



Stage 2 - Research Topic Statement

Print Form

RESEARCH PROGRAMS USE ONLY

RESEARCH IDEA NO:	23-002
DATE OF RECEIPT:	May 9, 2022
TOTAL MDT COST W/ICAP:	

RESEARCH PROGRAMS

Please submit completed forms via e-mail to [MDTResearch@mt.gov](mailto:MDTResearch@mt.gov). All fields are required, except the last field: XVIII, Sponsor(s). Incomplete forms will not be accepted.

TITLE (required): Implementation of Electric Vehicle Charging Infrastructure and Its Economic Benefits in Small Urban and Rural Communities

TOPIC STATEMENT:

Adoption of electric vehicles (EVs) is on the rise in the United States. Numerous automobile manufacturers including Chrysler, Ford, General Motors, and Nissan have committed to bringing more EV models to the market over the next decade, including electric pick-up trucks. Additionally, improvements in battery technology, which have allowed for an increase in the range over which EVs may operate, and more competitive pricing are making EVs a more viable alternative for many Americans. With greater adoption, the demand for charging infrastructure is expected to increase. The recent National Electric Vehicle Infrastructure (NEVI) Formula Program has provided an opportunity for Montana to plan for EV charging corridors; however the unique rural context of Montana has yet to be the focus of literature in this arena.

This research synthesis will examine the current state of the practice for EV charging infrastructure in small urban and rural communities. Topics explored will include challenges and best practices in EV charging infrastructure implementation; an examination of current EV charging infrastructure in Montana (what level of charger they are, where they are sited, and what amenities are nearby, and distance to MT's proposed EV corridors); and the economic impacts of providing EV charging infrastructure in small urban and rural communities. In such communities, users can plug in their vehicle and explore and/or recreate in the surrounding area. The goal of this research project is to understand the current state of the practice of EV charging infrastructure implementation in small urban and rural communities and how implementation of EV charging infrastructure can provide economic benefits to these communities. This information can help MDT implement EV charging infrastructure in a way that will best serve the traveling public in a cost-efficient manner while improving access to amenities, tourism, and recreational opportunities available in Montana's small urban and rural communities.

RELATED RESEARCH SUMMARY FROM STAGE 1:

Research in this topic area is growing as the market share of EVs continues to increase and states look to accommodate demand. Research has covered a wide variety of EV related topics from efficient siting of charging stations to how station availability impacts driving behaviors. In addition to published literature, many states have recently released plans related to preparing for an increase in EVs on the roadway.

Some research has been done regarding locating charging stations at highway rest areas. Other studies have identified the most effective placement of charging stations in general, with a focus on urban settings. While providing EV charging stations at interstate rest areas is currently not allowed (at least for now), there are opportunities along state routes worth considering, such as building on the success of installing charging stations at rest areas on state routes. Since many rest

Note: All research topics submitted become public property and submitters are not guaranteed to receive a contract for any work that may result from this topic statement.



Stage 2 - Research Topic Statement

Print Form

areas only have electrical systems designed for lighting, some experimentation with solar-powered units is also underway. Similarly, there have been studies looking at how charging stations impact the electricity demand and grid operation, including the possibility of installing energy storage at some sites.

Other research has looked at driving and charging behaviors depending on the charge level of a vehicle and the placement of charging stations along the driver's route and at end destinations. It is clear from these early studies that driver behavior (like route choice) is influenced by the existing charging infrastructure; the initial decision to invest in an EV is also largely predicated on access to sufficient charging infrastructure.

While the existing research is a useful starting point, there is a clear lack of information for rural settings. Montana's unique status as one of the most rural states in the United States requires considerations regarding how transportation infrastructure, like EVs, may face specific challenges or opportunities based on the state's geography, road conditions, population, and other characteristics. Furthermore, since this technology is still in its infancy, MDT does not yet have any uniform guidance to draw on (from the federal level or otherwise). There is a need to investigate the many challenges that will face Montana in the coming years and to begin formulating a high-level strategy to plan for EV charging infrastructure.

RESEARCH PROPOSED:

The proposed research project does not aim to duplicate efforts from the recent Montana Department of Environmental Quality (DEQ)/Montana Department of Transportation electric vehicle planning process. While some of the work may complement or build upon these efforts, this research effort will focus on understanding the experiences and economic benefits that small urban and rural communities have seen with implementing EV charging infrastructure. The proposed research project would include the following tasks:

- Project management, including a kick-off meeting and monthly progress meetings thereafter which will be used to engage MDT throughout the research process.
- A literature and document review examining the current state of the practice for EV charging infrastructure in small urban and rural communities in the United States. This would include an examination of published literature and state plans to examine existing and emerging technologies in use in a more rural context, how to site infrastructure depending on expected users and potential charging station locations including rest areas and other key destinations, lessons learned, and potential impacts to the community.
- An examination of existing conditions in Montana, including a look at current charging infrastructure available within the state, where it is located within a community, and what amenities are available within walking or bicycling distance.
- A survey of small urban and rural communities in Montana that have implemented EV charging infrastructure to gather information on how they are handling implementation of EV charging infrastructure, including funding sources utilized, best practices and challenges, and whether they have seen economic benefits to providing this type of infrastructure in the community (benefits to local restaurants/businesses).
- A final report, which would synthesize the efforts completed in the other tasks of this project and provide short-term and long-term recommendations for MDT's role in developing EV charging infrastructure.

RESEARCH PERIOD (Time to complete research project.):

The research period for this project is estimated at 12 months.

IT COMPONENT: Identify if the project includes an IT component (purchasing of IT hardware, development of databases, acquisition of existing applications, etc.). If so, describe IT component in as much detail as possible.

This research project would require no purchasing of IT components for completion. It is expected that proposers would have access to a surveying software and graphic information system (GIS) software.

**Note: All research topics submitted become public property and submitters are not guaranteed to receive a contract for any work that may result from this topic statement.**



Stage 2 - Research Topic Statement

Print Form

**FEASIBILITY, PROBABILITY OF SUCCESS, AND RISK:**

This research project is judged to be highly feasible and to have a high probability of success. The overall intent is to examine EV charging infrastructure and its associated economic impacts in small urban and rural communities. There is very little risk associated with this project, as the goal is to identify the main components of an EV charging infrastructure program for MDT and help the Department plan for future success.

**URGENCY, IMPORTANCE, AND EXPECTED BENEFITS/PAY-OFF: Address urgency, timeliness, and importance of the research. Identify if the research is required for any federal or state initiative or compliance. This section must include a description of how this research will help to meet MDT’s mission (i.e., serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and/or sensitivity to the environment).**

This research project has a high level of urgency and can be considered very important. The automobile manufacturing industry is trending towards the adoption of EVs, with many planning on producing only EVs in the next 10-20 years. Additionally, as EV technology continues to improve (i.e., development of more EV options (SUVs and pickup trucks), and prices of EVs become more competitive, there is an expected increase in demand for EV charging infrastructure. There is increasing political pressure and federal funding to push the automobile industry and consumers in this direction. The Biden administration has signaled these changes in its recent Infrastructure Investment and Jobs Act (IIJA) and the National Electric Vehicle Infrastructure (NEVI) Program which will provide funding to support a national electric vehicle charging network.

In order for consumers to switch to EVs, there needs to be a reliable charging infrastructure in place. In fact, many studies have shown that “range anxiety” (fear that a lack of EV charging infrastructure could lead to getting stranded) is a primary reason that people do not consider purchasing an EV.

Undertaking this important research now will provide many benefits to not only Montana residents but travelers to the state as well. Results of this research project will fill a knowledge gaps related to understanding of the challenges and lessons learned with implementing EV charging infrastructure in a more rural environment and the economic benefits of EV charging infrastructure and whether siting this infrastructure in small urban and rural communities help increase the number of people traveling to these communities and shopping/eating/recreating. Beginning this investigation will also signal to the public a continued commitment to MDT’s mission: “to serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and sensitivity to the environment.” In order to effectively serve the public, we must continue to provide vital transportation infrastructure; EV charging stations are very likely to be a major part of this infrastructure in the years to come.

**IMPLEMENTABILITY, IMPLEMENTATION PLAN, AND RESPONSIBILITY: Address the implementability of the expected results from the proposed project. Identify products that will enhance implementation. Identify any known implementation barriers and how these barriers might be eliminated or reduced. Identify MDT office or entity outside of MDT responsible for implementation. Describe initial implementation plan, include timeframe for implementation.**

MDT should be able to begin implementation of the research report’s findings soon after its completion. The final report of this project is expected to provide both short-term and longer-term recommendations for MDT to consider when planning for implementation of EV charging infrastructure. Based on the findings, MDT can begin formulating guidance for small urban and rural communities considering installation of EV charging stations. MDT will also be able to follow the report’s guidance on this research effort’s examination of current EV infrastructure gaps to prioritize potential new locations across the state. These implementation efforts will likely be centered in MDT’s Planning Division.

**Note: All research topics submitted become public property and submitters are not guaranteed to receive a contract for any work that may result from this topic statement.**



Stage 2 - Research Topic Statement

Print Form

**MDT PRIORITY FOCUS AREAS:** MDT may, as often as annually, identify priority research focus areas. These focus areas will be listed on <http://www.mdt.mt.gov/research/unique/solicit.shtml>.

Not applicable - MDT has not identified any priority focus areas at this time.

**TOTAL COST ESTIMATE** (If the project proposal comes in at a higher cost, it may require further approval and may be delayed.):

\$150,000

**MDT FUNDING SOURCE** (If MDT Research, enter SPR): SPR

**FUNDING MATCH SOURCE AND AMOUNT:**

Based on a total budget of \$150,000, the Small Urban, Rural and Tribal Center on Mobility (SURTCOM), part of the Western Transportation Institute, is able to provide funding for 2/3rds of the budget, equal to \$100,000, which means that MDT would need to fund the balance of \$50,000. SURTCOM's University Transportation Center (UTC) funding requires a 50% match, and State Planning and Research (SPR) funds are allowable as match.

**FUNDING PARTNER(S):** Not applicable (?)

**POTENTIAL TECHNICAL PANEL MEMBERS** (At this time, individuals do not necessarily need to be identified; rather, MDT offices and outside entities can be named. However, if known, individuals may be named):

Carol Strizich (Multimodal Planning Bureau Chief) and Sheila Ludlow (Multimodal Planning & Communications Section Supervisor)

<b>SUBMITTED BY: (required)</b>	
<b>NAME:</b>	Karalyn Clouser
<b>TITLE:</b>	Research Professional
<b>AFFILIATION:</b>	Western Transportation Institute at Montana State University
<b>ADDRESS:</b>	PO Box 174250, Bozeman, MT 59717-4250
<b>PHONE NO.:</b>	406-529-0654
<b>E-MAIL:</b>	karalyn.clouser@montana.edu

*Note: All research topics submitted become public property and submitters are not guaranteed to receive a contract for any work that may result from this topic statement.*



Stage 2 - Research Topic Statement

Print Form

**CHAMPION: Must be internal to MDT, feel strongly that the research will benefit the Department, and is willing to chair the technical panel. Note: If a champion is not identified by you or Research staff, this topic statement will not move forward.**

<b>NAME:</b>	Joseph (Joe) Hauck
<b>TITLE:</b>	Civil Engineering Specialist
<b>AFFILIATION:</b>	MDT/MSU Design Unit
<b>ADDRESS:</b>	2327 University Way, Suite 5, Bozeman, MT 59715
<b>PHONE NO.:</b>	406-994-1861 OR 406-697-9500
<b>E-MAIL:</b>	jhauck@mt.gov

**SPONSOR(S) (optional): Must be internal to MDT (Division Administrator or higher) and willing to ensure implementation occurs, as appropriate. If a sponsor is not identified by you or Research staff, this topic statement will not move forward.**

<b>NAME:</b>	Rob Stapley
<b>TITLE:</b>	Division Administrator
<b>AFFILIATION:</b>	MDT Rail, Transit, and Planning Division
<b>ADDRESS:</b>	2701 Prospect Avenue, Helena, MT 59601
<b>PHONE NO.:</b>	406-444-3445
<b>E-MAIL:</b>	rostapley@mt.gov

*Note: All research topics submitted become public property and submitters are not guaranteed to receive a contract for any work that may result from this topic statement.*