



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

AGENDA: 4

**Update on Regulation 12, Rule 16:
Evaluation of Options for Reducing
Combustion Emissions From Refineries**

**Stationary Source
Committee Meeting**

**Greg Nudd
Rule Development Manager
June 1, 2016**



Overview

- Refinery Impacts and Issues
- Progress on Refinery Strategy
- Strategy for Criteria & Toxic Pollutants
- Focus on Combustion Emissions
- Options for Combustion Emissions Reduction at Bay Area Refineries
- Staff Evaluation
- Staff Recommendations
- Next Steps





Refinery Impacts and Issues

- Major sources of air pollutants: criteria, toxic and greenhouse gas (GHG)
- Fine particulate matter (PM_{2.5}) and Toxic Air Contaminants (TAC) may impact communities
- Crude slate changes may increase emissions
- Cap-and-Trade does not guarantee local GHG reductions





Refinery Strategy Background and Progress

- Board Directs Staff (Resolution 2014-07)
 - Develop Emissions Tracking and Reduction Rules
 - Reduce refinery emissions by 20% or as much as feasible
- Board approves Refinery Emission Reduction Strategy
- Staff develops rules to address refinery emissions
 - 15% overall emissions reductions with four adopted rules
 - Enhanced emissions tracking required in adopted Rule 12-15
 - Additional rules will further reduce toxic and criteria pollutants (including fine particulates)





Refinery Strategy – Criteria & Toxic Pollutants

Criteria Pollutants

- Five rules adopted
- Significant emissions reductions
- Additional rules in development to realize further emissions reductions

Toxic Pollutants

- Rule 2-5: Toxic New Source Review
- Toxic Hot Spot Rule Development





Refinery Strategy – Focus on Combustion Emissions

Why Focus on Combustion Emissions?

- Burning fuel results in emissions of criteria and climate pollutants: NO_x , SO_2 , $\text{PM}_{2.5}$ and CO_2 .
- Burning less fuel directly reduces these emissions.
- Controls like scrubbers, baghouses and catalysts are already required where they make sense.
- Energy conservation projects pay for themselves over time.



Options for Combustion Emissions Reductions at Refineries

- Refinery-wide Combustion Emissions Reductions:
 - Meet carbon or energy intensity limit, or
 - Meet refinery-wide mass emissions reduction target
- Combustion Emissions Best Available Retrofit Control Technology (BARCT) on Refinery Processes
- Enforceable Numeric Emissions Cap
- Focus on methane





Evaluation Criteria

- Leveraging GHG reduction goals
- Simultaneous reductions of other pollutants
- Actions within Air District authority
- Avoids adverse environmental impacts
- Provides process transparency
- Implementation speed / complexity
- Technology benefits / promotes innovation





Staff Evaluation

Criteria	Refinery-Wide Combustion Reductions	BARCT Approach	Emissions Cap	Focus on Methane
Leveraging other GHG reduction goals	High	High	Low	Low
Simultaneous reductions of other pollutants	High	Medium	Low	Medium
Within Air District authority	Medium	High	Medium	High
CEQA Implications / Impacts	Medium	Medium	Medium	Medium
Process Transparency	Low	High	High	High
Implementation Speed / Complexity	Medium	Low	High	Medium
Technology Benefits / Innovation	Medium	High	Low	Medium



Staff Recommendations

Multi-path Approach:

1. Develop a rule to require refinery-wide reductions of combustion emissions.
2. Develop combustion emissions BARCT strategy leading to a prioritized list of source-specific rules for refineries and other significant sources of combustion emissions.
3. Develop methane control strategy leading to a prioritized list of source-specific rules for methane control.





Next Steps

- Ongoing stakeholder input and participation
- Board of Directors briefings and input
- Advisory Council consultations
- Develop detailed proposal for Refinery Combustion Emissions Reduction Rule
- Develop detailed strategy for combustion emissions and methane controls.
- Board consideration / direction
- Workshops / Open Houses

*June 1, 2016
Slide 11*



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

Efficacy of Refinery GHG Caps: Status Report

Presentation to Stationary Source
Committee, Board of Directors
By BAAQMD Advisory Council
June 1, 2016



Advisory Council: Members

Member	Background	Air Pollution	Health	Climate
Stan Hayes	Member and former chair, Advisory Council (1995-2007, 2009-); Principal Emeritus, Ramboll Environ; 40 years, air research consulting	X	X	X
Severin Borenstein	Professor of Business Administration and Public Policy, Haas School of Business, University of California, Berkeley			X
Tam Doduc	Member and former chair, State Water Resources Control Board; served as Deputy Secretary, Cal/EPA, directed environmental justice	X	X	
Robert Harley	Professor, Civil Engineering, Chair, Energy, Civil Infrastructure and Climate Environmental Engineering, University of California, Berkeley; former member, Advisory Council	X		
Michael Kleinman	Professor, Environmental Toxicology, Co-Director, Air Pollution Health Effects Laboratory, Adjunct Professor, College of Medicine, University of California, Irvine	X	X	
Tim Lipman	Co-Director, Transportation Sustainability Research Center, energy and environmental technology, economics, and policy researcher and lecturer; University of California, Berkeley	X		X
Jane CS Long	Senior Contributing Scientist, Environmental Defense Fund; Chair, California's Energy Future Committee, California Council on Science and Technology			X



Advisory Council: Question



First Key Question:

What is the efficacy of imposing numeric caps on Greenhouse Gas emissions from Bay Area refineries?





Advisory Council: Meetings – Full Day

- **December 3**
 - Kick-off
 - Key Question
 - Regulatory Background (BAAQMD)
- **February 3**
 - Cap-and-Trade (CARB)
 - Bay Area Refinery Regulations (BAAQMD)
- **April 25**
 - Stakeholders: NGOs (CBE, 350 Bay Area letter), Industry (CCEEB, WSPA)
 - Crude Slate (CEC), Low Carbon Fuel Standard (CARB)
- **July 18**
 - Review of District alternatives to caps
 - Finalize recommendations



Advisory Council: Speakers & Discussion

- **Bay Area Air Quality Management District**
 - Jack Broadbent, Executive Officer
 - Brian Bunger, General Counsel
 - Jeff McKay, Deputy APCO
 - Jim Karas, Director of Engineering
 - Henry Hilken, Director of Planning and Climate Protection
- **California Air Resources Board**
 - Richard Corey, Executive Officer
 - Sam Wade, Chief, Transportation and Fuels Branch
 - Jason Gray, Manager, Climate Change Market Monitoring Section
- **California Energy Commission**
 - Gordon Schremp, Senior Fuels Specialist
- **Stakeholders**
 - Communities for a Better Environment (CBE) – Greg Karras
 - 350 Bay Area – Letter
 - California Council for Environmental and Economic Balance (CCEEB) and Western States Petroleum Association (WSPA) – Bill Quinn and Berman Olbaldia; Gary Rubenstein, Sierra Research on behalf of CCEEB and WSPA



Council Deliberations: Progress to Date

- **Background**
- Guiding **Principles**
- Preliminary **Conclusions**
- **Next Steps**



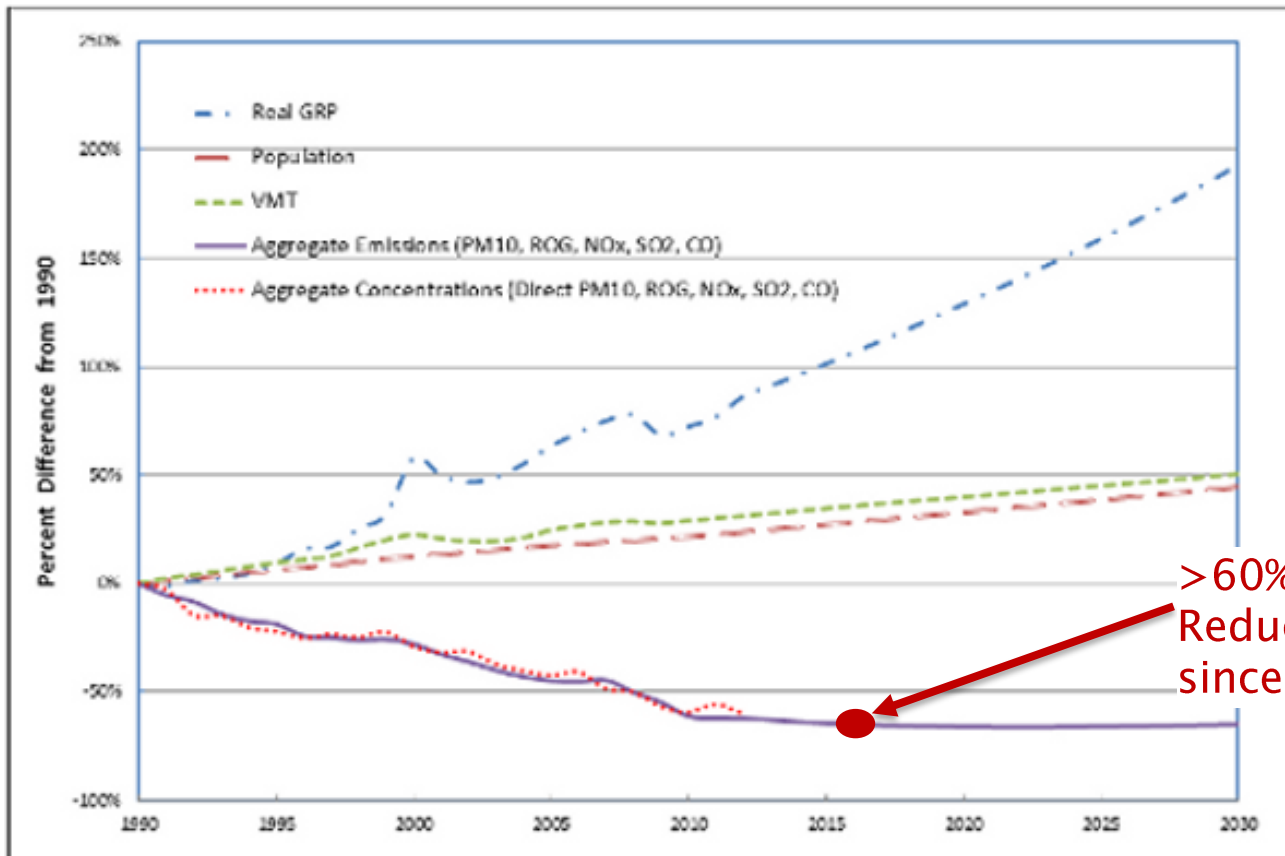
Background: District Mission

*“The Air District aims to **create a healthy breathing environment** for every Bay Area resident while protecting and improving public health, air quality, and the global climate.”*

- **Criteria Pollutants**
- **Toxics**
- **GHG**

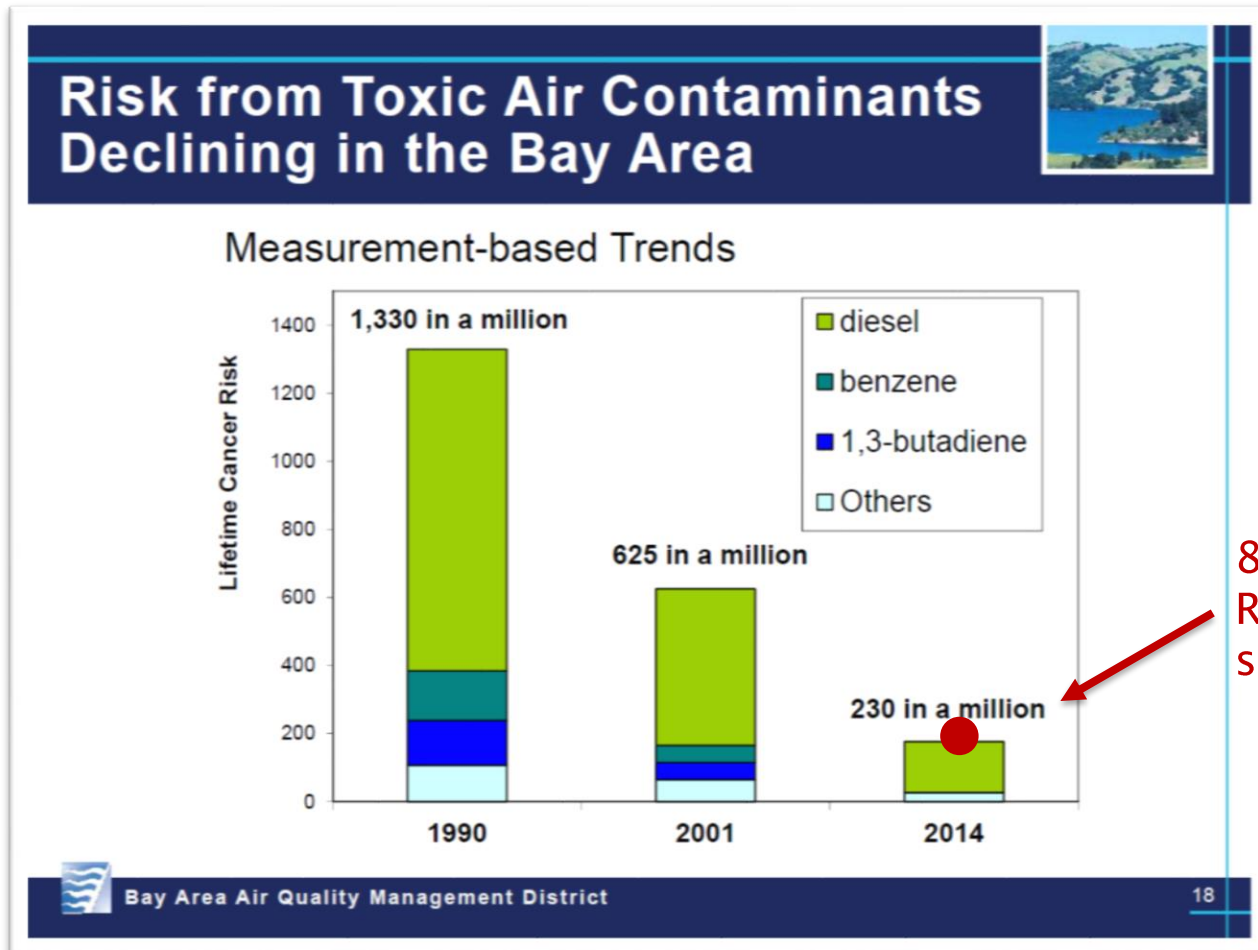


Background: Criteria Pollutants



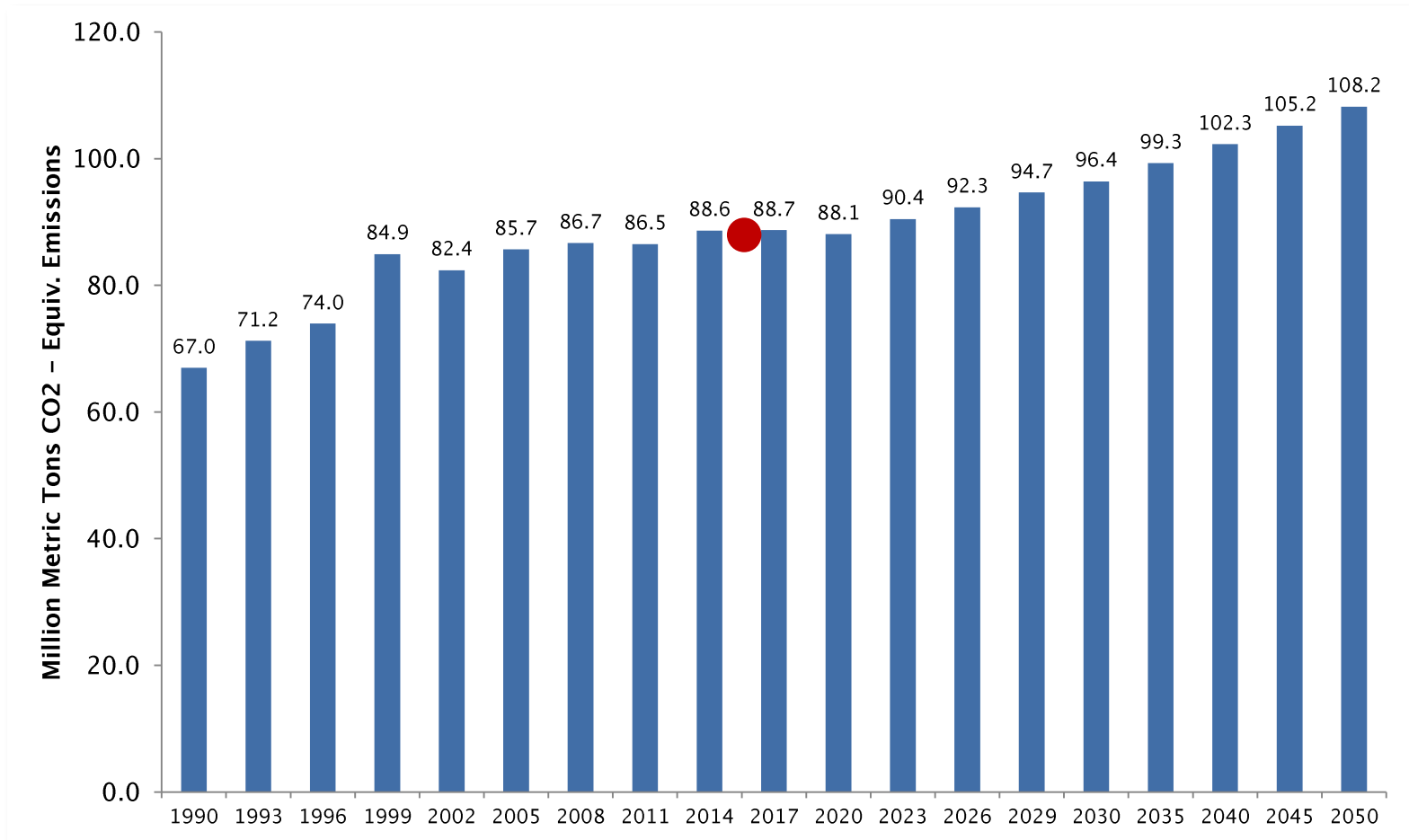


Background: Toxics





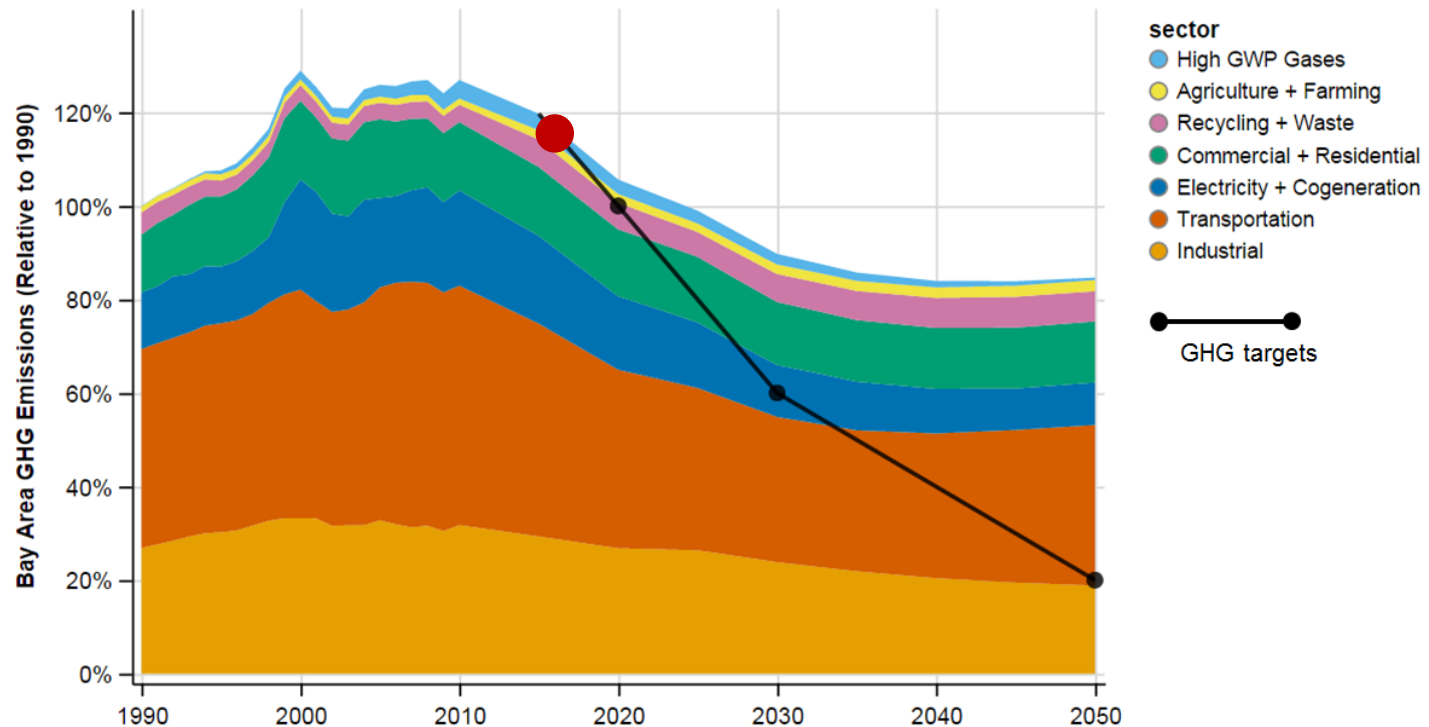
Background: GHG – **Without** Action





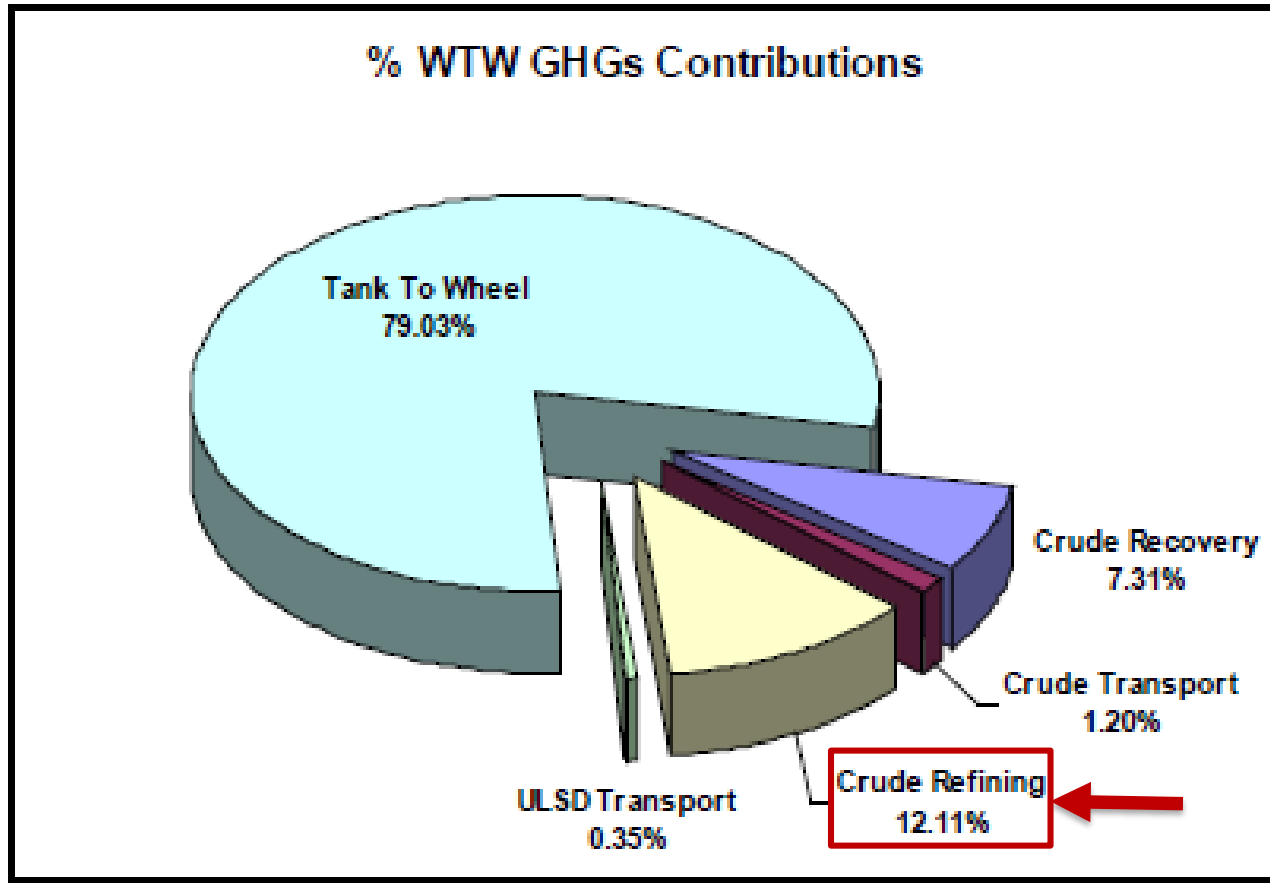
Background: GHG – **With** Action

GHG Emissions & Projections (Relative to 1990) with Committed & Expected Policies





Background: Refineries



Crude Refining: 12% of Well-To-Wheel GHG



Background: Refineries

Bay Area Refinery Locations

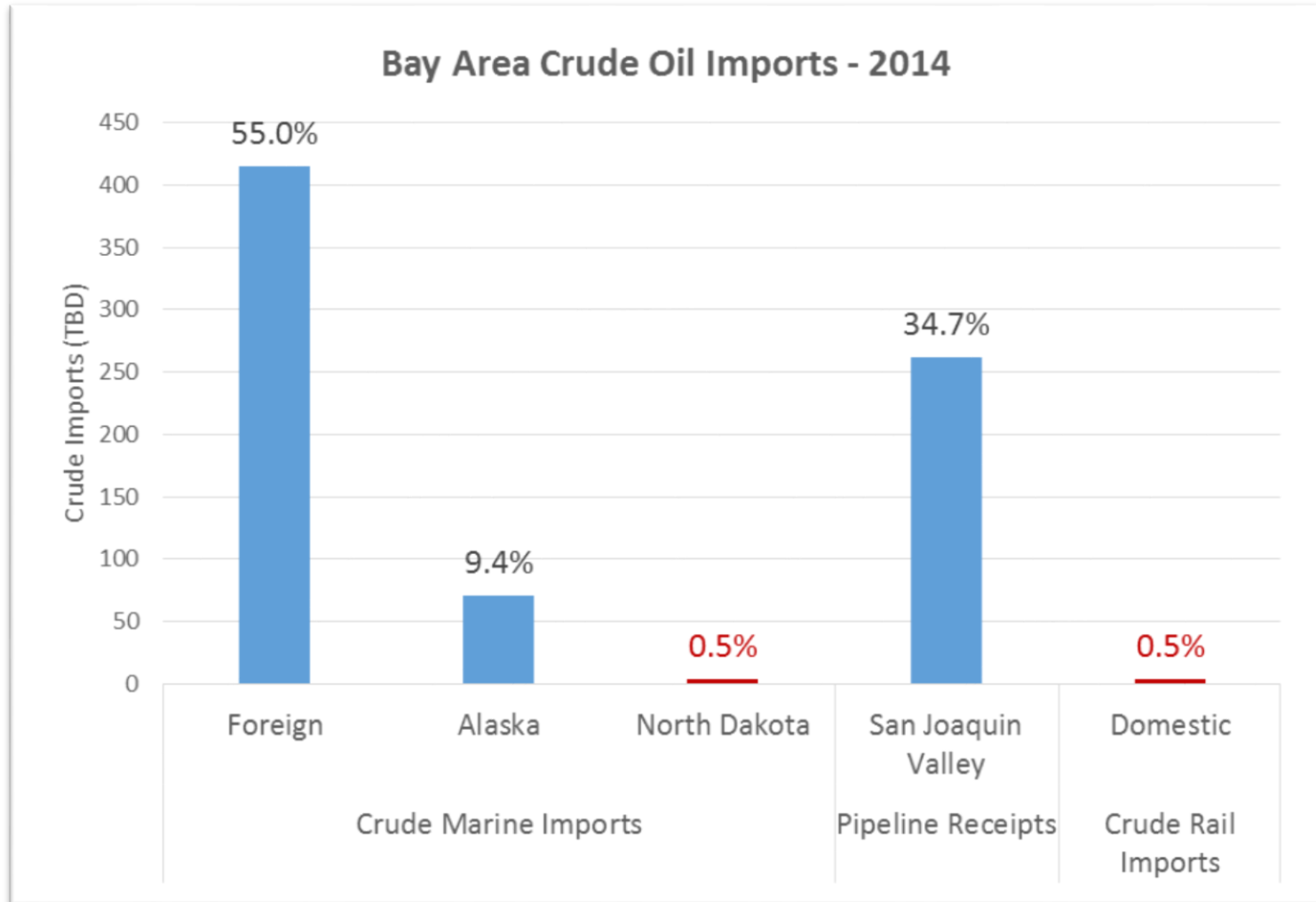


Bay Area Air Quality Management District

50

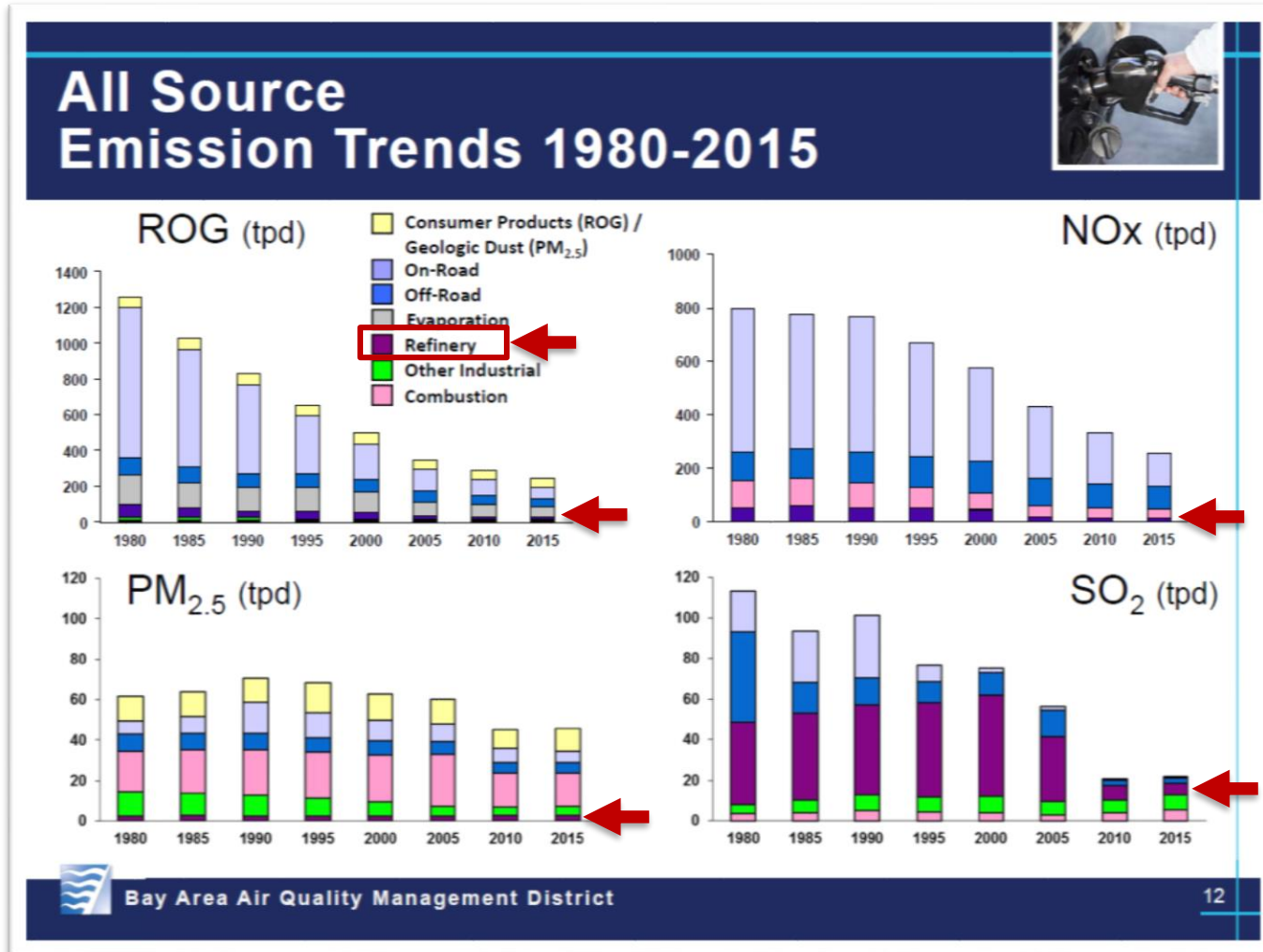


Background: Refineries



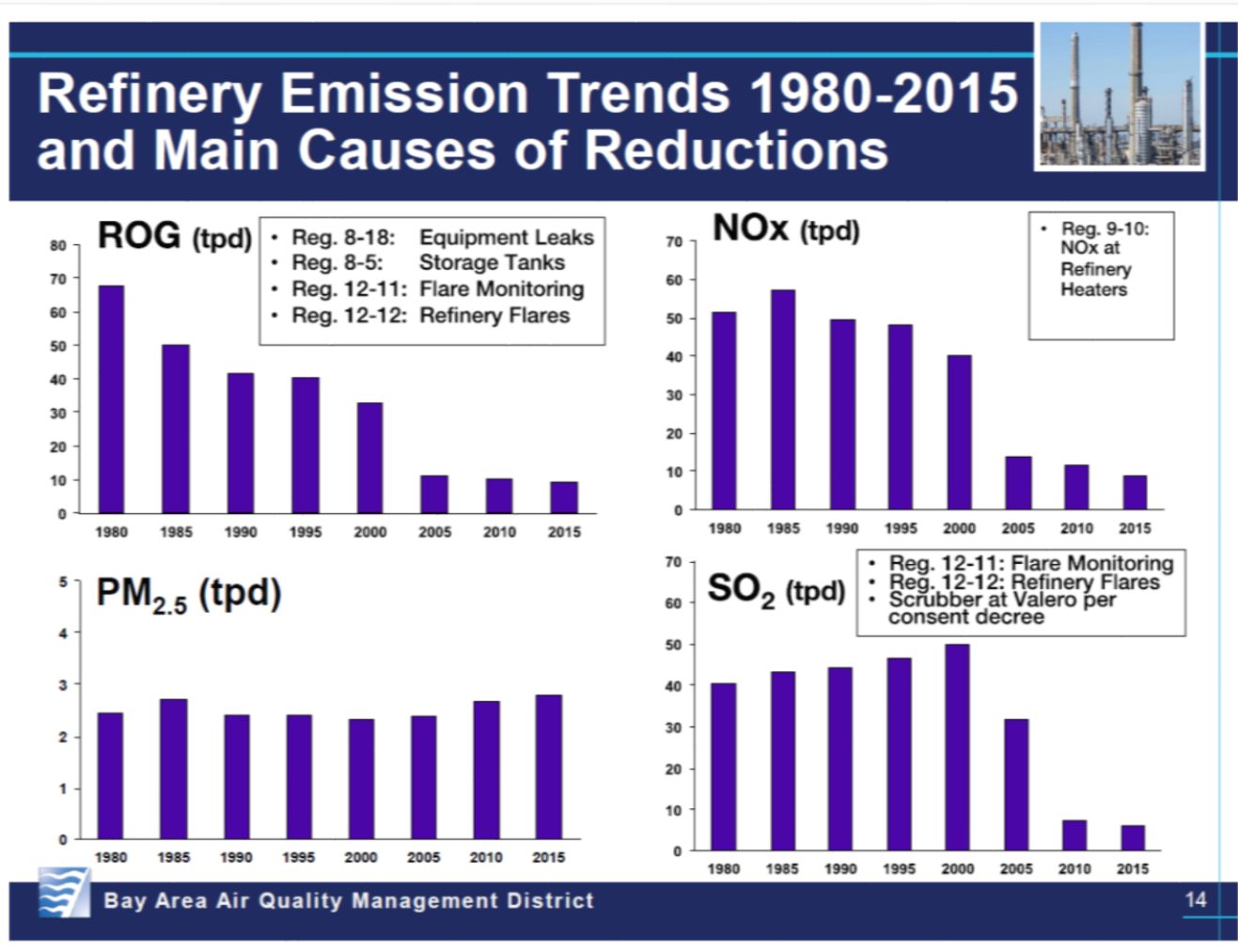


Background: Refineries





Background: Refineries





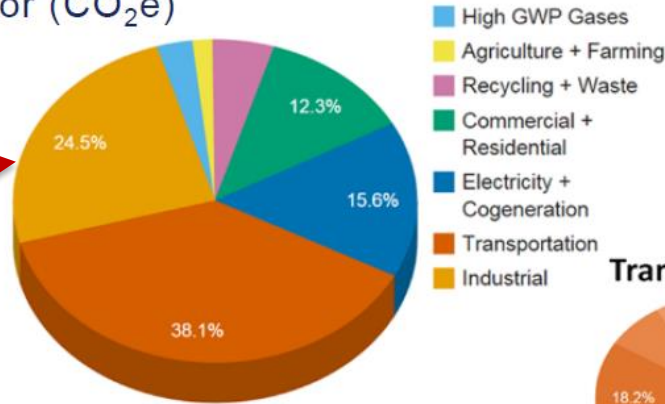
Background: Refineries

Bay Area GHG Emissions



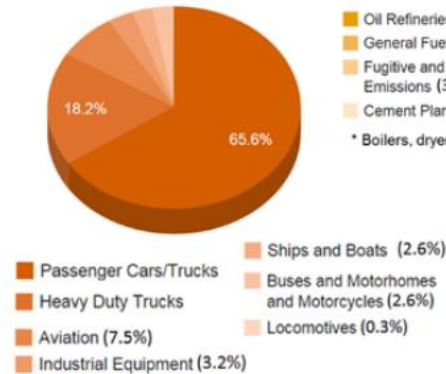
2015 Bay Area GHG Emissions
By Sector (CO₂e)

Industrial
(25%)

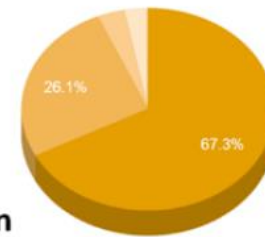


Total: 81 MMTCO₂e

Transportation



Industrial



Refineries
(16%)



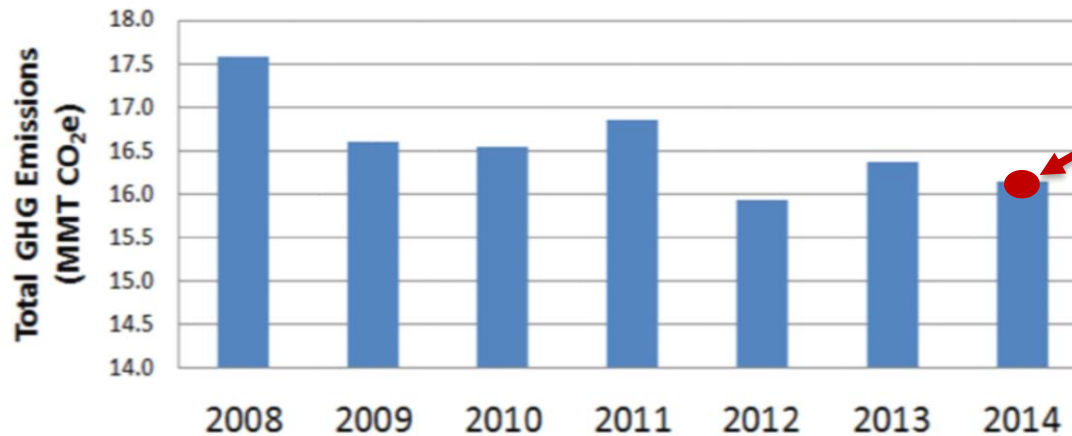


Background: Refineries

Bay Area Refinery GHG Emission Trends



Bay Area Refinery GHG Emissions
(Source: ARB)



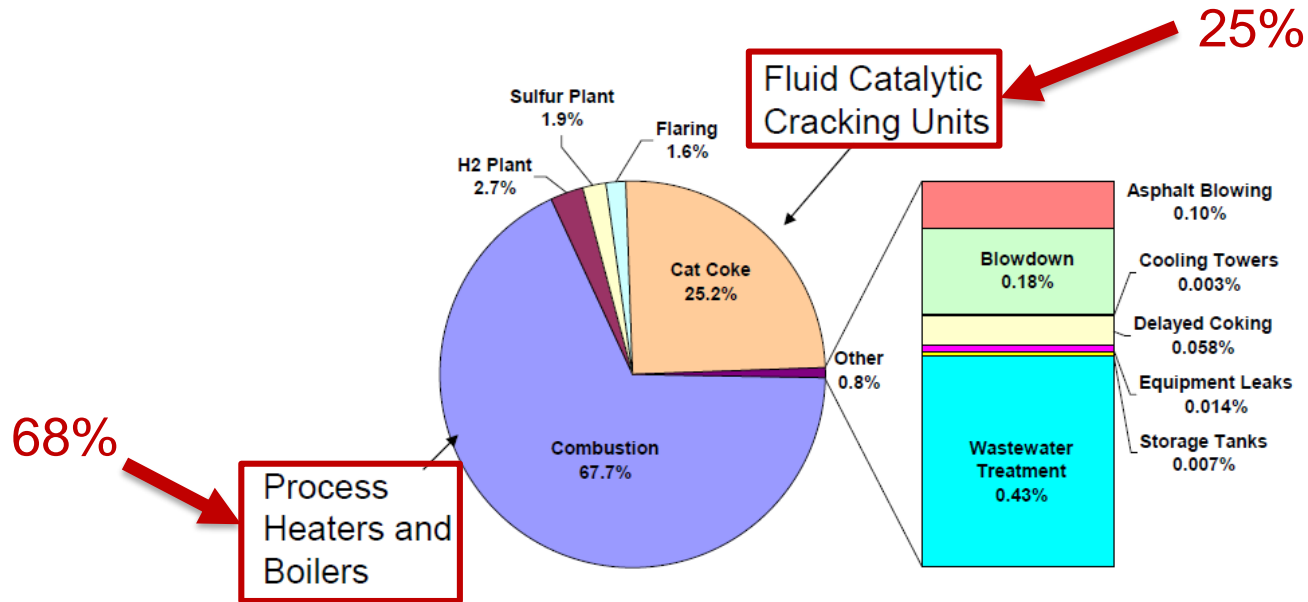
9%
Reduction
since 2008





Background: Refinery GHG

How much GHG do these sources emit?



August 8, 2008; TECHNICAL SUPPORT DOCUMENT FOR THE PETROLEUM REFINING SECTOR: PROPOSED RULE FOR MANDATORY REPORTING OF GREENHOUSE GASES

Largest: Process Heaters & Boilers, FCCUs



Council Deliberations: Question



First Key Question:

What is the efficacy of imposing numeric caps on Greenhouse Gas emissions from Bay Area refineries?





Council Deliberations: Guiding Principles

- Fairness is important, but make sure measures work, that is, global GHG emissions are **actually reduced**
- Beware of **leakage**
 - GHG may just be emitted elsewhere
 - GHG may increase from additional transportation
- Should be grounded in **plausible pathways**, with alignment between **goals and methods**
- Regulatory landscape is complicated; GHG regulations should be **complementary and non-conflicting** with CARB and other programs



Council Deliberations: Guiding Principles (cont'd)

- Effectiveness of GHG reduction options should be **evaluated systematically**
- Simple co-benefits between **GHG, toxics and criteria pollutant** reduction cannot be assumed
- **More real data** is needed (e.g., integrated top-down monitoring, FCCUs)



Efficacy of Refinery GHG Caps: Preliminary Conclusions

- Advisory Council is **not convinced** that facility-level caps on GHG emissions would be effective in mitigating climate change
- GHG reduction measures effective **only if global GHG emissions are reduced**, and it is unclear that Refinery GHG caps would do so, leakage is likely
- Use multi-pollutant strategies because toxics and criteria pollutant **co-benefits do not necessarily result** from Refinery GHG caps



Efficacy of Refinery GHG Caps: Preliminary Conclusions (cont'd)

- Effectiveness of Air District GHG reduction options should be **evaluated more systematically**
 - Must reduce global GHG emissions
 - Should complement, not conflict with CARB
- Air District has an **important role** to play, including:
 - Demand decreases, VMT reduction, public education
 - Collaboration with CARB to address fugitive methane emissions
 - Encourage or require refineries to reduce GHG emissions by methods other than a cap and that
 - Ensure reduction in global GHG emissions
 - Focus on largest sources, such as process boilers and heaters and FCCUs
 - Incorporate increased GHG emission monitoring data



Council Deliberations: Next Steps

- **June 1** – Stationary Source Committee
- **July 18** – Advisory Council
 - Review of District alternatives to caps
 - Finalize recommendations
- **July 20** – Board of Directors
- **TBD** – Report