CALIFORNIA AIR RESOURCES BOARD

Research Screening Committee Meeting
Cal/EPA Headquarters Building
1001 I Street
Sacramento, California 95814
(916) 445-0753

March 19, 2021
9:00 a.m.

ADVANCE AGENDA

I. Approval of Minutes of Previous Meeting:

January 21, 2021

- Approved

II. Discussion of Research Proposals:

1. "HIFIVE – Health Impacts of Filtration ImproVements in Elementary Schools," University of California, Irvine $840,000, Proposal No. 2849-298

While some studies have assessed classroom filtration effectiveness in reducing air pollutant concentrations and a substantial body of scientific evidence supports the link between criteria air pollutant exposure and child respiratory dysfunction, there is little direct evidence available for estimating the health benefits of air filtration improvements in schools. Moreover, asthma is a significant public health concern, especially among children living in many communities with disproportionally high exposures to particulate matter (PM). The proposed study will provide air filtration interventions in up to 30 elementary schools in an AB 617 community in the Southern California region and investigate the possible benefits directly associated with PM2.5 exposure reduction through these interventions. The proposed air filtration interventions include panel filter upgrades for existing Heating, Ventilation, and Air Conditioning (HVAC) systems or portable high efficiency particulate air (HEPA) filter air purifiers for each classroom. Classrooms will be randomized using a crossover randomized controlled trail. In this design, each classroom gets the intervention, but during different terms of the school year. At each school, air quality sensors that measure real-time PM2.5 concentrations will be installed both indoors and outdoors to monitor air quality. In addition, 300 asthmatic students from classrooms with indoor air quality sensors will be recruited to longitudinally assess allergy and respiratory symptoms. The analysis of these students will provide direct associations between measured exposure values and health outcomes at the individual level. The results from this study will provide data on health benefits of filtration in elementary schools in order to fulfill the accountability reporting requirements of the incentive program in a vulnerable community selected pursuant to AB 617. The results from the proposed crossover randomized controlled trial will assess direct health impacts associated with PM2.5 levels that can be generalized to other AB 617 communities with similar exposure levels.

III. Discussion of Draft Final Reports:

1. “Activity Data of Off-Road Engines in Construction,” University of California, Riverside, $200,000, Contract No.17RD013

   Construction equipment represents one of the most significant sources of nitrogen oxide (NOX) emissions in the heavy-duty off-road sector. Evaluation of the emission contribution of off-road diesel engines is critical for developing effective regulations and corresponding control strategies. In order to evaluate the emissions of off-road construction equipment, it is important to understand its activity patterns. Although some studies of off-road construction activity have been conducted over the years, the available data for off-road equipment is still limited, especially when compared to on-road vehicles, which have been studied for decades. Moreover, the off-road construction activity studies were mainly for engines certified to pre-Tier 4 final emission levels and based on survey data obtained prior to 2010. New activity data is needed to reflect the activity changes and the latest generation of emission control systems being used in construction applications. This study has conducted activity measurements on 54 pieces of Tier-4 construction equipment, representing 9 different typical construction equipment types in California. Each piece of equipment was instrumented with an engine control unit (ECU) datalogging device, and its instantaneous engine activity data were collected over a minimum of 4 consecutive weeks. With the data, construction equipment activity profiles were characterized such as engine start and soak time distributions, idling durations, and fraction of total use time, SCR functionality, and duty cycles for different types of vocational uses, operation hours, number of engine starts per day, power/work output, and fuel use for each equipment type. The results will be used to update the off-road emission inventory model, OFFROAD, for construction equipment. Engine duty cycles examined with the in-use engine activity data from this study deviated from the current certification cycles; more significant contribution to NOx emissions were found low load conditions that was it in current the certification cycles.

2. “Emission Impacts of Connected and Automated Vehicle Deployment in California,” University of California, Davis, $220,000, Contract No. 17RD003

   The transportation sector is undergoing a rapid transformation towards connected and automated vehicles (CAV) with unknown long-term impacts on air quality and climate emissions. This study examined the literature and several scenarios of CAV technology adoption, usage preferences, and policies in 2050, and estimated the associated vehicle miles traveled (VMT) and resulting criteria pollutant and greenhouse gas (GHG) emissions. Compared to the baseline, results of the high privately-owned CAV penetration scenario predict an increase in total automobile and truck VMT between 5 and 40 percent. This change in VMT would lead to a minimum increase in GHG and criteria pollutant emissions of 5 percent. The high privately-owned CAV penetration scenario coupled with electrification expects the same VMT results with a reduction in emissions of 74 percent. In contrast, results from the pricing scenario predict a change in total VMT between a decrease of 24 percent and an increase of 11 percent compared

to the baseline. The pricing scenario indicates a potential maximum emission reduction of 21 percent. Results from this project will inform the next generation of Advanced Clean Cars regulations, policies related to Senate Bill 375, and transportation and CAV planning efforts statewide.

IV. Other Business:

1. Update on Research Planning