

## Project Goals

- Consider the effects of charging a ferry battery on Alaskan microgrids.
- Build a scale model of a battery charging system to obtain charging data.
- Control the charging of the battery to assess effects of different levels of charges.

## Background

- **Context:**
  - Alaska's ferry system serves as a lifeline to regional hubs and the mainland.
  - Southeast Alaska's rural location and hydropower abundance make it a strong candidate for federally subsidized infrastructure projects.
- **Project Focus:**
  - Addressing state challenges and fostering dialogue to support sustainable transportation without overwhelming existing infrastructure.
- **Challenges:**
  - Environmental imperative and technical challenge of transitioning to electric ferry technology.
  - Potential strain on local power grids highlighted in previous studies.

## System Design

- **Model Design:** Scaled to replicate a ferry battery bank connected to the grid.
- **Components:** DC Power Supply, Buck Converter, Arduino-compatible Microcontroller for System Management.
- **Design Goals/Objectives:**
  - Emulate the charging process of electric ferries.
  - Collect data related to electrical grid and power consumption
  - Assess the impact on microgrids.

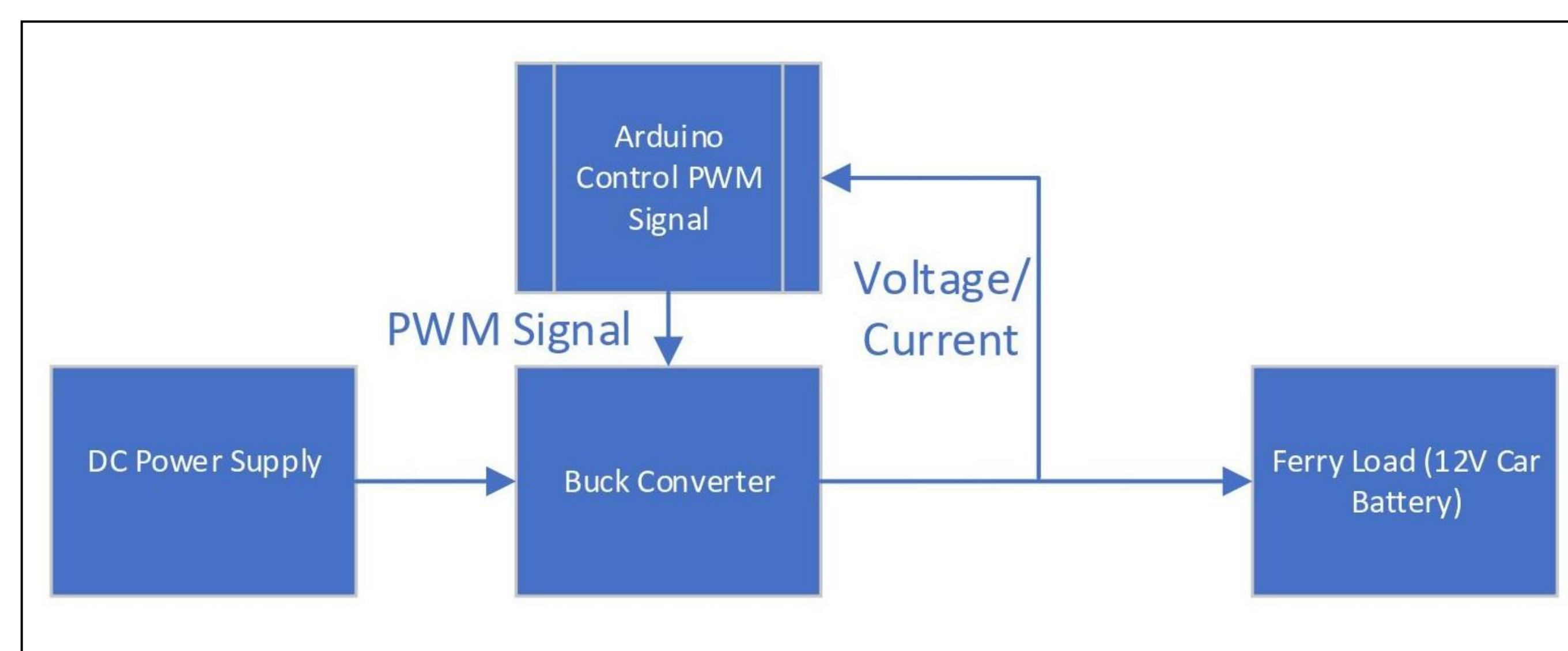


Figure 1: Block Diagram of the 12 V Ferry Battery Prototype Project.

## Results

- **PWM Signal Generation:**
  - Initial testing verifies effectiveness for battery management.
  - Further verifications and simulations underway.
- **Buck Converter Design:**
  - Validated through PSpice simulations.
  - Ensures compliance with specified ripple and power efficiency standards.
- **Real-World Testing:**
  - Completed for charging and discharging of the battery.

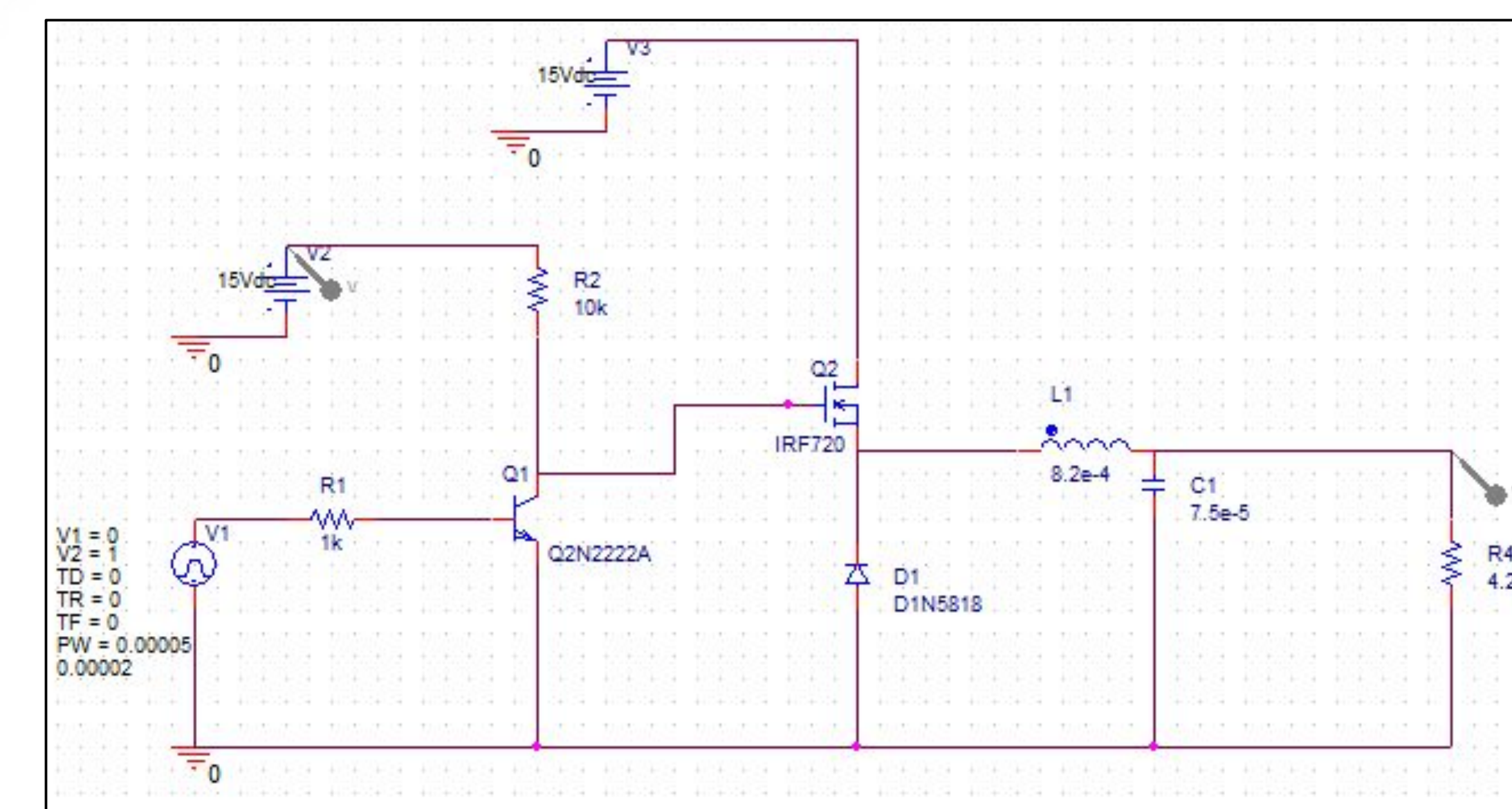
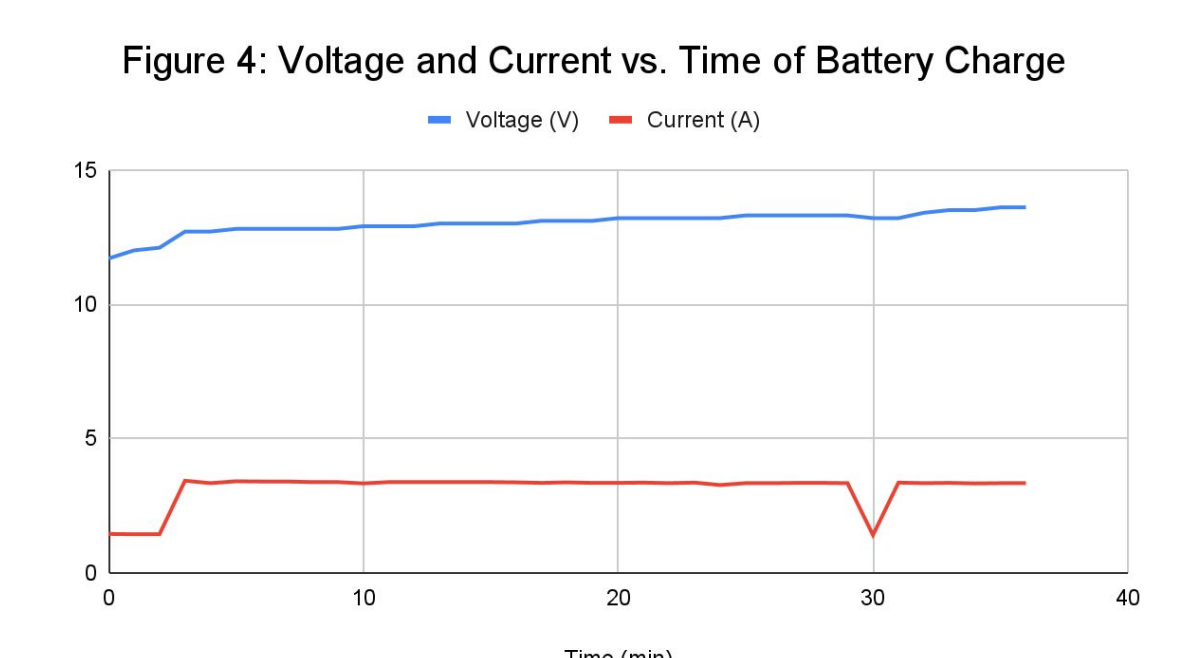
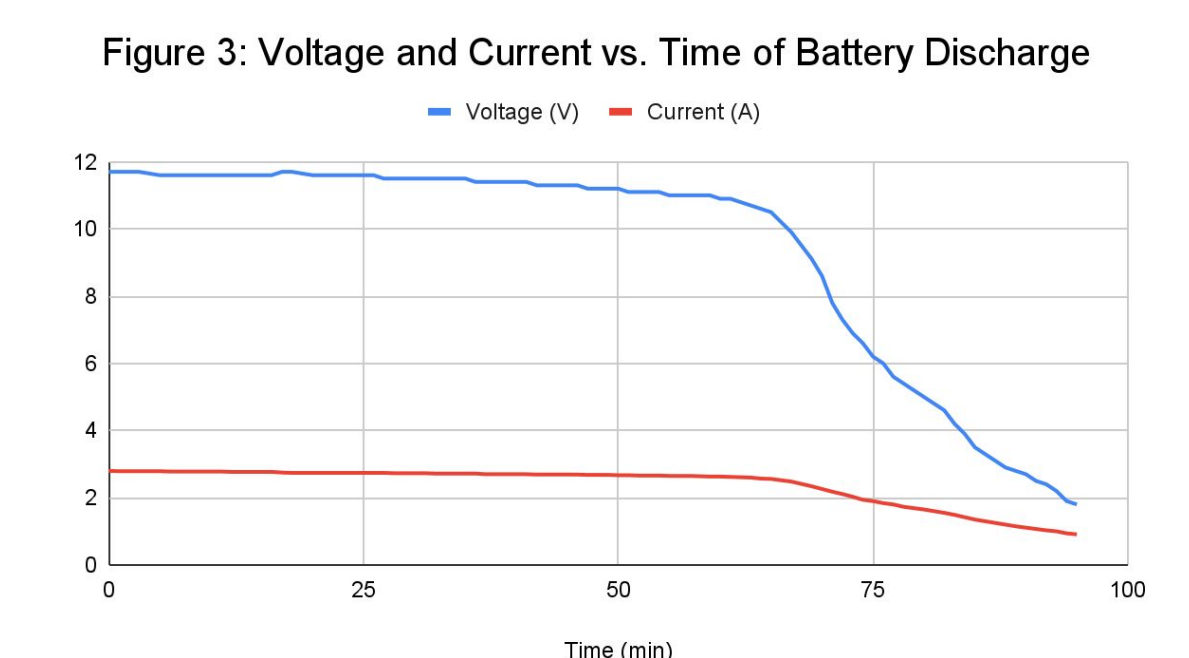


Figure 2: Buck Converter Design Simulated in PSpice.



## Expected Deliverables

- Ferry battery charging system prototype with data logger for real time monitoring.
- Comprehensive final report, detailing design, simulations, and data analysis.
- Electric ferries in Southeast Alaska feasibility assessment.
- Final presentation and video demonstrating timeline and flow of project.

## Endstate

- Construct a ferry battery bank prototype that charges from electrical grid source.
- Prove, through scaled data collection and analysis, whether electric ferry implementation is viable in Southeast Alaska due to limited electrical grid resources.

## Acknowledgement

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