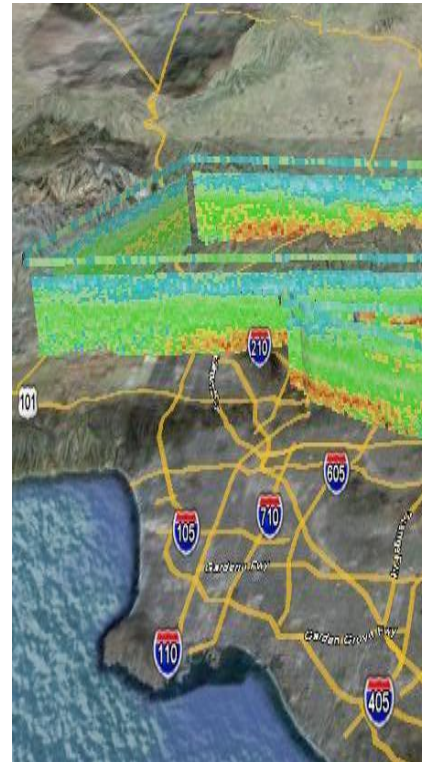




Proposed Research Plan

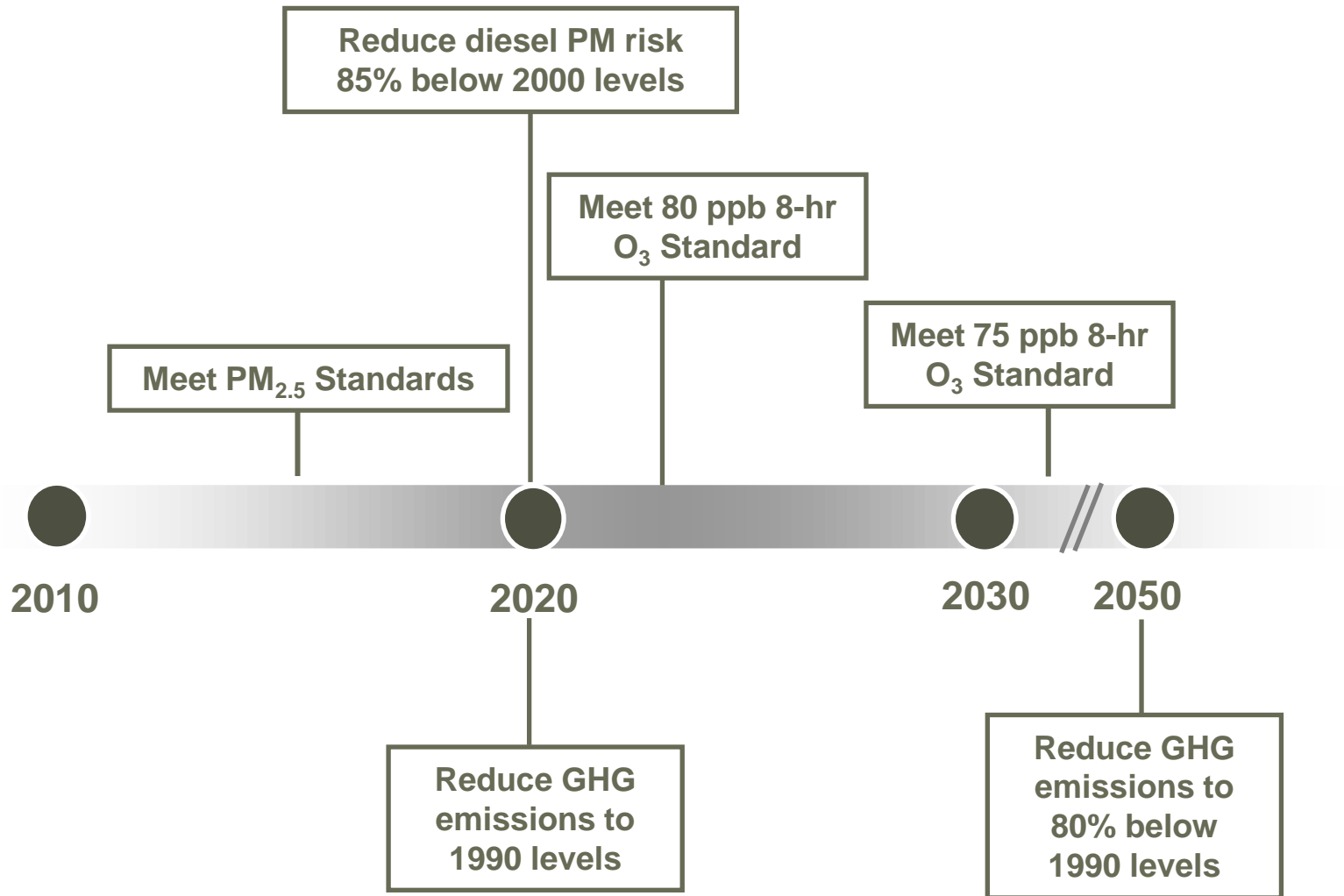
Fiscal Year
2015-2016



Today's Action

- Approve Fiscal Year 2015-2016 Research Plan
- Total \$6.5 million
- 17 research concepts

Planning Considerations



Developing the Research Plan

- Identified priorities based on ARB program needs
- Open call to the public for research ideas
- Concepts and proposals reviewed by ARB's Research Screening Committee

Emerging Research Topics

1970

Ozone & Car Emissions



1980

SIP Models, PM₁₀ & Indoor Air Quality



1990

Children's Health & Diesel Emissions



2000

PM_{2.5} & Greenhouse Gas Mitigation



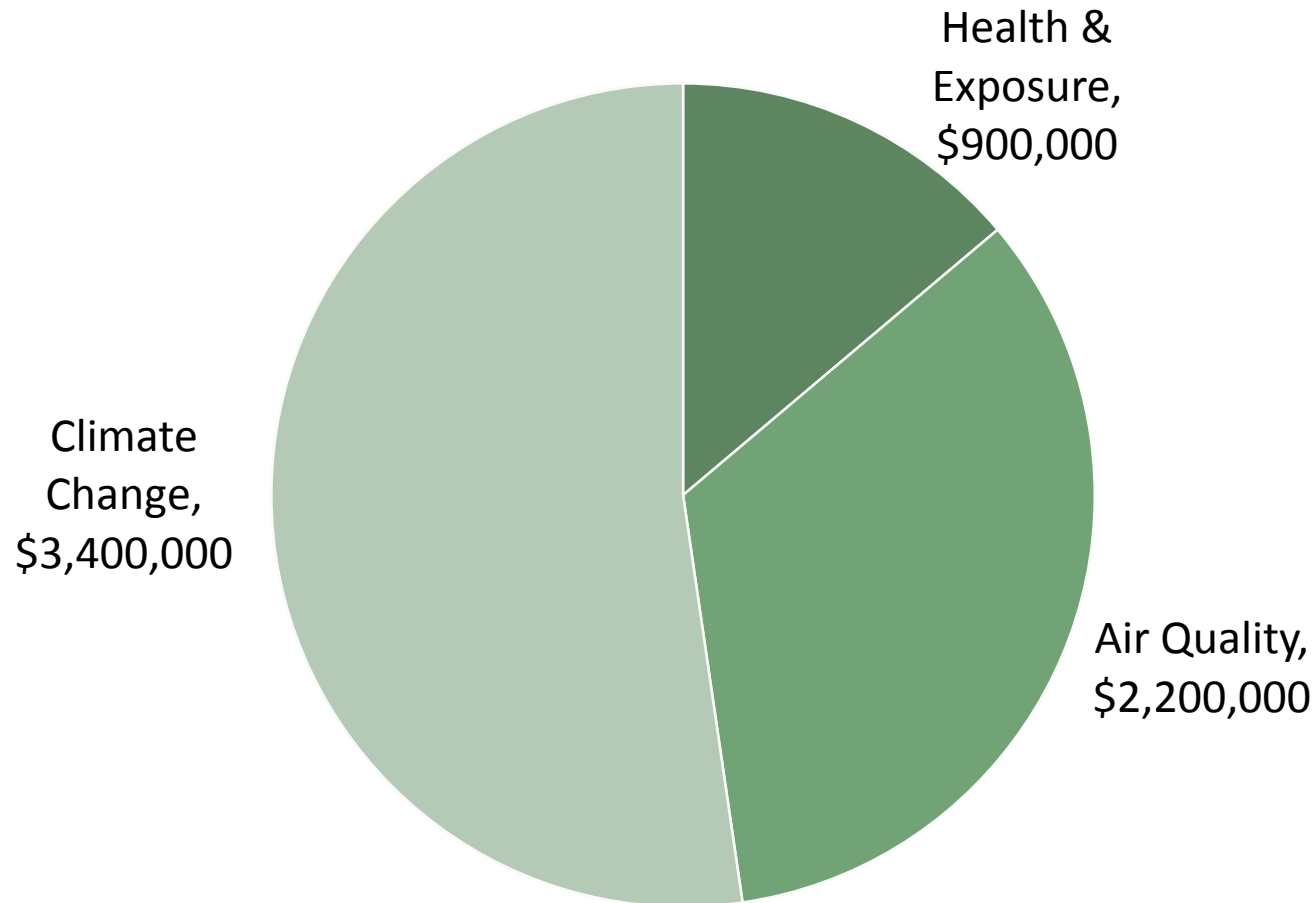
2010

Sustainable Communities & Low Carbon Strategies



Priorities Based on Program Needs

2015-2016 Program Areas



2015-2016 Program Areas



Health & Exposure



Atmospheric Science



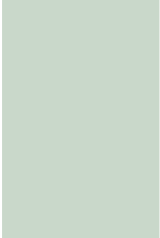
Trucks and Buses



Passenger Vehicles



Sustainable
Communities



Short-Lived Climate
Pollutants and Nitrous
Oxide



Health & Exposure



Health & Exposure Research



Recent Findings

- Epidemiological evidence indicating that PM_{2.5} exposure may lead to a greater risk of cardiovascular effects for women than men, particularly when post-menopausal
- Exposure to wildfire smoke in infancy is associated with suppressed immune function and health effects later in life

Health & Exposure

Recommended Research Projects



Women's Cardiovascular Risk from PM Exposure (\$600,000)



Heritability of Adverse Health Effects from Air Pollution Exposure (\$300,000)



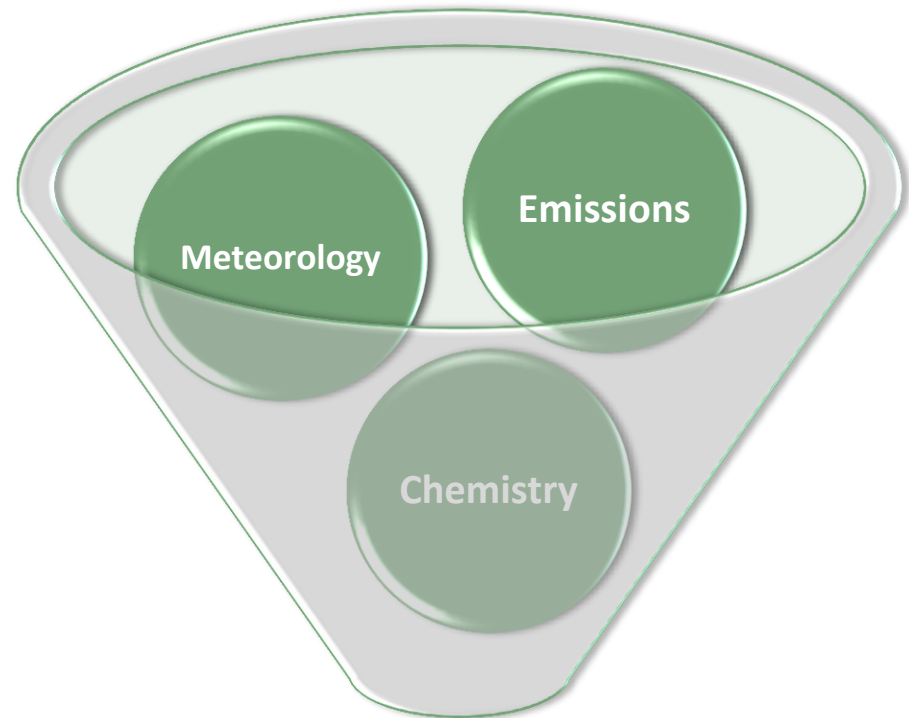
Air Quality



Atmospheric Science Research

Recent Findings

- Field studies document that background ozone is increasing
- Conditions that led to recent PM_{2.5} exceedance events need to be better understood



Photochemical Models

**Inform NAAQS
Planning Efforts**

Atmospheric Science

Recommended Research Projects

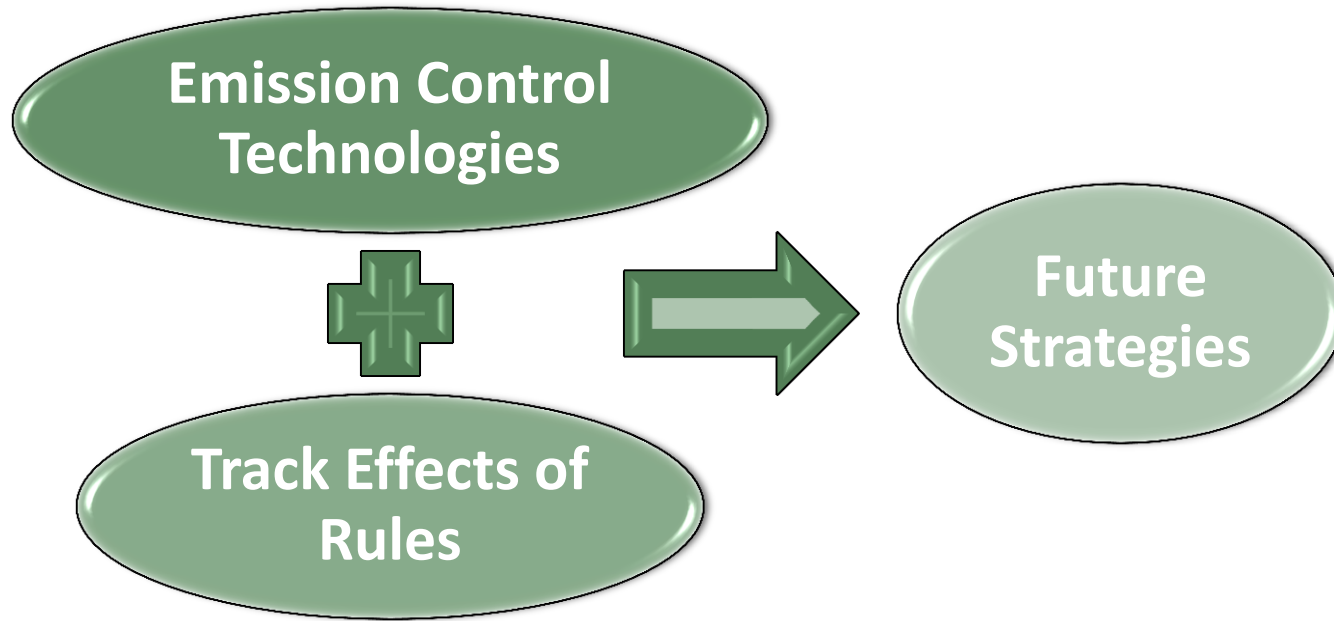


Improved Understanding of Pollution Sources and Atmospheric Processes Contributing to Ozone Exceedances in the San Joaquin Valley (\$400,000)



Modeling High PM_{2.5} Episodes in the South Coast and San Joaquin Valley (\$200,000)

Emissions Research



Recent Findings

- Preliminary field study results suggest that on-road emissions are being reduced as ARB regulations come into effect
- Real world emissions may be different than those measured during certification

Trucks and Buses

Recommended Research Projects



Expand Measurements of Real World Emission Rates (\$400,000)



Certification and In-Use Compliance Testing for HD Diesel Engines (\$500,000)



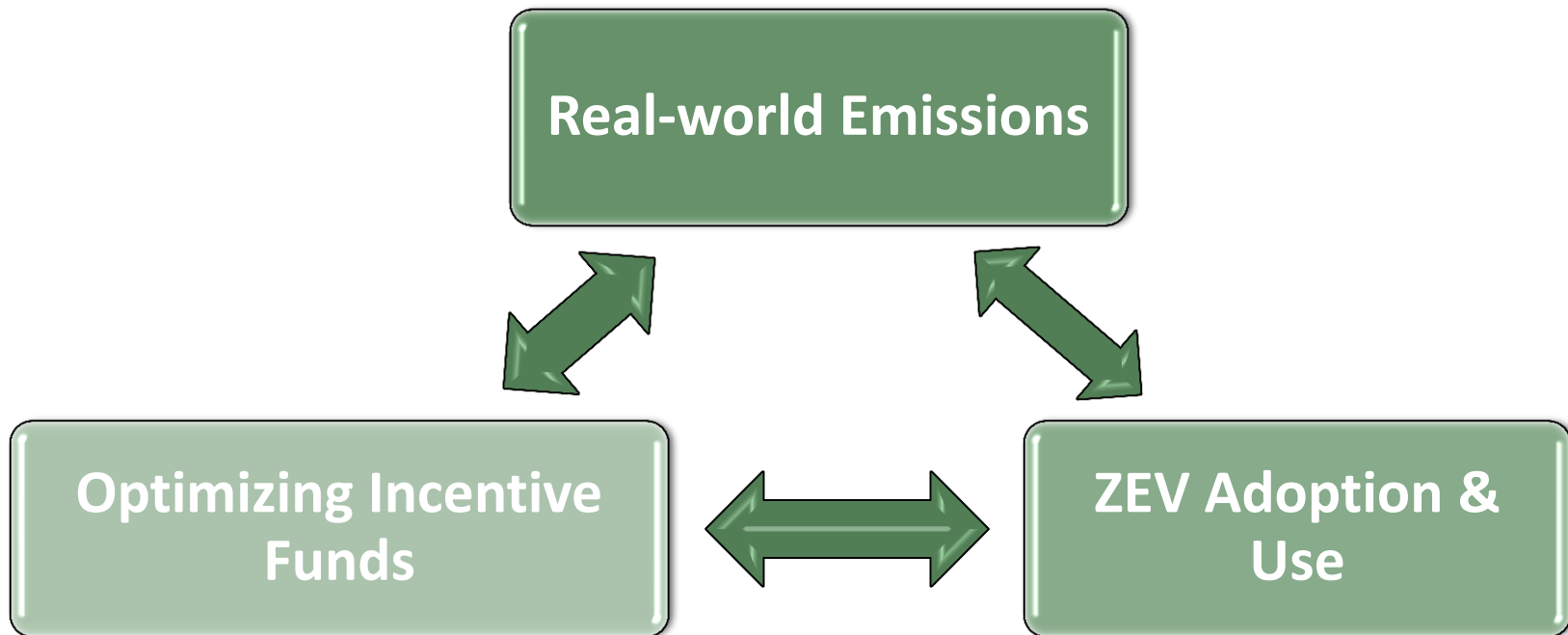
Prototype Heavy-Duty Vehicle Emission Verification Program (\$500,000)



Climate Change



Advanced Clean Cars Research



Recent Findings

- Many factors affect ZEV adoption and use and in turn affect real world emission benefits
- Recent legislation requires changes to CVRP and EFMP that require research

Passenger Cars

Recommended Research Projects

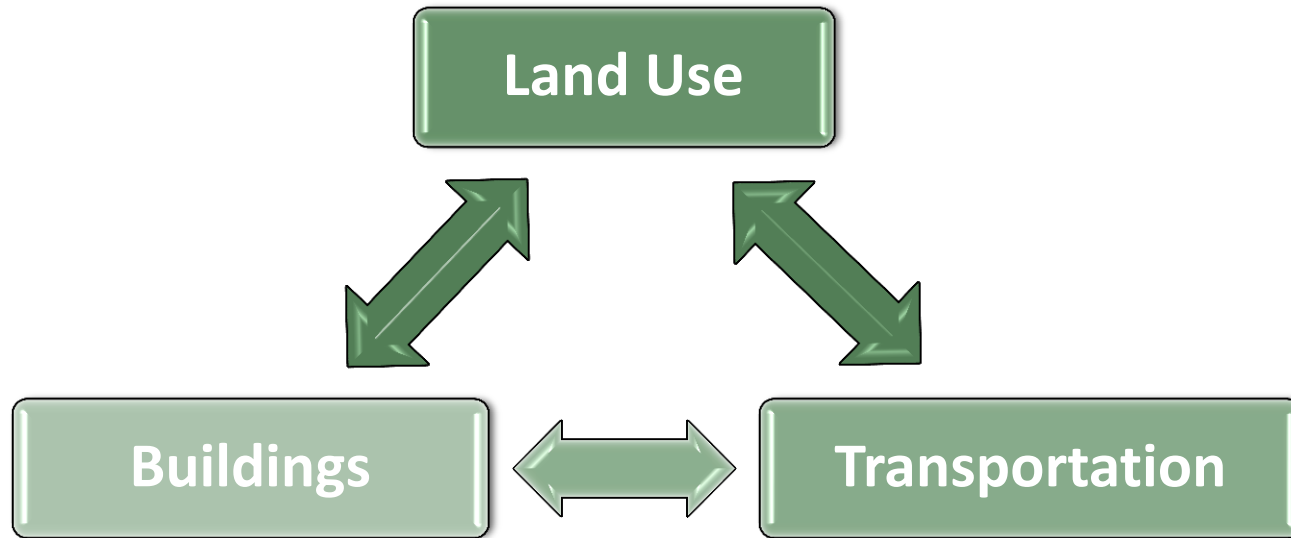


Tracking Emissions Benefits of Older PEVs and New ZEV Technologies (\$650,000)



Maximizing the Air Quality, Climate, and Social Equity Benefits of Light-Duty Vehicle Incentive Programs (\$500,000)

Sustainable Communities Research



Recent Findings

- GHG benefits of affordable housing in transit-oriented developments are poorly characterized
- Green buildings have GHG benefits beyond energy use

Sustainable Communities

Recommended Research Projects



Tracking Land Use Changes That Support Sustainable Communities (\$150,000)



Evaluation of Impact of Transit-Oriented Affordable Housing on Travel Demand (\$300,000)



Zero Carbon Building Technical Feasibility Study (\$400,000)

Short-lived Climate Pollutants and Nitrous Oxide Research



Recent Findings

- Field studies suggest that CH₄ and N₂O emissions are underestimated
- F-gas emissions continue to grow; further reductions will be needed to reach 2050 goal

Short-lived Climate Pollutants

Recommended Research Projects



California Dairy Manure Methane Emissions (\$400,000)



California-Specific Cattle Feed Rations to Improve Modeling of Methane from Enteric Fermentation (\$100,000)



Evaluation of a Variety of F-Gas Emission Reduction Strategies (\$300,000)

Nitrous Oxide

Recommended Research Projects



Additional and Uncertain Nitrous Oxide Emissions (\$400,000)



Continuation of Nitrous Oxide Monitoring (\$200,000)

Research Program Impact

- Rigorous scientific foundation for ARB's regulatory programs
- Identifies new emission reduction strategies
- Tracks program effectiveness

Leveraging Other Research

- Collaboration with federal and state agencies
- More than \$20 million of leveraged research over last 5 years
- Relevant research by others
 - PM_{2.5} measurements in the San Joaquin Valley (NASA)
 - GHG emission measurements in Los Angeles (NIST)
 - Ultrafine cohort study (U.S. EPA)
 - Sustainable transportation research (U.S. DOT)

Sharing Research Results

- Increasing emphasis on research dissemination
 - Press releases, seminars, trainings
 - Improved ARB research website
- Planned dissemination
 - Research syntheses to highlight key themes
 - Biannual newsletter highlighting recent results

Recommended Board Action

Approve Fiscal Year 2015-2016 Research Plan