Thayer Creek Hydropower Project – Angoon, AK

The Challenges of Designing and Building A New Dam And Hydropower Facility In Southeast Alaska

Del Shannon, PE
The Challenges of Dams in Cold Climates
Design, Construction, Permitting and Environmental Issues

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Angoon, AK

- Approx. 500 residents
- Kootznoowoo, Inc. (pronounced: Kootz' new woo) is a private corporation created through the Alaska Native Claims Settlement Act (ANCSA) of 1971 as a Village Corporation for Angoon, Alaska.
- Kootznoowoo is the Tlingit name for Admiralty Island. Translated to English, it means “Fortress of the Bears.”
**Anagoon, AK**

- Median Annual Income - $29,850
- Anagoon’s average household electricity and space heating cost is approx. $8,000/year (almost 27% of gross income)
- Power is currently generated by diesel generators (approx. $0.58/kWh)
- Alaska subsidizes power production through Power Cost Equalization (PCE)
ANGOON, AK

- Thayer Creek Hydropower Project
  - Replace inefficient diesel power generation
  - Remove diesel space heating at public schools
  - Replace residential fuel oil heating with high efficiency heat pumps
  - Significantly reduce the cost of electricity (from above $0.58/kWh to about $0.30/kWh)
  - Reduce cost of residential space heating to approx. $4000/year
  - Move from 0% renewable energy to nearly 100% renewable energy (electric and heat)
  - Reduce the State PCE subsidy for customers in Angoon by 50%
THAYER CREEK HYDROPOWER PROJECT

PROJECT BACKGROUND
THAYER CREEK HYDROPOWER PROJECT

- The ANILCA provided Kootznoowoo, Inc. the “...right to develop hydroelectric resources....within a defined hydropower reserve”
- ANCSA settlement of 1976: ANILCA, Section 506(a)(3)(B) defined hydropower reserve in the area around Thayer Creek
- Original intent – provide affordable energy residents of Angoon
- No project size was defined in ANILCA hydro reserve
  Exclusive development rights had no termination date
THAYER CREEK HYDROPOWER PROJECT

- Harza (1979)
  - Study looked at various site options and recommended the Barrier Falls site
- HDR (2000)
  - Study looked at various site options, recommending the Upper Thayer Creek option which was evaluated in more detail by AP&T
- USFS (2007-2009)
  - Environmental Impact Statement and Record of Decision analyses
  - Shipley Group – Fish/environmental assessment and hydrology study
  - GeoEngineers – Geotechnical assessment
  - Lachel & Associates – Geological assessment and penstock engineering
  - Survey work: LiDAR (Aerometrics) and surface surveys (All Points Survey)
  - Environ – Hydrology study
- Design/Build Approach (2015 to Present)
INTEGRATED HYDRO AND HEAT PUMP PROGRAM BEST UTILIZES PROJECT FEATURES

**Forecasted Electric Demand and Hydro Supply**

- Heat Pump Pk
- School Ht Elec
- Avg Pk Elec
- Est Delivered kW

**Household Energy Cost (Larger Over PCE Houses)**

- PCE
- Fuel oil cost
- Electricity cost

**Household Energy Cost (Smaller Under PCE Houses)**

- PCE
- Fuel oil cost
- Electricity cost

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- Barrier Falls Option (820kW)
  - Current Cost Estimate Approx. $15M - $16M
  - Small RCC Dam – Approx. 40 to 45 feet tall
  - Minimizes Site Access and Infrastructure Costs
  - Power output is well matched to current demand plus moderate growth
  - Avoids Wetlands and Access Issues With Other Sites
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The average monthly flows are consistent from year to year, with two periods of reduced flows.

Average Monthly Discharge at Thayer Creek

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THAYER CREEK HYDROPOWER PROJECT
Thayer Creek Hydropower Project

- Permitting
  - USFS
    - Record of Decision in Place
    - Change analysis submitted and approved for smaller project
    - Special use permit under development
  - Alaska Dam Safety
    - Originally classified as Class II (significant) hazard dam
    - Reduced to Class III (low) hazard dam by working with AKDNR and AKDF&G
    - Currently at 60% Design Level
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▪ Other In Progress Permitting Activities

  • USACE 404 permit for the marine facility and submarine cable tideland crossing
  • AK DNR Tideland permit and water resource allocation
  • AK DF&G Fish habitat permit
Thayer Creek Hydropower Project

- **Current Development Financing**
  - Kootznoowoo Inc. - $1.4 million (invested since 1979)
  - AEA Development Grant - $1.1 million
  - DOE Development Grant - $1.1 million

- **Planned Construction Financing (~$15.1 million required with >$17.5 million targeted)**
  - AEA Construction Grant - $7 million
  - Expect $3.9 million from the IRS New Market Tax Credit (focused on supporting economic development in low-income communities)
  - Kootznoowoo applied for $3 million grant from USDA High Energy Cost program
  - We are applying for a $0.6 million grant under the DOE Remote AK Communities Energy Efficiency Competition to fund the heat pump portion of the project
  - AEA or RUS debt financing ($2-3 million planned) at current ~3% interest rate
  - Inside Passage Electric Cooperative (under discussion)
  - Additional equity financing from Kootznoowoo Inc. as needed
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