Cordova Electric Cooperative – Past, Present, and Future

Alaska Senate Natural Resources Committee Briefing

Juneau, Alaska

Cordova, Alaska Waterfront

Resilience

The capacity to recover quickly from difficulties; toughness. Starts from a position of strength / capacity, is devastated by events, and returns to a position of strength. Resides with people and organizations, not resources or technology.

Copper River & NW Railroad – Closed 1938

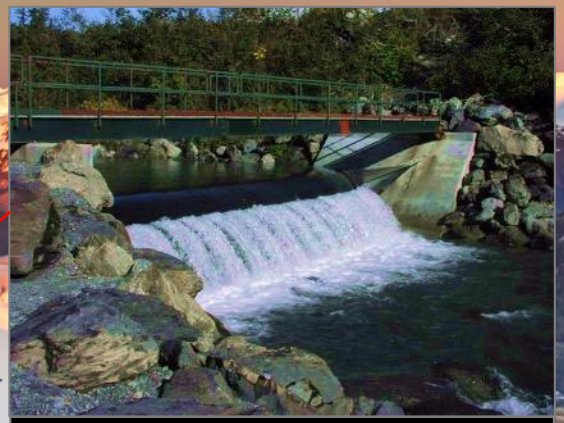
Great Alaska Earthquake 1964

Exxon Valdez Oil Spill 1989

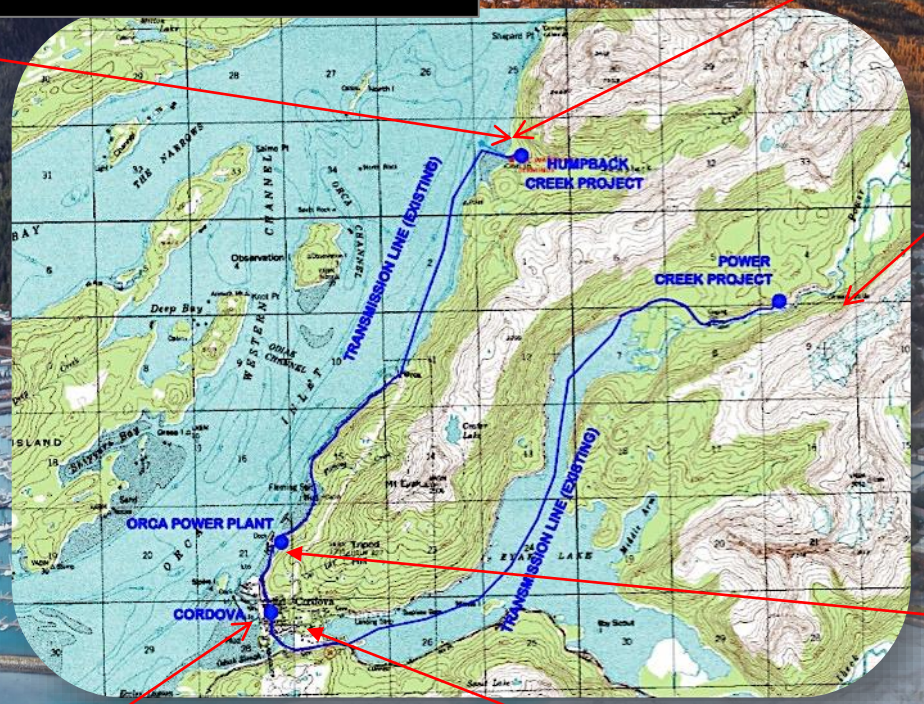
CEC Grid Architecture

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

HBC Edge Cloud
Water Cooled Decentralized Cloud



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

Battery Energy Storage System
1 MW, 1MWh
ABB/SAFT at Eyak Substation

Orca Power Plant
10.8 MW Diesel
Control Center, CEC

OUR PATH TO THE FUTURE:

COOPERATION ADAPTATION & INNOVATION IN CORDOVA, ALASKA

COOPERATION: BETTER TOGETHER

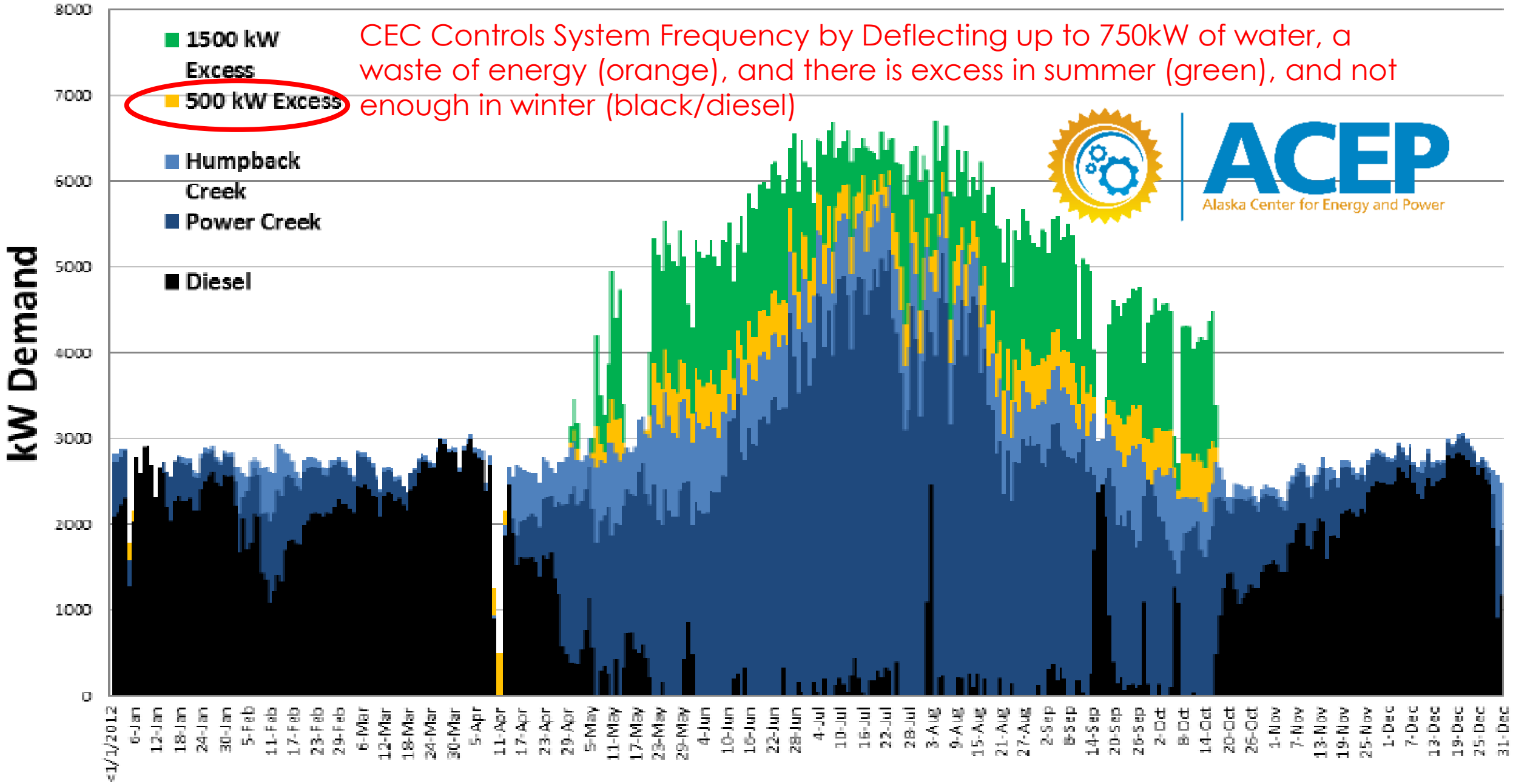
Power Creek Hydroelectric: Local, Affordable, Reliable Energy
Project Cost: $24M - $12M Federal, $12M State of Alaska

Power Creek Run of River Hydro Intake

Power Creek Project Benefits/Outcomes

- **Provides 70% of Community's Electricity**
- **Reduced rates ~ 20%**
- **Reduced diesel fuel use 70% (1.4M gallons/yr) - $50M in 20 years**
- **$0.06/kWh seafood incentive rates**
  - **Moved floating processing onshore**
  - **Increased Cordova and State Raw Fish Taxes ~ $750K/yr each**
  - **Attracted tens of millions in shipping and seafood infrastructure investments**
  - **Grew sales allowing CEC to keep rates flat for 20 years**

Avg Daily kW Load 2012 w/ Excess Hydro

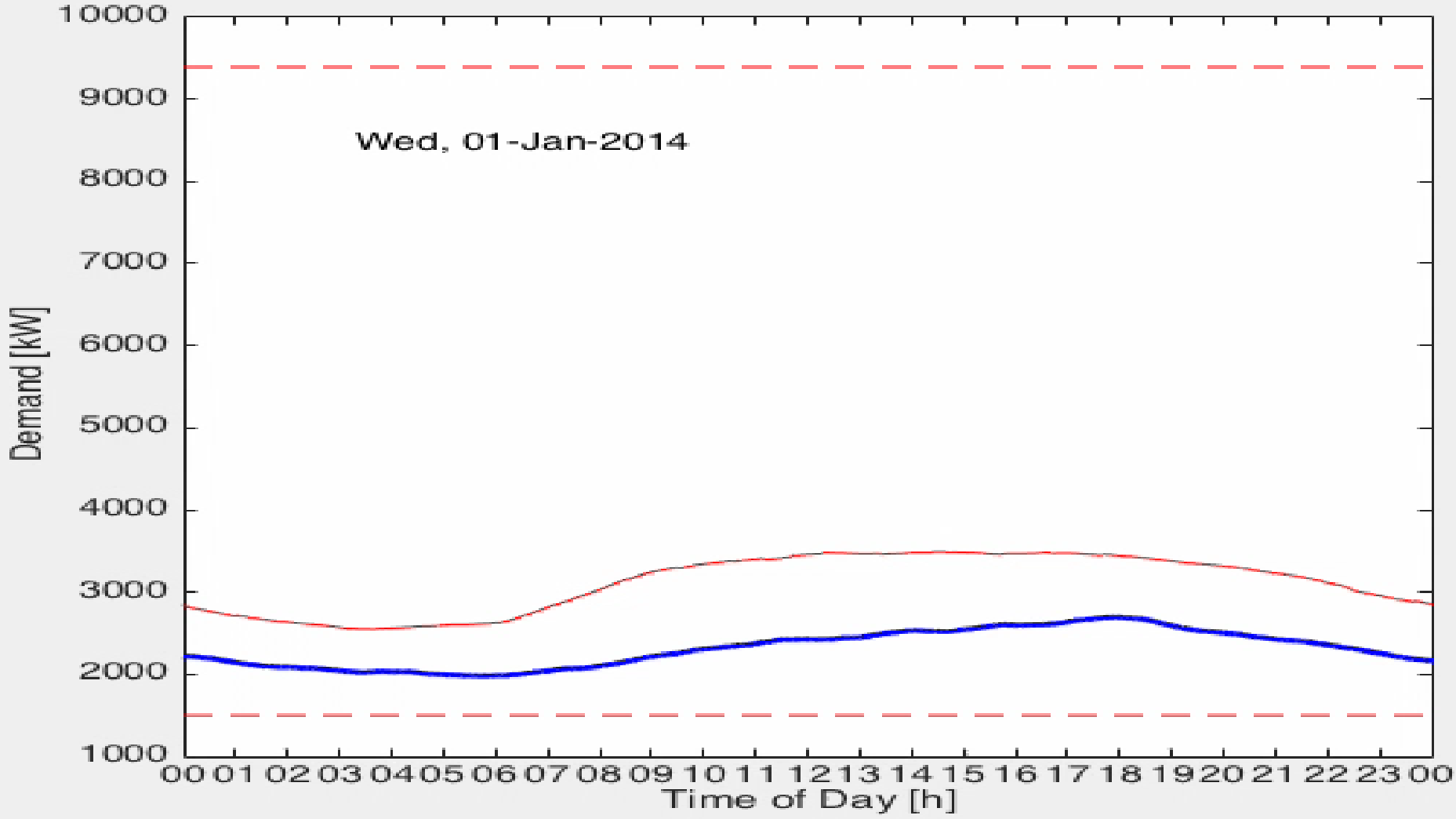


CEC Controls System Frequency by Deflecting up to 750kW of water, a waste of energy (orange), and there is excess in summer (green), and not enough in winter (black/diesel)

ACEP
Alaska Center for Energy and Power

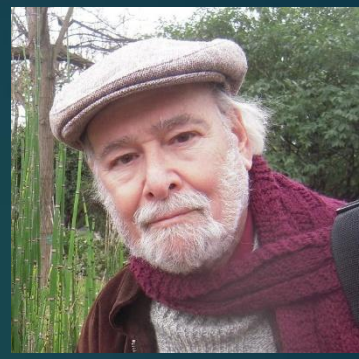
Cordova Seasonal Load Dynamics

Partners: Cordova Electric Cooperative, ACEP, SNL, CESA – funded through DOE OE



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

CEC Customer Engagement

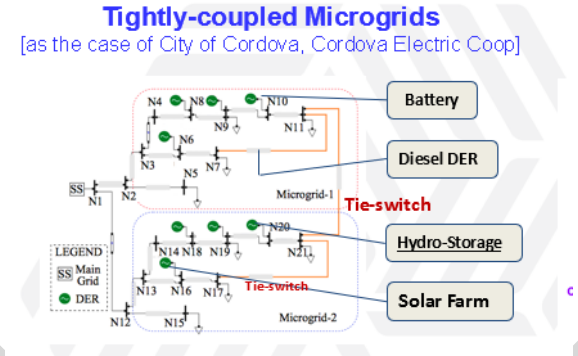
https://www.youtube.com/watch?v=2gcYvG84xRA

ADAPTATION: THE KEY TO SURVIVAL

100% Underground Power Lines: Reliability

OPTIMIZING HYDRO

- Instream Flow – 22,000 gal
- Trash Screens – 15,000 gal
- BESS Control – 25,000 gal
- Valve Upgrade – 20,000 gal
- Power Factor – 5,000 gal
- Diesel Warm – 25,000 gal
- Diesel Upgrades – 40,000 gal
- 2024 Trend: 80%+ Hydro, 200,000-gallon reduction or 1/3 of remaining diesel



INNOVATION: A PATH TO THE FUTURE

GRID MODERNIZATION LABORATORY CONSORTIUM
U.S. Department of Energy

Metro-Tel Cable Hound & Repurposed Reel

Resilient Alaskan Distribution system Improvements using Automation, Network analysis, Control, and Energy storage (RADIANCE)

Rob Hovsapian / Abraham Ellis

Idaho National Laboratory / Sandia National Laboratory

DOE Project Overview - December 13, 2017

CEC Digital Blueprint development for Real-time CHIL & PHIL evaluation

250 kW electric boiler as dispatchable load and saves diesel fuel 1500 gal/month

CEC Microgrid's Eyak Substation with BESS

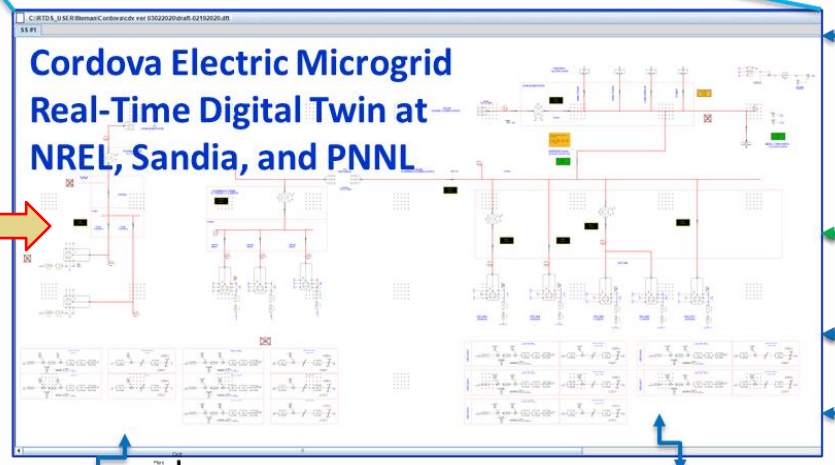
Power system simulation at 50us

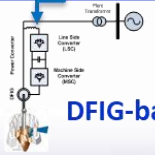
Power electronics simulation at 2us

Remote connectivity for field data used for calibration and validation of digital twin

Each PMU streams 120 samples/sec

Data server and 7 Micro-PMUs in Cordova, AK





DFIG-based PSH

1MW/0.9MWh Li-ion BESS

Microgrid Controller

Smart Meters

Energy Storage Optimization Controller

Hydro & Diesel Controllers

Protection Relays

Controller Hardware in the Loop

Heat Pumps

- Test Agreement – US Manufacturer
- Incentive Programs
  - CEC Mini-grant
  - USDA RESP 0% Loans
  - IIJA Incentives
- Aligns with sales growth strategy
- Can save customers substantially
- Supported by Winter Incentive Rate

HEAD IN THE CLOUDS: LOCAL AREA CLOUD/ EDGE COMPUTING

- Grow Sales
- Utilize Capacity
- Cloud Services “Inside the Fence”
- Data Security and Sovereignty
- Crossing the Digital Divide – Local Tech
- Cloud / AI Development Space
- New Nexus: energy-data-communications

BIG DATA: BIG OPPORTUNITY

AI LLM – Capacity Bottleneck – Alaska Climate and Infrastructure - Scaling

Temporary Winter Incentive Rate Public Hearing

September 25, 2024

Implemented: October 1, 2024

Proposal

Two-part incentive rate structure

- Top winter users in the cannery and large power rate class have an incentive tier based on historical winter maximum usage
- Large power, general service, and residential rate classes have an incentive tier implemented

Incentive Rate of 6 cents / kwh

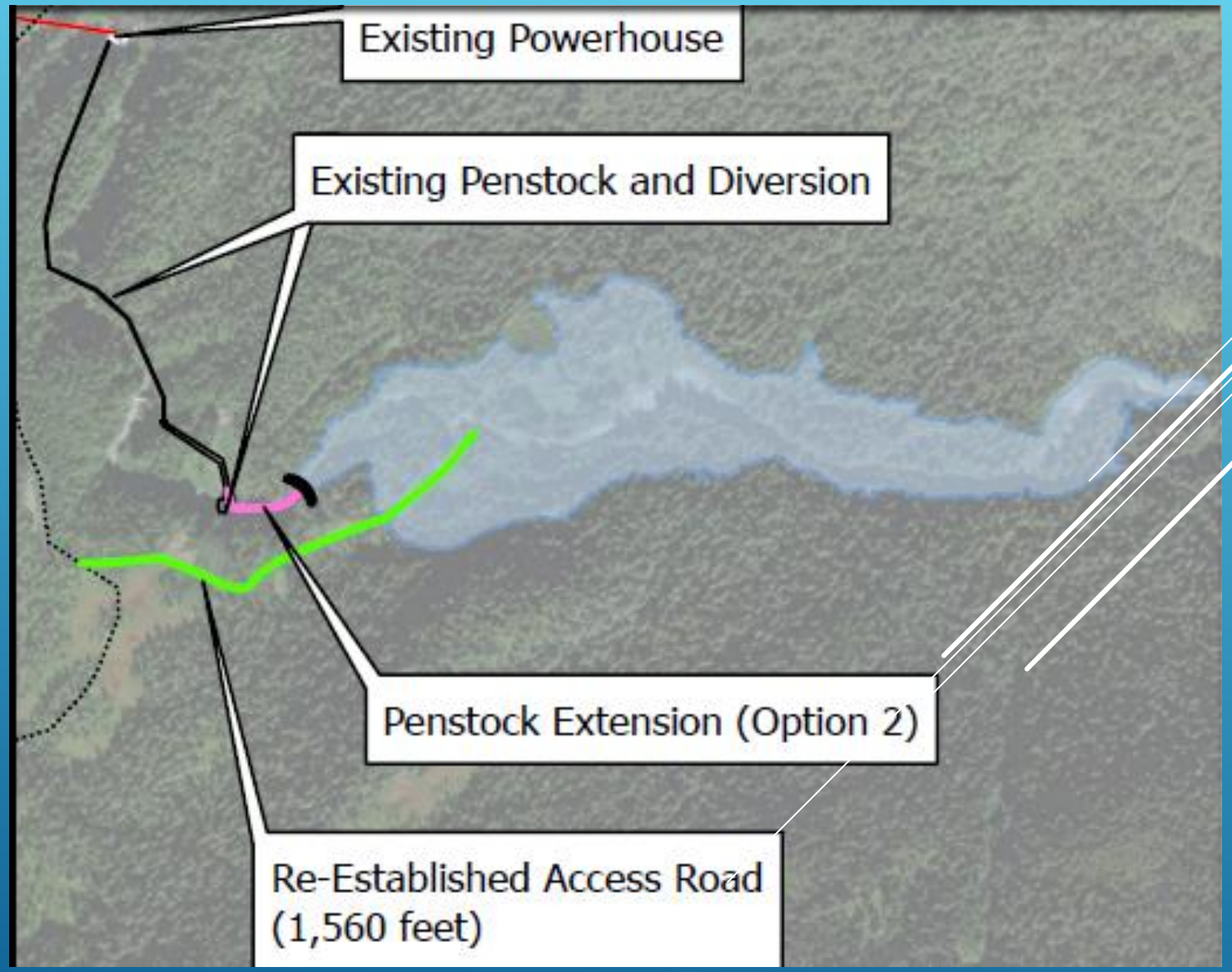
Effective Oct 2024 – Mar 2025

Tier Levels	Tier 1	Tier 2	Tier 3	Tier 4	Proposed Incentive Tier
CAN	20,000	40,000	200,000	200,000 +	Max use +
LP	5,000	25,000	25,000 +		Max use + & 25,000 +
GEN	500	500 +			2,000 +
RES	500	500 +			1,000 +

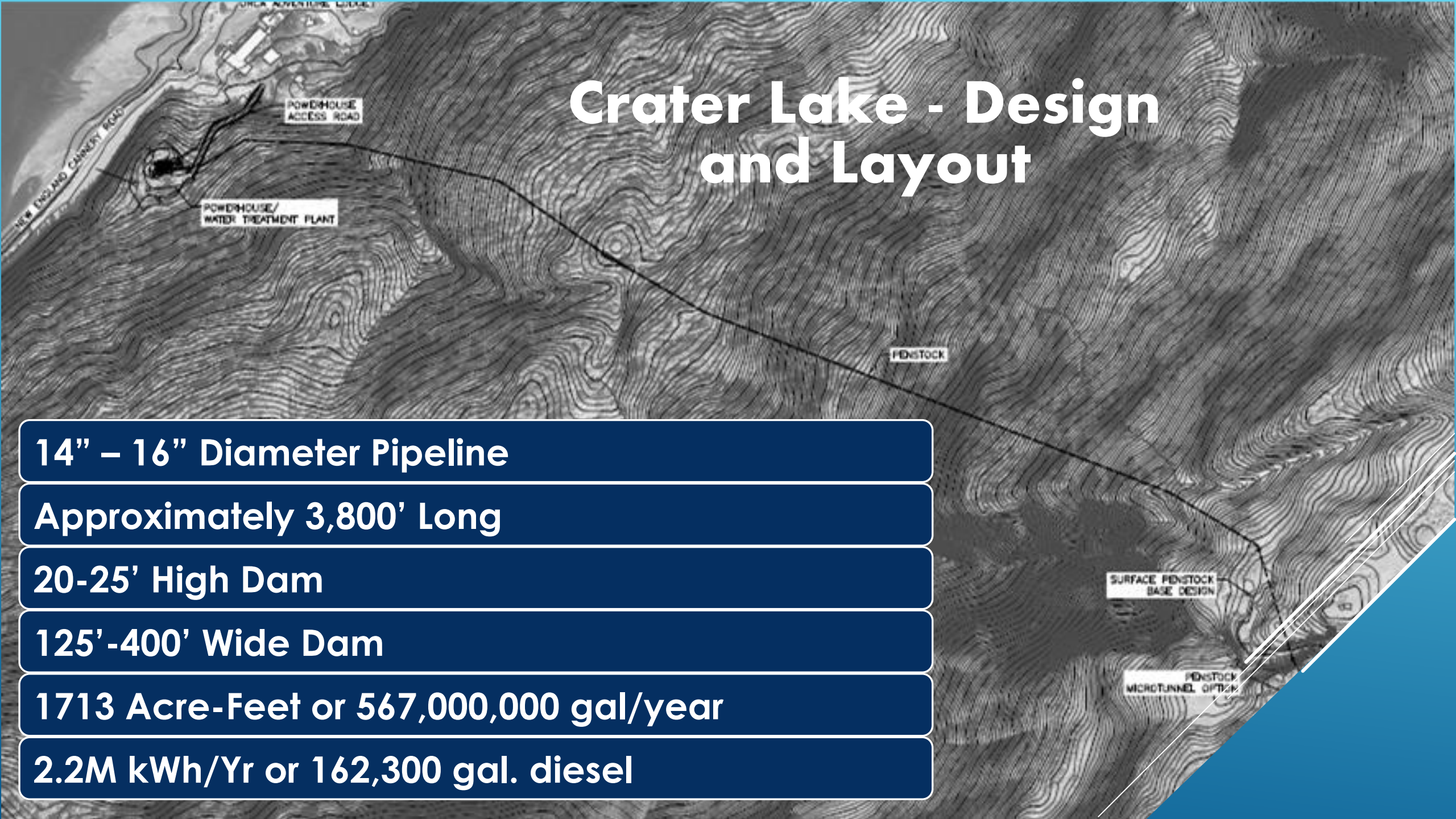
Current Rates	Tier 1	Tier 2	Tier 3	Tier 4	Proposed Incentive Rate
CAN	0.2397	0.2129	0.1977	0.1549	0.0600
LP	0.2088	0.1854	0.1616		0.0600
GEN	0.3114	0.2662			0.0600
RES	0.3259	0.2540			0.0600

HUMPBACK CREEK STORAGE ADDITION

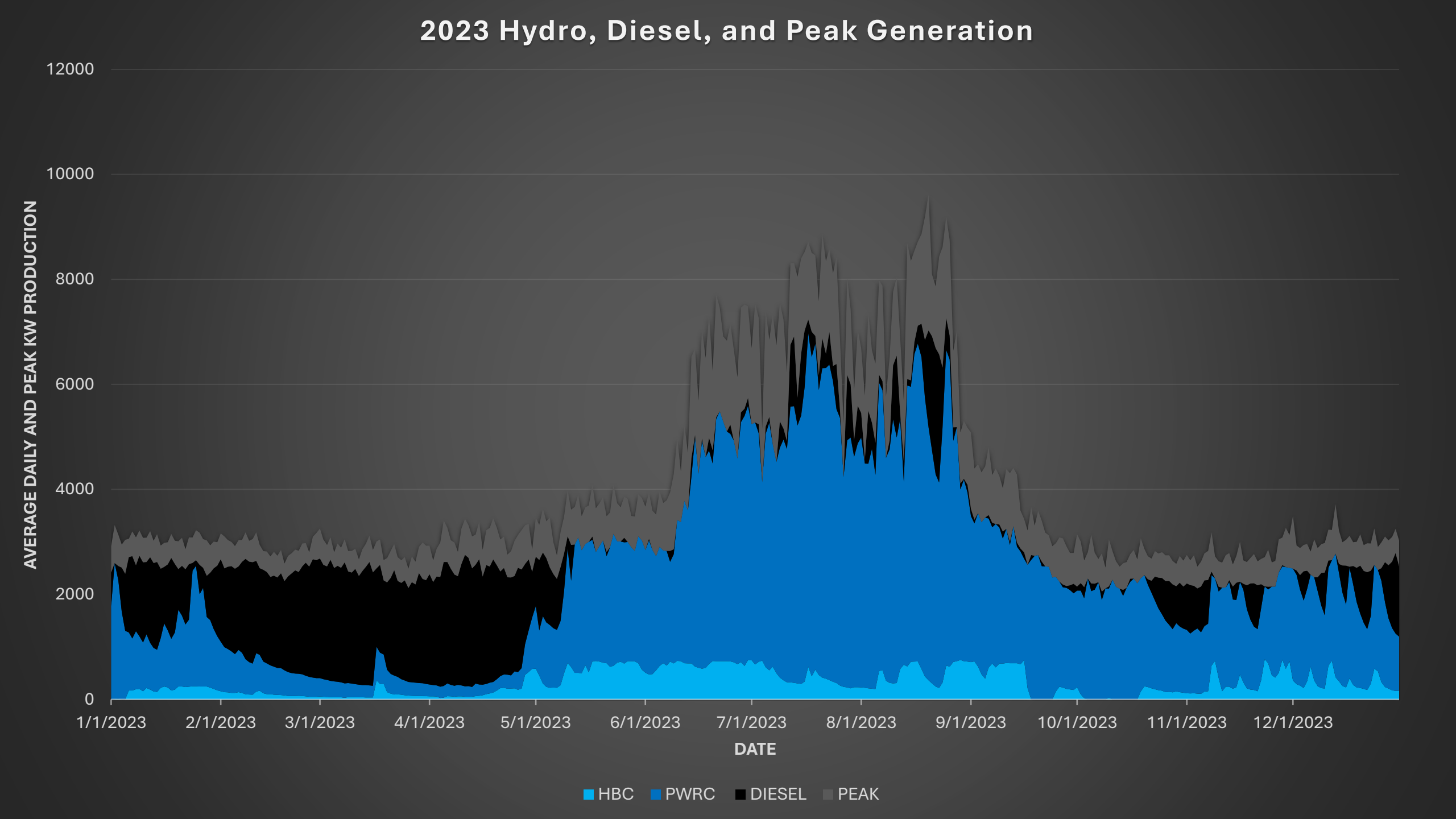
- Build 70’ Thin Arch Dam
- Connect Dam to Existing Penstock
- Remove (2) 500kW Francis Turbines with
- Install (1) 1,300kW Pelton Turbine Generator
- Upgrade Switchgear and Hydraulics
- Triple Output – Maximize Diesel Offset

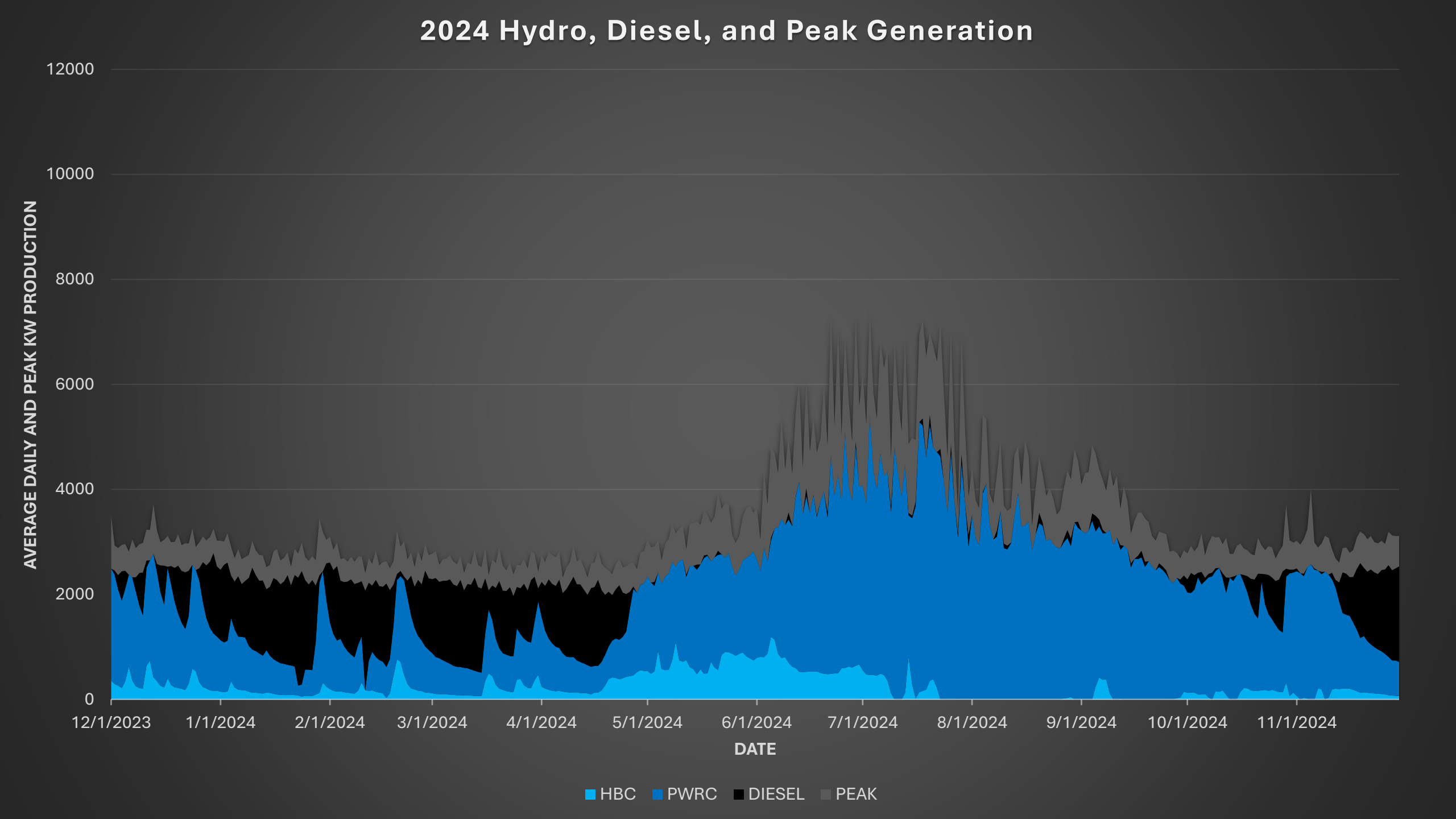


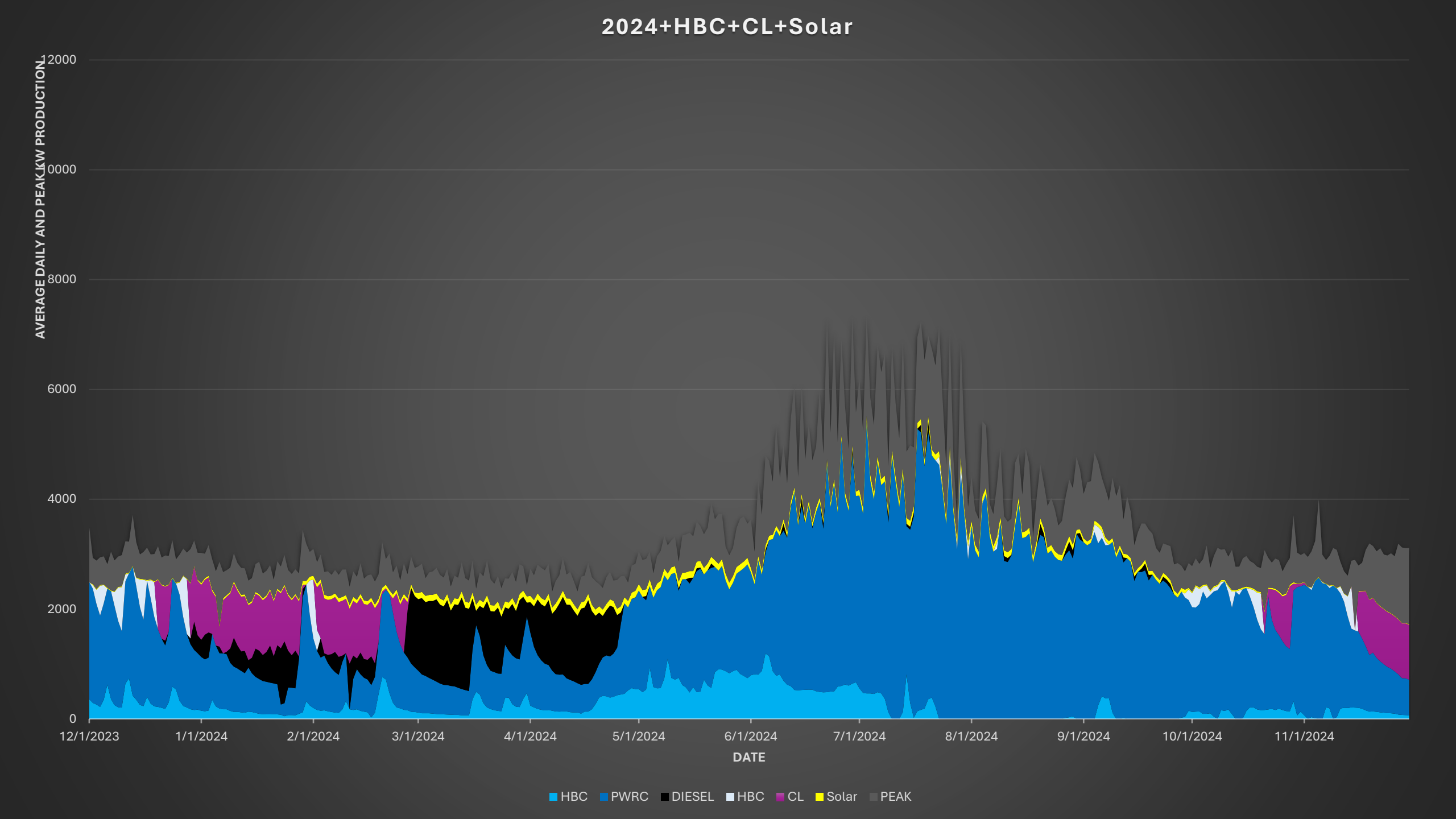
Crater Lake - Design and Layout



- 14” – 16” Diameter Pipeline
- Approximately 3,800’ Long
- 20-25’ High Dam
- 125’-400’ Wide Dam
- 1713 Acre-Feet or 567,000,000 gal/year
- 2.2M kWh/Yr or 162,300 gal. diesel


2023 Hydro, Diesel, and Peak Generation
12000
10000
8000
6000
4000
2000
0
AVERAGE DAILY AND PEAK KW PRODUCTION
1/1/2023
2/1/2023
3/1/2023
4/1/2023
5/1/2023
6/1/2023
7/1/2023
8/1/2023
9/1/2023
10/1/2023
11/1/2023
12/1/2023
DATE
HBC
PWRC
DIESEL
PEAK


2024 Hydro, Diesel, and Peak Generation
AVERAGE DAILY AND PEAK KW PRODUCTION
12000
10000
8000
6000
4000
2000
0
12/1/2023
1/1/2024
2/1/2024
3/1/2024
4/1/2024
5/1/2024
6/1/2024
7/1/2024
8/1/2024
9/1/2024
10/1/2024
11/1/2024
DATE
HBC
PWRC
DIESEL
PEAK


2024+HBC+CL+Solar
AVERAGE DAILY AND PEAK KW PRODUCTION
12000
10000
8000
6000
4000
2000
0
12/1/2023
1/1/2024
2/1/2024
3/1/2024
4/1/2024
5/1/2024
6/1/2024
7/1/2024
8/1/2024
9/1/2024
10/1/2024
11/1/2024
DATE
HBC
PWRC
DIESEL
HBC
CL
Solar
PEAK

THANK YOU! – Questions?

Cordova Center – Cordova, Alaska
2025 Alaska Power Association Annual Meeting
September 23-26
We Welcome Policy Tours and Field Hearings

ckoplin@cordovaelectric.com (907) 831-6339 M