U.S. Department of Transportation
Federal Railroad Administration

FEDERAL RAILROAD ADMINISTRATION

Rolling Stock Equipment and Component Research

Performance Work Statement for Investigating Efficacy of Aftermarket Technologies to Improve Locomotive Efficiency

April 14, 2026

1. Introduction

The Federal Railroad Administration (FRA) conducts applied research for the development and demonstration of advanced technologies that can improve the safety and efficiency of rail transportation across the nation. The proposed project will quantify aftermarket engine technologies such as fuel additives and engine kits for their ability to improve locomotive engine efficiency and performance.

1.1. Background

For many shortline and regional railroads, purchase of new locomotives is cost prohibitive as many of these railroads are small businesses. While Class I railroads often boast fleets of modern, high-horsepower units, smaller railroads typically operate on tighter margins and maintain older, legacy fleets, some featuring locomotives that have been in service for decades. To bridge the gap between aging hardware and rising diesel costs, smaller railroads have pivoted toward incremental modernization. By integrating advanced fuel additives and specialized injection kits, shortline railroads can optimize combustion and reduce parasitic loss across the combustion and tractive power cycle without the higher price tag of a Tier 4 compliant locomotive.

1.2. Objectives

The objective of this project is to investigate the efficacy of aftermarket technologies such as fuel additives and fuel injector kits to improve the efficiency and performance of older locomotive engines.

1.3. Scope of Work

The scope of this project is limited to (1) identification of aftermarket technologies for improving locomotive efficiency prominently used by smaller Class II and Class III railroads in the US, as defined by the Surface Transportation Board[1], (2) review of baseline research data on performance of fuel additions and fuel injector kits from previous research, identify gaps and develop plans for addressing the identified gaps, (2) conduct tests, both laboratory and locomotive and evaluation of promising technologies for their ability to improve locomotive engine efficiency.

1.4. Period of Performance

The period of performance is 18 months from date of award.

[1] eCFR :: 49 CFR Part 1201 -- Railroad Companies

1.5. Place of Performance

The place of performance for the research will be determined by the FRA and the contractor.

1.6. Government Furnished Equipment

FRA will provide access to government furnished equipment, specifically a research locomotive currently located at the Indiana Northeastern Railroad. FRA will coordinate access to the locomotive with the railroad and the contractor. If laboratory tests are required, the contract is expected to provide or seek access to necessary laboratory facility for testing.

2. Work Elements

This research requires cooperation and collaboration with shortline railroad partners and American Shortline & Regional Railroad Association.

2.1. Task 1 – Identify of Aftermarket Technologies

The contractor will identify technologies used by smaller railroads to improve the performance of locomotive engines, specifically those used exclusively by smaller railroads. The contractor should evaluate existing publicly available research on the technologies that proport to improve locomotive efficiency, and those from equipment and additives manufacturers, and more. Based on the technology search, the contractor will identify the technologies that will be tested in this research project. The contractor will provide a summary of each technology identified, its purpose, application format (additive, engine kits, etc.), method of application, vendor, advertised effects, and recommendation for inclusion in the program with justification.

Deliverable D.1: Technology Search Summary Report

Due Date: 90 days after award.

2.2. Task 2 – Procure Technologies for Testing and Assessment

Based on Task 1, the contractor will provide a list identifying the technologies that will be procured and tested during the research project. The technologies will be purchased through normal supply chains utilized by the shortline railroad industry.

Deliverable D.2: List of technologies to be procured and tested

Due Date: 120 days after award

2.3. Task 3 – Develop Test Plan

The contractor shall develop a test plan outlining the planned tests. The test plan will detail the sequences of tests, methodology, data to be collected, instrumentation, schedule,

safety requirements, industry standards and recommended practices, and more. The test plan will include requirements for accessing and using the locomotive that requires action from the railroad. Field tests will be conducted on FRA furnished locomotive in revenue service operation as such; installation and data collection must be minimally invasive as the locomotive will be operated by a working railroad. The contractor will provide a draft copy of the test plan to FRA for review before commencing the tests.

Deliverable D.3(1): Draft Test Plan

Due Date: No later than 45 days before start of tests

Deliverable D.3(2): Final Test Plan

Due Date: 15 days before start of tests.

2.4. Task 4 – Conduct Tests

The contractor will perform the tests based on schedule provided and in cooperation with FRA and the shortline railroad. If required, the contractor will ensure that technologies such as fuel additives are tested under railroad environmental conditions such as high ambient temperatures and humidity as well as low ambient temperatures. All testing shall follow recommended industry practices and standards for testing rail equipment and interchange service.

2.5. Task 5 – Data Analysis & Reporting

The contractor shall analyze the data collected during the tests and provide a summary of the results. The contractor will host a meeting to review the data and discuss the results of the tests. The presentation should include review of baseline test results and comparative engine performance under the influence of the aftermarket technologies tested at a minimum. The summary will give an overview of the test plan, setup, data collection methods, test sequence, test operation mode (lab, rail yard, revenue) and results obtained. Any anomaly experienced during the test will be detailed in the summary.

Deliverable D.4: Presentation of test results

Due Date: 45 days after completion of last test.

2.6. Task 6 – Recommendations

Using test data, the contractor will provide an overview of the technologies that performed well during the tests. If deemed necessary, the contractor will make recommendations for further testing needed. The contractor will provide recommendations on technologies that were shown to perform well based on the tests conducted. These recommendations will be shared with the shortline railroads for further discussions and possible decision-making. The final report will provide detailed discussion of the recommendations.

3. Deliverables and Milestones

Timely submission of deliverables and reports is essential to successfully completing this requirement. Schedules for deliverables are specified in Table 1.0. All deliverables shall be prepared and submitted according to media content, and schedule described in the contractor's proposal and this SOW. Table 1 may not include all possible deliverables and milestones for this research project, therefore, it is recommended the contractor provide in their proposal a list of deliverables and milestones for FRA consideration.

3.1. Project Management Plan

The contractor shall develop and maintain a comprehensive Project Management Plan (PMP) that serves as the primary management tool for the execution of this contract. The PMP shall detail the contractor's approach to meeting all performance objectives, milestones, and deliverables outlined in the PWS. At a minimum, the PMP shall include:

- **Integrated Master Schedule (IMS):** A detailed schedule identifying all tasks, dependencies, and the critical path.
- **Staffing & Transition Plan:** A roster of key personnel and a strategy for maintaining continuous coverage.
- **Risk Management Plan:** A log of identified risks, impact ratings, and specific mitigation/contingency actions.
- **Communication Plan:** Protocols for reporting status, escalating issues, and coordinating with the Contracting Officer's Representative (COR).

The Contractor shall review the PMP quarterly and provide updates to FRA if significant changes to the schedule, risk profile, or management approach occur.

Deliverable D.5(1): Draft PMP

Due Date: 10 calendar days after the post-award kick-off meeting.

Deliverable D.5(2): Final PMP

Due Date: no later than 10 calendar days after receipt of FRA feedback.

3.2. Project Progress Report

The contractor shall provide quarterly report on the status of the project. The quarterly project report is due **15 days** following the completion of the reporting period. The quarterly progress report at a minimum will include written data as to the financial status of the project (projected vs. incurred costs), any identified any risks, issues, or concerns, as well as their mitigation or plans for their mitigation. The quarterly progress report will detail the accomplishments in the various tasks and planned activities for upcoming months. Schedule delays and slippage will be discussed in the quarterly project progress report.

Deliverable D.6: Quarterly Progress Reports

Due Date: 15 days following the end of the reporting period

3.3. Technical Reports

The contractor shall provide FRA technical reports outlining the research, its purpose, results obtained and additional studies needed. All technical reports must follow FRA template and guidelines, be written using active voice as much as possible and meet all applicable requirements of Section 508 of Rehabilitation Act.

3.3.1. Research Results

The contractor shall provide two 4-page brief research results that summary the research activities. The first research results will provide a brief overview of the project activities over the first 12 months of the research project. The second research results will summarize the results obtained from project testing. A draft Research Results Report will be completed using the FRA technical report template can be found at the following link Research Results Template | FRA. FRA will review the draft report and provide feedback to the Contractor. The Contractor shall incorporate editorial suggestions made by the FRA and finalize each technical report, as determined to be reasonable and technically sound. The final technical report for publishing, incorporating FRA suggested technical edits are due within 12 months of award.

Deliverable D.7(1): Draft Research Results #1
Due Date: 12 months after award
Deliverable D.7(2): Final Research Results Report
Due Date: no later than 30 days following receipt of FRA comments
Deliverable D.7(3): Draft Research Results #2
Due Date: 16 months after award
Deliverable D.7(4) : Final Research Results Report
Due Date: no later than 30 days following receipt of FRA comments

3.3.2. Final Technical Report

The Contractor will submit 15 months after date of award, a draft technical report detailing the results of the research conducted according to the Tasks outlined in Section 2.0. The technical report will provide details about the research methodology and results obtained in execution of the contract. A draft technical Report will be completed using the FRA technical report template, (template to be provided upon contract award) and can also be found at the following link: Technical Report Template | FRA. FRA will review the draft report and provide feedback to the Contractor. The Contractor shall incorporate editorial and technical suggestions made by the FRA and finalize the final technical report, as determined to be reasonable and technically sound. The final technical report for

publishing, incorporating FRA suggested technical edits are due within 17 months of award.

Deliverable D.8(1): Draft Final Technical Report

Due Date: 15 months after award

Deliverable D.8(2) : Final Technical Report

Due Date: no later than 30 days following receipt of FRA comments

Table 1: List of Deliverables & Milestones

Section	No.	Milestones	Deliverables	Due Date
4.1	M.1	Award Kick-off Meeting		20 days after award
2.1	D.1		Technology Search Summary Report	90 days after award
2.2	D.2		List of technologies to be procured and tested	120 days after award
2.3	D.3(1)		Draft Test Plan	45 days before 1st test
	D.3(2)		Final Test Plan	15 days before 1st test
2.4	M.2	Conduct Tests		
2.5	D.4		Presentation of Testing and Results	45 days after last test
3.1	D.5(1)		Draft PMP	10 days after kick-off meeting
	D.5(2)		Final PMP	10 days after receiving FRA feedback
3.2	D.6		Quarterly Progress Report	15 days after end of reporting period
3.3.1	D.7(1)		Draft Research Results Report #1	12 months after award
	D.7(2)		Final Research Results Report #1	30 days after receiving FRA comments
	D.7(3)		Draft Research Results Report #2	16 months after award
	D.7(4)		Final Research Results Report #2	30 days after receiving FRA comments
3.32	D.8(1)		Draft Technical Report	15 months after award
	D.8(2)		Final Technical Report	30 days after receiving FRA comments
4.2	D.9(1)		Monthly Meeting Materials	5 days before scheduled meeting
	D.9(2)		Meeting Minutes	10 days after meeting

4. Meetings

For all meetings, the contractor shall be responsible for providing meeting materials, and administrative and facilitation support. Meeting materials shall be submitted to the Contracting Officer Representative (COR) at least five (5) days in advance of the meeting. Meetings will be conducted at either the FRA's HQ, Contractor's facilities or through an alternative method of communication such as Google Meet®, Microsoft Teams® or Zoom®.

4.1. Post-award Kickoff Meeting

Within 20 business days of contract award, the Government will conduct a post-award kickoff meeting, to be held virtually. The date and time of the kick-off meeting will be mutually agreed upon by the contractor and FRA contract team.

4.2. Monthly Project Status Meetings

Monthly status meetings will be conducted each month, as agreed by the contractor and FRA COR. The date and time of the monthly project status meeting will be decided upon during the kick-off meeting. The monthly project status review meeting can be changed as agreed upon by the contractor and COR. The Contractor is responsible for reporting the previous month's activities (including any risks, issues, or concerns, and actual or recommended actions for their mitigation), and projected activities for the following month.

Deliverable D.9(1): Meeting Materials
Due Date: No later than 5 days before meeting
Deliverable D.9(2): Meeting Minutes
Due Date: No later than 10 days after meeting

5. References & Sources

Research Results Template | FRA

Technical Report Template | FRA

eCFR :: 49 CFR Part 1201 -- Railroad Companies

Home | Section508.gov