

ALASKA ENERGY AUTHORITY

# MODERNIZING THE RAILBELT GRID

Curtis W. Thayer  
Executive Director

Alaska Power Association  
Annual Meeting  
September 13, 2024



# About AEA

**AEA's mission is to reduce the cost of energy in Alaska. To achieve this mission, AEA strives to diversify Alaska's energy portfolio — increasing resiliency, reliability, and redundancy.**



**Railbelt Energy** — AEA owns the Bradley Lake Hydroelectric Project, the Alaska Intertie, and the Sterling to Quartz Creek Transmission Line — all of which benefit Railbelt consumers by reducing the cost of power.



**Renewable Energy and Energy Efficiency** — AEA provides funding, technical assistance, and analysis of renewable energy technologies such as biomass, electric vehicles, geothermal, hydroelectric, solar, and wind.



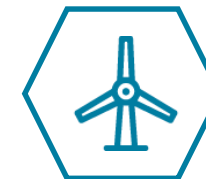
**Power Cost Equalization (PCE)** — In rural Alaska, PCE reduces the cost of electricity for residential customers as well as community facilities, thus ensuring its sustainability.



**Grants and Loans** — AEA offers loans to local utilities, local governments, and independent power producers for the construction or upgrade of power generation and other energy facilities.



**Rural Energy** — AEA constructs bulk fuel tank farms, diesel powerhouses, and electrical distribution grids in rural villages. AEA supports the operation of these facilities through circuit rider and emergency response programs.

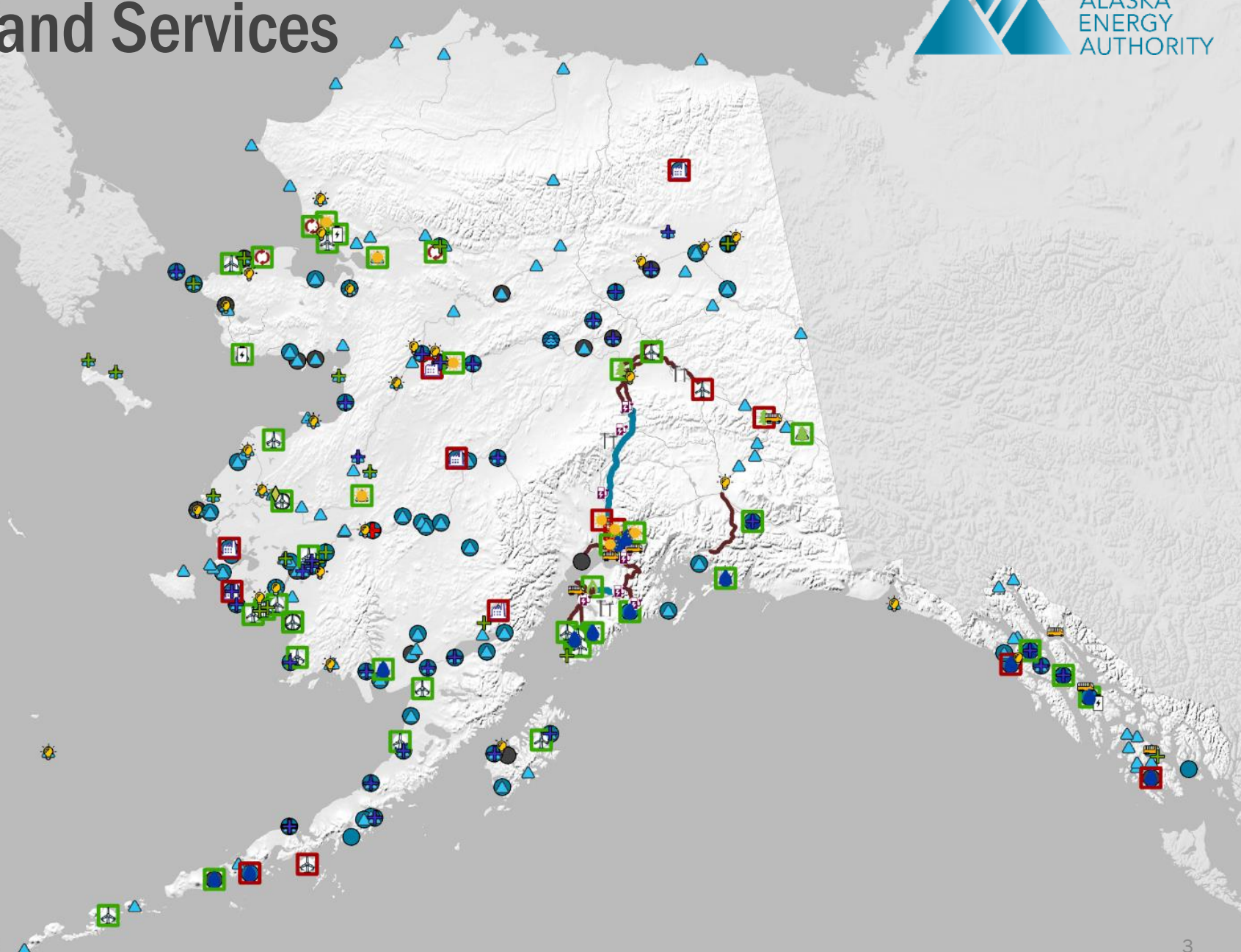


**Energy Planning** — In collaboration with local and regional partners, AEA provides economic and engineering analysis to plan the development of cost-effective energy infrastructure.



# AEA Active Projects and Services

- 🌱 Biogas (1)
- 🌳 Biomass (4)
- ⚡ Bulk Fuel Upgrades (25)
- 🏠 Diesel (6)
- 🚗 Electric Vehicles (9)
- 💡 Emerging Energy Technology Fund (1)
- ♻️ Heat Recovery (3)
- 💧 Hydroelectric (18)
- 🌊 Hydrokinetic (1)
- ⚡ Rural Power System Upgrades (33)
- ☀️ Solar (8)
- 🔋 Storage (3)
- 🏠 Transmission (3)
- 💡 Village Energy Efficiency Program (27)
- 🚗 Volkswagen Diesel Settlement Grants (7)
- ✈️ Wind (21)
- 🔵 Circuit Rider Assistance (93)
- 🛠️ Emergency Assistance (3)
- 📍 PCE Communities (193)
- 🏠 Power Project Fund
- 🌱 Renewable Energy Fund
- 📡 Transmission Line owned by AEA
- 🛤️ Other Transmission Line
- 👤 Utility Training (81)





# URBAN ENERGY

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#### CAPACITY

# 120MW

Bradley Lake generators are rated to produce up to 120 MW of power.

#### ENERGY

# 10%

Bradley Lake generates about 10 percent of the total annual electrical energy used by Railbelt electric utilities.

#### GENERATION COST PER KWH

# \$0.04

From 1995 through 2020, the project averaged 392,000 MWh of energy production annually at \$0.04 per kWh.

## Bradley Lake Hydroelectric Project

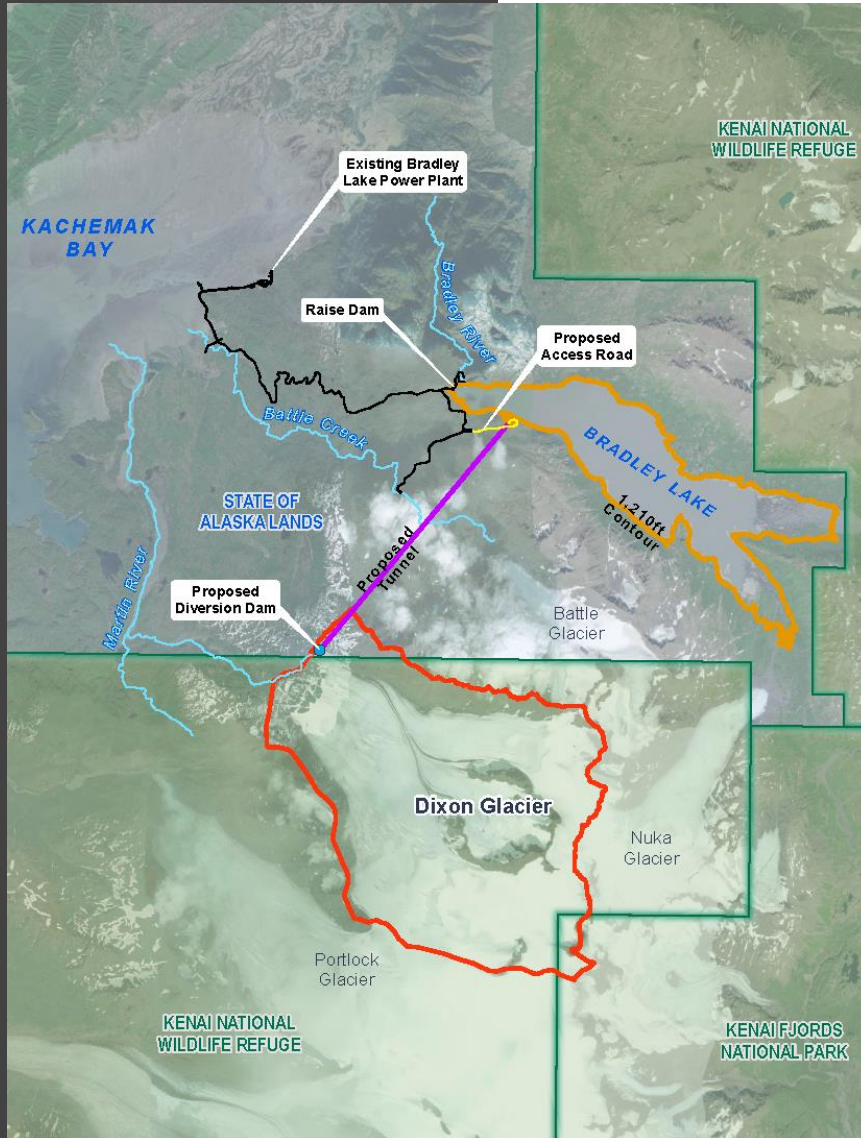
- Energized in 1991, the Bradley Lake Hydroelectric Project is **Alaska's largest renewable energy source**. It is located 27 air miles northeast of Homer.
- The 120 MW facility provides **low-cost energy to 550,000+** people on the Railbelt.
- Bradley Lake's **annual energy production** is ~10% of Railbelt electricity at 4.5 cents/kWh (or ~54,400 homes/year) and over \$20 million in savings per year for Railbelt utilities from Bradley Lake versus natural gas.
- AEA, in partnership with Railbelt utilities, **is studying the Dixon Diversion Project**, which would increase the annual energy production of Bradley Lake by 50% — or the equivalent of 14,000-28,000 homes.

\$342 Million

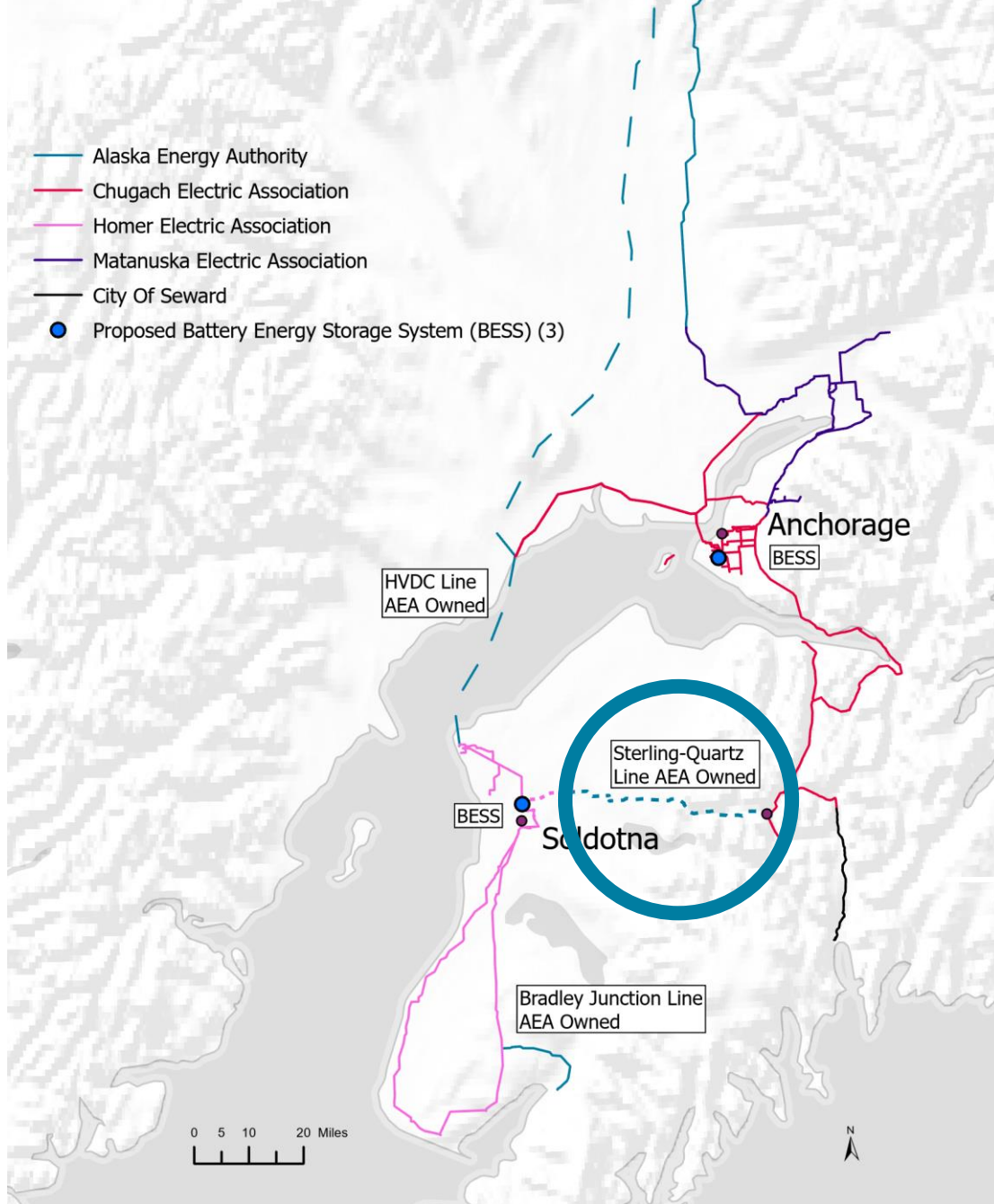
# Dixon Diversion Project

AEA is studying the Dixon Diversion Project to maximize the Bradley Lake Hydroelectric Project's energy potential. Like the West Fork Upper Battle Creek Diversion Project, the Dixon Diversion Project would divert water from Dixon Glacier to increase Bradley Lake's annual energy production by 50 percent.

- Located five miles from Bradley Lake and would utilize existing powerhouse at Bradley Lake
- Estimated annual energy 100,000-200,000 MWh (~24,000-30,000 homes)
- **Estimated to offset 1.5-1.6 billion cubic feet of natural gas per year in Railbelt power generation (equal to 7.5% of Alaska's unmet natural gas demand projected for 2030)**
- Estimated completion is 2030







**\$90 Million (Under Construction; AEA Bonds Existing)**

# Sterling to Quartz (SSQ) and Soldotna to Sterling Transmission Lines

In 2020, AEA acquired the SSQ Transmission Line, a critical component of the interconnected Railbelt transmission system on the Kenai Peninsula, as part of the Bradley Lake Hydroelectric Project.

- **Location** – 39.4 miles of 115 kilovolt (kV) transmission and out of use 69 kV transmission from Sterling to Quartz substation (Kenai Lake);
- **Benefits** – AEA ownership ensures better cost alignment, increase reliability, and more timely repairs and upgrades;
- **Status** – 69 kV line decommissioned and removed; engineers are designing and are procuring equipment for the upgrade of the existing 115 kV line to 230 kV. Upgrade will reduce line losses, increase line reliability and system resiliency; and
- **Cost** – Estimated cost to upgrade line to 230 kV standards is \$90 million for the transmission line between Sterling Substation and the Quartz Creek Substation on Kenai Lake.

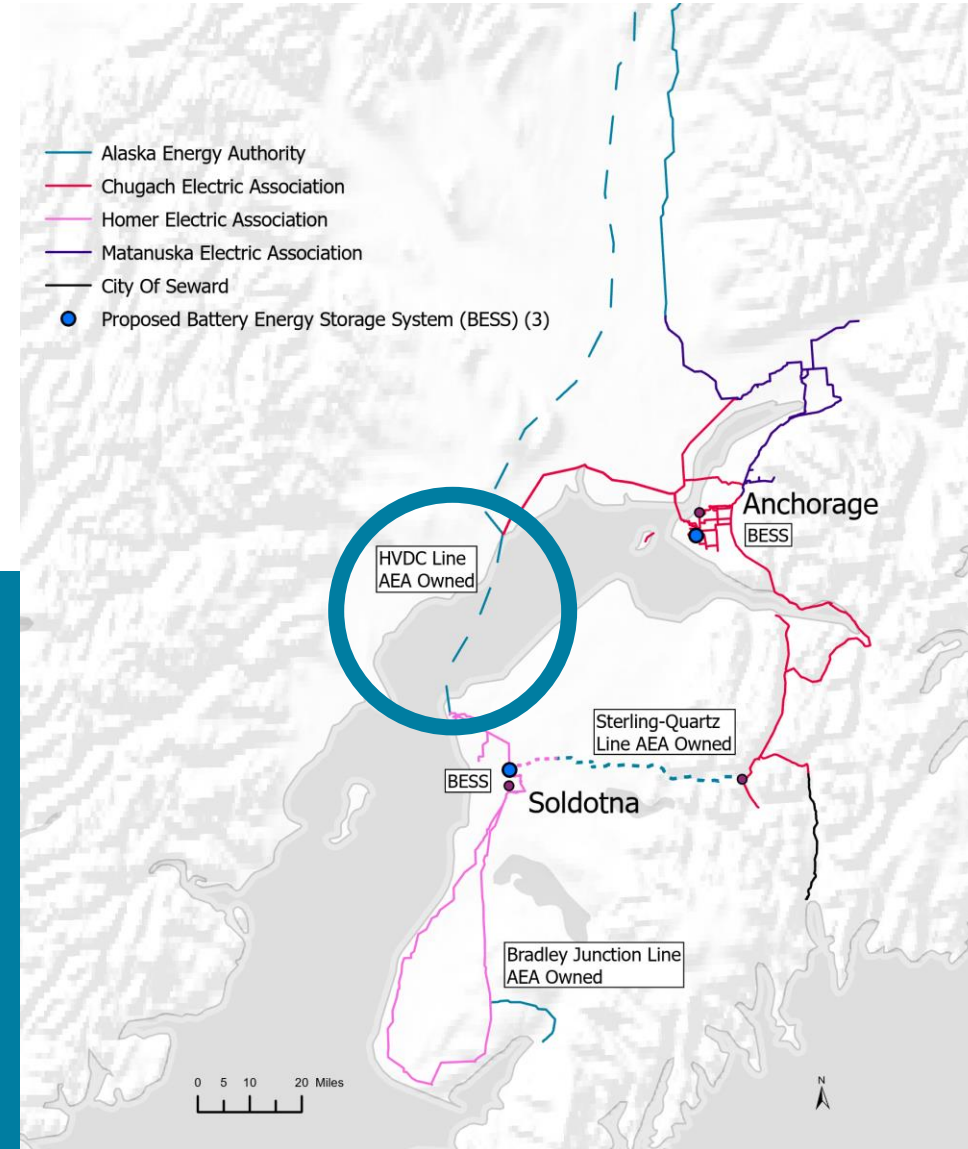
\$413 Million (206.5 Million Federal and \$206.5 Million Alaska Match)

# Grid Resilience and Innovation Partnerships (GRIP): HVDC Line

AEA secured \$206.5 million for GRIP Topic Area 3: Grid Innovation through the United States Department of Energy's Grid Deployment Office. A cost share of 100 percent, or \$206.5 million, is required for a total project amount of \$413 million. The Railbelt Innovation Resiliency project will construct a high-voltage direct current (HVDC) submarine cable to serve as a parallel transmission route from the Kenai Peninsula to Anchorage, creating a much-needed redundant system in case of disruptive events.

## Anticipated outcomes and benefits include:

- Increases transfer capacity between regions that enables higher renewable energy integration into the electricity system.
- Improves resilience and reliability for tribal and disadvantaged communities in the Railbelt region, and a reduction in reliance on fossil fuel generation and associated emissions.
- Supports the retention of high-quality jobs in the region, including 650 highly paid jobs with competitive employer-sponsored benefits.
- Creates apprenticeship and internship programs to train a new generation of lineworkers and wireworkers to reinvigorate Alaska's energy workforce.

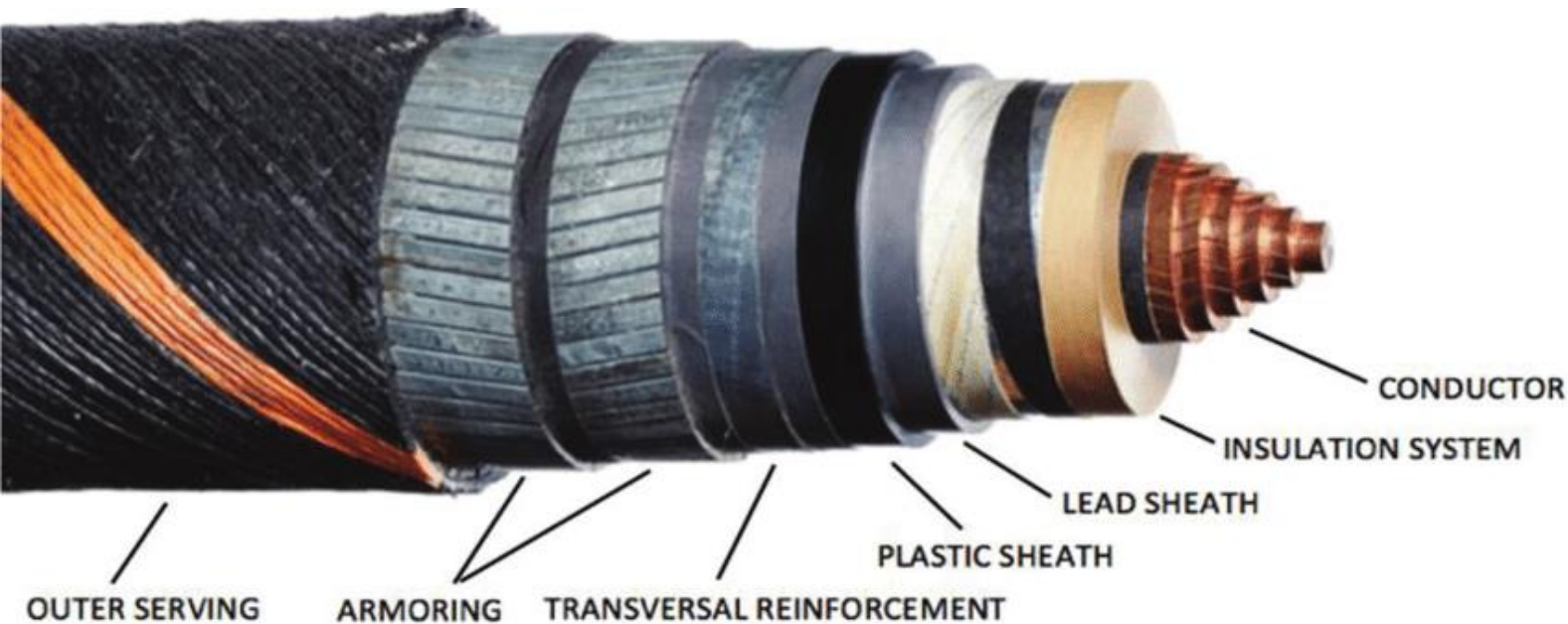




\$413 Million (206.5 Million Federal and \$206.5 Million Alaska Match)

# GRIP 3, Round 1 - Railbelt Innovation Resiliency Project: HVDC Submarine Cable

- The RIR project encompasses several projects — one of them being the installation of **a new submarine high-voltage direct current (HVDC)** transmission line from the Kenai Peninsula across Cook Inlet to the existing Beluga Power Plant — and, if feasible, **one or two battery energy storage systems (BESS)** in the Central (Anchorage) and Northern (Fairbanks) regions.

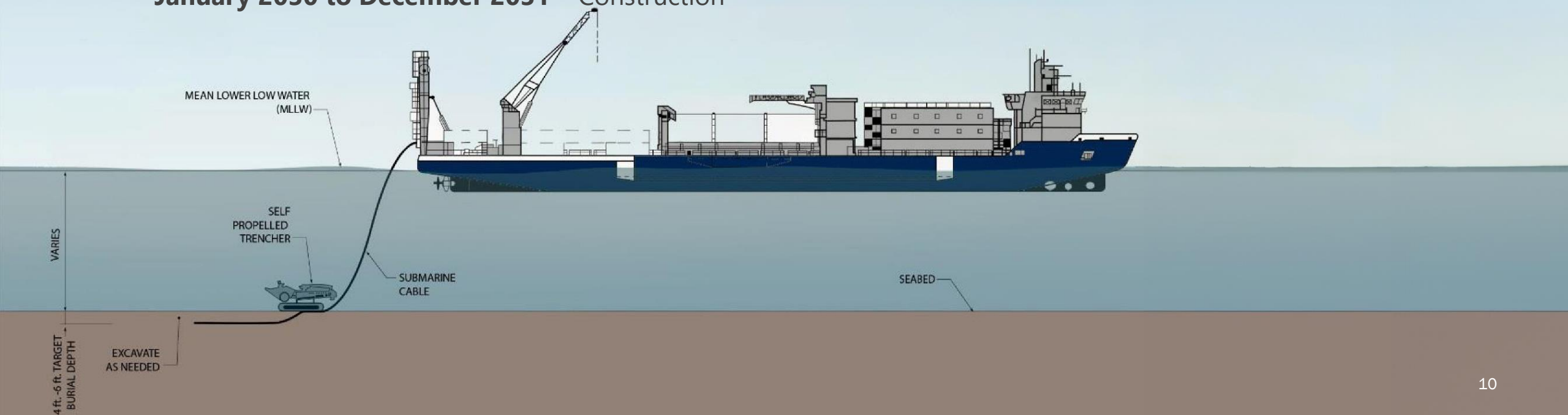


## Anticipated outcomes and benefits:

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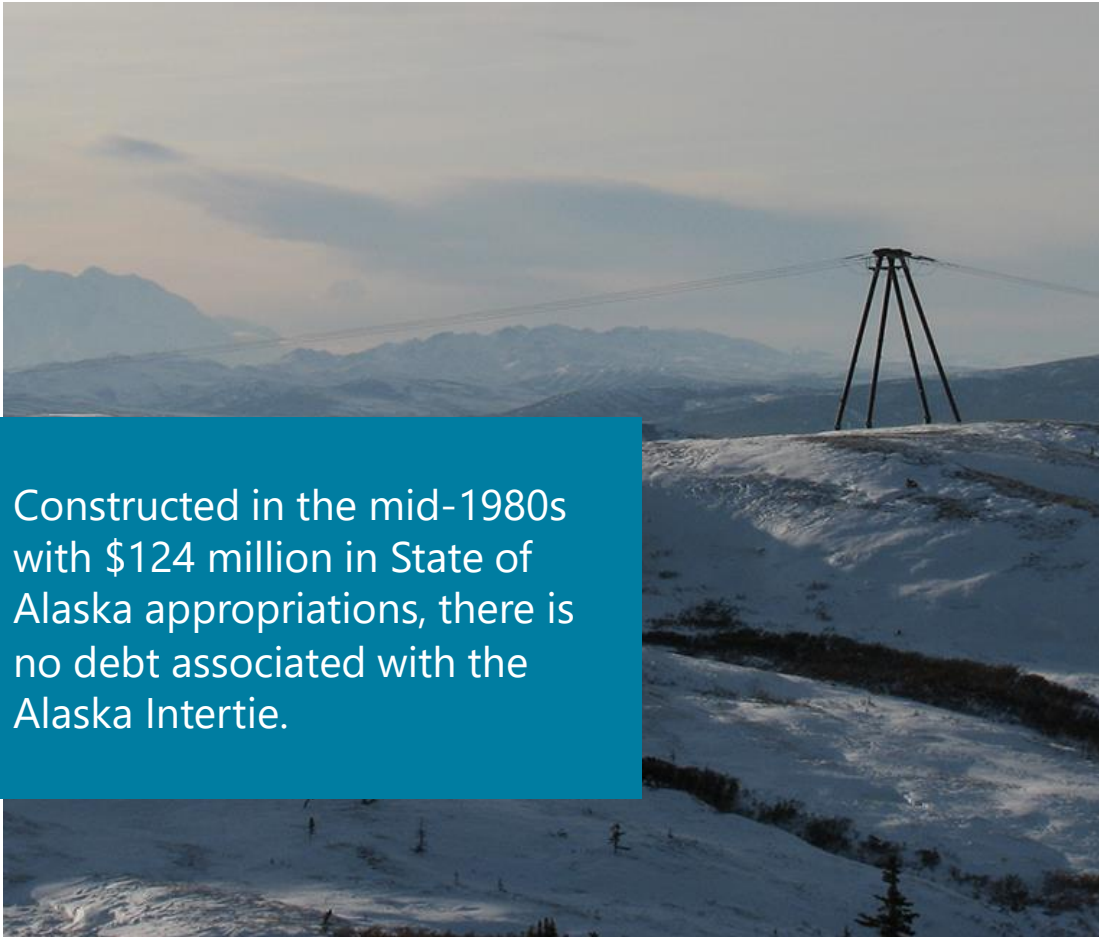
# Schedule

- The statutory period for the project is eight (8) years and the construction schedule below is based on a design-bid-build process — a traditional project delivery method that consists of three distinct phases in sequence:
  - **Second Quarter 2024** – Award
  - **Summer 2024** – Preliminary Engineering
  - **December 2024** – Complete Preliminary Design
  - **July 2027** – Complete National Environmental Policy Act (NEPA) Process
  - **December 2027** – Contractor Selection
  - **January 2028 to December 2029** – Long Lead Items
  - **January 2030 to December 2031** – Construction





# Alaska Intertie



Constructed in the mid-1980s with \$124 million in State of Alaska appropriations, there is no debt associated with the Alaska Intertie.

- AEA owns the **170-mile Alaska Intertie transmission line that runs between Willow and Healy**. The line operates at 138 kV (it was designed to operate at 345 kV) and includes 850 structures.
- A **vital section of the Railbelt transmission system**, the Intertie is the only link for transferring power between northern and southern utilities.
- The Intertie transmits power north into the Golden Valley Electric Association (GVEA) system and provides Interior customers with low-cost, reliable power — between 2008 and 2021, the Intertie **saved GVEA customers an average of \$37 million annually**.
- The Intertie provides benefits to Southcentral customers as well through **cost savings and resilience to unexpected events**.



**\$168 Million Total Cost (\$28 Million Current Available Funds)**

# Battery Energy Storage Systems for Grid Stabilization

- **Scope** – The BESS projects consist of an upgrade to the existing BESS system in the North, and also new BESS systems in the Southern, and Central regions of the grid. The Northern BESS is located at Fairbanks, the Southern BESS is located in Kenai, the Central Region BESS will be located at Anchorage. BESS will be needed to fully realize the benefits of a 230 kV bulk power supply system, regulate energy from various generation, and increase resilience.
- **Benefits** – Increase system resilience, transfer capability, more efficient use of system, and lowers impediments to additional renewable generation development.
- **Schedule** – Estimated completion date is 2026:
  - Southern (Kenai) – In service
  - Central (Anchorage) – October 2024
  - Northern (Fairbanks) – To be determined
- **Budget** – Estimated total cost is up to \$168 million (depending on technology choices and capacity)





# RURAL ENERGY



# Power Cost Equalization (PCE)

The PCE program was established in 1985 as one of the components of a statewide energy plan.



192

RURAL COMMUNITIES



91

ELECTRIC UTILITIES



81,700

ALASKANS



750 kWh

RESIDENTIAL

Residential customers are eligible for PCE credit up to 750 kWhs per month.

70 kWh

PUBLIC FACILITIES

Community facilities can receive PCE credit for up to 70 kWhs per month multiplied by the number of residents in a community.

\$48M

FUNDS BUDGETED

In Fiscal Year 2024, AEA disbursed \$48 million to rural electric utilities for the benefit of our rural communities.

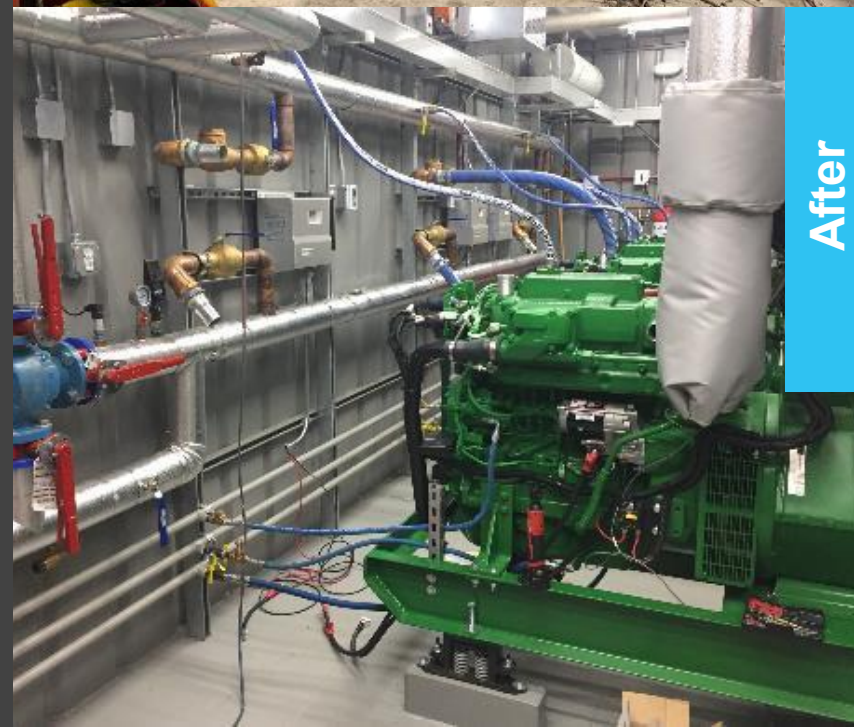
The cost of electricity for Alaska's rural residents is notably higher than for urban residents. PCE lowers the cost of electric service paid by rural residents. Ultimately ensuring the viability of rural utilities and the availability of reliable, centralized power.

# Rural Power System Upgrades

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Before

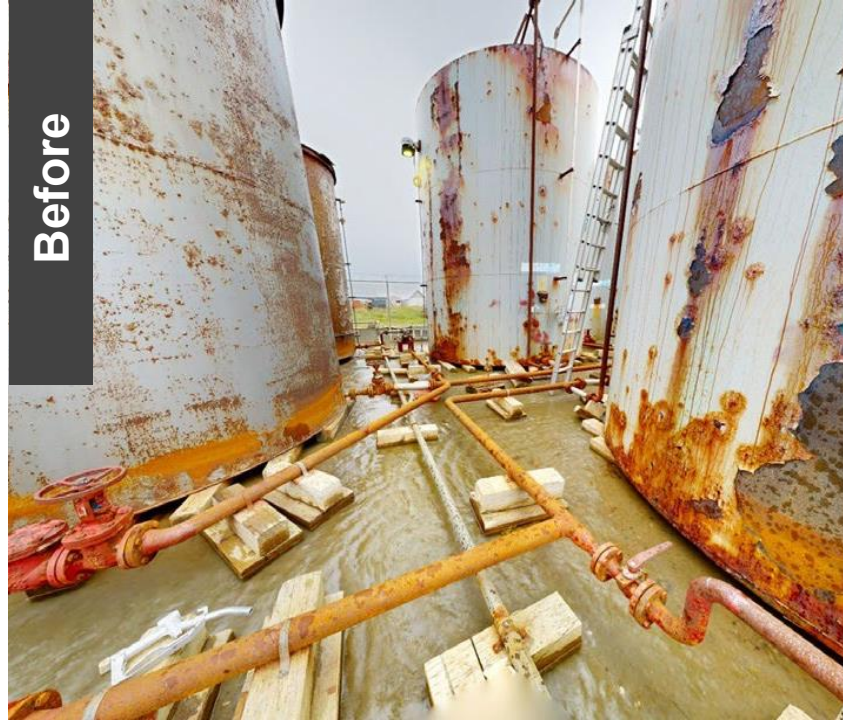


After

- AEA's **Rural Power Systems Upgrade program** improves power generation in Alaska villages with less than 2,000 people.
- Approximately **170 communities** are eligible for the program, which replaces outdated, inefficient mechanical systems with new electronically controlled generator sets.
- Due to declining funds, rural **power systems aren't upgraded timely**, and communities are left with aging systems at risk of failure.
- AEA evaluates **several factors** when prioritizing projects for funding – at this time **deferred maintenance is estimated at \$300 million**.



- AEA designs and builds modern, code-compliant bulk fuel facilities through our **Bulk Fuel Upgrade program**.
- In Alaska, there are over **400 bulk fuel facilities** — each sized to support the village.
- Most of the facilities are older than 40 years, **with many exceeding 50 years**, and they average **100,000 gallons** in size.
- However, **aging infrastructure poses several safety risks for rural communities**, e.g. corrosion, erosion, and environmental.
- AEA maintains an inventory and assessment priority need-based list — so far **deferred maintenance is estimated at \$1 billion**.



Before



After

# Bulk Fuel Upgrades





# PLANNING

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# Renewable Energy Fund (REF)

With Senate Bill 187, the Legislature and Governor appropriated \$10.5 million for five projects in June 2024. The appropriation is double the initial REF budget of \$5 million. In light of the numerous federal funding opportunities available, which compete for these same limited community resources, AEA and the REF Advisory Committee will seek fiscal year 2026 funds from the Legislature for the 19 projects not funded in Round 16.

## REF Highlights

Round 13: 11 Projects – \$4.75M

Round 14: 27 Projects – \$15M

Round 15: 18 Projects – \$17M

Round 16: 5 Projects – \$10.5M



Kongiganak, Alaska



Since its inception, the State has invested \$327 million in the REF;



Over 100 operational projects, and 59 are under development; and



The REF has offset the consumption of approximately 85 million gallons of diesel fuel, per an independent study.

# Power Project Fund (PPF) Loan Program

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The PPF loan program continues to see an increase in applications due to federal matching fund requirements and other incentives. The Inflation Reduction Act provides tax credits of up to 60% for clean energy projects. Capitalization of the fund would allow for additional loans to be issued to support the increased demand.



**Outstanding Loans**  
\$31 Million  
15 Loans



**Pending Applications**  
\$0  
Loans Under Review



**Uncommitted Cash Balance**  
—

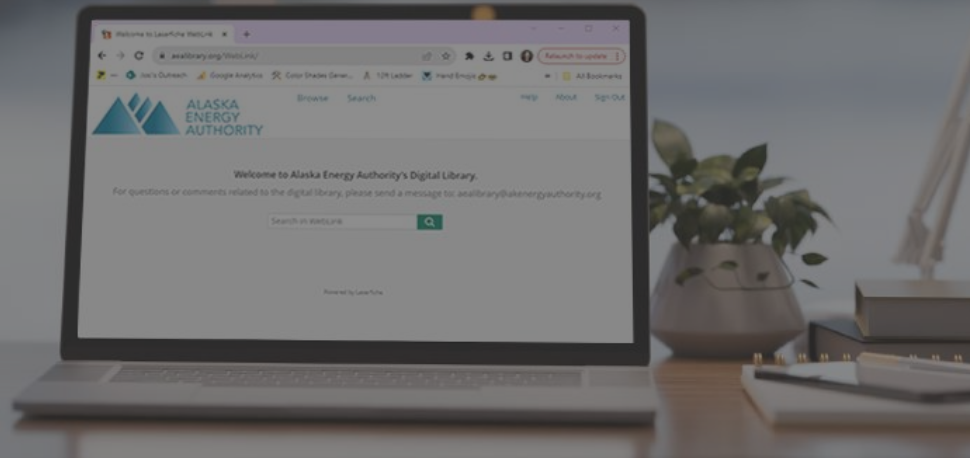


**Competitive Rates**  
Current PPF Interest Rate  
5.54% as of August 2024



# AEA Electronic Library (E-Library)

AEA's e-library provides public access to over 50 years of Alaska energy data, reducing staff time devoted to finding records for general inquiries and Freedom of Information Act requests.



On December 11, 2023, AEA officially launched its digital e-library, which was funded by a \$100,000 grant from the Denali Commission and \$40,000 from AEA.



Since its launch, the e-library has averaged over 650 unique visitors per month. Site visits to the e-library are reported to be trending positively, with an average 10% increase in site visits month over month.



The e-library launched with 7,500 documents, including program publications, technical reports, research and feasibility studies. Currently, over 11,000 documents are searchable.



The e-library is fully accessible to the public via AEA's website via the library tab, or directly via accessing AEA's website at <https://www.akenergyauthority.org/library>

A grayscale photograph of the Alaska State Capitol building, featuring a prominent dome and classical architectural elements like columns and a pediment. The building is set against a dark, overcast sky. The text is overlaid on the right side of the image.

# INFRASTRUCTURE INVESTMENT AND JOBS ACT

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\$60 Million (Over Five Years)

# Grid Resilience Formula Grant Program, IIJA 40101(d)



Per IIJA section 40101(a)(1), a disruptive event is defined as “an event in which operations of the electric grid are disrupted, preventively shut off, or cannot operate safely due to extreme weather, wildfire, or a natural disaster.”



- Over the next five years, Alaska will receive **\$60 million in federal formula grants** to catalyze projects that increase grid resilience against disruptive events. In August 2023, **the first two years of allocations, \$22.2 million**, was awarded to AEA. AEA’s competitive solicitation for these funds closed in February 2024. Notification of sub-awards are expected 2<sup>nd</sup> QTR 2024, pending DOE approval. For fiscal year 2025, AEA requested **\$17,627,018**, Alaska’s formula allocation for year 3, in Federal Receipt Authority and **\$1,816,579 in matching funds**.
- Resilience measures include but are not limited to:
  - Relocating or reconductoring powerlines
  - Improvements to make the grid resistant to extreme weather
  - Increasing fire resistant components
  - Integrating distributed energy resources like microgrids and energy storage
- Formula-based funding requires a **15% state match** and a **33% small utility match**.



# Solar for All

\$62.5 Million (Shared with AHFC)



- **In April 2024, AEA and the Alaska Housing Finance Corporation (AHFC) were selected for a \$62.5 million grant from the Environmental Protection Agency's Solar for All program.**
  - AEA will develop community solar in disadvantaged communities.
  - AHFC will develop residential rooftop solar for low income households.
- **Program benefits:**
  - Energy cost savings,
  - Increased resiliency,
  - Equitable access to solar,
  - Asset ownership benefits low income and disadvantaged communities,
  - Workforce development, and
  - Reduction in greenhouse gas emissions.
- **No match required for this competitive grant.**

\$52 Million (Over Five Years)

# State of Alaska Electric Vehicle (EV) Infrastructure Implementation Plan

- AEA and the Alaska Department of Transportation & Public Facilities (DOT&PF), continue to deploy the **State of Alaska NEVI Plan (The Plan)**.
- On **September 25, 2023**, the **first round of Alaska NEVI awards were announced**. AEA and DOT&PF selected projects in nine communities for a total investment of \$8 million. The \$6.4 million in NEVI funding will be matched with \$1.6 million from private entities selected to install, own, and operate the new EV charging stations.
- On **September 29, 2023**, the Federal Highway Administration approved the fiscal year 2024 plan. This **unlocked \$11 million in addition to \$19 million** available in the fiscal years 2022 and 2023.
- **Phase 2** will develop charging infrastructure in more than 30 communities along Alaska's Highway System and the **Marine Highway System**.



## State of Alaska Electric Vehicle Infrastructure Implementation Plan FY25





# Home Energy and High Efficiency Rebate Allocations

AEA is collaborating with AHFC to distribute Alaska's allocation of \$74 Million

## Home Efficiency Rebates

- Rebates for energy efficiency retrofits range from \$2,000-\$4,000 for individual households and up to \$400,000 for multifamily buildings.
- Grants to states to provide rebates for home retrofits.
- Up to \$2,000 for retrofits reducing energy use by 20% or more, and up to \$4,000 for retrofits saving 35% or more.
- Maximum rebates amounts are doubled for retrofits of low-and moderate-income homes.
- **Alaska's Allocation is \$37.4 million**
- **No State match is required.**
- **Funding is estimated to be available between fall/winter 2025.**

## Home Electrification and Appliance Rebates

- Develop a high efficiency electric home rebate program.
- Inclusive of means testing and will provide 50% of the project cost for incomes ranging from 80% to 150% of area median income. Rebates to cover 100% of the proposed cost for incomes 80% of area medium income and below, with similar tiers applied for multifamily buildings.
- Includes a \$14,000 cap per household, with an \$8,000 cap for heat pump costs, \$1,750 for a heat pump water heater, and \$4,000 for electrical panel/service upgrade.
- Other eligible rebates include electric stoves, clothes dryers, and insulation/air sealing measures.
- **Alaska's Allocation is \$37.1 million .**
- **No State match is required.**
- **Funding is estimated to be available between fall/winter 2025.**



\$15.7 Million

# Black Rapids Training Site (BRTS) Defense Community Infrastructure Pilot Program

AEA partnered with Golden Valley Electric Cooperative (GVEA) was awarded this grant from the Office of Local Defense Community Cooperation under the Defense Community Infrastructure Pilot Program.

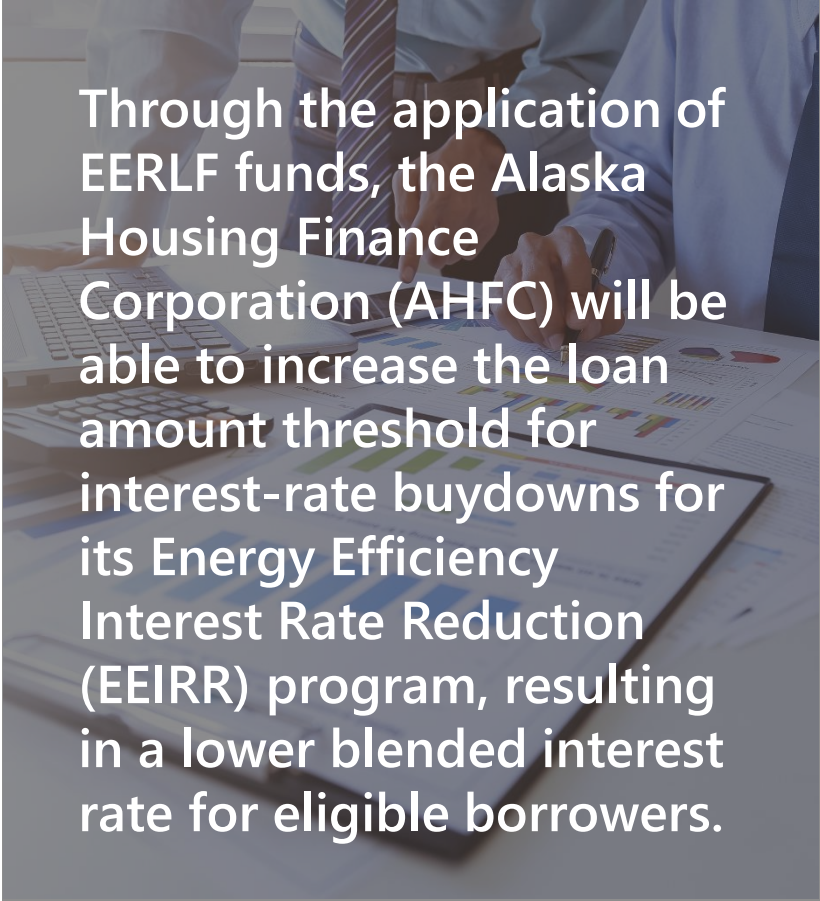
**Federal Receipt Authority of \$12.7 Million received in fiscal year 2024. A \$3 million supplemental budget request was submitted by AEA to complete additional work requested by the Department of Defense. No State match is required.**

GVEA will use the funds to extend an transmission line 34 miles along the Richardson Highway to BTRS. Currently, BTRS is powered by three diesel generators that are nearing the end of their useful lives. This extension will improve long-term sustainability and reliability for BTRS by tying them into GVEA's power grid.



# Energy Efficiency Revolving Loan Fund (EERLF) Capitalization Grant Program IRA 40502

- The EERLF was authorized under Section 40502 of the Inflation Reduction Act to provide capitalization funding for states to establish loan funds to eligible recipients for commercial and/or residential energy audits, upgrades, and retrofits. The state of Alaska was allocated \$4,782,480 under the federal formula, with funds being awarded to AEA in June 2024.
- With interest-rate buydowns stated as an allowable use of funds under the EERLF program, AHFC sought to apply the funds to its EEIRR program, increasing the loan amount threshold to which the interest rate reduction may apply, lowering the overall, blended interest rate for eligible borrowers.
- As the only entity eligible for the funds in the state, AEA applied with AHFC's support. AEA and AHFC have a reimbursable services agreement, and this award will be managed as a sub-award to AHFC. AEA will retain a portion of the funds for administration, reporting, and compliance, while AHFC will receive \$4.4 million to enhance its EEIRR program.



Through the application of EERLF funds, the Alaska Housing Finance Corporation (AHFC) will be able to increase the loan amount threshold for interest-rate buydowns for its Energy Efficiency Interest Rate Reduction (EEIRR) program, resulting in a lower blended interest rate for eligible borrowers.



\$496,725 (Single Award)

# U.S. DOE SCEP: Energy Future Grants (EFG) Program

With funding under the EFG program, the Alaska Municipal League (AML) will increase the capacity of up to 45 municipalities to access affordable clean energy, through cohort reviews and exercises related to permits, land-use, regulatory, and other aspects.



The U.S. Department of Energy's (DOE) EFG program is a competitive, federally-funded program that provides financial and technical assistance to support local, state, and Tribal government-led partnership efforts to increase resiliency and improve access to affordable clean energy. ■



With state energy offices eligible for the EFG program, AML and AEA partnered to submit an application under the first-ever program solicitation. It is slated to be a continuing program offered through DOE's State and Community Energy Programs (SCEP). ■



AML, via this pass-through sub-award opportunity to be managed under a Memorandum of Agreement between AEA and AML, will engage via a cohort-approach up to 45 Alaskan municipalities to enhance and improve their capacity for local energy operations and governance. ■



AEA's award under the program was preliminarily awarded in late March 2024. AEA expects the final award to be officially issued by DOE in August 2024, upon DOE's conclusion of negotiations. ■





Owing to recommendations from the governor's Alaska Energy Security Task Force concerning the elimination of transmission wheeling charges and the establishment of a RTO, the Legislature passed House Bill 307, which was signed into law on July 31, 2024. Under the new law, the RTO will be a division of AEA.

## Railbelt Transmission Organization (RTO)

- Form the RTO on or before January 1, 2025, modeled after the Bradley Lake Project Management Committee. Governance structure must be comprised of a representatives from AEA, the Railbelt utilities, and the Railbelt Reliability Council (non-voting member).
- Apply to the Regulatory Commission of Alaska (RCA) for a certificate under AS 42.05.221 on or before January 1, 2025.
- By July 1, 2025, file with the RCA a nondiscriminatory open access tariff that provides for the recovery of Railbelt backbone transmission costs and related ancillary services, and replaces wheeling charges with a new mechanism that fairly recovers and equitably allocates the costs of operating the backbone transmission system.
- Hold and administer the certificate and tariff for the RTO. The tariff will require updates to the revenue mechanism to reflect changes in costs from year to year.





# Thank You

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