CALIFORNIA AIR RESOURCES BOARD

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

September 18, 2020
9:00 a.m.

AGENDA

I. Approval of Minutes of Previous Meeting:

June 26, 2020

II. Discussion of Responses to a Request for Proposals

1. "Remote Sensing Measurements of Light-Duty Vehicle Emissions at Multiple California Locations" $650,000

   - Eastern Research Group, $649,953

   Between 1999 and 2018, the California Air Resources Board (CARB), the California Inspection and Maintenance Review Committee and the Coordinating Research Council have sponsored studies to measure light-duty vehicles (LDV) exhaust emissions using a remote sensing device (RSD) at a West Los Angeles roadside location (ramp from South La Brea Avenue southbound to Interstate-10 eastbound). The longitudinal data shows that the LDV fleet has generally become cleaner over the years. Despite this progress, however, LDVs continue to be a major source of oxides of nitrogen (NOX) and reactive organic gases (ROG) emissions in the region, contributing around 20 percent of NOX emissions and 25 percent of ROG emissions from all anthropogenic sources in Los Angeles County in 2015. The longitudinal data also suggests significant emission disparities between vehicles registered in socioeconomically disadvantaged communities and those registered in non disadvantaged communities in the Los Angeles area.

III. Discussion of Research Proposals

1. "Developing a Comprehensive Framework for Estimating the Social Costs of Emissions of Criteria Pollutants and Air Toxics In California, and Identifying Other Direct and Indirect Benefits of California's Climate and Air Quality Programs," University of California, Davis, $456,245, Proposal No. 2839-295

   Achieving California's challenging air quality and climate objectives will require accurate information about the health benefits (and avoided damages) of relevant policies. Metrics on the impact of policies on the health and well-being will make it easier for communities and decision-makers to understand and track the effect of aggressive climate and air quality policies and measures. The current Cost of Carbon metric is not sufficient to meet these needs and new

metrics are needed to better quantify climate, air quality, health, and other co-benefits of California's climate programs. This project will address that need by qualitatively assessing the environmental, energy, economic, and social benefits related to California's climate and air-quality programs. This project will estimate air-quality health benefits by developing a more comprehensive set of concentration-response functions, capturing the effects of socio-economic status (SES), and including a detailed analysis of the impacts of the emissions of toxic air contaminants. This work will also include estimates of the agricultural and visibility benefits of improvements in air quality, ecosystem benefits, and incorporate the interaction of the nitrogen cycle with air quality. The project will produce a spreadsheet model that will account for all of the major factors that determine air-pollution damages. CARB staff will be able to use this model to evaluate the full social costs and benefits of its climate-change and air-quality programs.

2. "Total Exposures to Air Pollutants and Noise in Disadvantaged Communities," University of California, Berkeley, $800,000, Proposal No. 2838-295

   Exposure to particulate and toxic air pollutants such as fine particulate matter (PM2.5), ultrafine particles (UFP), and Volatile Organic Compounds (VOCs) is associated with adverse health effects including asthma, respiratory disease, cardiovascular disease, lung cancer, and poorer neurodevelopmental outcomes in children. CalEnviroScreen, a geographically-based mapping tool that ranks communities by potential exposure, vulnerability, and social economic indicators, shows that many low income and disadvantaged communities (DACs) in California experience higher air pollution and consequent health impacts compared with more affluent neighborhoods. In addition to higher pollutant exposures, DACs are subjected to higher levels of ambient noise, which are also known to negatively affect health. While numerous studies have shown that DACs are subjected to disproportionate exposures to air pollutants and noise, there is less known about the direct impact of different sources, activities, and residential spaces on the total air pollutant and noise exposures for individuals.

IV. Discussion of Draft Final Reports:

1. "Strategies to Reduce Methane Emissions from Enteric and Lagoon Sources," University of California, Davis, $114,995, Contract No. 17RD018

   Enteric fermentation and manure management contributed over 50 percent of statewide methane (CH4) emissions in California, 97 percent of which came from cattle operations. Strategies reducing methane emissions from enteric and manure sources are therefore crucial in achieving Senate Bill (SB) 1383 goals that require reduction of statewide methane emissions by 40 percent below 2013 levels by 2030. This project conducted literature review, statistical analysis, and Life Cycle Assessment (LCA) to evaluate the effectiveness and feasibility of using feed and manure additives as a mitigation strategy to reduce methane emissions from dairy operations in California. Over 90 feed additives and 13 types of manure additives were examined. Based on the results of the data analyses, only one feed additive, 3-nitrooxypropanol (3NOP), with an average net methane reduction of 11.7 percent, was recommended for adoption

at this time, pending FDA's approval. Further studies are required for five other feed additive (nitrate, Mootral, macroalgae, Agolin and grape pomace) and three manure additives (biochar, acidification and SOP lagoon additive) due to limited number of studies available. Biochar is the most promising manure additive with a reduction potential of methane emissions up to 82.4 percent. The project provided a comprehensive and in-depth analysis of feed and manure additive use that is much needed to inform California's Short-Lived Climate Pollutant (SLCP) Reduction Strategies targeting the largest source of methane emissions in California.

2. "Emerging Technology Zero Emission Vehicle Household Travel and Refueling Behavior," University of California, Davis, $650,000, Contract No. 16RD009

   This draft final report combines the results of the current study (16RD009) with a previous study (12-319) that utilized the same methodology but focused on different zero-emission vehicle (ZEV) models. In combination, the studies examined vehicle usage in plug-in electric vehicle (PEV) and fuel cell electric vehicle (FCEV) households throughout California through surveys, vehicle logging, and interviews between 2015-2020. A detailed survey covering vehicle purchase, vehicle fleet, driving and charging behavior, and sociodemographic information was completed by over 13,000 PEV owners. From these survey respondents, 424 households were recruited to participate in the vehicle data collection study, which consisted of installing a data logging device onto all household vehicles, including the non-PEVs. The logging study collected driving and refueling behavior on the order of 1 to 10 seconds per parameter for up to a year. From the logged households, 40 were selected to participate in interviews. At the vehicle-level, results indicate that the average percent electric vehicle miles traveled (eVMT) for plug-in hybrid electric vehicles (PHEV) is 14-66 percent, depending on vehicle model. There is a similar large range in the percent eVMT at the household-level for PHEVs studied (4-62 percent) due to miles driven on household internal combustion engine (ICE) vehicles. PHEV households with more ICE vehicles have lower percent eVMT. The percent eVMT on battery electric vehicles (BEV) and FCEVs at the vehicle-level is 100 percent (by definition). BEV and FCEV households with at least one ICE vehicle had an eVMT of 33-70 percent and 65 percent, respectively.

3. "Zero-Carbon Buildings in California: A Feasibility Study," University of California, Berkeley, $680,574, Contract No. 16RD004

   Commercial and residential buildings contribute 30 percent of California's GHG emissions due to energy demand, water use, and wastewater treatment. Additional GHG emissions occur during the operation of buildings from waste generation and vehicle trips taken for commuting, shopping, travel and leisure. California's 2017 Climate Change Scoping Plan recognizes that zero carbon buildings will contribute significantly to achieving long-term climate goals. The objective of this research project was to explore the technical feasibility of zero or near-zero carbon building performance for residential and commercial buildings and the potential for community-scale strategies to achieve zero net carbon community performance. Results indicate that zero carbon new construction is feasible for warehouses, strip malls, single-family residential, and multifamily residential buildings across California in the next decade when

strategies are combined with modest investments in voluntary carbon credits. Building electrification offers an estimated 60 percent GHG emission reduction below baseline levels in single-family and multifamily buildings. For large offices and schools, much larger investments in voluntary carbon credits, slower implementation schedules, and/or new strategies and technologies are needed to achieve zero carbon performance. At the community scale, implementation of several key strategies can reduce GHG emissions by 80 90 percent by 2050. Since the majority of California's 2050 building stock exists today, the research study identified which strategies were applicable to existing buildings. Building electrification is by far the most important strategy for community scale decarbonization followed by VMT reduction, plug load/lighting efficiency, building load shifting, rooftop solar, and battery storage. While the research study evaluated the relative importance of mitigation measures by building type for existing buildings, it does not include recommended targets for zero carbon existing buildings. The draft final report recommends targets for new warehouses to be zero carbon by 2023, new residential buildings and strip malls to be zero carbon by 2026, new large office buildings to be zero carbon by 2035, and all new schools to be zero carbon by 2040. The results of this study are essential to identify cost effective GHG mitigation strategies to achieve California's long term climate targets.

4. "The Optimal Route for a Clean Heavy Duty Sector in California," University of California, Irvine, $499,697, Contract No. 16RD011

   Achieving California's climate and air quality goals requires significant transformation of the heavy duty sector. While electrification can help decarbonize vehicle energy demands, it may not be suitable or the least-cost option for all applications. Alternatively, biofuels can also reduce GHG emissions and provide a drop-in fuel substitute; however, they are limited in supply and may not reduce criteria pollutant emissions as much as ZEVs. This study develops long-term scenarios for least-cost uses of renewable fuel feedstocks, fuel production technologies, and powertrains for the heavy duty sector, given technology and emission constraints, to inform investments and policy development so California can achieve climate and air quality goals. Results from the techno-economic optimization show electricity and biomass-derived renewable diesel, natural gas, and hydrogen are viable pathways towards fleet mixes that can meet climate and air quality goals, but increasing ZEV adoption yields lower GHG emissions in the long-term at nearly the same cost. Additionally, constraints on biomass availability and uncertainty regarding competing demands from other sectors may require electrolytic fuel pathways play a prominent role long-term if hydrogen and renewable natural gas (RNG) meet a substantial portion of fleet fuel demands. Fleet barriers to achieving these future scenarios were investigated to create a guidance document incorporating strategies that help overcome identified constraints. The most effective policies and economic mechanisms to encourage zero and near-zero pathways are identified through analyzing existing policies and potential barriers to using advanced technologies

5. “Geofencing as a Strategy to Lower Emissions in Disadvantaged Communities,” University of California, Riverside, $300,224, Contract No. 17RD009

   Previous in-house CARB research comparing the trends in traffic-related pollutant concentrations in high and low SES communities has shown that while ambient PM2.5 concentrations are decreasing everywhere, higher concentrations are still found in the most disadvantaged communities. Geofencing is a promising new strategy to reduce such exposures. Geofencing allows a user to define virtual spatial boundaries on top of a real-world view of a specific geographical area within which a pollution emitter, such as HDVs, could be triggered to employ methods to reduce emission.

V. Other Business:

1. Update on Research Planning