

SEC High Efficiency Ferry Blueprint

POWER GENERATION SYSTEMS MEMO

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Prepared by:

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INTRODUCTION

The Alaska Marine Highway System is undergoing a modernization process as part of its long-range plan. A key initiative in this process is the High Efficiency Commuter Ferry (HE Ferry) project which includes both design of a new vessel and a *Shoreside Integration Blueprint* that is more focused on vessel charging needs. Overall, the HE Ferry project aims to explore hybrid-electric propulsion systems for routes that are well-suited for this technology as a way to lower operating costs and increase service levels and system capacity. This new vessel will allow AMHS and passengers to increase operational efficiency, while also enhancing transportation infrastructure for coastal communities that depend on affordable and reliable ferry services for economic stability.

Southeast Conference (SEC) is supporting the new AMHS vessel design through the development of a *Shoreside Integration Blueprint* to understand how the new ferry will charge, and how it fits into the current and future energy needs of each candidate community it may serve. Baseline utility modeling was conducted to support and inform the development of shoreside charging infrastructure and to confirm that existing generation, transmission, distribution, and storage capacity of each of the candidate communities could support a new HE Ferry now and into the future.

This memo details each candidate community's annual use of electrical energy (as measured in MWh) and, when available, the peak electrical demand of each community. This is important to understand how much energy capacity is present in each community to inform vessel designers how charging a future ferry might fit within the context of the community and its electrical needs and demands. This memo outlines the approach to modeling those needs and demands of the communities and does not yet incorporate any information related to proposed vessel specs, which will be incorporated later after they are finalized by the vessel designers. Key findings from this effort will support future work related to the development of costs and improvements to support vessel charging in candidate communities.

Study Communities

The *Shoreside Integration Blueprint* and the overall HE Commuter Ferry project are exploring the potential of adding the new HE Ferry to two AMHS routes, with a total of five candidate communities considered for potential vessel charging. These routes and communities are shown in Figure 1 and include the Ketchikan – Metlakatla route (with the proposed future terminal at Saxman also being considered) and the Haines – Skagway route.

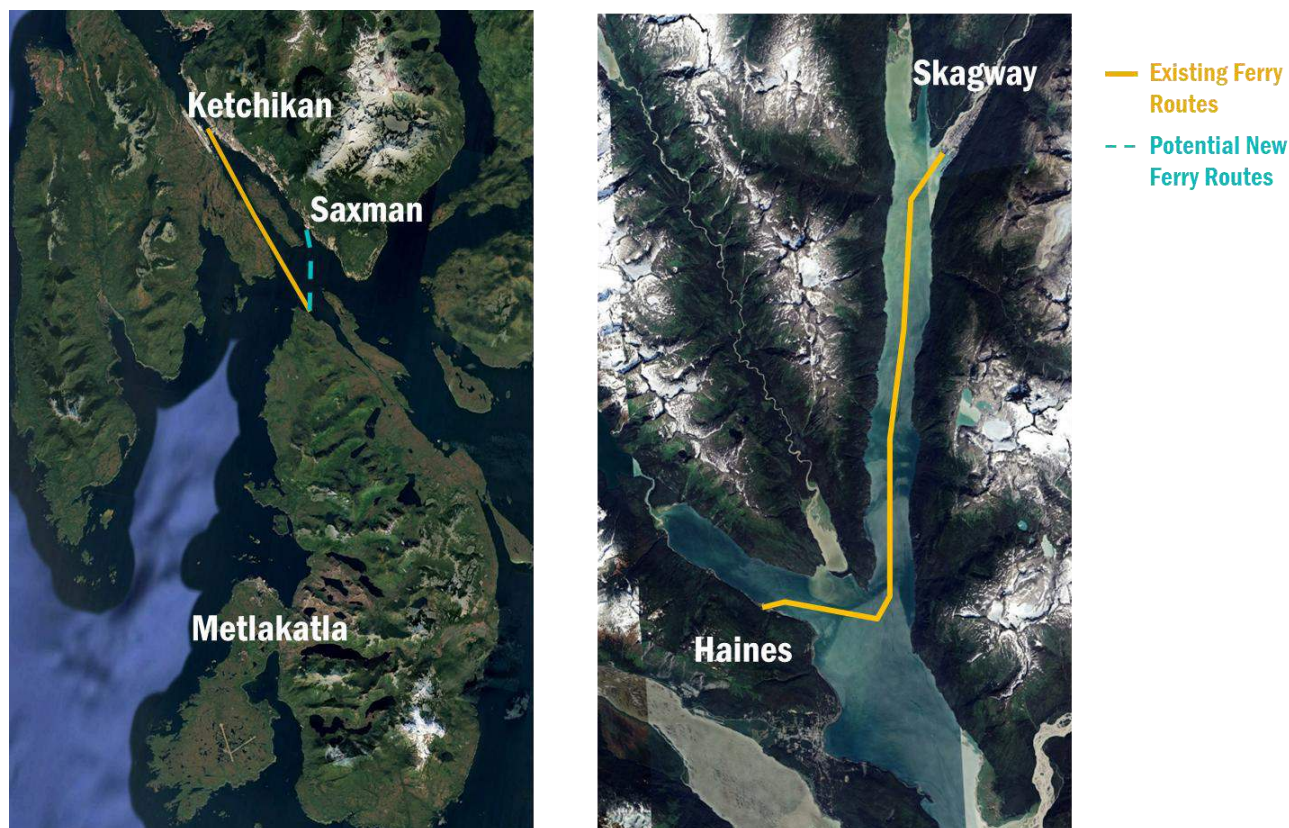


Figure 1- Candidate Routes and Communities

KETCHIKAN AND SAXMAN

Ketchikan is comprised of three governmental entities including the Ketchikan Gateway Borough (KGB), the City of Ketchikan, and Saxman. In the Southeast panhandle of Alaska, the City of Ketchikan and Saxman are located with the KGB's broader area, which covers 4,898.9 square miles of land and 1,981.3 miles of water and is home to roughly 19 percent of Southeast Alaska's population.

The KGB has approximately 14,000 residents. Of these two cities within the KGB, Ketchikan has a larger population, with roughly 8,000 residents in 2024 compared to Saxman's 300-resident population in the same year. Ketchikan has greater opportunities for access, with an airport, seaplane base, and ferry terminal, while the transportation access currently available in Saxman includes surface transportation to Ketchikan and a small boat harbor that is used by residents from small islands nearby to the community.

Ketchikan's economy is defined by its role as a "gateway" city. Its economic sectors include tourism, with over 1.5 million visitors annually, and fishing and seafood processing, as it is known as "the salmon capital of the world". Ketchikan's tourism is greatly attributed to visitors arriving via cruise ship. Saxman's largest employer is transportation and warehousing. Saxman's

Native village is a vibrant arts and cultural center, making tourism a key feature for the community.

Though separate cities, Ketchikan and Saxman share an electric utility. As a result, these communities were combined for the purposes of this baseline analysis. The electrical demand in the communities¹ is primarily for small commercial (43%) and residential (42%) buildings to support things like heating and lighting. Industrial uses such as the shipyard and fish processing make up 13% of energy demand. The remainder is made up of small boat harbor charging as well as street and area lighting loads.

METLAKATLA

The Metlakatla Indian Community (Metlakatla) is the most populated community within the Prince of Wales-Hyder census area, with a population of over 1,440 residents in 2022. Metlakatla is located at Port Chester on the west coast of Annette Island and is the only federal reservation for indigenous peoples in Alaska. Metlakatla's economy centers on fishing and seafood processing. Electricity in the community is used to support these uses and for commercial and residential buildings.

HAINES AND SKAGWAY

Though separate communities, Haines and Skagway share an electric utility. As a result, these communities were combined for the purposes of this baseline analysis. Energy usage in these communities² is primarily commercial (43%) followed by residential (31%) and government (16%).

Haines Borough is composed of six unique census designated places. The borough is situated between the Chilkoot and Chilkat rivers along Lynn Canal. Haines Borough has a total population of approximately 2,580 residents as of 2022, about 3.5 percent of the total population of the Southeast region. Haines' economy is characterized by a mix of cruise tourism, fishing, and forestry.

The Municipality of Skagway Borough (Skagway) is located at the northernmost point of the Lynn Canal. Skagway covers 452.4 square miles of land and 11.9 square miles of water. Skagway is home to 1.5 percent of the population of Southeast Alaska, with about 1,150 residents in 2022. Skagway's economy is characterized by tourism, especially during the May-September

¹ As provided by Ketchikan Public Utility

² As provided by Alaska Power & Telephone

cruise season, with features like the Klondike Gold Rush National Historical Park and White Pass & Yukon Route Railway attracting visitors.

Approach

To understand how a new HE Commuter Ferry might charge and how it fits into the current and future energy needs of each candidate community, the baseline utility conditions in each candidate community were evaluated, including current generation infrastructure; historic energy usage; power capacity, transmission and distribution; and baseline trends. As shown in Figure 2, taking this baseline, future tasks will then develop potential energy scenarios for each community to understand the range of possible future energy needs and to make sure that an HE Commuter Ferry can be accommodated in a variety of potential future conditions.

Energy Modeling Process By Candidate Community

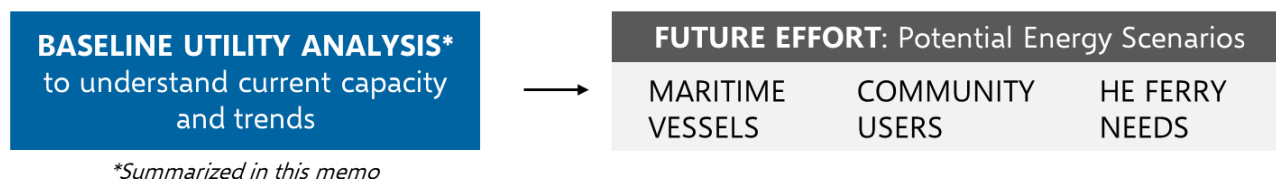


Figure 2: Blueprint Energy Modeling Process by Candidate Community

Potential energy scenarios will evaluate the needs and potential energy use of maritime vessels for standard operations along with community users for powering buildings and transportation uses. The energy and power needs of the HE Ferry are currently being developed by the vessel designer and will also be included in each scenario.

INTRODUCTION TO ELECTRICAL SYSTEMS AND KEY DEFINITIONS

This baseline model covers both energy and power, which while related, are distinct considerations for electrical systems.

- **Energy** is the ability to do work, measured in watt-hours (Wh).
- **Power** is the rate of energy transfer, measured in watts (W).

With hydroelectric systems, power is the product of water elevation above the turbine (head) and water flow. The electrical energy derived from the turbine is the product of power over time. The tables provided in each community utility profile illustrate this – the storage capacity of a reservoir is its energy and is shown in megawatt-hours (MWh). The rate that a turbine generator turns water into electricity is the generator’s power and is indicated in megawatts (MW).

After generation, electrical energy must then be transmitted from where it is generated (the power plant) to where it will be used. This is done through power lines including both **transmission and distribution lines**. Transmission lines operate at a higher voltage and are designed to minimize losses over long distances. Distribution lines operate at lower voltages and distribute power to individual users. The voltage of the power lines near the ferry landings in each community is indicated in kilovolts (kV).

Lastly, electrical energy can be stored in **Battery Energy Storage Systems (BESS)**. BESS store excess energy for use at a later time and can improve grid reliability.

BASELINE MODELING & TREND ANALYSIS APPROACH

Data was provided by each electrical utility upon request and each community provided daily or monthly energy usage over the reported time period. Since each utility tracks different parameters, identical information is not available for all communities. The communities of Ketchikan and Metlakatla provided peak power demand information, which was useful to compare to current capacity, but this information was not provided for Haines and Skagway. In addition to data review and modeling, interviews were conducted with utility and local stakeholders to inform this narrative and to define conclusions, and those are provided herein.

COMMUNITY UTILITY PROFILES

In general, Southeast Alaska communities rely largely on hydropower, and hydropower capacity is limited by snowpack and rainfall. Winter hydrogeneration is heavily managed to maintain water levels. Southeast Alaska started experiencing a drought in late 2016. In 2018, that escalated to severe drought status, and in 2019, it hit extreme drought before resolving. That corresponding energy usage decrease is reflected in the baseline models for each community. As residents conserve energy more mindfully when called upon, this model presents a more holistic representation of the capacity and demand of each studied community.

Ketchikan and Saxman

GENERATION INFRASTRUCTURE & CURRENT POWER CAPACITY

The energy needs of Ketchikan and Saxman are currently supported by two key agencies: a private power wholesaler Southeast Alaska Power Agency (SEAPA), and the publicly-owned, municipal utility Ketchikan Public Utilities (KPU).

Southeast Alaska Power Agency Facilities

SEAPA transmits power from its two hydroelectric powerplants, Tye Lake and Swan Lake, to Ketchikan and Saxman, along with the communities of Petersburg and Wrangell. The Swan Lake

Hydro Facility is dedicated to supplying power to KPU. Tyee Lake provides power to Wrangell Municipal Light & Power and Petersburg Municipal Power & Light. While the Swan Hydro Facility is a dam, the Tyee Lake project is a “lake tap” with an installed capacity of 20 MW. The Tyee Lake Project also connects to Ketchikan’s electric system through SEAPA’s Swan-Tyee Intertie with 57 miles of transmission line. In total, SEAPA provides about 38% of the total power capacity (hydro + diesel) for Ketchikan and about 63% of the city’s total hydropower capacity.

Ketchikan Public Utilities Facilities

KPU also provides power to both Ketchikan and Saxman and has a total capacity of 14.9 MW of hydroelectric power from four facilities, all of which are dams with reservoir storage capacity. KPU also has 25.1 MW of diesel generated backup power available for peaking and standby operation, and the utility has extra uninterruptible capacity only in the summer months. KPU expressed interest in a BESS and feels that the community would benefit from one on their grid to support resiliency and demand management. However, KPU is not actively engineering or funding a BESS project at this time.

Ketchikan’s energy capacity is limited by their power wholesaler, and the capacity available to Ketchikan varies depending on the loads at the other communities. Table 1 shows the total capacity of SEAPA and KPU facilities, with KPU’s total maximum stand-alone capacity being 40 MW.

Table 1: Powerplants Supporting Ketchikan and Saxman

Powerplant	Type	Power Capacity	Energy Storage Capacity
Upper Silvas (KPU)	Hydro	2.0 MW	21,829.6 MWh
Beaver Falls (KPU)	Hydro	4.2 MW	1,081.5 MWh
Whitman Lake (KPU)	Hydro	4.54 MW	5,300 MWh
Ketchikan Lakes (KPU)	Hydro	4.2 MW	2,051.2 MWh
Bailey Powerhouse (KPU)	Diesel	21.49 MW	N/A
North Point Higgins (KPU)	Diesel	3.65 MW	N/A
Swan Lake (SEAPA) ³	Hydro	25 MW	27,735.7 MWh

TRANSMISSION & DISTRIBUTION

KPU has both lower (12.47kV) and higher voltage (34.5kV) distribution lines running along Tongass Hwy, adjacent to the Ketchikan AMHS terminal.

³ SEAPA also has the facility at Tyee Lake that primarily serves Wrangell and Petersburg. Though the Swan-Tyee Intertie also connects Tyee to Ketchikan, the facility typically only provides power to KPU's grid when the Swan Lake Facility is offline.

KPU also provides power to the city of Saxman, where an alternate landing and overnight vessel tie-up location is proposed and where the South Tongass Ferry Terminal project would be developed. Because of its proximity to generation and distance from heavy industrial loads, Saxman may be better suited to support vessel charging than the current landing at Ketchikan. The Saxman port is scheduled to be all new construction, as is any electrical infrastructure serving it, with the aim of completion in 2030. There is a 34.5kV transmission line along the road near this site, which is the preferred voltage to support charging loads.

HISTORIC ENERGY & POWER USAGE

The Ketchikan model was built with usage data received from KPU. As a utility, KPU services the communities of Ketchikan and Saxman, and the communities are modeled in this section with their usage data combined. This model contrasts 2012 usage against 2024 usage and takes an average of that change over twelve years. Their growth is small, at only 0.3% per year, and usage peaked in 2023 at just over 178,000 MWh. During site visits, Ketchikan utility stakeholders expressed concerns about their ability to support any new, large loads without additional utility expansion.

Figure 3 shows Ketchikan's steady growth in peak power values, year-over-year. The community's hydro capacity, with SEAPA support, is approximately 35 MW, including approximately 15 MW of hydro generation from just KPU. Without SEAPA support, KPU's maximum stand-alone capacity is 40 MW, including diesel generation. In recent years, Ketchikan peak power demands have been regularly between 35 MW and 40 MW, which necessitates diesel supplementation even with full hydropower availability from both KPU and SEAPA.

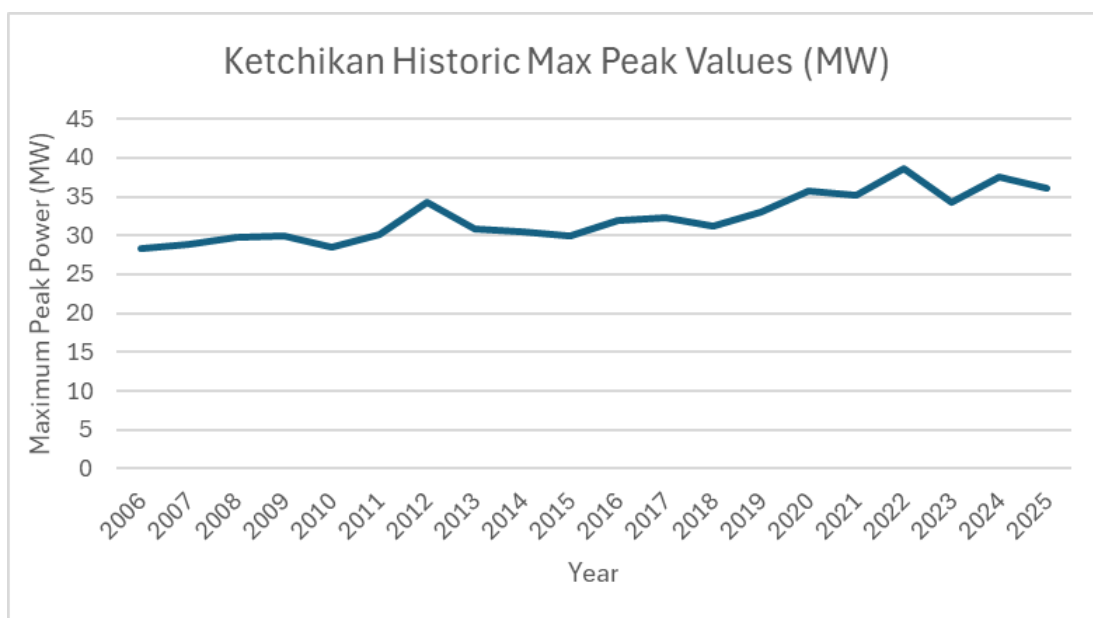


Figure 3: Ketchikan Maximum Power Demand Values, 2006 through Present

Figure 4 shows Ketchikan’s 0.3% annual growth in energy consumption. The impacts of the drought are evident, particularly the longer it progressed. At points throughout the drought, water levels were so low that hydropower resources could not run, and SEAPA was not able to provide any support to KPU. In months when diesel supplementation is needed, a fuel surcharge is added to customers’ bills. Because each customer’s surcharge varies depending on their energy usage, customers are encouraged to conserve. As soon as drought conditions resolved, energy consumption continued the previous upward trend.

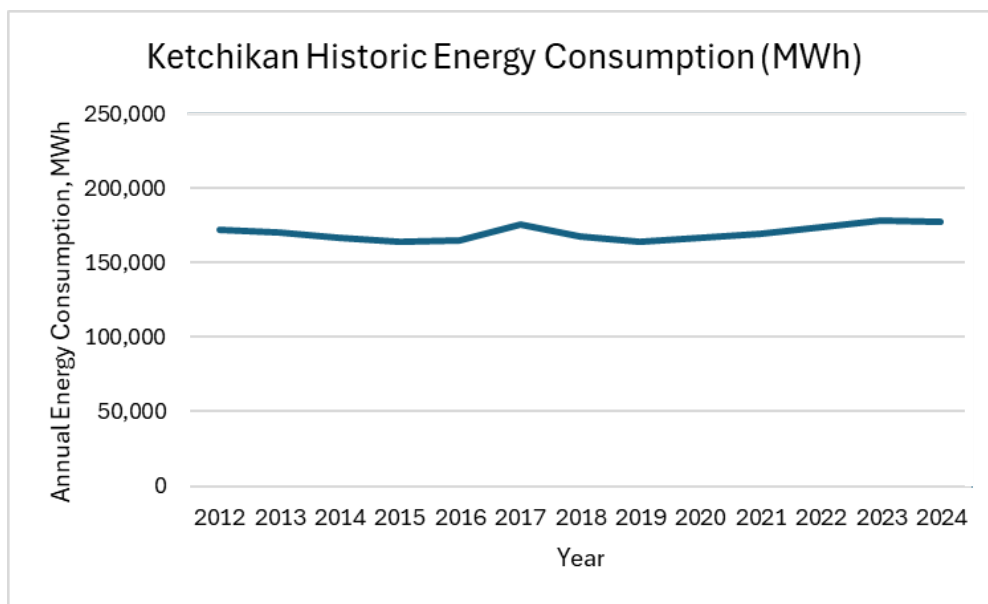


Figure 4: Ketchikan Historic Energy Consumption Data, 2012 to 2024

TREND ANALYSIS & KEY FINDINGS

Ketchikan relies on SEAPA to meet its energy needs. Over the 2012 to 2022 period, Ketchikan received almost half of its electrical energy from SEAPA via the Swan Lake transmission line, and if SEAPA fails in any way, the community is very vulnerable. As power demand in the community increases, so does this vulnerability. This is particularly true in winter months, as approximately 30% of the homes in Ketchikan have switched from fuel oil and wood to electric heat, putting KPU at a stress point for what can be provided. Even during summer months, when SEAPA performs maintenance, KPU needs to run generators to support normal loads. With 10% growth in wintertime peak in just one year, and winter peaks nearly double the summer peak demand, there is minimal room for winter growth at this time.⁴

⁴ Per SEAPA’s 30 Year Load Growth Study (August 2023)

To help meet increasing demands from electric heating and other users in Ketchikan and the other communities it serves, SEAPA is in the permitting process right now to add another 10MW generator at Tye Lake. This is planned to come online in 2033 to support winter peaking loads, as hydroelectric sources are presently nearly at full capacity and are periodically supplemented with fossil fuel power from the community powerplants.

The existing Power Sales Agreement disallows KPU from developing any additional renewable generation sources, so their ability to forecast load growth or commit support for large future projects is limited. Ketchikan has entered into a preliminary agreement with the community of Metlakatla for an intertie between the two

utilities. The agreement is to maintain a net zero overall exchange of energy, though this is not fully defined at this time. The schedule of the intertie is not yet known, but this should increase energy resiliency for both communities once it is complete. For KPU to complete this intertie would require a new line terminal at the existing Mountain Point substation with a new switch, new primary metering, and new protective relaying. Substation construction nationwide is impacted by material shortages and long lead times, so an appropriate timeline would be difficult to ascertain until funding is secured and materials ordered.

KEY FINDINGS: KETCHIKAN & SAXMAN

- Fast charging is not feasible without diesel use or hydroelectric upgrades
- Slow overnight charging is possibly feasible during off-peak, non-winter periods
- The new Saxman new is the best long-term charging candidate due to proximity to 34.5kV and greenfield construction

Figure 5 shows the historic energy usage and projects baseline future energy usage, based on the historic average growth rate of 0.3%.

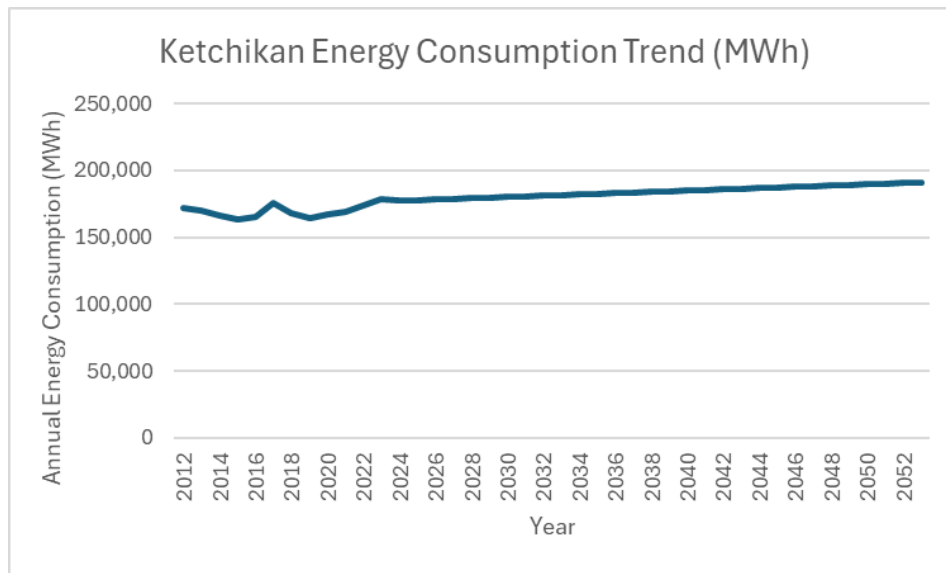


Figure 5: Ketchikan's Historic Energy Usage and 30 Year Future Usage Projection

Metlakatla

GENERATION INFRASTRUCTURE & CURRENT POWER CAPACITY

As with the rest of our studied communities, Metlakatla is heavily dependent on hydropower with diesel supplementation. As shown in Table 2, Metlakatla Power and Light (MP&L), the community's utility, has approximately 4 MW of capacity of hydroelectric power and owns hydroelectric facilities at Purple Lake and Chester Lake, which are detailed below. Metlakatla expressed that MP&L currently does not have concerns about having sufficient power capacity to charge a new HE Ferry.

Table 2: Powerplants Supporting Metlakatla

Powerplant	Type	Power Capacity
Purple Lake	Hydro	3.0 MW
Chester Lake	Hydro	1.0 MW
Centennial Power Plant	Diesel	2.25 MW

Purple Lake Hydro Power Plant

The Purple Lake plant has a 3.0 MW capacity and consists of three turbine-generator units. The plant is fed by a 64-inch penstock with an underground tap into Purple Lake which is located on Annette Island.

Chester Lake Hydro Power Plant

Also located on Annette Island, this plant is fed from penstock in the base of a 40-foot-high dam at the outlet of Chester Lake. With an approximately 1.0 MW capacity, the facility consists of one Pelton type turbine-generator. Chester Lake is also the source for Metlakatla's municipal water system, so lake levels are carefully managed to maintain adequate water supply. The community has discussed a potential expansion project at this facility to meet future power and energy demand increases, if needed.

Battery Storage Infrastructure

Metlakatla's previous BESS reached the end of its usable life and has been removed from service. MP&L has procured a new BESS but has not yet received adequate funding to install it. Once funding is procured, a BESS should help provide grid stability which would allow the community grid to support fast charging of a new HE ferry.

HISTORIC ENERGY USAGE

The Metlakatla model takes an average of the annual change for all years available – 2007 through 2024. This results in a negative growth rate of 0.2%. In discussions with the community,

Metlakatla is experiencing a small population decline, but the community does anticipate a continued transition to electric heating methods.

The 2016-2019 drought is seen most dramatically in historical usage, shown in Figure 6.

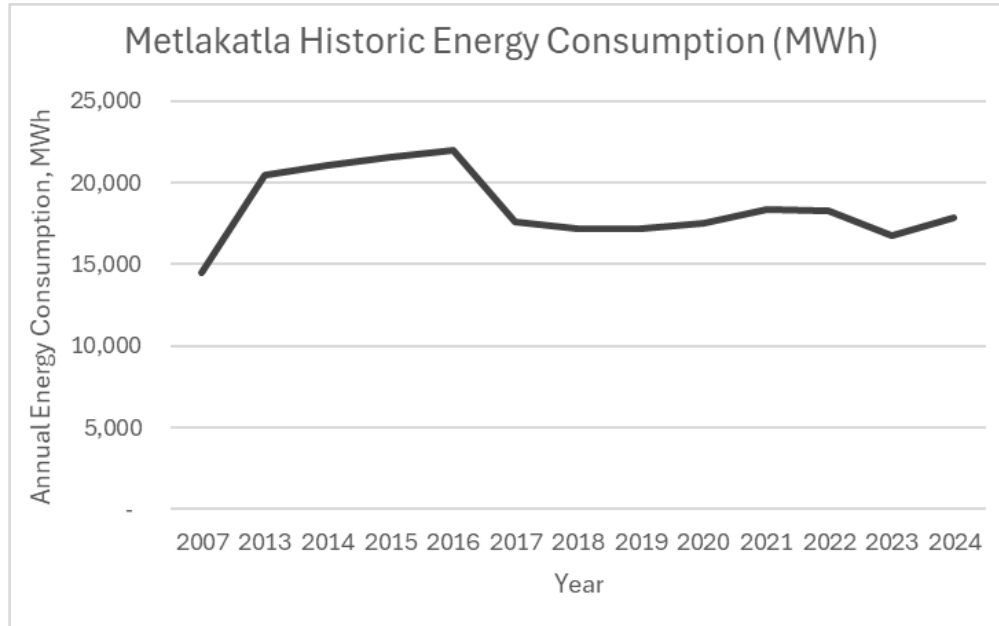


Figure 6: Metlakatla Historic Energy Consumption, 2007 to 2024

When Metlakatla started seeing impacts of the drought, the community-focused outreach in elementary and middle schools. Thanks in part to the attentive youth in the community, Metlakatla was able to cut water usage in half in the following years. For periods throughout the drought years, Metlakatla water reservoirs were so low that the communities relied entirely on diesel generated power, reserving water for their drinking supply. This led to drastically decreased energy usage.

Historic peak power demand values for the community, shown in Figure 7, have ranged between approximately 3.5 MW and 4.5 MW and have been decreasing since 2021.

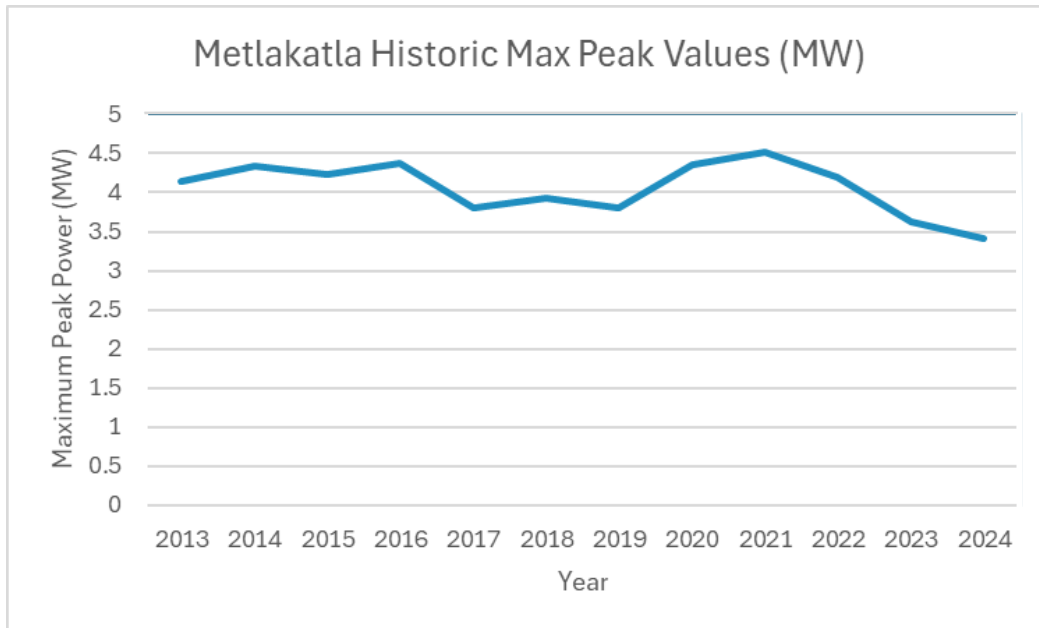


Figure 7: Metlakatla Maximum Power Demand Values, 2013 to Present

TRANSMISSION & DISTRIBUTION

Though MP&L currently does not have concerns about overall power capacity, their substation infrastructure needs to be updated to support a higher voltage for transmission. There is a 12.47kV power line running to the ferry terminal with capacity for slow battery charging of an electrified ferry, but this line would need to be upgraded to 34.5kV for fast charging.

This upgrade to 34.5kV is already under consideration, as the 34.5kV Metlakatla – Ketchikan Intertie cable would land near the existing ferry terminal. Because this voltage is not currently utilized on Annette Island, it will require a new substation near the Centennial Power Plant. The cable landing will require installation of a switch to connect to the existing transmission line. Two existing transformers on that line would need to be replaced, including the one at the ferry terminal. Line upgrades would also need to be completed to ensure insulators and spacing are appropriate for the new voltage. As funding is still being secured and substation materials across the country are seeing delays, the timeline of completion is unknown.

TREND ANALYSIS & KEY FINDINGS

In speaking with MP&L, the utility anticipates no change in their current loads for the foreseeable future. Metlakatla’s peak power demands have been trending downward in recent years, with a 2024 peak of less than 3.5 MW. This model, shown in Figure 8, most closely approximates stagnation, forecasting zero energy growth in energy usage. Metlakatla’s annual usage peaked in 2016, just shy of 22,000MWh.

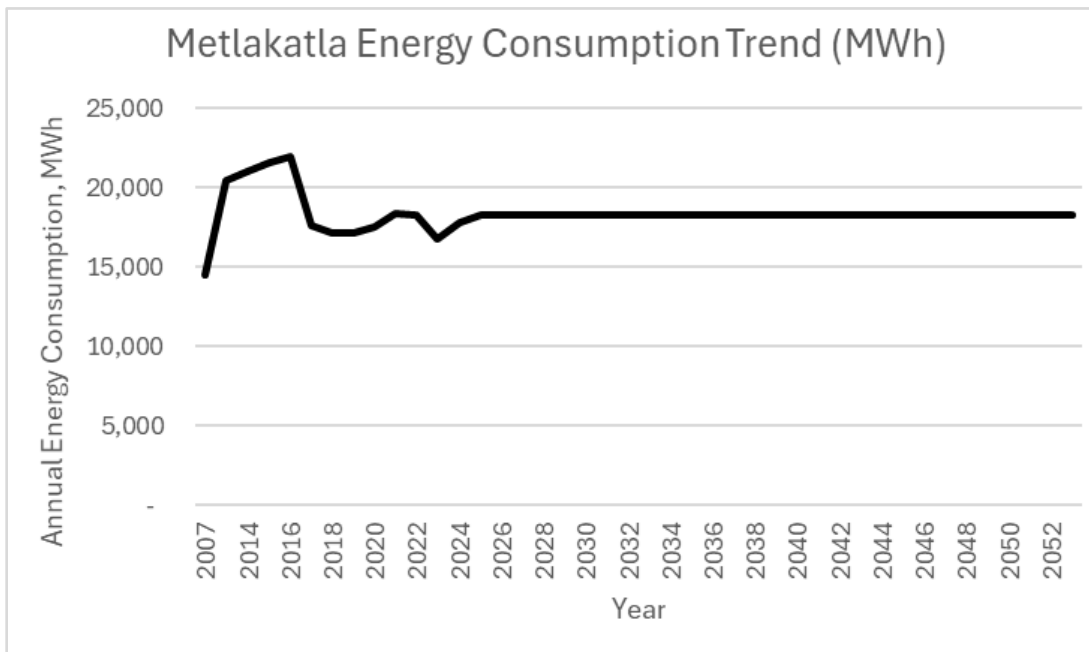


Figure 8: Metlakatla Historic Energy Usage and 30-year Usage Projection

KEY FINDINGS: METLAKATLA

- The community depends on maintaining water levels at their hydroelectric resources for both power and drinking water.
- A BESS as not just beneficial for this community but is potentially necessary to support fast charging of a ferry.
- Voltage upgrades are also needed to support fast charging of a ferry.

Haines and Skagway

The communities of Haines and Skagway were modeled together, as the communities are interconnected and data was not separated by the utility.

GENERATION INFRASTRUCTURE & CURRENT POWER CAPACITY

Alaska Power & Telephone (AP&T), the local utility, has a total hydroelectric capacity of 7.4 MW and total diesel capacity of 8.3 MW. AP&T operates the Dewey Lakes Hydro project, the Goat Lake hydroelectric facility, and the facility at Kasidaya Creek. These facilities are supplemented by local diesel as is shown in Table 3. AP&T indicated that as long as their 34.5kV transmission line is used, the system has capacity to support adding ferry charging infrastructure to both Haines and Skagway.

Table 3: Powerplants Supporting Haines and Skagway

Powerplant	Type	Power Capacity
Dewey Lakes	Hydro	1.0 MW
Skagway Powerplant	Diesel	4.1 MW
Goat Lake	Hydro	4.0 MW
Kasidaya Creek	Hydro	2.4 MW
Haines Powerplant	Diesel	3.2 MW

Dewey Lakes Hydroelectric Project

The 943-kW capacity Dewey Lakes Hydroelectric Project first began operations in 1902. Mid-May to October is the peak generation period for this facility, as licensing requirements restrict winter drawdown, limiting its flexibility during colder months.

Goat Lake Hydroelectric Project

The Goat Lake Hydroelectric Project is located approximately 6.5 miles northeast of Skagway, Alaska on a 204-acre, glacially fed lake that has the winter storage necessary to sustain year-round hydro-generation. The lake is used as a reservoir without any dams. As a primary generation source, Goat Lake has a 4.0 MW capacity and provides consistent output, providing operational flexibility due to its storage capacity.

Kasidaya Hydroelectric Project

This 3.0 MW hydroelectric project is a conventional hydropower facility located on Kasidaya Creek, which flows into the Taiya Inlet, a few miles south of Skagway, Alaska. It generates electricity primarily for the town of Haines, Alaska. While the facility can provide power during the summer, Haines relies on a subsea connection to the Goat Lake hydroelectric plant for winter power due to the creek's reduced water flow in the colder months. When Kasidaya is

offline due to low waterflow diesel generators are occasionally used to maintain supply reliability for both communities. January, February, and March are the most common months when diesel usage occurs, but overall, less than 6% of annual power generation for the communities comes from diesel.

TRANSMISSION & DISTRIBUTION

The Haines ferry terminal has an existing 34.5kV transmission line that runs along the road and is easily accessible. The Skagway ferry terminal has an existing 34.5kV transmission line nearby that can provide underground power. Power lines at the 34.5kV voltage are ideally suited for ferry charging as both slower, overnight and faster, mid-day charging can be accommodated.

HISTORIC ENERGY USAGE

The energy usage model includes both Haines and Skagway. It contrasts 2015 usage against 2024 usage and takes an average of that change over nine years, indicating annual growth of 1.2%. This model was chosen such that data recorded during the COVID pandemic would not skew the results, as these communities are more heavily dependent on tourism than the other candidate communities, and the utility power demand and energy consumption was significantly lower during that period due to dramatically reduced tourism. Though Haines and Skagway did experience a drier-than-normal 2016 through 2019, it was not to the degree that the southern panhandle experienced, and Haines did not issue water restrictions until 2019.⁵ Despite small population decline, both communities have seen strong growth in energy consumption since 2020.

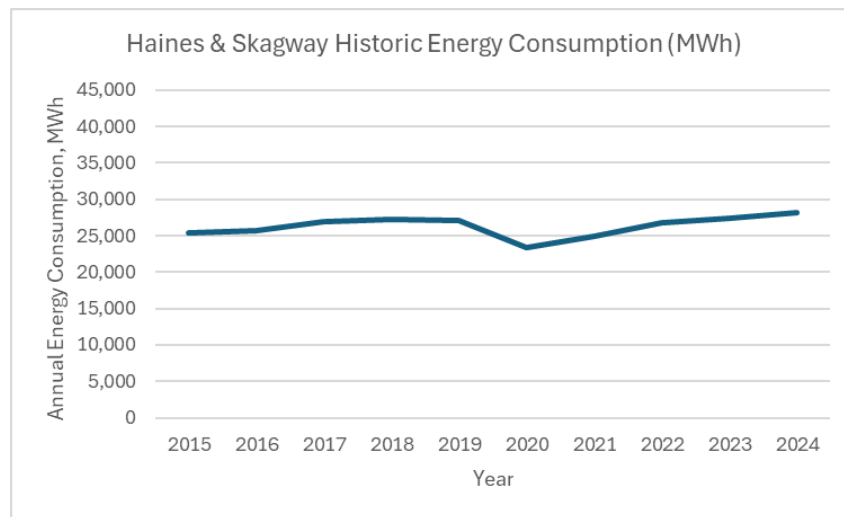


Figure 9: Haines & Skagway Historic Energy Consumption Data, 2015 to 2024

⁵ Hoell, A., Thoman, R., McFarland, H. R. & Parker, B. 2022. Southeast Alaska drought [report]. International Arctic Research Center, University of Alaska Fairbanks

Historical data regarding peak power demand was not provided by AP&T for analysis.

KEY FINDINGS: HAINES & SKAGWAY

- Lack of peak power data from AP&T introduces uncertainty
- Fast charging during winter peaks may still require wither a BESS or a managed charging approach.

TREND ANALYSIS & KEY FINDINGS

Both communities are seeing a strong increase in energy consumption, which is expected to grow with the new Haines hospital, planned to open in fall 2028. Annual consumption peaked last year at just over 28,000MWh. As the first incorporated city in Alaska, Skagway’s housing infrastructure is dated and approximately 41% of occupied homes in the Skagway Borough are drafty.⁶ As electric heating methods replace fuel oil, the energy inefficiencies of many homes are causing this to have a disproportionate impact on energy consumption. Figure 10 shows that, if historic energy use growth rates continue, combined annual energy consumption for the two communities would surpass 40,000 MWh in the early 2050s.

Both communities expressed interest in the ferry overnighting in their town, and Skagway indicated port electrification is their top priority. Skagway also expressed interest in a BESS, as the community does not have one currently to respond to system stability and rapid load changes.

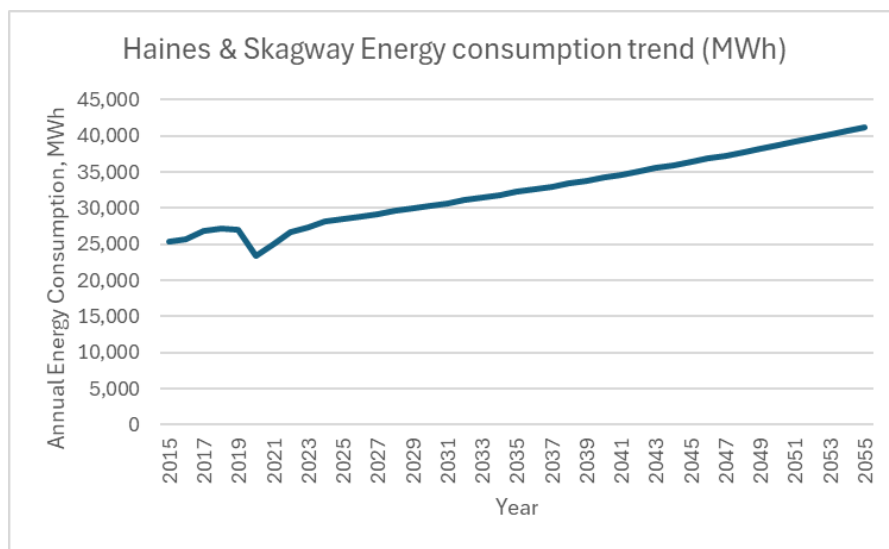


Figure 10: Haines & Skagway Historic Energy Usage and 30-Year Future Usage Baseline Projection

⁶ Final Skagway Borough Summary. Alaska Housing Finance Corporation. (2017). https://www.ahfc.us/application/files/7915/1510/4584/Final_-_Skagway_Borough_Summary.pdf

CONCLUSION

The goal of this analysis was to provide a baseline model of each community's existing infrastructure, energy usage, and growth trends that can be used to better understand each community's ability to host or support an electrified ferry. The 30-year forecasts, summarized in Table 4 were provided to evaluate current infrastructure and determine whether an electrified ferry may fit into a community's growth profile with or without additional resources.

Table 4: Summary of Community Findings

Community	2024 usage (MWh)	Projected Growth	Max Power Capacity
Ketchikan	177,488 MWh	0.3%	40.0 MW
Metlakatla	18,275 MWh	0.0%	5.00 MW
Haines & Skagway	28,150 MWh	1.2%	15.7 MW

These baseline projections indicate that:

- Power and energy usage is expected to increase in all communities except Metlakatla.
- All communities except Ketchikan do not have power capacity concerns regarding adding vessel charging at any time of year. Ketchikan may have the ability to support a slow, overnight charge during off-peak hours without needing to rely on diesel generators.
- Ketchikan is the only community whose needs may exceed capacity in the short term. However, the community grid will be more resilient after the third Tyee generator comes online in 2033, though the additional power will primarily serve Petersburg and Wrangell, which are the primary communities served by the Tyee facility.

Focus on Renewable Energy

As all communities have high reliance on hydropower, as shown in Table 5. As an HE Ferry is intended to reduce emissions and be environmentally friendly, it will seek to be powered by renewable energy only.

Table 5: Average Percent of Historical Community Energy Usage from Hydro in Comparison to Diesel

Community	Average % of Energy Usage from Hydro	Average % of Energy Usage from Diesel
Ketchikan	95.6% (49.08% SEAPA; 46.55% KPU)	4.37%
Metlakatla	100%	0%*
Haines & Skagway	94.3%	5.7%

*Diesel is used only on an emergency basis.

Once ferry energy needs are available, additional analysis will be conducted to confirm that adding ferry charging will not necessitate and increase in diesel generator use for communities.

Energy Resilience & BESS

No communities currently have BESS actively supporting their grid, but interest in such systems was expressed. Metlakatla also has a new BESS that is awaiting installation. Droughts pose key threats to energy reliability for hydropower facilities, as has been exhibited by the historic experiences of candidate communities. BESS can help reduce these reliability risks and as a result, will likely be considered as part of HE Ferry charging infrastructure.

Next Steps

This is a baseline analysis to understand the current situation and historical conditions in each community. Once the vessel energy needs information is received from the vessel designer, it will be incorporated into this analysis to confirm whether incorporating ferry charging into candidate communities will lead to energy and/or power capacity constraints. Further analysis will then also be conducted regarding the potential impacts to utility rates that may be associated with charging the vessel.

Additionally, uncertainties exist regarding potential future energy consumption and power demand growth based on cruise shoreside power adoption rates, rates of home heating electrification, and other factors. To address these uncertainties, this baseline and historic trends analysis will be expanded in future tasks by developing two potential future energy scenarios for each community based on different potential trends. Each scenario will identify potential grid challenges in terms of future energy usage and peak power capacity, and the scenario analysis will help determine if other communities besides Ketchikan might also experience capacity challenges with incorporating charging of a new HE Ferry under varying future conditions.