
ageto
Harbledown Island
a Year of Operation
Mike Murray
HOMER MICROGRID AND HYBRID POWER

Harbledown Island - British Columbia

Agenda

- Project Introduction
- System Analysis
- Lessons Learned

Project Introduction

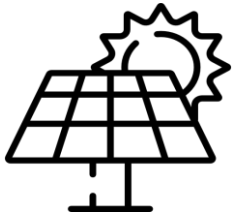
Energy Resources

215 kW

440 kWh

(3) Simmax

ComAp IntelliGen



99 kWAC

(3) SMA Core1

Dynapower

MPS-i125

125 kW

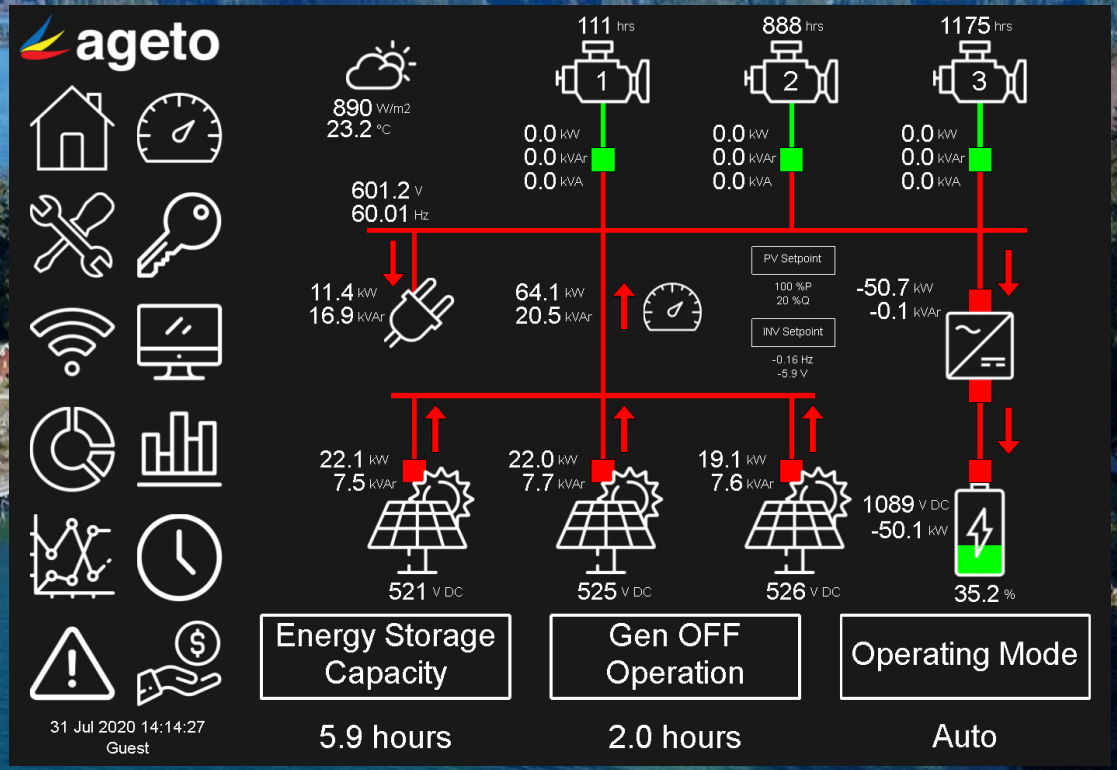
Samsung E3

The Ageto ARC Controller

The Ageto ARC Controller

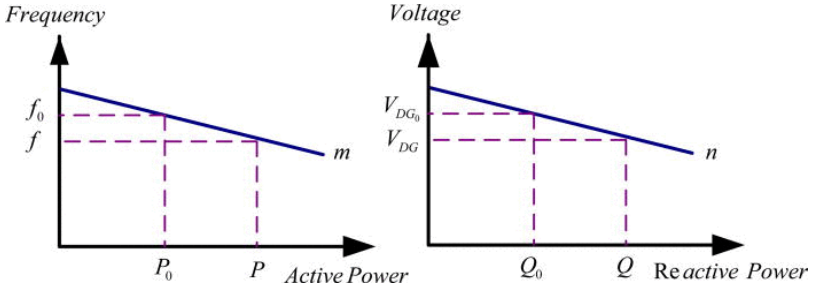
Microgrid Controller

- Control
- Monitor
- User-Interface



Advanced Control Methods

- Generator and energy storage both operating in grid forming mode
  - Advanced control methods
  - Additional spinning reserves
  - Nominal setpoints: 60 Hz, 600 V
- Generator optimization
  - Minimum loading, ramping, cycling
  - Maximize renewable penetration
  - Redundancy
  - Hour balancing

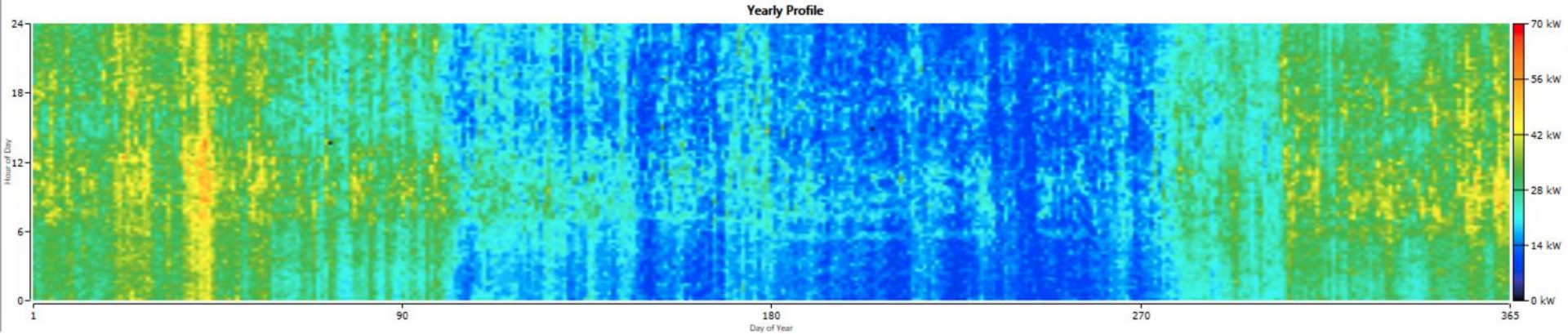


System Operations

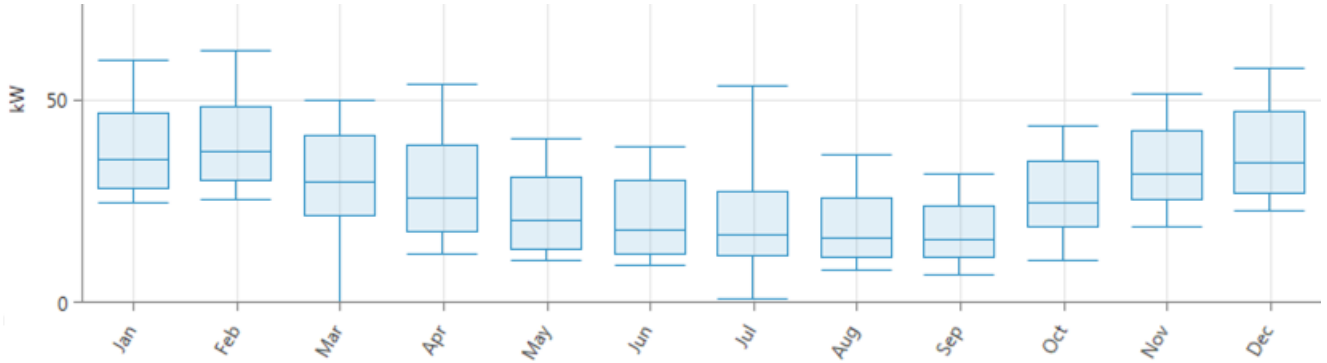
System Operations

System Analysis

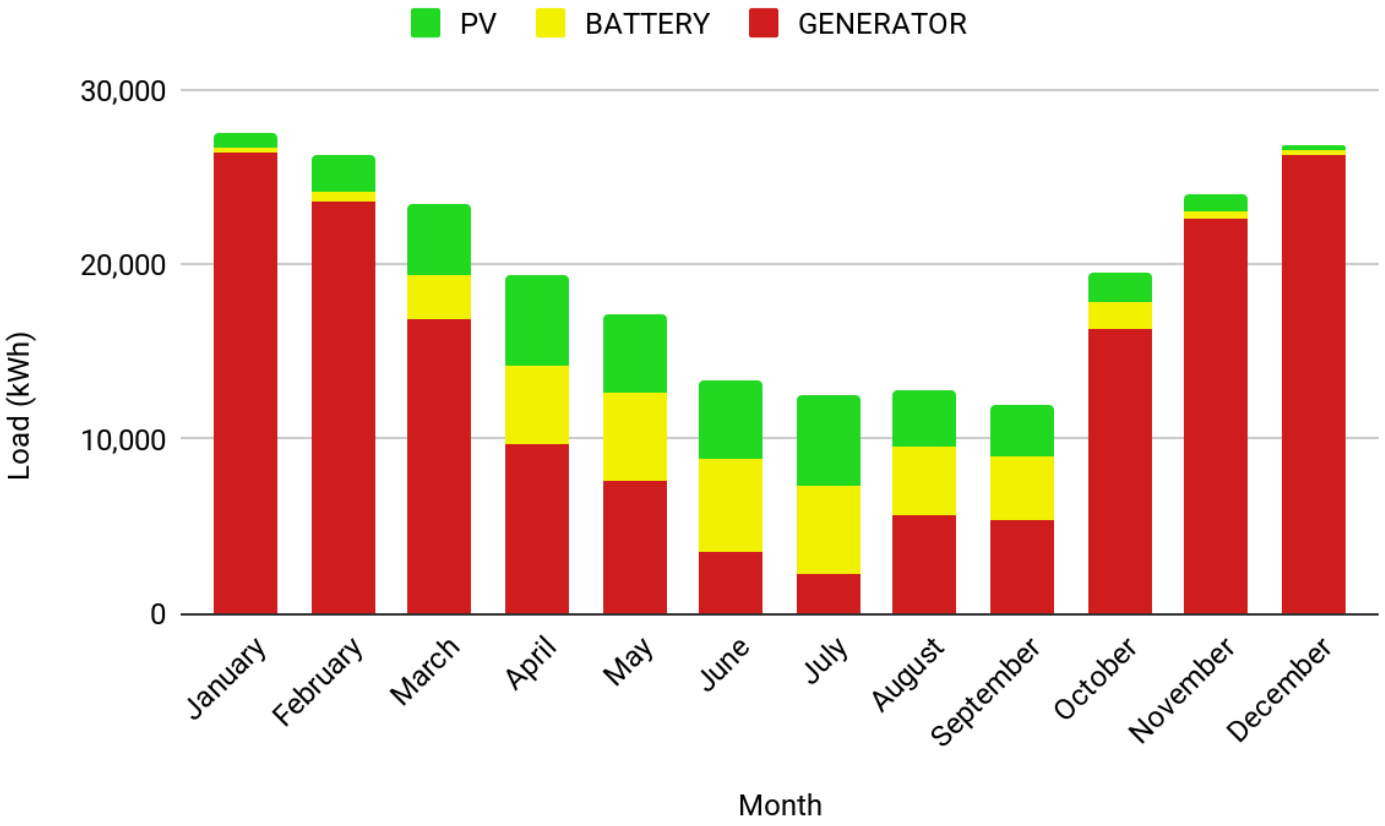
Seasonal Load Profile



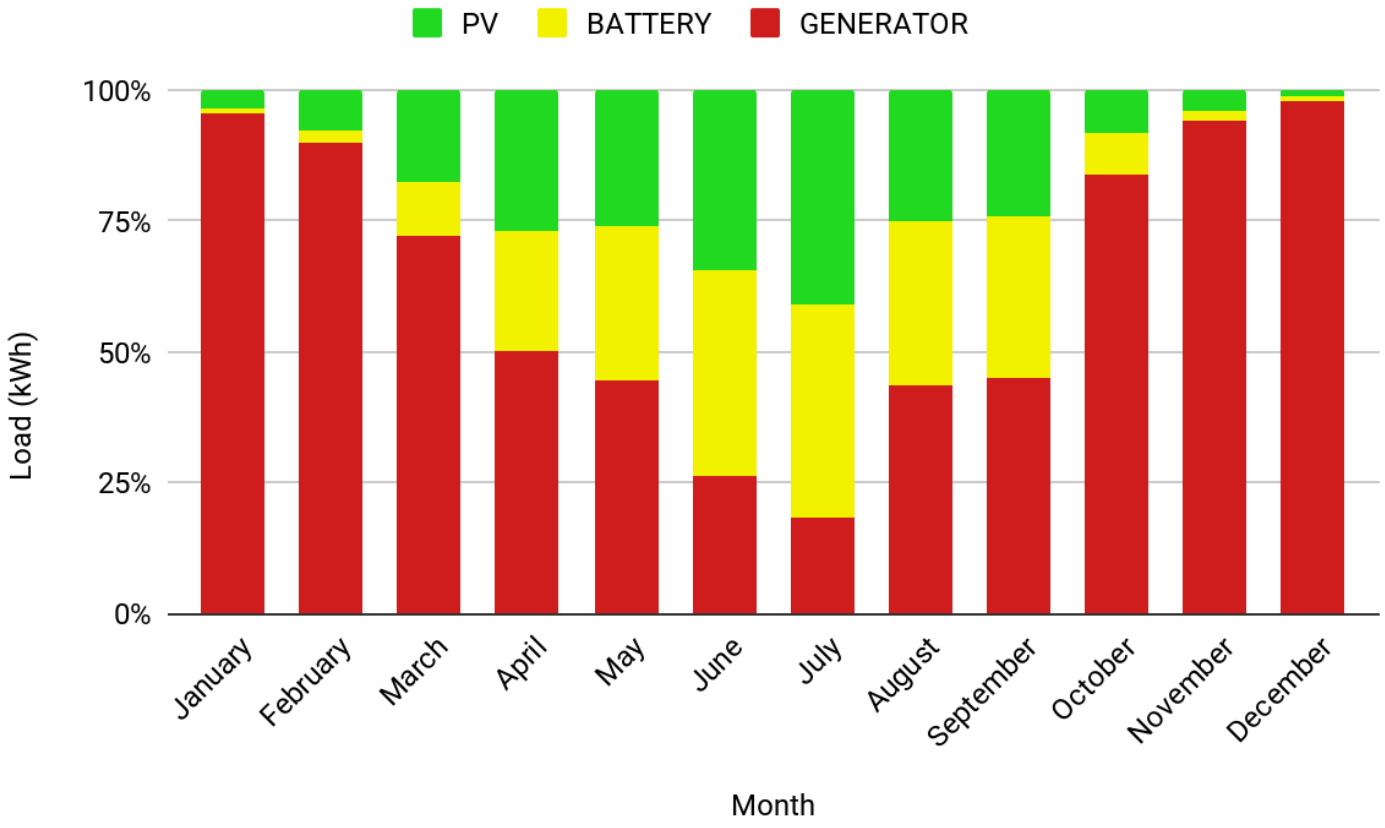
Metric	Baseline	Scaled
Average (kWh/day)	613.33	613.33
Average(kW)	25.56	25.56
Peak (kW)	62	62
Load factor	.41	.41



Energy Production (kWh)

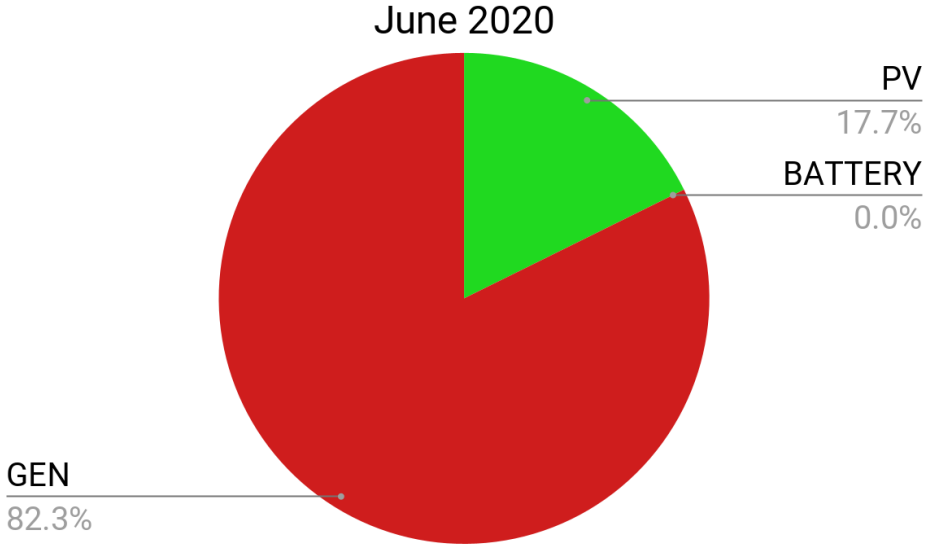


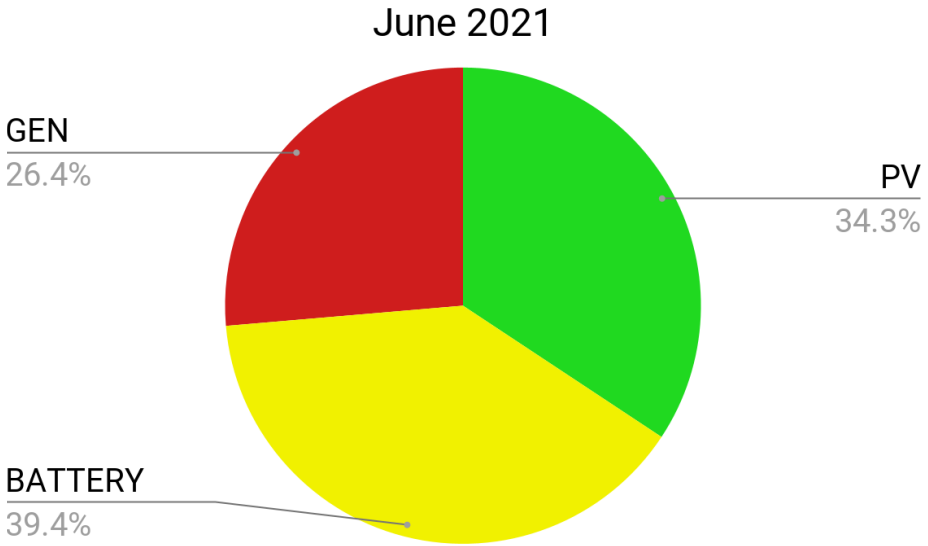
Normalized Energy Production



June 2020 vs 2021 Energy Resource Makeup

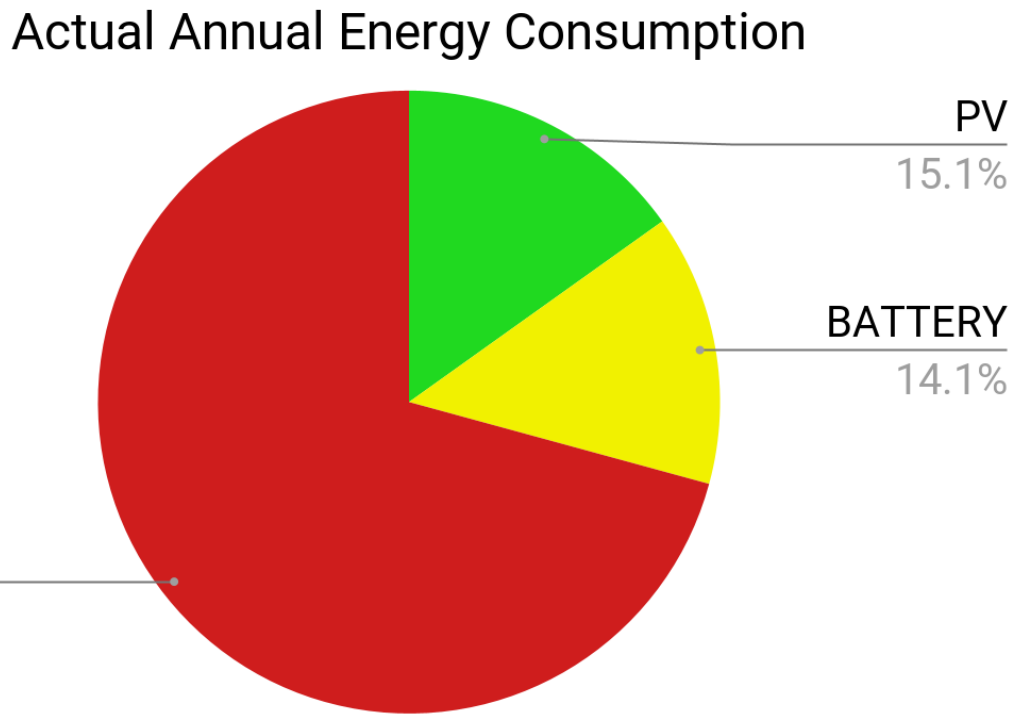
- Addition of grid-forming energy storage
  - Reduced fuel consumption by 60%
  - Saving 400 gal (1,514 L) of diesels and $1,560 in June
  - Capture an additional 4,700 kWh of solar energy





Annual Energy Contribution

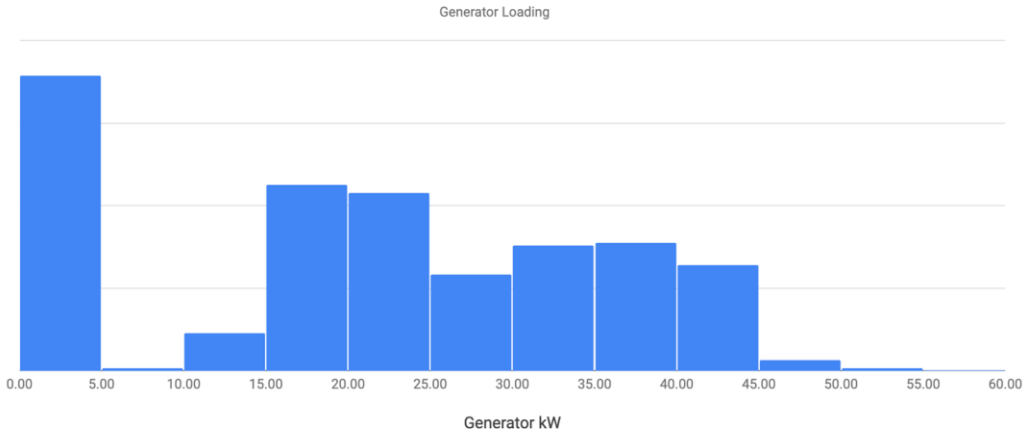
- HOMER Modeled
  - 99,777 kWh Solar using NASA data
  - 2,124 kWh Curtailed Solar
  - 129,884 kWh Diesel
  - 40% renewable contribution
- Actual Results
  - 72,552 kWh Solar using actual production
  - 166,203 kWh Diesel
  - 30% renewable contribution

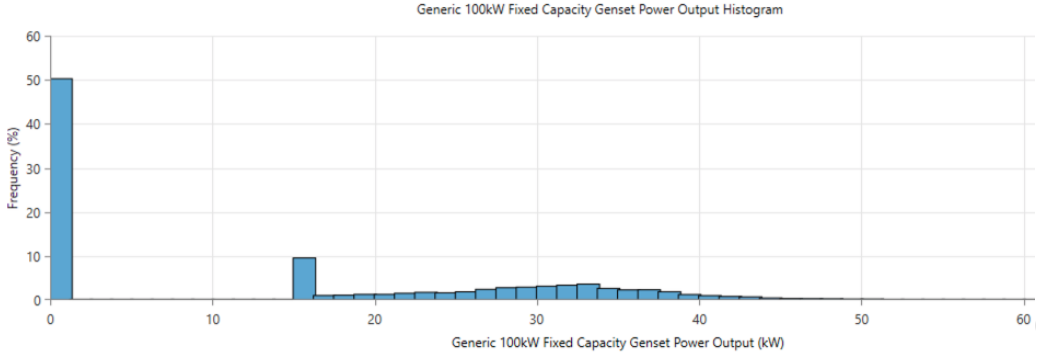


Generator Optimization

- Generator-off Operations
  - 2,214 hours
  - 25% of the year
- Minimum Loading
- One start per day
- Generator hour balancing

Generator Loading Histogram



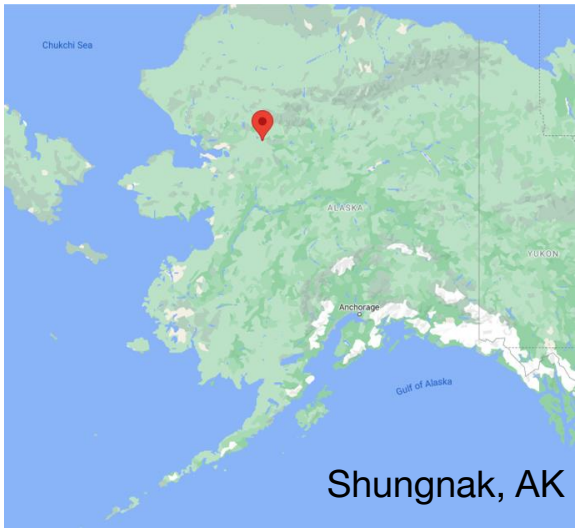


Lessons Learned

Improvements and Lessons Learned

- Repeatable Project
  - Use case for island and remote community microgrids
- Common goals
  - Realiabile, lower-cost, safe, clean power

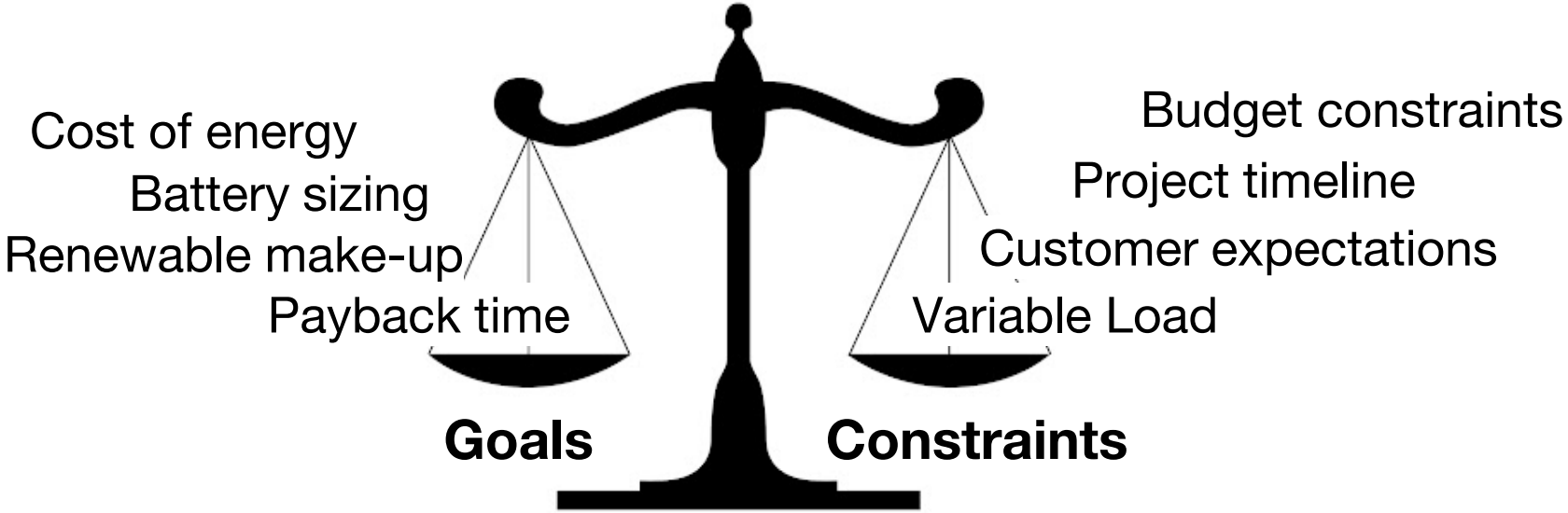

Harbledown Island, BC



Shungnak, AK

Improvements and Lessons Learned

- Sizing: ideal system vs. real world constraints



Conclusion

- Community Benefits
  - Reducing cost of energy
    - 5,600 gallons (21,200L) of diesel saved
    - $21,850 USD in diesel savings
    - 124,755 pounds (57mt) CO_2 reduction
  - Noise Reduction
  - Reliability
  - Clean Energy