SPR RESEARCH PROGRAM
SECOND-STAGE PROPOSAL SUMMARY

PROBLEM NUMBER AND TITLE

24-08 Understanding the Impacts of Electric Heavy Vehicles on Oregon's Highways and Roadside Infrastructure

PROBLEM SUMMARY

Recently Oregon along with other western states have adopted the Advanced Clean Truck Rule which would require manufacturers of heavy vehicles to sell a certain percentage of zero emission electric vehicles starting with 2025 model year. Due to the weight of the batteries in these vehicles, the amount of freight carried may decrease, leading to unintended increases in heavy vehicle volume. Moreover, these electric heavy vehicles could pose clearance issues at weigh stations and inspections bays warranting the need for reevaluating current facility designs to accommodate the growing demand. Additionally, supporting the expansion of electric heavy vehicle fleets will require new policies and investments – such as upgrading the standards for roads and bridges and maybe the need to modify allowable legal weight

ODOT OBJECTIVES

This research will be used to identify the potential impacts of electric heavy vehicles on highway and roadside infrastructure in Oregon. To properly assess the potential effects of electric heavy vehicles in Oregon, the following items need to be identified:

1. Assess the potential impact of electric vehicle weight in terms of gross vehicle weight, there may be design constraints that limit their payload capacity.
2. Evaluate current roadside infrastructure, electric heavy vehicles could pose clearance issues at weigh stations and inspections bays warranting the need for reevaluating current facility designs to accommodate the growing demand.
3. Examine current standards and regulations for roads and bridges and recommend potential updates considering weight limits and zero emission trucks.

BENEFITS

The ability to assess and evaluate the current and future readiness of highway and roadway infrastructure for electric heavy vehicles benefits the agency in planning for any potential issues related to inspections, safety, and logistics.

SCHEDULE, BUDGET AND AGENCY SUPPORT

Estimated Project Length: 22 months.
Estimated Project Budget: $187,000
ODOT Support: Amy Ramsdell - CCD, Jillian DiMedio – Climate Office

FOR MORE INFORMATION

For additional detail, please see the complete STAGE 2 RESEARCH PROBLEM STATEMENT online at: https://www.oregon.gov/odot/Programs/ResearchDocuments/24-08.pdf

SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2024

PROBLEM NUMBER AND TITLE

24-08 Understanding the Impacts of Electric Heavy Vehicles on Oregon's Highways and Roadside Infrastructure

RESEARCH PROBLEM STATEMENT

Recently Oregon along with other western states have adopted the Advanced Clean Truck Rule[1] which would require manufactures of heavy vehicles to sell a certain percentage of zero emission electric vehicles starting with 2025 model year. Of special concern to Commerce and Compliance Division (CCD) is how the growth of battery electric and fuel cell electric heavy vehicles will impact Oregon's transportation infrastructure and what impact, if any, these technologies are expected to have on the vehicle's payload capacity and thus vehicle operations. For example, battery electric trucks are heavier than their diesel counterparts, and while hydrogen fuel cell trucks are similar to diesel trucks in terms of gross vehicle weight, there may be design constraints that limit their payload capacity (The Trucker, 2023). In both cases, the amount of freight carried may decrease, leading to unintended increases in heavy vehicle volume, due to reduced carrying capacities. Moreover, these electric heavy vehicles could pose clearance issues at weigh stations and inspections bays warranting the need for reevaluating current facility designs to accommodate the growing demand. Additionally, supporting the expansion of electric heavy vehicle fleets will require new policies and investments – such as upgrading the standards for roads and bridges and maybe the need to modify allowable legal weights (Pittman, 2022). Hence, researching the forthcoming impacts of increased electric heavy vehicles on Oregon's highways will help direct operational changes, investment, and planning for CCD and more broadly the agency.

Figure 1. Electric trucks (Source: Forbes Cheap Batteries Could Soon Make Electric Freight Trucks 50% Cheaper To Own Than Diesel)

The agency's mission statement identifies providing a safe and reliable transportation system and one that address issues related to climate change. Therefore, an effective way of supporting the mission is to better understand the implications posed by the future growth of electric heavy vehicles on Oregon's highways. Identifying these implications will help CCD plan for any potential issues related to inspections, safety, and logistics.

RESEARCH OBJECTIVES

This research will be used to identify the potential impacts of electric heavy vehicles on highway and roadside infrastructure in Oregon. To properly assess the potential effects of electric heavy vehicles in Oregon, the following items need to be identified:

1. Assess the potential impact of electric vehicle weight in terms of gross vehicle weight, there may

[1] https://www.oregon.gov/deq/rulemaking/Pages/ctr2021.aspx

be design constraints that limit their payload capacity.
2. Evaluate current roadside infrastructure, electric heavy vehicles could pose clearance issues at weigh stations and inspections bays warranting the need for reevaluating current facility designs to accommodate the growing demand.
3. Examine current standards and regulations for roads and bridges and recommend potential updates considering weight limits and zero emission trucks.

WORK TASKS, COST ESTIMATE AND DURATION

To address the research objectives, the specific tasks to be completed are outlined and described below.

Task 1: Brief Literature Review and Survey [3 months]

The research team will conduct a literature review to better establish the extent of previous or parallel research on the impacts of electric heavy vehicles on state operations, investment, and planning. Additionally, the research team will review the most recent projects and literature of successful paradigms and lessons learned by other state agencies and research efforts regarding similar efforts. The review will synthesize information on the various policies and initiatives undertaken by local, state, and national governments (e.g., the Advanced Clean Truck Rule). Moreover, the research team will work in collaboration with ODOT to inventory and identify the necessary data (e.g., Oregon spatial data, volume, traffic, current and future infrastructure development) to be used for in this study.

Task 2: Perform Agency Surveys to Determine Implications of Electric Heavy Vehicles [2 months]

Develop and administer a stated preference survey instrument to public transportation planning agencies (e.g., other state DOTs) to determine and assess agency efforts regarding Advanced Clean Truck Rule and implications of electric heavy vehicles on operations, investment, and planning. Additionally, survey carriers who have purchased Electric Heavy Vehicles to seek information related to advantages or disadvantages of doing so. The stated preference survey will be administered through the Qualtrics Survey Platform utilizing updated panel lists for agencies and recruiting carriers.

Task 3: Collect and Analyze Data [6 months]

For this task the research team will work closely with CCD and ODOT to collect relevant data regarding Oregon's roadside infrastructure (e.g., current weigh stations, inspection bays, etc.) and assess the potential issues and challenges related to electric heavy vehicle clearance and potential vehicle weight. In addition, analyze the data collected from Task 2 and conduct various statistical analyses to reveal data trends, characteristics, and identify key inputs and locations for Task 4 and 5.

Task 4: Location-Based Site Scoring Models for Electric Heavy-Duty Vehicle Readiness and Apply [4 months]

Using the data collected in Task 3, the research team will develop a location-based site scoring model. Using the key inputs identified in Task 3, a site selection model will be generated to rank potential locations for roadside infrastructure (e.g., weigh stations, inspection bays, etc.) to assess current and future readiness for electric heavy vehicles. The scoring model will include attributes that are favorable for assessing electric heavy vehicle readiness, such as inspection bay and weight station dimensions, and truck traffic density. Using the location-based site selection model developed, the research team will identify the readiness of locations for handling electric heavy vehicles.

Task 5: Develop Cost/Benefit from Analyzed Locations [4 months]

The objective of this task is to assess the cost/benefit, through the location-based electric heavy vehicle readiness site scoring model developed, at those locations identified in the previous task.

Task 6: Final Report and Research Note [3 months]

Prepare draft and final versions of the comprehensive study report for review and acceptance of the project technical advisory committee. Submit a summary 'Research Note' to ODOT Research for their separate publication.

Key Deliverables:Where in Oregon is the current or future roadside infrastructure ready to handle electric heavy vehicle weight and potential clearance issues. A ranked list of current and future location readiness, as well as a set of recommendations on how the State can best accomadate and plan for the arrival electric heavy vechicles, which CCD and other ODOT divisions could use in relation to Oregon's highway and roadside infrastructure readiness.

Estimated Project Length: 22 months.
Estimated Project Budget: $187,000

IMPLEMENTATION
The results of the project should be used to develop guidance in relation to direct operational changes, investments, and planning for CCD and more broadly the agency. That guidance will include recommendations for assessing and evaluating the current and future highway and roadway infrastructure readiness for electric heavy vehicles in the state.

POTENTIAL BENEFITS
The ability to assess and evaluate the current and future readiness of highway and roadway infrastructure for electric heavy vehicles benefits the agency in planning for any potential issues related to inspections, safety, and logistics.

PEOPLE

ODOT champion(s):

Amy Ramsdell, Commerce and Compliance Division Administrator

Jillian DiMedio, Senior Transportation Electrification Analyst, ODOT Climate Office

Problem Statement Contributors: Sal Hernandez, Associate Professor of Transportation Engineering, Oregon State University

REFERENCES

1. **The Trucker (2023).** *Feds: Heavy electric vehicles, such as big rigs, could pose big safety risks due to weight***.** (https://www.thetrucker.com/trucking-news/the-nation/heavy-electric-vehicles-such-as-big-rigs-could-pose-big-safety-risks-feds-say) [Accessed January 2023]
2. **Pittman, M. (2022).** *Electric Vehicles and the Impact on Infrastructure***.** Forbes Technology Council, (https://www.forbes.com/sites/forbestechcouncil/2022/12/29/electric-vehicles-and-the-impact-on-infrastructure/?sh=764297f11835) [Accessed December 2022]

STAFF REVIEW PAGE

Literature Check

TRID&RIP

☒ A review of TRID & RIP databases found no existing research that answers the research question

Electric trucks are still very novel, and little research has been done about this topic.

Technology & Data assessment
☒ No Identified T&D output
☐ At the end of this project, the implementing unit(s) within ODOT will need to coordinate the adoption of new technology or data in order to realize the full potential of this research.

Cross-agency stakeholders

- List stakeholders or impacted units
  CCD, Climate Office

- Identify any issues of concern raised by an ODOT stakeholder. Note expected mitigation