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Dear Ms. Owen,

The [Alaska Institute for Climate and Energy](#) (ALICE) is a 501c3 research and education nonprofit that fosters bold new innovative climate mitigation and adaptation strategies best suited to Alaska and the Arctic through collaborative research, pilot project development and grassroots advocacy.

[Ground Truth Alaska](#) is a 501c3 educational nonprofit based in Alaska, dedicated to understanding resource, energy, and environmental issues in Alaska. GTA has helped analyze the implications of developing Pumped Energy Storage at Eklutna.

We appreciate the opportunity to comment on the draft Eklutna Hydroelectric Project 1991 Fish & Wildlife Agreement Implementation, Initial Information Package (IIP).

The Eklutna Pumped Energy Storage (Eklutna PES) concept offers the potential to increase energy generation capacity, provide low-cost storage for the integration of renewable energy resources and improve availability and management of water in Eklutna Lake and lower Eklutna River, thus assisting ongoing salmon restoration efforts. We hope you will consider including an analysis of relevant components of the Eklutna PES as a means of solving problems identified in the Draft Initial Information Package (IIP) in Section 6, PME Suggestions By Others, as part of the ongoing Eklutna Fish and Wildlife Agreement Stakeholder process.

To this end, we submit the following draft comment ahead of the April 16th Stakeholder meeting in the hopes we can provide more information to and receive feedback on these suggestions before finalizing our comment for submission prior to the April 24th deadline.

ALICE has been working on the Eklutna PES concept for several years. However, this past January Governor Dunleavy became interested in the idea and requested more information. We partnered with GTA to produce the [Pumped Energy Storage for Alaska](#) report (attached) in February.

Eklutna Pumped Energy Storage (PES) Concept

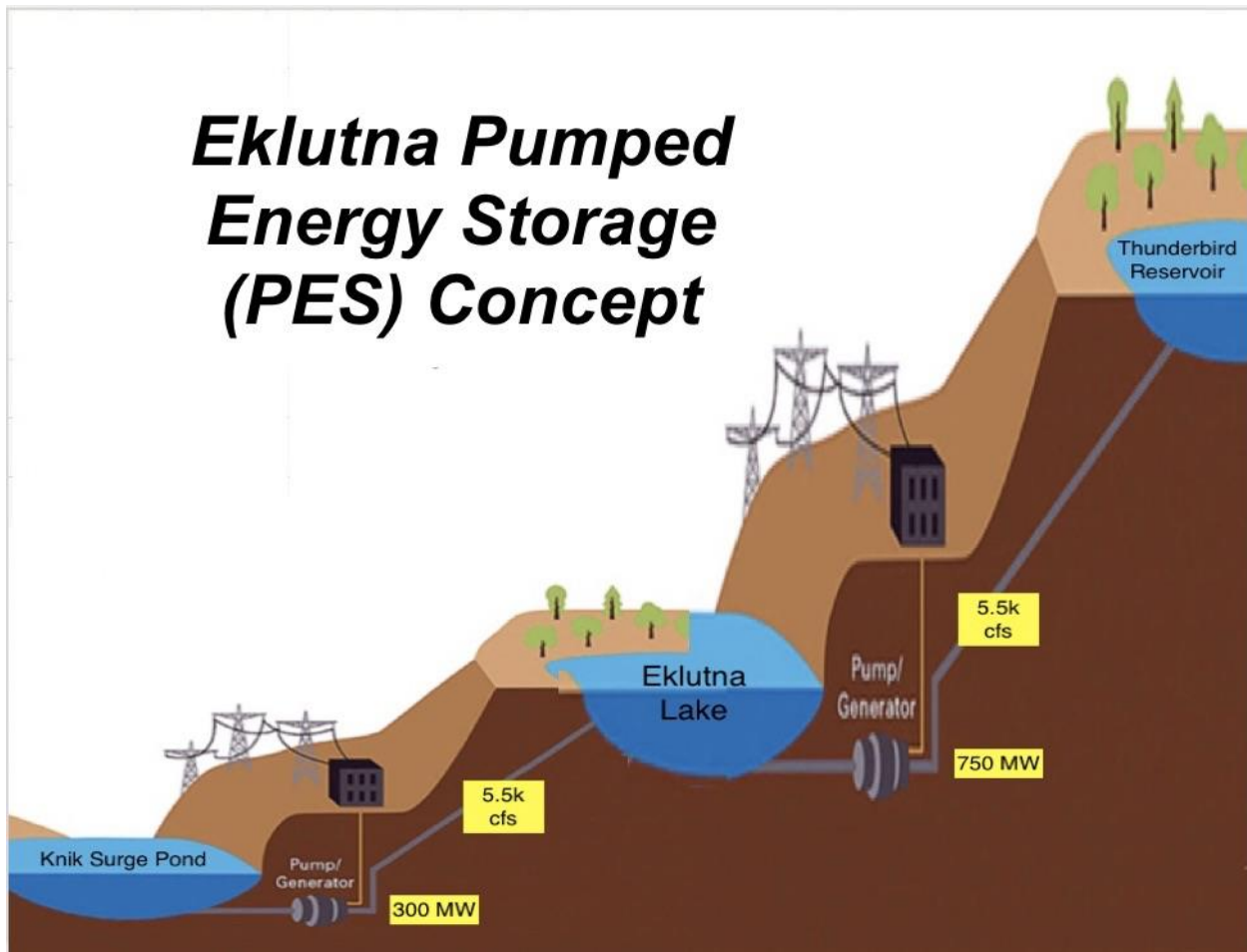


Figure 1. Eklutna Pumped Energy Storage (PES) concept.

As illustrated in Figure 1 above, upgrading the existing Eklutna Powerplant to PES requires adding reservoirs below and above Eklutna Lake to expand energy generation (via integration of renewable energy) and water storage capacity. Specifically, it involves adding two new alpine reservoirs on Thunderbird Creek, and two smaller lowland reservoirs near the current generation station along the Knik River. These would be connected by penstocks and tunnels, with reversible turbines installed so that not only could electricity be generated when water flowed down through the system, it could be stored in times of excess by reversing the turbines and pumping water uphill. The system we proposed was designed not only to meet utility demands, but also to improve the capacity to manage water in Eklutna Lake precisely, so that flow of water over the dam could be kept within specific constraints according to seasonal inflow needs to restore and maintain salmon populations in lower Eklutna River.

Shortly after reviewing our report, Governor Dunleavy directed the Alaska Energy Authority to conduct a cost and engineering feasibility study, ostensibly according to the “Next Steps” laid out in our report:

To further analyze the possibilities and savings, we recommend that the Alaska Energy Authority do a full feasibility study of the Railbelt PES projects and other potential PES sites around the state or contract such a study from a consultant familiar with PES (such as Black & Veatch who also already has an extensive knowledge of the Railbelt grid). The feasibility study should further evaluate wind resource potential by installing anemometers in the identified wind locations and other promising locations around the state. Lastly, we recommend that AEA assess how the Railbelt grid must evolve with a shift to renewable energy rapid enough to meet the states 50% renewable energy generation cost-effectively and equitably by 2025.

The AEA study is currently underway and expected to be complete this fall.

Additionally, our technical team is working in collaboration with several hydrologists to model the Eklutna PES system using Army Corp of Engineers [HEC-ResSim](#) software to test and better illustrate system operation throughout the year over time. Our analysis will feed data obtained from some of the same sources listed in the IIP, directly into the model, including:

1. Railbelt utility and Energy Information Agency data,
2. Long term rainfall projections from Brettschneider,
3. [Timothy P. Brabets, GLACIER RUNOFF AND SEDIMENT TRANSPORT AND DEPOSITION EKLUTNA LAKE BASIN, ALASKA, U.S. GEOLOGICAL SURVEY Water-Resources Water-Resources Investigations Report 92-4132, 1993](#)
4. [Loso, et al. Impacts of Variable Glacier Coverage on Downstream Fluvial Discharge a Case Study from the Eklutna Basin](#)
5. H. Hanson, [2019 USFWS Upper Eklutna preliminary fish habitat flow assessment](#))
6. Loso & Sinnott: <https://journalhosting.ucalgary.ca/index.php/arctic/article/view/67703/51599>
7. USDA data from the Moraine Site: <https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=1035>
8. AOOS data: https://portal.aos.org/#map/clear_launch_all/8c5dd704-59ad-11e1-bb67-0019b9dae22b

Eklutna PES has the potential to affect the following protection, mitigation, and enhancement (PME) measures proposed in the Draft IIP to:

1. Improve efficiency of hydroelectric generation at Eklutna,
2. Balance variabilities and growth in electricity supply and demand on the Railbelt,
3. Improve availability and management of instream flows needed to restore and maintain healthy salmon populations in lower Eklutna River,
4. Expand recreational opportunities,
5. Stabilize municipal water supplies for Anchorage as the hydrology of the Eklutna drainage changes.

Inclusion of all or some of the components of the Eklutna PES concept as a potential PME in the IPP would expand options for meeting the needs of utilities, Railbelt ratepayers, the Native Village of Eklutna, salmon recovery and long-term maintenance, the Municipality of Anchorage and Chugach State Park recreational users according to the following considerations specified in section 1.2.1 of the Draft IIP, under Section 6.2.1 Flow Related PME suggested by others:

1. Purposes of efficient and economical power production
2. Protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat)
3. Municipal water supplies
4. Other beneficial public uses
5. Requirements of State law

1. Purposes of efficient and economical power production

Developing a system of connected reservoirs to support an Eklutna PES system could substantially reduce the cost of power production¹ for MEA, Chugach Electric, and ML&P (as well as for other utilities) by balancing supply and demand variability that currently adds cost to power production and by enabling hundreds of megawatts of cheap renewable energy to replace more expensive fossil fuel generation. As noted above, an Alaska Energy Authority cost and engineering feasibility study² is also underway.

2. Protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat.

Eklutna PES would enable a controlled outlet flow capable of matching all the USFWS flow assessment recommendations³ without a need for spill gates, curtailing Eklutna hydro power or the risk of flood events⁴. The outlet flow would be controlled by raising and lowering Eklutna Lake.

3. Municipal water supplies

By expanding reservoir capacity and adding several new flows to manage those reservoirs, Eklutna PES can greatly expand water management options for municipal water supply, including the possibility of bringing water from the Knik river to supplement Eklutna River flows and glacial flows decline.

The Eklutna PES complex is designed to avoid mixing Knik or Thunderbird waters with Eklutna Lake, a presumed requirement for salmon migration. However, in the longer-term, the system would operate more efficiently if Knik River groundwater were allowed to sometimes enter the

¹ Williams, Smith & Higman, [Pumped Energy Storage for Alaska](#), February 3, 2020

² Personal Communication, Governor Dunleavy and Curtis Thayer, Director Alaska Energy Authority, January 2020.

³ Hanson, Heather, P.E., [Upper Eklutna River Survey, Preliminary Fish Habitat Flow Assessment](#), U.S. Fish and Wildlife Service, July 14, 2019.

⁴ [Eklutna River Workshop: Summary of Outcomes, Recommendations, and Future Needs](#). Trout Unlimited, June 2018.

lake. Assessing Eklutna PES impacts on water quality (chemistry, turbidity, temperatures and other relevant variables) under the two scenarios should be looked at.

Climate change is increasing the risk of drought events and water shortages. Within the expected lifetime of this project Anchorage well-water supplies are projected to decline including the possible disappearance of Eklutna Glacier altogether. Glaciers feeding the Knik and Matanuska Rivers in the Mat-Su Basin form a far larger system with more natural water storage in groundwater, glaciers, and alpine snow, as well as greater catchment for rain, so they are much less vulnerable to disruptions in flow. The groundwater associated with those rivers should protect municipal water supplies, keep Eklutna River flowing, and keep Thunderbird Creek flowing even through the worst drought conditions. Water quality and groundwater flow should be investigated to find potential limitations should it be needed.

4. Other beneficial public uses

While it's not expressly part of the Eklutna PES concept, we've proposed a tram system as opposed to conventional roads be used for constructing the Eklutna PES complex. The Main Access tramline could run from a brown field near the Glenn Highway Eklutna exit to a 3000' elevation mountain saddle located 1.75 miles SW of the Eklutna Lake outlet. Another branch, the Lower Thunderbird tramline, would run from the west corner of Eklutna Lake to link with the Main Access at that saddle.



A 1987 [study](#) from the Alaska Department of Natural Resources, Alaska Division of Parks and Outdoor Recreation identified “Eklutna South” (shown above) as a potential downhill ski area in Chugach State Park.⁵ Using tramlines instead of roads to construct the upper reservoirs could reduce Eklutna PES construction impacts and facilitate the expansion of skiing and other

⁵ ADNR, ADPOR, 1987, A Comparison of Potential Alpine Ski Areas in Chugach State Park

recreational access to the high country above Eklutna Lake from a parking area next to the Glenn Hwy.

5. Requirements of State law

As designed, Eklutna PES has potential land ownership and management conflicts that would need resolution. The Thunderbird reservoirs are within Chugach State Park designated wilderness areas. The State would need to resolve potential conflicts between Chugach State Park mandates to protect wilderness, municipal water supplies and recreational access, and determine if legislation is required, as provided for in the specific CSP authorizing statutes. Beluga Reservoir is within a conservation easement. If the lower reservoir is determined not to be a legitimate use in the easement, it could be moved to a State-owned lands about a half mile NE of the Beluga Reservoir.

Either site would require groundwater flow and water quality assessments, but the alternate site would also need to be evaluated for possible impacts to nearby wells in the subdivision adjoining the east side of that parcel.

Thank you for considering our draft comment. We look forward to your feedback on Thursday.

Sincerely,

Ceal Smith, MSci., Alaska Institute for Climate & Energy
Kerry Williams, Alaska Institute for Climate & Energy
Brentwood Higman, PhD, Ground Truth Alaska