Oregon Department of Transportation

Research Stage 1 Problem Statement

Number 26-12 – "Electric Vehicle Charging Resiliency for Tribal and Rural Communities"

1. Concisely describe the **transportation issue** (including problems, improvements, or untested solutions) that Oregon needs to research.

Problem:
This proposal attempts to integrate three interrelated challenges that may benefit from a singular solution:
1) Rural and remote communities and tribes experience gaps in electric vehicle (EV) charging access and reliability due to limited energy infrastructure and power availability. Energy supply challenges during disaster events are a particular concern and are potentially exacerbated by climate change and population growth
2) Concerns about vehicle range, access to chargers and charging infrastructure reliability challenge state and region-wide electric vehicle adoption.
3) The benefits of transportation electrification are not distributed equitably across the state or region.
In sum, Oregon and other western states with large rural and remote areas may benefit from climate-resilient EV charging infrastructure strategies. **A promising option is investing in tribally owned EV charging infrastructure powered by Distributed Energy Resources and open to the public.**

Solution:
Tribally owned EV charging infrastructure powered by Distributed Energy Resources and open to the public provide three key benefits to Oregon and the region.

1) Statewide emergency evacuation planning must evolve as the transportation system electrifies and climate change induces more frequent and intense extreme events. Climate change and population growth are pressing issues that require proactive emergency event planning, response, and recovery strategies. Publicly accessible charging from Distributed Energy Resources can be highly valuable for state or multi-state evacuation planning and disaster response as the transportation system electrifies and population distributions shift.

2) Rural communities and tribes with Distributed Energy Resources may benefit from enhanced local safety, access and economic opportunity. For example, the systems can be mobile reservoirs of energy during and after extreme events for nimble use at priority locations within communities (e.g., hospitals and evacuation centers). Rural communities and tribes are also key beneficiaries of federal and state funding for transportation electrification due to the lack of available charging infrastructure to support longer average drive distances to jobs, schools, health care, and other basic needs. Lastly, charger downtime and maintenance issues in rural and remote areas are concerns that may be exacerbated by more frequent and intense climate hazard events and a lack of existing qualified workforce. Risk could be reduced with locally owned, Distributed Energy Resources that can respond to and withstand climate hazard impacts.

3)Tribal ownership of transportation electrification infrastructure in rural and remote areas can offer significant benefits for the tribes and the general public. Tribal nations can benefit by developing the workforce required to support this infrastructure and through increased economic development opportunities for local businesses at or near these charging stations. These charging stations may also serve as a platform for the inclusion of Distributed Energy Resources. The public benefits from having more charging options, especially in rural and remote areas where charging infrastructure is limited. A locally trained workforce can reduce charger downtime and help address trip range anxiety.

2. What **final product or information** needs to be produced to enable this research to be implemented?

A key research question is whether or not tribally owned EV charging infrastructure, powered by Distributed Energy Resources and open to the public, improves statewide EV charging resilience.

To test this, ODOT would conduct a pilot project in collaboration with a cooperating Tribe (interest has been expressed) to implement tribally owned EV charging infrastructure site(s) powered by Distributed Energy Resources and open to the public. The pilot project would include a study of how the infrastructure was used and how it performed during extreme events. It would also determine if the results of this study would help to determine if investment in tribally owned EV charging infrastructure, powered by Distributed Energy Resources and open to the public should be expanded or widely adopted.

Deliverables for state and regional audiences:
1) An "uptime report" showing the number of hours the mobile, energy-independent infrastructure is functional. This will be compared to infrastructure connected to the grid to test and verify the resilience of energy-independent investments.

2) Document and report use of energy-independent charging infrastructure during emergency events and lessons learned by users. The goal of this effort is to learn how the infrastructure is used and perceived value or benefit from users.

3) A financial report from Tribes that includes maintenance costs of the infrastructure, investments in any equipment to enhance use of the infrastructure (e.g., trucks or trailers use to enhance mobility of devices) and income generated from public access.

3 (Optional) Are there any individuals in Oregon who will be instrumental to the success of implementing any solution that is identified by this research? If so, please list them below.

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Mary Brazell	ODOT Transportation Electrification Program Manager	Mary.BRAZELL@odot.oregon.gov	
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4. Decision making lenses

Please complete the following three sections. Your answers to these questions will be applied on a programmatic basis to support agency decisions. Answering yes to the questions below is not required. Resolving a narrowly focused technical research problem may meet agency needs without answering yes to any of the following questions. The ODOT Research Section will seek a balanced portfolio some projects will answer yes to one of the three categories below (e.g. climate, equity, and/ or safety) and other projects in a different category.

We are looking for an overall program balance and no one project is expected to balance all categories. Generally, a research problem statement is expected to be able to answer yes with clear and verifiable information in only one of the three categories below, some projects may be able to answer yes in two or even three categories. Some projects (i.e. needs focused on specific elements of infrastructure design), may have no yes answers but may still be high value research need.

Climate

Oregon recognizes the climate crisis and makes systemic changes to reduce emissions caused by travel. Every mile driven in Oregon is powered by a clean source of fuel. We seek research that supports construction and maintenance operations are carbon neutral and investments in mobility that support travel by low and no emission modes. While every research project may not result in a reduction in emissions, transportation investments overall support emission reductions to achieve state goals. Oregon envisions a transportation system that is resilient in the face of seismic and climate events and impacts to the degradation of the natural environment are reduced. Our vision includes a transportation infrastructure is built in a way that avoids impacts on key habitat and results in better environmental conditions for wildlife and native vegetation. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan and Oregon Transportation Plan.

4f. Will addressing the **transportation issue** identified as a need in Question 1 develop, or validate methods for the estimation, measurement, or monitoring of transportation generated greenhouse gasses (GHG)?

☐Yes ☒No ☒Unsure

4g. If climate or GHG is not the focus of this **transportation issue** identified in this problem statement, will the research apply a GHG analysis to transportation infrastructure, planning, operations, maintenance, or materials?

☐Yes ☒No ☐Unsure

4h. Will the addressing the **transportation issue** include development or testing of construction practices, methods, or materials to establish potential reductions in greenhouse gas emissions?

☐Yes ☒No ☐Unsure

4i. Will the solving the **transportation issue** in question 1 study or support the reduction of vehicle miles traveled and single occupancy vehicle travel or support transition to electric vehicles (or other types of zero emission vehicles) or low-carbon alternative fuels?

☐Yes ☐No ☒Unsure

4j. Will the solving the **transportation issue** in question 1 lead to work that will support, measure, monitor, transportation system resilience in response to expected climate events, effects, or natural disasters in general?

☐Yes ☒No ☐Unsure

4k. Will the solving the **transportation issue** in question 1 lead to work that may result in better environmental conditions for wildlife and native vegetation ?

☐Yes ☒No ☐Unsure

4l. If you answered yes to any of the climate questions above or can provide alternative details related to climate, please provide additional information:

Climate change resilience is a primary focus of the proposed work. In particular, the resilience of EV charging infrastructure and associated energy storage systems. The goal is to test the viability of tribally owned, energy independent EV charging stations (e.g., solar powered battery energy storage systems) as a climate change adaptation strategy to improve rural and remote EV charging and mobile energy storage resilience. Energy independent systems increase local resilience to power outages and grid instability, particularly during extreme events and emergency evacuation scenarios. Extreme events that may impact grid stability are expected to become more frequent and severe into the future. Rural and remote communities and tribes are often more vulnerable to the negative impacts of outages and longer recovery times after an event. From a DOT perspective, enhanced charging infrastructure access during evacuation events (in particular) can reduce the frequency of EV abandonment in the road or right of way during an emergency event.

From a climate change mitigation perspective, the approach to expand the use of independent energy storage systems is likely to include solar and other sustainable energy sources. In these cases, there are carbon emission reduction benefits that may offset the impacts of charger system production over the long term. Broadly, the proposed work benefits efforts toward decarbonization of the transportation system by supporting electrification.

Equity

Equity can have many dimensions and impacts relating to communities, and transportation. It is important that problem statement proposals clearly explain in what capacities are equity dimensions or impacts being examined within problem statements. It is a goal of the OTP to "Improve access to safe and affordable transportation for all, recognizing the unmet mobility needs of people who have been systemically excluded and underserved. Create an equitable and transparent engagement and communications decision-making structure that builds public trust". Proposed research may have the intent of studying elements of this goal or apply analysis to specific transportation topics to ensure the resulting research recommendations is consistent with our equity goals. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan and Oregon Transportation Plan.

4a Is the **transportation issue** identified as a need in Question 1 specifically focused on transportation equity?

☒Yes ☐No ☐Unsure

4b If the **transportation issue** is not focused on transportation equity, will the primary topic be assessed for equity benefits or impacts within the research project?

☐Yes ☐No ☐Unsure

4c Is the implementation of potential findings from this research likely to directly involve participation from an identified group that would benefit from an equitable process or outcome?

☒Yes ☐No ☐Unsure

4d Is the intended final product or information expected to support ODOT's equity efforts (Including but not limited to supporting one of the equity related objectives of the ODOT's Strategic Action Plan or Oregon Transportation Plan) ?

☒Yes ☐No ☐Unsure

4e If you answered yes to any of the equity questions above or can provide alternative details related to equity, please provide additional information:

The proposal aims to improve equity in a few measurable ways:
1) it aims to reduce the gap in EV charging access to rural and remote communities throughout the state, thus reducing gaps and improving equitable access to EV infrastructure and related transportation and economic benefits. This can be measured in the number of increased charging stations in areas that currently have few or none (e.g., gaps).

2) it aims to develop a tribal ownership model for energy independent charging infrastructure. This could benefit the tribes in several ways, including direct revenue from charges associated with public EV charging (measurable in number of businesses and/or profits), and the nimble access to energy storage systems that can be used to provide mobile power at priority locations during and after extreme events (e.g., tribally owned businesses, homes, etc.).

Safety

Research outcomes may include interventions and countermeasures to prevent or reduce the frequency of crashes or other causes of transportation-related injury or death; or may include measures to reduce severity of injury (including prevention of death) after a crash or other injurious event. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan, Oregon Transportation Safety Action Plan and Oregon Transportation Plan.

4m. Will solving the **transportation issue** in question 1 support improving **safety culture** for either transportation workers or the traveling public?

☒Yes ☐No ☐Unsure

4n. Will the solving the **transportation issue** support improving safety through **healthy and livable communities**?

☒Yes ☐No ☐Unsure

4o. Will solving the **transportation issue** support improving safety through using **best available technologies**?

☒Yes ☐No ☐Unsure

4p. Will solving the **transportation issue** support improving safety through **communication and collaboration**?

☒Yes ☐No ☐Unsure

4q. Will the solving the **transportation issue** support improving safety through **investing strategically**?

☒Yes ☐No ☐Unsure

4r. If you answered yes to any of the safety questions above or can provide alternative details related to safety, please provide additional information:

The proposal enhances safety by improving access to EV charging during times of grid instability or outage using best available technology. This is particularly beneficial to safety during emergency evacuation scenarios where demand for charging is urgent and widespread, but access to reliable or functional charging infrastructure may be limited. Additional safety benefits come from the mobility of the energy storage systems, allowing for alternative uses of power based on local need. This study element enhances communication and collaboration potential among emergency managers. An additional, big-picture safety benefit is improved access to EV charging throughout the state that also enhances healthy and livable communities through EV related emissions and noise reduction benefits. Reducing charging access gaps in remote and rural areas can improve the security of EV use throughout the state and region. From a DOT perspective, enhanced charging infrastructure access during evacuation events (in particular) can reduce safety hazards related to EV abandonment in the road or right of way during an emergency event. These improvements may be difficult to measure but the benefits of lives saved or reduced harm during extreme events is clearly beneficial from a safety enhancement.

5. Other comments:

6. Corresponding Submitter's Contact Information:

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