Los Angeles County
Metropolitan Transportation
Authority
One Gateway Plaza
3rd Floor Board Room
Los Angeles, CA

Metro

Board Report

File #: 2016-0130, **File Type:** Informational Report **Agenda Number:**

PLANNING AND PROGRAMMING COMMITTEE
FEBRUARY 17, 2016

SUBJECT: UPDATE ON THE MOTION 14.1: FEASIBILITY OF ADVANCED LOCOMOTIVE EMISSION CONTROL SYSTEMS AT THE CENTRAL MAINTENANCE FACILITY AND UNION STATION

ACTION: RECEIVE AND FILE

RECOMMENDATION

RECEIVE AND FILE update on feasibility of **Advanced Locomotive Emission Control Systems at the Central Maintenance Facility and Los Angeles Union Station**.

ISSUE

Motion 14.1 was introduced at the October Board meeting to examine the feasibility of installing Advanced Locomotive Emission Control System at the Metrolink Central Maintenance Facility and Los Angeles Union Station.

DISCUSSION

The Southern California Regional Rail Authority operates the Metrolink commuter rail system in six southern California counties. The system includes 55 locomotives, 57 cab cars, and 201 coaches operating over 512 miles (536 with the new Perris Valley service). Currently the system utilizes two maintenance facilities for light and heavy maintenance and six layover facilities for minor maintenance. The Central Maintenance Facility (CMF) is located on the east bank of the Los Angeles River in Elysian Valley/Cypress Park. The Eastern Maintenance Facility (EMF) is located in San Bernardino.

Most of the equipment is maintained at CMF. At this location, locomotives undergo light and heavy maintenance and the coaches and cab cars are maintained and cleaned. During the operations at the yard, locomotives idle and are load tested in a stationary setting.

Metro and Metrolink staff have collaborated on the preparation of this report. In the past five years, the following actions have been taken by Metrolink to reduce the emissions at the CMF. These actions include:

2010 - Automatic Engine stop and locomotive idling reduced 35%.

2011 - Streamlined operations.
2012 - Plug-in Program which uses electricity at the CMF to power the vehicles for maintenance, not requiring locomotive supplied power.
Tier 4 locomotive criteria approved.
2013 - First 20 Tier 4 locomotives ordered.
2016 - Metrolink exercised the option for twenty additional locomotives.
2016 - Expected delivery of the first of the Tier 4 locomotives.
2018 - Expected delivery of the last of the replacement Tier 4 locomotives.

The Advanced Locomotive Emission Control System (ALECS) is a system of stationary emission control equipment connected to an articulated bonnet. The bonnet, or hood, is attached to the locomotive to capture emissions. These emissions are routed into the stationary equipment and scrubbed for pollutants. The ALECS utilizes stationary equipment that scrubs the emissions for SO_2, NO_x, hydrocarbons, and particulate matter. The system is designed to treat exhaust flows between 2000 cubic feet per minute (idling) and 12,000 cubic feet per minute (full power). This system is not in revenue service anywhere in the nation.

This system was tested for feasibility in 2006 at the Union Pacific Railroad's J.R. David Rail Yard in Roseville California. This yard sees significant rail traffic, 21,500 locomotives are serviced, maintained, or repaired per year at this facility. The testing was performed on special tracks with two particular locomotives. This test took place in a controlled environment away from the normal yard operations and not under normal yard operation standards. The following information is from the report of that study.

The tests of the system yielded the following efficiencies:

	NO_x	HC	PM	SO_2
Overall Average Control Efficiency	97.8%	62.7%	92.1%	97.3%

In addition, a reduction in noise through the use of the hoods was measured with the system. Noise measurements were conducted during the test that showed a reduction of 5.3 to 6.8 decibels, representing noise energy reductions of 70% to 79%.

Additional analysis of the costs for the system was presented within the report. For a system at that yard, the cost estimate was $8,593,980 in 2006 dollars. The total life cycle of the system is estimated to be 20 years. In addition, operation and maintenance costs average $611,515 per year over 20 years. This would bring the total life cycle cost, considering initial cost and operations and maintenance, to $25,165,221 in 2006 dollars, according to the study. This includes the estimated four operators and one technician necessary to operate the system.

The study concluded that the ALECS proof-of-concept tests met most of the project objectives and provided valuable information that the system is capable of capturing and treating locomotive emissions for the sample locomotives. It should be noted that the tests were performed on two selected locomotives, a yard switcher and an over the line locomotive, and not Tier 4 equipment.

Consequently it is not known how effective the system would be with the new Metrolink equipment.

This test was performed with a prototype unit and not in yard operations; therefore, much of the information discussed in the report was based on a hypothetical installation in yard operations. While the system was effective at reducing emissions in the two sample locomotives, additional study is needed to support fielding a cost effective system in an active rail yard situation. A full scale system was not tested.

A similar system is used for some ships. It was recently approved for use on containerships and will be undergoing testing on other vessel types this year. This system is not in service for locomotives at this time. In a rail yard, the locomotives are constantly moving between tracks, thereby decreasing its effectiveness in reducing emissions and noise. In order to establish this system in a rail yard, work will have to be done to develop the prototype and study the use of this in a rail yard application.

Metrolink explored the concept of a similar system that could be adopted at CMF. This system was estimated to cost approximately $8.5M in initial capital plus approximately $1.75M in installation costs. Metrolink did not study the annual maintenance costs of the system. However, the application of the costs for the prototype system could apply at the CMF.

Metrolink ordered twenty Tier 4 locomotives in 2013. In addition, the option for twenty additional locomotives was exercised in 2016, bringing the total to forty Tier 4 locomotives to be placed into service. These locomotives will reduce diesel particulate matter and nitrogen oxide emissions by 85%. The first locomotive is expected to be delivered in the summer of 2016, with final delivery expected in spring of 2018. The Tier 4 locomotives will replace the aging fleet of Tier 0 and Tier 1 locomotives currently in service, resulting in a clean running fleet of locomotives.

The ALECS has been redesigned since the test of 2006. It is a smaller unit and is not as intrusive into the footprint of the facility. Assuming the Board decided to proceed; the procurement of the system for the CMF would be on the basis of an experimental project. Since the system is not in service in an active rail yard at this time, additional study will be needed to ensure that this system works within the confines of Metrolink yard operations. The following would be the procurement steps necessary to move forward with the project:

- Initial Research: Since the system is not in revenue service, the availability of a system must be explored.
- Scope Development: It will be necessary to find a consultant to assist in writing the technical scope for the project.
- Request for Interest/Proposal: The path to the Request for Interest (RFI) or Request for Proposal (RFP) will be contingent on the availability of the technology.
- Financial Commitment: The Metrolink Board must approve the initial start - up cost and address the future costs of operations and maintenance. In addition, the funding source would need to be determined.
- Procurement Process: The procurement will be based upon the scope and the color of money. For federal dollars, additional requirements such as DBE involvement would be defined. This will determine how long the procurement will take. However, most procurements of this nature could take upwards of six months.

The motion also addressed the study of the installation of the ALECS at Los Angeles Union Station (LAUS). Currently, the station functions with push - pull operations where the trains come into the station cab car forward and exit the station locomotive forward. Due to the nature of the operations, trains are idling at LAUS for 20 to 30 minutes minimum within the station. This equates to approximately 50 cumulative hours of locomotive idling time each day.

The Southern California Regional Interconnector Project (SCRIP) will take up to six of the yard tracks; run them out the south end of the station, over the US-101 freeway to connect with mainline tracks south of LAUS. This will provide a pass through station for at least 50% of the trains utilizing LAUS, creating dwell times of no more than five minutes per train. While it does not appear that the ALECS will see effective use in that situation, it could be feasible to install this system on tracks that are not running through the station where trains are stationary for a portion of the time that they are in the station.

Under consideration will be the type of system to be most effective, operations of the rail yard with the ALECS, and the cost effectiveness of the system.

Since the system is not in revenue service for locomotives at this time. A significant amount of work will need to be performed to determine the feasibility in an operating rail yard. This will require testing of a prototype system. As the 2006 study reported, additional work needed to be completed to develop a cost effective system for use in an operating railroad yard. The procurement schedule for such a test will be a lengthy process. While the test system may be eligible for grants, this is not confirmed and funding will be an issue.

DETERMINATION OF SAFETY IMPACT

There are no recommendations associated with this report that impact safety.

FINANCIAL IMPACT

Additional study regarding the operational effectiveness and cost effectiveness of this system is necessary to determine the financial impact.

Impact to Budget

None at this time.

ALTERNATIVES CONSIDERED

Metrolink has made significant investments and operations modifications to reduce emissions and noise levels for the neighboring communities. They continue to work with the community and other stakeholders to address their concerns about Metrolink operations. An alternative for the Board to consider is to continue efforts to make immediate improvements on daily operations including the integration of the new Tier 4 locomotives which will dramatically reduce emissions starting in late 2016.

NEXT STEPS

The ALECS is not in revenue service at this time. There are significant maintenance and yard operations issues that need to be resolved to implement the system. The ALECS installation and operation at LAUS will be further studied, bearing in mind the environmental benefits associated with the imminent introduction of Tier 4 vehicles.

ATTACHMENTS

Prepared by: Don Sepulveda, Executive Officer, Regional Rail (213) 922-7491

Reviewed by: Richard Clark, Executive Director, Program Management, (213) 922-7557

Phillip A. Washington
Chief Executive Officer