

Planned Air Pollution Research

Fiscal Year 2008-2009

July 24, 2008

California Environmental Protection Agency

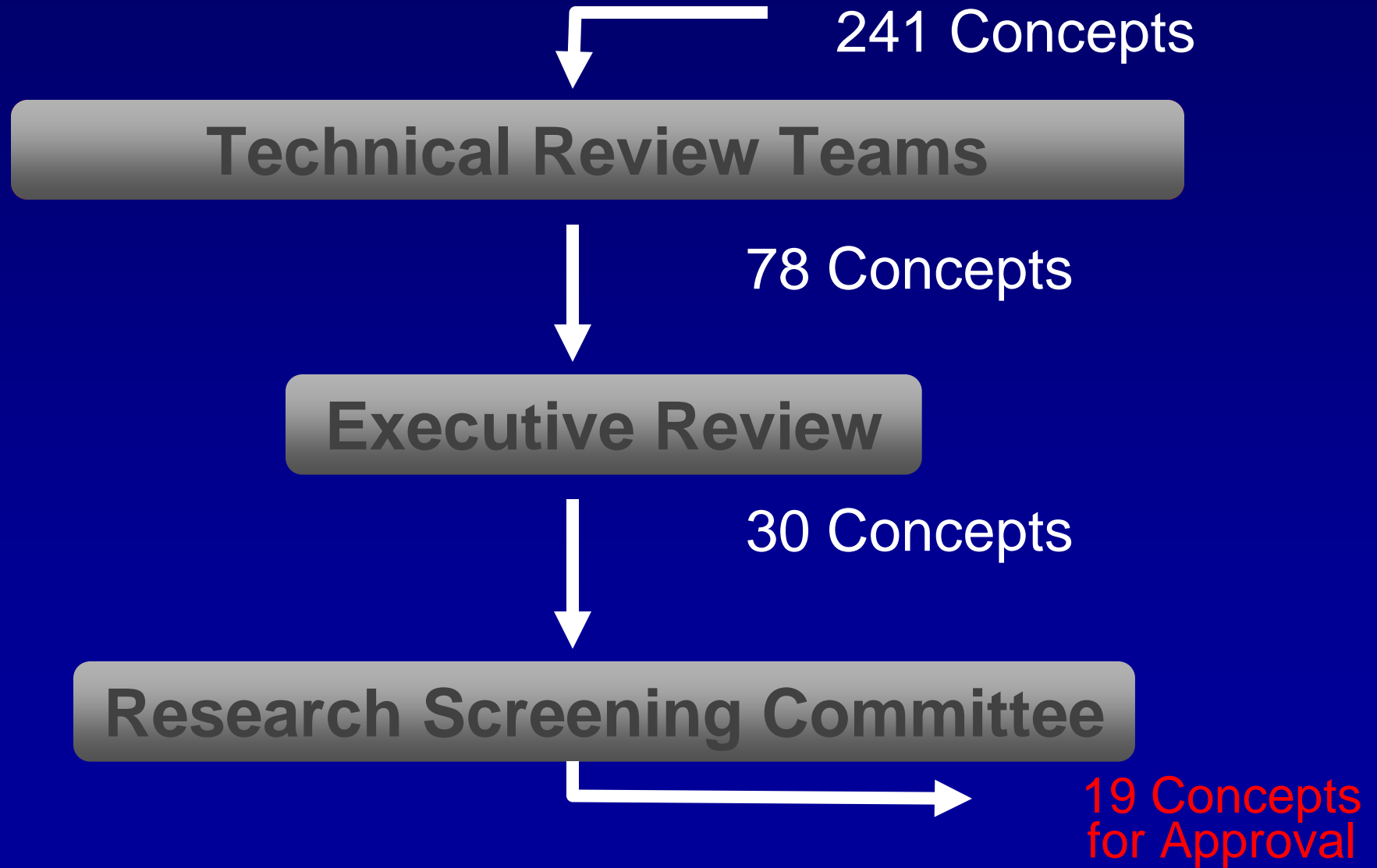


Air Resources Board

ARB's Research Program

- Addresses causes, effects, and solutions to California's air pollution
- Provides scientific information to support ambient air quality standards
- Supports ARB's **regulatory and policy priorities**

Research Planning Process



Technical Review Teams

- Identify major research gaps
- Identify niche areas for ARB to target funds
- Review concepts for technical merit and responsiveness to gaps
- Avoid duplicative research
- Identify collaboration and co-funding opportunities

Technical Review Teams: Interagency Coordination

External Reviewers and Collaborators

Bay Area Air Quality Management District

California Department of Transportation

California Energy Commission

California Integrated Waste Management Board

California Public Utilities Commission

Coordinating Research Council

Health Effects Institute

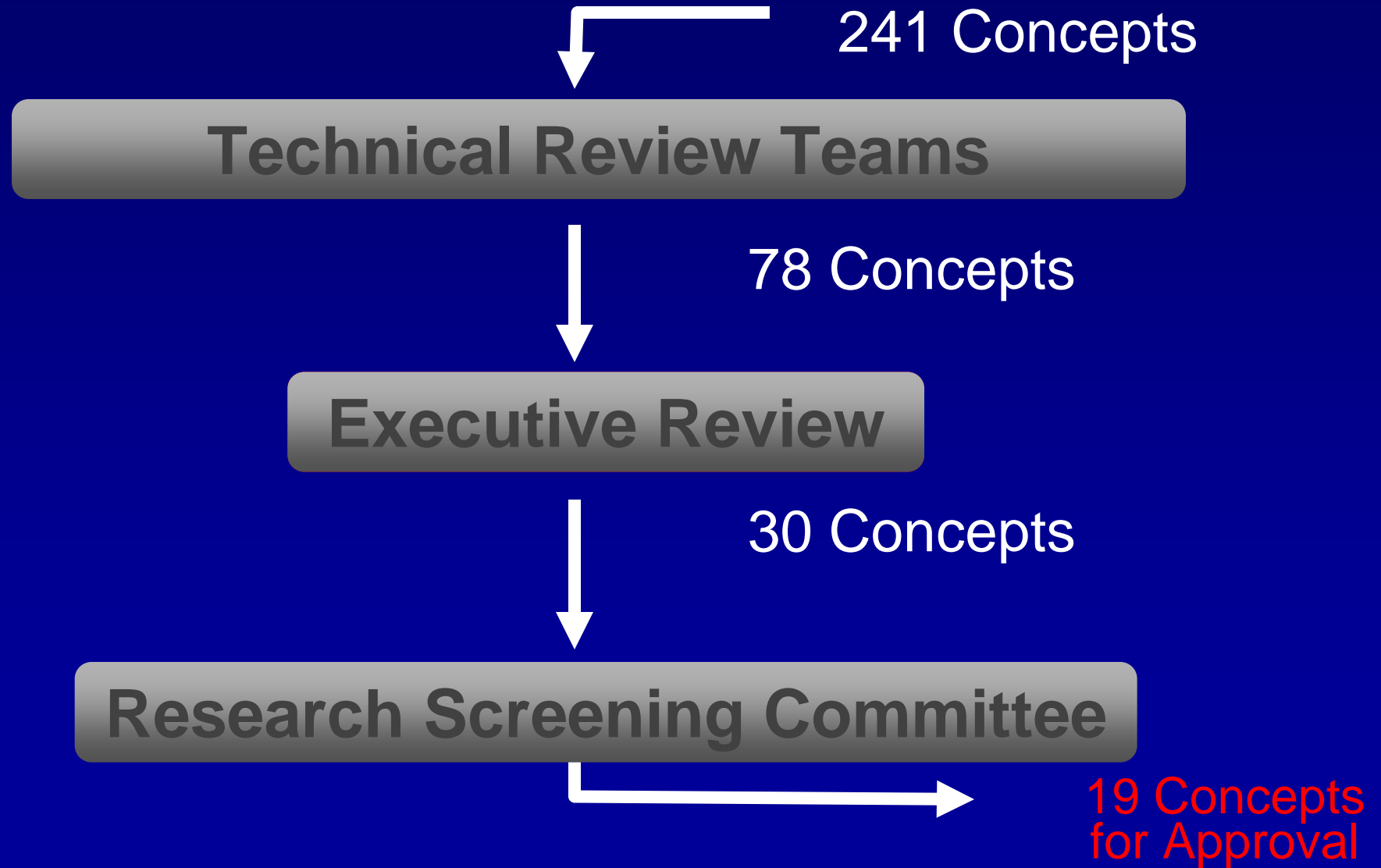
New York State Energy Research and Development Authority

Office of Environmental Health Hazard Assessment

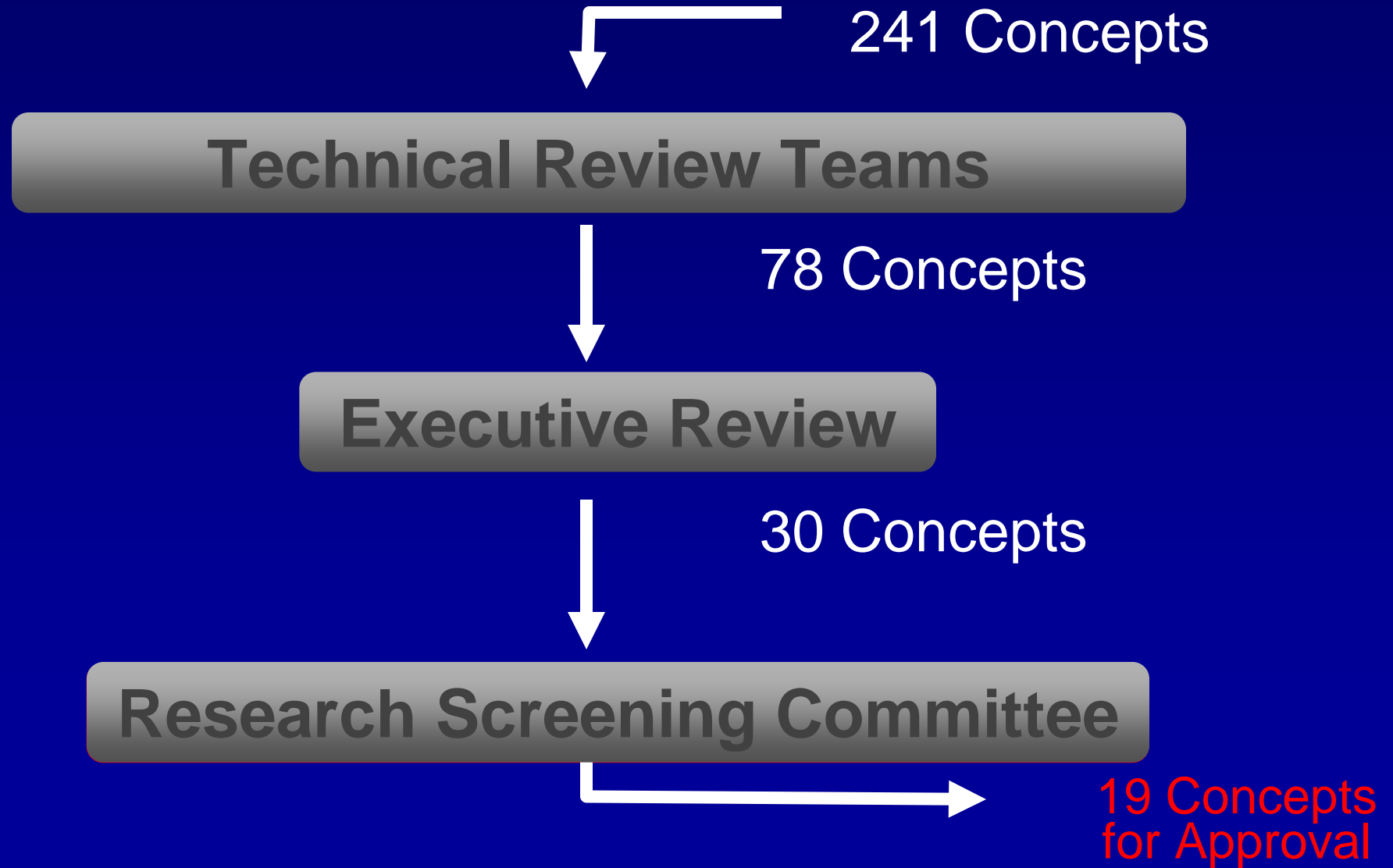
South Coast Air Quality Management District

United States Environmental Protection Agency

Research Planning Process



Research Planning Process



Research Screening Committee

Harold Cota, Ph.D. (Chairman), Cal Poly SLO

Robert Devlin, Ph.D., US EPA

Steven Japar, Ph.D., Ford Motor Company, Retired

Irva Hertz-Picciotto, Ph.D., UCD

Charles Kolstad, Ph.D., UCSB

Chung Liu, D.Env., SCAQMD

Rachel Morello-Frosch, Ph.D., M.P.H., UCB

Tracy Thatcher, Ph.D., Cal Poly SLO

Forman Williams, Ph.D., UCSD

Matthew Kahn, Ph.D. (*Adjunct Member*), UCLA

Suzanne Paulson, Ph.D. (*Adjunct Member*), UCLA

Climate Change Research: Interagency Coordination

- ARB initiated:
 - ongoing discussion of statewide strategic plan
 - catalog of climate change research and demonstration
- CAT Research Subgroup formed
- 2008 CAT Report to summarize State's climate research

Climate Change Research: Interagency Coordination

California EPA
Department of Transportation
Energy Commission
Public Utilities Commission
Resources Agency
Biodiversity Council
Coastal Conservancy
Department of Conservation
Department of Forestry and Fire Protection
Department of Water Resources
Integrated Waste Management Board
State Parks and Recreation
Department of General Services
Office of Environmental Health Hazard Assessment
State Water Resources Control Board

Financial Stewardship

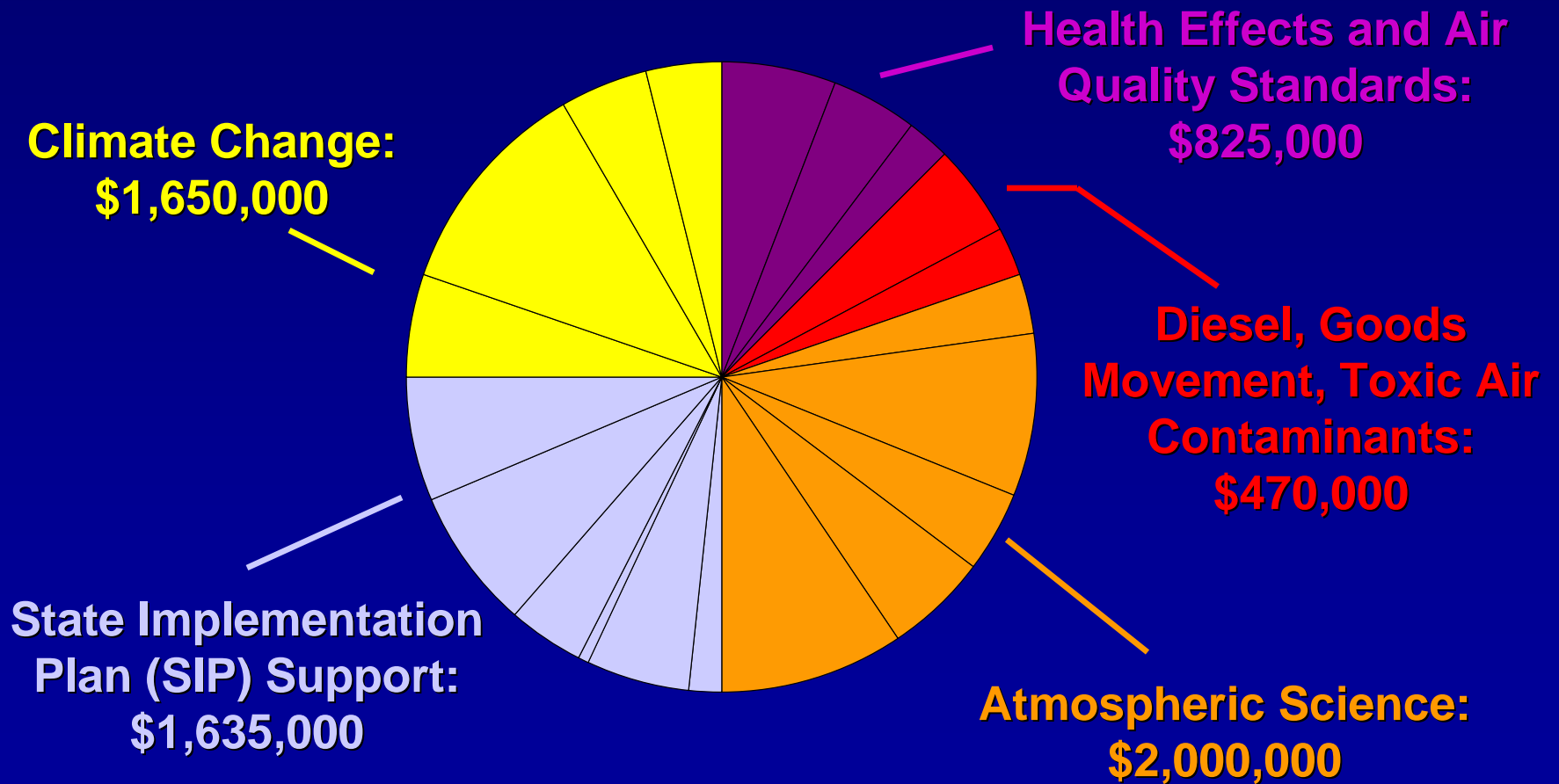
- Coordinates with other funding agencies to avoid duplicative research
- Significant co-funding/leveraging secured annually
 - For 2008 plan: over \$13 million secured so far
 - 2007: \$1.6 million
 - 2006: \$ 2 million
- Requires lowest overhead rates available
 - 10% from UCs
 - 25% from CSUs

Research Program Areas

- Health Effects and Air Quality Standards
- Diesel, Goods Movement, and Toxic Air Contaminants
- Atmospheric Science
- State Implementation Plan (SIP) Support
- Climate Change

Funding Allocations

\$6,580,000



Health Effects & Air Quality Standards

POLICY LINKS

- Children's Environmental Health Protection Act (SB 25)
- Title 17, Health and Safety Code: Ambient Air Quality Standards
- Environmental Justice Policies and Actions (2001)

KNOWLEDGE GAPS

- Neurotoxicity of PM
- Biological mechanisms of PM's health effects
- Exposures and sensitivities of vulnerable populations
- Health effects in highly exposed populations
- Toxicity of PM from different sources

Health Effects & Air Quality Standards

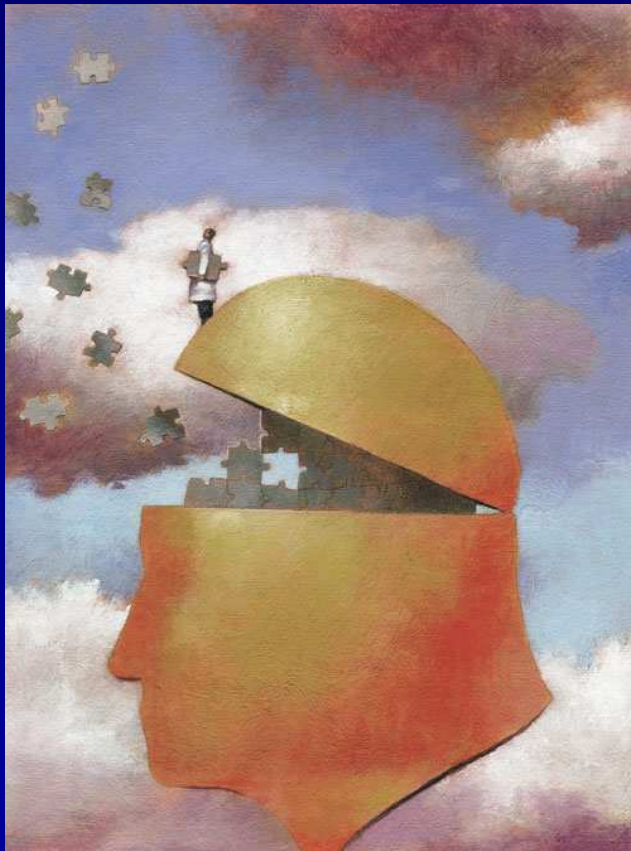
PROPOSED RESEARCH

- Children's Exposures in Daycare Centers (\$375,000)
- PM and Heart Rate Variability in Elderly Subjects with Coronary Heart Disease (\$150,000)
- Neurotoxic Effects of Ambient Particulate Matter (\$300,000)

BENEFITS

- Support setting Ambient Air Quality Standards protective of vulnerable populations
- Respond to Children's Environmental Health Protection Act

Neurotoxic Effects of Ambient Particulate Matter: the Role of Oxidative Stress



How does exposure to particulate matter affect the functioning of the brain?

source: <http://www.dddmag.com/biomarkers-alzheimers-disease.aspx>

Diesel, Goods Movement, and Toxic Air Contaminants

POLICY AND IMPLEMENTATION LINKS

- Diesel Risk Reduction Plan
- Measurement Protocols for Ultrafine Particles to assess emissions and exposures

KNOWLEDGE GAPS

- Characterization of equipment deterioration and retrofit performance
- Improved emissions activity data, characterization of port trucks
- Characterization of climate and health impacts of diesel emissions
- Public health risks of TACs
- Exposure of port workers to air pollution

Diesel, Goods Movement, and Toxic Air Contaminants

PROPOSED RESEARCH

- Diesel Solid Nanoparticle Emissions Measurements (\$170,000)
- Measurement of Off-Road Diesel Engine Deterioration (\$300,000)

BENEFITS

- Investigate Europe's ultrafine measurement protocol
- Improve off-road emissions inventory

Measurement of Off-Road Diesel Engine Deterioration



Improved emissions inventory will support planning and assessment of regulatory efforts.

Atmospheric Science

CalNEX 2010: Research for improved understanding of air quality, climate change, and emissions inventories

GAPS ADDRESSED

- Emissions inventory of GHGs, precursors of ozone and PM, and sulfur
- Improved models for predicting air pollution



Atmospheric Science

PROPOSED PROJECTS: CaINEX 2010

- Night-time Chemistry in Los Angeles (\$200,000)
- Chemical Differences between South Coast & San Joaquin Air Basins (\$550,000)
- Characterization of Organic PM Sources and Processes (\$282,000)
- Sulfur Study in Coastal Southern California (\$350,000)
- Field measurements of VOCs, formaldehyde, and trace greenhouse gases (\$618,000)

BENEFITS

- Reduce uncertainty in models and emissions inventories
- Better understanding of impact of regulatory controls in South Coast Air Basin and San Joaquin Valley
- Characterize organic PM

State Implementation Plan (SIP) Support

POLICY LINKS

- Monitoring to determine attainment status, identify air pollution trends, develop models and emissions inventories
- Ozone: achieve compliance with respect to new federal standard
- PM: bring South Coast and San Joaquin Valley into attainment

KNOWLEDGE GAPS

- Monitors with high resolution in time and space
- Updated characterization of ambient base case VOC mixture
- Formulation of products with low VOC emissions
- Characterization of organic and secondary aerosol

SIP Support: Monitoring

PROPOSED PROJECTS

- Analyzers for Monitoring NO/NO₂/NO_x/PAN (\$100,000)
- Low-Cost Sensors for Enforcement, Compliance, and Research (\$350,000)

BENEFITS

- Improve accuracy and lower cost of measuring chemicals involved in ozone formation
- Respond to needs of enforcement, research, and environmental justice communities for low-cost monitors

SIP Support: Ozone

PROPOSED PROJECTS

- Updated Ambient VOC Mixture for Models (\$40,000)
- Near-Zero VOC Stain Blocking Primers (\$400,000)

BENEFITS

- Improve basis for reactivity-based regulations
- Reduce VOC emissions in California by up to 2.6 tons/day

SIP Support: Particulate Matter

PROPOSED PROJECTS

- Formation of Secondary Organic Aerosols: Chamber Study and Modeling (\$475,000)
- The Relationship Between On-Road and Laboratory Diesel Emission Measurements (\$420,000)

BENEFITS

- Improved prediction and control of secondary aerosol
- Better understanding of emissions measurements

The Relationship Between On-Road and Laboratory Diesel Emission Measurements



Clarify emissions measurements of ultrafine particles (UFP) and impacts of diesel particulate filters on climate-forcing properties of emissions.

Climate Change

POLICY LINKS

- California Global Warming Solutions Act (AB 32)
- June 2005 Executive Order: 80% Reductions by 2050

KNOWLEDGE GAPS

- Climate impacts of aerosols
- Emissions inventory of N₂O and CH₄
- Planning for local and regional scale adaptation
- Design outreach to support climate-friendly choices

Climate Change

PROPOSED PROJECTS

- Climate Forcing and Source Apportionment of Combustion-Derived Particles in California (\$750,000)
- Behavioral and Demographic Determinants of Low Residential Consumption Patterns (\$250,000)
- N₂O Emissions from Application of Nitrogen to Land (\$300,000)
- Collaborative Cool Community Program (\$350,000)

BENEFITS

- Support Early Action Items
- Link combustion emissions to climate impacts
- Outreach strategy for home energy and water savings

Development of a Cool Community Program in Support of AB 32



Provide technical assistance for “cool communities” early action measure to reduce GHG emissions and improve livability of urban environments.



Recommendation

**Approval of the
Planned Air Pollution Research
Fiscal Year 2008-09**

AIR POLLUTION RESEARCH

California Environmental Protection Agency



Air Resources Board