Project PEER:
PacifiCorp's Equity-aware Enhancement of grid Resiliency
(Topic Area 1 – 40101c)

Lead Organization

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Team Member Organizations

Labor Associations: International Brotherhood of Electric Workers (IBEW) Local 659

Sub-Recipients: Crater Lake Electrical Joint Apprenticeship Training Center (CLEJATC), Rural Developments Initiative (RDI), Utah State University (USU)

Technology Partners: American Wire Group (AWG), Creative Pultrusions/Creative Composites Group, Kaddas, Marmon Utility, RS Poles, Schweitzer Engineering Laboratory (SEL), Siemens, Southwire, TAPP

Public, Community, and Educational Partners: Boys and Girls Club of Rogue Valley, Center for Energy Workforce Development (CEWD), City of Grants Pass, College of the Siskiyous, Del Norte County, Grid Forward, Oregon Department of Forestry, Oregon Institute of Technology, Rogue Community College, Yurok Tribe

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Project Location(s):
California, Oregon, and Utah

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1 PROJECT OVERVIEW

1.1 Background

PacifiCorp's Equity-aware, Enhancement of Grid Resiliency (PEER) project addresses the U.S. Department of Energy's (DOE) Topic Area 1 focus on projects that "reduce the likelihood and consequence of impacts to the electric grid due to extreme weather, wildfire, and natural disaster," that also "generate the greatest regional or community benefit . . . in reducing the likelihood and consequences of disruptive events." Among the more specific objectives discussed in Section 1.2 and later in this technical volume, PEER also seeks to provide "comprehensive transformational transmission and distribution technology solutions that will mitigate one or multiple hazards across a region or within a community" with specific emphasis on rural, disadvantaged communities (DAC) in Oregon and California.

California and Oregon, two of the six western states that PacifiCorp serves — are particularly vulnerable to wildfire and other extreme weather events. The increasingly urgent goals of resilience and wildfire mitigation align PacifiCorp with Oregon and California state and local priorities to protect citizens facing the devastating impacts of wildland fire. The relevance of wildfire on the nation, the region, and these counties cannot be overstated. In recent years, wildland fires caused by natural and human-made conditions in the West have burned millions of acres, blanketing the region in smoke, impacting communities like Glide and Santiam Canyon in Southern Oregon and Happy Camp, California (Karuk Tribe) to name a few. Over the past 15 years, the southern Oregon and northern California counties included in this application were directly or indirectly impacted by the Carr (2018), Chetco Bar (2017), Dixie (2021), Klamath Theater Complex (2008), and River Complex (2021) fires, which burned over 1.7 million acres in total, lasting for months, creating their own weather, and causing billions of dollars in damage. Smoke from these fires blanketed the region, creating at times the worst air quality in the world for downwind cities, even impacting air quality on the other side of the continent.[1] While these national and regional wildfire impacts are dramatic, wildfire risks are the most devastating to the small towns and DACs in these heavily forested, rural counties. Apart from the extreme wildfire risks faced by the region, communities such as the Yurok Tribe have faced recurring floods that affect safe and reliable operation of electric distribution system.

Over the past several years, PacifiCorp has invested several hundred millions of dollars in asset hardening and control center upgrades to mitigate against the potential risks of wildfire and extreme weather events. PacifiCorp has established detailed wildfire mitigation plans to predict, protect, and maintain its electrical lines and equipment to minimize the risk of wildfire ignition. PacifiCorp continues to analyze its electric system to develop longer-term strategies that consider

[1] Oregon's largest wildfires | OregonLive.com; Carr Fire | CAL FIRE; Dixie Fire | CAL FIRE; River Complex | CAL FIRE; Wildfire: Information on Forest Service Response, Key Concerns, and Effects of the Chetco Bar Fire | U.S. GAO; https://www.kuer.org/health-science-environment/2021-08-06/utah-had-the-worst-air-in-the-world-today-heres-what-you-need-to-know-to-be-safe; https://www.cnn.com/2021/07/21/weather/us-western-wildfires-wednesday/index.html

the changing climate and increasing wildfire risks, with a continued focus on mitigating Public Safety Power Shutoff (PSPS) impacts to customers.

1.2 Project Goal

PacifiCorp's Equity-aware Enhancement of grid Resiliency (PEER) project addresses the aforementioned DOE objectives through concurrent implementation of regional asset hardening and system automation technologies, while also addressing a critical community and industry need of training new workers. System hardening for fire-resistance and fire prevention includes the replacement of overhead bare wire with covered conductors, fire-resistant poles, non-expulsion fuses; in addition, system hardening also includes new substation infrastructure to avoid water impact in flood-prone areas of the Yurok tribe. System automation includes adaptive protection and control microprocessor relays with remote communications. 100% of this project will be implemented in DACs and tribal regions that are vulnerable to wildfire and extreme weather events. PacifiCorp expects Project PEER to benefit the targeted DACs by (i) demonstrating a five-minute improvement in System Average Interruption Duration Index (SAIDI), (ii) reducing 50% outages per mile per year, (iii) effectively eliminating ignition risks from overhead distribution lines in the area, (iv) ceasing flood-related outages impacting Yurok tribal community, and (v) introducing over 400 pre-apprentice graduates into the workforce in Oregon, California, and Utah DACs. The following graphic illustrates Project PEER's scope and impact:

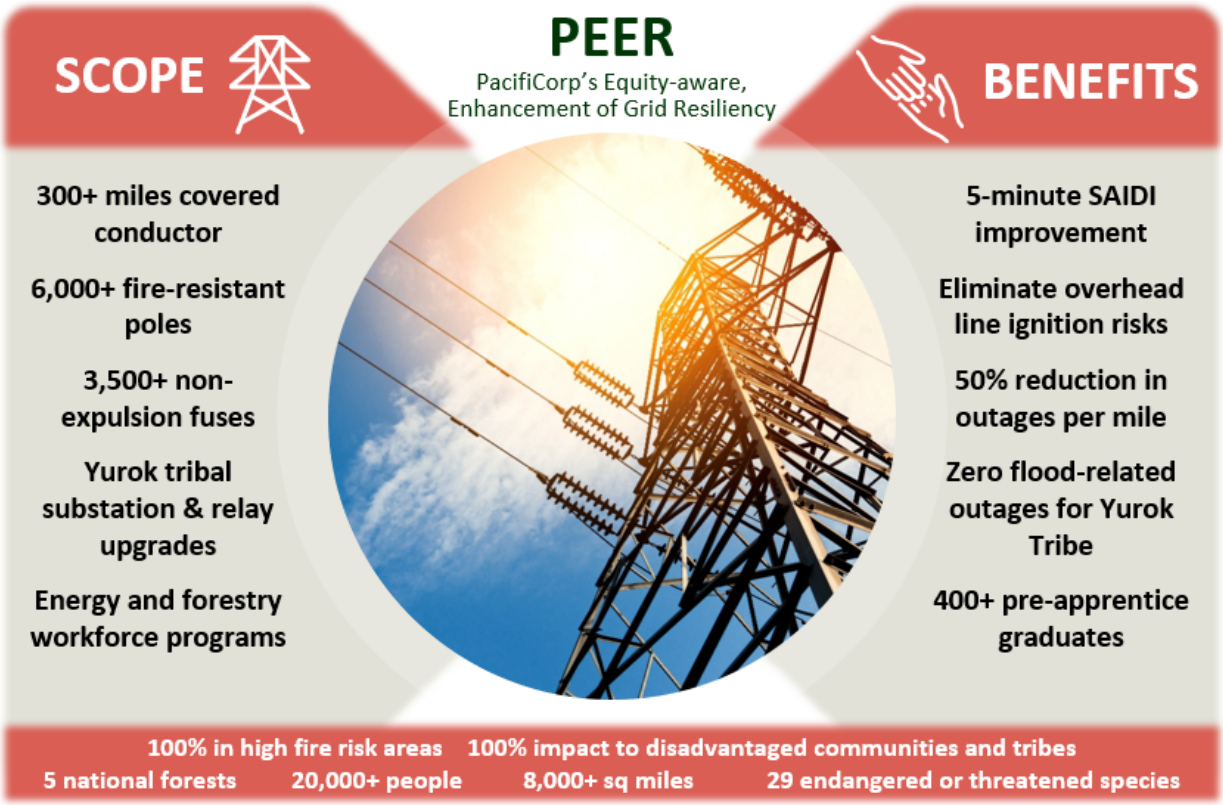


Figure 1—Project PEER Scope and Impact Overview

1.3 DOE Impact

DOE funding will enable the engineering design and deployment of the PEER system, benefiting 8,000+ square-mile region of high fire risk areas inhabited by DACs and tribes to reduce or eliminate wildfire risks and improve system resiliency in these extremely rural regions of Oregon and California. DOE funding is expected to enable the deployment of this project that consists of comprehensive implementation of system hardening and automation technologies for much-needed resiliency and reliability improvements in the area, as well as developing the next generation of electrical workers for electrical, utility, and solar industries. . Additionally, the project is expected to create significant opportunities for greater coordination and dialogue between PacifiCorp and these communities. This is best exemplified by PacifiCorp's collaboration with the Yurok Tribe, the largest tribe in California, with more than 5,000 enrolled members.[2] Through PEER, the Yurok Tribe and PacifiCorp plan to address reliability challenges caused by frequent weather events unique to the tribal community region. Table 1 provides further explanation about the importance of DOE's funding to each technology included in PEER.

Table 1—DOE Funding and Technical Elements

Technology	Use for DOE Funding
Covered Conductor and Fire-Resistant Poles	DOE funding will prioritize installation in large swaths of rural areas that disproportionately suffer from high fire risk and other extreme weather events.
Non-Expulsion Fuses	DOE funding will ensure that the circuits in high wildfire risk areas replace expulsion fuses with CAL FIRE-approved non-expulsion fuses.
Microprocessor Relays with Wildfire Protection Features	DOE funding will accelerate the installation of microprocessor relays in the Yurok tribal area and, as applicable, in rural areas with high wildfire risk. These microprocessor relays will be equipped with advanced wildfire protection features such as high-impedance fault (HIF) detection and elevated fire risk (EFR) settings; the precise deployment will align with the circuit locations identified in the *LOW.xls*.
Substation and Transmission Upgrades	DOE funding will allow PacifiCorp to holistically mitigate the effects of climate change on reliability and resilience for infrastructure serving the Yurok Tribe. These upgrades include elevating the Yurok substation to avoid water impact in a flood-prone location and adding reclosers to the adjacent transmission line.

With DOE funding, PEER adopts a holistic approach — implementing multiple technologies simultaneously in communities that are most vulnerable to the risk of outages and damage caused by extreme weather events. PEER goes far beyond the objectives of the Justice40 initiative under Executive Order 14008. 100% of the PEER project benefits of improved grid resiliency and reliability flow to Justice40 communities that also fall in high fire-risk areas (see Figure 2).

[2] Our History | Yurok Tribe

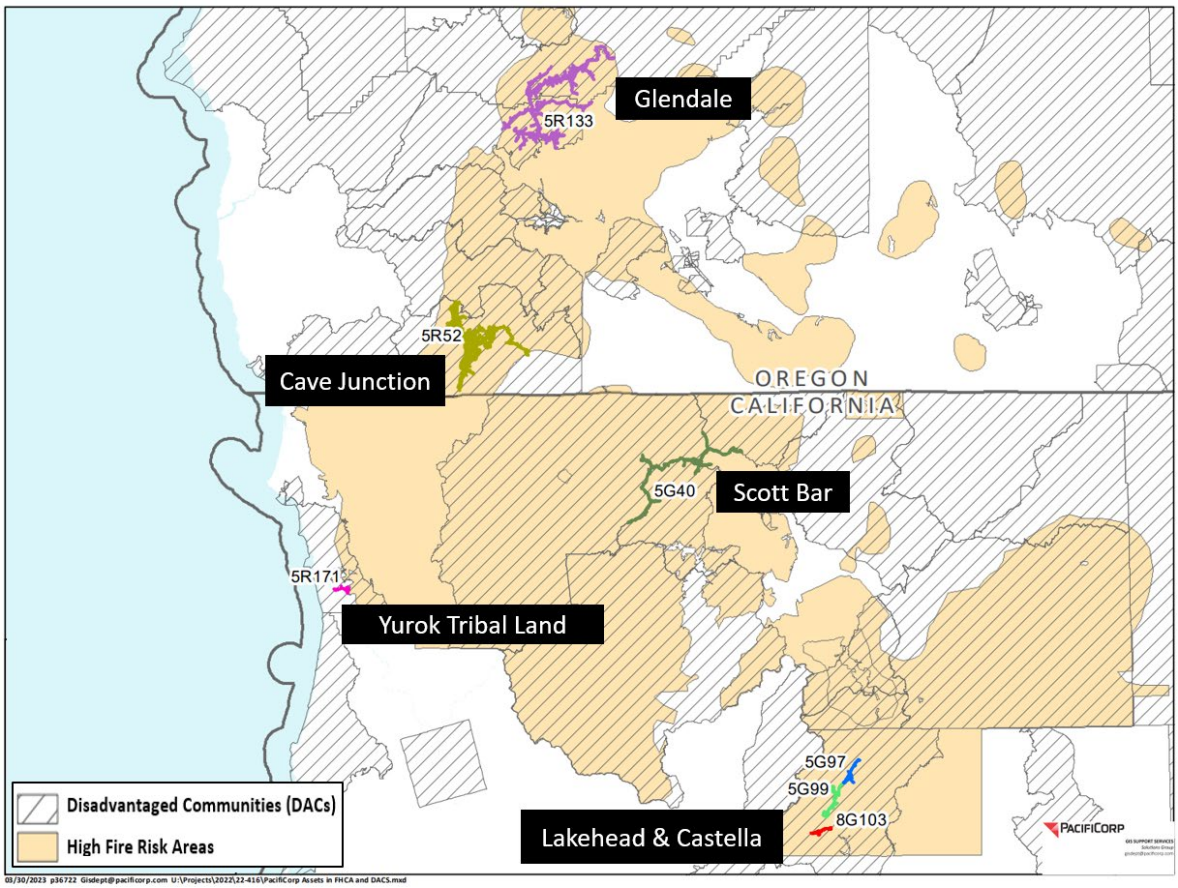


Figure 2—PEER Project Map

1.4 Community Benefits Plan

PEER's technical implementation includes over five communities in California and Oregon, of which 100% are DACs. The project scope is rooted in PacifiCorp's extensive engagement with these communities. Company understanding of community priorities has shaped PEER's focus: first, on reducing risk of wildfire incidence and intensity (both top threats to community well-being) and second, on improving energy resilience. All of the census tracts in these communities rank in the top 90th percentile or higher for building and/or agricultural losses due to natural disasters. In addition, all DACs are low-income, most face higher rates of fine particulate matter (PM2.5), and a majority have high rates of health risks associated with wildfires (e.g., asthma, heart disease). [3]

In addition, PEER seeks to ensure deeper community needs are met by extending PacifiCorp's programs for high-quality job creation, improved energy efficiency (reduction in energy burden) and renewable resource deployment (increase in local clean energy). PacifiCorp will allocate approximately 10% of federal funding toward directly benefiting DACs through (i) workforce

[3] Explore the map - Climate & Economic Justice Screening Tool (geoplatform.gov)

training programs, (ii) improved diversity in its workforce and suppliers, (iii) site-specific resiliency initiatives in communities impacted by PSPS events and (iv) energy efficiency programs for reducing energy burden *(*please see the *Community Benefits Plan* for more details*).* Through PEER, PacifiCorp and local labor unions in California and Oregon will ensure all field crews are represented workers.

PacifiCorp has service territories in Utah, and labor unions often share resources across state borders. As a result, PEER's workforce development program will be expanded beyond Oregon and California and include Utah DAC and tribal regions. PacifiCorp will partner with sub-recipients Crater Lake Electrical Joint Apprenticeship Training Center (CLEJATC) and Utah State University (USU) to expand availability of the electrician pre-apprenticeship course specifically designed for high school students in underserved rural and tribal communities in California, Oregon, and Utah. This course uses a mobile educational unit (MEU) operated by the International Brotherhood of Electrical Workers/ National Electrical Contractors Association (IBEW/NECA), CLEJATC, and USU. The project will be accomplished in two phases: first, the MEU will be pilot tested and demonstrated in southern Oregon; second, an expansion of the course to serve the larger region — including coal communities negatively impacted by the transition to clean energy, and multiple areas in the Navajo tribal area in Utah. This partnership is expected to graduate over 400 pre-apprentices into the workforce. The program curriculum, using a combination of classroom learning and functional workshops, will develop the next generation of electrical workers and promote career opportunities in electrical, electrical utility, and solar industries.

In addition, PacifiCorp will leverage our current work under the Stronger Together partnership, a pre-apprentice talent development program with IBEW to expand programs targeted at minority and diverse communities in DACs.

Federal funds will also be used for an independent, scientific, and data-driven approach to measure impact and optimize implementation structures to maximize community benefits, primarily in the DAC and tribal regions. With this objective, PacifiCorp will establish a stakeholder advisory board (called the Regional Coordination Unit or RCU), led by Rural Development Initiatives (RDI), to create collaborative company-local engagement to optimize investments in grid infrastructure and programs for DACs.

PacifiCorp does not expect Project PEER to impact its communities' access to natural resources and tribal cultural resources.

1.5 Climate Resiliency Strategy

PacifiCorp is acutely aware of the need to prioritize grid asset hardening and protection in response to the increasing climate risks. PacifiCorp has recently partnered with Electric Power Research Institute (EPRI) to implement the Climate Resilience and Adaptation Initiative (READi): Power Common Framework[4] to apply climate-related information at the asset level, with

[4] https://www.epri.com/research/sectors/readi

guidance for specific asset/system vulnerability analyses, thus, enabling the most effective future design and operation of a reliable, resilient, and low-cost power system.

2 TECHNICAL DESCRIPTION, INNOVATION, AND IMPACT

2.1 Relevance and Outcomes

DOE Topic Area 1 supports activities that mitigate extreme weather and wildfire impacts to the electrical grid using transformative solutions that address multiple hazards "across a region or within a community." In addition to critical infrastructure resilience improvements, positive economic and social justice impacts are vital to PEER's relevance and success. Ultimately, PEER project elements must also reach beyond themselves in a way that other utilities can replicate. PEER addresses these DOE objectives through community-focused system hardening based on fire-resistance and fire prevention efforts including installation of covered conductor, fire-resistant poles, non-expulsion fuses and non-expulsion arresters, and microprocessor relays with wildfire protection features such as such as high-impedance fault (HIF) detection and elevated fire risk (EFR) settings. PacifiCorp has significant experience with these innovative, system-hardening technologies; however, this will be the first time these technologies are being collectively deployed to primarily benefit DACs and tribal communities.

PacifiCorp expects Project PEER to benefit the targeted Justice40 area by (i) demonstrating a five-minute improvement in System Average Interruption Duration Index (SAIDI), (ii) reducing 50% outages per mile per year, (iii) effectively eliminating ignition risks from overhead distribution lines in the area, (iv) ceasing flood-related outages impacting the Yurok tribal community, and (v) introducing over 400 pre-apprentice graduates into the workforce.

It is important to note that avoiding a single large wildfire and the damage associated with such an event could pay for the PEER investments multiple times over. For example, the Carr Fire alone created over $1 billion in losses and the Dixie Fire cost over $600 million just for fire suppression.[5] While the economic impact of fire resilience is difficult to quantify, PacifiCorp has developed metrics to quantify grid impact of Project PEER as detailed later in this section.

2.1.1 Fire resistant technologies and fire prevention systems

Covered conductors for overhead distribution systems: Covered conductor installation typically involves the replacement of bare overhead conductor and associated framing with conductor insulated with abrasion-resistant polyethylene coatings. The installation of covered conductor in both primary and secondary overhead systems — as a replacement for standard bare wire installations used by utilities for over a century — can help reduce the occurrence of phase-to-phase contacts either directly or through a medium such as a tree branch, animal/bird, or a foreign object, which may result in a wildfire ignition. In addition to wildfire-related safety benefits, the elimination of numerous transient-type outages is expected to improve reliability, the overall resiliency of power systems, and facility life expectancy. Covered conductor systems

[5] Carr Fire Losses May Reach $1.5B in Likely Another Destructive Season for California (insurancejournal.com); Costs of the largest U.S. wildfires 2021 | Statista

also provide additional avian and animal safety, joint use, and right-of-way benefits not directly related to wildfire mitigation; covered conductors require less maintenance and simplify tree trimming requirements as compared to a bare wire.[6] PEER will install approximately 300 miles of distribution covered conductors in DACs vulnerable to significant wildfire risks in the states of Oregon and California.

Utility pole management: Replacement of traditional wood poles with fire-resistant composite and/or steel poles is expected to protect the pole infrastructure from the excessive heat generated by typical brush/grass fires. The current wood pole-based infrastructure can be more easily damaged and potentially ignite in a brush fire event; composite fire-resistant or steel poles typically maintain their structural integrity, which reduces the risk of failure during wildfires. As a result, these poles remain less susceptible to damage and degradation caused by a fire. PEER will include evaluation of all pole infrastructure for the circuit segments that are installing covered conductor and, wherever appropriate, will install fire-resistant steel or composite poles. Initial estimates indicate 6,000 pole replacements as part of Project PEER.

Non-expulsion fuses: Expulsion fuses have traditionally served as one of the primary protection devices on the overhead distribution system. However, expulsion fuses may generate electrical arcs, sparks, or hot material during their normal operation — a significant ignition risk that could potentially trigger large wildfires. A non-expulsion fuse is a full-range, current-limiting dropout fuse with a self-contained design that offers silent interruption — no gas, sparks, or debris emitted — with significant fire risk reduction in dry or drought-stricken areas. PacifiCorp plans to replace all expulsion equipment and other linked hardware in the identified DACs that are within high fire risk areas. PEER will install approximately 3,500 non-expulsion fuses on overhead distribution covered conductors in the DAC areas vulnerable to wildfire risks in the states of Oregon and California.

2.1.2 Yurok tribal community: monitoring, control, and adaptive protection technologies; substation and distribution line upgrades

Microprocessor relays with wildfire protection features: Design and deployment of advanced microprocessor relays will include new cutting-edge features such as high-impedance fault (HIF) detection and advanced elevated fire risk (EFR) settings. HIFs are short-circuit faults with currents smaller than those a traditional overcurrent protective relay can detect. The main causes of HIFs are tree branches touching a phase conductor, dirty or failing insulators that cause flashovers between a phase conductor and the ground, or downed conductors. HIF relays trip during such low frequency events, reducing fire risk and preventing a potential spark event. During low-risk seasons, these relays can identify potential faults before a trip, giving line crews time to examine the circuit without interrupting electrical service. Relays with EFR settings enable a faster trip, shutting off power within a second of contact, dramatically reducing ignition risks. PEER will deploy HIF detection relays in the Yurok tribal community and ensure all circuits in the project

[6] Trager, Brian J. (n.d.). *Spacer Cable Vs. Tree Wire Vs. Bare Wire Overhead Distribution Systems.* Milford, NH: Hendrix Overhead Power Solutions/Marmon Utility LLC.

area can detect EFR such that devices are adjusted to trip on contact — deenergizing the line and lowering the risk of a sustained event or possible ignition.

Substation and distribution line upgrade: The Yurok Tribe has historically had multiple floods that have impacted the local distribution substation, causing long-duration outages to the community. Additionally, the 69-kilovolt radial transmission line connecting the Yurok substation traverses a heavily wooded area where frequent lightning and tree-related outages have compounded reliability challenges. Based on multiple discussions between PacifiCorp and Yurok tribal leadership, PEER plans to holistically address tribal reliability concerns by (i) upgrading the Yurok distribution substation with new transformers and circuit breakers as well as raising the ground level by 10-15 feet; (ii) install advanced microprocessor relays and recloser devices on the 69-kilovolt transmission line.

2.1.4 Grid Outcomes

PEER will harden the grid infrastructure for target DACs in a region increasingly vulnerable to extreme weather and significant wildfire impacts. PacifiCorp has identified metrics to quantify and track project impacts. Traditional metrics, such as SAIDI and Customer Average Interruption Duration Index (CAIDI), will be combined with new metrics to measure the impact of improved resilience to extreme weather events, as shown in Table 2 below. All metrics will be tracked with baseline, mid-point, and end-of-project quantitative values.

Table 2—Project PEER Impact

Area	Initiative	Proposed Metric	Explanation
Ignition Risk	Covered conductor	Number of outages from foreign object contact	Covered conductor protects live wire from contacting dry brush during extreme weather events.
	Non-expulsion fuses	Number of operations	Non-expulsion fuses — whenever they are operated or activated — reduce ignition risk.
Resilience	Microprocessor relays with wildfire protection features, Yurok tribal community	HIF/EFR trips, EFR deployment frequency	These represent events that could lead to wildfire that were potentially mitigated
	Covered conductor	Outages (defined by SAIFI and other metrics)	High-wind speeds, storms and other extreme weather events tend to impact poles and lines. Covered conductors and steel or fire-resistant poles are more resilient to these situations.
Reliability	Covered conductor	Outages (defined by SAIFI and other metrics)	Faults by contact are significantly reduced
	Microprocessor relays with wildfire protection features, Yurok tribal community	HIF detections before trip	Interface recognizes impedance allowing investigation of interference before a fault

The economic value of other resilience and reliability benefits would also be quantified to demonstrate the project impact. Further, these benefits will be tracked in DACs and tribal areas as specified in the Justice40 section of the Community Benefits Plan.

To further support industry advancement, PEER will also supplement PacifiCorp's ongoing integration with the Outage Data Initiative Nationwide (ODIN) campaign that will support real-time data outage and other grid performance data sharing with the DOE.

2.2 Feasibility

PacifiCorp's internal processes and external relationships ensure PEER's feasibility. For all the equipment being considered in this project, PacifiCorp has developed internal construction standards, installation best practices, inspection and maintenance policies, and training guidelines. These efforts firmly established individual initiative benefits and helped PacifiCorp clarify best practices and familiarity with technical limitations. Furthermore, all the initiatives in PEER will take place in existing rights-of-way — mitigating any risks associated with siting and permitting. PacifiCorp also has significant experience collaborating with PEER's vendor organizations. Lastly, PacifiCorp has established material and services contracts with applicable technology partners and constructed the workplan presented in Section 3 to match these expectations. The most critical suppliers have provided letters of commitment supporting PEER's execution. Technology-specific feasibility details are described below.

Covered conductors, fire-resistant poles and non-expulsion fuses: PacifiCorp began a system hardening pilot that included covered conductor, fire-resistant poles, and non-expulsion fuses in 2020 and completed over 60 miles across its service territory in 2022. This pilot program has allowed PacifiCorp to familiarize itself with project implementation containing this type of equipment and subsequently identify and mitigate project risks.

In Project PEER, the scope has been divided into smaller, location-specific projects for modular and streamlined implementation. Additionally, PEER will be implemented in areas where PacifiCorp has an active ongoing engagement with the communities. Multiple meetings with Josephine County (Grants Pass), Siskiyou County (Scott Bar), and the Yurok Tribe have established their support for similar resilience initiatives. These precursor efforts will allow PacifiCorp to quickly move from the project scoping phase into the project execution phase without unexpected delays.

Microprocessor relays (Yurok substation) with wildfire protection features: PacifiCorp plans to install SEL's advanced microprocessor relays for enhancing grid operations under climate-risk conditions — a technology PacifiCorp has significant experience operating and troubleshooting, and which integrates well with existing infrastructure. These advanced relays also come with EFR settings that allow operators to adjust system automation based on wildfire risk. The installation of these technologies, potentially coupled with circuit breaker, is a familiar process. To address labor shortages, these installations will be implemented in phases with the goal of retaining a smaller, fully trained workforce capable of completing projects in an efficient manner.

***Yurok Substation and distribution line upgrades*:** Based on discussions with the Yurok Tribe, PacifiCorp has confirmed that the substation serving the community is in a low-lying area more likely to be impacted by climate change-induced flooding. To address the community's legitimate concerns about substation energy reliability, PacifiCorp proposes to elevate the substation above the flood plain. Compared to relocating the substation, which could cause several years of delay due to onerous permitting processes, PacifiCorp has determined that elevating the substation is

the best, quickest solution to address substation flooding concerns. To address long-duration sustained outages caused by a 69-kilovolt radial transmission line connecting Yurok substation, PEER commits to adding a transmission recloser to significantly reduce outage frequency and duration. Considering PacifiCorp has years of experience coordinating and supporting the Yurok tribal community, the project objectives are expected to be delivered timely and with full support of the tribe. A letter of support from the Yurok Tribe associated with these efforts is included inthe *PacifiCorp_Partner.pdf* enclosed with this application.

2.3 Innovation

Project PEER seeks to supplement proven technologies with (a) innovative technology solutions and (b) a novel community-focused approach to implementation.

Community-focused implementation approach: The traditional utility implementation approach for upgrading infrastructure has been to prioritize upgrades based on factors such as reliability, age of assets, wildfire risk, and the number/type of customers served. The most critical constraint in project execution is typically availability of funds that could delay certain project components by several years. This often leads to a fragmented approach towards asset hardening, wherein it takes significant time for customers to realize benefits from the overall project.

PEER's innovative approach involves the concurrent planning and implementation of multiple technologies on the system to eliminate a piecemeal approach and allow the much quicker impact benefiting DACs that typically face the highest risk from extreme weather events. This holistic approach is expected to have a greater impact than the traditional linear approach, as it addresses multiple vulnerabilities at once and considers the needs of specific communities. By implementing multiple technologies simultaneously, PEER is able to enhance the resilience of the grid, reduce the risk of outages and damage caused by extreme weather events, and support economic growth and community well-being.

As mentioned in Section 2.1.3, PacifiCorp will use a combination of traditional and new metrics to quantify and track local community and grid impacts. PacifiCorp is partnering with Rural Development Initiatives (RDI), a regional leader in community engagement and impact assessment, to enable an independent evaluation of PEER's benefits.

Innovative technology: Covered conductors have a record of improving reliability and system resilience while decreasing the wildfire risk associated with traditional bare wire installation — however the implementation approach of the conductor is still evolving. For instance, the tools available for installation of conductors on energized lines are new and currently undergoing rigorous evaluations by utilities, including PacifiCorp. Under PEER, PacifiCorp will work with suppliers to develop specialized tools for stripping covered conductors using existing workmanship methods approved by the labor unions. Similarly, non-expulsion fuses and microprocessor relays are proven technologies that have not yet become the norm for utilities in the US. Increasing adoption of this technology is anticipated to spur further technology development to improve applications and reduce costs, thereby benefiting other regions of the United States. Project PEER team will share applicable data with relevant suppliers to facilitate product improvement activities and increase the level of innovation through active collaboration.

2.4 Industry Impact

PEER's positive impacts reach far beyond the five primary communities touched directly by the project. As a larger utility operating in a region facing high fire risk, PacifiCorp is uniquely positioned to act as a frontrunner in new utility wildfire mitigation technology adoption and supply chain development. With DOE assistance, the company can demonstrate the effectiveness and viability of emerging wildfire mitigation technologies, and the impact of simultaneous installation, through new metrics and benefit-costs analysis of different implementation approaches. DOE funding will expand the company's investment in emerging technologies; the company's investment will further help these technologies mature—mitigating the broad risk of misapplication of expensive, insufficiently tested tools. As the technologies continue to mature, manufacturing efficiencies and probable supplier competition can reduce costs, thereby supporting scaled deployment by a wide range of utilities, especially smaller utilities struggling to respond to extreme weather impacts.

Immediate industry impact—sharing lessons learned with peer utilities: As a subsidiary of Berkshire Hathaway Energy (BHE), PacifiCorp shares critical lessons learned with other BHE affiliates, including MidAmerican Energy Company and NV Energy. PacifiCorp will work with its partner Grid Forward on an annual symposium to share lessons learned from funded federal projects related to wildfire mitigation. As part of the regional coordination workgroup focused on wildfire technology, PacifiCorp will share lessons learned with other workgroup members including Portland General Electric, Idaho Power, Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Bear Valley Electric, and Liberty Utilities. PacifiCorp also shares lessons learned, as mandated by California's Office of Energy Infrastructure Safety through publicly available annual filings. Finally, PacifiCorp will coordinate with Edison Electric Institute to share best practices with its extensive member utilities.

PacifiCorp's past successes have stimulated other ecosystem partners to pursue similar fire risk strategies. As an example, PacifiCorp will be continually evaluating undergrounding of assets as an alternate option for system hardening. The company's technology choices are based on cost-benefit and feasibility analysis on a case-by-case basis. PacifiCorp will share the results of this analysis with broader industry forums so that company insights and experience can improve the decision frameworks used in utility system hardening projects.

Collaboration with technology providers and research institutions: In 2023, PacifiCorp will be part of the Climate READi program led by EPRI (see also Section 1.5). As part of this program, participants from more than 25 major utilities, independent system operators, state regulatory commissions, and consultants are engaged in developing a common framework to provide an informed approach to climate risk assessment and strategic resiliency planning along with developing infrastructure adaptation strategies. PacifiCorp will share lessons learned from PEER's resiliency focused investments with program participants to increase general awareness and share specific technical and operational guidelines.

Extended industry impact: PacifiCorp has consistently received feedback from suppliers expressing interest in expanding/improving product portfolios to include technologies that assist

in reducing climate-risk impacts, including wildfires. The significant level of investment included in the PEER project will allow PacifiCorp to strategically work with new suppliers to improve their product offerings through additional investments as well as to find ways to create/expand manufacturing in the United States. As an example, PacifiCorp will work with U.S.-based suppliers to develop specialized tools for stripping covered conductors as covered conductor must be treated as a hot, energized wire when the conductor jacket is stripped for splicing purposes. The best existing tools are designed for splicing deenergized wire; existing tools for hot splicing conductor are cumbersome. The company is working to develop ergonomic manual tools and a battery-operated tool to complete this work safely and more efficiently. Similarly, PacifiCorp consistently shares data gathered from its microprocessor relays with its suppliers to allow further investment in product improvement activities.

2.5 Project Support for State and Local Resilience and Energy Plans

Improved energy resilience: PacifiCorp expects PEER to reduce the need for deliberate, sustained power outages like PSPS, which have a tremendous impact on the economies and productivity of the communities the company serves and the well-being of its customers. While California has had a long history with PSPS, Oregon is experiencing increasing wildfire risk and a rise in such events.[7] Although PacifiCorp, its customers, and communities are adapting to the greater need for PSPS events to support the grid's stability and regional safety, these events are disruptive to the day-to-day functioning of businesses, of families, of all customers. The topic of energy resilience is a critical issue frequently discussed during PacifiCorp's city, tribal, and county leadership engagement sessions. PEER is expected to reduce the need for triggering sustained outages to reduce wildfire risks, improve overall system reliability, and support improved energy resilience and safety for customers in DACs and tribes.

Reduced risk of extreme weather events and wildfires: PacifiCorp's recent customer survey, conducted as part of engagement with Oregon communities in February 2022, identified wildfire impact as a top concern. PEER will support efforts to reduce the severity of wildfire impact and will prioritize deployment in communities at the greatest risk of impact from extreme weather events. The five DACs and tribes included in PEER are in the top decile of building or agricultural loss from natural hazards among census tracts across the nation. Additionally, the Yurok tribal area is in the 95th percentile for loss of life due to natural hazards. Wildfire often causes increased air pollution due to higher levels of particulate matter; Scott Bar, Lakehead, and Grants Pass all rank above the 90th percentile in particulate matter. Per the EPA, these concentrations can lead to increased heart complications and decreased lung function. All three communities rank in the 97th percentile of heart disease.[8] The loss of life and property are exacerbated by the lower household incomes in these communities and the generally low population density that makes paying for wildfire protection burdensome. The increasing wildfire threat is reflected in PacifiCorp territories' state resilience plans and policies that require utilities to prepare and

[7] Associated Press, "Power could be cut in 6 Oregon counties due to extreme wildfire conditions," accessed December 2022: https://www.oregonlive.com/wildfires/2022/09/power-could-be-cut-in-6-oregon-counties-due-to-extreme-wildfire-conditions.html

[8] Explore the map - Climate & Economic Justice Screening Tool (geoplatform.gov)

submit wildfire mitigation plans. Project PEER aligns with and builds upon the wildfire resilience strategies outlined by PacifiCorp in these plans.

While PacifiCorp cannot guarantee specific outcomes around natural disasters, PEER intends to provide a comprehensive resilience solution to the DACs in Scott Bar, the Yurok tribal area, Castella, Lakehead, and Grants Pass. This focus on *comprehensive* resilience led, for example, to PEER's plans related to the Yurok Tribe. PEER was initially intended primarily as a wildfire risk reduction project. While engaging with Yurok tribal community in PacifiCorp's northern California service territory, it was clear they faced significant reliability issues due to the system location. During our past engagement, the tribe highlighted the severe impact of outages primarily caused by periodic flooding of the Yurok distribution substation. The PEER project includes rebuilding of the substation to ensure future flooding does not impact the substation.

3 WORKPLAN

3.1 Project Objectives

Project PEER will deliver regional system hardening of electric distribution assets through fire-resistant and fire prevention systems including the replacement of overhead bare wire with covered conductors, fire-resistant poles, non-expulsion fuses; and through system automation that includes adaptive microprocessor relays with remote communications. The project is focused on benefiting 100% DACs and will demonstrate a five-minute improvement in SAIDI, 50% reduction in outages per mile per year, effectively eliminate ignition risks from overhead distribution lines in the area and cease flooding related outages impacting the Yurok tribal community; it will also introduce over 400 pre-apprentice graduates into the workforce in Oregon, California, and Utah DACs. The company has developed project objectives with a focus on the communities that will be directly impacted by these upgrades and have addressed concerns brought forward by a diverse group of stakeholders representing these communities.

All of PEER's elements involve the construction and alteration of utility infrastructure in the United States. As a for-profit entity, PacifiCorp is exempt from the Buy America requirement. PacifiCorp still seeks to abide by Buy America and promote minority-owned businesses when it is possible and has identified TAPP, a Hispanic-owned business based out of California, to be one of its primary vendors to provide steel poles. Companywide, PacifiCorp is making efforts to develop local vendors wherever the industry has traditionally relied on foreign sourced components. Project PEER will continue these efforts.

3.2 Technical Scope Summary

The work would be implemented in 2024-2027 and be divided into four equal budget periods of 12-months each. The total project aims to install over 300 miles of covered conductor with fire-resistant poles, approximately 3,500 non-expulsion fuse installations, and relay replacements in the 2-3 substations through scoping, permitting and procurement, engineering and design, and installation. The Gantt chart in Section 3.5 represents the completion of activities that are contained in the respective budget periods. The last budget period will largely focus on reporting project results, best practices and lessons learned. Figure 3. Illustrates the project delivery model to plan, design, procure, install, and commission all construction projects under PEER.

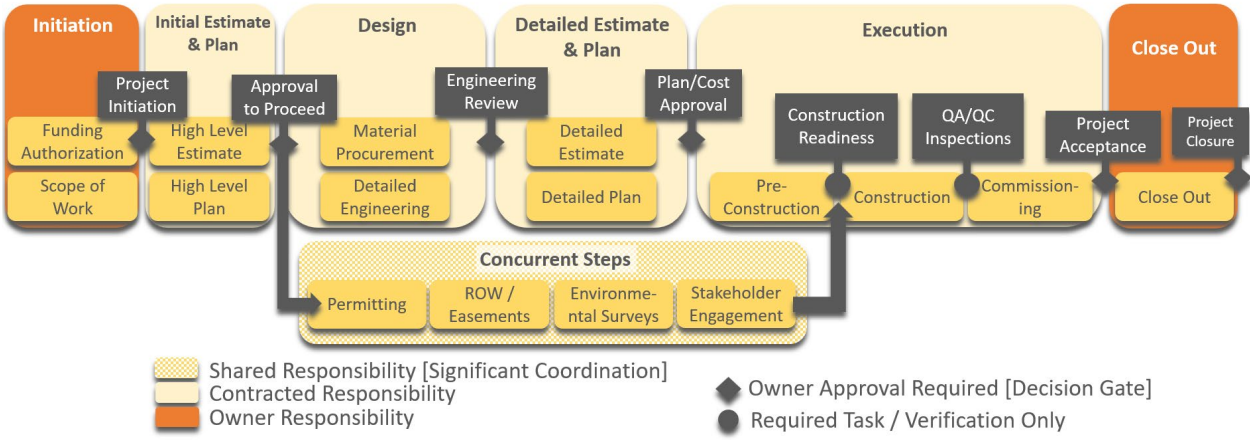


Figure 3—PEER Overall Delivery Model

3.3 Work Breakdown Structure and Task Description Summary

Task 1.0 – Project Management and Planning for Each Budget Period – Submit a project management plan (PMP) to/receive approval from the DOE PM (1.1). Provide necessary documentation for National Environmental Policy Act (NEPA) compliance (1.2). Revise and resubmit cybersecurity plan (1.3). Provide continuation briefings and all necessary reports (1.4).

BUDGET PERIOD 1

Task 2.0: Engineering Scoping – Execute scoping analysis for covered conductor (2.1), non-expulsion fuses (2.2), and microprocessor relays (2.3).

Task 3.0: Permitting and Procurement – Ensure that all permits and materials have been obtained for covered conductor (3.1), non-expulsion fuses (3.2), microprocessor relays (3.3), and Yurok substation upgrades (3.4).

Task 4.0: Engineering and Design – Complete design reviews for covered conductor (4.1), non-expulsion fuses (4.2), and microprocessor relays (4.3); complete design reviews for Yurok substation upgrades (4.4).

Task 5.0: Installation and Testing – Complete ODIN installation (5.1), install roughly 100 miles of covered conductor (5.2), non-expulsion fuses (5.3), and microprocessor relays (5.4); install and commission Yurok substation upgrades (5.5).

BUDGET PERIOD 2

Task 6.0: Engineering Scoping – Execute scoping analysis for covered conductor (6.1), non-expulsion fuses (6.2).

Task 7.0: Permitting and Procurement – Ensure that all permits and materials have been obtained for covered conductor (7.1), non-expulsion fuses (7.2).

Task 8.0: Engineering and Design – Complete design reviews for covered conductor (8.1), non-expulsion fuses (8.2).

Task 9.0: Installation and Testing – Install roughly 100 miles of covered conductor (9.1), non-expulsion fuses (9.2).

BUDGET PERIOD 3

Task 10.0: Engineering Scoping – Execute scoping analysis for covered conductor (10.1), non-expulsion fuses (10.2).
Task 11.0: Permitting and Procurement – Ensure that all permits and materials have been obtained for covered conductor (11.1), non-expulsion fuses (11.2).
Task 12.0: Engineering and Design – Complete design reviews for covered conductor (12.1), non-expulsion fuses (12.2).
Task 13.0: Installation and Testing – Install roughly 100 miles of covered conductor (13.1), non-expulsion fuses (13.2).

BUDGET PERIOD 4

Task 14.0: Reporting – Compile lessons learned and best practices for all activities, solicit and record feedback, complete an analysis on technology effectiveness (14.1).

- EOP 4A: Yurok substation has a new transformer, is raised above the floodplain, and has installed advanced microprocessor relay(s) with recloser(s) and circuit breakers(s).
- EOP 4B: Approximately 300 miles of covered conductor will be installed with approximately 6,000 steel and composite pole replacements in northern California and southern Oregon. Approximately 3,500 expulsion fuses that are on these circuits will be replaced with non-expulsion fuses, microprocessor relays at multiple sites will be installed and commissioned.

3.4 Work Milestones and Milestone Verification

Table 3 below provides the key milestones per budget period, including SMART and Go-No-Go milestones, and the milestones related to implementation of the Community Benefits Plan. The table also provides details of how the milestone achievement would be verified.

Table 3—DOE Funding and Technical Elements

No.	Milestone Description	Milestone Verification	Period
1.1	Submit PMP each budget period	Submit PMP to/receive approval from DOE PM	BP1-BP5, Q4
Budget Period 1			
M1	Complete design reviews for Yurok substation	Publish technical design	Q1
M2	Scope ~100 miles of covered conductor	Publish GIS map identifying scoped segments	Q2
M3	Complete ODIN integration	Document connectivity of data model	Q3
GNG1	Completed substation upgrade that raises substation and adds a transformer	Completed testing and commissioning forms	Q4
Budget Period 2			
M1	Scope another ~100 miles of covered conductor	Publish GIS map identifying scoped segments	Q1
M2	Obtain all relevant permits	Permit confirmation through consulting service	Q2
M3	Complete design reviews for covered conductors	Publish technical design	Q3
GNG2	Approx. 200 miles of distribution line have covered conductor	Inspection approved for 200 miles and redlines are submitted	Q4
Budget Period 3			

No.	Milestone Description	Milestone Verification	Period
M1	Scope last ~100 miles of covered conductor	Publish GIS map identifying scoped segments	Q1
M2	Obtain all relevant permits	Permit confirmation through consulting service	Q2
M3	Complete design reviews for non-expulsion fuses	Publish technical design	Q3
GNG3	Approx. 300 miles of distribution line have covered conductor and 3500 fuses	Inspection approved for 300 miles and redlines are submitted	Q4
Budget Period 4			
M1	Report on lessons learned from installations	Publish best practices and lessons learned	Q1
M2	Solicit feedback from Yurok and four other communities impacted by PEER	A survey, interview, forum or like method inquiring on all relevant aspects of PEER	Q1
M3	Receive feedback from Yurok and four other communities impacted by PEER	Receipt of one of the methods described above	Q3
GNG4	Report initial findings on PEER effectiveness	Metrics identified in Table 2 or alternatives are reported	Q4
Community Benefits			
M1	Conduct the first RCU meeting	Meeting notes that include attendance of at least 4 benefit organizations, 2 partners and 4 communities	BP1-Q2
M2	Track 100% of supplier invitations/DBE status	List of supplier invitations (with DBE status)	BP2-Q1
M3	Complete 10 resilience feasibility studies for organizations in DACs	Submit feasibility study reports to relevant parties	BP3-Q3
M4	Distribute 75% allocated workforce dev. funds	Receive report from workforce partners	BP3-Q4
M5	Renegotiate five collective bargaining agreements (CBA) expiring during the project	Five CBAs extend beyond 2027	BP4-Q4
M6	Complete training for over 400 pre-apprentice graduates	Graduation data	BP4-Q4
M7	Reduce diverse employee turnover to levels at parity with all employees	Internal reporting	BP4-Q4
M8	Create best practices and lessons learned report	Publish best practices and lessons learned	BP4-Q4

3.5 Project Schedule

The task numbers in the Gantt chart below correlate to the tasks and subtasks outlined in the WBS found in Section 3.3, and in the SOPO.docx.

Table 4—PEER Gantt Chart

Item		BP1				BP2				BP3				BP4			
1.1	Maintain PMP each budget period																
1.2	Manage and report on NEPA compliance																
1.3	Revise/resubmit cybersecurity plan																

Item		BP1				BP2				BP3				BP4			
1.4	Provide briefings and reports																
Task 1 Milestones																	
M0	Submit PMP each budget period				X				X				X				X
Budget Period 1																	
Task 2 – Engineering Scoping																	
2.1	Scope 100 miles for covered conductor (CC)																
2.2	Scope fuse replacements																
2.3	Scope relay replacements																
Task 3 – Permitting and Procurement																	
3.1	Materials & permits received for CC																
3.2	Materials & permits received for fuses																
3.3	Materials & permits received for relays																
3.4	Materials & permits received for Yurok substation																
Task 4 – Engineering and Design																	
4.1	Design CC install																
4.2	Design fuse install																
4.3	Design relay install																
4.4	Design Yurok substation install																
Task 5 – Installation and Testing																	
5.1	Complete ODIN integration																
5.2	Install ~100 miles of CC																
5.3	Replace old fuses																
5.4	Replace relays																
5.5	Install and commission Yurok substation upgrades																
Budget Period 1 Milestones																	
M1	Complete substation design	X															
M2	Scope ~100 miles of CC		X														
M3	Complete ODIN integration			X													
GNG 1	Completed Yurok substation upgrades				**X**												

Item		BP1				BP2				BP3				BP4			
	and installed 100 miles of CC																
Budget Period 2																	
Task 6 – Engineering Scoping																	
6.1	Scope next 100 miles for CC																
6.2	Scope fuse replacements																
Task 7 – Permitting and Procurement																	
7.1	Materials & permits received for CC																
7.2	Materials & permits received for fuses																
Task 8 – Engineering and Design																	
8.1	Design CC install																
8.2	Design fuse install																
Task 9 – Installation and Testing																	
9.1	Install ~100 miles of CC																
9.2	Replace old fuses																
Budget Period 2 Milestones																	
M1	Scope ~100 miles of CC					X											
M2	Obtain all permits						X										
M3	Complete CC design							X									
GNG 2	Complete next ~100 miles of CC								**X**								
Budget Period 3																	
Task 10 – Engineering Scoping																	
10.1	Scope final 100 miles for covered conductor																
10.2	Scope fuse replacements																
Task 11 – Permitting and Procurement																	
11.1	Materials & permits received for CC																
11.2	Materials & permits received for fuses																
Task 12 – Engineering and Design																	
12.1	Design CC install																
12.2	Design fuse install																
Task 13 – Installation and Testing																	
13.1	Install ~100 miles of CC																
13.2	Replace old fuses																
Budget Period 3 Milestones																	
M1	Scope ~100 miles of CC									X							
M2	Obtain all permits										X						

Item		BP1				BP2				BP3				BP4			
M3	Complete fuse design											X					
GNG 3	Complete final ~100 miles of CC												**X**				
Budget Period 4																	
Task 14 - Reporting																	
14.1	Report on lessons learned and initial performance																
Budget Period 4 Milestones																	
M1	Report on lessons learned from installations													X			
M2	Solicit feedback from Yurok and 4 other communities impacted by PEER														X		
M3	Receive feedback from Yurok and 4 other communities impacted by PEER															X	
GNG 4	Report initial findings on PEER effectiveness																**X**
Community Benefits Milestones																	
M1	Conduct first RCU meeting		X														
M2	Track 100% of supplier invitations for DBE status					X											
M4	Complete 10 renewable energy feasibility studies for DACs											X					
M5	Distribute at least 75% of workforce development funds												X				
M6	Renegotiate 5 Collective Bargaining Agreements (CBA) expiring by 2027																X
M7	Graduate over 400 pre-apprentices																X
M8	Reduce diverse employee turnover to levels at parity with all employees																X
M9	Report on lessons learned																X

Work towards community benefits will be executed continuously throughout the project lifetime. Therefore, the Gantt chart above only reflects the milestones that are part of these efforts.

3.6 Project Management

The leadership structure and lead contact for each partner organized by category is shown in Section 4.1. PacifiCorp will manage the overall program, coordinate all project funding, create and execute contracts with participants. PacifiCorp will schedule regular check-ins with the project team, monitor sub-recipient progress toward completion, perform regular risk assessment, and generally follow industry best practices in managing this project. PacifiCorp plans to organize an in-person, full team kick-off meeting, followed by quarterly stakeholder workshops to keep the team well-informed and coordinated. PacifiCorp will lead development of all quarterly, annual, and preliminary and final progress reports and ensure timely submission to the DOE. Any project changes or modifications will be coordinated by PacifiCorp and submitted to DOE for approval. Additionally, RDI will conduct program assessments to measure the effectiveness and to track the impacts on diversity, equity, inclusion, and accessibility (**DEIA**) and **Justice40** populations. RDI will house, maintain, and document all the data related to these activities.

3.7 Access to Equipment and Facilities

All work for the covered conductor, steel pole replacement, and non-expulsion fuses will be done in areas where PacifiCorp has the right to work. Tooling and specific equipment for these projects will be provided as part of the construction contract from vendors. Similarly, the microprocessor relay installation and automation upgrades will be done on PacifiCorp assets in PacifiCorp rights-of-way. Any specialized equipment that may be required will be included in contracts with vendors.

3.8 Risks and mitigations

Workforce and construction resources: Working in rural areas increases the challenge of finding skilled local workers. The issues are twofold: one, finding companies that will perform work; two, hiring and retaining qualified workers. The company will mitigate this potential risk through an open bidding process to establish a multi-year contract with an engineer-procure-construct (EPC) company. PacifiCorp has informed its partners of PEER's schedule; the labor unions have confirmed their support to deliver the project goals. These efforts reduce the risk of delays or cost overruns due to a lack of internal or external resources. PacifiCorp will ensure clear communication throughout the project; workforce availability concerns will be addressed in a timely and effective manner.

Environmental Surveys: Given the challenging geography and environmental sensitivities of the project sites, there may be potential unknowns that could delay implementation. For this reason, PacifiCorp proactively hired environmental consultants to pre-screen PEER's project sites and provided detailed information as part of the environmental questionnaire (see *ENV.pdf*). For PEER implementation, PacifiCorp plans to work with environmental experts for identification, scoping, and execution of any necessary environmental surveys to support permit acquisition, meet compliance requirements, or facilitate design or construction activities.

Permitting: Both Oregon and California have complex regulatory environments that can create permitting challenges. For each project, PacifiCorp will hire a permitting consultant to work with our internal environmental and permitting team. Pre-application meetings will be set up with the permitting agency either on a single-project or program basis to validate application needs and establish an expected permitting timeline. Through this process, a permit application package will be developed include all required surveys and data collection to satisfy the permitting agency. PacifiCorp will utilize this proven permitting process for PEER's implementation to ensure identification and timely acquisition of all relevant and necessary local, state, or federal permits.

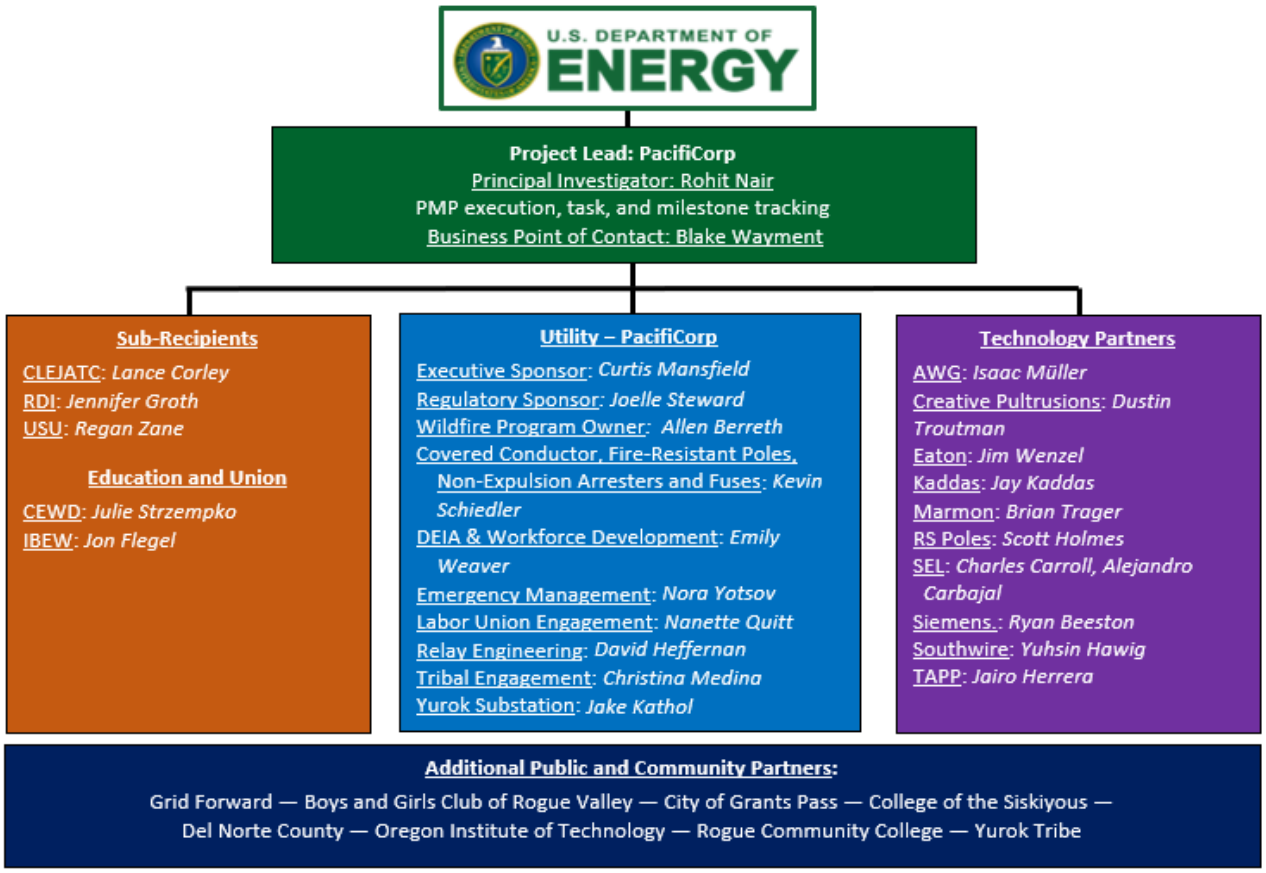
Materials supply chain: The current global supply chain environment, albeit improving, has led to material lead time and project implementation delays. However, PacifiCorp has been able to work with its suppliers to avoid material shortages and delays. For PEER materials with known long lead times, PacifiCorp will leverage long-term supplier partnerships to provide forecasts for material requirements and reserve production capacity. In the past, this has manifested in considerable lead time improvements. PacifiCorp will also coordinate with its contracted construction services team, which has significant experience in managing the delivery, storage, preparation, transportation, and logistics associated with materials and/or tools needed to support construction projects. PEER will continue these mitigation steps by projecting material needs in advance and considering suppliers that are familiar with and capable of meeting these requirements.

Inclement weather: To mitigate the impact of seasonal weather patterns, project schedules and milestones will be developed to account for potential delays or disruptions that may be caused by inclement weather, both in winter and summer. In addition to targeting construction activities to minimize weather-related risks, project schedules will also include contingencies or buffers to account for potential delays caused by inclement weather.

Engineering design: PacifiCorp will coordinate with internal and external design engineers to support all construction projects. Qualified engineering design firms will be utilized to complete detailed designs based on the company's scope of work. Working alongside experienced, third-party engineering firms will reduce risks associated with design flaws.

Quality control: PacifiCorp adheres to the DOE's Human Performance Improvement (HPI) Handbook, which provides a systematic approach to improving performance, reducing errors, and mitigating organizational weaknesses. PacifiCorp will use HPI tools such as cross-checking, pre- and post-job review, and an emphasis on communication to detect error-likely situations. Further, PacifiCorp will work with its external construction services team for scoping, planning, and completing post construction inspections prior to commissioning to ensure QA/QC, adherence to standards, consistency across all projects, and compliance with state specific codes.

4 TECHNICAL QUALIFICATIONS AND RESOURCES



4.1 Project Team

PacifiCorp (Role: Manage the overall program, coordinate all project funding, create and execute participant contracts) – PacifiCorp is the largest grid operator in the western United States with over 16,000 miles of high voltage transmission lines serving 1.9 million customers in six states. PacifiCorp is comprised of two business units: Pacific Power and Rocky Mountain Power. The Principal Investigator, Mr. Rohit Nair, joined PacifiCorp in 2011 PacifiCorp and has successfully been involved in multiple DOE awards, including DE-EE0007997, DE-EE0009782, DE-FOA-0002206, DE-FOA-0001987, and DE-EE0009224 for a combined $25+ million.

International Brotherhood of Electrical Workers (IBEW) (Role: Lead Labor union partner for the project) – Founded in 1891, IBEW is a labor union that represents approximately 775,000 workers and retirees in the electrical industry in the United States, Canada, Guam, Panama, Puerto Rico, and the US Virgin Islands; in particular electricians, or inside wiremen, in the construction industry and line workers and other employees of public utilities. The union also represents some workers in the computer, telecommunications, and broadcasting industries, and other fields related to electrical work. IBEW Local 659 has worked extensively with PacifiCorp in the targeted DACs and wildfire risk areas.

Crater Lake Electrical Joint Apprenticeship Training Center (CLEJATC) (sub-recipient) (Role: Train graduate pre-apprentices) — Located in Medford, Oregon, nonprofit CLEJATC is a long-time partner of PacifiCorp and IBEW Local 659. Established in 1967, CLEJATC provides the training/education of electrical apprentices, journey electricians, and others; its training center is a registered electrical construction industry apprenticeship program with approved standards in Oregon and California. Doing business as the Crater Lake Electrical Training Center, the CLTC has steadily grown and improved since its inception; it is based out of an 11,655 sq. ft. facility in Central Point, Oregon, fitted with all the tools, equipment, material, staff, and expertise needed to turn out quality electricians for the industry.

Rural Development Initiatives (RDI) (sub-recipient) (Role: Community benefits and engagement partner) – Rural Development Initiatives (RDI) is a 501(c)(3) nonprofit that works in and within rural communities to develop networks of leaders, revitalize economies, and elevate rural voices and priorities. RDI has helped create and implement locally driven strategies in hundreds of rural communities in the Pacific Northwest. RDI is recognized as a national leader in rural leadership development; it has trained and supported over 9,000 leaders working for community and economic vitality, engaged over 700 rural Hispanics in community and economy-building work, and coached over 600 community volunteer facilitators in the region.

Utah State University (USU) (sub-recipient) (Role: Work with CLEJATC to adapt/replicate the pre-apprenticeship program to the rural Utah region including tribal communities) – USU — a land-grant institution, is the lead campus for the National Science Foundation (NSF)-funded ASPIRE Engineering Research Center. In 2020 the ASPIRE center received $50.6 million in NSF funding to exponentially grow research and workforce development electrification initiatives. USU brings tremendous leadership and research experience in microgrids, power balance and control systems, grid interaction, consumer behavior, business models and energy markets, and charging infrastructure. Workforce development is core to ASPIRE, with an emphasis on K-12, trades, and community college pathway development. USU has satellite campuses across Utah including USU Eastern in Price, which is in the heart of coal country, and USU Blanding, which serves the majority Navajo San Juan County.

Center for Energy Workforce Development (CEWD) (Role: DEIA outreach to workers from nontraditional and historically marginalized communities) – CEWD, started in 2006, is a nonprofit consortium of energy companies (over 120 energy companies), contractors, associations, unions, educators, and business partners collaborating to ensure a skilled, diverse workforce pipeline to meet future industry needs.

American Wire Group (AWG) (Role: Covered conductor supplier) – Florida-based AWG has become one of the world's leading manufacturers of wire and cable since its establishment in 2001. After starting small, it expanded to become the nation's largest inventory of products used in the power transmission and distribution, substation, solar, wind, battery energy storage, and electric vehicle infrastructure markets, with four regional distribution centers in Pennsylvania, California, Texas and Florida.

Creative Pultrusions/Creative Composites Group (Role: Specialty pole supplier) – Creative Composites Group is based in Alum Bank, Pennsylvania and has recently partnered with other fiber reinforced polymer (FRP) composite suppliers to create Creative Composites Group. This

partnership allows Creative Pultrusions to leverage vast engineering, design, and manufacturing experience to deliver quality products for utilities

Eaton (Role: Non-expulsion fuse supplier) – Eaton is a 100-year-old, internationally known manufacturer of a wide range of utility and grid solutions products among many other items. Its Cooper Power series, which includes ELF non-expulsion (dropout) fuses, which eliminate the expulsive shower that exists with traditional fuse operation, mitigating the risk of fire.

Grid Forward (Role: Share learnings and lessons with industry) – Grid Forward, founded in 2010 as Smart Grid Oregon, is a non-profit trade association dedicated to promoting and accelerating innovation on the regional electric system. The organization has over 70 regional members representing regional utilities, advanced technology providers, major energy users, higher education, government agencies, non-profits and other grid development stakeholders.

Kaddas (Role: Wildfire cover supplier) – Kaddas, a family-owned business based in Utah, manufactures a broad product line of thermoformed plastic parts that are 100% made in America. Since its establishment in 1987, it has become a global leader in the production of raptor protection and wildfire covers.

Marmon Utility (Role: Covered conductor supplier) – Marmon's products are made in the United States with manufacturing facilities in New Hampshire and Connecticut. Since introducing aerial cable systems to the industry over 50 years ago, Marmon has striven to be an innovative leader in the utility industry.

RS Poles (Role: Fiberglass pole supplier) – RS Poles is based in St. George, Utah. Since 2003, it has been devoted to manufacturing high-quality composite poles for the utility industry that meet the needs of any project size and scope. RS Poles has been creating dynamic solutions that address the infrastructure challenges brought on by extreme weather related to climate change.

Schweitzer Engineering Labs (SEL) (Role: Supplier and technical support services for advanced microprocessor relay technologies) – SEL is a 100% employee-owned company that has spent decades developing transformative technologies for critical infrastructure. Since 1984, SEL has been at the forefront of relay technology research and implementation that has revolutionized the electric grid.

Siemens (Role: Non-expulsion arrester supplier) – Siemens Energy provides state-of-the-art, utility-scale, wildfire mitigation equipment, including non-expulsion arresters. Its 9,600 strong team is headquartered in Florida, and dedicated to serving as a fully integrated, full-service partner and driver of the energy transition.

Southwire (Role: Covered conductor supplier) – Family-owned since 1950, Southwire has become one of the world's leading manufacturers of wire and cable and an emerging influence in the industrial electrical space.

Transmission Power Products (TAPP) (Role: Steel pole supplier) – TAPP is a minority-owned company based in Houston, Texas. Since 1958, it has been devoted to manufacturing quality steel structures for the utility industry that meet the needs of any project size and scope. Further, its reserve of pre-purchased raw materials sets TAPP ahead for supply lead times.