



Stage 2 - Research Topic Statement

Print Form

RESEARCH PROGRAMS USE ONLY

RESEARCH IDEA NO:	23-007
DATE OF RECEIPT:	8-25-2022
TOTAL MDT COST W/ICAP:	

RESEARCH PROGRAMS

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

TITLE (required): Renewable Energy Generation within MDT ROW

TOPIC STATEMENT:

Montana is a large state with large potential for the development of renewable energy. The Montana Department of Transportation (MDT) owns significant land in its right of way (ROW) and should develop a process to develop renewable energy within the ROW and analyze energy efficiency in MDT buildings. MDT has an obligation to the taxpayers to make responsible choices in the investment of resources. A financial analysis of any renewable system is necessary prior to installation. This research project would complete financial analysis of variable renewable energy generation components, as wells as costs for installation and O&M, and a comparison of generated output to grid electrical costs.

The research would identify ROW that may have close proximity to the electrical grid that has good solar and wind exposure. The ROW may have lack of competing development efforts for the property, good access, and sufficient land area that could be utilized for renewable energy generation. Proper candidates could include interchanges, rest areas, MDT Maintenance Facilities, and other large tracks of open ROW land that are unshaded, have good wind exposure, and have easy access.

Implementing renewable projects can reduce agency operational costs, and those cost reductions can be allocated to other essential agency activities. There are tangible economic benefits associated with renewable resources. Photovoltaic (PV) solar panels are an efficient source of energy. The PV systems contain no moving parts, are silent, very durable and reliable, and are low maintenance. Wind turbines are increasingly common. Heat pumps are becoming more efficient in cold temperature environments. This research will consider where there are constitutional limitations if energy project generates income to the department, and will include updated guidelines from FHWA and what it allows in the national highway system ROW.

RELATED RESEARCH SUMMARY FROM STAGE 1:

Bayrakci Boz, Mesude, Bridget Donaldson, and Brian Diefenderfer. "Use of Solar Photovoltaic Energy Systems in Department of Transportation Facilities: A Review of Practice and Preliminary Assessment for Virginia Department of Transportation," SAE J. STEEP 3, no. 2 (January 2022). <https://doi.org/10.4271/13-03-02-0009>.

Rusk, Todd, Ryan Siegel, Linda Larsen, Tim Lindsey, and Brian Deal. Technical and Financial Feasibility Study for Installation of Solar Panels at IDOT-Owned Facilities (FHWA-ICT-21-019). Springfield, IL: Illinois Department of Transportation, August 2021. <https://doi.org/10.36501/0197-9191/21-024>.

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Kurtz, Sarah, Edgar Kraus, Kristopher Harbin, Brianne Glover, Jaqueline Kuzio, William Holik, and Cesar Quiroga. Solar Power Initiative Using Caltrans Right-of-Way: Final Research Report (CA20-3177). Sacramento, CA: California Department of Transportation, 2020. <https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/final-reports/ca20-3177-finalreport-a11y.pdf>

Hodges, Tina, and Amy Plovnick. "Renewable Roadsides" Public Roads 82, no. 4 (Winter 2019). <https://www.fhwa.dot.gov/publications/publicroads/19winter/04.cfm>

Federal Highway Administration. Roadside Renewables: Exploring Alternative Uses of Highway Right-of-Way to Reduce Costs. McLean, VA: Federal Highway Administration, 2018. <https://rosap.ntl.bts.gov/view/dot/58285>

Bishop, Thay. Value Capture: Solar Energy. McLean, VA: Federal Highway Administration, Office of Innovative Program Delivery, 2017. <https://rosap.ntl.bts.gov/view/dot/55667>.

Caltrans Division of Research, Innovation and System Information. Utility-Scale Solar Power Generation Facilities in California. Sacramento, CA: California Department of Transportation, December 2017. <https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/preliminary-investigations/utility-scale-solar-power-generation-facilities-in-california-pi-a11y.pdf>

Oregon Department of Transportation. Solar Highway Program: From Concept to Reality. Salem, OR: Oregon Department of Transportation, 2016. <https://rosap.ntl.bts.gov/view/dot/31492>.

Federal Highway Administration. Renewable Energy Generation in the Highway Right-of-Way – Briefing, Updated January 2019 (FHWA-HEP-16-052). McLean, VA: Federal Highway Administration, Office of Real Estate Services, May 2016. <https://rosap.ntl.bts.gov/view/dot/49020>.

Good Company. Vermont Agency of Transportation Solar Plan. Richmond, VA: Virginia Department of Transportation, December 2016. <https://vtrans.vermont.gov/sites/aot/files/VTrans-SolarPlan-2016-12-08-FINAL.pdf>

Poe, Carson, Gina Filosa, Julianne Schwarzer, Aviva Brecher, and Katherine Millette. Alternative Uses of Highway Right-of-Way : Accommodating Renewable Energy Technologies and Alternative Fuel Facilities. McLean, VA: Federal Highway Administration, January 2012. <https://rosap.ntl.bts.gov/view/dot/9607>.

RESEARCH PROPOSED:

- 1) Utilization of GIS capabilities, MDT will evaluate the renewable energy potential for ROW, rest areas, and facility buildings. MDT will identify areas of ROW, Rest Areas, and Maintenance buildings with highest renewable energy generation potential.
- 2) MDT will conduct a financial analysis of developing renewable energy systems utilizing the top candidates determined in the first step. The financial analysis will contain variable components, including material and installation costs, O&M costs, and output compared to grid electrical costs. Implementation of solar projects can reduce agency operational costs, and those cost reductions can be allocated to other essential agency activities.
- 3) If financial analysis indicates that renewable energy production is cost effective, develop a MDT guidance for implementation of PV projects within MDT ROW. As net-metered systems are likely the simplest system, communicate with facilities regarding pilot installations of PV systems with net metering on Rest Area and maintenance facilities that were identified as an acceptable candidates.

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- 4) Research funding mechanisms to install additional renewable energy systems.
- 5) Select ROW near a MDT facility and run a cost estimate to utilize a energy developer to construct a system that allows MDT to purchase power at a fixed rate. Provide data to potential energy developers and utilities to determine interest.

RESEARCH PERIOD (Time to complete research project.):

2 years if steps 3 and 4 are included.

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.

A database to list ROW properties will be developed
GIS work also required.

FEASIBILITY, PROBABILITY OF SUCCESS, AND RISK:

High success, high feasibility, low risk: There has been an influx of these types of projects at other state DOTs that have shown success. There is a high probably of success and considerable future cost savings.

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 has an expected benefit to reduce long term energy consumption costs incurred by the department. Project is anticipated to result in the creation of a program that will save tax dollars.

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.

Readily implemented utilizing existing technologies.

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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>.

MDT will focus on candidates with the highest probability of success.

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

- \$100,000:
- 1) GIS Research - \$15,000
- 2) Financial Analysis - \$10,000
- 3) MDT Guideline - \$10,000
 - Pilot test - \$50,000
- 4) Funding Research / Grant applications - \$10,000
- 5) Project location and cost estimate - \$5,000

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

FUNDING MATCH SOURCE AND AMOUNT:

FUNDING PARTNER(S):

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):

Mike Murolo, Facilities; Robert Heiser, ROW; Aaron Anderson, Environmental; Potential spots for participant within MDT Geospatial Information, MDT Administration, and MDT Contracting

SUBMITTED BY: (required)	
NAME:	Aaron Anderson
TITLE:	Environmental Scientist
AFFILIATION:	MDT Remediation and Assessment Section
ADDRESS:	PO Box 201001, Helena MT 59620
PHONE NO.:	406 444 0872
E-MAIL:	aganderson@mt.gov

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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.

NAME:	Aaron Anderson
TITLE:	Environmental Scientist
AFFILIATION:	MDT Remediation and Assessment Section
ADDRESS:	PO Box 201001, Helena MT 59620
PHONE NO.:	406 444 0872
E-MAIL:	aganderson@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.

NAME:	Rob Stapley
TITLE:	Administrator
AFFILIATION:	MDT Rail, Transit and Planning Division
ADDRESS:	PO Box 201001, Helena MT 59620
PHONE NO.:	406-444-3445
E-MAIL:	rostapley@mt.gov

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