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Electric Vehicle Charging Stations and Oregon Federal Lands: A Prospective Policy Analysis

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Electric Vehicle Charging Stations and Oregon Federal Lands: A Prospective Policy Analysis

Introduction

In 2022, the Oregon Department of Transportation (ODOT) committed $100M towards expanding electric vehicle (EV) charging stations statewide (McGuiness 2022). The policy goal is to provide EV fast-charging capacity[1] for four vehicles per station over the Interstate 5 and 84 corridors, along with the US 101, 97, 26, and 20 corridors. ODOT's investment establishes clear statewide EV charging corridors for the travelling public, not only in the most populated corridors but also across the more rural parts of Oregon and connecting to neighboring states. In order for the travelling public to access public lands for recreation, economic, and other purposes by EV, the next task is to extend EV charging capacity into secondary transportation facilities, those that access rural federal lands, and on the major destinations travelers are leaving the major alternative fuel corridors for. The key policy questions then are where to site EV charging stations on or adjacent to federal lands, in what priority, and in alignment with existing local, state, and federal EV charging investments.

This paper therefore provides a prospective policy analysis for siting EV charging stations on or adjacent to federal lands in Oregon. It begins by outlining the policy issue and context for EV charging in Oregon along with the audience for this analysis. It then describes the theoretical and methodological approaches employed and data to be used. Finally, it describes how the author intends to analyze the data and propose an EV charging framework.

Audience

The audience for this analysis is three-part, although other audiences could certainly apply. First, it is written for the Federal Lands Access Program (FLAP) Statewide Needs Assessment project team to support the project's wider effort at identifying and prioritizing federal lands transportation access projects throughout Oregon (Lemon 2022). The project team is co-led by the Federal Highway Administration (FHWA) and ODOT with support from the US Forest Service, US Fish and Wildlife Service, and Association of Oregon Counties. Second, it is written for policy and planning practitioners looking to better understand how to identify and prioritize EV investments in their own contexts. Lastly, it is written for the general public, including researchers and advocacy groups, who are looking to understand Oregon's federal lands planning and EV policy context.

Issue and Policy Context

The policy issue in question is how to ensure EV travelers can access rural federal lands that often well outside major population areas and transportation facilities. Recognizing that ODOT is investing EV charging capacity on key interstate and highway corridors, how can their local, state, and federal partners co-produce EV charging capacity that complements the corridor-level investments? EV charging siting on federal lands is informed by at least three related sets of policy information: (1) federal land management agency (FLMA) definition and roles, (2) local,

[1] Fast-charging stations are those that provide a full charge to a vehicle in 15 to 20 minutes.

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state, and federal transportation planning policies, and (3) federal EV policies. This section describes each group as well as how they relate to one another and the more specific policy issue of EV charging station siting.

Federal Land Management Agencies

FLMAs are those agencies with management jurisdiction over federal lands throughout the United States. For transportation purposes, 23 USC Section 203 identifies these agencies as the National Park Service (NPS), US Forest Service (USFS), US Fish and Wildlife Service (USFWS), US Army Corps of Engineers (USACE, Bureau of Land Management (BLM), Bureau of Reclamation (BOR), and other independent Federal agencies with natural resource and land management responsibilities. The final group includes agencies such as the Department of Defense Military Surface Deployment and Distribution Command (SDDC) and the Presidio Trust. Bureau of Indian Affairs (BIA) is also a land management agency, managing lands across the US in trust for Tribal governments. BIA is not included in the FLMA list under 23 USC Section 203, however, since the relationship between the federal government and Tribal governments is quite different from those of other federal agencies. The BIA-Tribal relationship is therefore categorized as a government-to-government relationship addressed under separate federal laws and regulations.

Most of the FLMAs mentioned above operate in Oregon and manage federal lands. As Figure 1 illustrates, NPS, USFS, USFWS, USACE, BLM, BOR, and BIA all have lands in Oregon, with USFS and BLM being the largest land managers. DOD is not a major land management agency, and the Presidio Trust is exclusive to the Golden Gate Park are of San Francisco. The FLMA lands shown in Figure 1 are the focus of this study that the project team seeks to provide access to EV charging capacity.

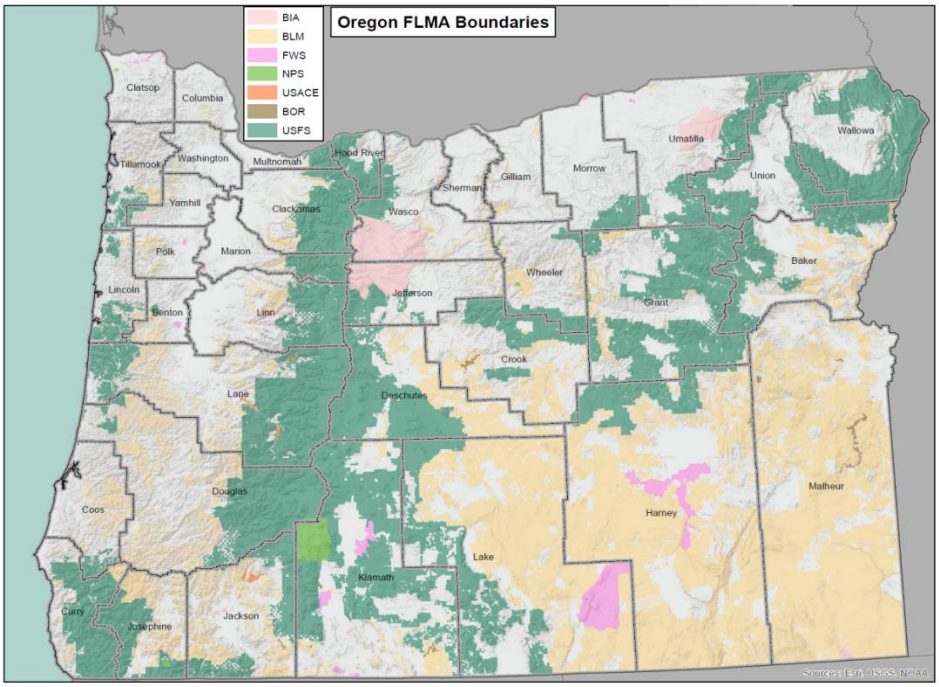

Figure 1. FLMA Lands and Boundaries in Oregon (Lemon 2022).

Planning Institutional Framework

There are four sets of policy documents governing the planning of transportation infrastructure in Oregon relevant to this study. Illustrated in Figure 2 on the next page, they include the Pacific Northwest FLMA Long Range

Transportation Plan (LRTP), ODOT's Oregon Transportation Plan (OTP), FLMA unit-specific plans, and local agency transportation system plans (TSPs). As the figure suggests, the OTP is the overarching transportation policy document for Oregon, with local TSPs refining OTP goals and policies at the local level. The local and state transportation system and any proposed EV charging siting on such a system is therefore governed by these policy documents. For federal lands, the OTP and local TSPs do not directly apply but FLMAs, ODOT, and local agencies often coordinate their policies anyway. The overall policy document for FLMAs in Oregon is a single collaborative LRTP that outlines the context, goals, policies, and strategies for all FLMA transportation decision making together. Unlike the OTP and TSPs, the unit-level FLMA plans are not explicitly linked to the overall LRTP, although the two documents usually align in overall goals and policies.

Examining the policy influence of the OTP first, there are a few assumptions that need to be made. First, the OTP is actually an umbrella policy document that includes the overall OTP and its policies, as well as nested mode and topic plans that provide more detail to different aspects of the statewide transportation system (ODOT 2022a). For this reason, while the OTP houses the overall transportation policies for Oregon, each of the nested mode and topic plans provides more detail that may be relevant to the EV charging policy context. Second, as of 2022 the OTP is currently being redeveloped by ODOT, including developing new goals, policies, and strategies (ODOT 2022b). The study therefore operates with the existing OTP policies in place but recognizing that new OTP policies may be in place before the EV charger siting study is complete. To mitigate some of the uncertainty of operating between two policy documents, we can look to draft materials for the OTP update and Oregon Transportation Commission policy memoranda that provide some indication of how policies may change in the new OTP, especially

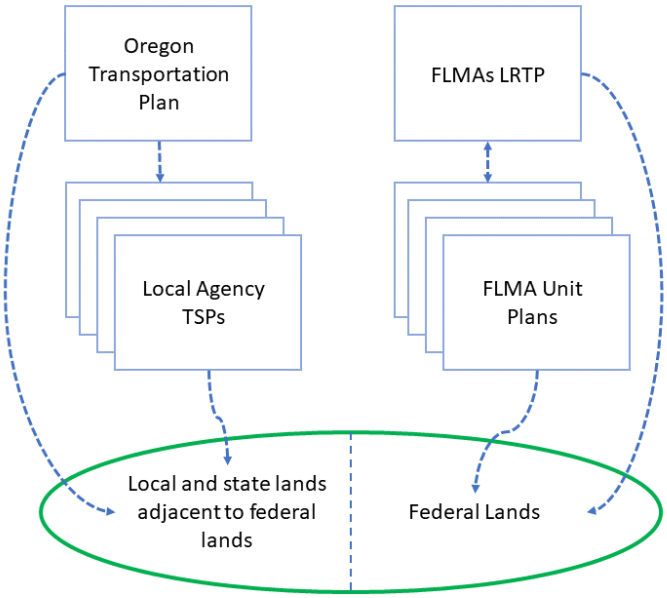

Figure 2. Federal Lands Transportation Policy Context in Oregon.

as they relate to EVs. Lastly, EV charging is a relatively new policy domain for ODOT generally, so some of the policy decisions are emerging from program staff rather than out of adopted plans. For example, ODOT's Office of Innovative Funding seems to be leading much of the EV investment collaboration with partners as a special program outside of ODOT's other programs (ODOT 2022c). With these considerations in mind, the OTP goals are summarized as:

1. Mobility and accessibility
2. Management of the system
3. Economic vitality
4. Sustainability
5. Safety and security
6. Funding the transportation system
7. Coordination, communication, and cooperation (ODOT 2007)

Each goal includes additional policies and strategies, which we can focus on as applicable as the analysis progresses. TSPs vary considerably in content and complexity depending on the size and context of the local agency. On the whole, they are required to align with the OTP under Oregon Administrative Rules 660-012-0015, making the policy content ostensibly similar to the broader OTP. For example, the Multnomah County TSP highlights safety and efficiency, balanced modes, rural character, healthy economy, funding, and reduced vehicle traffic—all of which could be nested under OTP's policies (Multnomah County 2016). For the purposes of this study then, we limit the non-federal policy considerations to the OTP for the moment, with the expectation that local TSP considerations will become more valuable later in the study.

Turning to the FLMA LRTP, there are six goals that inform our study. They are summarized as: (1) place-based collaboration, (2) resource protection, (3) safety, (4) access and connectivity, (5) visitor experience, and (6) asset management. Like the OTP, each of these has additional actions that support the larger goal, which we can focus on as need later in the study. By contrast to the OTP, the individual FLMA unit plans are (1) not necessarily transportation-focused and (2) do not have to explicitly align with the wider LRTP. For example, the BLM's Cascade-Siskiyou National Monument Resource Management Plan primarily focuses on the resource and land management goals for the agency (BLM 2008). The transportation component focuses on providing limited access to the unit as needed for recreation, private properties, and emergency management. For the purposes of our study then, the LRTP provides the best policy guidance with applicable unit-level plans more relevant for implementation efforts.

To summarize the relevant policies and goals, Table 1 compares the OTP and LRTP documents side by side. Where possible, this study aligns similar policies between the two documents together. Polices that do not have an analog in the other document are shown in italics. This study generalizes the policy themes in the left column as well.

Table 1. Summary of Policy Considerations for EV Charger Siting in Oregon Federal Lands

Policy	OTP	LRTP
Accessibility	Mobility and accessibility	Access and connectivity
Asset management	Management of the system	Asset management
Sustainability	Sustainability	Resource protection
Safety	Safety and security	Safety
Collaboration	Coordination, communication, and cooperation	Place-based collaboration
--	*Economic vitality*	*Visitor experience*
--	*Funding the transportation system*	--

Federal EV Policy Considerations

The last set of policy information influencing this work is that of federal EV policy and program documents. As part of President Biden's climate priority as well as the 2021 Bipartisan Infrastructure Law, EVs and their associated infrastructure have become a much higher priority in local, state, and federal infrastructure investments (The White House 2020; The White House 2021; FHWA 2022). Indeed, the Biden administration and USDOT have designated new alternative fuel corridors throughout the country to focus EV investments, which ODOT appears to be in alignment with through their own planned investments (See Figure 3 below). The most valuable information for our study, however, comes from FHWA's Rural EV Toolkit.

The Rural EV Toolkit provides a number of considerations to help site EV charging stations on or adjacent to Oregon's federal lands. The key elements to focus on here are scale, access, equity, ownership, and utilities concerns (FHWA 2022b). Scale refers to the scope of charging investment, either at the corridor, community, or site-level. Since we are examining federal lands in Oregon broadly, corridor or community-level is most appropriate. Access refers to whether the charging station is for a private residence or multifamily residence,

Figure 3. Current and Planned Alternative Fuel Corridors (The White House 2021). Note that the planned corridors in Oregon align with ODOT's planned investments described in this paper's introduction.

workplace or commercial, or accessible by the public (US Department of Energy 2022). For our purposes, we focus on publicly-accessible charging stations. Equity refers to the financial, geographic, and underserved community considerations for accessing EV charging. Ownership refers to the entity that owns and operates the EV charging station. This issue is often complex, as some private companies have constructed EV charging stations on federal lands for agency or public use, which confuses who is the owner and operator of the EV station and whether it is truly public in nature. Figure 4 below, for example, shows a Tesla EV charging station donated to the NPS's Crater Lake unit that is currently accessible to the public. Lastly, utilities concerns refers to the electricity and telecommunications needs to operate EV chargers, such as sufficient electricity capacity on site and wired or wireless internet communications for payment.

If we take the three influences together—FLMAs, planning institutional framework, and federal EV policies—we can generate a basic outline of the criteria we may use for evaluating policy options for siting EV charging stations in Oregon. We summarize them in Table 2 below as the lands to focus on, the policy considerations, and EV charging considerations.

Figure 4. EV Charging Station at Crater Lake National Park (author's image).

Table 2. EV Charging Station Siting Evaluation Criteria.

Applicable Federal Lands	Policy Considerations[2]	EV Charging Considerations
National Park Service	Accessibility	Scale
Bureau of Indian Affairs	Asset management	Access
Bureau of Land Management	Sustainability	Equity
Bureau of Reclamation	Safety	Ownership
US Army Corps of Engineers	Collaboration	Utilities concerns
US Fish and Wildlife Service		
US Forest Service		

Using these criteria, in the next sections this study develops an approach to conduct the actual EV charging station siting analysis.

Theoretical Approach

The theoretical approach underpinning this study is a post-positivist model with assumed bounded rational decision-making as opposed to rational choice decision-making. Post-positivism assumes an objective truth exists, but observations of such truth are necessarily imperfect, subjective, and limited due to the policy analysts own information processing, skills, and assumptions (Smith and Larimer 2016, 129-132). The post-positivist approach relies heavily on deliberative democracy to structure policy problems and solutions while leveraging the interpretive and facilitator skills of the policy analyst to derive meaning, goals, and strategies (Smith and Larimer 2016, 133). Bounded rationality is a related assumption of the post-positivist approach, assuming that individuals do not (and cannot) consider the entire universe of possible alternatives before making policy decisions (Dunn 2018, 50). Instead, individuals seek satisficing solutions that meet as many of their preferences as possible with the limitations of information availability (Dunn 2018, 50-51).

Given the theoretical description above, we add two additional assumptions that inform this study. The approach to be examined in the next section assumes policy options that are both effective and responsive to the policy problem of where to site EV charging stations. Effectiveness refers to the "achievement of a valued outcome" (Dunn 2018, 197). In the context of our study, we can think of effectiveness as meeting the implied goal of EV charging capacity in all federal lands. Responsiveness refers to the "extent that a policy satisfies the needs, preferences, or interests of a particular group" (Dunn 2018, 203). For our study, we can think of these preferences as aggregated into the goals and policies of the OTP and LRTP. Ostensibly, both policy documents are the output of a public and stakeholder involvement process that distilled public preferences into overall goals as adopted in both plans.

[2] OTP policies of economic vitality and funding the transportation system should be considered as well for lands adjacent to federal lands. LRTP policies on visitor experience should be considered for federal lands.

Methodology

Conducting the actual policy analysis for siting EV charging stations is essentially a mapping exercise to remove from consideration areas that already have publicly accessibly EV charging and focus on the remaining lands that are suitable for future EV charging investment. This section therefore outlines how future work would develop siting options that fit with the evaluative criteria examined earlier. Figure 5 below illustrates the conceptual model to be used for filtering and sorting siting options. In this model, the first task is the gather information on EV charging stations that inform spacing and cost for future stations. This includes the current industry standard for EV range with stations close enough that vehicles do not need to use their entire charge simply to travel from one station to the next, but also be able to visit federal lands destinations between charges. For the purposes of this study, we assume an ideal spacing of approximately 25 miles between charging stations, which is one half of the maximum range of the lowest-range EV market in 2022 (Moloughney 2022).

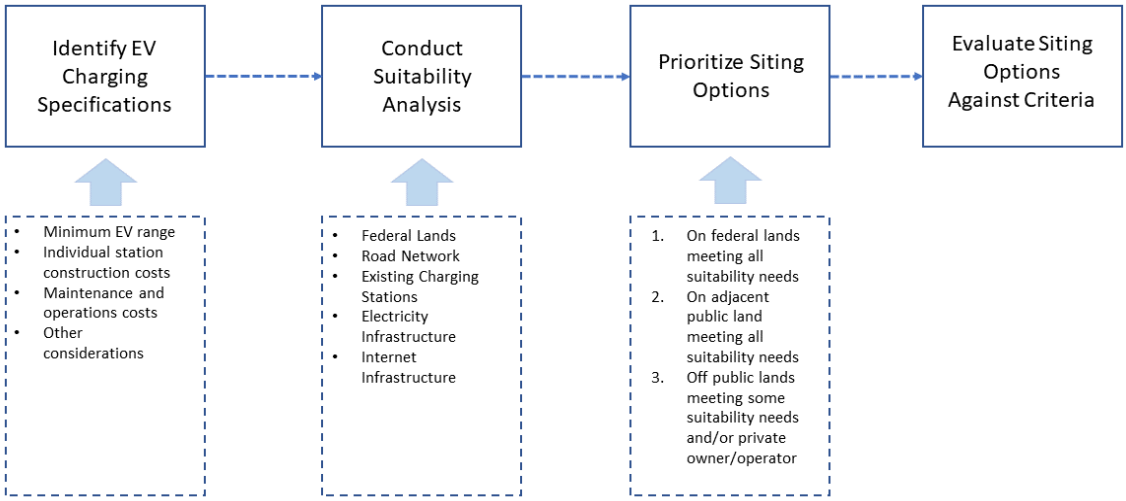

Figure 5. Conceptual Model of Proposed Policy Analysis

After documenting the relevant EV charging specifications, the next task is to conduct a suitability analysis. A suitability analysis is a geospatial exercise to "to qualify, compare, and rank candidate sites based on how closely they adhere to criteria that you select and define" (ArcGIS 2021). To do so, we use a variety of geospatial layers to filter out lands that are less suitable for EV charging stations and identify those that are most suitable. The spatial layers this study focuses on include, but are not limited to:

- Federal lands
- Road network
- Existing EV charging stations
- Electricity infrastructure
- Internet infrastructure

We would filter out areas that already have publicly accessible EV charging stations for the moment.[3] We then use the road network layer to remove corridors that already have planned EV charging station investments. The remaining road network and federal lands layers should provide the basic 'access to federal lands' imagery we seek. The last step is to overlay existing electricity and internet infrastructure layers to determine where stations can be built without further infrastructure investments. The results of suitability analysis should identify the primary locations for EV charging siting on or adjacent to federal lands. It is possible that adding economic and demographic data could further weight siting locations, such as specific federal lands destinations with the most visitations.

Following the suitability analysis, we would propose primary, secondary, and tertiary EV charging siting for future investments. Primary locations are those that complete an EV charging gap, are on federal lands, have the necessary electric and internet infrastructure in place. Secondary locations are those that are adjacent to federal lands, such as state or local agency facilities, but otherwise meet the suitability criteria of primary locations. Tertiary locations are those lacking one or more of the primary suitability criteria. For example, the location is privately owned, such as private recreation company, but otherwise has the entire necessary infrastructure in place. Another issue could be on or adjacent to federal lands but does not have the necessary electricity or internet infrastructure in place. Depending on the results of the suitability analysis, we would provide specific limitations and considerations for tertiary siting locations.

The final step is to evaluate the primary, secondary, and tertiary siting locations against the evaluations criteria outlined in Table 2. The evaluation will be presented in a table format similar to the example shown in Table 3 below. Those in the primary and secondary columns will meet nearly all evaluation criteria, while the tertiary column will necessarily have gaps and explanatory narrative. The approach underlying the evaluation that of effectiveness and responsiveness, or the notion that the policy option identified meet the implied goals of providing EV charging coverage for federal lands (effectiveness) and the broader policy goals of local, state, and federal partners (responsiveness).

[3] This study acknowledges that some areas that have publicly-accessible EV charging stations still may not meet the criteria of fast charging or have enough individual stations on site to support multiple vehicles simultaneously. An example of this would be the Tesla EV charging station shown in Figure 4, which is neither a fast-charging station nor capable of supporting multiple vehicles at once.

Table 3. Example Evaluation of Proposed EV Charging Siting Options. (P) Indicates a policy criteria and (E) indicates EV criteria. "+" suggests "meets criteria", "-"does not.

Evaluation criteria	Primary Locations	Secondary Locations	Tertiary Locations
Federal Lands Accessed	+	+	-
Accessibility (P)	+	-	-
Asset Management (P)	+	+	+
Sustainability (P)	+	-	-
Safety (P)	+	+	-
Collaboration (P)	+	-	+
Scale (E)	+	+	-
Access (E)	+	-	-
Equity (E)	+	+	-
Ownership (E)	+	-	+
Utilities Concerns (E)	+	+	-

Data Sources

To conduct the policy analysis as described, we need to draw on a number of data sources. For simplicity, this study organizes these data needs and sources in Table 4 below.

Table 4. Data Needs and Sources.

Data Need	Proposed Source(s)
EV Specifications	USDOT EV Infrastructure Project Planning Checklist
Federal Lands	US Geologic Survey Protected Area Database (PADUS); Federal Lands Highway GIS.
Road Network	ODOT TransGIS (for state and local roads); Federal Lands Highway GIS (for federal lands road networks)
Existing Charging Stations	US Department of Energy (Alternative Fuels Data Center: Alternative Fueling Station Locator)
Electricity Infrastructure	US Energy Information Administration (State Profile and Energy Estimates); Oregon Department of Energy (Oregon Utilities)
Internet Infrastructure	TravelOregon - Oregon Broadband Office (Broadband Map).
Travel Demand and Visitor Use	*Directly from applicable FLMAs*

Conclusion

Through federal and state investment, Oregon is a position to greatly expand travelers' access to EV charging capacity throughout the state. Understandably, ODOT is focusing its current investments in the highest capacity corridors that align with the wider USDOT alternative fuel corridors nationally. That said, FLMAs and their partners have an interest in developing EV charging capacity on their own systems as well, to ensure EVs along the alternative fuels corridors can also access federal lands for recreation and other purposes. Identifying the best siting options for federal lands therefore closes a major gap in Oregon's EV charging network and improves overall access to federal lands for Oregonians and other.

This study therefore provides a path for identifying possible sites for future EV charging station investment. It grounds the issue in the planning and policy contexts most influential on future investment decisions and then described the theoretical and methodological approaches employed and data to be used. Finally, it describes how one would analyze the data and propose an EV charging framework. The intent is that this prospective policy analysis can serve as a starting point and guide for conducting a future analysis as part of the Oregon FLAP Statewide Needs Assessment. It cannot, however, be completed without further discussions with FLMA, state, and local partners on the evaluative criteria and other decision-making factors.

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