

A City and Borough of Sitka Project  
**SITKA COMMUNITY  
RENEWABLE ENERGY  
STRATEGY**



**SCRES ENERGY  
QUEST WORKSHOP—  
TECHNICAL REPORT**



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# EXECUTIVE SUMMARY

Energy Quest: Sitka's Path to 2050 is an innovative, game-based tool used within the Sitka Community Renewable Energy Strategy to engage residents in planning the community's energy future. The creation of this tool was a part of the Department of Energy's Energy Technology Innovation Partnership Project, for which the City and Borough of Sitka was part of the third cohort of community partners, with projects that began in 2023. The game translated complex planning questions into an interactive format through which participants built energy roadmaps to 2050, explored tradeoffs, and expressed priorities. From this exercise emerged four core themes: Affordability, Reliability, Self-Sufficiency, and Innovation. As an isolated island microgrid powered primarily by hydropower, Sitka depends on imported diesel generators for backup, making the cost and reliability of that fuel a critical concern in long-term planning.

In the game, participants played through eight turns, each representing three years; participants made decisions about new load growth to support, electrification goals, new generation resources, and efficiency measures. They worked with a limited pool of surplus hydroelectric energy and could choose to add new renewable or efficiency projects or rely on existing diesel generators as a backup. This mirrors Sitka's real-world system, where diesel is not a primary resource but a costly, less reliable insurance against low-water years and other disruptions to hydropower. This structure illustrates real constraints and requires players to balance present needs with long-term planning, while responding to uncertainty introduced through event cards. The activity generated both concrete energy "roadmaps" and qualitative feedback on what matters most to Sitkans in their energy future.

Affordability emerged as a central theme, with participants consistently emphasizing that Sitka's energy planning must not place an undue financial burden on residents. Many workshop results pointed to a strong preference for strategies that prioritize energy efficiency and make better use of existing infrastructure before turning to large, expensive new projects. Some discussions focused on who should bear additional costs and how to distribute them fairly, with some participants suggesting that industries and tourism-related activities could play a larger role in absorbing higher energy expenses, thereby protecting residential ratepayers. There was clear concern about keeping utility rates stable, and many responses reflected a desire to minimize or avoid increases in household energy bills wherever possible.

Reliability was consistently identified as critical to Sitka's energy future. Participants stressed the importance of a stable and dependable electricity supply that can withstand seasonal fluctuations, emergencies, and aging infrastructure. Roadmaps often prioritized maintaining sufficient surplus renewable generation and a mix of resources to ensure energy is available during low-water years or unexpected events. Diversification of generation, through solar, wind, and additional hydropower, was seen as an important strategy for maintaining reliability and insulating the community from disruptions.

Self-Sufficiency was a prominent and recurring theme in both gameplay and written responses. Participants did not view energy planning in isolation; they connected it closely with food systems, waste management, and local economic resilience. Hydroponic gardens powered by renewable energy were the second most frequently chosen goal after residential heating, reflecting a strong desire to use Sitka's renewable resources to increase local food security and reduce reliance on imported produce. Electrified composting facilities also ranked highly, highlighting interest in self-sufficient systems that turn local waste into useful resources. Overall, participants favored pathways that reduce dependence on imported fuels and goods and strengthen local control over essential services.

Innovation captured participants' interest in advanced and emerging energy solutions that leverage Sitka's unique geographic and environmental context. Many responses supported exploring novel technologies, marine-based energy systems, and alternative fuels to tackle the most challenging electrification goals. The innovation theme emphasized a willingness to experiment with cutting-edge approaches, provided they contribute to the broader objectives of reliability, self-sufficiency, and long-term affordability. Participants framed innovation as a way to build a forward-looking, resilient energy system that can adapt to changing conditions and opportunities.

Across these four themes, Energy Quest demonstrated the value of game-based engagement in uncovering community preferences and priorities. The game showed that Sitkans are willing to balance affordability with investments in reliability, are strongly committed to self-sufficiency in energy, food, and waste systems, and are open to innovative solutions that build on local strengths. The resulting roadmaps and insights offer a grounded foundation for scenario development and decision-making within the Sitka Community Renewable Energy Strategy.



**Energy Quest  
Workshop –  
Technical Report**

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# INTRODUCTION

Energy Quest: Sitka's Path to 2050 is an innovative game designed as a key component of the Sitka Community Renewable Energy Strategy (SCRES). The primary aim of the game design was to stimulate public discussion about Sitka's energy future, helping to identify community priorities and establish a comprehensive energy vision. As an island microgrid powered primarily by hydropower that relies heavily on imported diesel for backup power, Sitka faces high fuel costs and increased vulnerability to supply disruptions, making reliable local energy solutions especially critical. By adopting an interactive approach, playing Energy Quest shifted the conversation from traditional formats to an engaging, thought-provoking experience that encouraged citizens to actively participate in defining the direction of Sitka's energy priorities. With structured gameplay focusing on practical scenarios, our facilitated workshops offered an opportunity for critical thinking and dialogue about how best to plan for the current energy surplus and serve the community's future energy needs.

The development of Energy Quest arose from a request to create a practical tool that brings together various stakeholders in the community, allowing for a discussion that is both comprehensive and inclusive. The game acted as a starting platform, inviting diverse views on energy efficiency, energy generation sources, and sustainability goals while considering the unique challenges and opportunities that Sitka faces. By playing the game, the participants gain insights into the complexity of energy management and the need for strategic planning in achieving long-term goals. It simplifies the intricate elements of the energy sector into manageable pieces that can be absorbed and debated by participants of varying expertise and backgrounds.

Ultimately, with Energy Quest, the goal of our game design was to garner a clearer understanding of the community's energy vision and priorities. The information and insights gathered from these sessions offered valuable input to scenario planning and other strategic dimensions of the SCRES. This participatory approach ensured that the energy strategy was not only well-informed but also reflective of the broad spectrum of community attitudes and aspirations. By facilitating discussions through a game format, it was expected that Energy Quest could lessen barriers to participation while making the topic of energy transition accessible and relevant to all members of the Sitka community.

## GAME OVERVIEW

Energy Quest is a strategic exercise aimed at visualizing and discussing Sitka's energy future by 2050. It simulates real-world scenarios wherein players act as engineers, architects, and policy-makers, working towards building a sustainable energy roadmap. The game is divided into eight

turns, each representing a three-year period, during which players can implement electrification goals or increase energy generation to meet future goals. The ultimate objective is to balance the need for energy generation with the implementation of various electrification initiatives, while responding to unforeseen events that may impact the community.

## **GAME DEVELOPMENT**

The game was developed through direction from the Sitka Sustainability Coordinator, the Sitka Electric Department Director, and members of the Sitka Sustainability Commission. These advisors gave initial direction on the game goals and design, as well as feedback during a work session. Community members directed the content of the cards used during game play. One recommendation provided by the community members was to make the type of local energy generation (solar, wind, hydropower, etc.) blind, meaning that game players do not know that a generation card represents a specific type of generation. Instead, the cards only include the duration of time to build the generation and the amount of energy generated upon completion. This decision forced game players to make choices about whether to prioritize quick incremental generation development or longer timeframe developments that would ultimately provide larger amounts of generation, without preconceived notions about specific technology.

## **GAME PLAY SUMMARY**

Players begin the game with a set of game pieces, including Energy Roadmap, Goal Cards, Generation/Efficiency cards, and several token types representing the current available surplus generation in Sitka. Throughout the game, players use goal cards and generation tokens to target specific electrification objectives, such as electrifying residential heating, or enhancing public transportation. Each electrification goal requires a specific number of tokens, symbolizing the amount of energy generation necessary to achieve that goal. Additionally, each goal demands a certain number of turns, representing the approximate number of years required for its completion. These turns and tokens provide a simplified representation of the complexities involved in achieving such goals. Assumptions had to be made to distill these intricate dynamics into understandable game mechanics. For instance, a goal necessitating 1 token compared to another requiring 2 tokens does not necessarily imply that the latter needs twice as much generation in the real world. These generalized assumptions aim to balance approachable gameplay and reflect the actual process of energy planning and implementation. Specific details about which goal cards were included in the game are listed below.

Table 1: Goal cards used in the Energy Quest game, showing each goal, a brief description of its focus within Sitka's energy transition, and the number of cards of each type included in the game.

Goal	Description	Count of Cards Each Player Starts with
<b>Build a Commercial Composting Facility</b>	Establish a centralized facility that processes organic waste into compost, reducing landfill use and supporting local soil health.	1
<b>Build New Energy Efficient Housing</b>	Construct new homes that use advanced building materials and designs to significantly reduce energy consumption and utility costs.	1
<b>Cruise Port Electrification</b>	Install shore power infrastructure so docked cruise ships can plug into the local grid instead of running their engines.	1
<b>Electrify 10% of Residential Heating</b>	Transition 10% of homes from imported fuel-based heating to efficient electric systems such as heat pumps.	5
<b>Electrify 20% of Personal Vehicle Fleet</b>	Replace 20% of gasoline and diesel personal vehicles with electric vehicles and the charging infrastructure they require.	5
<b>Electrify 50% of Commercial and Industrial Heat</b>	Convert half of commercial and industrial heating needs from imported fuels to electric technologies like heat pumps or electric boilers.	2
<b>Electrify 50% of Tour Buses</b>	Replace 50% of tour buses with electric models to cut emissions and noise in popular visitor areas.	2
<b>Electrify Public Transportation</b>	Transition public transit vehicles, such as buses and shuttles, to electric power and provide the necessary charging facilities.	1
<b>Install Large Scale Hydroponic Garden</b>	Develop a large indoor hydroponic system that uses controlled environments and efficient lighting to grow food locally with lower land and water use.	3

In the game, players start with 6 tokens representing Sitka's current surplus of generation from Green and Blue Lake Hydroelectric Projects. To implement additional electrification goals, players will need more generation, which necessitates building new generation infrastructure. This process requires turns, with different generation cards demanding varying amounts of time and producing different quantities of renewable energy tokens. Players can also use red diesel generation tokens at any time, these symbolize existing diesel capacity and do not require turns to generate. Participants could also gain tokens by implementing energy efficiency measures. Strategic planning is crucial, as players must decide when to add new generation to ensure they have enough energy to achieve future goals, balancing immediate needs with long-term planning.

Table 2: Generation and efficiency cards used in the Energy Quest game, listing each card type and the number of copies included to represent different options for meeting Sitka's future energy needs.

Generation/Efficiency Card	Count
<b>Build Renewables - Generate 1 Token</b>	5
<b>Build Renewables - Generate 3 Tokens</b>	4
<b>Build Renewables - Generate 15 Token</b>	1
<b>Home Efficiency - Generate 2 Tokens</b>	3

Several turns culminate with the drawing of an Event Card, which introduces dynamic elements to the game, such as technological innovations, new policies, or challenges like low water years. Successfully navigating these events can yield bonus points, fostering adaptive strategies among players.

Table 3: Event cards used in the Energy Quest game, including brief descriptions of each event that may be drawn at the end of selected turns, introducing dynamic elements such as new technologies, policy changes, and challenges like low water years that affect Sitka's energy pathway.

Event	Card Description
<b>Utility Scale Storage Available</b>	Utility scale storage becomes available in Sitka. This can generate 3 tokens but requires 2 turns. Play Event Card #1 on your Energy Roadmap if you want this generation
<b>Low Water Year</b>	Sitka has experienced a series of low water years, you must give up 2 existing yellow tokens. You receive the bonus points if you can move around generation to still implement all your current goals. You can add diesel tokens if needed.
<b>Alternative Marine Fuels</b>	There is a push for alternative marine fuels to be used in Sitka. This would require local production and storage of these fuels. To accept this event, it requires 3 generation tokens and 3 turns.
<b>Data Center - New High Energy Use Industry</b>	A new data center is interesting in starting in Sitka but they need 6 generation tokens to operate and requires 2 turns
<b>New Aviation Policy</b>	New federal policy requires electrification measures at airports. This includes things like alternative fuel storage, electric shuttles, aircraft tractors, etc. You must give up 2 generation tokens. You receive the bonus points if you can move around generation to still implement all your current goals. You can add diesel tokens if needed.
<b>High Water Year</b>	Sitka experiences a series of high water years. You are given an additional 2 existing generation tokens.

# SCENARIO DEVELOPMENT

Over the course of several months, 84 community members participated in the entire Energy Quest activity, with an additional 40 participants filling out a shortened follow up questionnaire. The results from these activities provided valuable insights that have been integrated into four scenario themes through which to discuss Sitka's 2050 energy future: **Affordability, Reliability, Self-Sufficiency, and Innovation**. By analyzing participant feedback gathered during this interactive exercise and the follow up questionnaires, critical community priorities were identified and can be aligned with actionable strategies for the ongoing energy transition. Each theme reflects key social, environmental, and economic considerations expressed during Energy Quest discussions, ensuring that Sitka's roadmap is both comprehensive and responsive to local needs. Table 4 summarizes the four scenario themes that emerged from the Energy Quest workshops and presents a count of how often each theme appeared. These counts were derived by systematically reviewing participants' responses to multiple survey questions and coding any statements that aligned with one or more of the identified themes.

*Table 4: Scenario themes identified through Energy Quest workshop responses, showing each theme, a general definition, and the number of participants whose survey responses aligned with that theme<sup>1</sup>.*

Theme	Definition	Count
<b>Affordability</b>	Decreasing the residential energy burden of electric infrastructure through minimal rate increases and reducing consumption in the near term.	46 (37% of respondents)
<b>Reliability</b>	Ensuring consistent availability of dependable electricity supply across the community and minimizing disruptions in power far into the future and in unknown circumstances.	25 (20% of respondents)
<b>Self-Sufficiency</b>	Utilizing local energy to support necessities and reducing reliance on external energy.	30 (32% of respondents)
<b>Innovation</b>	Implementing forward-thinking energy solutions to address the most challenging electrification goals as soon as possible.	55 (44% of respondents)

<sup>1</sup> Note: Several participants left one or more survey questions blank, including 34 who did not respond to the question asking them to describe their approach to developing the roadmap. The percentages reported include all survey respondents, regardless of whether they answered this specific question, while the counts in the table reflect only those written responses aligned with a given theme.

# AFFORDABILITY

The affordability scenario for Sitka's 2050 energy roadmap focuses on decreasing the residential energy burden by employing renewable technologies and electrification pathways that minimize rate increases. The scenario also emphasizes reducing overall consumption in the near term through energy efficiency and conservation measures. This approach reflects the community's priority of balancing innovation with economic sustainability, ensuring that Sitkans are not financially impacted while the city's grid is updated and modernized. Workshop results reveal a collective desire to address financial constraints by leveraging existing infrastructure, improving energy efficiency, and adopting cost-effective diversification strategies to meet energy demand.

Integrating workshop results into the affordability scenario highlights key insights from the community's feedback. Many residents stressed the importance of solutions such as solar energy, affordable electrification programs, and lower-cost renewable energy initiatives, demonstrating a shared focus on minimizing costs while expanding energy options. Responses also underscored the value of retrofitting existing infrastructure and reducing waste to avoid expensive new developments. The inclusion of strategies aimed at incentivizing home-level participation, like residential electrification and energy efficiency upgrades, further reinforces the community's pragmatic vision for affordability. To understand Sitka's roadmap in detail, four subthemes to affordability emerge from the workshop discussions: **Lowest Impact to Rates, Increasing Utilization of Existing Infrastructure, Energy Efficiency and Conservation, and Consumption Diversification.**

Table 5: Overview of affordability subthemes found in the Energy Quest responses, including definitions and examples quotes that highlight each subtheme

Sub-Themes:	Definition:	Example:
<b>Lowest Impact to Rates</b>	Focus on implementing renewable energy options that minimize costs for individuals and the community and are perceived as low cost to deploy and maintain.	<p><i>"I want to electrify our community but in a way that prevents rate payers from increasing rates so they are unaffordable and people move and leave due to cost of living"</i></p> <p><i>"Building roads for wind is not cheap or a good idea."</i></p>
<b>Increasing Utilization of Existing Infrastructure</b>	Prioritizes using existing infrastructure to inform extent of electrification or explicitly limiting generation/consumption options based on existing grid capabilities.	<p><i>"Variable electric rates to encourage use during spill events"</i></p> <p><i>"Electrify based on our hydropower."</i></p> <p><i>"No diesel use! Limited or no additional renewables"</i></p>

Sub-Themes:	Definition:	Example:
		<i>"improve the opportunity and efficiency for new and existing generation"</i>
<b>Energy Efficiency and Conservation</b>	Strategies for making home energy upgrades to reduce consumption	<i>"We wanted to lower electricity use for houses"</i> <i>"Be efficient with our homes' energy use."</i> <i>"more focus on efficiency less on new energy"</i>
<b>Diversification of Users</b>	Increasing commercial/industry demand to shift consumption and related cost burden to non-residential sectors	<i>"many costs should be taken on by private industry (cruise port, commercial heating, etc.)"</i> <i>"Build another dam to generate electricity for power-hungry industries."</i>

## LOWEST IMPACT TO RATES

One of the central concerns voiced in the workshops was minimizing the impact of energy transitions on residential electricity rates. Responses repeatedly emphasized prioritizing solutions that reduce costs for individuals and households. For example, solar energy was frequently discussed as both an affordable option for utility-scale deployment and as a viable choice for individual home installations. Participants recognized solar’s potential to introduce renewable energy pathways with lower costs compared to other options, making it more financially accessibility for families. Similarly, wind energy faced critique due to its perceived need for costly infrastructure, such as road construction, which would place further economic strain on the community. Additionally, as shown below in Figure 1, when prompted about whether Sitka should only pursue new energy projects if they don’t impact utility rates 41% (42 out of 102 responses<sup>2</sup>) of participants agreed, compared to the 32% (33 out of 102 responses) who disagreed to some extent.

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<sup>2</sup> 22 participants chose not to respond to this question on the survey.

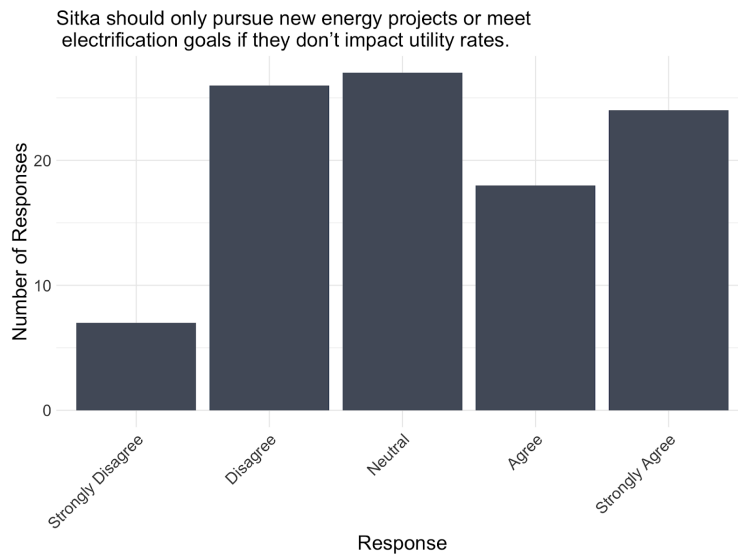


Figure 1: Responses to the statement: "Sitka should only pursue new energy projects or meet electrification goals if they don't impact utility rates." The bar chart illustrates the distribution of responses, with "Neutral" and "Disagree" receiving the highest number of responses, while "Strongly Disagree" garnered the least.

## INCREASING UTILIZATION OF EXISTING INFRASTRUCTURE

Residents emphasized leveraging Sitka's current energy infrastructure, particularly hydroelectric systems, to minimize both costs and environmental impacts. Many responses highlighted the effectiveness of hydropower as a backbone for energy generation, noting its reliability and potential for expansion. Workshop participants encouraged strategies such as electrifying existing residential heating and transportation systems using excess hydroelectric capacity rather than investing in building new and expensive infrastructure projects. By better utilizing existing systems, Sitka can avoid unnecessary costs while optimizing renewables already in place to meet growing demand.

## ENERGY EFFICIENCY AND CONSERVATION

Energy efficiency and conservation were seen as critical components of affordability. Many workshop survey responses recommended prioritizing energy-saving measures in homes and public infrastructure to directly lower costs for residents. Participants discussed efficiency as a way to reduce consumption without compromising quality of life to increase capacity, ensuring that savings from lower energy demand could translate into stabilized utility rates. Conservation incentives were also widely discussed, with participants suggesting variable electric rates during spill events or excess renewable generation to drive reduced consumption. As shown Table 1,

90% of participants in the Energy Quest activity played at least one Energy Efficiency card to increase available energy, the most of all the energy generation cards.

*Table 6: Percentage of participants who included at least one card related to different energy project types during the Energy Question game*

	Energy Efficiency	Small Energy Project	Medium Energy Project	Large Energy Project
<b>Percentage of participants that included at least one of these cards</b>	90%	64%	63%	27%

**CONSUMPTION DIVERSIFICATION**

In this affordability scenario, the idea of consumption diversification involves growing commercial and industrial electricity demand so these sectors absorb a greater portion of energy costs, helping keep residential rates manageable. This approach seeks to balance Sitka's energy economics by expanding the role of industry and tourism-related operations (e.g., cruise ports and commercial heating) in absorbing development and upgrade costs. Workshop participants proposed strategies like incentivizing private industries to adopt renewable energy solutions, enabling broader electrification while stabilizing residential energy rates. For instance, the construction of an additional hydropower dam was suggested to generate the substantial electricity needed for power-intensive industries, a move that could also reduce reliance on imported fuels for heavy commercial operations.

**RELIABILITY**

Reliability is a central concern for Sitka's energy future, with many residents emphasizing the importance of a steady and dependable energy supply. The reliability scenario for Sitka's 2050 energy roadmap prioritizes creating a dependable electricity supply across the community and minimizing disruptions. This focus is not limited to current needs but extends to ensuring future reliability in the face of unknown circumstances. By diversifying energy sources and implementing forward-thinking strategies, Sitka aims to build a robust and resilient energy system capable of operating consistently and efficiently, regardless of environmental or societal challenges. Workshop participants expressed their concerns over seasonal fluctuations,

emergencies, and aging infrastructure, highlighting the importance of long-term preparedness and energy security.

Results from the workshops align closely with this reliability vision. Sitka residents consistently advocated for a diversified mix of renewable energy sources tailored to the local environment, such as the current hydropower, and new solar or wave/tidal power. Responses to the discussion questions also highlighted the prioritization of energy security, including storage solutions and emergency backups, allowing Sitka to remain resilient during unexpected power shortages. Additionally, responses revealed the importance of crisis preparedness through fuel reserves, adaptable systems, and infrastructure improvements. From these insights, three subthemes can be derived: **Diversifying Utility-Scale Generation, Energy Security, and Crisis Preparedness.**

Table 7: Overview of reliability subthemes found in the Energy Quest responses, including definitions and examples quotes that highlight each subtheme

Sub-Themes:	Definition:	Example:
<b>Diversifying Utility-Scale Generation</b>	Deploying a mix of energy resources to ensure reliability	<p><i>"Since we already have hydro, solar would work well when there's more water—better hydro, less water—better solar."</i></p> <p><i>"Wind to diversify portfolio."</i></p>
<b>Energy Security</b>	Prioritizing actions to address access to energy over decades or with minimal amounts of reinvestment and/or waste.	<p><i>"More long-term operations with less short-term changes."</i></p>
<b>Crisis Preparedness</b>	Retaining access to fallback sources or strategies to manage emergencies or unexpected shortages in hydropower production	<p><i>"Even though I had a bit of excess energy I think it was perfect because it leaves room in case something bad I can't predict happens."</i></p> <p><i>"Always have the option to use diesel during a crisis."</i></p> <p><i>"We needed just a little bit more excess energy, just in case"</i></p>

**DIVERSIFYING UTILITY-SCALE GENERATION**

Reliability in an energy system is frequently strengthened by maintaining a diversified mix of utility-scale generation sources. Workshop feedback underscored the importance to the community of combining the current hydropower system with other available generation sources such as, solar energy, tidal/wave systems, and geothermal to balance supply and manage natural fluctuations in any single source. For example, several participants proposed

pairing hydro with solar, pointing out this combination’s ability to balance peak energy output when water availability varies seasonally. Similarly, wind energy was considered cautiously, with residents acknowledging its logistical challenges, including infrastructure costs, while identifying tidal energy as an intriguing addition to Sitka’s energy mix. Figure 2 shows results from the workshop questionnaire with the community’s responses to whether different generation types should be a part of Sitka’s energy future. General agreement across different technologies shows an interest in diverse energy production.

Diversification allows Sitka to distribute the energy burden across multiple resources, reducing dependency on a single type of renewable generation and minimizing risks in reliability. With its abundant access to coastal and hydrological resources, Sitka is well-positioned to develop multifaceted generation systems that protect against seasonal dips and unexpected shortages.

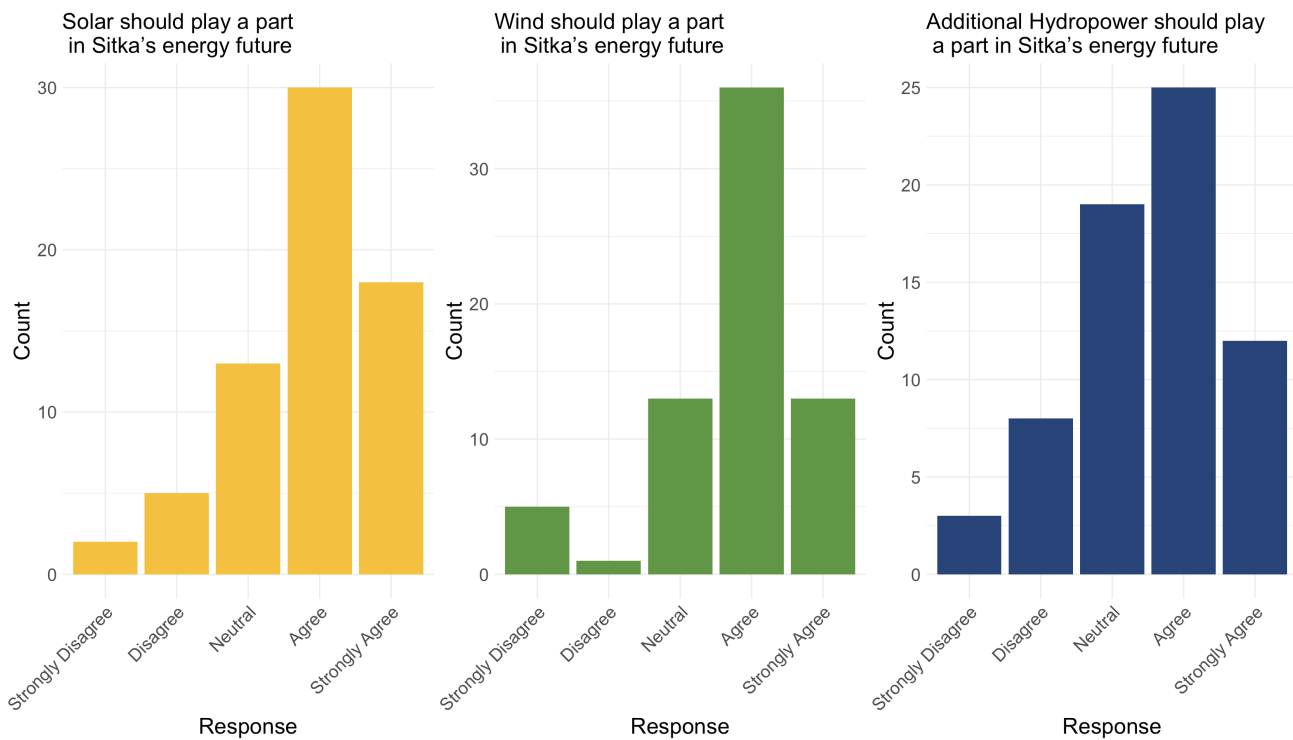


Figure 2: Responses to the Energy Quest questionnaire evaluating community opinions on whether solar (yellow), wind (green), and additional hydropower (blue) technologies should be part of Sitka's energy future. Each plot displays the count of responses across five categories: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. Solar and wind overwhelmingly received positive responses (Agree and Strongly Agree), with fewer Neutral responses.

## ENERGY SECURITY

Energy security emerged as a key element in Sitka’s reliability framework. Responses reflected the community’s desire to reduce dependency on external sources and maintain control over its energy systems. Participants emphasized sustainable infrastructure capable of meeting long-

term needs and lessening reliance on imported fuels like diesel. The workshop highlighted energy storage solutions, such as alternative fuel reserves and utility-scale battery systems, as essential tools to manage surpluses and ensure energy availability during periods of high demand. Analysis of the workshop results showed that 64% of participants included utility storage in their roadmaps. By focusing on local generation and strategically incorporating storage technologies, Sitka can fortify its energy system against both predicted challenges and unforeseen circumstances.

## **CRISIS PREPAREDNESS**

Participants voiced concerns about Sitka's ability to handle energy shortages or emergencies, emphasizing the importance of crisis preparedness as a central pillar of reliability. Diesel, though not preferred for regular use due to higher cost, was cited as a critical fallback option in emergencies to ensure continuous power. Recommendations included building systems with redundancies, such as extra hydro dams and utility storage systems, to allow Sitka to weather unforeseen disruptions without sacrificing reliability.

In addition to emergency measures, proactive strategies like surplus-focused planning and community microgrids were suggested as part of broader preparedness efforts. These systems give Sitka the flexibility to dynamically respond to power deficits while maintaining stability in the broader grid.

## **SELF-SUFFICIENCY**

Sitka's self-sufficiency scenario envisions a future where essential services currently reliant on external sources are transformed through locally generated renewable energy. The focus is on localizing or electrifying critical sectors like food production, transportation, and waste management to reduce reliance on off-island supply chains and lower consumer costs. By leveraging Sitka's renewable capabilities, hydroponic gardens could help decrease the need for imported produce, and investments in electric public transportation and personal electric vehicles reduce land-based emissions while providing affordable and sustainable mobility options. Food waste is diverted to community-scale composting and waste-to-energy facilities, ensuring efficient resource utilization while reducing off-island waste processing and landfill dependency.

Although these changes require substantial investment, the resulting load growth and increased revenue help keep electricity rate adjustments lower than those expected under continued reliance on external services, which are increasingly vulnerable to fluctuating diesel prices and the price uncertainty of non-local supply chains. If slight increases in electricity rates are required to due to necessary grid upgrade to accommodate the load growth, they could be offset by

reductions in food prices, waste disposal fees, and transportation costs, making the overall transition economically sustainable for residents. Furthermore, residential solar installations could create a distributed energy network that eases pressure on the electric grid, though balancing individual self-sufficiency with utility operational demands remains a challenge. Excess renewable energy in the future could be converted into alternative fuels, providing additional generation capacity and supporting a local land-based transportation or a small fleet of local ships. This vision encompasses three critical subthemes: **Distributed Generation Sources, Reducing Dependency on Imported Fuels, and Food Security and Waste Stream Reduction.**

Table 8: Overview of self-sufficiency subthemes found in the Energy Quest responses, including definitions and examples quotes that highlight each subtheme

Sub-Themes:	Definition:	Example:
<b>Distributed Generation Sources</b>	Developing localized energy grids or smaller systems that reduce dependency on external grids and improve community-focused autonomy	<p><i>"Starting with small quickly achievable projects and then larger projects with bigger payoff.."</i></p> <p><i>"I think that solar could be used for smaller projects"</i></p> <p><i>"I like micro-generation because it doesn't involve some kind of technology lock in"</i></p>
<b>Reducing Dependency on Imported Fuels</b>	Efforts to transition away from diesel fuel due to its high operational costs and import reliance, with a preference for affordable and renewable alternatives.	<p><i>"To avoid using diesel and slowly move every day resources to more renewable energy sources."</i></p> <p><i>"My reasoning was based on tourism and not using diesel fuels"</i></p>
<b>Food Security and Waste Stream Reduction</b>	Using energy to grow food on island and utilizing waste streams locally to reduce imports and exports	<p><i>"Food security with hydroponics very important"</i></p> <p><i>"support solid waste reduction, increase food security."</i></p> <p><i>"Food prices and security is a large issue, so big gardens could help with that"</i></p>

**DISTRIBUTED GENERATION SOURCES**

Distributed generation systems emerged as a key subtheme in achieving energy independence. Participants recognized distributed solar grids, and storage as critical components of localized energy autonomy. These systems allow neighborhoods or individual buildings to generate and manage their own energy, reducing dependency on centralized grids and imported energy. Distributed generation empowers Sitkans to create flexible energy solutions designed to meet specific local demands, offering resilience and customization for each area in the community.

Additionally, responses revealed enthusiasm for alternative-fueled combined heat and power systems as a viable microgrid technology to further decentralize energy generation.

### REDUCING DEPENDENCY ON IMPORTED FUELS

Transitioning away from imported fuels, particularly diesel, is essential for lowering operational costs and achieving long-term self-sufficiency. Workshop discussions emphasized electrifying residential heating, transportation, and community-scale systems using renewable sources like hydropower and solar. Stakeholders acknowledged the need for phased, long-term strategies to decrease reliance on diesel while prioritizing affordable and efficient renewable alternatives. This shift would allow for energy generation to become increasingly localized and environmentally aware.

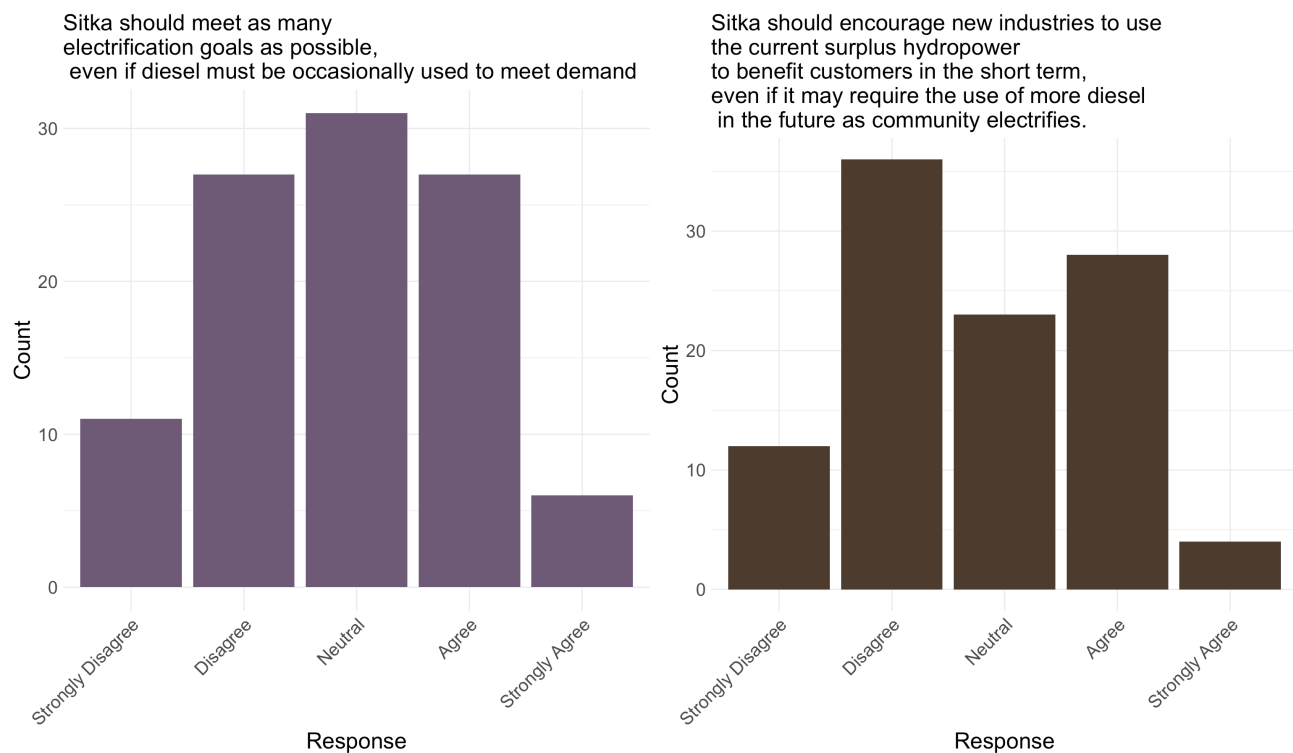


Figure 3: Responses of participants regarding the use of diesel in the context of electrification goals and industrial development in Sitka. The graph on the left shows opinions on meeting electrification goals even if diesel must occasionally be used, with a notable segment of respondents expressing disagreement (strongly disagree and disagree). The graph on the right illustrates views on encouraging new industries that may require increased diesel use, where disagreement is also prominent. Both graphs highlight a consistent proportion of respondents opposing the use of diesel as a result of growth or development.

### FOOD SECURITY AND WASTE STREAM REDUCTION

Utilizing renewable energy to grow food locally and manage waste streams effectively emerged as a priority for reducing imports and exports while strengthening resource self-sufficiency.

Figure 4 shows that hydroponic gardens (in green) were the second most used goal in the Energy Quest game highlighting the value of hydroponic gardens powered by renewable energy to mitigate the reliance on imported produce. Similarly, excess renewable generation could support electrified composting and waste-to-energy facilities, transforming waste into usable resources. Participants stressed the importance of maintaining just enough surplus energy to cover unexpected challenges, while ensuring reliable operations.

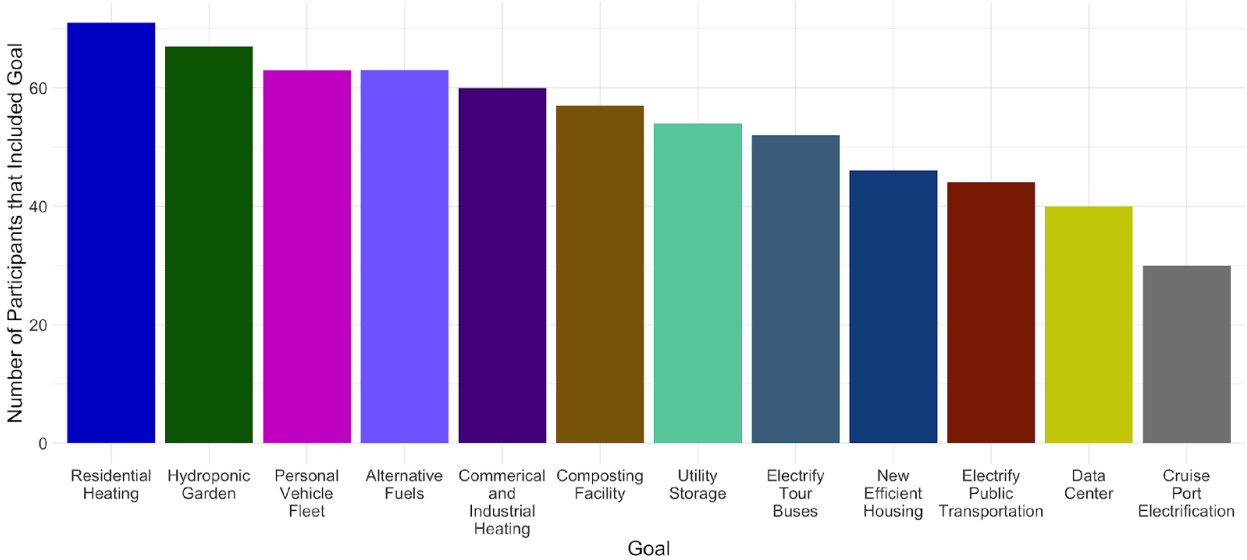


Figure 4: Number of participants that included each goal in their energy roadmap as part of the Energy Quest activity. Notably, goals related to hydroponic gardens and composting facilities ranked highly, with hydroponic gardens being the second most frequently selected goal, closely following residential heating, and composting facilities being a central focus for many participants. These results underscore the importance given to self-sufficient agricultural practices and waste management in the energy roadmaps.

## INNOVATION

The innovation scenario in Sitka’s 2050 energy roadmap centers around adopting bold, forward-thinking energy solutions to address the community’s most challenging electrification goals. This scenario focuses on harnessing emerging technologies and leveraging Sitka’s unique geographic and environmental advantages to implement cutting-edge solutions as quickly as feasible. Workshop participants demonstrated a strong interest in exploring the potential of advanced systems like geothermal energy, tidal/wave energy projects, alternative fuel production, and nuclear microreactors to meet ambitious sustainability targets. By leading with innovation, Sitka would not only reinforce its commitment to sustainability but also position itself as a model for adopting pioneering technologies in rural and coastal contexts.

The workshop results integrate into this innovation-focused scenario with responses reflected Sitka’s openness to experimentation and creativity, with mentions of marine-based energy

systems, novel technologies, and alternative fuels designed to reduce dependence on imported energy sources and diesel. Participants expressed an eagerness to study and evaluate the feasibility of emerging energy solutions while allocating resources and efforts to test and implement them locally. The scenario identifies three overarching subthemes as key to Sitka's energy innovation: Novel Technologies, Marine-Based Energy Solutions, and Alternative Fuel Development.

Table 9: Overview of self-sufficiency subthemes found in the Energy Quest responses, including definitions and examples quotes that highlight each subtheme

Sub-Themes:	Definition:	Example:
<b>Novel Technologies</b>	Encouraging the use of cutting-edge technologies such as nuclear energy, geothermal systems, and alternative marine fuels to address energy challenges creatively.	<p><i>"Small nuclear energy could be dependable."</i></p> <p><i>"Shallow geothermal gardens near Mt. Edgecumbe."</i></p>
<b>Marine-Based Energy Solutions</b>	Exploring tidal and wave energy systems that utilize Sitka's coastal geography for forward-thinking renewable generation.	<p><i>"Tidal/Wave energy should be invested in."</i></p> <p><i>"Wave power alongside hydro could positively change energy production for Sitka."</i></p> <p><i>"Uncertain effectiveness, but tidal power should be studied further."</i></p>
<b>Alternative Fuel Development</b>	Generating alternative fuels from renewable energy sources for storage, transportation, or industrial uses.	<p><i>"Converting excess renewable power into green fuel and long-term energy storage."</i></p> <p><i>"Green-fueled combined heat and power, microgrid, and community uses for green fuel."</i></p> <p><i>"Hydrogen gas for heating combined with hydro's surplus."</i></p>

**NOVEL TECHNOLOGIES**

Workshop feedback demonstrated enthusiasm for adopting novel energy technologies as solutions to Sitka's energy challenges. Responses included suggestions for geothermal systems, nuclear microreactors, and biodigestion techniques that could be tailored to Sitka's unique conditions. Geothermal energy near Mt. Edgecumbe was highlighted due to the area's proximity to geothermal activity, which lends itself to closed-loop systems capable of delivering dependable, local power<sup>3</sup>. Participants also discussed nuclear microreactors as a dependable option for addressing energy sustainability and reliability in the long term<sup>4</sup>. Additionally, one

<sup>3</sup> Roughly 12% of participants, 10 out of 84 respondents, mentioned geothermal energy either as a viable option for Sitka or as an area of interest for further exploration.

<sup>4</sup> Five respondents (6%) specifically mentioned nuclear power, such as microreactors, as an option to consider for Sitka's future energy mix.

response emphasized biodigestion technology for waste management and energy production, thereby creating additional sustainability benefits for the community. Figure 5 shows participants’ opinion on pursuing new energy generation projects in Sitka, which indicates strong agreement, as indicated by the high count of respondents in the "Agree" category. Emphasizing the community's support, this data underscores the potential for leveraging novel technologies and innovations to achieve renewable energy growth, even in the face of increased individual costs.

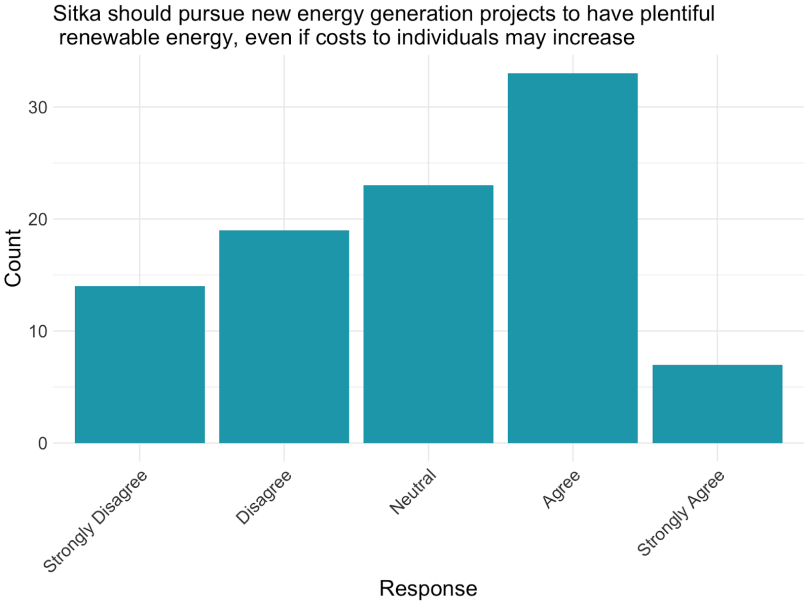


Figure 5: The distribution of responses to the statement, "Sitka should pursue new energy generation projects to have plentiful renewable energy, even if costs to individuals may increase." Responses range from "Strongly Disagree" to "Strongly Agree," with "Agree" receiving the highest count.

**MARINE-BASED ENERGY SOLUTIONS**

Marine-based energy solutions emerged as a promising strategy for leveraging Sitka’s coastal geography. Workshop participants advocated for tidal and wave energy systems as renewable options that could be uniquely suited to Sitka’s environment, with 25% of respondents<sup>5</sup> including mentions of tidal or wave energy. Responses highlighted how tidal power, paired with existing infrastructure, could diversify the community’s energy production. While there was skepticism about the feasibility and effectiveness of tidal systems currently available, participants indicated a strong interest in piloting or studying these solutions further to determine viability. Investing in innovative marine-based systems could set Sitka apart as a leader in coastal renewable energy development.

<sup>5</sup> This proportion corresponds to 21 out of 84 workshop participants who completed the activity.

## **ALTERNATIVE FUEL DEVELOPMENT**

Alternative fuel development was repeatedly highlighted as a vital component of Sitka's innovation roadmap, with six respondents including mentions of alternative or alternative fuel development. Responses emphasized producing fuels locally from hydropower surpluses, such as hydrogen or other alternative fuels, to store excess energy, reduce waste, and support transportation and industrial uses. Workshop participants pointed to alternative-fueled combined heat and power systems as an innovative way to integrate alternative fuels into microgrids, further decentralizing energy generation and enhancing community autonomy. Additionally, participants supported developing alternative marine fuels to transition Sitka's tourism-dependent industries, such as cruise ships, toward alternative operations. Note in Figure 4 that Alternative Fuels was the fourth most used goal in energy roadmaps amongst participants.

# CONCLUSIONS

The Energy Quest workshops provided Sitka with a clearer understanding of community priorities across affordability, reliability, self-sufficiency, and innovation. The roadmaps and written responses generated through gameplay offer a grounded foundation for evaluating plausible strategies within the Sitka Community Renewable Energy Strategy. The themes identified in this report highlight how residents envision balancing immediate needs with long-term investments, and they reveal a strong interest in solutions that preserve affordability while strengthening local resilience.

These results can support Sitka's next steps in scenario planning, resource assessments, and community conversations about future investments. By translating participant preferences into actionable insights, the City and Borough of Sitka can better evaluate tradeoffs, prepare for uncertain conditions, and align future decisions with the values expressed through the Energy Quest process. The findings also provide a starting point for exploring policy pathways, infrastructure priorities, and opportunities for collaboration across sectors.

We thank all community members, workshop participants, and partners who contributed to Energy Quest, your engagement made this effort possible. The insights shared through your participation will continue to guide the development of a robust and community-driven energy strategy for Sitka's future.