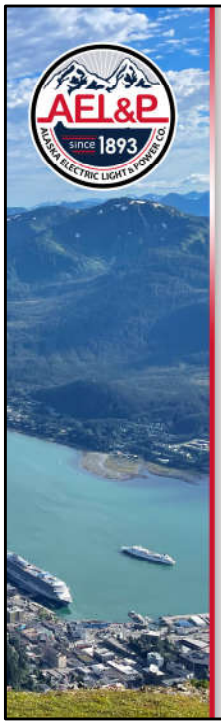
Shore Power Update

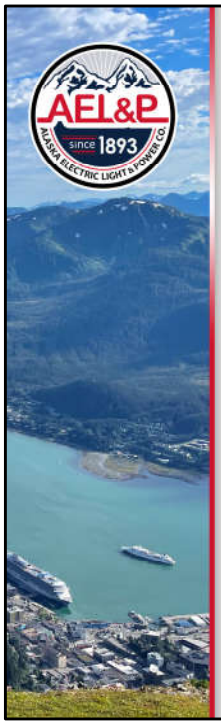
4/18/2024



OUTLINE

- **Dock Electrification Project Status Update**
- **Dock Interconnection Equipment**
- **Energy and Power Supply**
- **Regulatory and Financial Issues**

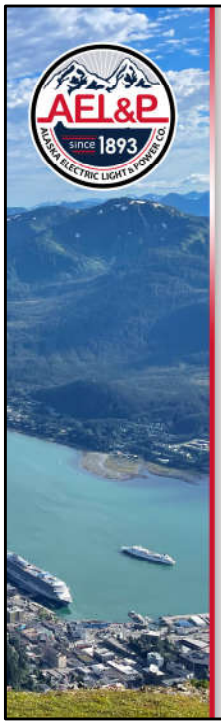
- This presentation is organized into these topic areas. Starting with what AELP has done recently and plans to accomplish in the coming year, the presentation will then discuss some key issues related to connecting additional cruise ships.



PROJECT STATUS UPDATE

- **Bi-weekly meetings with AEL&P and CBJ Docks and Harbors in 2023**
- **Research on State of the Industry**
  - Ports of Miami, San Diego, Seattle, Vancouver, Long Beach and Los Angeles
  - Shore power "out of the box" vendors Watts Marine and PowerCon
  - Equipment suppliers ABB, Siemens, Schneider Electric, Wabtec and Cavotec
  - Reviewed latest IEEE standards
  - CBJ Dock Electrification Study team
  - Engineering firms with experience designing shorepower systems

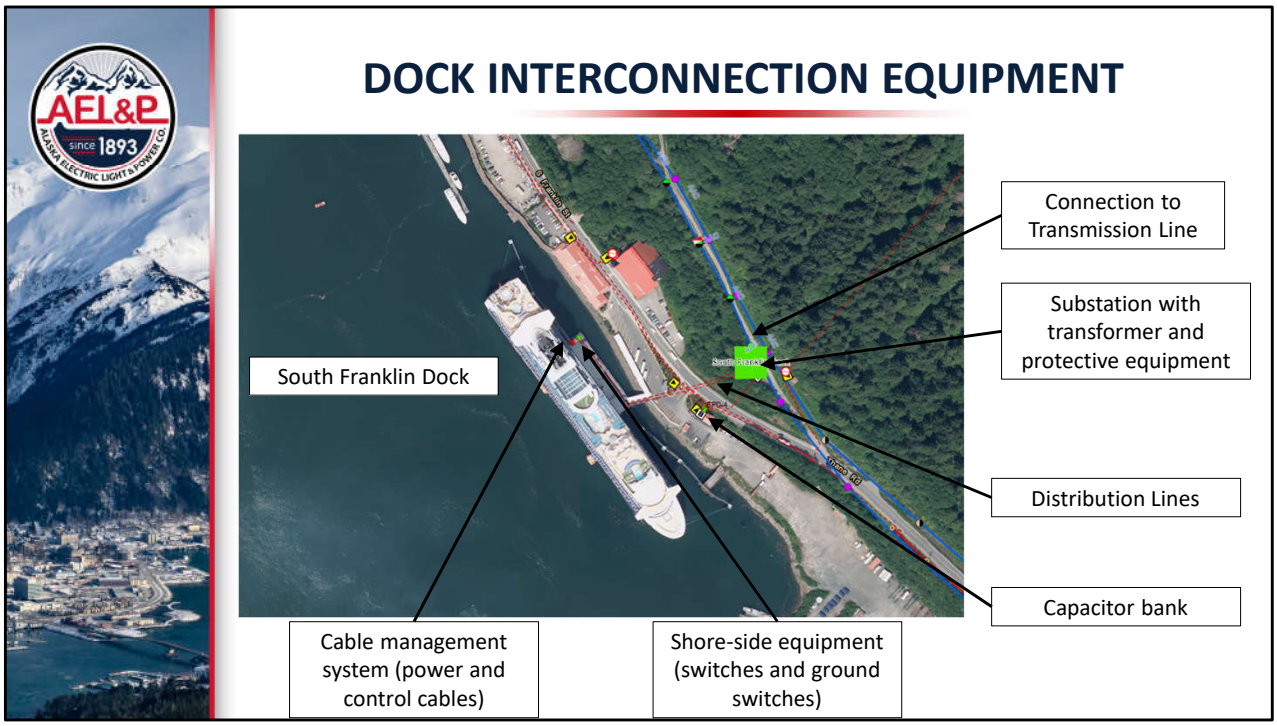
- In 2023, AELP's transmission and distribution engineer met with the port director and docks and harbor's staff biweekly to get a handle on the current approach to cruise ship shore connections.
- Meetings with various ports helped emphasize the ways in which Juneau is different from other electrified ports, with the most glaring difference being the size of the utilities from which the ports receive power.
- A somewhat surprising finding was that, even in large ports, the docks may have capacity restrictions that limit the ability to serve cruise ships. In Long Beach, for instance, while there are two docks that have the ability to serve ships, they can only serve one ship at a time.



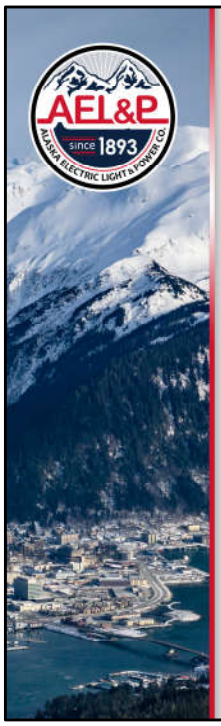
PROJECT STATUS UPDATE

- **Current Status of Project**
  - South Franklin Substation replacement transformer to arrive in 2024
  - MOA signed with the CBJ Docks and Harbors department 3/4
  - Kickoff meetings with H3 (Design Engineers) happening this week

- AELP previously received a Marine Passenger Fee grant to purchase a replacement transformer for the South Franklin Substation, which serves ships at the South Franklin dock. Replacing that transformer is a necessary first step to ensure any future docks could be connected. The new transformer will arrive this year and will be installed prior to the 2025 season.
- In early March, AELP signed a MOA with CBJ that enabled AELP to contract for the design of CBJ dock interconnection equipment. One aspect of this design that differs from other ports is that the design will start at the transmission system, where other ports typically only need to request a distribution circuit from their serving utility.

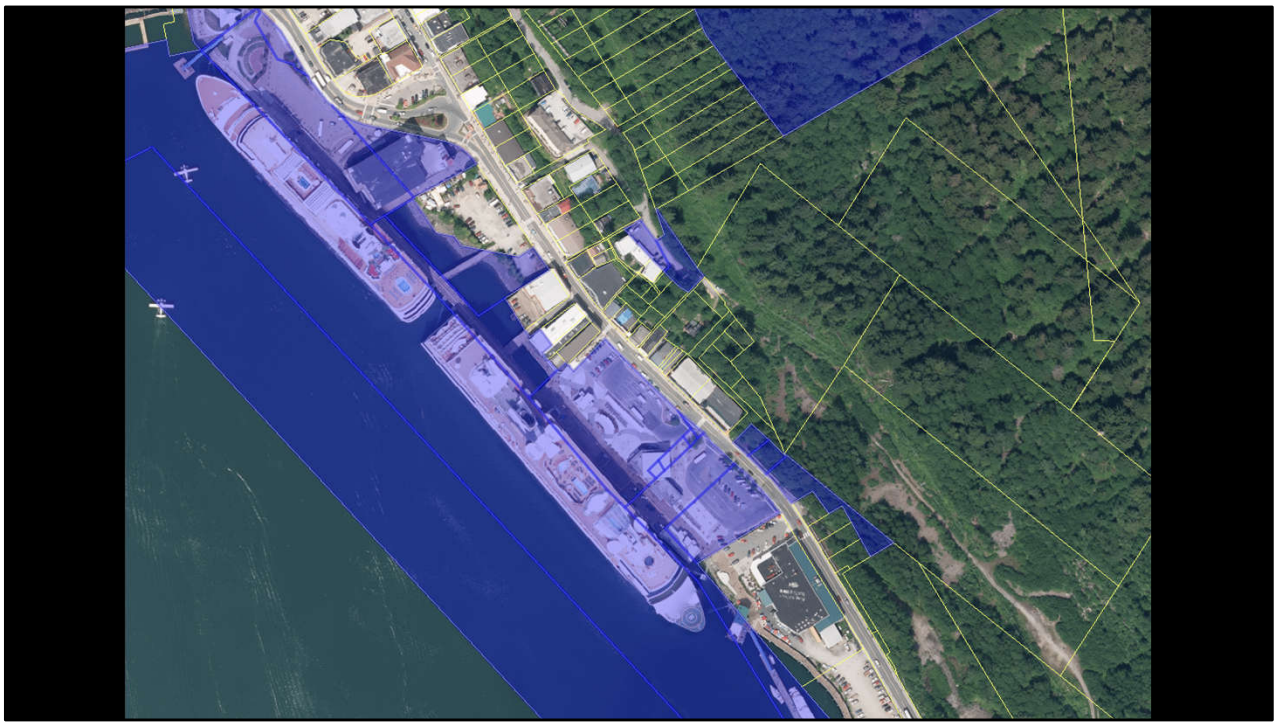


- Here's an overview of the different components of the equipment required to connect a cruise ship.
- The transmission line connects to a large transformer in the substation, and that transformer has outputs at voltages necessary to serve the ships, as well as at our standard distribution voltage.
- A distribution line connects the substation to equipment at the dock, including a switch that is necessary to ensure the safety of personnel while they handle the cables that connect at the ship.
- A hoist is used to raise and lower the cables with tidal fluctuations.
- A capacitor bank is located near the dock and help to improve power quality when the ship is connected to AELP's system.

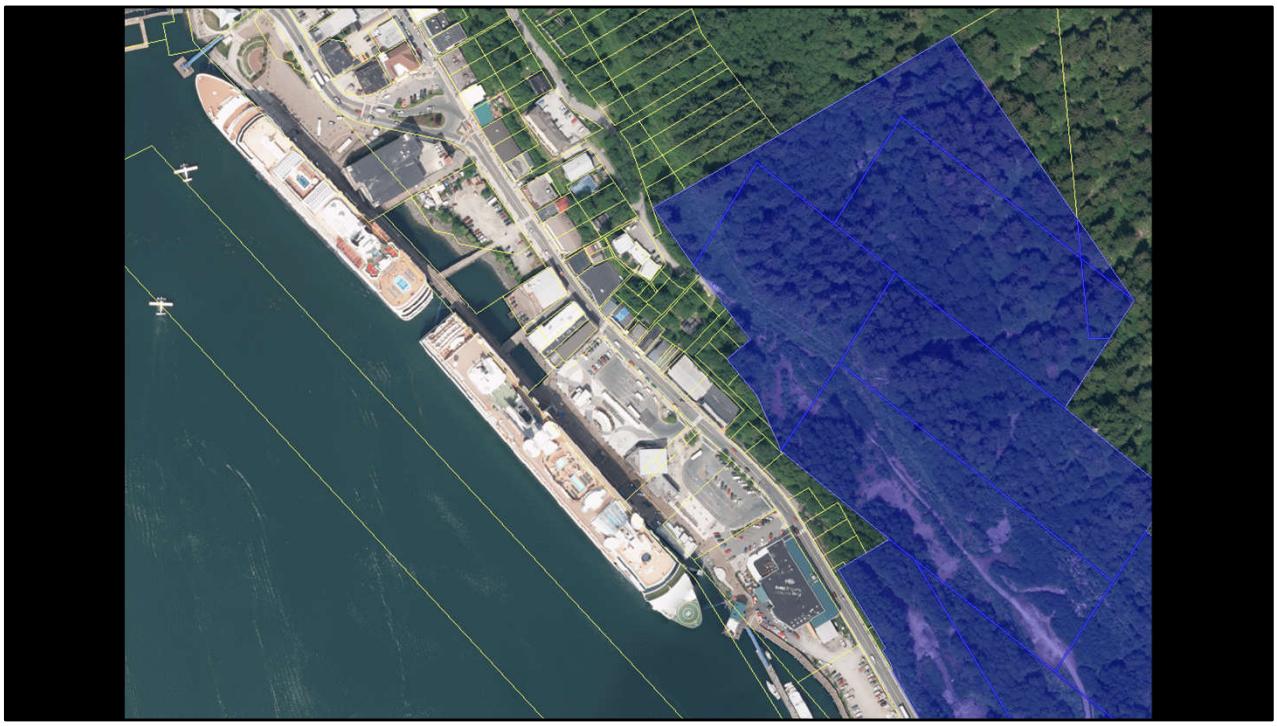


DOCK INTERCONNECTION EQUIPMENT

- In this image, you can see the route of the transmission line that will supply the substations required to serve the CBJ docks.
- Parallel transmission lines run along the hillside above South Franklin and then above and along Gastineau Avenue.



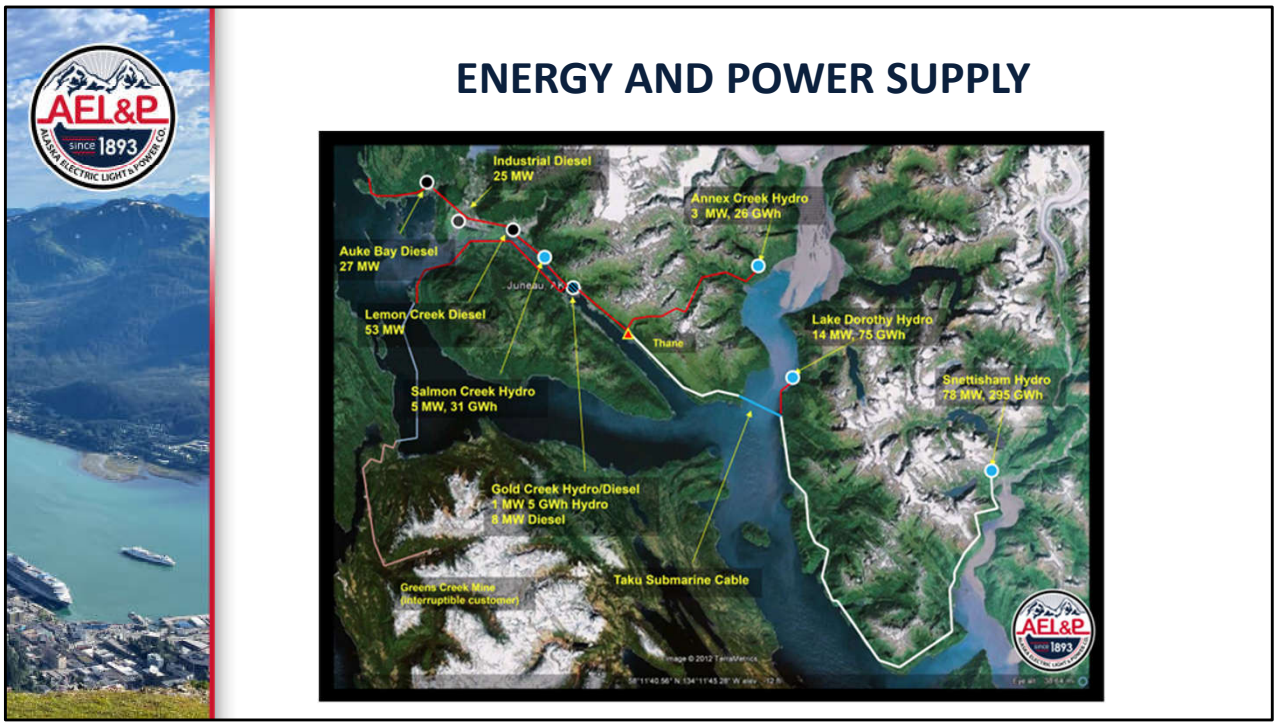
- Zooming in a little closer on the parcel map, the shaded properties in this image are owned by CBJ.



- The shaded properties in this image are owned by AELP's sister company, AJT Mining Properties, Inc.
- One of the key elements of the design will be to identify a suitable site for the substation in a hazard zone for landslides and avalanches.
- A route for the power lines that will run between the substation and docks is another important consideration.

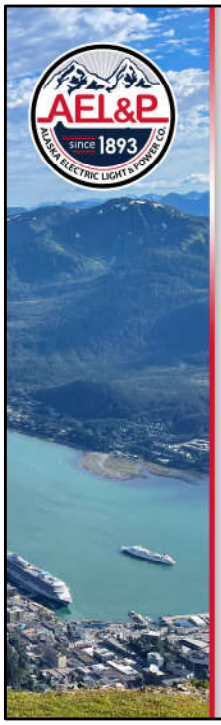
DOCK INTERCONNECTION EQUIPMENT

- Another key consideration in the design of shoreside equipment for the CBJ docks that differs from the South Franklin dock and other electrified ports is that the CBJ docks are floating docks with a large tidal range.
- These unique aspects of the design in Juneau mean that the entities that provide packaged solutions for this equipment are not a preferred choice in Juneau.
- The floating dock complicates the design because the distribution lines traveling from shore to the dock will need to move with the tides.
- One advantage of the floating dock may be that it will simplify the handling of cables at the dock. That said, most of the time that passes between the ship's scheduled dock time and when the ship shuts down its generators is related to the industry-standard procedures in place to ensure worker safety during the connection and disconnection of the power cables.



Overview of Juneau's Electrical System. Generation –> Transmission –> Distribution -> Homes and Businesses

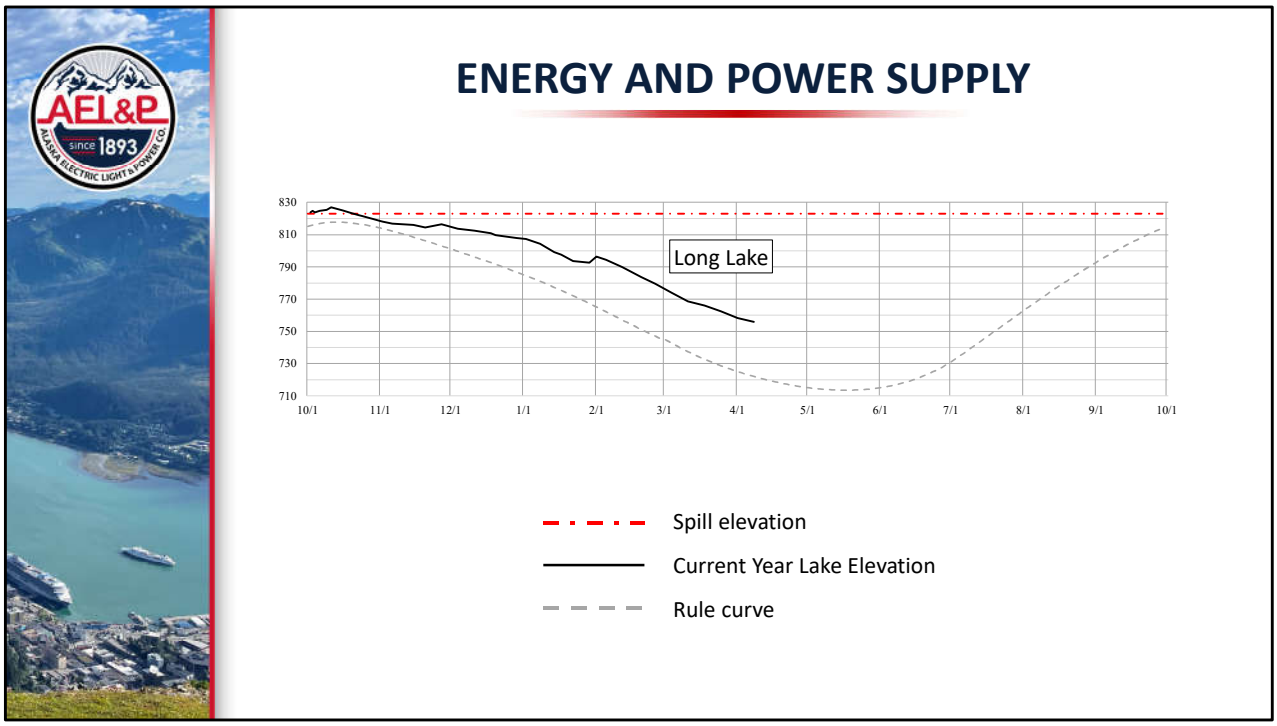
Operate 5 hydroelectric plants with emergency diesel generation as backup
High voltage transmission lines push bulk power throughout the community to substations. At substations, the voltage is stepped down and then power is distributed to homes and businesses.



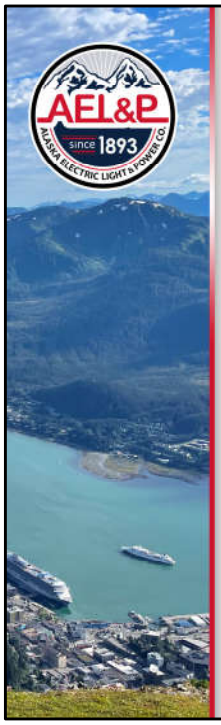
ENERGY AND POWER SUPPLY

Energy **v.** **Power**

- When talking about energy and power supply, it's important to note the different meanings of these two terms.
- Energy is a property that can be transferred to perform work. In AELP's hydro projects, energy is stored as water in reservoirs, so our ability to supply energy is limited by the precipitation that flows into reservoirs.
- Power is the instantaneous demand for energy, which is met by the output of AELP's generators. Each generator has a maximum power output, and all of the transmission and distribution equipment in Juneau has a maximum capacity for carrying power to loads.
- The next slides will talk first about issues related to energy supply and then issues related to power supply.

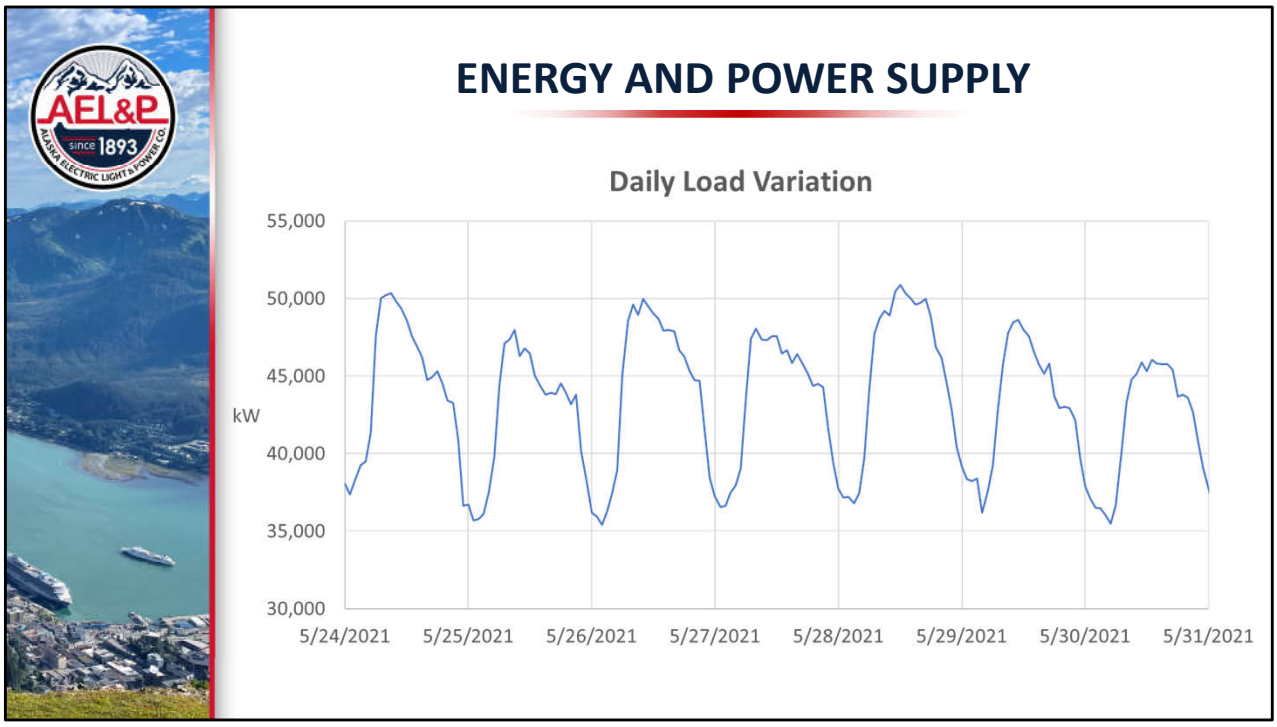


- A question that AELP is commonly asked is whether we have enough energy available to serve additional cruise ships. The answer is a frustratingly ambiguous, “Sometimes.”
- The graph on this slide shows the “rule curve” for Long Lake, the larger of two lakes that feed the Snettisham Power Plant. This graph shows how lake levels should be managed throughout the year to maximize average energy production.
- Because precipitation in the winter months falls as snow, that winter precipitation largely does not flow into the lake until spring, and the lowest lake levels exist when the cruise ships are starting to arrive in Juneau.
- As we move into June and through the summer, lake levels rise rapidly, first because of snow melt and then due to heavy rains as we enter the fall.
- In seeking to manage service to cruise ships at the CBJ owned docks, AELP will look to ensure lake levels do not fall below the rule curve and that levels are as high as possible entering the winter.

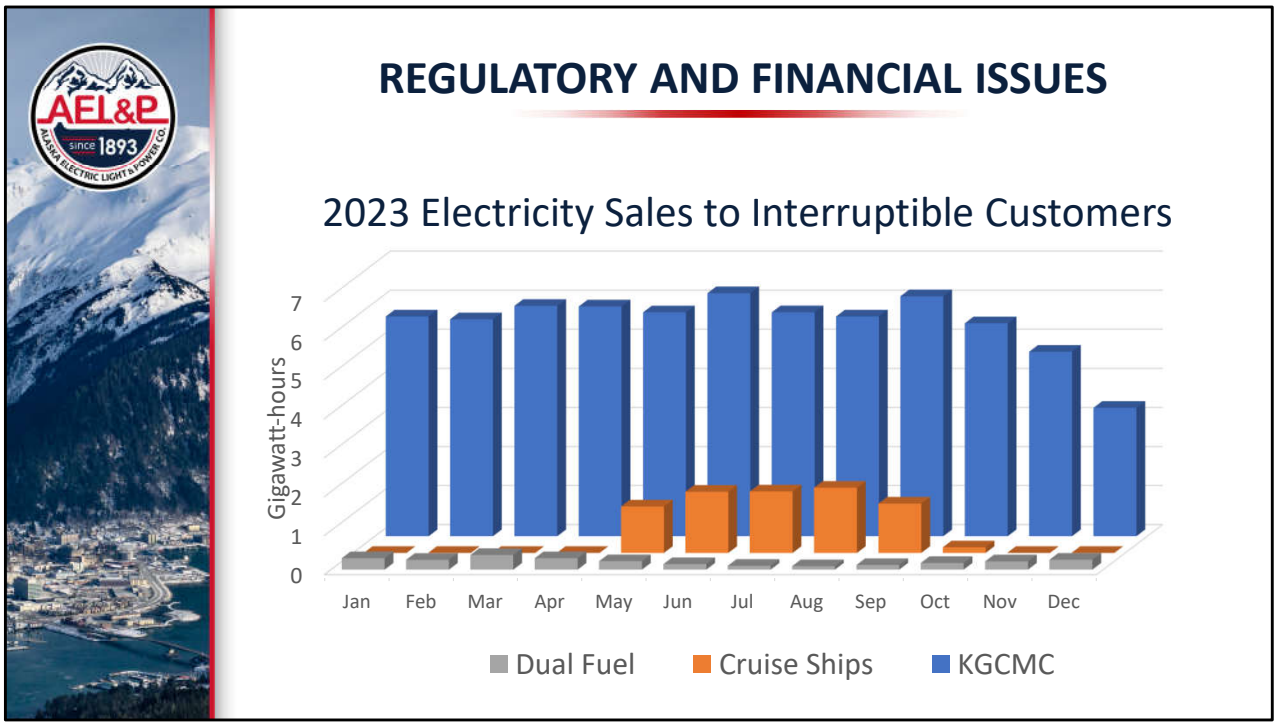


ENERGY AND POWER SUPPLY

- Currently, AELP sells nearly all the energy it can produce in an average water year. This means that AELP may be able to serve additional cruise ships during periods with above-average precipitation.
- While AELP does not currently have a need to construct a new hydroelectric facility to meet firm customer energy requirements, the pending upgrade to the Salmon Creek penstock may enable that facility to produce more energy than it does now because pressure drop in the penstock will be lower.
- Depending on changes to firm customer energy use in the coming years, additional energy from the Salmon Creek power plant may increase the frequency that enough surplus energy is available to serve additional cruise ships.



- This graph is one that AELP presented a few years ago, and it shows fairly typical fluctuations in load in late May. Daytime power requirements in town is much higher than nighttime power needs. During warmer weather, loads are lower, and during colder weather, loads are higher.
- The maximum power output of AELP's hydro generators is around 100 Megawatts (MW), and each cruise ship often requires around 10 MW.
- The safe operation of the electric system requires the utility to maintain a buffer of spare capacity called "spinning reserve," which allows the system to respond to increases in load or loss of a generator.
- While AELP will have spare power capacity to connect additional cruise ships most of the time, on some cold days in the spring or fall, it may not be possible to connect additional ships.
- Also, AELP takes advantage of lower loads in the summertime to perform system maintenance. Work that takes generators offline for periods limit the total power AELP can supply with its hydro generators, or work on transmission lines may make it impossible to deliver power from one or more generating facilities for a period of time. These types of projects may limit AELP's ability to serve additional cruise ships at times.



- Firm Customers: AELP has an obligation to serve firm customers with the power they need, when they need it. If hydro plants are unavailable, AELP *must* supply with another source, which in our system is generated with diesel.
- Interruptible Customers: Purchase energy generated from hydroelectric plants when that energy is not required by firm customers. Maintain their own alternate source of heat (dual-fuel heating customers) or electricity (large interruptible customers).
- Interruptible customers purchase about 20% of the total energy sold by AELP, with most of those sales to the Greens Creek mine. Interruptible sales allow AELP to sell hydroelectric energy when it is available and to preserve hydroelectric energy for firm customers during low water years.
- Without interruptible energy sales, AELP's rates would be about 20% higher than they are currently.
- Since Lake Dorothy came online in 2009, AELP has provided greater than 80% of Greens Creek's electricity.