Guemes Ferry TAG Report

August 31, 2026

Executive Summary

The technical advisory group (TAG) is a group of community and county individuals appointed by the Board of Skagit County Commissioners (BOCC) to advise the BOCC on the preferred replacement option for Guemes Island Ferry. The TAG includes maritime industry experts and citizens who have knowledge of, and interest in, the Guemes Island Ferry system. The TAG met once a month from November 2025 through August 2026 to analyze ferry system requirements and various propulsion options. The objective of the TAG is to make a recommendation to the BOCC outlining the path that the BOCC should take to replace the existing ferry, which will reach the end of its useful life of 60 years in 2039. That recommendation is as follows:

- Replace the existing ferry with a plug-in hybrid design that uses shore power, on-board diesel generator(s), and batteries to store, and when necessary produce, the electricity required to drive the ferry with electric motors. An extensive shore-side charging infrastructure will not be necessary.
- To lower fossil fuel emissions and operating costs, construct a modest shore-side charging station at the Anacortes terminal, using existing 480-volt power to significantly reduce the amount of diesel fuel required to charge the batteries via the on-board generators.
- Given the speed at which the technology to implement electrified propulsion systems is changing in the maritime industry, as well as the dramatic cost decrease in recent years of hybrid technology (especially battery technology), expect to wait at least five years before engaging in component and integration contracts as well as construction for the plug-in hybrid design in order to best “future-proof” the new ferry.
- Continue to operate and properly maintain the existing ferry for up to the next 10 years to provide ferry service while waiting for the electrification technology to mature. After 10 years the existing ferry will be 57 years old—just within its 60-year useful life span. (Note: It may well take 5 years to design, issue requests for proposals to build, issue contracts, secure funding, and place into service a new ferry.)

What is the TAG mission?

The TAG mission is to advise the BOCC on the preferred ferry replacement options for the Guemes Island Ferry. This includes evaluating and comparing multiple design alternatives while considering factors such as cost, environmental impact, safety, and operational efficiency. The goal is to provide a well-researched recommendation for a ferry solution that best serves the community’s needs.

Who is on the TAG?

The TAG consists of two types of members: the first type are nine individuals from the community who have either significant knowledge of the marine industry including naval architecture, boat building, and the design and implementation of both diesel and electrified propulsion systems; or individuals who have extensive knowledge of the Guemes Ferry operations and/or its history. Additionally, community members were selected such that five members reside on Guemes Island, and four members reside in other parts of Skagit County. All community members were appointed to the TAG by the BOCC from a pool of submitted nominations.

The second type of member consists of county employees covering the bases from Skagit County (County) public works, engineering, ferry management, as well as county staff. The members from

the County are supported by two individuals from the consulting firm of Maul Foster & Alongi, Inc., who function as facilitators.

The County members do not materially contribute to the TAG's discussions, nor do they have a vote. County members do provide vital factual information about the operation of the ferry, as well as extensive information about the history of the ferry including past planning and implementation efforts to replace the existing, but aging, ferry. The consultants facilitate TAG discussions to meet time frames, prepare agendas, and provide the communications infrastructure (e.g., Microsoft Teams, Zoom) such that TAG members can attend remotely and share documents. The consultants also prepare materials for the TAG meetings and document the TAG meetings in meeting summaries.

There is also a group designated as the Core Team, which consists of the entire County member group, plus community member Sandy McKean who was the elected chair of TAG. The Core Team has a brief electronic meeting once a month that occurs two weeks before each TAG meeting to set objectives, provide logistics, and to ensure all materials are ready that the TAG may need.

All members of the TAG are listed below with a short description of their background.

TAG members

Paul Bieker

Paul Bieker is a licensed naval architect living and working in the Anacortes area. Although most of his experience is in designing and engineering high-performance racing sailboats, he has experience working in the commercial naval architecture world, including completing projects for Washington State Ferries. Mr. Bieker also has experience with all-electric marine propulsion systems.

Allen Bush

Allen Bush is a third-generation Guemes Island resident, communications professional, and cattle rancher whose work reflects a longstanding commitment to community engagement, practical problem-solving, and stewardship of local resources.

Becca Fong

Becca Fong is a full-time Guemes Island resident. She has spent her career in public service and is currently an environmental program planner. She has worked in public communications, community organizing, and natural resource management. Her experience as both a local government employee and a community member on public projects has taught her how to navigate the process for mutually beneficial outcomes. She joined the TAG to help build a sustainable future for her family and community on Guemes Island, Anacortes, and Skagit County.

Corey Joyce

Corey is the well-known owner of San Juan Marine Freight & Services which runs barge services among the islands in the Salish Sea. Corey knows well what it takes to operate a ferry-like vessel in these waters. He has a special relationship with Guemes Island, as it is his service that islanders primarily use to make necessary crossings when no County ferry service is available. He is highly respected on the island and often goes well above the normal call of duty.

Sandy McKean, Chair of TAG

Sandy is a long-time resident of Guemes Island. He took an immediate interest in the Skagit County ferry system and soon attended nearly every meeting related to the ferry (both Island-sponsored and County-sponsored). He has extensively researched the history of the Skagit County ferry service. He also became familiar with both the Pierce and Whatcom County ferry operations. Eventually, he became a member of the Guemes Island Ferry Committee (GIFC). Over the years Sandy has been particularly interested in finding solutions to ferry issues that address the County's constraints as well as address the needs of the ferry ridership. In his professional life, Sandy spent many years as a management consultant to small and large companies. He brings proven project management and strategic planning experience to the TAG effort. This experience will assist the TAG to arrive at a well-considered and documented report.

Ryan Monahan

Ryan Monahan's family has been on Guemes Island for generations and therefore has a keen interest in the ferry replacement project. Ryan has experience in advanced technology projects including power train electrification, hybridization, and alternative fuels.

Adam Paull

None submitted.

Jonah Petrick

Jonah Petrick was born and raised on Guemes Island and recently became a resident with his wife and children. Jonah is a Captain for Foss Maritime in Puget Sound. He has knowledge of the maritime industry, has operated vessels in various West Coast ports, has participated in various maritime committees, and desires to be actively engaged and supporting his community. He is grateful to call this place home.

Tom Fouts

Tom is a long-time resident of Guemes Island. He has been heavily involved in the Guemes Fire Department's solar systems. He has used his impressive mechanical skills to design and build two of the department's fire engines. He knows the maritime industry and has taught classes for the U.S. Coast Guard (USCG). He holds a 100-ton Marine Master's license.

TAG support

The TAG was supported in its efforts by the following:

- **Skagit County:** Marie Lambert, Jennifer Rogers, Rachel Rowe, Michael See, Tom Weller
- **Maul Foster & Alongi, Inc.** (consultants): Claire Moerder, Hilary Wilkinson

Studies, reports, and other documents used

Skagit County Ferry Replacement Project Timeline

This excellent document provides a history of events since the ferry replacement discussion began in 2012. It is continually updated by the Ferry Division.

2017 Glosten Concept Design reports

Early in the ferry replacement project, the naval architectural firm of Glosten developed an extensive concept design of a possible new ferry to replace the existing M/V *Guemes*. Much of the technical details and characteristics of a new ferry are documented in this set of reports, which tackle most of the requirements for building a new ferry, such as capacity, size, hull design, structure, tonnage, propulsion, USCG requirements, electrical and piping systems, and preliminary cost estimates. The conceptual design presented in these reports is the basis for the replacement ferry that will eventually be built.

2021 Glosten Preliminary Design reports

In 2021, the conceptual design was further developed into a preliminary design. This set of reports details the ferry design, and importantly, gives cost estimates.

Professional and consultant studies

Over the years, several other studies and surveys have been completed to define the considerations and issues that would surround replacing the existing ferry. These studies include:

- 2006 Art Anderson: *Mid-body Extension Feasibility Study*
- 2013 Elliott Bay Design Group: *Ferry Replacement Plan*
- 2016 Art Anderson: *Propulsion and Power Study*
- 2019 International Inspection: *Ultrasonic Gauging Survey*
- 2020 Art Anderson: *Lifecycle and Propulsion Study*
- 2021 Delphi Maritime: *Condition and Valuation Survey*
- 2023 Charles Taylor: *Condition and Valuation Survey*
- 2025 Certified Inspection Services: *Underwater Hull and Suspect Areas Report*
- 2025 First Watch Maritime: *Condition and Valuation Survey*

Industry articles

Several articles from maritime industry sources were used to develop an understanding of technology trends. Industry periodicals, for example, *WorkBoat* and *Maritime Reporter and Engineering News* were used to help the TAG with such tasks as defining standard nomenclature for each of the propulsion options and determining the extent of the industry's commitment to electrification of propulsion systems.

Whatcom and Pierce ferry systems

Much like Skagit County, Whatcom County has an extensive website that contains very useful documents. Whatcom County runs a similar ferry system and is also replacing its aging ferry. For example, the Elliot Bay Design Group's April 2020 *Propulsion System Selection Study* looks at many of the same issues the TAG has dealt with. As in Skagit County, Whatcom County has a very active ridership group. In 2023, the Whatcom County Ferry Advisory Committee (WCFAC), an official citizens advisory committee, formed, building on a long history of informal ridership groups similar to the GIFC in Skagit County. The minutes of the WCFAC are valuable to show how another county jurisdiction has handled ferry issues. Pierce County's website, although not as extensive as Whatcom's, also contains useful information about its ferry operation.

Propulsion options evaluated

Defining the propulsion options

Over several meetings, and after thorough discussions, the TAG members narrowed the propulsion options to six, which were finalized at the fourth meeting of the TAG. (Note: many of these six propulsion options are mentioned in the TAG's enabling county resolution R20250207):

- Plug-in hybrid
- Diesel hybrid, parallel
- Diesel hybrid, series
- Diesel electric
- Diesel mechanical (preserve current ferry)
- Whatcom/Lummi design

Other possible propulsion options based on fuels such as liquefied natural gas, compressed natural gas, or hydrogen were considered impractical for a Guemes Ferry for the foreseeable future. This left propulsion options that depend on two well-established, and locally available, energy sources: diesel and electricity.

Given that the maritime literature often uses multiple names for the same design, the TAG constructed a table of standard option names: each with a clear definition of characteristics. Over the months, as each option was analyzed, these characteristics were refined somewhat. The final characteristics are included in this report as Attachment A. Most options are also illustrated, with a schematic included in this report as Attachment B.

Key characteristics of the six defined propulsion options

All options use either diesel, electricity, or both to provide the energy needed to propel the ferry.

The word "hybrid" is used consistently in the six definitions to indicate that there is at least one battery somewhere in that propulsion system. Options that include the ability to charge the battery from the grid use the word "plug-in" and have the advantage of reducing the amount of fossil fuel emissions produced in the operation of the ferry.

Note that there is no all-electric propulsion option. In a single ferry system, with a single charging station, as the Guemes Ferry must be, any ferry design must include on-board generator(s) capable of powering the boat for a significant period to supplement the battery, provide backup for shore power failure, or to respond to emergency situations. Furthermore, this design can improve ferry service reliability by providing redundancy in the propulsion system given that the design can include multiple generators, and the ferry can provide limited service using either diesel or electricity as the source of power if the other is unavailable. Such a design is best termed plug-in hybrid.

All six options drive the ferry via a propeller and shafts which are, in turn, driven by either an electric motor(s), or a diesel engine(s). In some options, all of the energy driving the boat is derived from diesel; in other options, some of the energy may be derived from the grid.

In many options, on-board generators produce, to a greater or lesser extent, the electricity used by the electric motors. Most of these options have batteries somewhere in the system.

Criteria used to evaluate the propulsion options

To determine which propulsion system the TAG would recommend to the County, during the third TAG meeting, the following nine criteria were settled upon and ranked in this order of importance:

- **Upfront capital costs** were incorporated into the overall evaluation, encompassing both the expenditure required to replace the ferry and any associated infrastructure investments necessary to support a new propulsion system.
- **Year-over-year maintenance costs and intervals** matter because they show how much ongoing effort and funding a ferry will require as it ages. Understanding these trends helps ensure that the replacement vessel remains affordable to operate and is reliable for the long term.
- **Reliability** is critical because the ferry service is a lifeline, not a luxury. For island residents and visitors, reliable transit means uninterrupted access to work, medical care, and family.
- **Life cycle costs** look at the big picture and calculate the ferry's total cost—from purchase to retirement. True life cycle planning accounts for every dollar, ensuring that our vital ferry service stays financially sustainable for decades to come.
- **Complexity** in how the ferry is designed and built—is a major factor in ensuring that it operates reliably over its entire lifespan. Systems that are too complex can be harder to maintain and support.
- **Emissions (including vessel air emissions)** are an important consideration in a ferry replacement project because vessel operations have a direct and measurable impact on regional air quality and the surrounding marine environment. Prioritizing lower-emission technologies also ensures long-term compliance with evolving environmental regulations and supports the community's broader sustainability commitments.
- **Energy consumption** is a critical factor in a ferry propulsion system because it contributes to the long-term operating cost of the vessel and to its overall environmental impact. A ferry that uses energy more efficiently reduces fuel or electricity demand, lowers annual operating expenses, and supports compliance with evolving sustainability goals and regulations.
- **Terminal impacts** are important because a new vessel may require modifications to docks, transfer spans, or access points to ensure safe, efficient, and reliable operations. Evaluating these needs early helps avoid service disruptions and ensures that the terminal can support the ferry throughout its lifespan.
- **Available funding sources** such as grants and local taxes—are a key consideration because they determine how much of the ferry replacement project can be delivered without creating an unsustainable financial burden. Securing the right mix of funding helps keep the project affordable while ensuring that the new vessel and required infrastructure can be fully supported over the long term.

Ranking of the Propulsion options

The main business of the fourth and fifth TAG meetings was to use the nine evaluation criteria to rank the six propulsion options.

First, the consultants asked the TAG members to share their top three criteria. These "votes" were then combined such that each of the nine criteria were given a number representing a weighting importance number (with 1=least important and 6=most important) for all the criteria. (Note: only six weighting importance numbers were required as some ties occurred in the voting process.) This information was then documented in an evaluation matrix spreadsheet.

Between the two meetings the nine TAG members independently used the evaluation matrix to give a level-of-confidence number (with 1=lowest level and 100=highest level) to each of the criteria for each of the propulsion options. The spreadsheet then calculated a score for each propulsion option by combining its importance with the member's confidence level. These individual scores were then averaged to give an overall TAG score for each of the propulsion options.

Figure 1 is an example of what the evaluation matrix looked like after a single TAG member completed the scoring for one of the propulsion options (plug-in hybrid). Figure 2 shows the overall combined scores from the nine TAG members for all the six propulsion options (Note: one TAG member did not complete their evaluation matrix.)

Figure 1: Evaluation matrix for a single propulsion option (plug-in hybrid)

	A	B	C	D	E	F	G	H	I
1			1. Plug-In Hybrid						
2			Yes/No (Yes=1, No=0)	Level of Confidence (1=lowest level, 100=highest level of confidence)	Confidence factor (E/100)	Weighting Importance (1=Least Important, 6=Most Important)	FINAL SCORE (Columns: D x F x G)	Highest Possible Score	Percentage (FINAL SCORE/Highest Possible Score)
3		Criteria	If yes, to what extent?						
4	1	Upfront Capital Cost	0	40	0.4	6	0	6	0%
5		Upfront Capital Cost TOTAL					0	6	0%
6	2	Maintenance Cost	1	50	0.5	5	2.5	5	50%
7		ar-over-year Maintenance Costs and Intervals TOTAL					2.5	5	50%
8	3	Propsulsion System Reliability	1	80	0.8	4	3.2	4	80%
9		Reliability TOTAL					3.2	4	80%
10	4	Lifecycle Cost	0	60	0.6	3	0	3	0%
11		Lifecycle Cost TOTAL					0	3	0%
12	5	Complexity	0	50	0.5	3	0	3	0%
13		Complexity (including Design and Build) TOTAL					0	3	0%
14	6	Emissions	1	95	0.95	2	1.9	2	95%
15		Emissions (including Vessel Air Emissions) TOTAL					1.9	2	95%
16	7	Energy Consumption	1	95	0.95	2	1.9	2	95%
17		Energy Consumption TOTAL					1.9	2	95%
18	8	Terminal Impacts	0	30	0.3	1	0	1	0%
19		Terminal Impacts TOTAL					0	1	0%
20	9	Availability of Funding	1	60	0.6	1	0.6	1	60%
21		Funding Availability TOTAL					0.6	1	60%
22			Plug-In Hybrid Total Score:				10.1	27	37%

Figure 2: Overall TAG scores added together by propulsion option

	1	2	3	4	5	6
TAG member	Plug In Hybrid	Diesel Hybrid Parallel	Diesel Hybrid Series	Diesel Electric	Diesel Mechanical	Whatcom/ Lummi Design
Bush	3.15	3.7	3.85	13.9	12.7	3.3
Fong	13.7	18.9	19.25	13.6	19.4	16.3
Fouts	24.3	4.4	23	3.2	7	11.8
Joyce	4	5	9	14	26	8
McKean	10.1	14.2	23	20.65	17.25	12.7
Monahan	20.8	22.35	23.75	23.6	20.75	20.75
Paull	4	5	9	17	26	9
Petrick	4.9	18.3	19.9	17.9	20.6	18.4
FINAL - TOTAL	84.95	91.85	130.75	123.85	149.7	100.25

Note

Highest

Second-Highest

Third-Highest

TAG recommendation

The TAG recommends that the County eventually replace its existing ferry with a plug-in hybrid design that uses on-board diesel generators and batteries to produce and store the electricity required to drive the ferry with electric motors.

Of the six analyzed propulsion options, the TAG prioritized these two as the best options to replace the existing Guemes Ferry:

- Plug-in hybrid
- Diesel mechanical (and preserve current ferry)

As can be seen in the evaluation matrix above, at first the TAG members preferred either the diesel electric, or the hybrid series propulsion systems; however, after discussing some of the disadvantages of the series hybrid design, and the recent development of less expensive charging methods when compared to the plug-in hybrid from the 2017 Glosten design, the plug-in hybrid and diesel mechanical propulsion systems became the final two preferred systems. Unfortunately, it also became clear that both these options had a significant flaw.

The plug-in hybrid is the preferred option of the majority of the TAG, given that it lowers fossil fuel emissions and is less expensive to operate and maintain than the diesel mechanical option; however, TAG members are concerned that this option has an inherent flaw given the speed at which the electrified propulsion technology in the maritime industry is changing—including the dramatic decrease in cost of hybrid technology that has been seen in recent years (especially battery technology)—it would be better to wait five to ten years for this technology to mature before using it for the design of a new ferry. It would be a poor choice to build and put into service a plug-in hybrid ferry too soon.

The diesel mechanical option also has a flaw; namely, it does not provide a plan for building a new ferry by 2039 when the existing ferry reaches the end of its useful life. The existing ferry was put into service in 1979. The TAG believes, and many maritime experts agree, that 40 years is a reasonable limit to a ferry's useful life in the Puget Sound given the harsh weather and high currents found here. However, given that the existing ferry was exceptionally well built (e.g., thick steel), and has been exceptionally well maintained, the TAG believes the existing ferry can reasonably be expected to have a useful life of 60 years, hence the 2039 date. Given the current, strong move in the maritime industry toward electrification, it is unlikely that a new ferry, targeted to be put into service 10 to 15 years from now, would be designed using strictly a diesel mechanical design.

At the TAG's fifth meeting on March 9, 2026, a comment was made that by putting the two propulsion options <u>together</u> as part of a single plan, each option might well solve the other option's flaw. The plug-in hybrid option is the best option to answer the question: *"What should the next ferry be once the existing ferry hits the end of its useful life?"* At the same time, the diesel mechanical option of the existing ferry is the solution to needing to wait up to 10 years for the plug-in hybrid technology to mature. As one attendee commented at the very end of the fifth meeting: *"The existing ferry can be part of the solution for replacing the ferry using new technology."*

This idea of combining the plug-in hybrid and diesel mechanical options into one 15-year plan is quite consistent with the maritime industry's vision of the future of ferries as these quotations from recent articles in the highly respected industry magazine *WorkBoat* demonstrate:

WorkBoat January 2026 article subtitled: Once seen as an unproven newcomer, hybrid electric propulsion has arrived

> *"Instead of just a diesel engine or engines, the hybrid marries diesel power with an electric motor or motors, depending on how much power is needed, allowing for a mix of energy sources arranged to deliver fuel efficiency, minimize emissions, and improve performance."*
>
> *"These propulsion systems are designed to deliver improved fuel efficiency, reduce emissions, increase power and flexibility, and lower noise levels"*

WorkBoat February 2026 article subtitled: Ferry fleets modernize as decarbonization debate continues

> *"US ferry fleets built in the 1970s and '80s are reaching the end of their service lives, the cost of maintaining legacy machinery continues to rise, and federal funding is increasingly aligned with emissions reduction goals. At the same time operators are weighing how quickly, and how decisively to move beyond diesel as technology, infrastructure, and policy evolve.*
>
> *"What is emerging is a generational replacement cycle that will shape ferry operations for decades. Hybrid and zero-emission propulsion are central to that transition, but equally important are the clarity, consistency, and commitment factors the industry leaders say will determine how effectively the US ferry sector capitalizes on the opportunity now taking shape."*

The TAG recommendation differs from the all-electric 2017 Glosten design. This 2017 design required a massive shore-side structure to house a separate set of batteries together with a large, complex charging arm to meet the power demands of that design. As of today, this charging arm is only manufactured in Germany, and there are few, if any, technicians trained here in the U.S. to service these arms.

Instead, the TAG proposes a modest shore-side charging system using widely available 480 volt 3-phase power with standard connectors that can be plugged in and removed by the crew between runs. This proposed system is modest in its size (footprint), complexity, impact on the terminal area, and impact on the surrounding community. One of the TAG members who has extensive knowledge of such systems (Ryan Monahan) put together a succinct presentation outlining a possible such system at the TAG's sixth meeting on April 13, 2026.

Five slides from that presentation outline how a modest charging station might look and operate. Here is an explanation of the meaning of each slide:

> Figure 3: The actual station can be quite small—not much larger than the stations used to charge an electric automobile.
>
> Figure 4: Assumptions were made as to the amount of electrical energy necessary to do a typical run using a new hybrid ferry (based on the earlier work by Glosten). These assumptions are based on the actual measured energy consumption of the existing ferry expressed in kilowatt hours with the assumption that 75 percent of the total energy required would be from the shore-side source and 25 percent would come from the electricity generated by the on-board diesel generators.
>
> Figure 5: The crew would use plugs similar to these to plug into the charger each time the ferry docks at the Anacortes terminal and unplug just before the ferry leaves the dock to do the next run.
>
> Figure 6: The operational performance of this hybrid system needs to be analyzed in two situations: a day with normal weather, and a day with extreme weather. Obviously, the more

the ferry must deal with waves, wind, and currents, the faster the batteries will discharge. The batteries start the day fully charged. Each run drains a fraction of that charge. Some of that charge is replenished between runs while the ferry is plugged into the charging station at the dock. The largest recharges occur during the approximate two-hour meal layover break which happens twice a day. Note that, on extreme weather days, the batteries alone cannot provide all the necessary energy. The system would manage the on-board generator(s) to make up this difference. The generator(s) would be designed such that the ferry could run indefinitely even if shore-side charging were not available during power outages, USCG required emergency operations, or other failures of various kinds.

Figure 7: The last slide summarizes the benefits, challenges, and considerations of adopting this type of system.

Figure 3: Conceptual view of the modest charging station

Assumptions

- Ferry Energy Requirements:
  - Electric Operation: 75% Energy Contribution from Batteries
  - Normal Operation (R/T): 140 kWh
  - Bad Weather Operation(R/T): 190 kWh
  - Battery Capacity: 1,000 kWh (1 MWh)
- Ferry Terminal Electrical Service:
  - 480v
  - 400-amp
  - 3 – Phase

  } = *332.5 kW Capacity*
- Charging/Dwell Times:

Interval	Charge Time	Energy Added
30 minutes	10 minutes	54 kW
45 minutes	25 minutes	135 kW
60 minutes	40 minutes	216 kW
75 minutes (Dinner)	55 minutes	297 kW
105 minutes (Lunch)	85 minutes	459 kW

Figure 4: Energy requirements for a typical ferry run

Charging Options

- 360 kW Max Rating
- Cost ~ $100,000
- Flexible Site Setup

ABB HVC 360 + ChargeDock

Figure 5: Example of the charging station plug that the crew would need to use

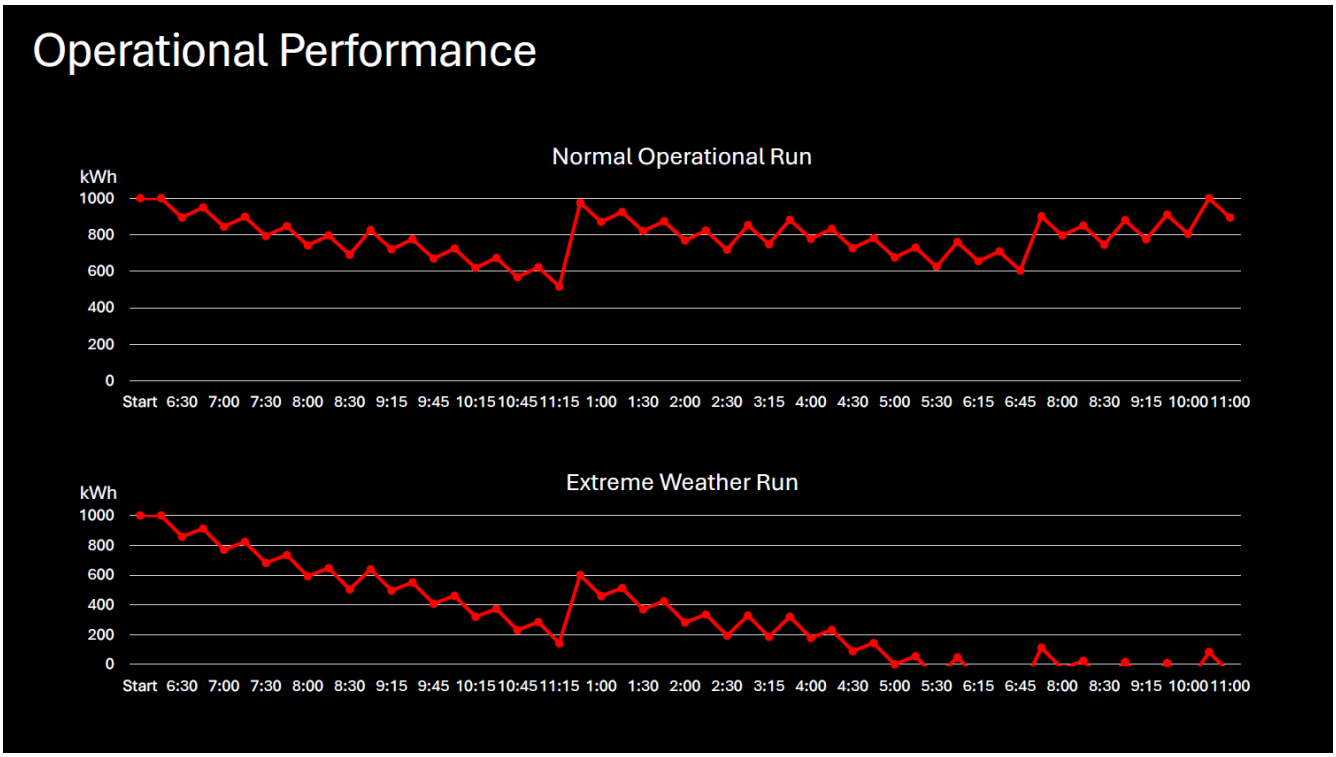


Figure 6: Charging requirements for both a normal day and for a bad weather day

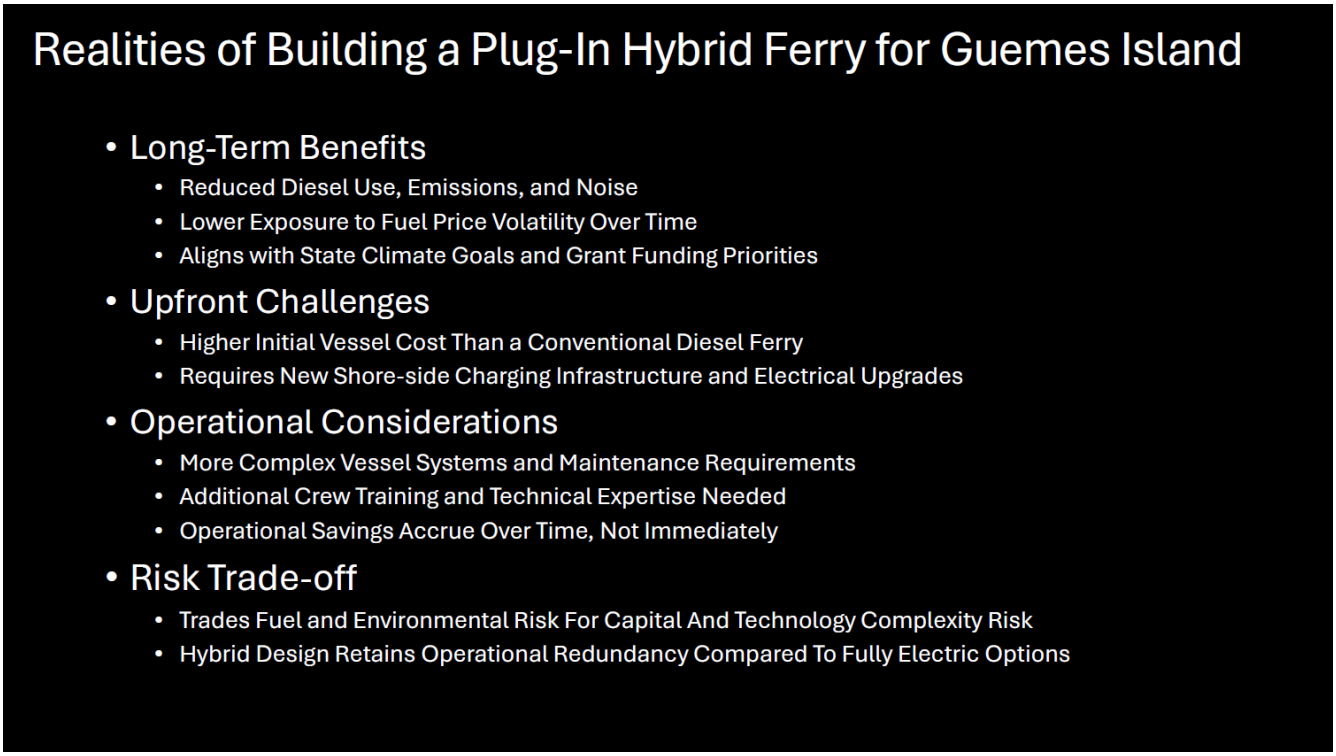


Figure 7: Considerations for evaluating the proposed modest charging station

Other considerations

Funding considerations - confirm secured funding and plan for unsecured funding

Adequate funding is essential to implement the TAG's recommendation and build the replacement ferry. With the time delays and design changes to this project, updating the funding options is essential. Due to the project changes, some of the previously secured funding may no longer be available for this project. County staff need to follow up with state and federal funders to determine the status, requirements, and award timelines for all previously secured funding.

Factors that could impact funding availability include the following:

- Funding was secured for an all-electric ferry design with significant shore-side infrastructure and proprietary technology for electrical integration.
- Awards were made to be used for earlier time periods.

Follow-up should be done immediately to create an accurate funding profile. The questions to be discussed with funders include the following:

- Can these funds be applied to the plug-in hybrid propulsion system, including the associated changes to shore-side electrification?
- Are the fund awards/contracts/appropriations still available for use with the later project timeline?
- What is involved with updating contracts to secure funding?
- Are Skagit County Local & Road funds still available for the previously determined amounts?

The current economic and political situation at the local, state, and national level has and will likely continue to impact available funding. Washington State and Skagit County face budget shortfalls, and funding programs for electrification and emissions reduction are unlikely to be available in the amounts of previous years.

Below is a summary of the funding available for the ferry replacement project as documented by Skagit County Ferry Division and provided to the TAG.[1]

Project costs, spending, secured funding, and funding gaps

Project Phase	Estimated Cost	$ Spent	Remaining Costs	Secured Funds	Unsecured Funds
Vessel Construction	$33,232,586	$2,706,580	$30,526,000	$30,000,000	$526,000
Shore side Electrification	$8,399,714	$536,850	$7,842,850	$1,239,521	$6,603,329
Terminal Modification	$3,757,356	$130,356	$3,627,000	$2,650,000	$977,000
Totals	**$45,389,656**	**$3,373,786**	**$41,995,850**	**$33,889,521**	**$8,106,329**

[1] Source: 01.07.24_GuemesFerryReplacementProject_CostEstimates.xlsx provided by Rachel Rowe.

Secured funding

This funding has been awarded, budgeted, and/or is under contract. Many of these funds were secured in previous years; continued availability needs to be confirmed.

Vessel construction

With the change in the propulsion system, the costs may change significantly. Connecting with funders about continued availability of funds is essential. The Move Ahead Washington grant was awarded in 2022, when the project was going out for bid in 2023. The Washington state budget award was allocated in 2024. With recent state budget deficits, it would be good to confirm that this is still available.

Funding Source	Fed/State/ County	Funding Type	Amount	Spent/ Unspent	Notes
County Ferry Capital Improvement Program (CFCIP)	State	Financial assistance program	$6,000,000*	Unspent	The County applies for funding annually via the County Road Administration Board*
Move Ahead Washington	State	Grant	$14,000,000	Unspent	Secured, for vessel construction
2024 Washington State Budget Award	State	Fiscal year budget allocation	$10,000,000	Unspent	From fiscal year 2024, Not yet under contract. For vessel construction.
Total secured funds			**$30,000,000**		

Note
*Total amount awarded was $7,500,000 payable over 20 years at $375,000/year. Annual payments made in 2019, 2020, 2021, and 2022 have funded design for all three projects and total $1,500,000. There is $6,000,000 remaining for vessel construction (debt service unknown and not included).

Shore-side electrification

With the change in the propulsion system from the initial Glosten design, the shore-side infrastructure changes that would be necessary would be dramatically different, likely to result in a substantial decrease in costs from earlier estimates.

Funding Source	Fed/State / County	Funding Type	Amount	Spent/ Unspent	Notes
Electrification of Transportation Systems Grant	Federal	Grant	$989,521	Unspent	• Shore side electrification • From Washington State Department of Commerce • Requires match from Skagit County local funds
Skagit County Local Funds	County	County budgeted cost	$250,000	Unspent	• For shore-side electrification, Commissioner committed 1/24/24. • Not budgeted**
Total secured funds			**$1,239,521**		

Funding Source	Fed/State / County	Funding Type	Amount	Spent/ Unspent	Notes

Note
**This was shown as "secured" funding but was specified as "unspent/unbudgeted."

Terminal modifications

The change in propulsion system may impact the costs for terminal modifications due to the shore-side charging infrastructure needed.

Funding Source	Fed/State / County	Funding Type	Amount	Spent/ Unspent	Notes
Federal Transit Administration (FTA) fiscal year 2022	Federal	Direct appropriation	$2,500,000	Unspent	• Terminal modifications • Fiscal year 2022 Omnibus Spending Package Appropriation
Skagit County Local Funds	County	County budgeted cost	$150,000	Unspent	• For terminal modification, not budgeted**
Total secured funds			**$2,350,000**		

Note
**This was shown as "secured" funding but was specified as "unspent/unbudgeted."

Unsecured funding

This funding was identified as potential funding sources and used in calculations for funding projections. The availability of these potential funds needs to be confirmed. Skagit County staff should plan to reach out to Washington State Department of Commerce contacts to confirm the appropriation and create a plan for budgeting local funds for the various project phases.

Funding Source	Fed/ State/ County	Funding Type	Amount	Status	Notes
Washington State Capital Budget Direct Appropriation	State	Direct appropriation, Commerce	$1,929,000	Pending, funding agreement with Commerce expired.	• Awaiting update, for shore-side electrification.
Skagit County Local Funds	County	County budgeted cost	$989,521	Not budgeted	• Matching funds for ETS grant, for shore-side electrification.
Skagit County Local Funds	County	County budgeted cost	$637,000	Not budgeted	• Needed vessel design, engineering, and construction.
Skagit County Local Funds	County	County budgeted cost	$250,000	Not budgeted	• Needed shore-side electrification: design, engineering, and construction.

Funding Source	Fed/ State/ County	Funding Type	Amount	Status	Notes
Skagit County Local Funds	County	County budgeted cost	$150,000	Not budgeted	• Needed terminal modifications: design, engineering, and construction.
Total unsecured funds			**$3,955,521**		

Note
Commerce = Washington State Department of Commerce.

Reliability of the technology

Ensuring high reliability in the selected power train architecture remains essential for the Guemes Island Ferry replacement, as the vessel must deliver consistent propulsion performance, predictable load response, and minimal unplanned downtime across all operating conditions.

Over the next five to eight years, continued advancements in maritime electrification and hybridization—including higher-density lithium-ion (Li-ion) batteries, improved thermal-management systems, and increasingly sophisticated hybrid energy-management controls—are expected to enhance system efficiency, power availability, and operational resilience.

Parallel progress in shore-side charging infrastructure is also anticipated, with higher-capacity chargers, improved grid interconnection technologies, and more intelligent load-balancing systems enabling faster turnaround times and greater operational flexibility. Designing the vessel around proven, reliable technologies today—while ensuring compatibility with these future charging and energy-storage capabilities—reduces life cycle risk, supports maintainability, and positions the ferry system to integrate performance improvements without major structural or electrical redesign.

U.S. Coast Guard regulations

The preliminary design of the 28-car ferry by Glosten categorizes the vessel under the Code of Federal Regulations (CFR) Title 46, Chapter I, Subchapter T, however; the plug-in hybrid propulsion system the TAG is recommending does not fall under current regulations.

As Li-ion battery systems are being utilized in the maritime industry and the technology is developing, so is the USCG regulation. The USCG CG-ENG Policy Letter No. 02-19 establishes design guidance for commercial vessels using Li-ion batteries within the existing regulatory framework. That document was drafted in collaboration with the USCG Marine Safety Center to provide consistent guidance to designers of vessel electrical systems and for the USCG personnel reviewing those designs. The purpose of the guidance is to provide an acceptable method for using Li-ion battery technology that will result in a streamlined and consistent plan approval process.

According to CG-ENG Policy Letter No. 02-19, vessel designers are encouraged to communicate with the Marine Safety Center early in the conceptual design phase to identify any unique issues in the design process. The USCG policy letter also is consistent with ASTM International's F3353-19: *Standard Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries*.

Future-proofing infrastructure and system planning

The TAG recognizes that ferry replacement is not solely a vessel decision, but a long-term transportation systems project involving terminals, parking, traffic flow, pedestrian access, emergency response, and future growth. Prior County studies, including the 2017 *Transportation System Assessment* prepared by Glosten and PND Engineers, evaluated the ferry system as an

integrated network and identified future infrastructure needs related to throughput, terminal operations, dock facilities, and larger vessel accommodation.

Based on these findings, the TAG recommends a phased approach that continues proactive maintenance and targeted upgrades to the existing M/V *Guemes* while prioritizing adaptable infrastructure improvements that remain compatible with multiple future propulsion technologies and vessel configurations. This strategy preserves operational reliability, reduces near-term capital risk, and allows the County flexibility to incorporate future technological advancements, evolving regulatory requirements, and future funding opportunities before committing to a final replacement design.

Maintaining M/V *Guemes* through transition to a replacement ferry

Maintaining the M/V *Guemes* through the procurement of a future replacement vessel will require a structured program of continued maintenance, targeted capital reinvestment, regulatory compliance, and phased infrastructure coordination. Previous vessel assessments concluded that, while the vessel is approaching the upper range of its traditional economic service life, the hull and core structure remain serviceable if supported by proactive maintenance and periodic component replacement.

To support continued operation over the next 5 to 10 years, the County should plan for:

- Continued dry dock requirements, steel preservation, outdrive and propulsion inspections, and regulatory dry dock requirements.
- Replacement or modernization of aging systems, hydraulics, navigation electronics, and passenger cabin components.
- Ongoing propulsion and drive train maintenance to preserve operational reliability and emergency response capability.
- Strategic investment in terminal and apron infrastructure already planned or federally funded, ensuring compatibility with both the existing vessel and future replacement options.
- Preservation of critical spare parts inventories and workforce/operator familiarity with the current diesel mechanical system.

The TAG further recommends that any near-term infrastructure projects—including apron replacement, dock upgrades, parking improvements, and electrical utility work—be coordinated within a long-range ferry system plan to avoid duplicate investments or infrastructure incompatible with future vessel configuration.

Recommended Actions

0–2 Years Complete apron replacement and terminal improvements; continue required haul-outs and regulatory inspections; perform condition assessment updates; preserve propulsion reliability and critical spare systems.

2–5 Years Modernize aging onboard systems (navigation, electrical, hydraulics, passenger cabin); coordinate shore-side infrastructure upgrades compatible with future hybrid/electric integration.

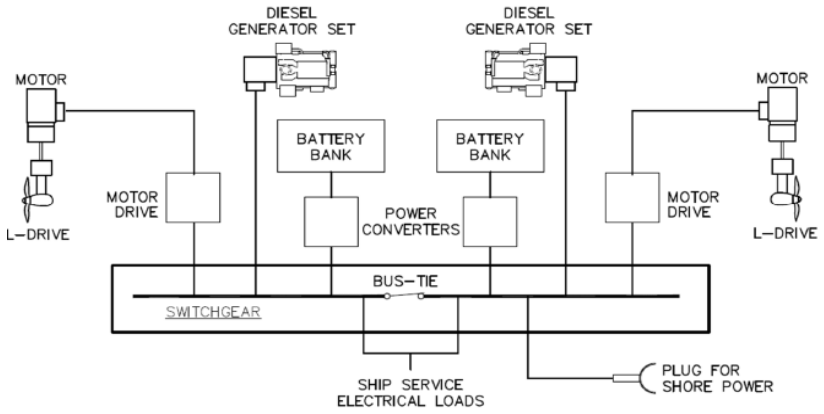
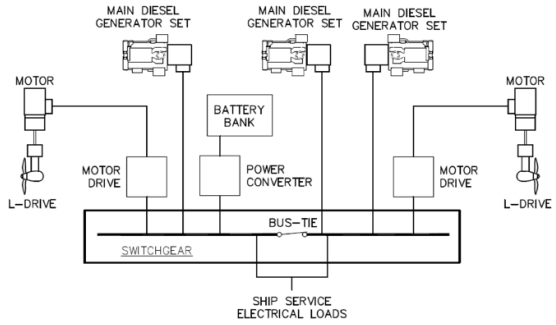
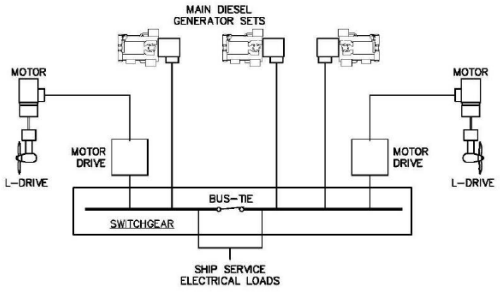
5–10 Years Continue life cycle maintenance and structural preservation of M/V *Guemes* while advancing final design, permitting, procurement, and commissioning of replacement vessel; phase infrastructure integration to support transition into replacement ferry service.

This phased strategy allows the County to preserve reliable ferry operations while reducing near-term capital risk and maintaining flexibility as vessel technology, regulatory requirements, and funding conditions continue to evolve.

Attachment A– Characteristics of Each Propulsion Option

#	Title	Description/Key Characteristics
1	Plug-In Hybrid	• Power provided to propeller solely by electric motor. • Electricity is a significant, or the primary, energy source. • Uses shore-side infrastructure to charge battery. • On board generator(s) can charge battery if battery state of charge is low, or for longer range during an emergency response, or for backup if shore-side power lost. • May require a substantial infrastructure for shore-side charging. • Reduces fuel consumption relative to conventional diesel systems. • Significant reduction of greenhouse gas emissions.
2	Diesel Hybrid, parallel	• Power provided to propeller by either engine or motor. • Diesel is the primary energy source. • Diesel engine and electric motor connected to the same shaft. • Battery is charged using onboard diesel generator(s). • Does not require plug-in shore-side charging. • More flexible but less emissions-reducing than plug-in systems.
3	Diesel Hybrid, series	• Power provided to propeller solely by electric motor. • Diesel is the primary energy source. • Diesel generator(s) may feed electrical energy directly to the motor or may charge onboard battery. • Battery is charged using onboard diesel-driven generator(s). • Does not require plug-in shore-side charging. • More flexible but less emissions-reducing than plug-in systems.
4	Diesel Electric	• Power provided to propeller solely by an electric motor. • Diesel is the primary energy source. • Diesel generator(s) provide all electrical energy directly to motors. • Requires no onboard battery. • Electric motors improve efficiency and produce less emissions. • Valued for reliability and simplicity.
5	Diesel Mechanical (current ferry preserved)	• Power provided mechanically to propeller solely by a diesel engine. • Diesel is the primary energy source. • No battery or electric motors. • This is the propulsion system of the current ferry. • Does not require planning for a replacement ferry.
6	Whatcom County/Lummi Ferry Design	• Uses the diesel hybrid, series design. • Piggyback on Whatcom County's efforts with Lummi ferry; possibly mimic the design and potentially achieve short and long-term efficiencies as a result.

Attachment B – Schematics of Most Propulsion Options

#	Title	Schematic
1	Plug-In Hybrid	
2	Diesel Hybrid, series	
3	Diesel electric	
4	Diesel Mechanical (current ferry preserved)