finding the best solutions for Kotzebue. The goal for number of responses was for as many residents as reasonable to complete the questionnaire to ensure the those leading the energy planning process could be confident the results reflect salient attitudes and beliefs about energy among Kotzebue residents. To do this, in May 2025, the ETIPP team mailed letters to every addressee in Kotzebue (n=1914) explaining the purpose of the questionnaire, how to access the questionnaire online, how to obtain a paper copy alternative. Addresses were obtained from public voting records. Letters were written from and signed by an individual leading the local energy planning process. Following this, in early June 2025, a postcard reminder was mailed to each PO Box (n=982). The questionnaire closed July 1. Respondents could opt in to a raffle for vouchers for credit on their household electricity bills, specifically, for one of two \$500 credit vouches to the local electric utility, provided by the ETIPP grantee. Along with the letter and postcard, community partners and ETIPP team members conducted radio outreach and posted printed announcements in high traffic areas throughout the community including the grocery store, post office, and the city and tribal offices. The questionnaire was also mentioned during both in-person events the ETIPP team held in Kotzebue in June. The questionnaire received a total of 172 responses. This is more than the 100 responses the ETIPP team and community partners set as a goal for obtaining enough responses for confidence in the results.

B.2 Survey Items

The questionnaire included six sections on home energy concerns, home heating and energy efficiency, attitudes toward renewable energy projects and beliefs about outcomes, familiarity with energy programs, energy goals, demographics and interest in participating in future community events related to energy planning. Each section utilized 5-point agreement scales or related metrics, multiple choice options, and write in options. The online form was designed to require respondents to answer each question (excluding written comments and the demographic sections which were optional) before moving to the next.

B.3 Findings Summary

All questions included in the questionnaire are documented below, including percentage of respondents choosing each particular answer.

YOUR ENERGY CONCERNS

How concerned are you about each of the below? 172 responses					
	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	I don't know
Reducing my energy usage	4.1%	16.3%	33.1%	44.8%	1.7%
The reliability of electricity for my home	7.6%	15.7%	27.9%	48.8%	
Relying on diesel fuel to heat my home	11.6%	10.5%	26.2%	44.8%	7%
Air quality in Kotzebue	10.5%	15.1%	32.6%	40.7%	1.2%
The cost of electricity		10.5%	23.3%	62.2%	3.5%
The cost of heating	1.7%	5.8%	20.9%	65.1%	6.4%
The cost of water	5.2%	10.5%	27.3	50%	7%

- Please share any other concerns about meeting your energy needs here: 47 responses**
- N/A
 - The cost of heating fuel is very expensive. I am concerned that our residents will spend most of their funds for heating and not much left for groceries.
 - Cost of everything is high
 - I'm sure everyone is worried about the prices going up. But I am thankful for the energy assistance we receive. I would like to get involved and keep the prices down.
 - I wish we didn't have to pay so much to live here.
 - We need as many back up plans as possible
 - With Inflation, having this opportunity to voice my concerns through this Questionnaire is a great way to further help our community in the future. This questionnaire will definitely help others see it from your perspective. Many blessings and much appreciation goes to NVOK for all the help provided and hard work every worker is putting forth with this energy efficient projects you all had worked hard for. As a community, I stand by NVOK to continue to do what is needed to help our Future!
 - Need to get solar panels. Where would we get them
 - concerned about costs related to global instability
 - Power outages forcing me to use leave for work and not having leave
 - N/a
 - I am concerned about heating fuel costs. Sometimes consumers have to decide if heating the home is more important than putting food on the table.
 - I'm concerned about the burnable materials we throw away to bury in a landfill that could be heating our homes.
 - I wanted to purchase solar power panels but didn't know where to start.

- Concerned about State legislature raiding the PCE program to fund other sectors of state programs/functions
- The cumulative effect of home heating oil leaks across community
- Diesel cost too high for hub city
- I'm worried what will happen if electricity goes out for an extended period of time.
- Natural gas is available for use but not utilized.
- The high cost of living in Kotzebue drives locals into urban cities where it is more affordable.
- I think it is important to find ways that are reliable, work in our extreme weather, sustainable, and also aren't at the whim of the oil market which can often be used for politicking.
- The little energy meter usage you can plug in to any outlet is so useful. Can you guys get them make them available at an affordable price?
- I'm concerned the PCE may disappear and I'll be left with a large bill.
- Help with elder bills
- Utilizing local resources to provide sustainable power, i.e. natural gas.
- Thank you for your help
- By putting a department just for this program so people could call and make it a lot easy for them to access such needs
- Air quality is bad due to dirt roads
- My house is fairly small and fairly well-insulated, which means my heating costs are reasonable. Investing in improving housing quality is as important, I'd say, as finding alternative ways to heat our homes.
- I'll use this space to suggest another form of renewable energy: The current of Kotzebue Sound. I know one experiment was done, and I encourage you to pursue that idea!!
- Why hasn't heating fuel gone down in 4 years when the price of oil is much less than it was 4 years ago?
- Assist Elders on how they can save on Electric Bill, they have monthly income to budget
- concerned about the cost of fuel for vehicles too and the feasibility of electric vehicles in the arctic
- My concern is the "brown energy" that is so hard on appliances.
- It would be good if Kotz IRA would give new Toyostoves that people need when they're no longer running.
- Carbon footprint of my household and our community; durability of our community infrastructure in face of sea level rise, climate change, and age of systems.
- I am very concerned about lower my energy bill
- I dont have a backup if the power goes out in the winter for heat
- I am concerned that politics will get in the way of our energy independence.
- I like that the quality of Kotzebue water is getting alot better
- We know the area where locals get firewood from, my concern are these non natives getting firewood from the same area. This place i believe is on native allotment.
- The air quality concern is mostly because of the unpaved roads within the city. The heating of my home is paid by the landlord, but the rent is dependent upon the heating costs. I am also concerned about heating if the supply chain is disrupted and heating fuel cannot be acquired in Kotzebue.
- Winter time I use wood stove, also oil, so I try to get wood stored before winter, if there happens to be power outage, I know people will get cold who are use oil
- I'm happy KEA continues to diversify for energy needs.

- Need more funding for low income households. Clean water from water delivery. Discount for elderly.
- Quality of Kotzebue's water

ENERGY EFFICIENCY AND YOUR HOME

Which of the below are currently installed in your home or building? Check all that apply.

Energy Efficiency Installations	Number Reported Usage	Obstacles for Energy Efficiency Installation	Number Reported as Obstacles
Efficient appliances installed in the past 10 years	91	Availability of materials or service	81
LED lighting	86	Upfront cost is too high	72
Programmable thermostat	44	Don't own home or building	53
Updated insulation or other weatherization	43	Don't know enough about my options	43
Heat pump	12	Have not found the time	16
I don't know	30	Not interested/not my responsibility	10

Write in installations

- New fridge, water heater
- I recently moved to a house I'm renting, and it does seem like it needs better weatherization
- We turn our thermostat way down and use power strips to reduce phantom energy use. We also walk, bike to reduce burning fossil fuels.
- The IRA denies me when i apply for weatherization.
- Rental unsure of all
- Three pane windows, seals around doors, attic insulation, need wall insulation and to redo the subfloor insulation
- I live in apartment owned by Maniilaq
- If only can do these repairs with a deed to the house a lot of ppl need this
- I rent, so I don't know much. I assume the insulation is newish, because the building is.
- wood stove to reduce diesel fuel for heating
- Cheeper hot water supply

Write in obstacles

- So hard to get people to work on houses
- recently moved to this house I'm renting, beginning of May 2025
- my job is ending and I won't have any assistance for several weeks
- Difficult to get help here in Kotzebue
- Completed energy efficiency upgrades 20 years ago so just monitoring and scheduling replacement to systems as needed
- Completed energy efficiency upgrades 20 years ago so just monitoring and scheduling replacement to systems as needed
- No experience
- I am low income and it has been difficult to manage electricity
- I live apartment owned by Maniilaq
- We need more "handymen" in Kotz who can be hired to help with home upgrades.
- Lack of availability of local residential contractors

RENEWABLE ENERGY PROJECTS IN KOTZEBUE

What is your attitude toward adding or expanding renewable energy projects in Kotzebue? 172 Responses

	Very negative	Negative	Positive	Very Positive	I don't know
Renewable energy projects generally in Kotzebue?		1.2%	34.3%	57.6%	7%
Solar energy	0.6%	4.1%	39%	52.3%	4.1%
Wind energy	1.7%	2.3%	37.8%	55.8%	2.3%
Biomass (wood energy)	8.7%	17.4%	36.6%	18.6%	18.6%
Biogas (waste energy)	2.3%	7%	39%	30.8%	20.9%

To what extent do you agree or disagree that adding renewable energy projects in Kotzebue will lead to these outcomes:

	Strongly disagree	Disagree	Agree	Strongly agree	I don't know
Reduction in my electric bills		6.4%	47.1%	39.5%	5.8%
Improved quality of life	1.2%	1.7%	47.1%	39.5%	10.5%
More reliable electricity	1.2%	5.2%	44.8%	39.5%	9.3%
Improved air quality		4.7%	41.9%	42.4%	10.5%
Improved water quality	1.7%	11.6%	31.4%	38.4%	16.9%
Create local jobs or economic development		1.2%	47.1%	41.9%	9.3%
Revenue creation for the purpose of community benefit	1.7%	5.8%	41.9%	39%	11.6%
Benefits for wildlife	1.2%	7.6%	33.1%	43.6%	14.5%
Benefits for wild or natural areas	1.2%	7.6%	33.7%	41.9%	15.7%

What is your attitude toward adding or expanding other energy projects in Kotzebue? 172 Responses

	Strongly disagree	Disagree	Agree	Strongly agree	I don't know
Additional diesel generators	7%	21.5%	39%	10.5%	22.1%
Diesel generator upgrades to increase efficiency	0.6%	4.1%	62.2%	24.4%	8.7%
Small nuclear reactor	20.3%	20.9%	16.9%	15.1%	26.7%
Battery energy storage	0.6%	8.7%	39%	36%	15.7%
Replacing fossil fuel appliances with electric (electrification)	4.7%	9.3%	38.4%	19.2%	28.5%
Thermal storage (storing heat for later use)	2.3%	2.3%	41.9%	33.1%	20.3%
Heat pumps	2.3%	2.3%	40.7%	30.8%	23.8%
Heating oil buying group to reduce cost		2.9%	41.9%	40.7%	13.4%

Additional comments on adding or expanding energy projects in Kotzebue: 31 responses

- Thank you for your service
- House hold heat pumps work! A lot of that other shit breaks soon
- I would like to see our Native Village get involved and become an IPP
- I am up for all things to help our people save money
- Heat pumps for Kotzebue residents would be nice.
- I believe what NVOK has planned for future projects to help our community, is tremendously amazing, from energy efficiency, to making sure our wild life is still protected at all cost, and being able to work around a lot more then just these projects in the future, also being able to make jobs available to our people to further help our future generations.
- Quyaana thank you for helping make Kotzebue healthier.
- Purchase aid for Greenland wind generators, already arctic tested, approved
- Reducing price for all residents
- From what I learned in the last meeting, we need to work together to reach our goals.
- There have been multiple attempts to get various orgs to join annual bulk fuel consortium but there are always municipalities that have issues with paying back its loan to state that causes this concept to be fully realized
- Community owned bulk fuel storage. More EV demonstrations. Waste to energy plant (heat and electricity)
- Heat pumps for homes

- N/A
- I think there is the reality of making our current systems better and more efficient while still widening our available energy sources and pursuing sources that are renewable and better for our environment. I would prefer to have solar panels on my house, but I'll likely still need another energy source to supplement too.
- Expand roof solar energy
- Find Oil on NANA land so we don't have to worry about this ever again.
- Get dead wood like from up river for these who need
- I'm not familiar with the details of nuclear reactors, heat pumps, etc. I'm all for approaches that decrease costs and expand safe non-diesel energy options.
- Like I said, I encourage exploration of using the current in the sound. Other places do this, it works.
- All the entities need to collaborate and negotiate the price for fuel and heating oil before it's shipped to Kotzebue.
- It would be nice to have reduced stove oil prices and gas prices for AK Natives
- Absolutely no nuclear.
- any good ideas would really help our community and lower cost of living
- I believe to preserve our culture we need to reduce our dependency on fossil fuels.
- Solar panels, windmills
- Most current energy projects seem to require solar cycles to produce winds / solar energy. We need power alternatives to cover the winter nights up here.
- None
- Continued diversification will benefit members.
- Wind or solar for large buildings and homes

THE NATIVE VILLAGE OF KOTZEBUE ENERGY PROJECT

How familiar are you with the Native Village of Kotzebue Energy Project: 172 responses

	Never heard of it	Somewhat familiar	Familiar	Very familiar
How familiar are you with the Native Village of Kotzebue Energy Project?	40.7%	43.6%	11%	4.7%
How familiar are you with the Independent Power Producer (IPP) model?	66.3%	19.8%	10.5%	3.5%
How familiar are you with the Alaska Power Cost Equalization (PCE) program?	24.4%	34.3%	25%	16.3%

Share any comments you have about the Native Village of Kotzebue Project, the IPP model, or Alaska's PCE here: 45 responses

- Thank you for your service
- Get heat pumps for every home. Find low-cost simple electric four-wheelers that can be used in villages widespread
- Hurry up and start the process
- I am only familiar with the PCE because I see it on my bill and how much it saves me each month
- Will this project at least keep our energy costs where they're at. Ideally it would be nice to see a reduction in those costs.
- I'm excited for the possibilities!
- I'm highly thankful and show much gratitude towards what our NVOK tribal workers are doing to help our future generations to become more successful in life itself, from life in land, to our wildlife's well-being, and also to saving our tribal members much stress and worry about high cost of living.
- How can home do better to lower costs of electric.
- Nervousness around federal grants, and cuts to PCE in the legislature.
- Don't we get state assistance to reduce costs?
- N/a
- Providing more basic information to the consumers about these type of projects would be beneficial both on social media, on the website or written documentation.
- Sounds like an exciting project!
- Not at this time.
- Want to learn more about potential impact to migratory and year round wildlife
- PCE really helpful
- Al Adams once said that PCE was Alaska's balanced approach to balancing rural and urban energy needs. We must always remember and honor this balance.
- Do it!
- Anyway we can help the tribe.
- PCE helps
- N/A
- PCE is very vital to the rural communities.
- I'm glad to hear we are pursuing things that can make life up here more affordable, especially with the increased cost of living. I don't understand how the PCE works or how my electricity bill fluctuates so much for similar amounts of usage.
- I think its important to continue on with the various energy projects. We need all types of energy. Sustainable, reliant, affordable.
- I think it's great
- PCE sounds like its on it's way out statewide, we need to figure out ways to fend for ourselves.
- Merge with NANA so we can stop calling you Native Village of Kotzebue Energy Project.
- Start working together as a ira group
- I just know there is a new building for IRA
- I was sad to see that the EPA cancelled the grant you were expecting!!
- Have public meeting for this for more people can become familiar with it along with other programs that are available to public would be cool. Taikuu

- It sounds like a great program.
- KEA thank you for the PCE as it doe help reduce the cost of the electric bill
- Without the PCE our region would be paying so much more for power.
- Would be good thing for IRA to get this project done for lower cost of living
- without PCE our electric bill would be higher
- It would be a positive if we can begin fitting residential buildings with solar and selling excess energy back to KEA.
- Energy consumption is at its highest during our long winter seasons. Solar energy doesn't seem like a likely answer with our short winter daylight hours not to mention cloudy days on top of that.
- No comment
- I'd like to read up on these after this survey.
- None
- These innovative projects are what it's all about!
- IPP will help us keep PCE credits
- More solar and wind power for homes and business

KOTZEBUE'S FUTURE ENERGY GOALS

How important are each of the below energy goals? 172 responses

	Not at all important	Slightly important	Moderately important	Very important	I don't know
Reducing reliance on energy sources from outside our local area (Energy independence)	1.7%	8.1%	28.5%	56.4%	5.2%
Kotzebue's right to decide how our energy resources and lands will be used or developed (Energy sovereignty)		5.2%	22.1%	69.2%	3.5%
Managing threats or disruptions to affordable and reliable energy (Energy security)		4.7%	24.4%	65.1%	5.8%
Making energy more affordable for all users in Kotzebue		4.1%	12.2%	80.2%	3.5%
Reducing Kotzebue's reliance on fossil fuels to address climate change	2.9%	5.8%	19.8%	67.5%	4.1%

Share any comments about goals for Kotzebue's energy future: 28 responses

- Thank you for your service
- Appreciate your efforts in reducing the cost of heating fuel and lowering our electric bills
- no comments at this time
- The more independent we can be the better
- The goals that are set forth for this energy efficiency is well beyond amazing! The more I read about what's happening and how NVOK is helping, gives me more hope in our community to thrive for better lifestyles; for better jobs, and also living in a more healthier environment.
- We're feeling the effects of global warming so tis imperative to plan accordingly.
- Kotzebue has been a model for what renewable energy looks like in rural Alaska. I think it is important that we continue on that path.
- N/a
- Less talk and being a doer would move things forward. Our region has been talking about reducing energy costs for many years but there needs to be a regionwide comprehensive plan and partnerships to make these things happen. Be inclusive. Work together. No one organization can do things alone.
- Kotzebue should look into diverting burnable wastes from going to the landfill.
- We need to come together as a people, organizations to make Kotzebue great again.
- We will always have need for use of fossil fuels to generate power regardless of progress of use of solar/wind power as supplemental sources
- Create local economy from local renewable resources
- Lower cost of heating and electricity
- N/A
- I would like to see an independent, sustainable, and reliable source for Kotzebue's future energy. I think reliable is of the utmost importance because some homes won't heat without electricity to help the boiler or stove and when we have power outages in the middle of storms or the middle of winter, it can wreck plumbing, cause pipes to burst, and have bigger impacts on infrastructure than just a simple outage.
- NANA
- Low income rates
- Good luck!
- We need to look at natural gas cause diesel is expensive hint
- I think this project would really lower electricity bills.
- I hope we can get to the point that we only use fossil fuels as a back up energy source.
- No comment
- Kotzebue must be more self-reliant.
- None
- We are setting the standards for energy goals throughout the State.
- Less cost for heating and electricity

ABOUT YOU AND YOUR HOME

How do you heat your home or building? Check all that apply. 172 responses	Number Reported Usage
Diesel Toyo stove	83
Diesel boiler	53
Wood	36
Electric baseboards	25
Electric space heater	21
Diesel furnace	17
Heat pump	3
I don't know	10
Infloor heat	1
Diesel Toyotomi	1
I think we have a diesel furnace	1
Boiler unsure what type	1
We have a wood stove that we plan to use next year occasionally and have used sparingly the past few winters.	1
Stove oil	1
The white thingy on the floor	1
Drip stove	1
The stove we cook on	1

If you heat with more than one source, what is your primary heating source? 154 responses	Number Reported Primary Heat Source
Diesel Toyo stove	55
Diesel boiler	38
Wood	5
Electric baseboards	16
Electric space heater	6
Diesel furnace	9
Heat pump	1
I don't know	16
None	1
N/A	1
Oven	1
Heated home with Toyo stove only	1
Drip stove	1
Cooking stove	1

No other source	1
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Do you (or does a person you live with) own or rent your current residence? 171 responses	Number Reported
Rent	71
Own	91
Lease to own.	1
My sons house that he doesn't charge me to live in	1
Family members house	1
Grandpas house	1
No	1
Live in my grandma's other house she dont use	1
Share land but not houses	1
Living in parents very old home	1
Awaiting probate	1

Do you currently live in or near Kotzebue? 172 responses	Number Reported
Yes, year round	165
Yes, part time	5
Not currently, but in the past	2
No, but I have family or other connections in Kotzebue	

What is your age? 171 responses	Number Reported
Under 18	1
18-24	9
25-34	25
35-44	31
45-54	37
55-64	43
65-74	21
75-84	3
85-94	1
95 and older	

What is your gender? 170 responses	Number Reported
Male	81
Female	89
Non-binary	

What is the highest degree or level of school that you have completed? 171 responses	Number Reported
Grade school	1
Some high school	6
High school graduate	42
Some college credit	36
Vocational/apprentice/trade school	19
Associate degree	10
Bachelor's degree	31
Graduate degree	19
GED	3
Occupation related certifications	1
N/a	1
Nursing diploma	1
Doctorate	1

What best describes your race/origin? 171 responses	Number reported
Alaska native	111
American Indian	4
White	43
Black or African American	1
Asian	4
Native Hawaiian or Other Pacific Islander	2
Hispanic or Latin origin	1
White/Alaskan Native	1
Middle eastern / white	1
Alaskan	1
Black and white	1
Ak native /athabaskin	1

Tribal membership: 169 responses	Number Reported
Native Village of Kotzebue	90
Not a Tribal member	55
Noatak	2
Native Village of Ambler	2
Native Village of Council	1
Deering	1
Native village of point hope	1
Native village of buckland	1
Buckland ira	1
A tribal member does reside in my home	1
Kiana	1
Native Village of Shungnak	1
NANA KIC	1
Buckland IRA	1
Native Village of Selawik	1
Native Village of Buckland	1
Native Village of Noatak	1
Shungnak Tribe	1
Ambler	1
CIRI	1
Turtle Mountain Band of Chippewa	2
Noorvik ira	1

YOUR PARTICIPATION IN KOTZEBUE'S ENERGY FUTURE

We want your participation. Are you interested in joining a community meeting to review this questionnaire and help plan Kotzebue's energy future? 170 responses	Number Reported
Yes	99
No	71
Do you want to receive email updates about community meetings and other opportunities to participate in planning Kotzebue's energy future? 169 responses	Number Reported
Yes	109
No	60