Stehekin Integrated Resource Plan
An Energy Resource Plan for Meeting Future Load Growth

Jim White and Andrew Grassell
Jan. 20, 2020
Why we are here

• Situation
  – Increasing growth in Stehekin is leading to an increasing reliance on diesel generation
  – Peak demand nearing generating resources capacity
  – Estimated load growth is expected to outpace current energy supply between 2021 and 2027

• Two Challenges
  – Immediate need – meeting peak demand
  – Mid-term – meeting average energy needs
What we’ll cover

• Set the stage – why we’re here

• Look in-depth at the challenges to be addressed

• Review options to meet challenges

• Review next steps – No decision is needed today
Setting the Stage
Background

• Geographically isolated community

• ~150 Customers served in Stehekin

• National Park Service is the largest customer
Operating/Regulatory Environment

• Water Rights
  – Hard constraint of 17.86 cubic feet per second (cfs)
  – Seeking additional water rights would likely lead to additional and costly requirements

• Operating Permit
  – Hydro project operating under permit issued by the National Park Service

• Air Quality Permit-WA Department of Ecology
  – Permits limit the use of large diesel generators to emergencies only
  – Permit allows for use of smaller diesel generator to meet peak load
Generation Resources

Stehekin Power Source

180 kW (D2 required)  
(Primary source)  
Hydro Generator

255 kW (D2 & Hydro shut down)

Secondary source  
Diesel Generator (D2)

Emergency source  
Diesel Generators (D1 or D4)

Electrical Demand

50%  
Residential services

50%  
Commercial and non-residential services
Peak day resource profile
Impacts on available resources from load growth

- 100% Diesel
- D-1 or D-4
- 4% of Time
- D-2 Needed
- 56% of Time
- Rated Capacity of Hydro and D-2 Generator
- Approved Load Growth
- Rated Capacity of Hydro Generator
- D-2 Needed
- 16% of Time

Stand-Alone Diesel Generators (D-1 or D-4)
Projected Load Growth w/ 2000 Amps of New Service
Exist. 5-Minute Instantaneous Peak Loads
Historical usage and projected load growth

- **Historical**
- **2000 Amp, High Load Growth**
- **2000 Amp, Medium Load Growth**
- **2000 Amp, Low Load Growth**

Practical Limit of Existing Hydro & Supplemental D-2 Diesel Generator
## Stehekin retail revenue

<table>
<thead>
<tr>
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<td>$106,441</td>
<td>$115,499</td>
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<td><strong>Total Annual kWh</strong></td>
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<td><strong>Revenue per kWh</strong></td>
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Setting the stage: Conclusion

• Immediate need to address peak demand
  – Currently bumping against max capacity
  – To comply with operating permits, additional peak capacity resources are needed

• There is a choice in the mid-term of whether to make investments to reduce D2 usage
  – We will review the costs of alternative resources in comparison with D2 operations

• There is a small retail revenue base to spread out costs of future actions
Options to Meet Capacity Needs
Stehekin peak load growth estimates and peak capacity resources
Battery storage

- Most cost-effective solution
- Offered a $125,000 grant from APPA
- Battery will provide capacity AND create additional energy from any excess hydro
- It will be important to combine policy solutions with technical solutions
  - Battery will displace diesel as long as load is at a level that allows for charging

Cost is an estimate, plan is to issue RFP to fine tune estimates prior to moving forward.

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<thead>
<tr>
<th>Rank</th>
<th>Capacity Measures</th>
<th>Expected Measure Life (Years)</th>
<th>Total Cost per Unit</th>
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<th>Annualized Cost per Year</th>
<th>Cost per Peak kW per Month</th>
<th>Incremental Peak kW Reduction</th>
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<tbody>
<tr>
<td>1</td>
<td>Residential Lighting Replacement with LED</td>
<td>8</td>
<td>$3</td>
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Options to Reduce Diesel Usage
Stehekin load growth estimates and energy resources

Average Annual Energy Use, Avg. KW

- Hydro Generator
- D2 Diesel Generator
- Residential Lighting
- Lithium Ion Battery
- Water Heater Load Control
- Phase 1 Conservation
- Phase II Conservation
- Electric Appliance to Propane
- Hydro Eff. Improvement

Load Growth Categories:
- Low Load Growth
- Medium Load Growth
- High Load Growth

Years:
- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029

17
Stehekin levelized cost of electricity (LCOE)
Conclusions
Conclusions

• **Stehekin Cost and Revenue Structure** - Solutions will add to the costs on a system with average revenues of $106,000 since 2014. A discussion on how to fund resources needs to occur with the Stehekin Community.

• **Peak Demand Challenge** - Immediate action is needed and a battery system is the most cost-effective measure*

• **Energy Issue/Reducing D2 Usage** - There are options to meet growth, but at additional costs

• **Leverage Other Technology** – Utilizing AMI in Stehekin needs more analysis. It could be a valuable tool for the District and community to better understand usage and where we could partner with Stehekin to make the most efficient use of limited resources

• **Technical Solutions are Finite** - We are unable to serve an ever-expanding load growth; this needs to be discussed with the community. Policies, such as expanding tiered rate, need to be reviewed as additional tools

*Pending RFP results focused on fine tuning cost information before proceeding
Next steps

• Issue RFP for battery system – early March

• Set times and dates to share these findings with the Stehekin Community

Questions?
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Stehekin Customer Base

- National Park Service
- Lodge
- Restaurant
- Bakery
- Private Residences
- Seasonal Cabins
- Recreational