CALIFORNIA AIR RESOURCES BOARD

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

August 20, 2021
9:00 a.m.

ADVANCE AGENDA

I.   Approval of Minutes of Previous Meeting:

March 19, 2021

II. Discussion of Research Proposals:

1. "Preterm Birth, Low Birth Weight, Childhood Autism, Parkinson's and Alzheimer Disease and Air Pollution – California Studies," University of California, Los Angeles, $1,000,000, Proposal No. 2850-299

    The California Air Resources Board (CARB) currently quantifies three adverse health outcomes associated with reductions in PM2.5 emissions resulting from its programs and regulations. These health endpoints are premature death from cardiopulmonary disease, hospital admissions from heart- and lung-related causes, and emergency room visits for asthma. However, scientific evidence supports the existence of additional PM2.5-related outcomes and impacts of other criteria pollutants such as ozone, as well as adverse effects of air toxics, including both cancer and non-cancer effects. Thus, in April 2020, CARB adopted Board Resolution 20-13 directing staff to expand their methodologies to include additional air pollutants and health endpoints. The proposed project will develop modeled daily air pollution surfaces at 30m spatial resolution for PM2.5, O3, and nitrogen dioxide, as well as for six air toxics (benzene, 1,3-butadiene, chromium, lead, nickel, and zinc). The California-wide air pollution surfaces will extend from 1990 to 2019, and they will be used to investigate relationships between pollutant exposures and preterm birth, term low birth weight, autism spectrum disorder, and Alzheimer's and Parkinson's disease. Economic valuations will be identified for these health impacts. These findings will inform CARB's efforts to expand its analysis of health benefits associated with its current and future programs and regulations.

2. "Examining the Health Impacts of Short-Term Repeated Exposure to Wildfire Smoke," University of California, Irvine, $500,000, Proposal No. 2851-299

    Given the hotter and drier weather in California and the impacts of climate change, longer term and larger wildfires are expected to continue and a project that updates the estimates of health impacts of exposure to wildfires in California is needed. The University of California, Irvine has assembled a multi-disciplinary team with expertise in community air quality modeling, remote sensing and air pollution exposure assessment, air pollution epidemiology, biostatistics, and risk communication to expand the understanding of wildfire-induced health impacts.

This study will link detailed health and covariates data with high spatiotemporal resolution wildfire smoke exposure obtained from sophisticated air quality modeling to examine the impacts of wildfire on a number of health outcomes, including cardiovascular, respiratory, birth, and mental health impacts throughout the state. In addition, this study will address concerns for disadvantaged communities through collaborative and informative outreaches with designated community members in California. The results of this project will better inform CARB's analysis of the health burdens from extreme events like wildfires by providing a dose response assessment of wildfire smoke. CARB has been developing programs and policies to reduce and provide solutions to worsening climate change impacts, including those in natural and working lands, and the results of this study will help CARB in the analysis of the potential health benefits of policies that help to reduce the risk of wildfire. Moreover, this project would inform messaging and outreach efforts designed to help the public better understand the impacts of smoke and how to protect themselves from it, specifically in DAC that are most vulnerable to climate change impacts.

3. "Improved Assessment and Tracking of Health Impacts for California Communities Most Burdened by Pollution," University of California, Los Angeles, $500,000, Proposal No. 2852-299

This project will, in collaboration with CARB and partners in priority communities, compile and assess community-informed health indicator data that are sensitive to air pollution reductions, as well as develop a web-based dashboard to provide this information to the public.

4. "High Spatiotemporal Resolution PM2.5 Speciation Exposure Modeling in California," University of California, Irvine, $301,214, Proposal No 2854-299

PM2.5 concentrations often exceed the National Ambient Air Quality Standards (NAAQS) in many parts of California. As part of State Implementation Plans (SIPs), regional air quality modeling is performed to understand the spatial and temporal variabilities of speciated PM2.5 levels and to determine the most viable air quality improvement pathways. Currently, the model outputs are evaluated using limited ground-level air quality monitoring data that primarily describes the air quality overpopulated urban centers. An additional dataset on ambient PM2.5 composition is needed to further improve the performance of the regional air quality modeling. For the last few years, satellite remote sensing technologies have advanced and have been used to infer ground-level speciated PM2.5 levels at a relatively high spatial resolution. This project will exploit the recent advancement in satellite remote sensing technologies and machine learning algorithms to estimate ambient concentrations of PM2.5 composition across California for the last two decades. This project will further impute missing satellite-derived concentrations using regional air quality modeling, which will inform health effect studies (no specific health studies yet but potentially future in-house research or contracts after the data on PM2.5 composition are generated by this contract) and environmental justice efforts. Finally, the project will provide recommendations for targeted and effective PM2.5 mitigation strategies that add to the future SIP development efforts.

5. "Understanding the Sources and Formation Regimes of Present-Day PM2.5 to Mitigate Particulate Pollution in California," University of California, Riverside, $500,000, Proposal No. 2855-299

Stringent emission controls have resulted in decreased ambient levels of O3 and PM2.5 known to cause adverse health effects, especially among sensitive populations. However, ambient O3 and PM2.5 levels continue to frequently exceed the NAAQS in many regions of California. This project will develop an improved understanding of O3 and PM2.5 sources and sensitivity to changing precursor emissions. The project will carry out a set of four one-month field studies in areas representative of distinct causes of high PM2.5. A comprehensive suite of instruments will be used during the field studies to measure the concentrations of relevant gases and the size distributions, composition, and concentration of PM2.5. The sensitivity of O3 and PM2.5 to changes in oxides of nitrogen (NOX), volatile organic compounds (VOCs), and ammonia (NH3) will be quantified using the Captive Aerosol Growth and Evolution (CAGE) chambers. Together with the ambient and flow reactor measurements, the perturbation experiments will be used to understand present-day sources of O3 and PM2.5 and the anticipated changes in their concentrations accompanying future reductions in the emissions of their precursors. The result of this project will help improve the performance of a chemical transport model (CTM) used to develop the SIPs. Such effort will identify viable pathways to optimize O3 and PM2.5 reductions in California.

6. "Demonstration of Sensor Technologies for On-Road and Off-Road Heavy-Duty Diesel Vehicles," University of California, Riverside, $750,000, Proposal No. 2856-299

CARB has been developing and implementing a range of different regulatory programs to reduce mobile source emissions. Accurate, stable, and durable on-board sensors are necessary for implementing these programs effectively. Specifically, certain emissions aftertreatment systems, such as Selective Catalytic Reduction (SCR), can be optimized only when accurate real-time information is available through on-board sensors. The lower emissions levels needed to meet air quality goals necessitates on-board sensors that perform better than current technology is delivering. The objective of this research is to evaluate the potential of using state of the-art and innovative sensor technologies in meeting and enhancing the needs for existing and future regulatory programs. The research will monitor NOX, PM, NH3, and CO2 emissions and vehicle weight from 100 on-road heavy-duty diesel vehicles (HDDVs) and 20 large off-road diesel engines (ORDEs) using state-of-the-art and emerging technology sensors. This research will include both laboratory and field testing to evaluate sensor accuracy, precision, linearity, detection limit, measurement range, cross-species interference, and other metrics. This research will identify the advantages and limitations of on-board sensors for regulatory programs, and the real-world datasets collected from both HDDVs and ORDEs will be used to characterize emissions and activity patterns that can be referenced for emission inventories and current and future regulatory programs.

7. "Opportunities to Address Past Inequity to Build Healthier, More Sustainable Communities," University of California, Berkeley, $300,000, Proposal No. 2857-299

Historically, racially discriminatory practices have placed public services and funding sources out of reach for many residents based on race and ethnicity. Although many of these practices have been outlawed in the past several

decades, current policies that shape public infrastructure investments are not providing sufficient investments to adequately develop and provide equal access to clean, healthy, and resilient communities for all people in California. This project will identify inequitable transportation, housing and land use policies, practices, and funding programs by place type. The researchers will find remedies, strategies, and resources for underserved communities in the housing, land use, and transportation sectors. The results from this study will support decision makers and advocates prevent harm by removing inequitable policies, underinvestment, and disparities between underserved and non underserved communities, and implement equitable policies across California. The project findings will identify and prioritize equitable policies that also contribute to reductions in vehicle miles traveled (VMT) and GHG emissions, and preserve, protect, and allow for the production of more affordable housing across the state. Moreover, the project results will help deepen CARB's racial equity lens through a culturally competent, transformative justice framework. In general, this project will offer opportunities to identify how existing and new public investments can be utilized to yield economic, environmental, and social returns to support healthy and more sustainable community development.

8. "Alignment of Planned Transportation Investments with Climate and Equity Goals," University of California, Los Angeles, $200,000, Proposal No. 2858-299

Geographic location, along with additional unique characteristics of large and small Metropolitan Planning Organizations (MPO) can result in a broad array of limitations when it comes to adopting and implementing regional transportation plans (RTP). Large MPOs tend to have more capacity to develop elaborate processes to inform the development of RTPs and performance measures to evaluate their efficacy. These MPOs have benefitted from having implemented performance-based measures for years, prior to recently prescribed federal and or state mandates. The performance based measure of some MPOs even exceed the federal and state mandates. Despite these achievements, MPOs continue to face multiple adversities. This project will develop a deep understanding of how MPOs select the projects that appear in their RTPs project list and SCS implementation. The project will also examine how selection processes has evolved over time and identify how project performance is tracked after implementation. Information will be collected through interviews with MPO staff, Board members, and other relevant advocates, as well as by synthesizing publicly available information on RTP project selection and evaluation criteria. The project results will help to inform future SB 150 Reports. The results will also help to inform future attempts to align regional and local plan-making and project selection with California climate and equity goals.

IV. Other Business:

1. Update on Research Planning