

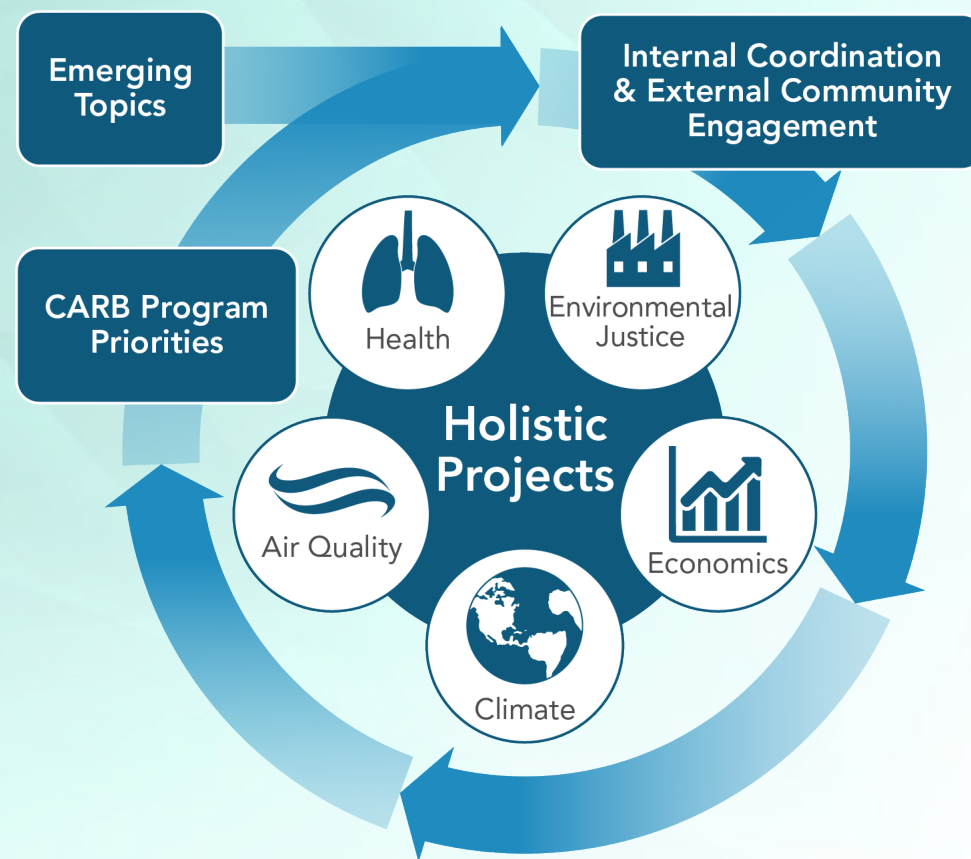


# **Proposed 2021-2024 Triennial Strategic Research Plan and Proposed Research for Fiscal Year 2021-2022**

March 25, 2021

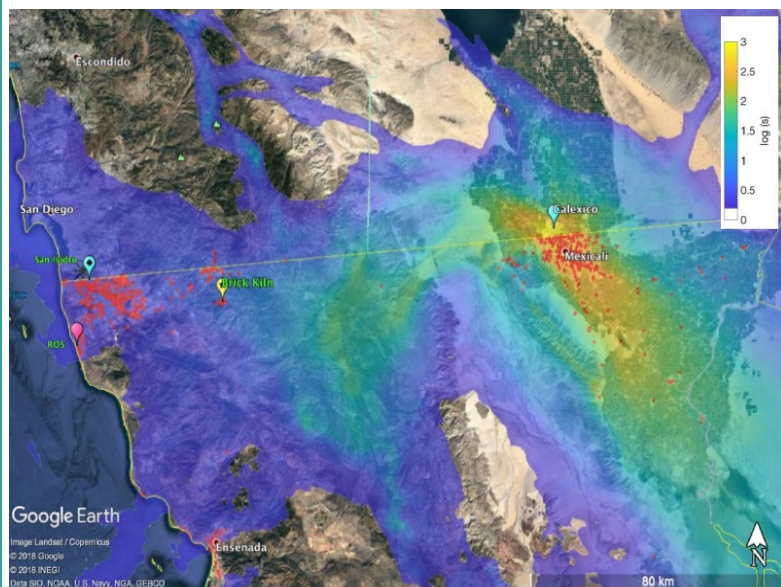
# CARB Research Program

- Legislatively mandated research program
- Sound science to support CARB goals
- Research topics and projects



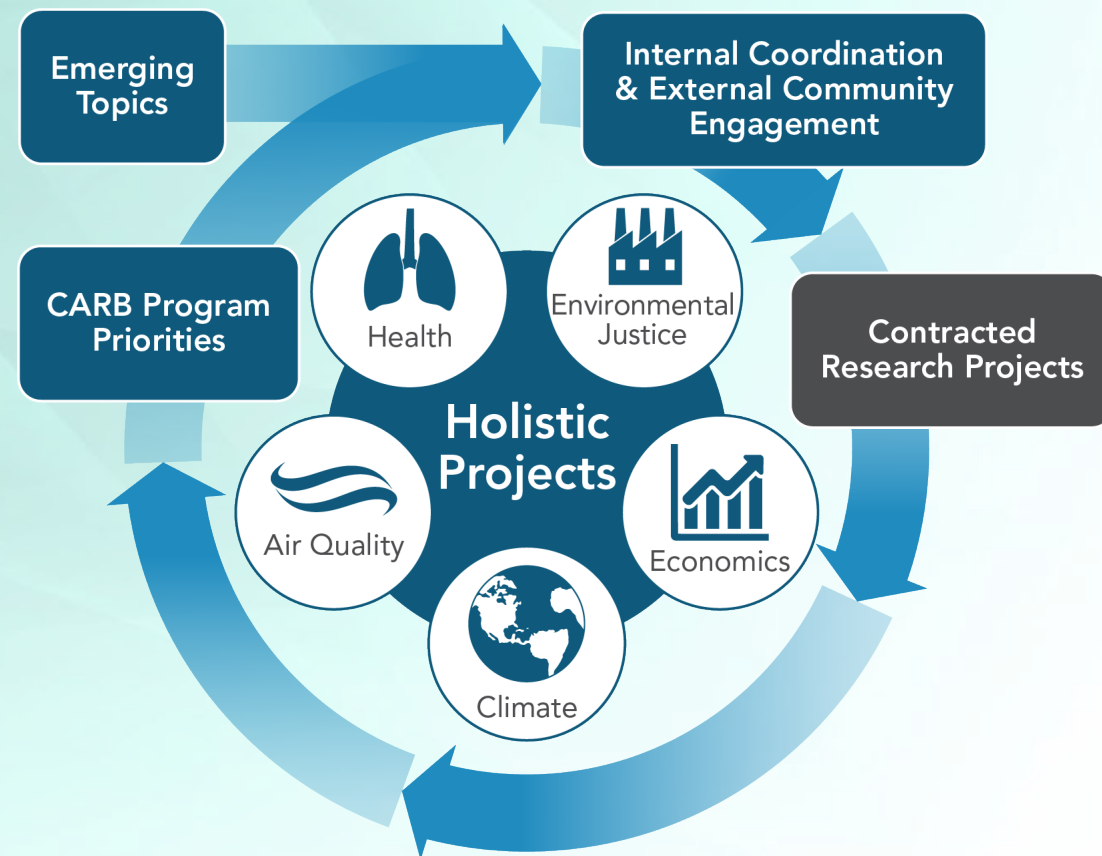
# CARB Research Program

## Emissions at U.S.-Mexico Border



- OEHHA's CalEnviroScreen
- Environmental Justice Efforts

Contracted Research Projects



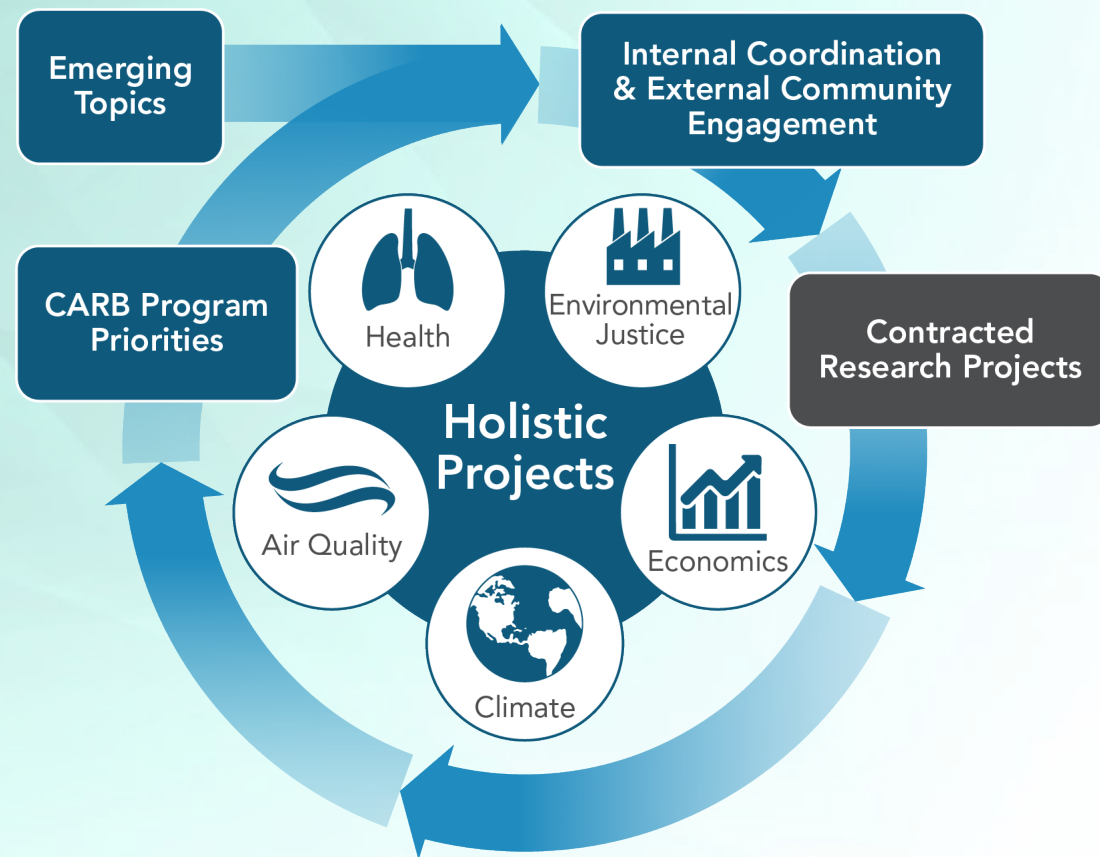
# CARB Research Program

## Real-world Heavy-Duty Emissions Testing



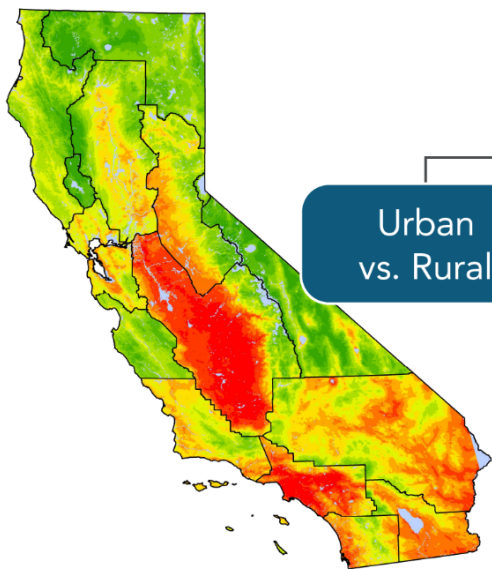
- Inventory
- Truck and Bus Rule
- Heavy-Duty Omnibus
- Heavy-Duty Inspection & Maintenance

Contracted Research Projects





# CARB Research Program



## PM<sub>2.5</sub> Exposure

Urban  
vs. Rural

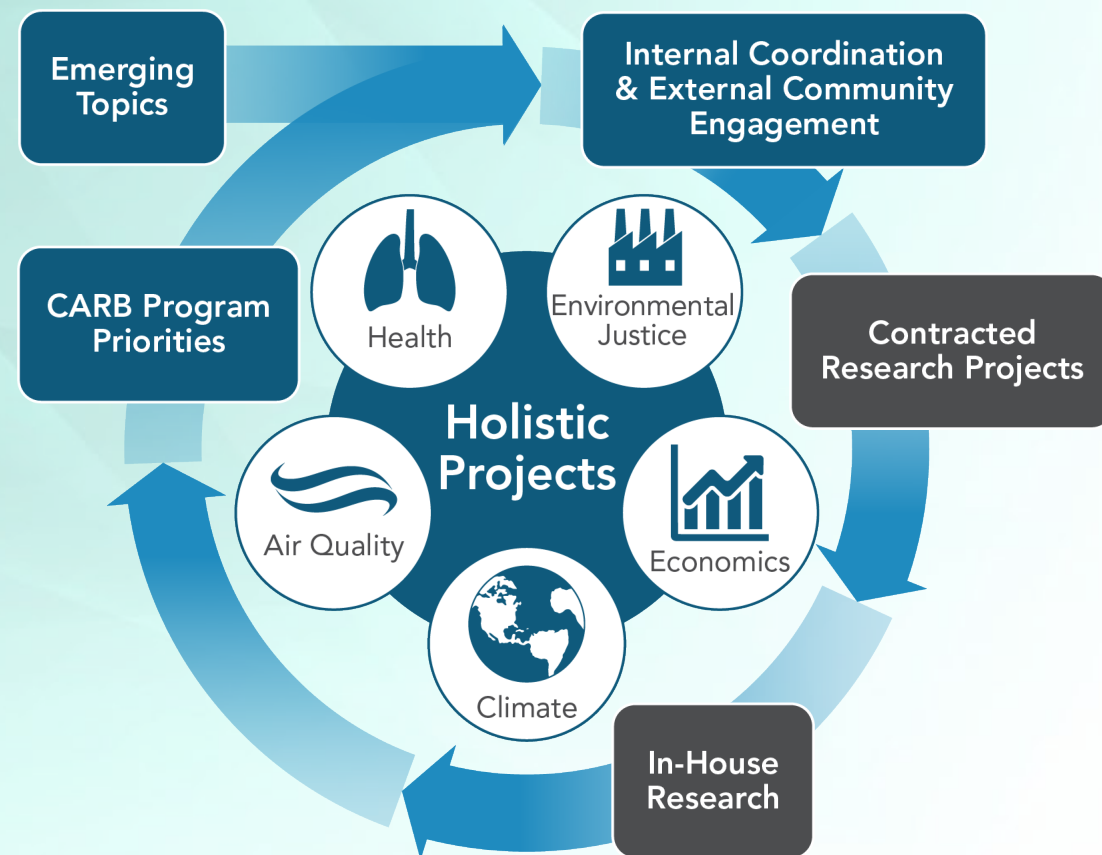
Within-Urban  
vs. Between-Urban

Social  
Vulnerability

## PM<sub>2.5</sub> Exposure Map:

- Fill in data gaps
- Identify "hot spots"
- Support AB 617

In-House Research Projects



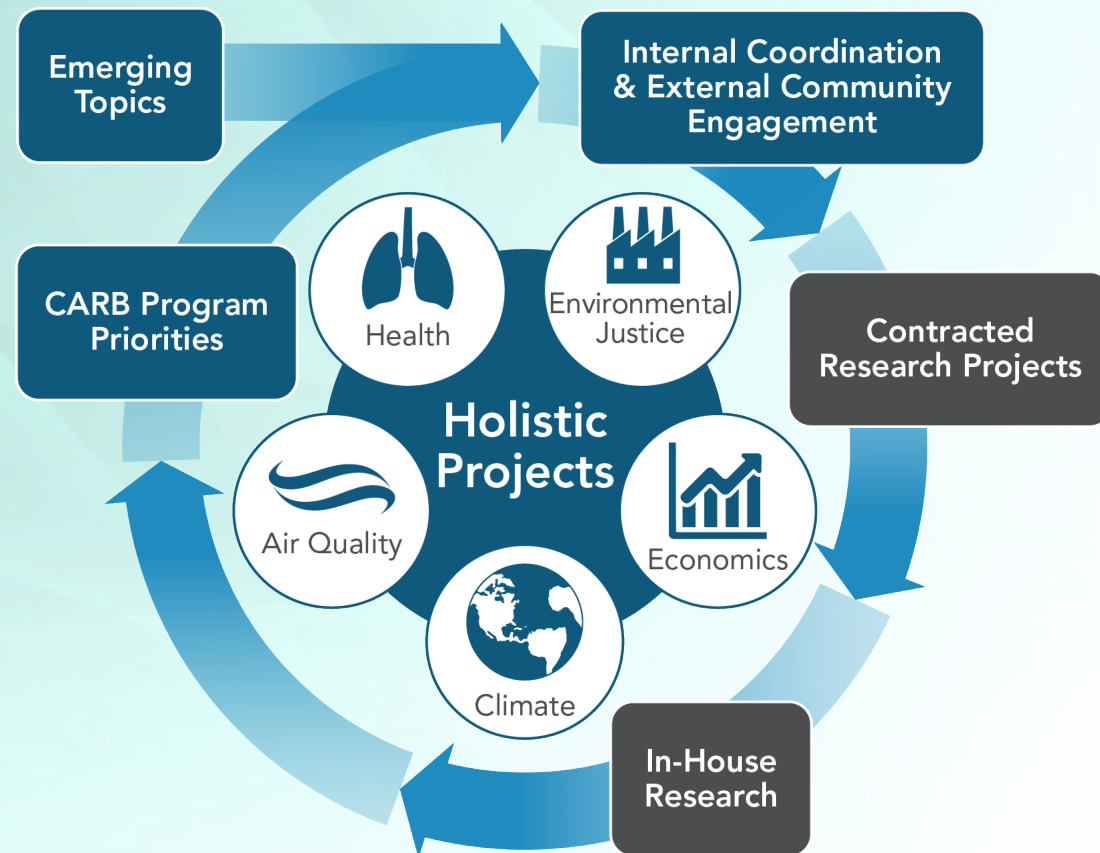
# CARB Research Program

Studying air pollutant emissions from California's dairy operations using Mobile Measurement Platforms

- Inform inventories
- Evaluate mitigation strategies
- Track progress

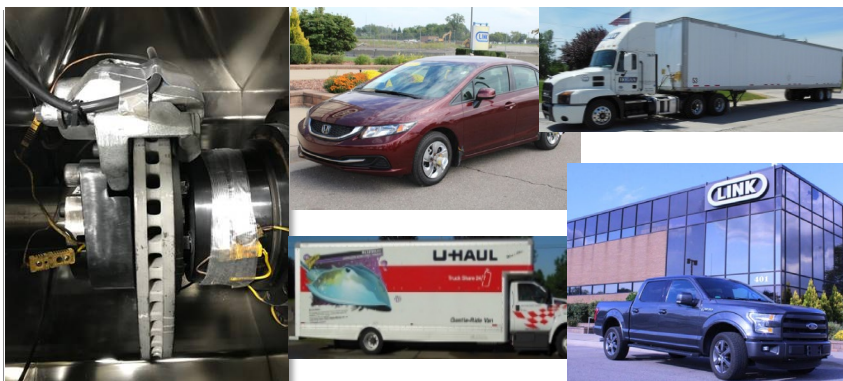


In-House Research Projects



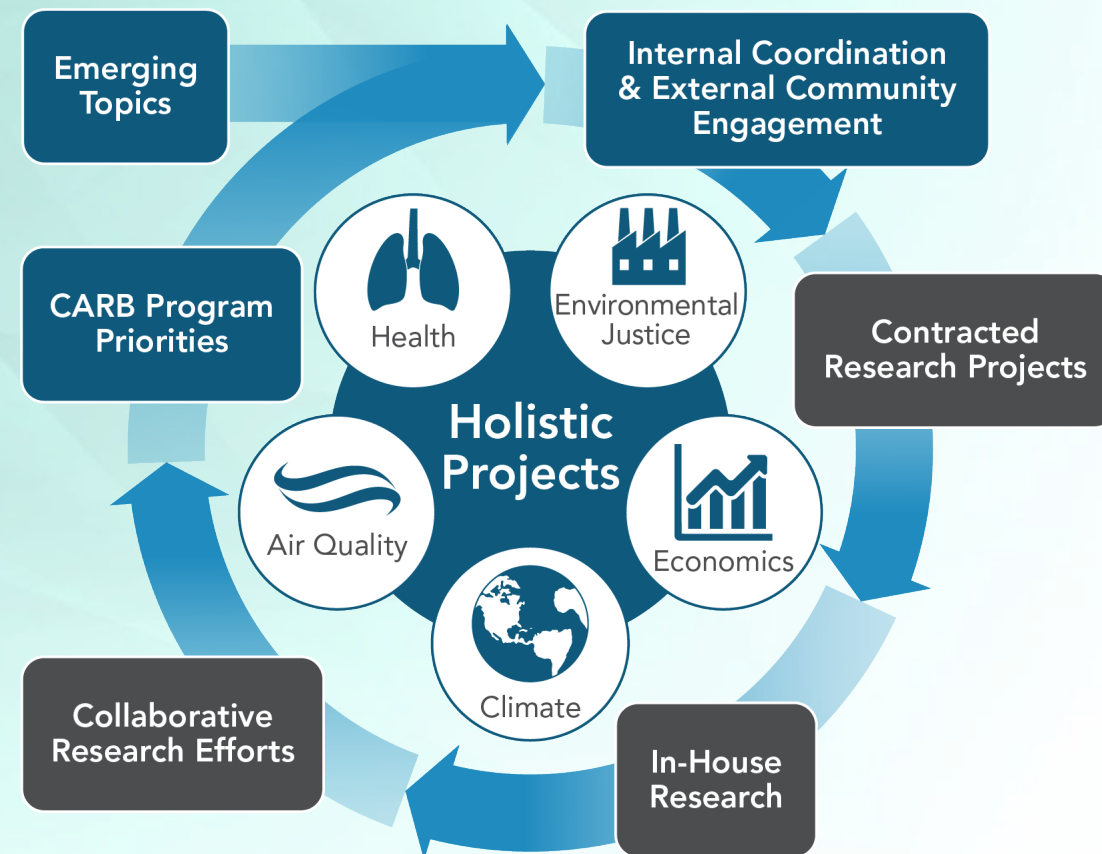
# CARB Research Program

## Brake-wear Particulate Matter Emissions Measurements



- State of the art
- New industry standard
- Worldwide impact and collaboration

Collaborative Research Projects



# Strategic Guidance: Priorities

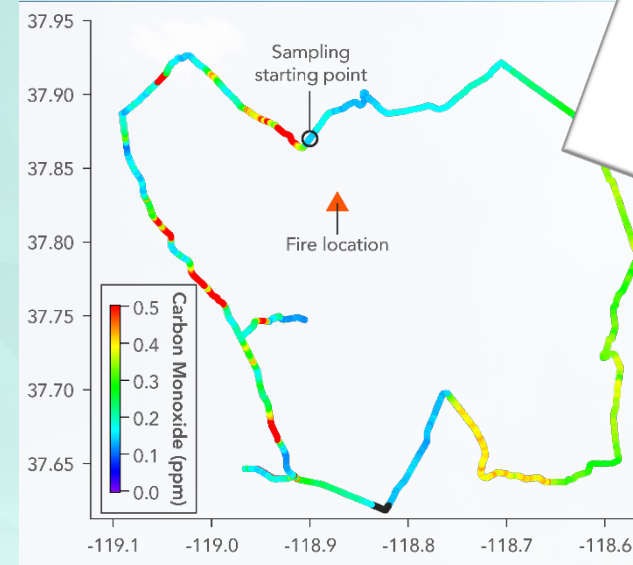
- Triennial Strategic Research Plan
  - Developed with public input
  - Provides roadmap
  - Aids in research planning and outreach
  - Guides annual project selection
  - Delineates new priorities





# What's new in this Plan?

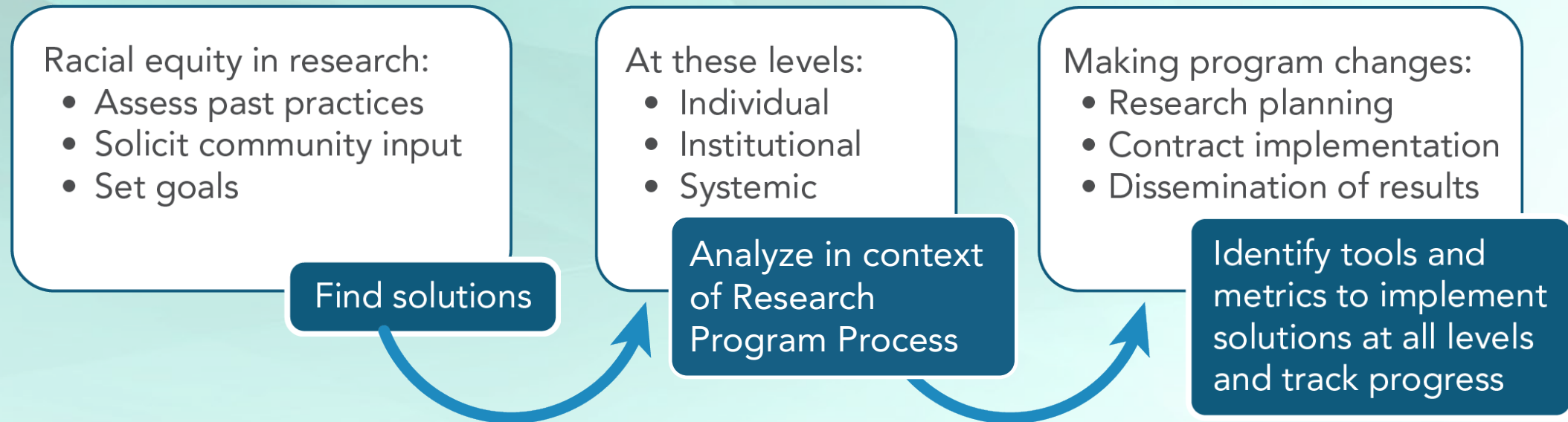
- How do we operationalize racial equity in CARB Research?
- New Research Topics
  - Wildfire smoke exposure
  - Uncovering systemic relationships: the COVID-19 example
  - Carbon neutrality
  - Focus on communities and equity



# How do we operationalize racial equity in CARB research?

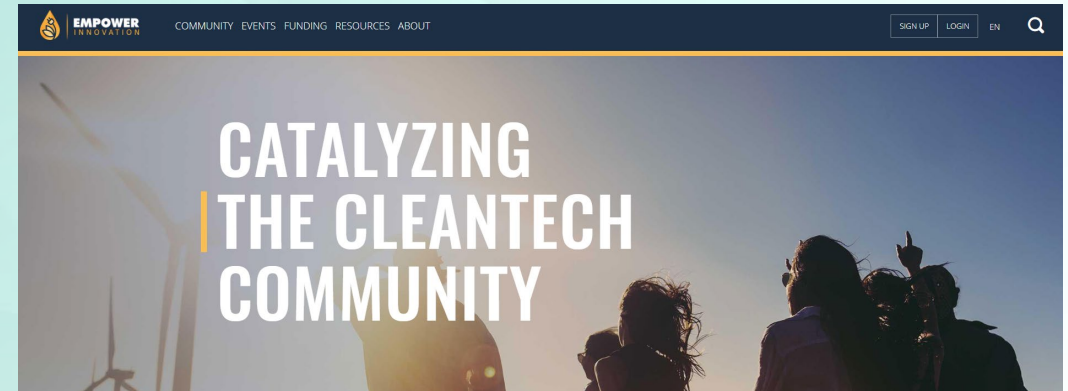
- CARB's Mission:
  - Environmental Justice
  - Commitment to racial equity and social justice: Board resolution 20-33
    - Proactive measures ensuring racial equity in all CARB activities
    - Establish best practices for community engagement
    - Transparent and inclusive processes
- Making changes:
  - How we do our research: Incorporate more community voices
  - What research we do: Projects striving for equitable outcomes
- Guidance received from:
  - Preliminary outreach efforts
  - Resources: Government Alliance on Race and Equity, the Greenlining Institute report on Racial Equity in Research, SB 350, AB 617 Community Engagement Plan

# Steps to Operationalize Racial Equity in Research



# A New Starting Point

- Near-term actions for program changes:
  - Research planning
  - Project implementation
  - Disseminate of results
- Longer-term actions: Stand-alone Equity Framework
  - Expand coordination, collaboration with parallel equity efforts
  - Assess baseline, define metrics, track progress
  - Updates to the Board on equity planning, pilots and progress



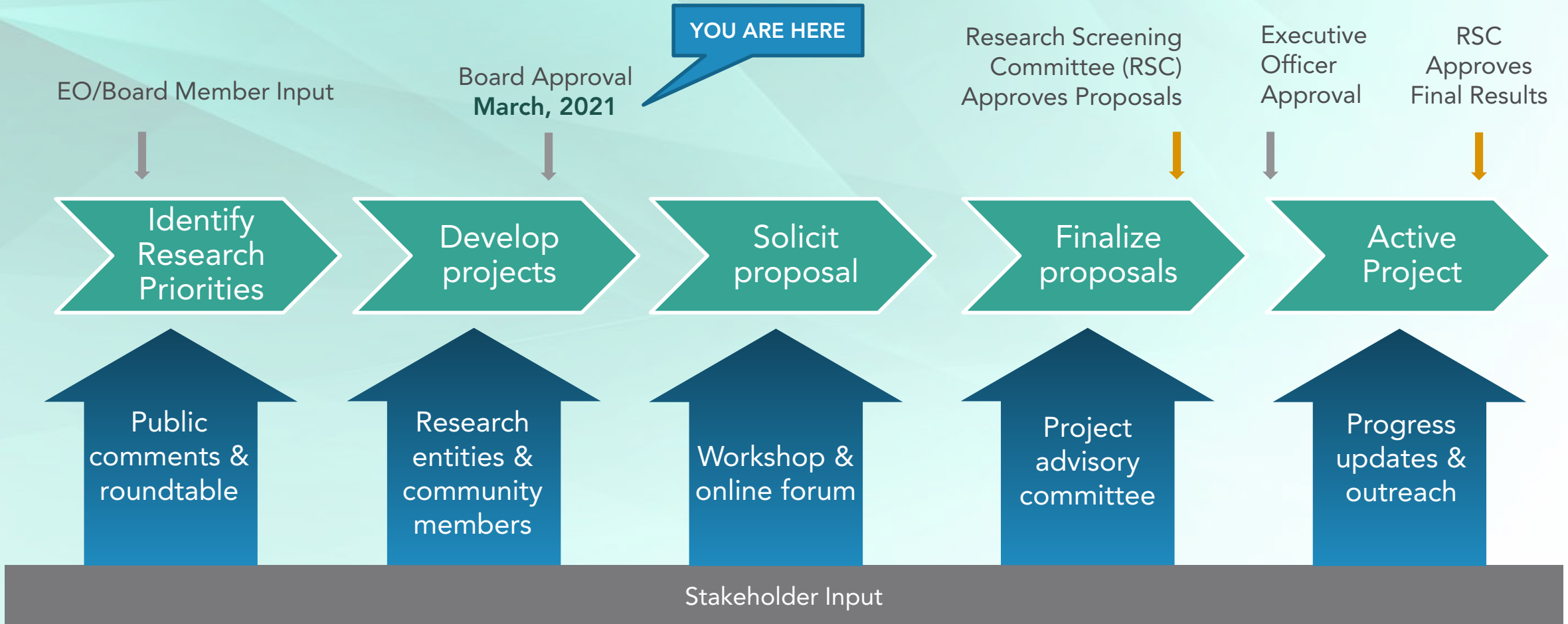


# Strategic Guidance: Research

- Triennial Strategic Research Plan
  - 26 Research initiatives
    - Retired 1
    - Added 5
- Guides Annual Research
  - FY21-22: 11 Proposed Projects
  - FY22-23: To be developed
  - FY23-24: To be developed



# Annual Research Planning Process



# Summary of Proposed FY21-22 Projects

- Expanding Health Analysis
- Short-term Exposure
- Cumulative Exposures in Communities
- NO<sub>x</sub> Sensor Technology Demonstration
- PM<sub>2.5</sub> Satellite Data Dashboard
- PM<sub>2.5</sub> Sources and Formation Regimes
- Place-based Investments
- Align Investments with Climate and Equity Goals
- White Paper Projects x 3

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**Total - \$4.2M**

# Triennial Research Initiatives



- Exposure Impacts and Mitigation
- Indoor Pollution Sources, Exposure, and Mitigation
- Sustainable Communities and Health
- **New Initiative: Expanding Health Analysis**

- Cumulative Impacts
- Short-term Health Exposure
- Identifying Emission Sources
- **New Initiative: Reducing Disparities**



# Health and Environmental Justice Projects FY21-22

- Overarching Research Question: What are the opportunities to maximize public health, environmental and economic co-benefits of CARB programs?
- Proposed Projects
  - Expanding Health Analysis Project: Identify and measure additional health outcomes
  - Cumulative Exposures in Communities Project: Define health indicators for tracking progress in highly impacted communities throughout California
  - Short-Term Exposure Project: Measure impacts of wildfire smoke exposure to assist public outreach

# Research Initiatives



- Market Transformation
- Program Assessment
- **New Initiative: Behavioral Economics**

## State Implementation Plans

- Ozone Sensitivity and Transport
- Identifying Sources of PM<sub>2.5</sub>
- **New Initiative: Emissions Reduction Strategies**

## Mobile Sources

- Light-Duty Fleet Deterioration & High Emitters
- Real-World & Laboratory Emission Discrepancies
- Potential of Advanced Technology
- Heavy-Duty Real-World & Certification Emission Discrepancies
- Reductions from Off-road
- Increased Freight Efficiency
- Potential of Advanced heavy-Duty Technology
- **New Initiative: Non-tailpipe Emission Sources**

# Air Quality SIP and Mobile Source Projects FY21-22

- Overarching Research Question: What air quality mitigation strategies will enhance air pollutant reductions?
- Proposed Projects
  - **Sensor-based Emissions Project**: Demonstrate the feasibility of using new generation on-board NO<sub>x</sub> sensors in reducing emissions and improving regulatory compliance for heavy-duty vehicles
  - **Ambient PM<sub>2.5</sub> Sources Project**: Fill in data gaps on ground-level PM<sub>2.5</sub> and understand emerging organic sources and formation regimes to optimize emission control strategies that reduce both PM<sub>2.5</sub> and O<sub>3</sub>, particularly in San Joaquin Valley and South Coast Air Basin

# Research Initiatives



## GHG Pollutants & Mitigation

- Evaluating Trends & Refining Emissions Estimates
- New Initiative: Mitigation Options

## Sustainable Transportation and Communities

- Tracking Progress & Co-benefits
- Evaluating and Mitigating GHG Emissions from VMT, Land Use & Buildings



# Sustainable Transportation and Communities Projects FY21-22

- Overarching Research Question: What are the best practices for the equitable implementation of sustainable community strategies and removing barriers to investments in priority communities?
- Proposed Projects
  - Best practices to align transportation investments with climate and equity goals: Assess best practices to select and evaluate transportation investments
  - Opportunities to address inequitable distribution of public investments: Develop recommendations to remove barriers to public investments and reduce disparities across California communities

# White Paper Projects: Defining long-term research paths

- Health and Environmental Justice Topics
  - Community engagement for research goals in the Imperial Valley area
  - Activity-based patterns of exposure to harmful pollutants
- Sustainable Transportation Topics
  - Strategies to Improve Freight Efficiency

# Next Steps

- Annual Research Plan 2021-2022:
  - Develop full project scopes
  - Solicit proposals from University of California and California State University researchers
    - Connect cross-university researchers, community partners: Empower Innovation
    - Hold solicitation workshops: Thursday April 8, 2021
- Engage on how to operationalize equity in research

Research Activities listserv:

<https://public.govdelivery.com/accounts/CARB/subscriber/new> (Link takes user to listserve sign up page)

# Staff Recommendation

- Approve Resolution 21-5
  - Triennial Strategic Research Plan for FY 2021-2024
  - Research Projects for FY 2021-2022