

# Proposed Annual Research Plan

A decorative horizontal bar consisting of a solid green line on top, followed by a white line, and then three thin, parallel light green lines below.

**Fiscal Year 2016-2017**

**May 19, 2016**

# Today's Action

- Consider Research Plan for FY 2016-2017
- \$4.7 M total budget
  - \$3 M committed to projects previously approved by the Board
  - \$1.7 M available for new projects
- 5 new research projects
  - Leveraging >\$13 M through collaborations

# New Projects

- In-use NO<sub>x</sub> Emissions from Vocational Trucks (\$150 k)
- Pathways to a Near-Zero Heavy-Duty Sector (\$500 k)
- Improving CalEnviroScreen at the California-Mexico Border (\$150 k)
- CO<sub>2</sub> Monitoring in Los Angeles (\$200 k)
- California Methane Hot Spot Survey (\$700 k)

# ARB Research Program

- Created by the Legislature
- External contracts and in-house research
- Research Screening Committee appointed by Board for scientific and technical review
- Strong relationship with the UC/CSU system
- Multiple coordination mechanisms
- Many types of research dissemination

# Research to Inform Policy

**1970s**

Ozone & Car Emissions



**1980s**

SIP Models, PM10 & Indoor Air Quality



**1990s**

Vulnerable Populations & Diesel Emissions



**2000s**

PM2.5, GHG Mitigation & SLCPs



**2010s**

Sustainable Communities & Alternative Fuels



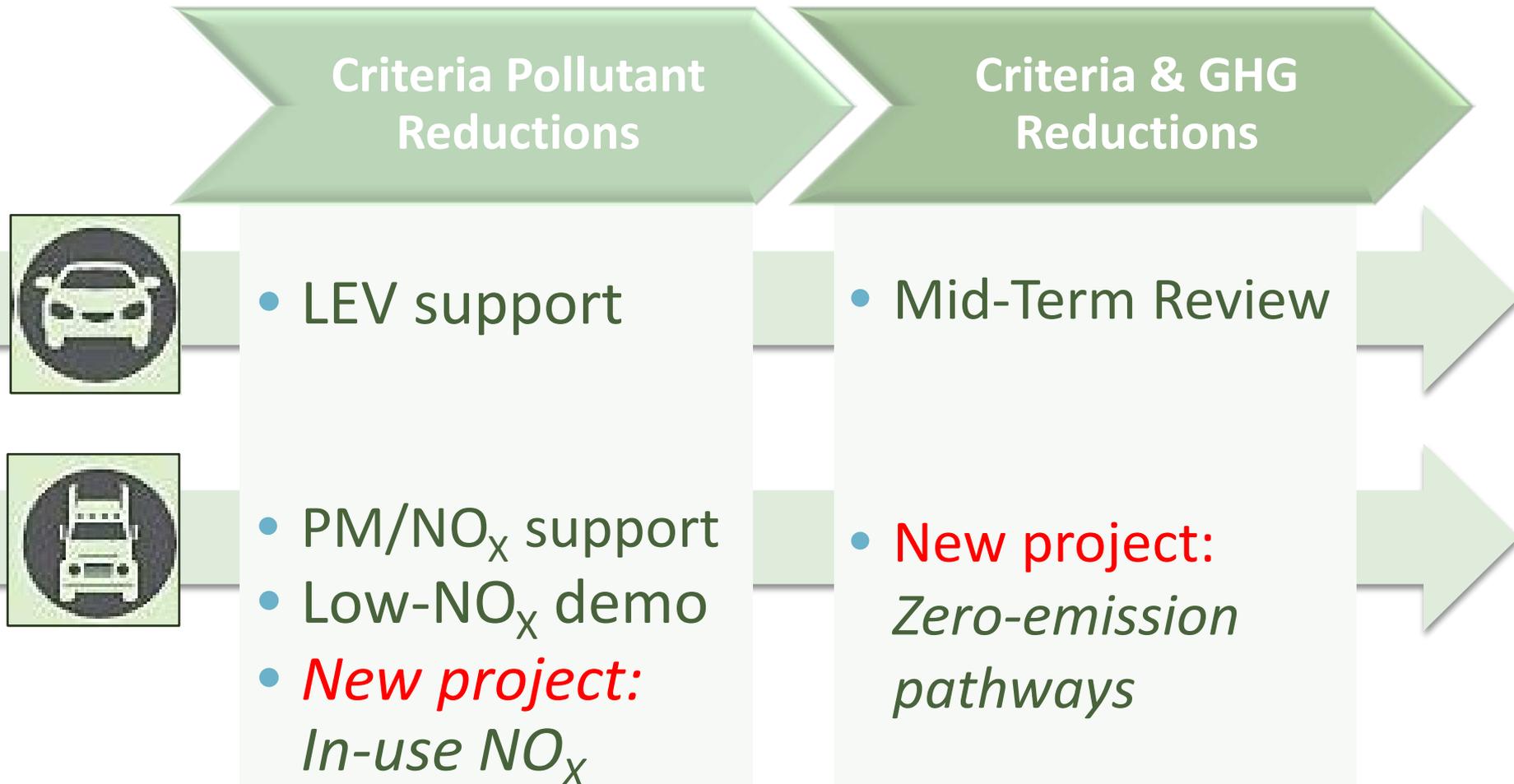
# Research to Inform Policy



# Research to Inform Policy



# Mobile Source Strategies Support



# In-use NO<sub>x</sub> Emissions from Vocational Trucks (\$150 k)

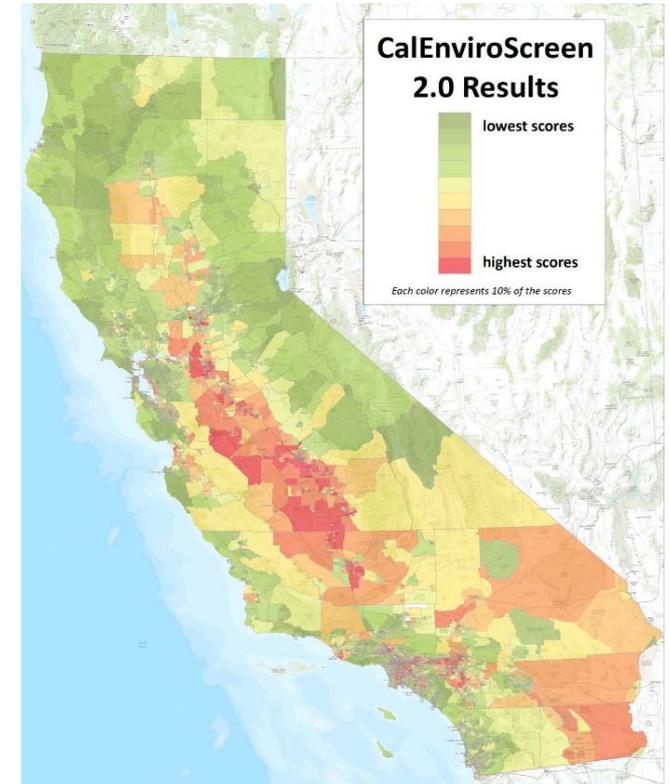
- Inform the bridge between certification and in-use NO<sub>x</sub> by vocation
  - NO<sub>x</sub> emissions from vocational trucks with SCR
  - Multiple engines types and alternative fuels
- Co-funded by SCAQMD, CEC, and SoCal Gas (\$2.85 M)

# Pathways to a Near-Zero Heavy-Duty Sector (\$500 k)

- Future heavy-duty fleet and renewable fuel mix
- Role of connected and automated technologies
- Best policies and use of incentives
- Leverages CEC grid modeling (\$2 M)

# Environmental Justice Program Support

- Environmental Justice Screening Method (EJSM) was the basis for CalEnviroScreen
- Inputs
  - Monitoring of air pollution, pesticides, water quality
  - Socio-economic indicators
  - Proximity to hazards
- Limited coverage at CA-Mexico border



CalEnviroScreen scores by census tract. Darker reds indicate higher pollution burdens and population sensitivities. Green indicates lower pollution burdens and sensitivities. Image credit: OEHHA.

# Improving CalEnviroScreen at the California-Mexico Border (\$150 k)

- Create geospatial database of Mexican emission sources
- Improve accuracy of pollution burden at the CA border for CalEnviroScreen
- Leverages air monitoring in San Diego (OEHHA, \$225 k), Imperial County (NIH, \$2 M)

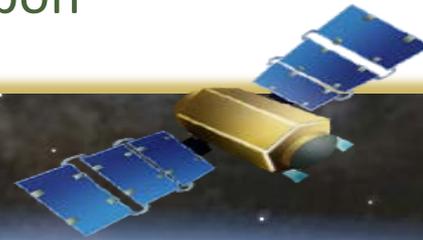


Permanent and special study monitoring networks.

# Scoping Plan & SLCP Strategy Research

CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, Black Carbon

Satellite



Aerial



Ground-level



Tower  
Network



Mobile



Field Studies



Remote Sensing



Laboratory &  
Modeling

## Coordination

NASA, NOAA,  
NIST, CIRPAS, JPL,  
LBL, LLNL,  
Caltech, Scripps,  
UCs, Picarro, CEC,  
CalRecycle,  
DOGGR, CDFA

# CO<sub>2</sub> Monitoring in Los Angeles (\$200 k)

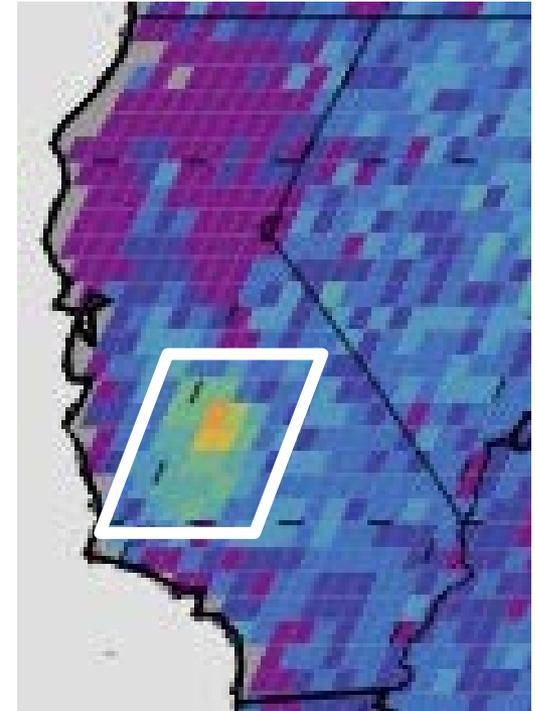
- Continues longest CO<sub>2</sub> time series in California
- Evaluates progress to 2020 target by sector
- Complements Los Angeles Megacities network
- Leverages NIST, NOAA, NASA (>\$5 M)



Megacities observing system for Los Angeles.  
Image Credit: NASA-JPL.

# California Methane Hot Spot Survey (\$700 k)

- AB 1496 requirement to monitor high methane regions
- Tiered approach for regional, local, source level attribution
- Co-funding: CEC, NASA (\$1.4 M)
- Coordinating with air districts, CDFA, CalRecycle, industry



Satellite methane concentration enhancements observed from the period 2003-2009. Image Credit: NASA, JPL-Caltech, U. Michigan.

# Support for ARB Programs

- Recent Board Hearings
  - Near-roadway exposure mitigation strategies (January)
  - Aliso Canyon natural gas leak (February)
  - HFC sector for the Proposed SLCP Strategy (today)
- Upcoming Board Hearings and Other Events
  - Air quality trends in disadvantaged communities
  - Low-NO<sub>x</sub> heavy-duty engine demonstration
  - Research symposium on methane emissions
  - Research symposium for the Midterm Review

# Impact of ARB Research

- Scientific Quality
  - 80% of peer-reviewed articles published in top quarter of journals, in terms of scientific impact
- National and Global Impact
  - Used in National Ambient Air Quality Standards reviews
  - Citation of ARB-funded publications
    - Cited 50 times (on average) in scientific literature
    - 2-3 times higher than other funding organizations

# Recommended Board Action

Approve Fiscal Year 2015-2016 Research Plan