1. Brief description of the project, including outcomes that would result from the successful completion of the project that align with the strategic goals and objectives of the GRIP program and the applicable GRIP Topic Area. *2,000-character limit.*

The Railbelt electric grid in Alaska extends over 700 miles from Homer to Delta Junction. The Railbelt is a small, but fully functioning long-distance electric grid that serves three regions and includes over 75% of Alaska's residents, five critical military bases and generates 80% of the electricity in Alaska. The existing operating voltages, combined with long distances and lack of redundancy, limit the ability of the utilities connected to the grid to transfer low-cost and reliable power to where it is most needed. The Railbelt grid is currently subject to capacity restrictions, vulnerable to natural hazards, and heavily reliant on non-renewable resources.

Through this project, 240 miles of HVDC transmission line will be constructed from the Central Region, which serves Anchorage and the neighboring Matanuska-Susitna Borough, to the Northern Region, with the line terminating in Healy.

The Project closely aligns with the strategic goals of GRIP Topic 3 to promote environmental justice with construction of a HVDC line substantially increasing interregional transfer capacity between the Central and Northern regions of the grid. This increase in system capacity will improve the resiliency of the entire grid by eliminating congestion, stabilizing long-term costs to consumers, and lowering carbon emissions. This upgrade is necessary to transition to the use of renewable energy sources and stabilize costs for Railbelt consumers, especially the 40% who live in disadvantaged communities (DACs) and/or Alaska Native Village Statistical Areas (ANVSAs).

Other project outcomes include the collaboration of this unique team, consisting of nonprofit electric cooperatives, a municipal, and state agencies, to redefine transmission governance and cost-recovery techniques in the Railbelt by advancing the agenda through the state regulatory commission and promoting opportunities to integrate new renewable energy projects.

2. Brief description of the impact of DOE funding on the project. *2,000-character limit.*

Without funding made possible through GRIP, this essential project is delayed due to the perceived potential for consumer rate increases. The proposed HVDC extension will reach the entire Railbelt, some 70% of power consumers in Alaska. Consumers outside the Railbelt, such as the residents of 193 remote rural villages, will benefit from energy cost stabilization in the Railbelt due to Alaska's Power Cost Equalization (PCE) endowment that equalizes rural electric rates with respect to those paid in urban areas.

This Project Team has been previously selected for an award for $206.5 million through the first funding round of GRIP Topic 3. That project is currently unlocking $206.5 million in matching funds to construct a HVDC line from the Southern to Central Regions of the Railbelt grid. This Project will utilize a similar combination of funds, expanding on that project to cover the Central Region to the Northern Region, ensuring that consumers from Fairbanks to Homer also receive the maximum benefit.

The innovative, upgraded Railbelt grid paves the way for private sector investment in renewable energy and future investment in transmission infrastructure. Completing the line from the Central Region to the Northern Region is estimated to cost $730 million and is expected to unlock additional State and utility matching funds on the order of $365 million. Funding of this project allows the utilities to continue

focusing on integrating large-scale renewable energy projects that can significantly change how energy is delivered to over 75% of Alaska residents. Some of these projects are also pursuing funding from the DOE through the Loan Programs Office. Our Projects' alignment with DOE's strategic goals through both DOE -GDO and DOE-LPO promotes a more resilient and economically viable energy landscape, all while demonstrating the benefits of grid modernization.

3. List the primary technologies and/or tools that will be deployed in the project. 2,000 character limit. MULTIPLE TECHNOLOGY

This project involves the installation of HVDC-light transmission line and station hardware, comprising poles, towers, and three conductors in a reliable three-conductor bipolar configuration with a neutral. The setup will include self-commutated voltage source converters, station-class large power transformers, and high-voltage DC and AC breakers. These components will likely be necessary for interconnection into the AC grid at both Healy and Beluga. Additionally, in certain areas, HVDC cables or state-of-the-art high-capacity conductors may be required. This is especially relevant for obtaining permitting access through state and national parks, where the infrastructure will probably follow existing DOT/PF rights of way.

4. If the project will be deploying hardware, describe the role and impact of hardware deployment as part of the proposed project scope and identify any elements of this deployment that represent a significant innovation for the industry and/or project. Enter "N/A" if no hardware will be deployed. *2,000-character limit.*

The deployment of hardware in this project encompasses the installation of transmission lines and HVDC to AC converter stations equipped with state-of-the-art solid-state (IGBT) voltage source self-commutating converters over a 700-mile area. Given the Railbelt's scale and the planned integration of inverter-based technologies (IBRs) such as wind, solar, battery energy storage systems (BESS), and HVDC this project is a fitting proving ground for implementation of scalable geographically dispersed grid-forming inverters (GFM) in power systems.

Data from the project will provide further insights into the impact of high IBR penetration levels on short-circuit current and voltage stability and the economics and effectiveness of GFM compared to synchronous condenser deployment. The findings will inform further advancement and integration strategies for renewable energy sources. Specialized data will be generated and collected for performance in volatile conditions such as snow events, avalanches, volcanos, earthquakes, cold weather, and wind resistance.

5. If the project will be deploying software, describe the role and impact of software deployment as part of the proposed project scope and identify any elements of this deployment that represent a significant innovation for the industry and/or the project. Enter "N/A" if no software will be deployed. *2,000-character limit.*

This project will allow for the secure transfer of power from intermittent clean resources between load balancing areas that cannot be scheduled on a normal day-ahead basis. Modified System Control and Data Acquisition (SCADA) software, or more sophisticated high-speed communications and GFM software, may therefore be required when these generation resources are brought online to reflect active

changes in power output and corresponding changes to power flows between load-balancing areas. This will result in the innovative use of the existing software to create dynamic schedules that change based upon SCADA scan rates, or at protective communications speeds as required, and allow multiple load balancing areas to simultaneously regulate intermittent generation resources to maintain frequency control. Maintaining control over the use of the resources will facilitate the construction of lower-cost, renewable energy projects throughout the Railbelt system.

6. If the project will include development of a new business/regulatory/financing approach, describe the approach and the potential for and path to replicability or broader adoption. *2,000-character limit.*

To facilitate transmission investment and construction, the Regulatory Commission of Alaska (RCA) has agreed to join the project team, subject to their statutory limits. The RCA has agreed to initiate proceedings to investigate novel solutions for sustainable and viable infrastructure development utilizing innovative funding mechanisms for transmission investment cost recovery. The full scope of the proceedings is still under development. Modifications to enabling regulations may be required and will require at minimum a two-year process. One outcome goal for this project is to develop a novel solution for cost effective long-term funding that may well serve as a replicable model. However, the project is not dependent on legislative mandates to be completed.

On a parallel path, the Railbelt electric utilities are working in a collaborative manner to address issues of governance, operations and maintenance, and cost-recovery as they relate to transmission of wholesale energy on the Railbelt grid. These efforts will change the regulatory and energy landscape in the Railbelt. This Project, and the projects being proposed as part of the Railbelt's broader Grid Modernization and Resilience Plan, will serve as catalysts to modernizing not only the physical infrastructure of the grid, but other areas of governance and operations that can streamline processes and provide greater value to the Railbelt's consumers.

7. Describe the readiness, viability, and expected timing of the project (include the impact of DOE funding in the response). *2,000-character limit.*

A similar project covering the Southern to Central Region of the Railbelt was selected for funding in GRIP Round 1. Through negotiations with DOE in the Round 1 funding process, the Project Team has taken DOE's guidance with Its Round 2 concept paper seeking HVDC solutions to the Railbelt's resiliency and interregional transmission capability bottleneck. The Project's plans and estimates have been adjusted accordingly. The project is viable based on the opportunity to follow the already established and fully permitted route of the Alaska Liquid Natural Gas (AKLNG) project, from Beluga to Healy, making the acquisition of the right-of-way (ROW) both feasible and timely. This project may request use of the AKLNG ROW strategically, with potential sharing arrangements where permissible with the Alaska Gasline Development Corporation (AGDC); and, if practical, using the ROW as a reliability buffer in areas like hillsides to minimize tree contact. AGDC is an independent public corporation of the State of Alaska. Additionally, the Project will build upon experience gained through the GRIP Funding Round 1 and utilize its resources strategically to achieve maximum benefits for Railbelt consumers.

Upon securing the grant, we will immediately commence stakeholder engagement, final design, NEPA permitting, regulatory updates, and ROW acquisition, expecting this phase to span two to three years. With design and permits in hand, construction will begin in parallel phases, aiming for completion within an eight-year timeframe. Notably, procurement of converter stations will be strategically delayed, aligning with the GRIP Funding Round 1, HVDC submarine cable acquisition, to the extent it does not delay this project's schedule. This approach intends to mitigate post-pandemic supply chain issues while maintaining economies of scale for both projects.

8. Identify risks and challenges (e.g. technical, labor, financial, market, environmental, regulatory, security) to project success, and outline mitigation strategies for each risk. *2,000-character limit.*

As a part of our detailed project management plan, we will develop and maintain a risk register complete with ongoing mitigation strategies. At this point we anticipate these risks to be (1) staffing (2) procurement, cost, and supply chain management and (3) permitting the section near Denali State Park and Denali National Park.

To address the national shortage of electrical workers, the Project Team is in ongoing discussions with the IBEW local, NECA, and their Alaska Joint Electrical Apprenticeship and Training Trust (AJEATT) to inform them of project timing, staffing needs and to reinforce a desire to use local workers. For additional needs, staffing will be sourced from the lower 48 states through the IBEW. The Project Team is also working to develop training opportunities for Alaska Native tribal members and shareholders in a proposed partnership between the utilities, IBEW/NECA, and local Native village and regional corporations.

The engineering and project management plan will include periodic evaluations of the supply chain for major equipment. The designed schedule is flexible with modular engineering and construction plans to navigate around supply chain challenges while maintaining productivity. Procurement of scarce items will be delayed as much as possible to minimize supply chain and inflationary cost impacts without derailing the schedule.

A robust and early stakeholder engagement plan as detailed in the Community Benefit Plan will aid in working through permitting challenges. Further, the project will build in contingencies/options such as using innovative advanced conductors to minimize conductor size and spacing, or potentially undergrounding some portions of the line or routing the line around the state and national parks. It should be noted that an AKDOT managed ROW exists through both parks and AGDC previously obtained permits in both parks because of close coordination with their permitting team.

9. Briefly describe the Project Management Team and any key personnel and project partners, including vendors and suppliers (if identified; if not yet identified, address how the project will secure vendors/suppliers). Indicate whether the Team has the required skills, any prior applicable experience, prior projects with partners, and access to equipment /facilities to successfully execute the proposed project. If those are not met, explain how the Team will obtain knowledge/access for successful execution. *2,000 character limit.*

The project team encompasses stakeholder outreach specialists, engineers, and project managers. The Team boasts decades of combined experience in transmission, generation engineering, construction, and operations. For over 30 years, these cooperatives have collaborated on significant projects, from the $328 million (1991 cost) Bradley Lake Hydroelectric Project (BLHP) to the recent $45 million West Fork Upper Battle Creek Diversion, enhancing the BLHP's energy output by approximately 10%. The team's achievements also include securing a $166 million bond package for upgrading the Sterling to Quartz section of the 115 kV southern transmission line.

Key team members include:

***Curtis Thayer, Executive Director of AEA**, has been steering the State's energy office and leading agency for statewide energy policy and program development since 2019.*

***Bryan Carey P.E., Director of Owned Assets at AEA**, brings over 20 years of experience managing energy projects, including the Bradley Lake Hydroelectric Project and its transmission assets.*

***Jim Mendenhall P.E., Project Manager at AEA**, has over 35 years of project manager experience.*

***Travis Million, COO of GVEA**, has over 20 years in electric power systems and system protection.*

***Larry Jorgensen, Director of Power, Fuels, and Dispatch at HEA**, brings over 40 years' experience in the public utility sector.*

***Dustin Highers, Vice President, Corporate Programs at CEA**, has 20 years in the utility industry, currently leading Chugach's energy transition.*

***Ed Jenkin P.E., Chief Energy Transformation Officer at MEA**, is a former COO with over 30 years of utility industry experience.*

***Julie Estey, Chief Strategy Officer at MEA**, oversees the cooperative's public and member-facing activities, strategic plans, and special projects.*

***Brian Hickey P.E., former COO of CEA**, has over 40 years of Railbelt engineering and operating experience.*

10. How will this project reduce innovative technology risk, achieve further deployment at-scale, and lead to additional private sector investments? *2,000 character limit.*

Given the scale and interconnected nature of the Railbelt power system it is realistic to reach levels of penetration that can generate technical results capable of being replicated in larger interconnected grid systems of the lower 48 states and in smaller grid systems internationally. Empirical data and analysis of the effects and acceptable boundaries of deep penetration of IBRs and their performance in terms of stability will inform all interconnected power systems in gauging integration of deeper IBR penetrations in power systems, and thereby reduce the risks of technical innovation by manufacturers and vendors in this particular space.

This project is a replicable pilot project not only for grid resilience but for public-private partnerships with state agencies and electric utilities. Leveraging public funds, private investments, and regulatory agencies creates a support network to reduce barriers to project completion.

11. Describe how the project supports State, local, Tribal, community and regional resilience, in reducing the likelihood and consequences of disruptive events, decarbonization, or other energy strategies and plans. *2,000 character limit.*

The Railbelt, characterized by some of the world's most challenging environmental conditions, emphasizes grid resilience as a top priority. The area has historically faced earthquakes, volcanoes, avalanches, forest fires, extreme temperatures, and landslides, often leaving communities powerless for extended durations. A significant 40% of Railbelt customers reside in ANVSAs and DACs. These ANVSA and DAC regions, among the most vulnerable in the Railbelt, will benefit greatly from enhanced grid reliability, as evidenced by improved transmission reliability indices and energy costs. Furthermore, consumers outside the Railbelt such as the residents of Alaska's 193 remote rural villages benefit from energy cost stabilization in the Railbelt due to Alaska's unique PCE endowment that reduces rural residential electric rates up to 70kWh to match the rates paid in urban areas.

A minimal reduction in Railbelt electric costs, such as a penny per kWh, could save Railbelt consumers approximately $44 million annually and increase the PCE fund by over $1.5 million each year. The widespread impacts of this project create a solid foundation for environmental justice and equal opportunity for federal investment. This is especially critical as the Railbelt is currently facing declining regional reserves of natural gas in the Southern Region with significant implications given the islanded nature of Alaska's infrastructure. The State is engaged in ongoing energy planning with a focus on energy security for Alaska's small and dispersed population.

The Railbelt is home to five critical military installations, a Space Force Station, several fighter wings, and the globe's third largest air cargo port. Jet fuel research and development is a major clean energy initiative. Future projects surrounding hydrogen, decarbonization of the electric grid, and carbon recycling will also benefit from the installation of the new transmission line.

12. What will be the grid-benefitting outcomes to be delivered by the project (e.g. number of customers impacted, unlocked clean energy generation, improvement in reliability metrics). List 1-3 outcomes maximum. *2,000 character limit.*

This project in conjunction with the approved Round 1 GRIP project and the proposed installation of the HVDC line has numerous positive outcomes that benefit Railbelt grid consumers as well as others. The two anticipated outcomes with the highest order of magnitude are:

- *Elimination of the single contingency islanding between the Northern and Central Regions will reduce large scale transient and small signal instability that can result in underfrequency load shed and the threat of system wide or regional collapse. This will improve transmission and generation related reliability indices.*

- *This project will provide reliable access to proposed utility-scale wind and solar projects in the Central and Northern Regions where resilient access is currently limited. The completion of this project will introduce additional potential off-takers, likely increasing the capacity of the resource and reducing its delivered cost through enhanced economies of scale. The construction of towers to support double circuiting is planned. The double*

circuit capable towers will be engineered to enable the future construction of an AC local transmission loop. This loop is intended to transport electricity from the decarbonized grid directly to the pipeline compression stations situated along the proposed AKLNG pipeline. Significantly, this corridor, which traverses the west side of the Susitna River drainage, will bring electrical access to a region that currently lacks it. The project will increase interregional transfer capability which will improve heat rates and reduce carbon emissions creating a more resilient interconnection that will foster renewable energy developments, drive governance reform, and foster a broader market for innovations.

13. Demonstrate how this Community Benefits Plan will address community and labor engagement, and how feedback from specific and relevant community stakeholders will be incorporated into the Community Benefits Plan. *4,000-character limit.*

The Project Team recognizes that broad support for the Project is necessary for successful project implementation. A public participation plan for the Project will be further developed to maximize stakeholder input and communication. The Community Benefits Plan (CBP) will include work sessions before and during the project. The five utilities along with AEA will form hubs for this process. The work sessions will include:

- *Scope, costs, timeline, and potential impacts. How the public can learn more, track project progress, and how their feedback will be used.*
- *Success stories as well as lessons learned from other electrical infrastructure upgrades conducted on the Railbelt.*
- *Identifying the roles of each utility and AEA in the project.*
- *Communicating metrics that will be used to measure the success of Project implementation, including DEIA goals.*

The foundation of the public participation plan includes early engagement with the stakeholders to guide project revisions and establish constructive relationships. Discussion topics will include environmental impacts, viewshed impacts, subsistence impacts, state and federal land easements, Power Cost Equalization, workforce development (including apprenticeships), support for minority business enterprises, DEIA recruitment, DEIA workplace policies, and state legislation.

Examples of key stakeholders include Alaska Federation of Natives, Alaska Village Electric Cooperative, University of Alaska, Alaska Pacific University, Alaska Black Caucus, Alaska Municipal League, IBEW Local 1547, IUOE Local 302, Alaska State Office of Veterans Affairs, Alaska Chapter of the National Electrical Contractors Association, Alaska Operating Engineers Training Trust, Alaska Joint Electrical Apprenticeship & Training Trust, Railbelt Tribal councils, and Railbelt City Councils. Outreach will be conducted in informal settings in an attempt to recruit a more diverse group of stakeholders. Examples of suitable events include, but are not limited to, the Alaska Federation of Natives convention, Alaska Black Caucus meetings, Alaska State Fair, community farmers' markets,

Juneteenth programming, Alaska Federation of Filipino Americans programming, Sportsman shows, and music festivals.

This robust process is designed to ensure all relevant stakeholders have an opportunity to share their opinions and help shape the project. Barriers to entry in this participation process will be reduced as much as possible.

14. Provide expected number of jobs or workforce development opportunities that the project will create. Describe how these positions are the result of community engagement or agreement. Explain how your project will generate quality jobs and that workforce development opportunities provided are relevant to impacted communities. *4,000 character limit.*

This project is currently projected to create approximately 100 good-paying new construction jobs and 43 technical Engineering and Administrative during the project with 10-15 new positions created indefinitely. Using the economic multiplier of 1.5 this results in over 200 jobs for eight years and 15-20 positions indefinitely. In addition to new-job creation, investment in this project will retain high-quality, good paying jobs with employer sponsored benefits at all five Railbelt utilities through the creation of new infrastructure that will require operation and maintenance for the next 25 years, as well as by preparing the Railbelt grid for the development of low carbon energy infrastructure projects such as ammonia production, direct air carbon capture, and drop in green jet fuel production.

As of 2021, 659 of the 1,071 total employees who work at the five utilities belong to labor unions. These are highly skilled and highly paid positions with the average 2023 wage of a journeyman line worker at these utilities ranging from $54.40 to $58.00 an hour. Railbelt utilities sponsor the following benefits: medical, dental, vision, life insurance, defined contribution retirement plans, 401(k), pension, short-term disability, long/short-term disability, tuition reimbursement, paid time off, and paid holidays. With State support affirmed through the AEA and RCA involvement, the Project's public participation plan anticipates very few issues establishing partnerships with tribal entities, local governments, and other State of Alaska departments with the goal of matching progressive workforce solutions to project needs.

The Railbelt utilities have long-term relationships with organized labor in Alaska. They have used project labor agreements in the past for projects of this scale, such as the construction of the Alaska Intertie. Each of the utilities has collective bargaining agreements with IBEW, among other unions. As outlined in the Project's public participation plan, the Project Team is engaging its labor partners early in the process to initiate discussions. Items of specific interest are local and targeted hiring goals, card-check neutrality, and programs to attract, train, and retain new workers. We believe that the IBEW is well-positioned to maintain strong labor relations with partner utilities throughout the Railbelt grid modernization and revitalization projects.

15. Identify Community Benefits Plan elements that will support Diversity, Equity Inclusion, and Accessibility, including methods to ensure accountability to specific goals throughout the project. *4,000 character limit.*

Alaska offers significant opportunities to engage underserved populations, including American Indian/Alaska Native residents, Pacific Islander residents, and veterans. The Project's public participation plan is designed to identify workforce partnerships to encourage participation of these and similar communities in the project. This may include meetings with organizations representing DACs to discuss how the Project can best utilize and support minority business enterprises (MBEs), focus groups including minority populations to test effectiveness of communication materials, public outreach targeting events with diverse populations, and hosting public meetings after work to reduce barriers to participation. DEIA goals will be measured against data collected by the AEA and utility HR departments regarding workforce (including contractors') veteran status, ethnicity, gender, and disability status. DEIA goals, as ratified by utility boards, will be evaluated against this data.

The Project Team supports continued development of a skilled, inclusive local workforce via the IBEW-NECA AJEATT, individual utility training programs, and the University of Alaska system. During the Project's public participation plan, meetings will be held between the project team, the Alaska Operating Engineers/Employers Training Trust (AOEETT), and the AJEATT. These meetings will assess how the apprenticeship programs these organizations offer serve workers facing systematic barriers to employment, and how to reduce those barriers. As noted, a program to allocate several positions in their apprenticeship programs for AI/AN residents affected by the project will be pursued with both IBEW and NECA.

Notably, all work performed with GRIP funding will be done in compliance with Alaska public contracting law, which contains provisions for local hire, apprenticeship training, prevailing wages, and other forward-looking policies. Alaska has a unique labor market that results in construction employees on projects of this scale being dispatched by organized labor and benefiting from registered apprenticeship programs represented by the Alaska Apprenticeship Training Coordinators Association (AATCA). AATCA, composed of 16 different construction trades, is a member of the Alaska Works Partnership, a non-profit organization focused solely on getting Alaskans into careers in the construction industry. Alaska Works is jointly funded by the U.S. Department of Labor, the Alaska Department of Labor and Workforce Development, the Alaska Department of Transportation and Public Facilities, and the North American Building Trades Unions. By complying with Alaska public contracting law and engaging registered apprentices on this project, there are assurance of accessing the resources brought to bear by the Alaska Works Partnership in support of local hire, veteran hire, and as diverse a workforce as Alaska has to offer.

16. Identify how this project will contribute to the Justice40 Initiative goal that 40% of overall benefits flow to disadvantaged communities. *4,000 character limit.*

This project is anticipated to provide significant benefits to Alaska's ANVSAs DACs both on and off the Railbelt. There are 22 census tracts that qualify as disadvantaged on the Railbelt, with a combined population of 81,921. There are 17 ANVSAs on the Railbelt, with a combined population of 160,486. These communities will receive benefits from grid upgrades, cost stabilization, and long-term resiliency. Because the utilities are owned by the consumers, the consumers receive direct benefits from grid upgrades, cost stabilization, and long-term

resiliency. The Railbelt's 260,000 residential utility accounts serve 75% of Alaska's population, 40% of whom live in a DAC or ANVSA.

A unique feature of the Project is that it will also have significant economic impacts outside of the Railbelt due to Alaska's Power Cost Equalization (PCE) program. The PCE endowment program was established in 1985 to provide economic assistance to residents and community facilities in rural Alaska, where electricity rates can be two to five times higher than in urban areas. The primary beneficiaries of PCE are residential customers, who are eligible for subsidy of actual consumption up to 750 kWh. Community facilities are also eligible for actual consumption up to 70 kWh per month per community resident. AEA administers the PCE program by making payments directly to individual utilities enrolled in the program.

Any change to the electricity rates in Anchorage and Fairbanks creates a corresponding change in the Average Class Rate AEA uses to calculate PCE for rural utilities, consequently increasing the PCE credit for eligible communities and residents. In FY23 PCE served 193 communities, 154 (82%) of whom qualify as DACs or Tribal lands. Even a one cent decrease in the average class rate will increase the amount that would be issued by AEA to PCE-enrolled DACs by approximately $1,500,000.