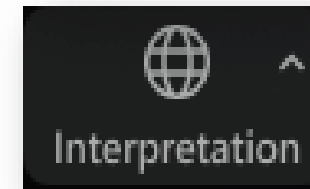


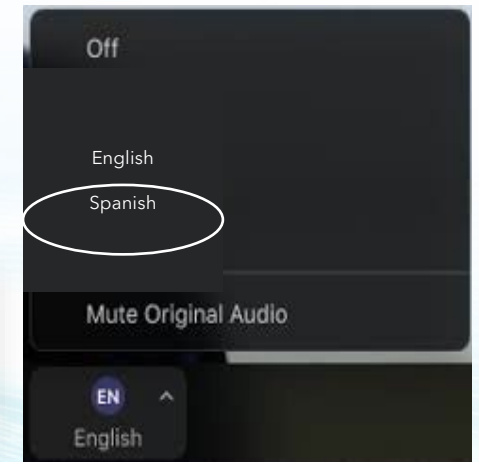
# Language Interpretation through Zoom

- **Spanish Interpretation is being provided**
- **Note:** The Interpretation feature requires downloading the Zoom application to your desktop.
- All attendees are asked to find and click on the Interpretation Icon.
  - English: select Off
  - Spanish: select Spanish, then Mute Original Audio



## Interpretación de Idiomas en Zoom

- **Tendremos servicio de interpretación.**
- **Advertencia:** Para usar la función de interpretación de idioma, los participantes tienen que descargar la aplicación de Zoom en su desktop (escritorio).
- A todos los participantes se les pide que busquen y opriman el ícono de interpretación (Interpretation)
  - Para inglés, tiene que hacer clic en inglés (English) y luego hacer clic en Silenciar Audio Original (Mute Original Audio).
  - Para español, tiene que hacer clic en español (Spanish) y luego hacer clic en Silenciar Audio Original (Mute Original Audio).





# **Public Meeting - Funding Year 2026-2027**

## **Research Priorities**

May 28, 2025

# Today's Agenda

- Introductions
- CARB Research Program Overview
- Update on the Five-Year Strategic Research Plan
- Changes to the Research-Planning Process
- Break-out sessions:
  - Summary of our research drivers and current research focus
  - List of proposed funding year 2026-2027 priorities
- Break-out rooms:

Health

Natural and  
Working Lands

Cross-Cutting Issues: Agriculture  
and Climate/Air Quality  
Interactions

For Spanish stay in  
main room



# CARB Priorities

Air Quality Standards



Environmental Justice



Climate Change



Mobile Sources



Sustainable Communities



# How CARB works with federal and local air quality agencies

## FEDERAL



### US EPA

Sets & enforces national air quality standards.  
Regulates interstate transportation.



TRAINS



PLANES



SHIPS

## STATE



Regulates mobile sources of air pollution,  
greenhouse gases & consumer products.



CARS



TRUCKS



BUSES

## LOCAL



### Local Air Districts

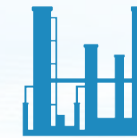
Regulates stationary & local  
sources of air pollution.



FIREPLACES



FACTORIES



REFINERIES

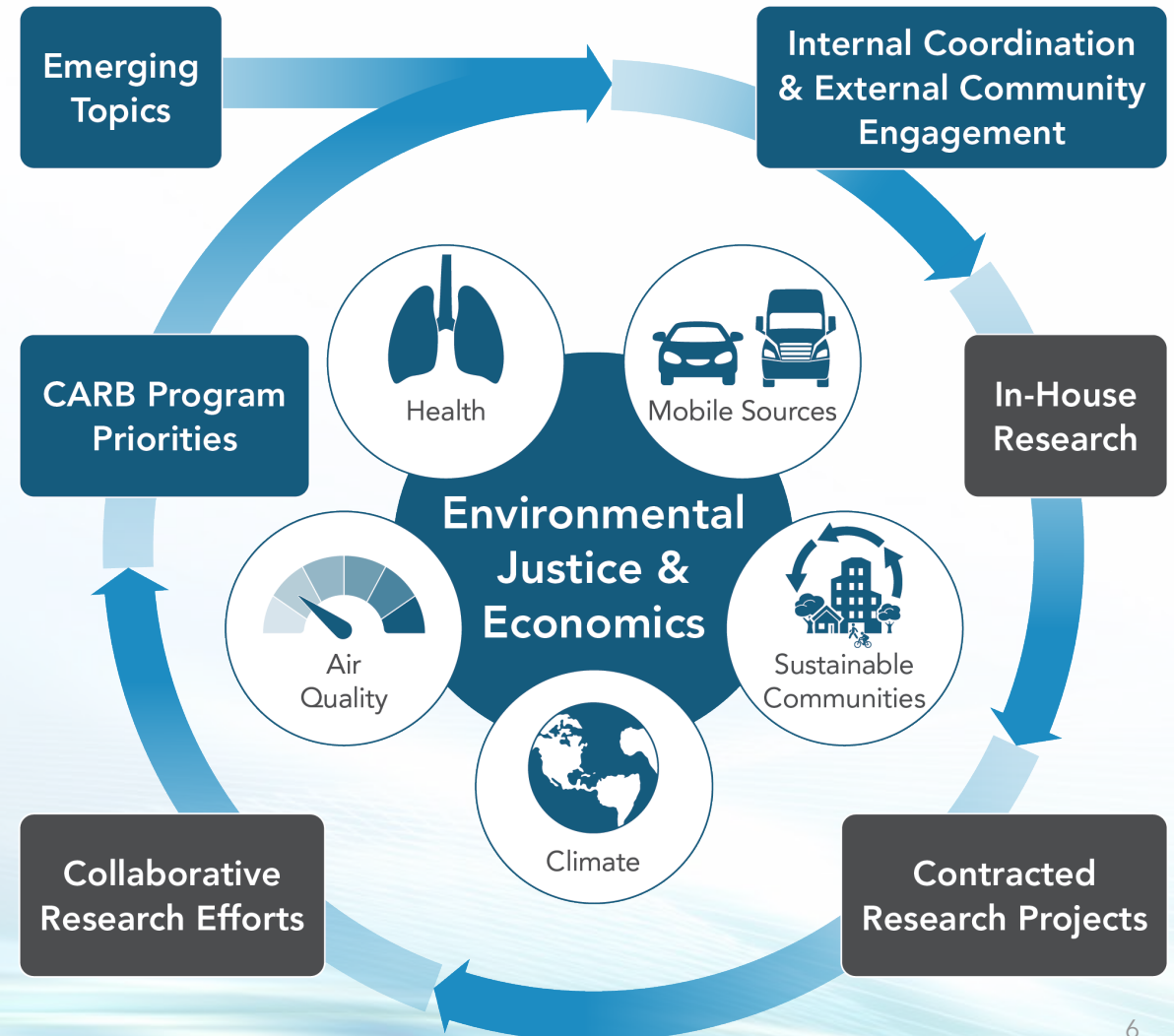


POWER PLANTS



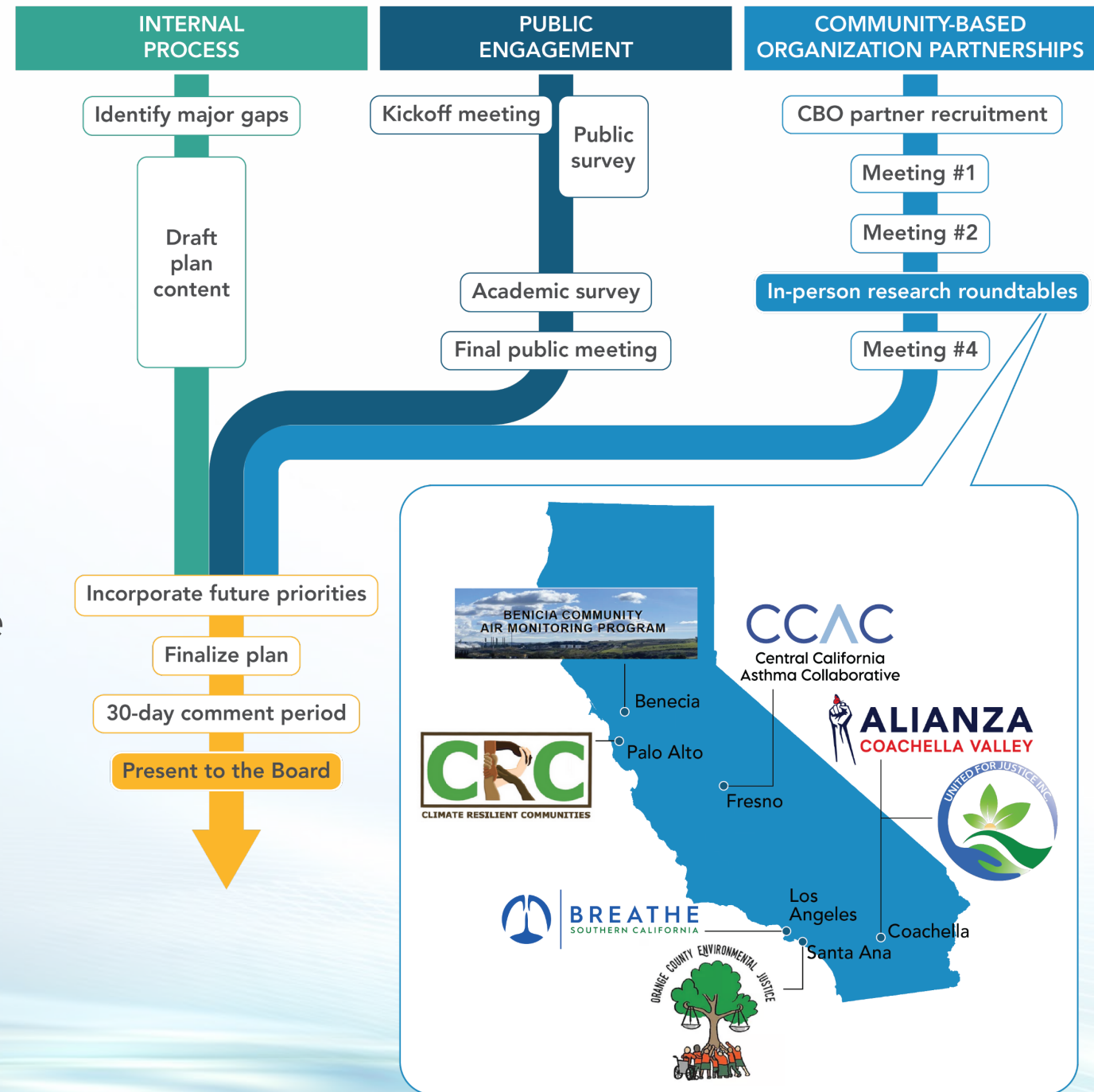
# CARB Research Program

- Legislatively mandated research program
- Sound science to support CARB programs
- Oversee in-house, contracted, and collaborative research efforts



# Five-Year Strategic Research Plan

- What is it?
- How was it developed?
- How does it help with the annual research planning process?
- Some important features of the Five-Year Plan.
- Updates:
  - August 15 - 30-day comment period begins
  - September 25 - Present to the Board



# Update to CARB's Annual Research Planning Process

**CARB funds 8-10 research contracts per year, \$4-8M**

## Previous Process



## New Process





# Timeline of Research Planning Process



# Key Considerations

- Program relevance
  - Will results will easily integrate into program work?
  - Is it policy relevant?
- Is this project novel and does it push the science?
- Is it multidisciplinary?
- Does this project address long-term anticipated challenges?
- Does it have a community engagement component or a strong equity component?
- Is it cost-effective and/or leverage existing efforts?
- Is it appropriate for the timeline?
- Is it technically viable?

# Summary of Top Priorities

## Health

- Health analysis of indoor air quality
- Cumulative health burdens
- Co-benefits of climate adaptation strategies
- Climate-friendly hydrofluorocarbon alternatives

## Natural and Working Lands

- Carbon maps of understudied biomes
- Wildfire severity
- Prescribed burning
- Smoke exposure

## Cross-Cutting Issues: Agriculture and Climate/Air Quality Interactions

- Interactions of air quality, meteorology and climate
- Livestock emissions under different management practices
- NOx and VOC emissions from silage
- Impact of farming practices on NOx emissions from soils

## Confirmed or continuing research concepts

### • Air Quality

- Advancing the Application of Real-Time TAC/HAP Measurement Technologies for Communities Burdened by Air Pollution
  - \$900k
- Follow-up on Imperial Valley Community-Focused Collaborative Research Plan
  - \$400k-750k

### • Mobile Sources

- Quantifying NOx and PM Mass Exhaust Leak Rates from Heavy-Duty Vehicles and Off-Road Equipment
  - \$750k-1.5M
- Activity-weighted light-duty vehicle emissions in California communities
  - \$200k



# Confirmed or Continuing Research Concepts

- Advancing the Application of Real-Time TAC/HAP Measurement Technologies for Communities Burdened by Air Pollution
  - \$900k
    - Identify existing technology
    - Assess performance and reliability
    - Conduct field validation
    - Assess impacts of technology for overburdened communities
- Follow-up on Imperial Valley Community-Focused Collaborative Research Plan
  - \$400k-750k
    - Community-centric strategic research plan
    - Reflects community concerns and priorities for research
    - Guide future health and air quality research

# Confirmed or Continuing Research Concepts

- Quantifying NO<sub>x</sub> and PM Mass Exhaust Leak Rates from Heavy-Duty Vehicles and Off-Road Equipment
  - \$750k-1.5M
    - Quantify exhaust leak mass emission rates from HDVs and ORE
    - Develop quantification method – capture untreated emissions
    - Develop method to capture snapshot measurements
    - Explore use of OBD data
    - Field tests and in-use laboratory tests
- Activity-weighted light-duty vehicle emissions in California communities
  - \$200k
    - Leverage previous data and travel demand modeling
    - Investigate impact of emissions on overburdened communities

# Important Dates

## **June 13 – Submit final survey responses**

- Survey includes:
  - Ranking and input on individual priorities
  - Input on confirmed or continuing research concepts
  - Space for additional comments and concerns that can be addressed by research
- Submit additional comments – email to [research@arb.ca.gov](mailto:research@arb.ca.gov)

## **July 2025**

- Approval of top 8-10 priorities by the Executive Office

## **August-December 2025**

- Development of priorities into project concepts
  - Some opportunities for public engagement

## **Winter-Spring 2026**

- Solicitation

Sign up for our listserv!



# Break-out Room Instructions

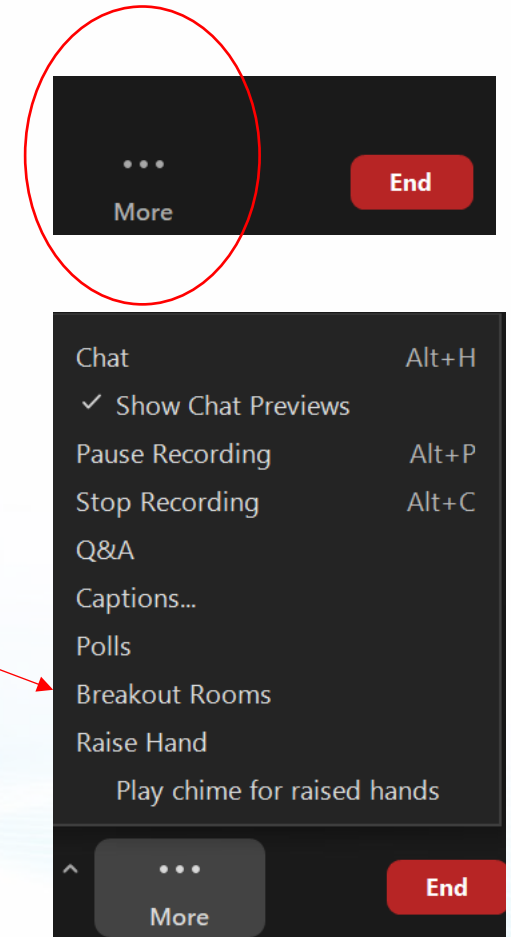
- A prompt will ask you to join one of 3 break out rooms
- In case the prompt doesn't come up, hit the "More" button and choose the "Breakout rooms" option.
- Hit the "Join" button for your top discussion room choice

Health

Natural and  
Working Lands

Cross-Cutting Issues:  
Agriculture and Climate/Air  
Quality Interactions

For Spanish  
stay in main  
room





# **Health Research for FY26-27**

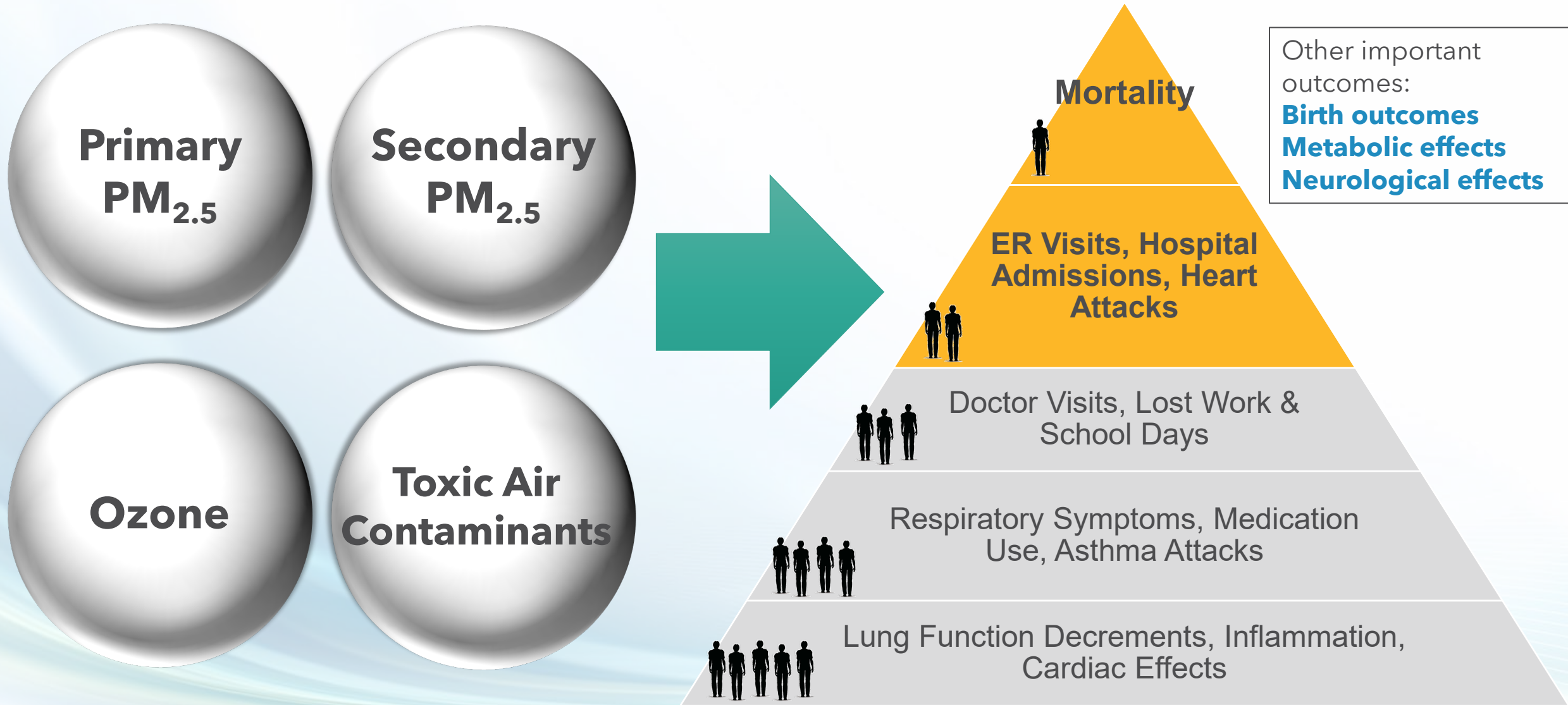
Break-out sessions

# Health Research Needs and Drivers

- CARB's Mission
  - Protect public health
- National Ambient Air Quality Standards (NAAQS)
  - Health based
- Regulatory health benefits analysis
- Inform the public
- Toxics health risk assessment
- Health impacts of climate change and adaptation



# Air Pollution and Health Impacts



# Proposed Research Initiatives for Five-Year Plan

- Health impacts of climate change and wildfire smoke
- Indoor Health Pollution Sources, Exposure, and Mitigation
- Health Analysis: Expanding Understanding of Health Outcomes and Environmental Justice Factors
- Air Toxics
- Community-level Exposures and Equity

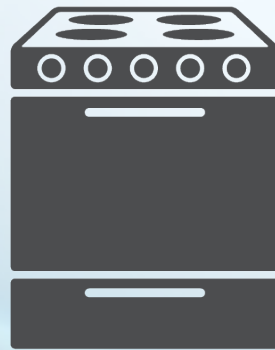


# **Proposed Health Research Priorities for FY26-27**



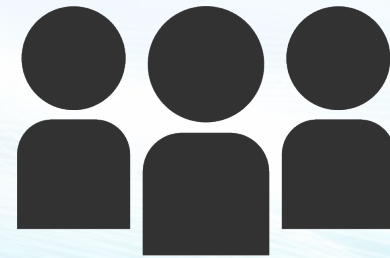
# Health Impacts of Indoor Air Quality

- What current or novel methodologies can be utilized or developed to quantify and monetize the health impacts and burdens associated with indoor exposures of air pollutants from a variety of sources in residential and non-residential settings including indoor sources such as emissive appliances and infiltration from outdoor sources such as wildfire smoke emissions?



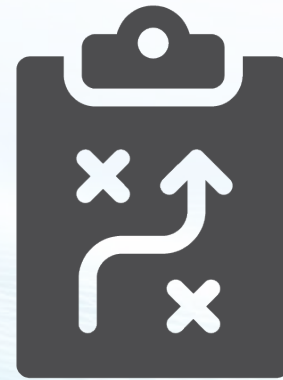
# Cumulative Health Burdens

- How can we evaluate, and quantify where possible, cumulative health impacts from multiple sources of pollution as well as community and environmental stressors at a local scale?
- Which communities and Tribes are the most burdened by cumulative sources?



# Co-benefits of Climate Adaptation Strategies

- What are the co-benefits of climate adaptation strategies in California at a finer scale?
- What tools and approaches can be developed to analyze current and potential health impacts from adverse climate conditions to help inform communities and promote community resilience?





# Climate-friendly Hydrofluorocarbon Alternatives

- What is the feasibility, performance, and safe use of climate-friendly HFC alternatives for heat pump technologies and other HFC sectors?
- Are there HFO and HFC degradation products and do they have any potential health impacts?



# Proposed Health Research Priorities for FY26-27

- Health Impacts of Indoor Air Quality



- Cumulative Health Burdens



- Co-benefits of Climate Mitigation Strategies



- Climate-friendly Hydrofluorocarbon Alternatives

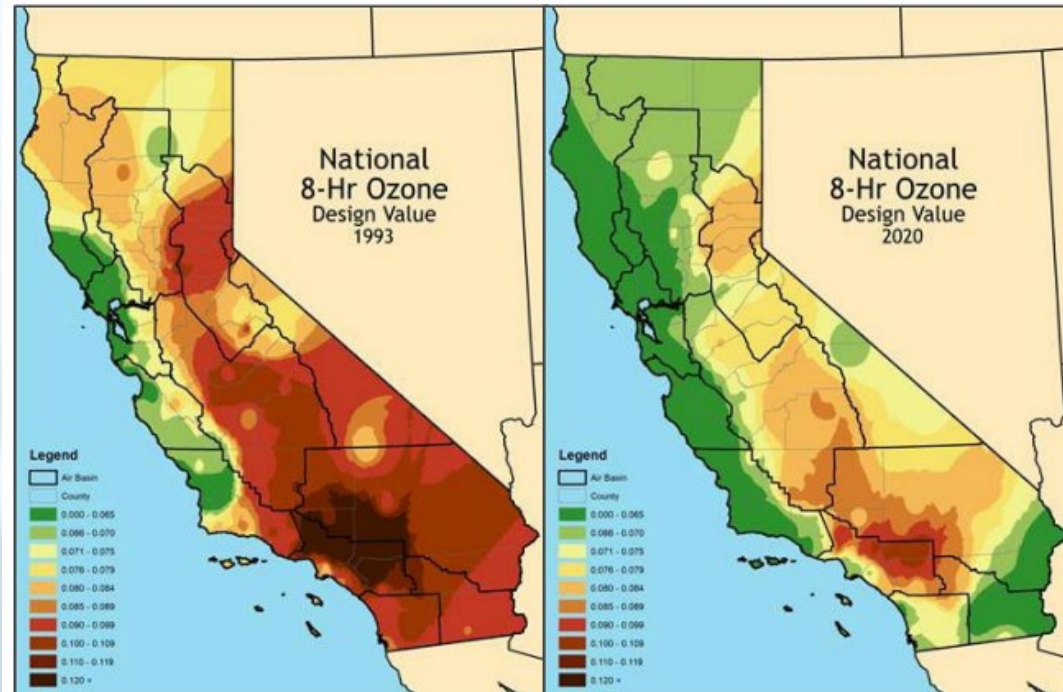




# **Natural and Working Lands Research for FY26-27**

Break-out sessions

# Air Quality Research Drivers



Ozone air quality progress in CA (Fig 1 - 2022 SIP)

## Air Quality Targets

- 2025
  - Attainment year for ozone and PM2.5 (2023/2025)
  - Identify toxics in communities
  - Improve tools to guide decisions for the Air Toxics Program
- 2030
  - Attainment year for 12  $\mu\text{g}/\text{m}^3$  PM2.5
- 2032
  - 75 ppb 8-hr ozone standard
  - Obtain lasting emissions reduction in AB 617 communities
  - Reduce toxics of major concern
- 2037
  - 70 ppb 8-hr ozone standard

- 9  $\mu\text{g}/\text{m}^3$  PM2.5 annual standard



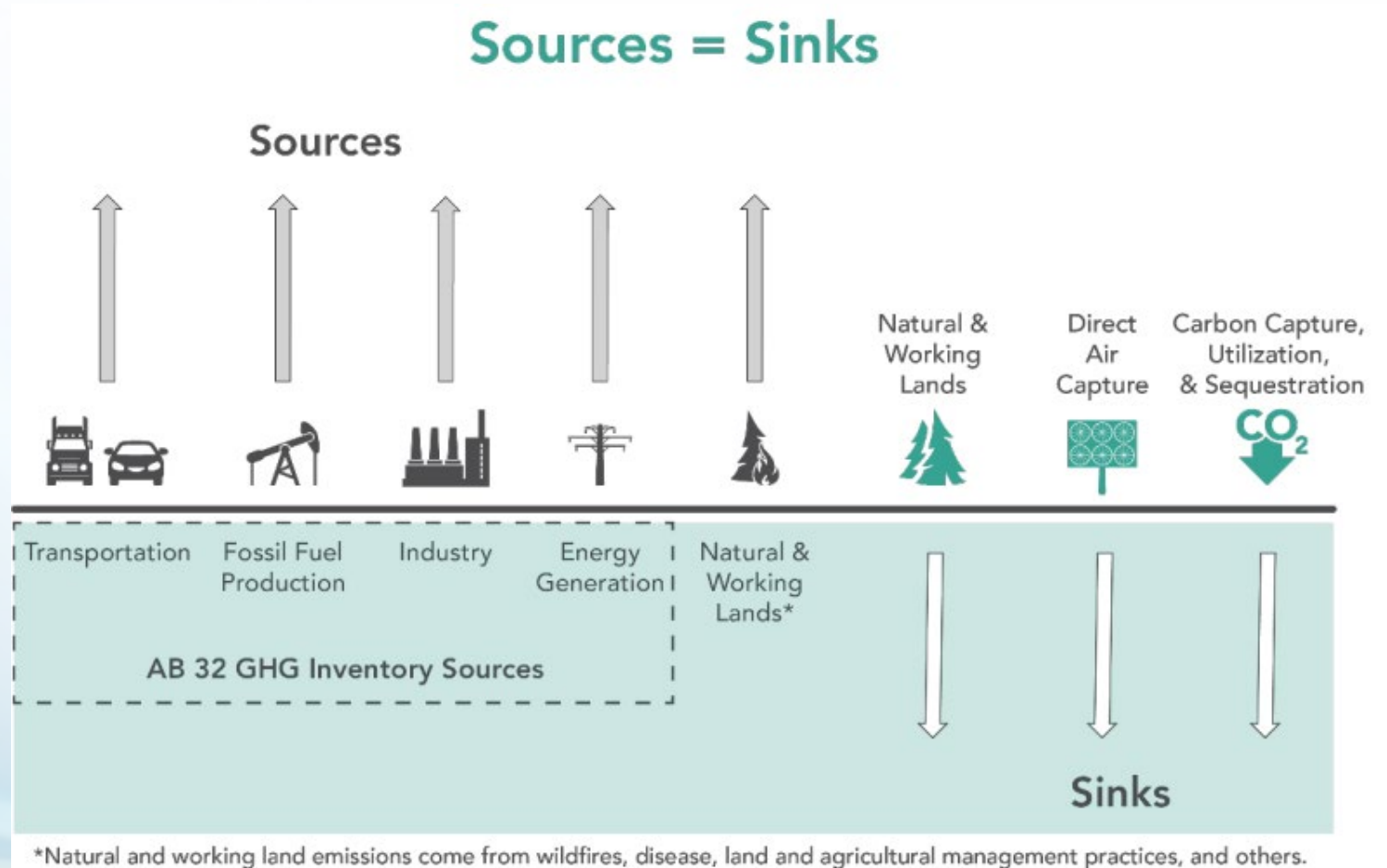
# Climate Research Drivers

- Program Drivers
  - AB 32 – CARB lead agency
  - SB 32 – 40% below 1990 levels by 2030
  - AB 1279 – By 2045
    - Reduce anthropogenic GHGs to 85% below 1990 levels
    - Achieve carbon neutrality
  - AB 1757 – Nature-based climate solution to support carbon neutrality
  - [2022 Scoping Plan for Achieving Carbon Neutrality](#)



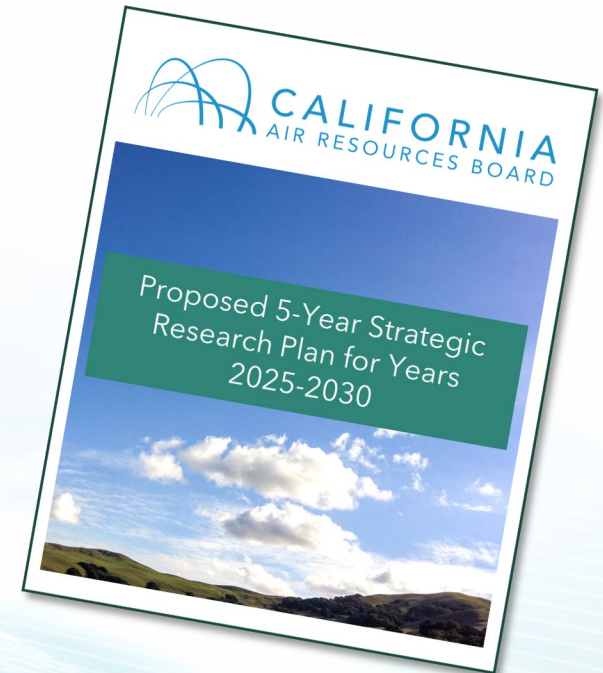
# Climate Research Areas of Focus

- Natural and working lands
- Methane and short-lived climate pollutants
- Supporting our GHG inventory needs
- Equity impacts and community needs
- Co-pollutants and health implications



# Proposed Research Initiatives for Five-Year Plan

- Health Research
  - Health impacts of climate change and wildfire smoke
- Ambient Air Quality Research
  - Understanding the Challenges of Meeting NAAQS in a Changing Climate
- Climate Research
  - Greenhouse Gas Emissions and Sinks from Natural and Working Lands
  - Wildfire Emissions in a Changing World and Impacts on EJ Outcomes



# **Proposed Natural and Working Lands Research Priorities for FY26-27**



# Carbon Maps of Understudied Biomes

- What research is needed to deepen understanding of carbon stocks, fluxes and general dynamics in California's various landscapes to use within CARB's NWL carbon inventory?
- How can estimates of biomass utilization feedstocks and wildfire fuel loading in different biomes be improved for use within CARB programs?



# Wildfire Severity

- How will fire emissions change as the severity of wildfires increase due to climate change?
- What are the potential climate, air quality, and health outcomes under different wildfire scenarios?



# Prescribed Burning

- What are the potential air quality and health benefits and trade-offs of different scenarios for prescribed burning?
- How do fire emissions change on large spatial and temporal scales when prescribed burning is adopted on a wide scale?



# Smoke Exposure

- What are the health impacts to both physical and mental health from exposure to smoke and ash from wildfire and WUI fires over different time periods?
- How do these health impacts differ for long-term or chronic exposures to multiple fires over years (e.g., long-lasting effects) and short-term peak exposures (e.g., effects seen days after the exposures)?





# Proposed Health Research Priorities for FY26-27

- Carbon Maps of Understudied Biomes



- Wildfire Severity



- Prescribed Burning



- Smoke Exposure

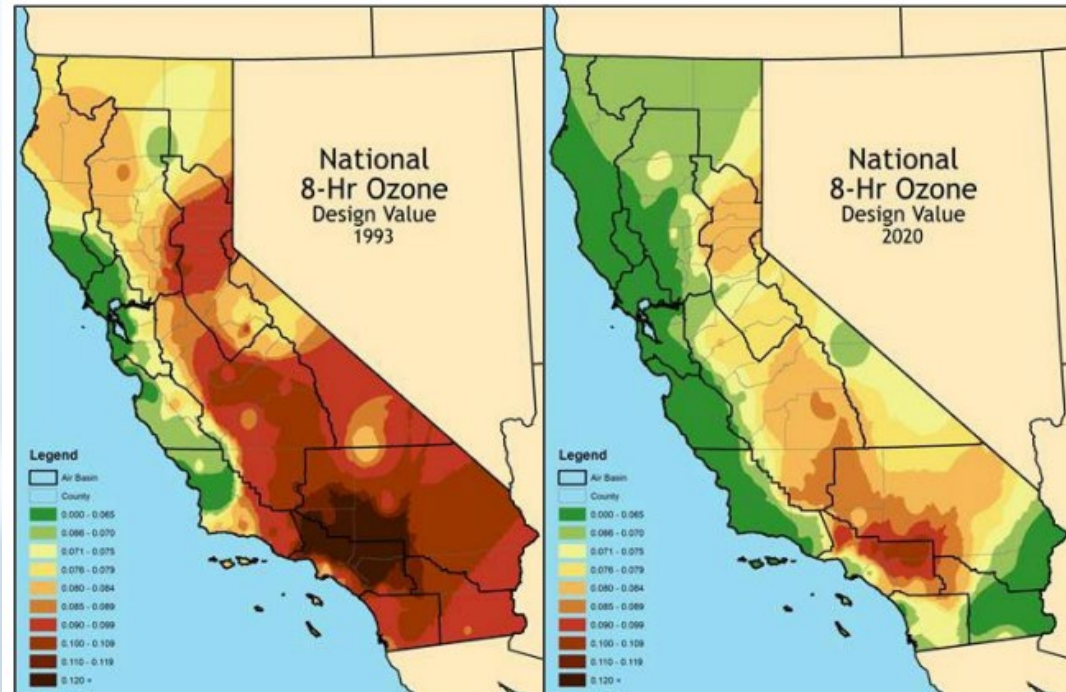




# **Cross-Cutting Issues: Agriculture and Climate/Air Quality Interactions**

Break-out sessions

# Air Quality Research Drivers



Ozone air quality progress in CA (Fig 1 - 2022 SIP)

## Air Quality Targets

- 2025
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- 9  $\mu\text{g}/\text{m}^3$  PM<sub>2.5</sub> annual standard



# Current Areas of Focus in Air Quality

- Sources and formation of air pollution in different regions
- New tools and methods for air quality monitoring
- Emission factors from previously uncharacterized sources
- Impacts from climate change on air quality



Ozone non-attainment areas – 2022 SIP Strategy



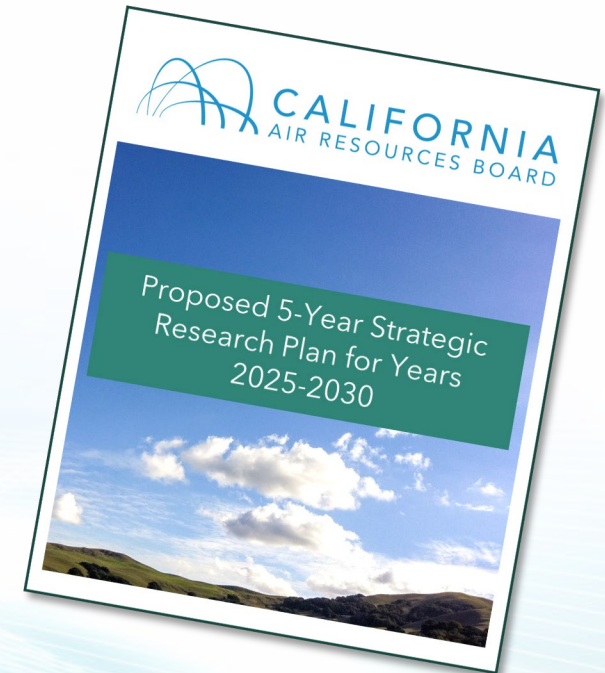
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  - [2022 Scoping Plan for Achieving Carbon Neutrality](#)



# Proposed Research Initiatives for Five-Year Plan

- Ambient Air Quality Research
  - Understanding the Drivers of Future Ambient PM<sub>2.5</sub> Formation
  - Understanding the Challenges of Meeting NAAQS in a Changing Climate
  - Air Quality Impacts from Dairy and Agricultural Operations
- Climate Research
  - Dairy Emissions from Changes in Management Practices



# **Proposed Research Priorities for FY26-27**

## **Cross-Cutting Issues: Agriculture and Climate/Air Quality Interactions**

# Interactions of Air Quality, Meteorology and Climate

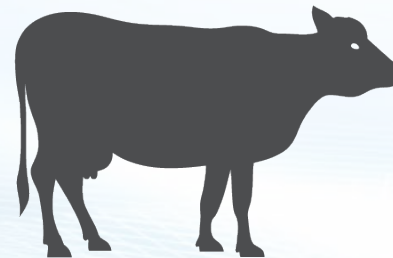
- How can we further inform our understanding of the interactions between air quality, meteorology, and climate under future air quality and climate policies?
- What role do additional observational data or more precise models at higher spatial and temporal resolution play?





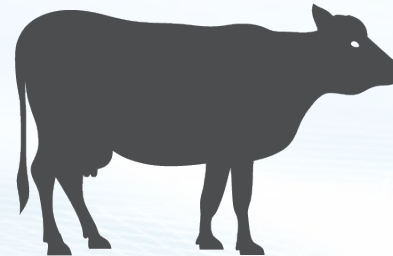
# Livestock Emissions Under Different Management Practices

- How can emission estimation models be improved to better estimate dairy and livestock emissions of GHG and ammonia under different feeding or manure management practices?
- How can measurements help improve models to better quantify emission reductions due to the implementation of mitigation measures at dairies or livestock operations?



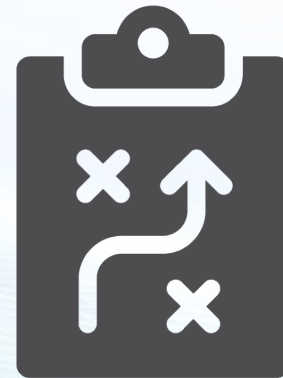
# NOx and VOC Emissions from Silage

- What additional research can best inform the dairy and livestock estimates including silage and feeding or manure management practices?
- How can measurements and models consider implementation of mitigation measures at dairies or livestock operations?



# Impact of Farming Practices on NOx Emissions from Soils

- How do different farming practices, such as fertilizer application and irrigation, impact NOx emissions from soils?
- How will these emissions change as new climate-smart agricultural strategies are adopted?

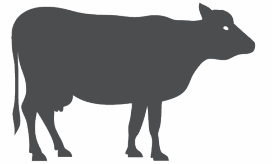


# Proposed Research Priorities for FY26-27

- Interactions of Air Quality, Meteorology and Climate



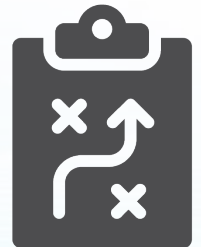
- Livestock Emissions Under Different Management Practices



- NOx and VOC Emissions from Silage



- Impact of Farming Practices on NOx Emissions from Soils





# Next Steps

- FY26-27 Research
  - Fill out survey or send us email by June 13
  - Sign up for our listserv to stay tuned for additional engagement opportunities
- Five-Year Strategic Research Plan
  - Full Draft Plan available August 15
  - Plan presented to the Board on September 25
  - Submit comments through public docket

# How to contact us

- Sign up for our listserv:  
<https://public.govdelivery.com/accounts/CARB/subscriber/new>
  - Select "Research Activities" from the options provided
- E-mail us: [research@arb.ca.gov](mailto:research@arb.ca.gov)