

# Effects of Commingling Ethanol Fuels with MTBE or Non-Oxygenated Fuels

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Sponsored by the



# Background

- The Commingling Effect
  - Non-linear increase in Reid Vapor Pressure (RVP) is observed when ethanol-containing gasoline is mixed with gasoline having no ethanol in vehicle fuel tanks.
- Commingling can only be avoided if ethanol-containing gasoline is never mixed with non-ethanol gasoline.

# Sierra Commingling Study

## Case # 1

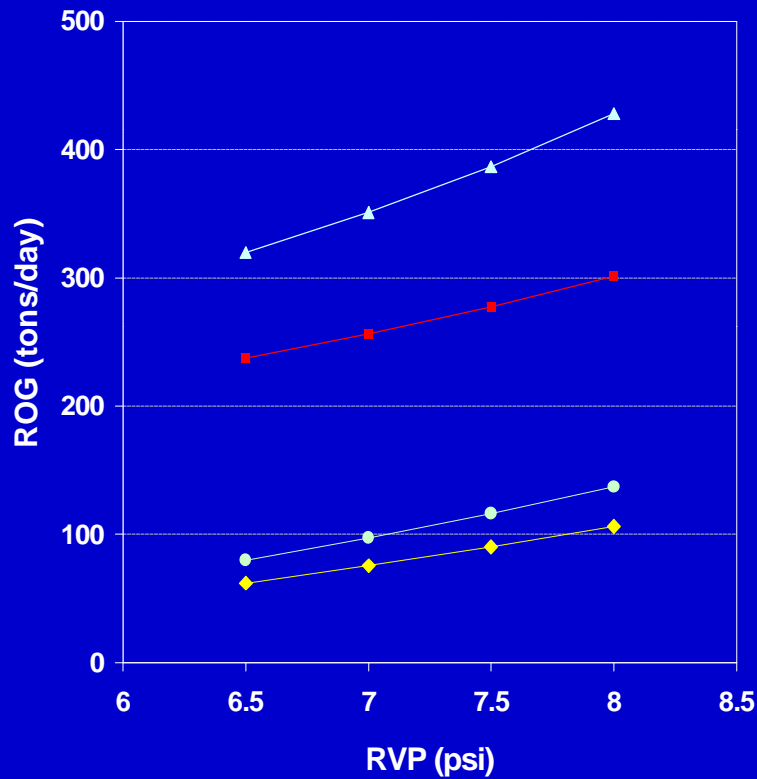
- 6.7 psi RVP Ethanol-Containing Fuels
- Ethanol at 2.0, 2.7, and 3.5 wt. % oxygen
- 6.7 psi RVP MTBE-Containing Fuels
- Future Situation in 2000

## Case # 2

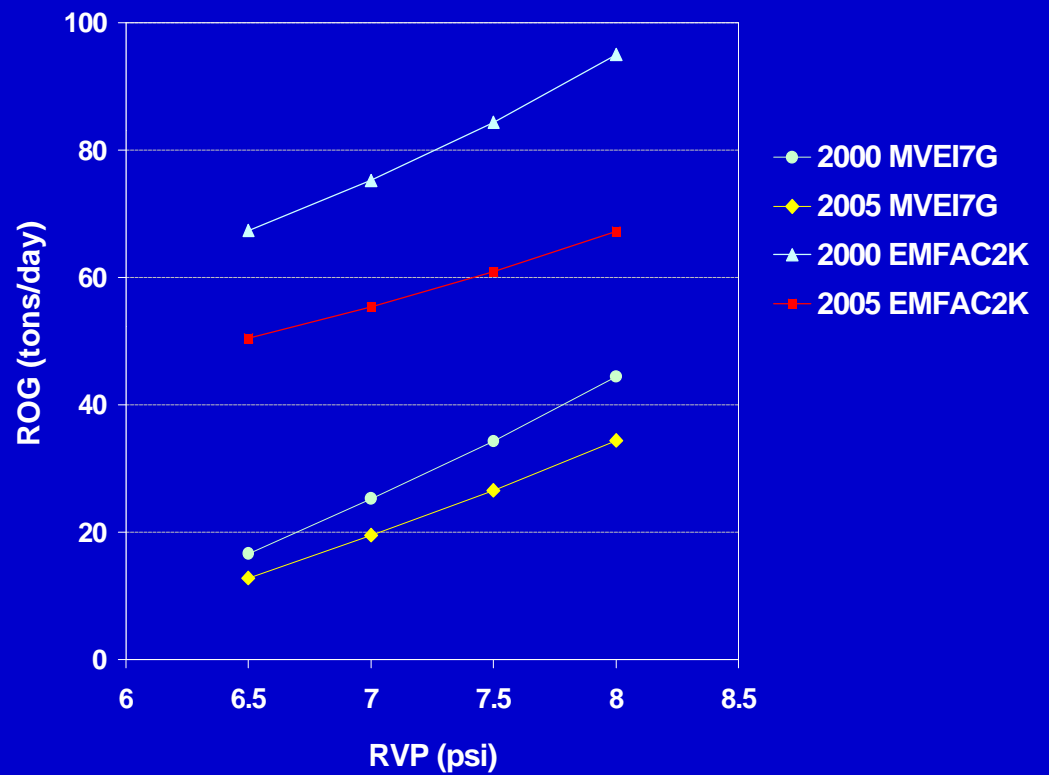
- 6.9 psi RVP Ethanol-Containing Fuels
- Ethanol at 2.0, 2.7, and 3.5 wt. % oxygen
- 6.5 psi RVP Non-Oxy Fuels
- Future Situation in 2005 if CA waived from federal oxygenate requirement

# RVP - Emissions Response

## South Coast Air Basin



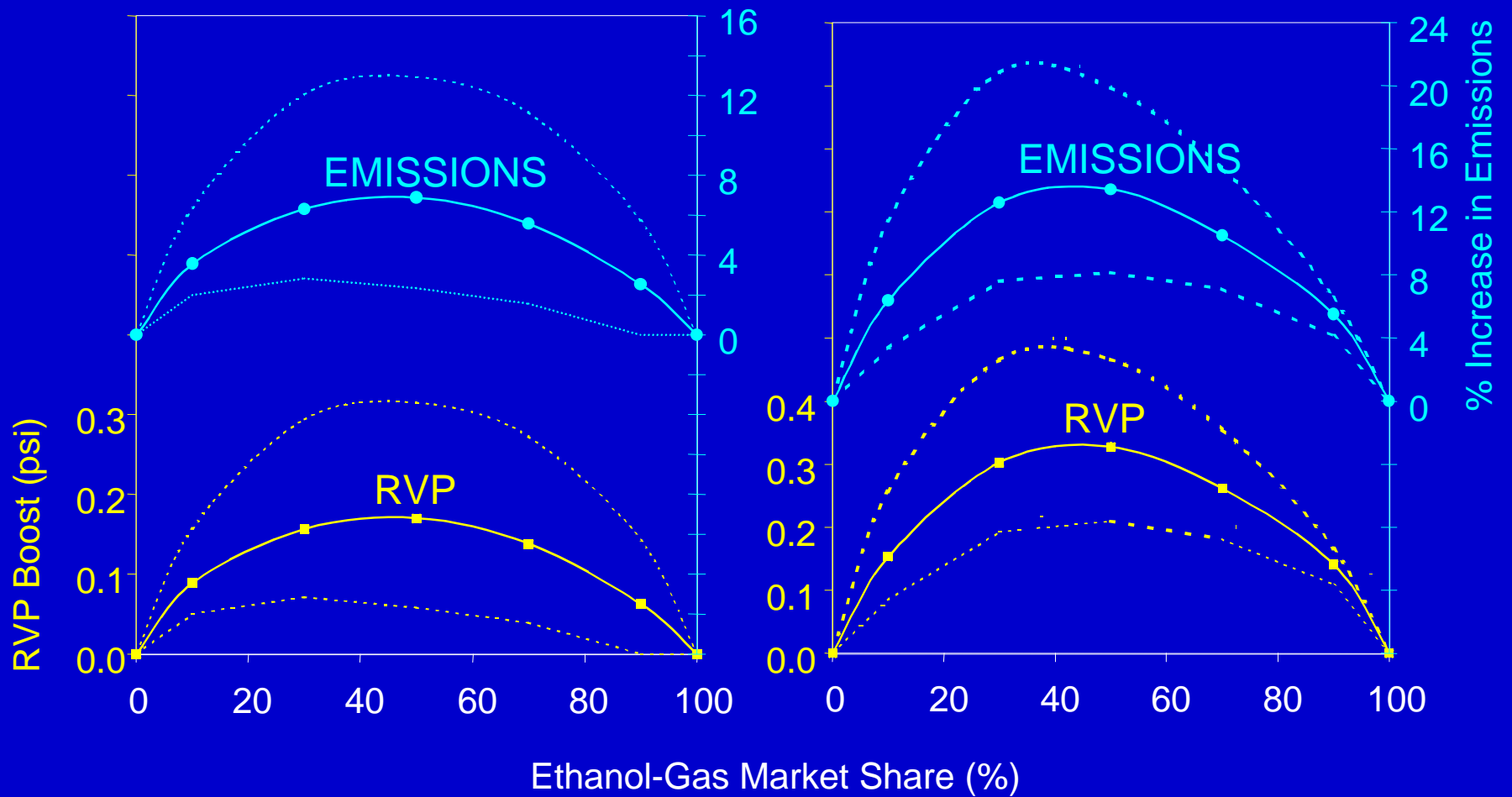
## Sacramento Valley Air Basin



# Results - SCAB Effects

Near Term - 2000

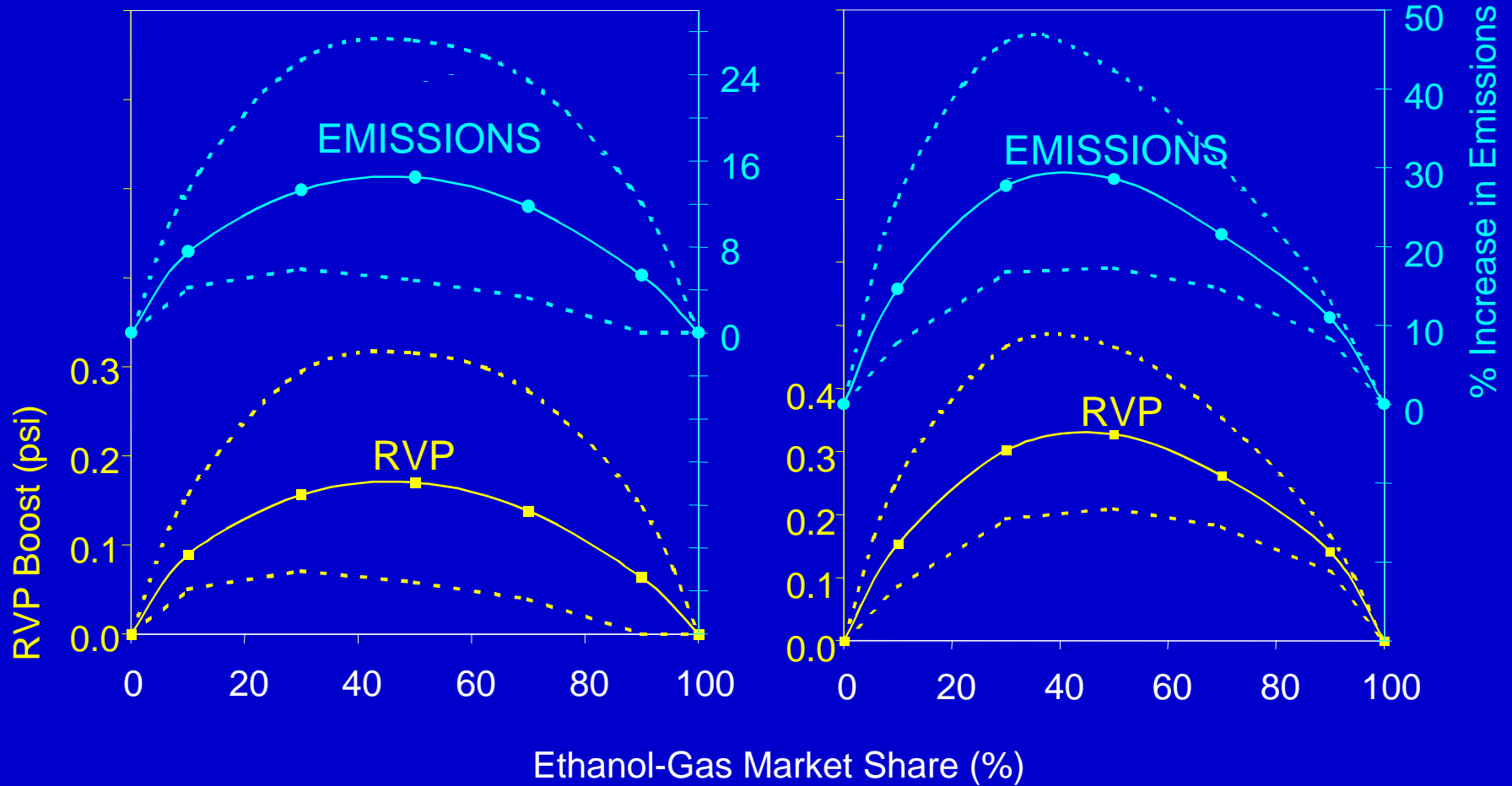
Longer Term - 2005



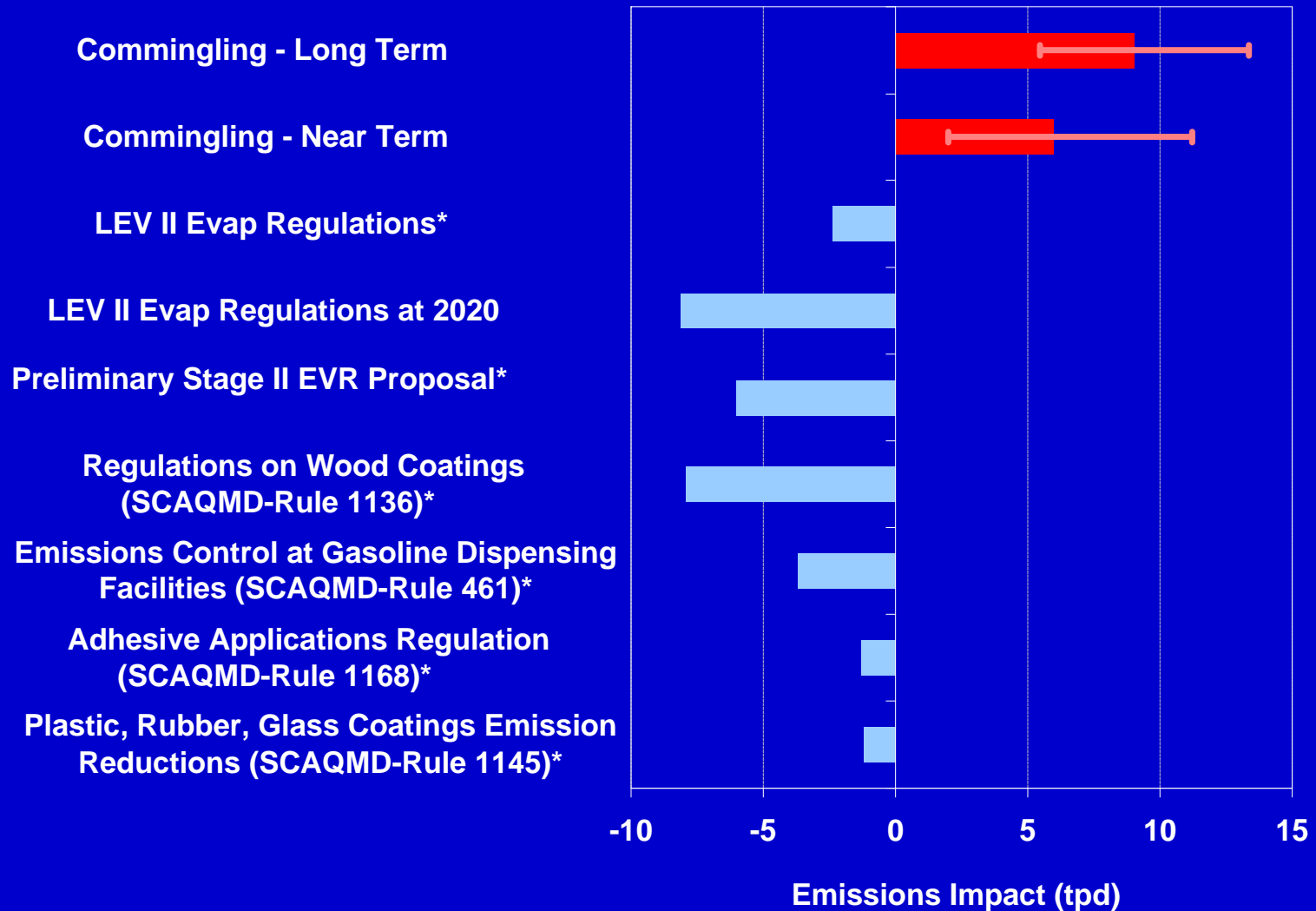
# Results - SVAB Effects

Near Term - 2000

Longer Term - 2005

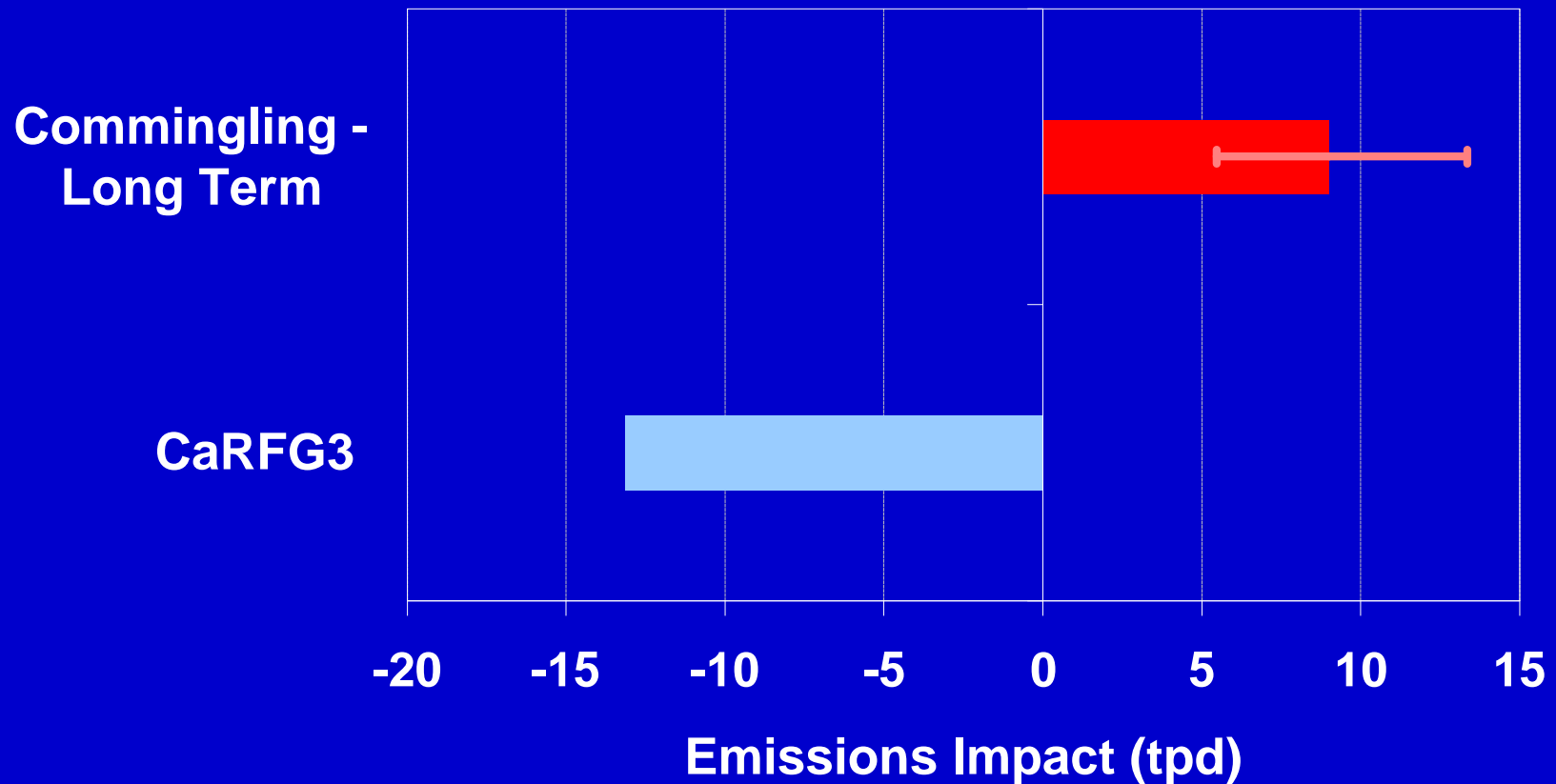


# SCAB Impact Comparison



\*Values depict emissions impact achieved through rule implementation in 2010.

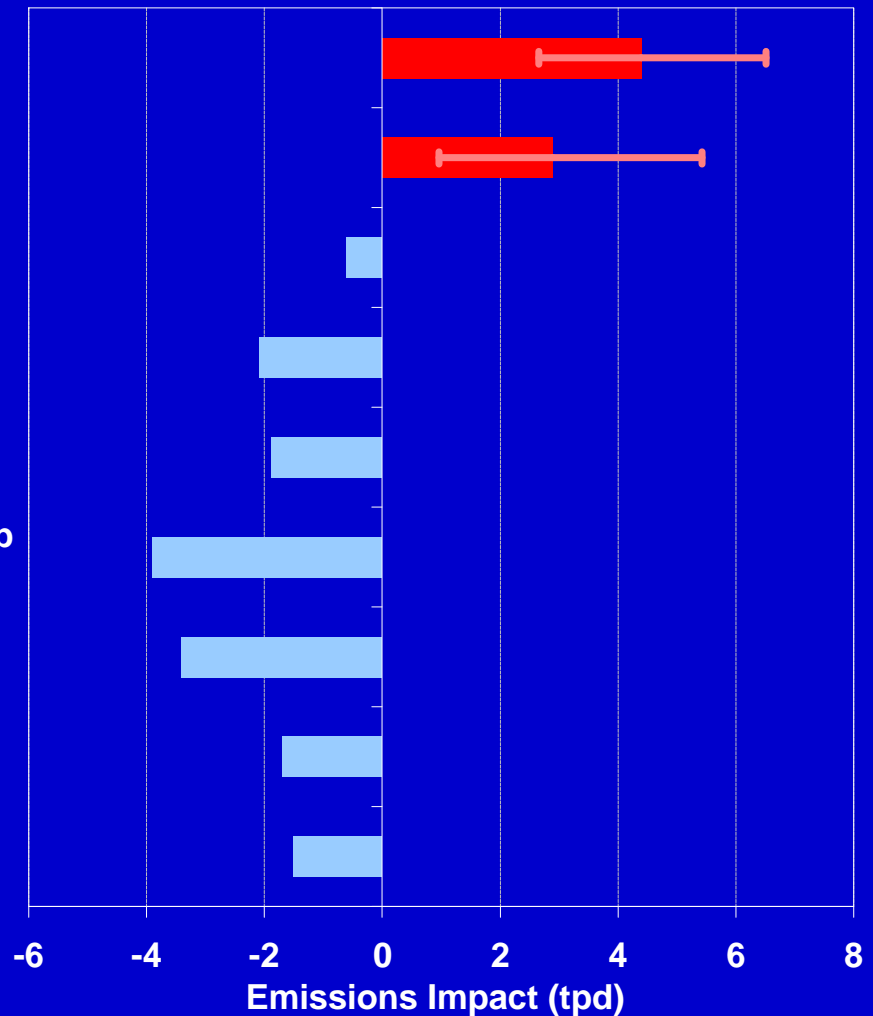
# SCAB Impact Comparison - 2005





# SVAB Impact Comparison

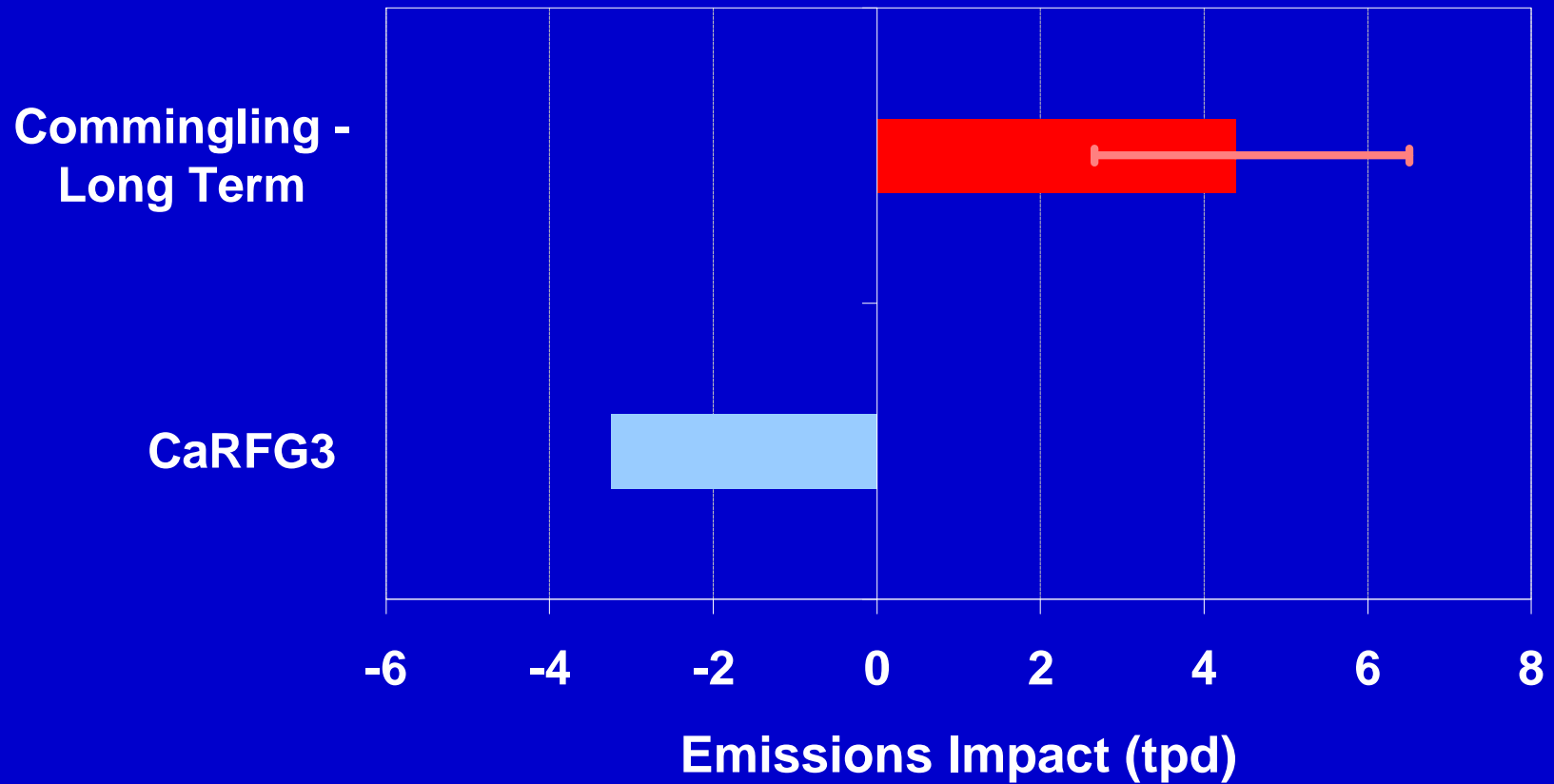
- Commingling - Long Term
- Commingling - Near Term
- LEV II Evap Regulations\*\*
- LEV II Evap Regulations at 2020
- Preliminary Stage II EVR Proposal\*\*
- Facilities' Surface Preparation and Clean-up Regional Measure\*
- Auto Refinishing Measure\*
- Architectural Coatings Regional Measure\*
- Adhesives Regional Measure\*



\*Emission impact achieved through measure implementation in 2005.

\*\*Values depict emissions impact achieved through rule implementation in 2010.

# SVAB Impact Comparison - 2005



# Conclusions

- Fuel RVP will increase as a result of commingling unless there is no ethanol used in gasoline or all gasoline contains ethanol.
- Increased evaporative emissions resulting from commingling may occur (and may have already occurred) prior to the effective date of CaRFG3, December 31, 2002.

## Near-Term Solution (2000–02)

- An orderly transition to ethanol use is needed. Options are:
  - Adopt an Ethanol Control Period wherein ethanol use is banned during the summer months; or
  - Require that all gasoline contain ethanol.

## Near-Term Solution (2000–02)

- This solution could be implemented on a geographical basis; e.g., in Northern California, use only fuels with ethanol, and in Southern California, use only fuels without ethanol.

## Longer-Term Solution (2003+)

- In the longer term, CARB needs to complete promised studies on commingling and take appropriate regulatory action to address the issue.