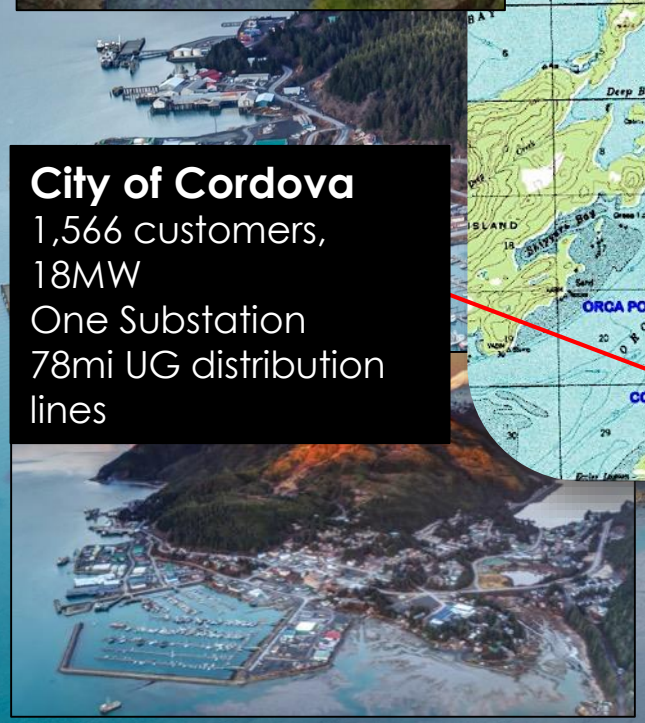
BESS Application in a Microgrid - Cordova Electric Cooperative

Electricity Advisory Committee
NRECA HQ – Arlington, Virginia
October 16, 2019

Cordova, AK (aerial view)

Humpback Creek Hydroelectric Plant
1250kW (2 x 500 kW + 1 x 250 kW)
17,000 foot UG and submarine transmission line

Power Creek Hydroelectric
6278kW (2 x 3124 kW)
25 kV transmission ties to Eyak Substation, Inflatable dam



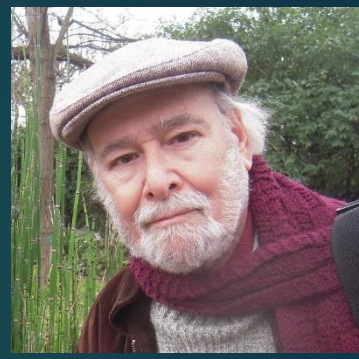
City of Cordova
1,566 customers, 18MW
One Substation
78mi UG distribution lines

Orca Power Plant
10.8 MW Diesel
Control Center, CEC

Crater Lake Dam Storage
may offset 25% Diesel consumption

A US Department of Energy Sponsored Microgrid Battery Energy Storage Application

(Dr. Imre Gyuk, Director of Energy Storage Research, Office of Electricity)



PARTNERS: US DEPT OF ENERGY-SANDIA-NRECA-ACEP-CEC;

SAFT/ABB PACKAGE

NRECA
America's Electric Cooperatives

ABB

Office of
ELECTRICITY

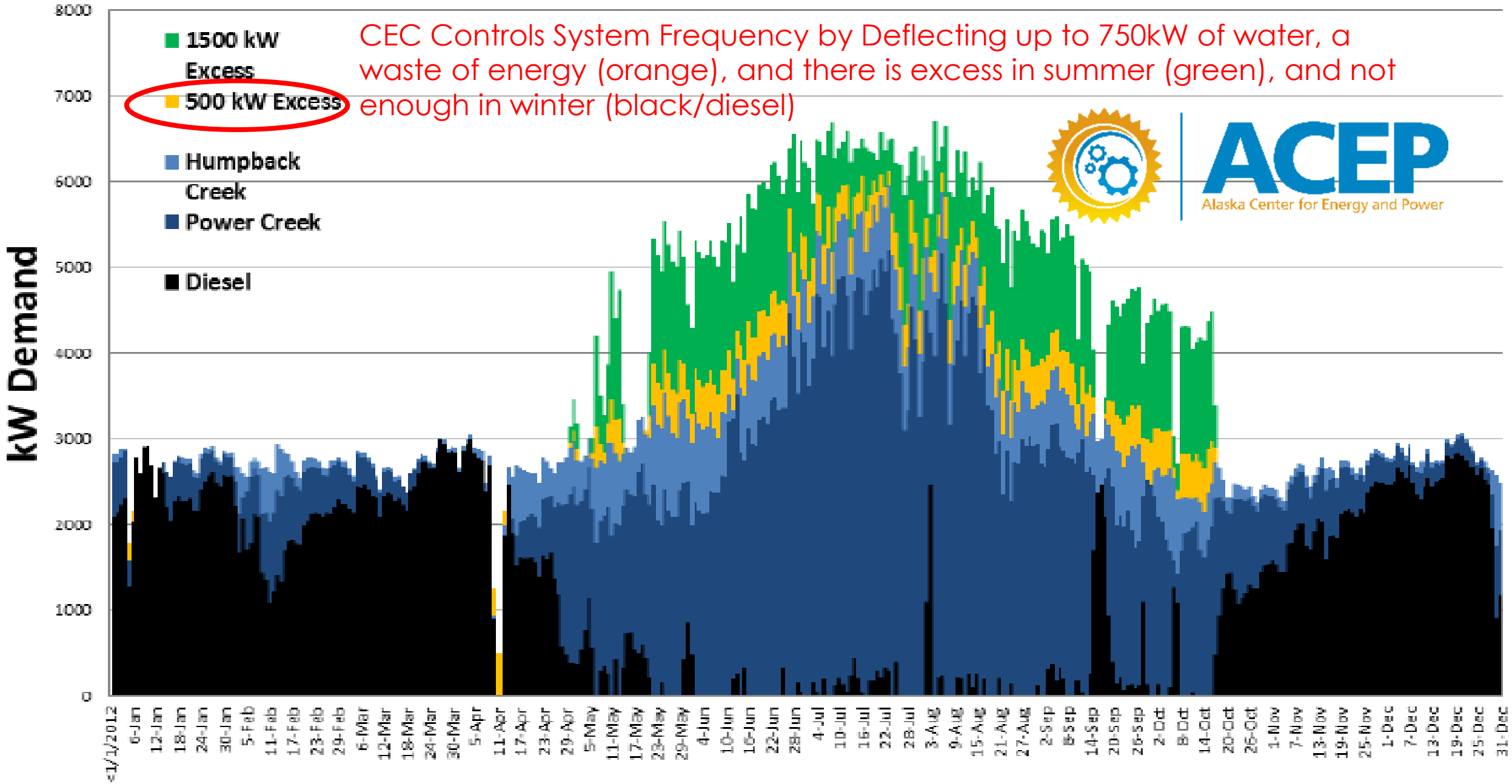
Sandia
National
Laboratories

ACEP
Alaska Center for Energy and Power

CEC

SAFT

Avg Daily kW Load 2012 w/ Excess Hydro



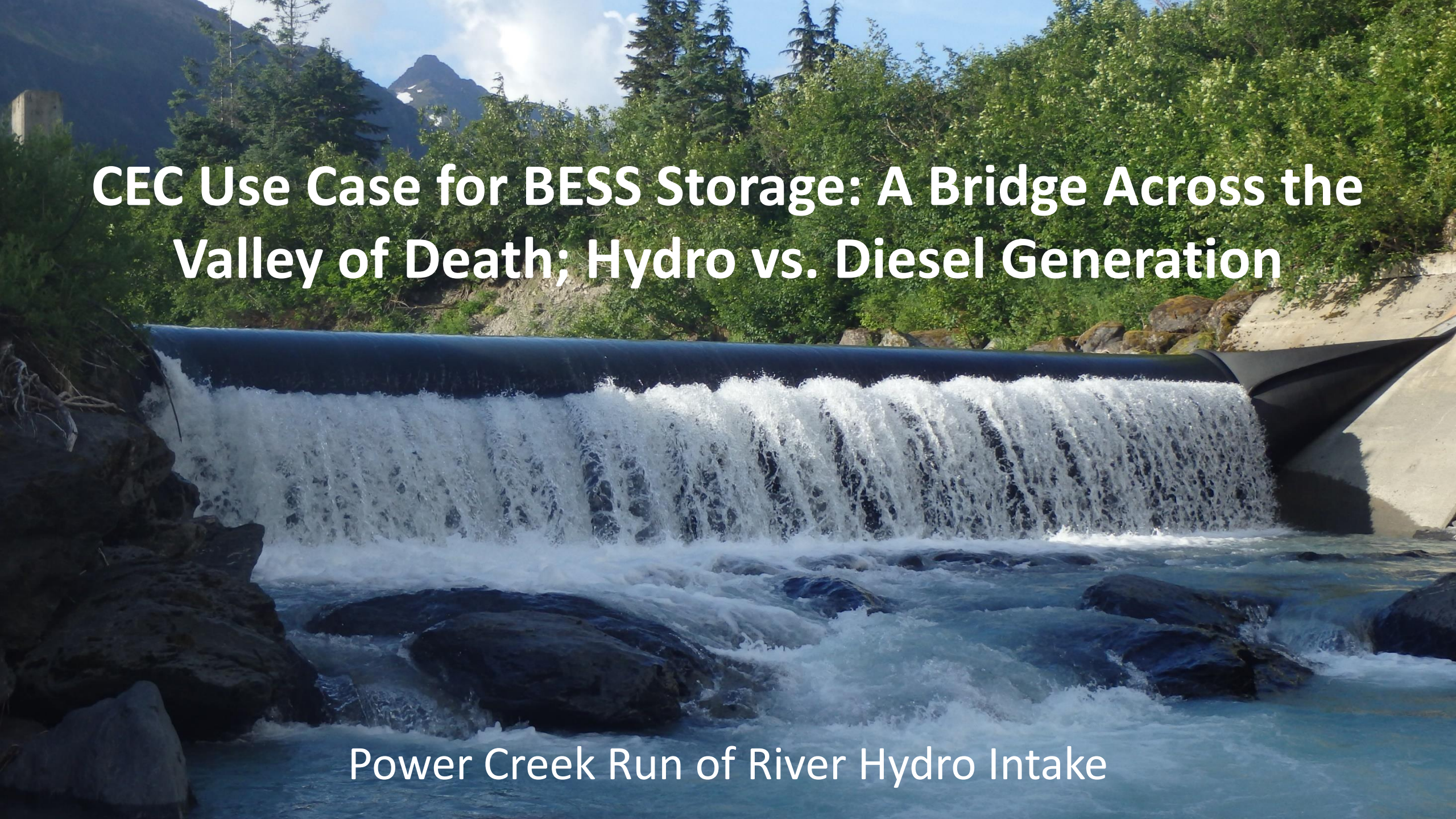
CEC Controls System Frequency by Deflecting up to 750kW of water, a waste of energy (orange), and there is excess in summer (green), and not enough in winter (black/diesel)

ACEP
Alaska Center for Energy and Power

Battery Energy Storage – Vendor Choice

SAFT-ABB PACKAGE

CEC Use Case for BESS Storage: A Bridge Across the Valley of Death; Hydro vs. Diesel Generation



Power Creek Run of River Hydro Intake

CEC BESS Cost & Benefit

SAFT-ABB Package 1MW, 919	$1,400,000
EPS Design & Integration	$ 200,000
CEC Force Labor/Staff Deliverables	$ 300,000
Additional Equipment & Site Develop	$ 100,000
TOTAL PROJECT COST	**$ 2,000,000**
Annual Operating Cost (finance/O&M)	**$ 171,644***
Fuel & Lube Oil Savings	$ 106,626
Rebuild & Capacity Savings	$ 16,590
Defer Diesel Maintenance and Replace	$ 30,000
Annual Operating Savings	**$ 153,216**

Site Work – May/June 2019

INSTALLATION / COMMISSIONING

RIBBON CUTTING

Cordova Community Medical Center


Questions?

Here is What We Learned About BESS…

- Calendar aging capacity loss of 1.5% per year, our chemistry is estimated at 0.5%
- Capacity loss is kWh; kW remains near constant, round trip DC efficiency drops slightly
- Deep cycling causes rapid loss of life, shallow cycling extends life and total kWh throughput
- Frequency controls (small charges/discharges) can occur while bulk charging/discharging
- Removal, recycling, replacing a full battery set can cost 60% of initial package cost.
- Delivery times are fairly short, < 12 mo. From award to receipt
- Factory warranties and required annual maintenance are expensive
- Control algorithms are complex
- Integration into a microgrid is costly and complex
- Significant improvements can be expected through careful monitoring and iterative optimizations