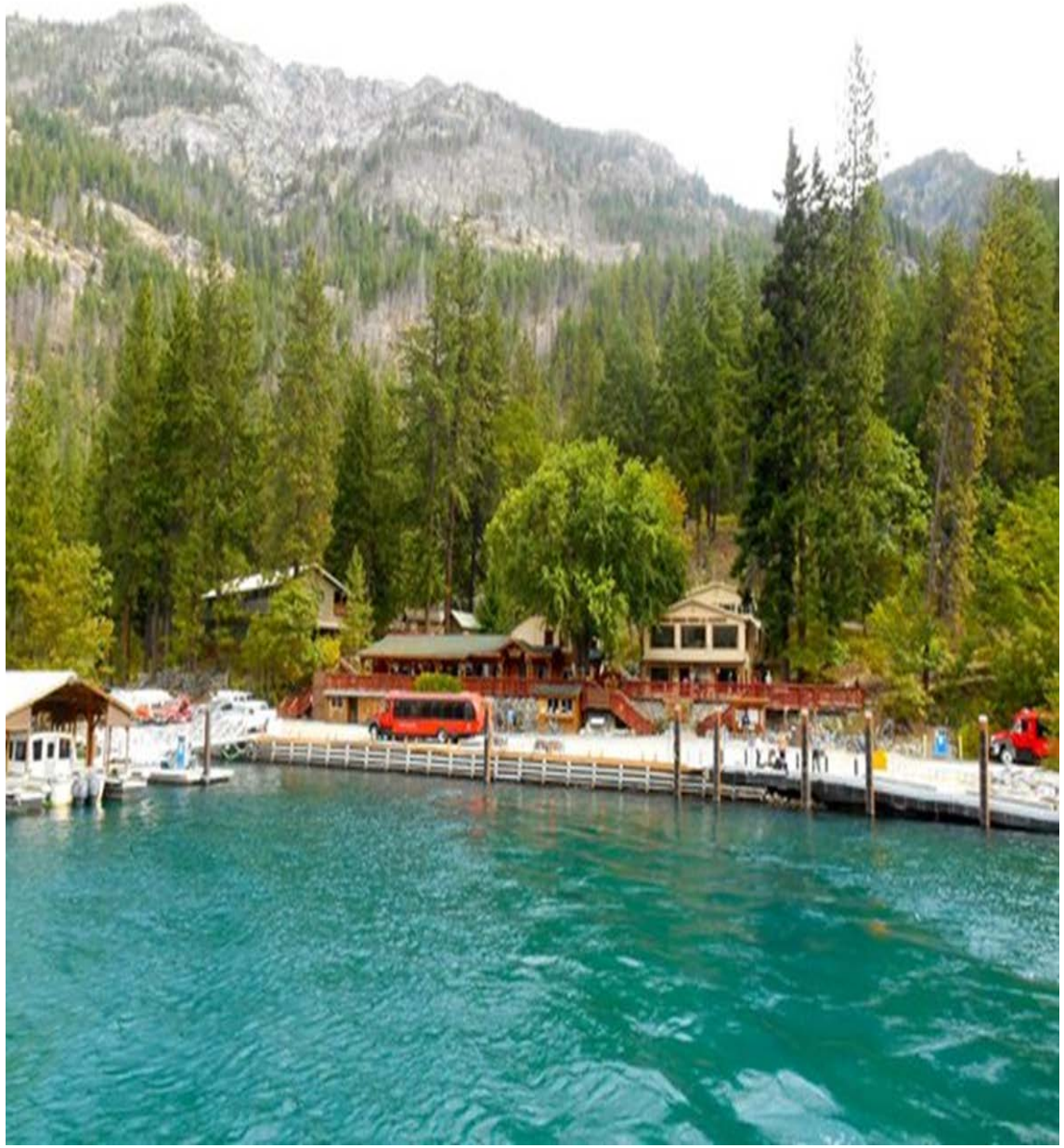

Stehekin Integrated Resource Plan

An Energy Resource Plan for Meeting Future Load Growth

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Andrew Grassell

Jan. 20, 2020

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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

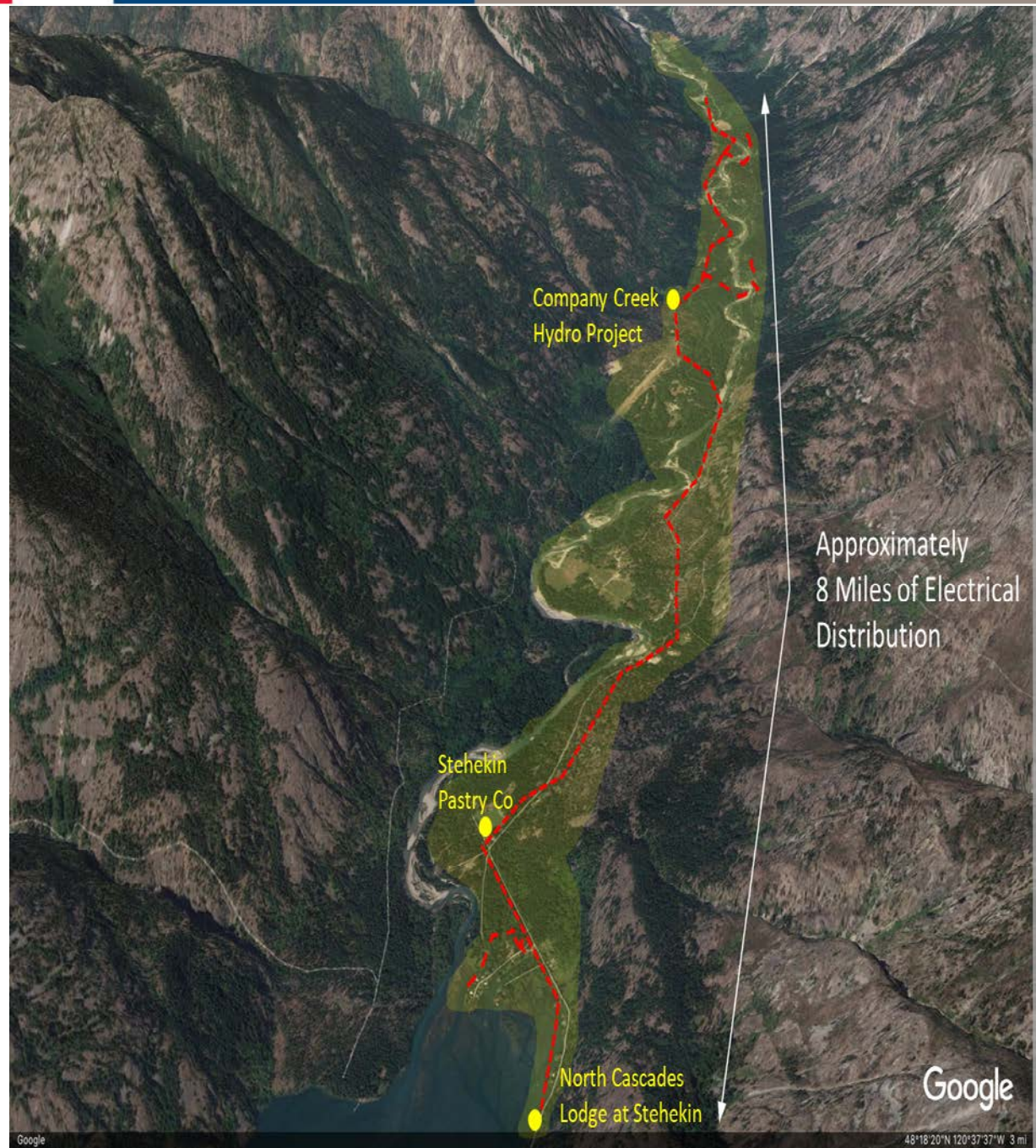
What we'll cover

- 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

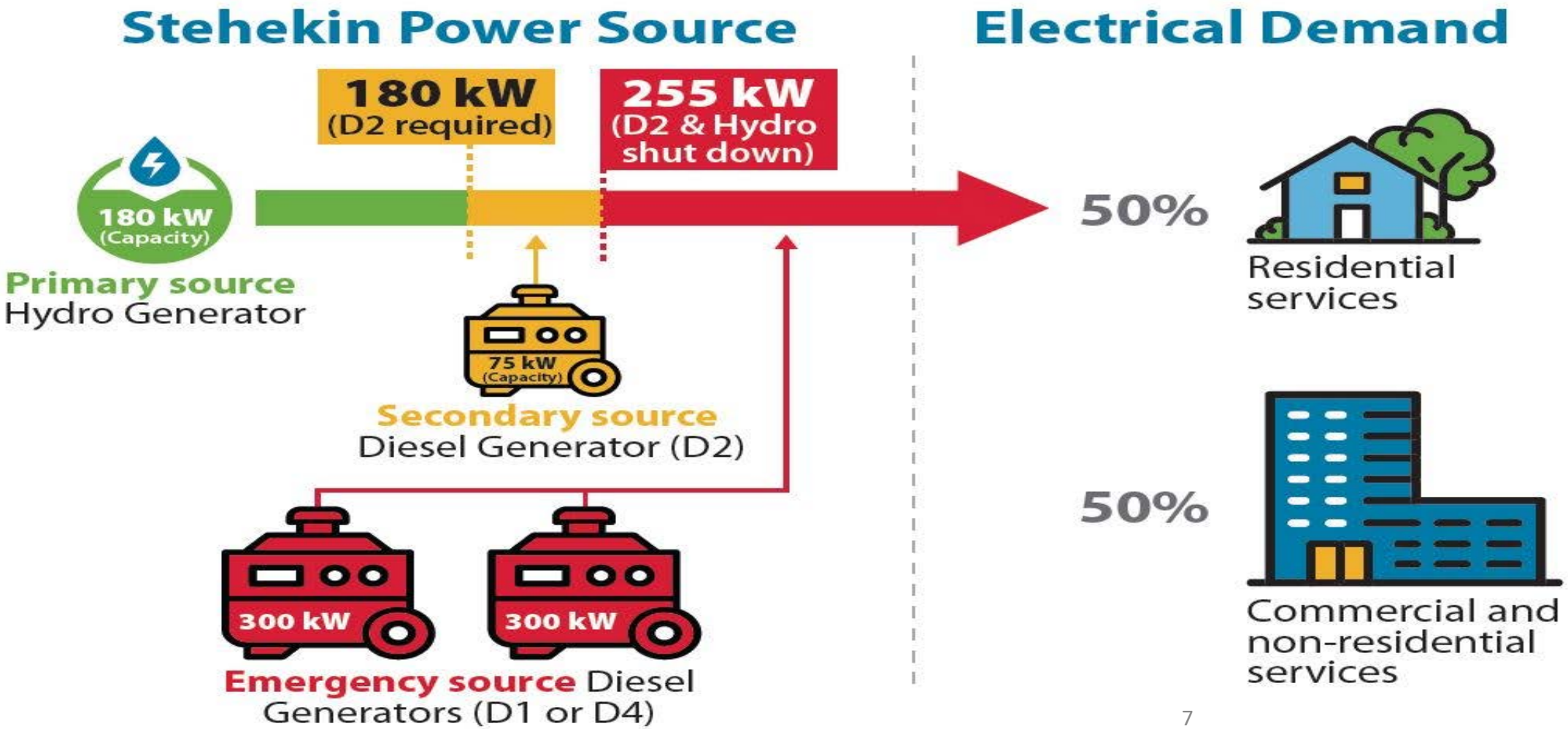
- Geographically isolated community
- ~150 Customers served in Stehekin
- National Park Service is the largest customer



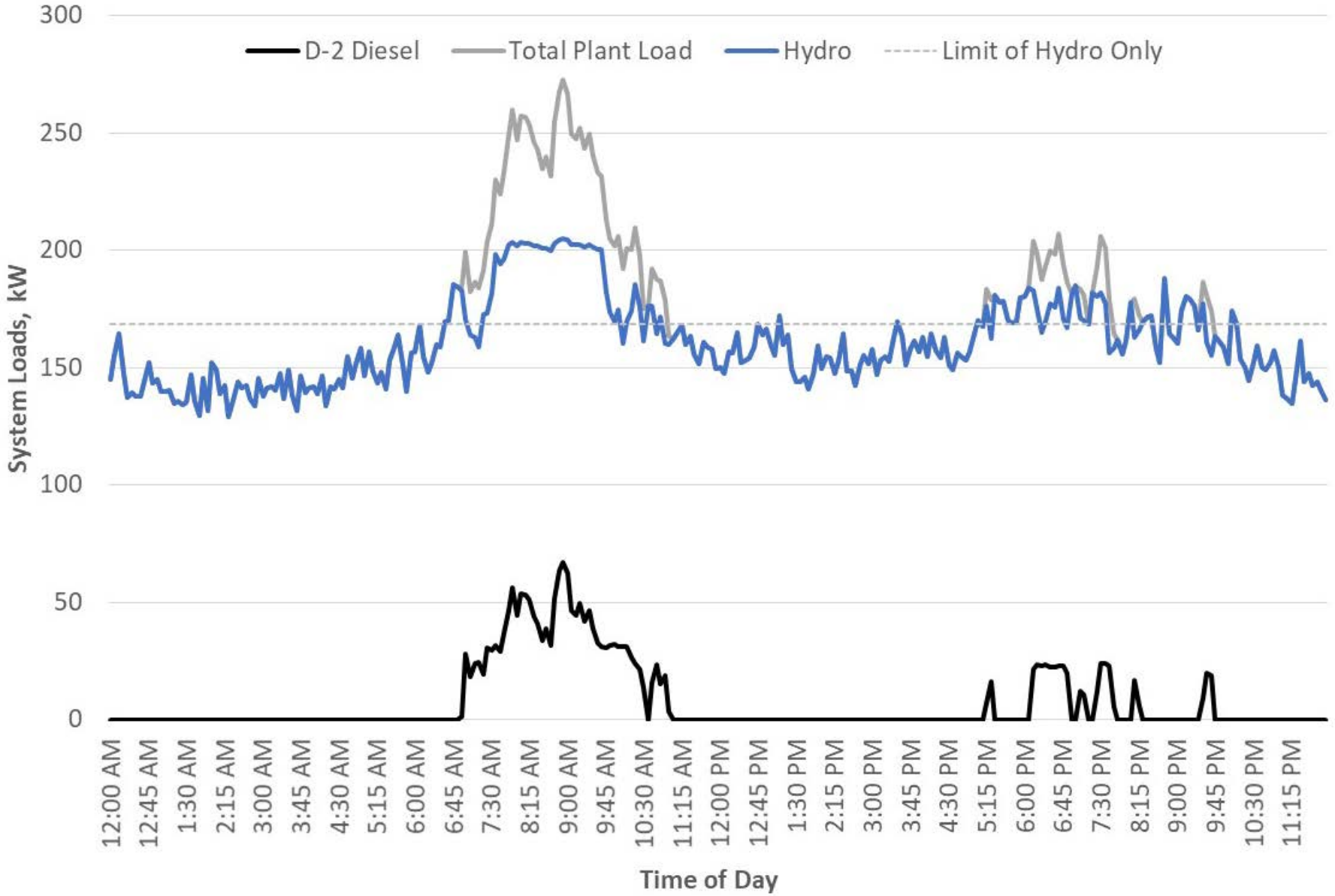
Operating/Regulatory Environment

- 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



Peak day resource profile



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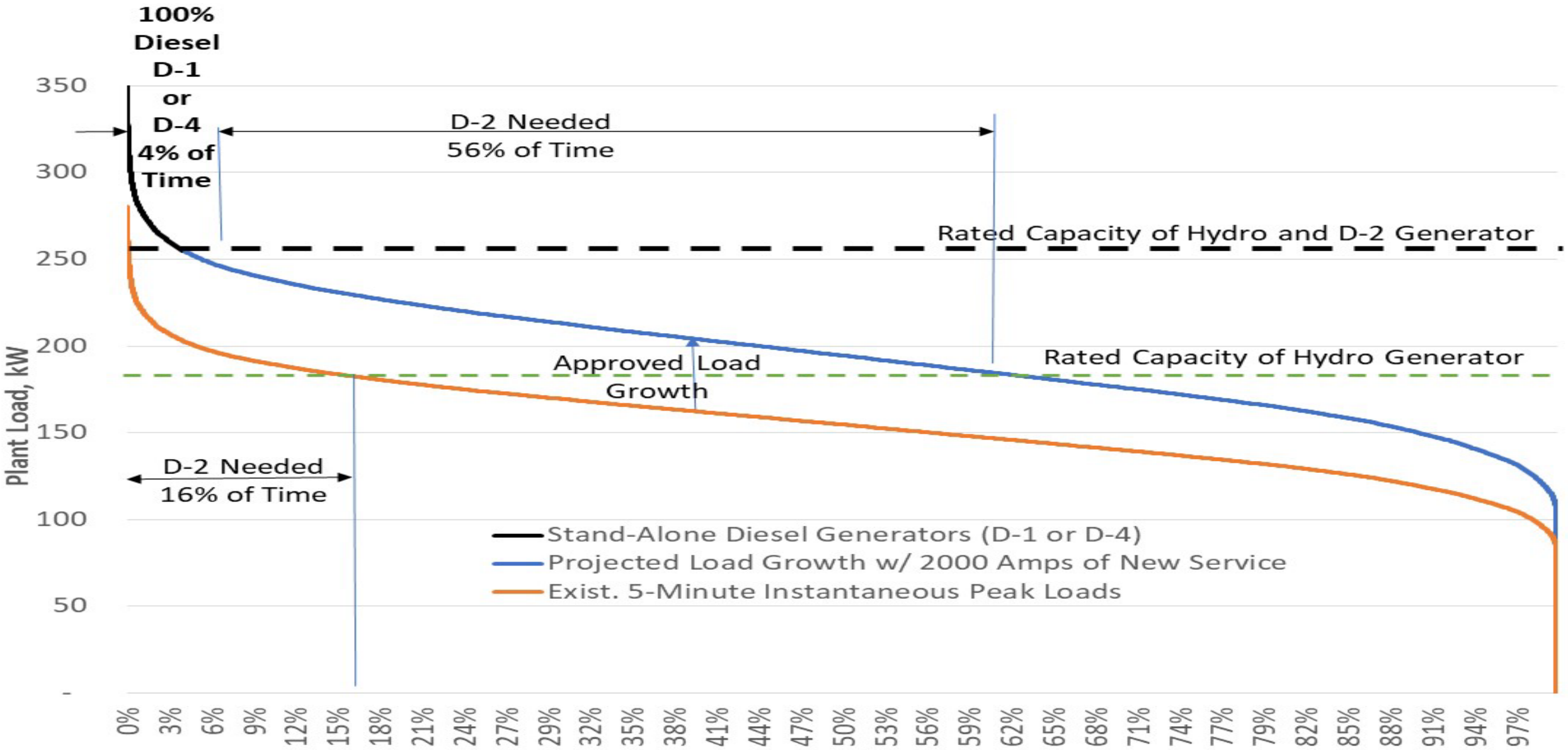
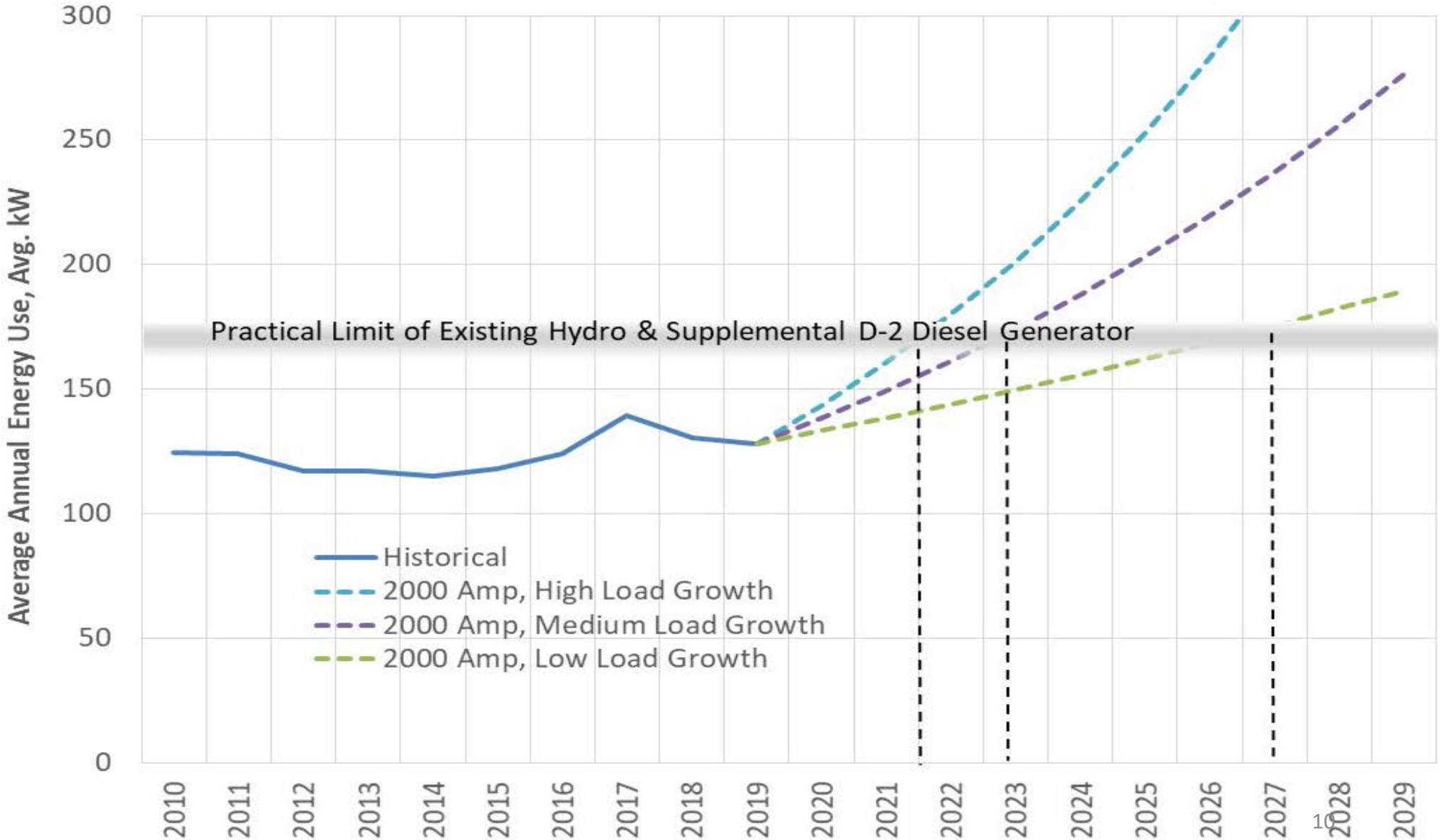
Impacts on available resources from load growth



Historical usage and projected load growth



Stehekin retail revenue

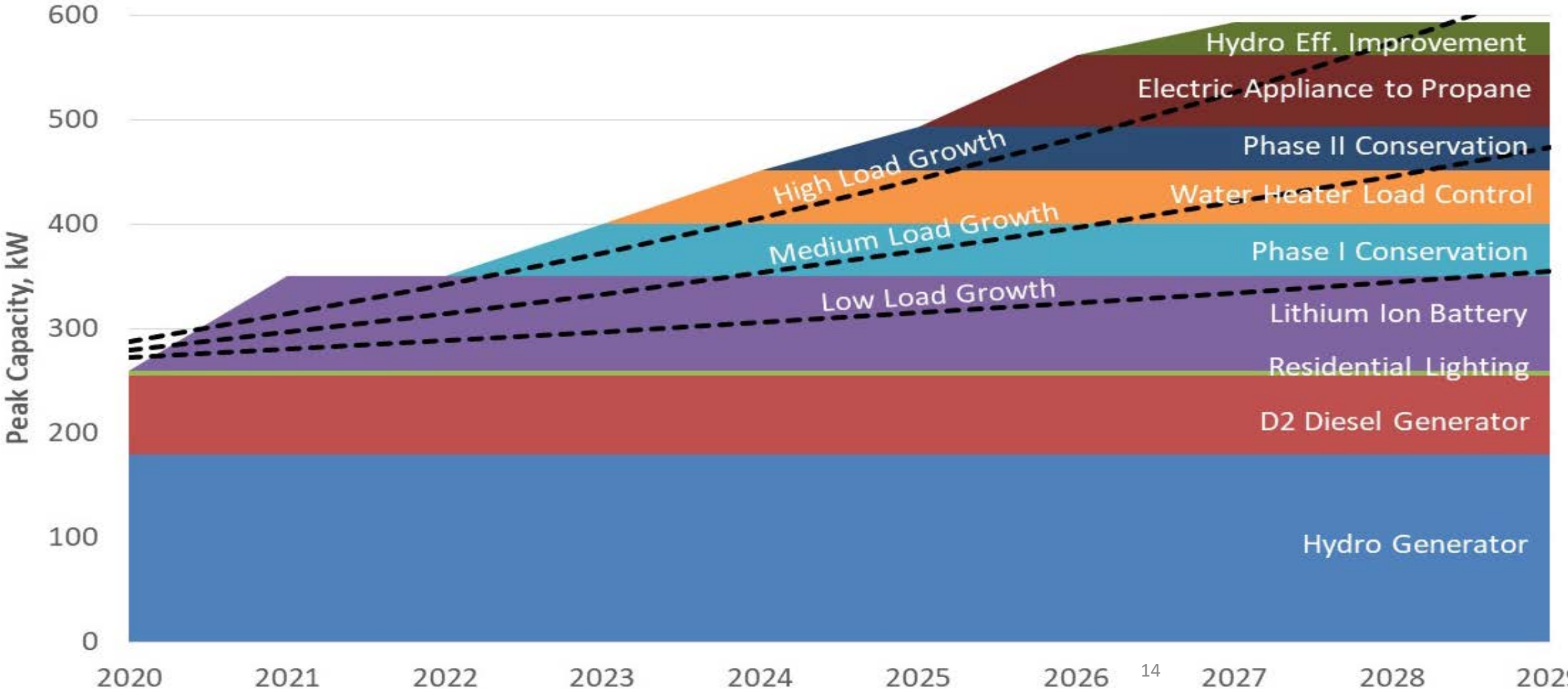
	2014	2015	2016	2017	2018	2019
Total Annual Revenue	$100,068	$102,328	$106,441	$115,499	$107,378	$111,767
Total Annual kWh	849,093	863,972	919,320	1,023,800	942,551	992,168
Revenue per kWh	$0.12	$0.12	$0.12	$0.11	$0.11	$0.11

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

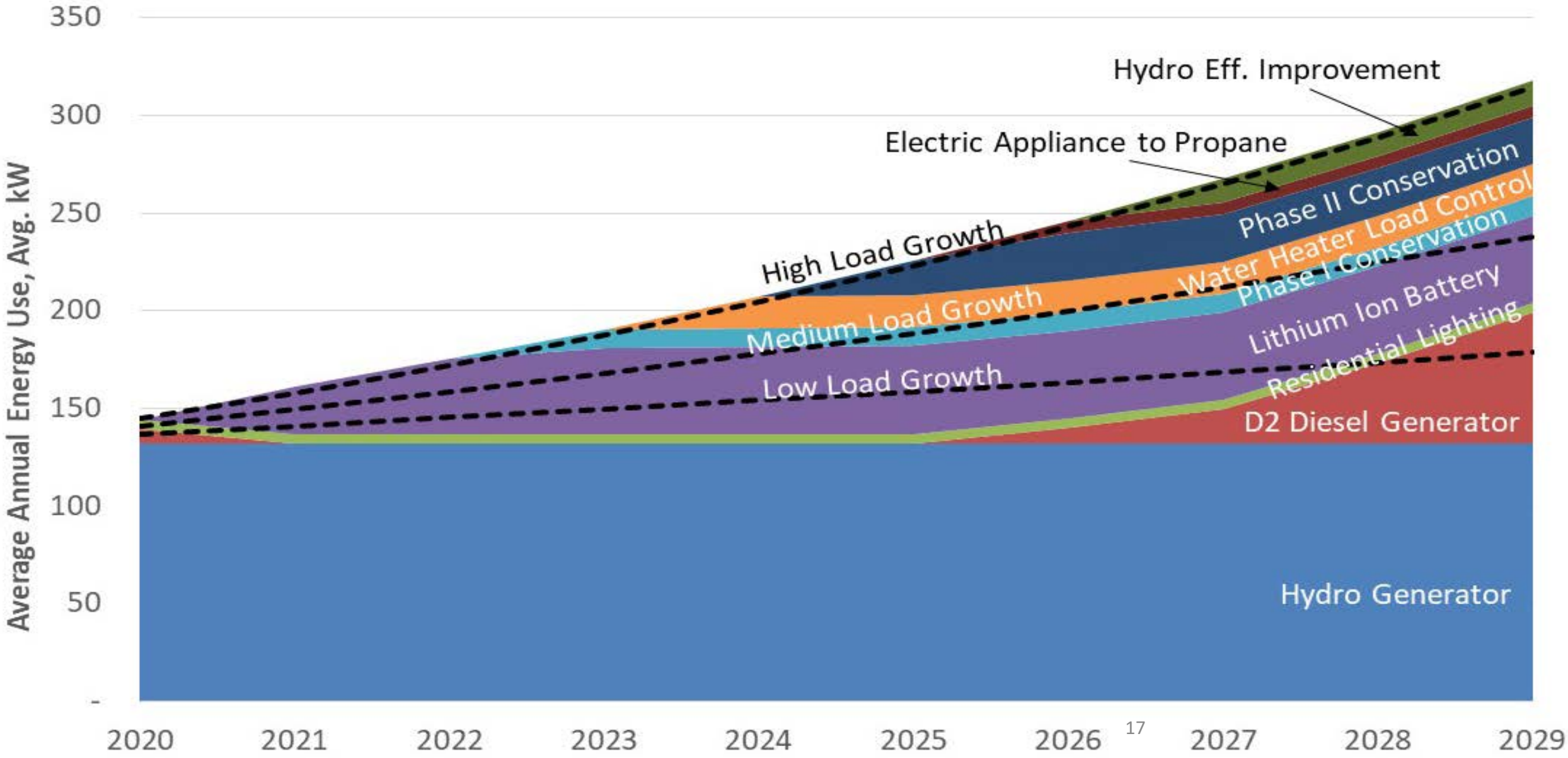
- Most cost-effective solution
- Offered a $125,000 grant from APPA
- Battery will provide capacity AND create additional energy from any excess hydro
- It will be important to <u>combine</u> policy solutions with technical solutions
  - Battery will displace diesel as long as load is at a level that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

Rank	Capacity Measures	Expected Measure Life (Years)	Total Cost per Unit	Total Installed Cost	Annualized Cost per Year	Cost per Peak kW per Month	Incremental Peak kW Reduction
1	Residential Lighting Replacement with LED	8	$3	$4,444	744	$13.73	5
2	500 kWh/250 kW Lithium Ion Battery Storage System*	12	$350,000	$225,000	28,328	$25.95	91
3	Commercial Lighting Replacement with LED	7	$15	$6,300	1,169	$30.99	3
4	Electric HP Water Heater	15	$2,350	$60,630	6,657	$31.39	18
5	Propane Dryer Replacement	15	$1,150	$66,413	7,292	$31.57	19
6	Pre-1990 Refrig. w/ EnergyStar Replacement	15	$1,400	$14,000	1,537	$33.86	4
7	WH Demand Control	15	$2,850	$214,463	23,547	$38.63	51
8	Commercial Ductless HP	15	$5,500	$82,500	9,058	$46.47	16
9	Propane Water Heater Conversion	15	$2,250	$169,313	18,590	$46.75	33
10	Commercial Insulation & Weatherization	50	$4,000	$12,000	870	$47.02	2
11	Residential Insulation & Weatherization	50	$4,000	$60,000	4,348	$47.02	8
12	Pre-1993 Refr. w/ EnergyStar Replacement	15	$1,400	$4,200	461	$47.63	1
13	Propane Stove/Oven Conversion	15	$1,450	$91,350	10,030	$49.53	17
14	Residential Ductless HP	15	$5,000	$50,000	5,490	$57.72	8
15	New EnergyStar Rated Refr.	15	$1,400	$75,460	8,285	$69.09	10
16	Commercial Windows	50	$12,000	$60,000	4,348	$70.53	5
17	Residential Windows	50	$12,000	$180,000	13,043	$70.53	15
18	Pre-2000 Refr. w/ EnergyStar Replacement	15	$1,400	$28,000	3,074	$83.74	3
19	Upgrade D-2's 75 kW generator to 120 kW & replace 75 kVA transformer	30	$35,000	$35,000	8,728	$88.49	8
20	Multi-Jet Pelton Wheel	50	$1,723,000	$1,723,000	124,848	$333.96	31

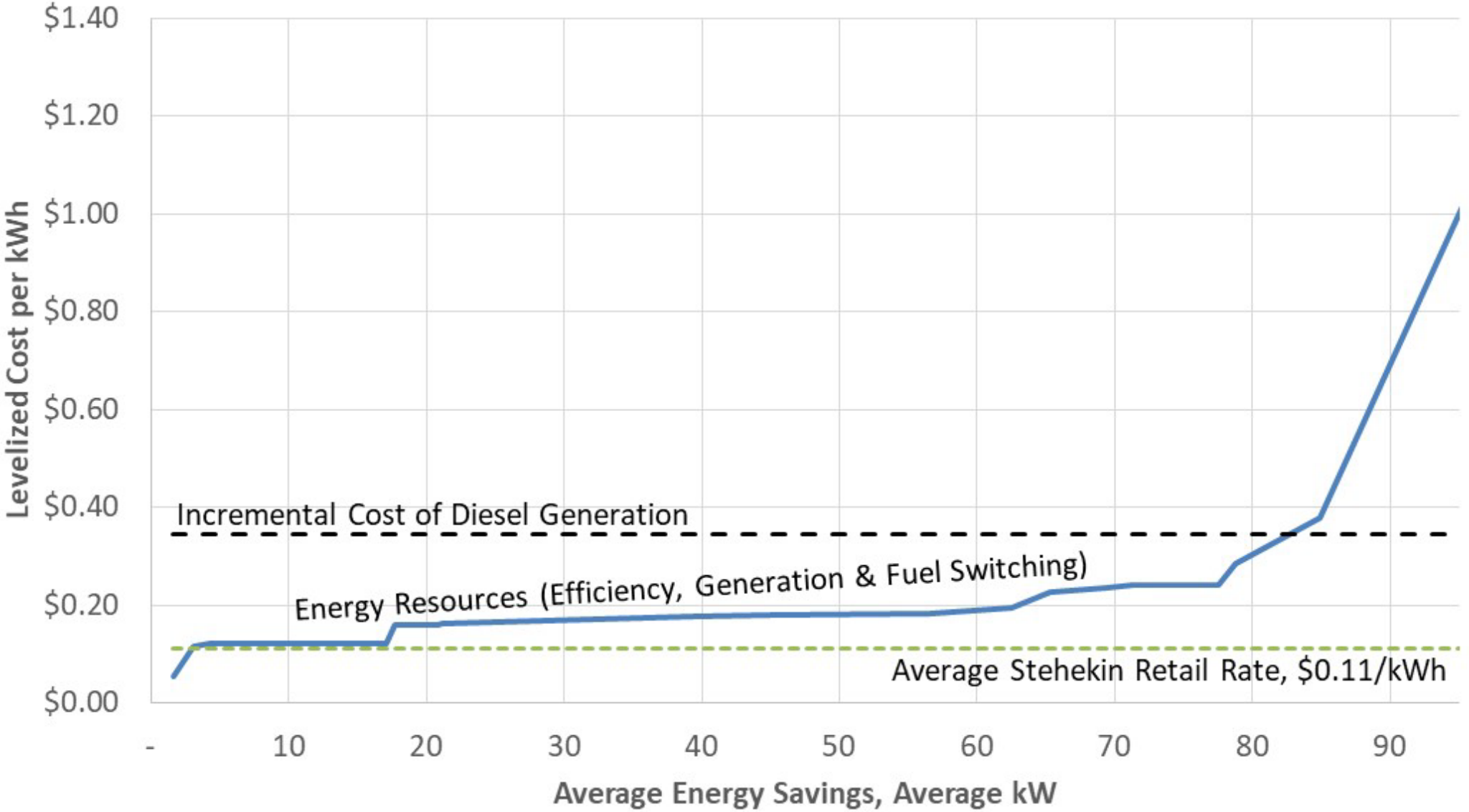
*Cost is an estimate, plan is to issue RFP to fine tune estimates prior to moving forward.

Options to Reduce Diesel Usage

Stehekin load growth estimates and **energy** resources



Stehekin levelized cost of electricity (LCOE)



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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?

Appendix

Energy Measures

Rank	Energy Measures	Expected Measure Life (Years)	Total Cost per Unit	Total Installed Cost	Annualized Cost per Year	Cost per Peak kW per Month	Incremental Peak kW Reduction	Cumulative Peak kW Reduction
1	Residential Lighting Replacement with LED	8	3	4,444	744	$13.73	5	5
2	Pre-1990 Refrig. w/ EnergyStar Replacement	15	1,400	14,000	1,537	$33.86	4	8
3	Commercial Lighting Replacement with LED	7	15	6,300	1,169	$30.99	3	11
4	Electric HP Water Heater	15	2,350	60,630	6,657	$31.39	18	29
5	Propane Dryer Replacement	15	1,150	66,413	7,292	$31.57	19	48
6	Commercial Insulation & Weatherization	50	4,000	12,000	870	$47.02	2	50
7	Residential Insulation & Weatherization	50	4,000	60,000	4,348	$47.02	8	58
8	Pre-1993 Refr. w/ EnergyStar Replacement	15	1,400	4,200	461	$47.63	1	58
9	500 kWh/250 kW Lithium Ion Battery Storage System	12	350,000	225,000	28,328	$25.95	91	149
10	Commercial Ductless HP	15	5,500	82,500	9,058	$46.47	16	166
11	Propane Water Heater Conversion	15	2,250	169,313	18,590	$46.75	33	199
12	Propane Stove/Oven Conversion	15	1,450	91,350	10,030	$49.53	17	216
13	Residential Ductless HP	15	5,000	50,000	5,490	$57.72	8	224
14	New EnergyStar Rated Refr.	15	1,400	75,460	8,285	$69.09	10	234
15	Commercial Windows	50	12,000	60,000	4,348	$70.53	5	239
16	Residential Windows	50	12,000	180,000	13,043	$70.53	15	254
17	Pre-2000 Refr. w/ EnergyStar Replacement	15	1,400	28,000	3,074	$83.74	3	257
18	Upgrade D-2's 75 kW generator to 120 kW & replace 75 kVA transformer	30	35,000	35,000	20,542	$69.42	25	282
19	Multi-Jet Pelton Wheel	50	1,723,000	1,723,000	124,848	$333.96	31	313
20	WH Demand Control	15	2,850	214,463	23,547	$38.63	51	364

Stehekin Customer Base

National Park Service
Lodge
Restaurant
Bakery
Private Residences
Seasonal Cabins
Recreational