

REFINERY FLARING IN SOUTH COAST AQMD

**2011 NACAA Permitting &
Enforcement Workshop**

Chicago, June 14-16, 2011

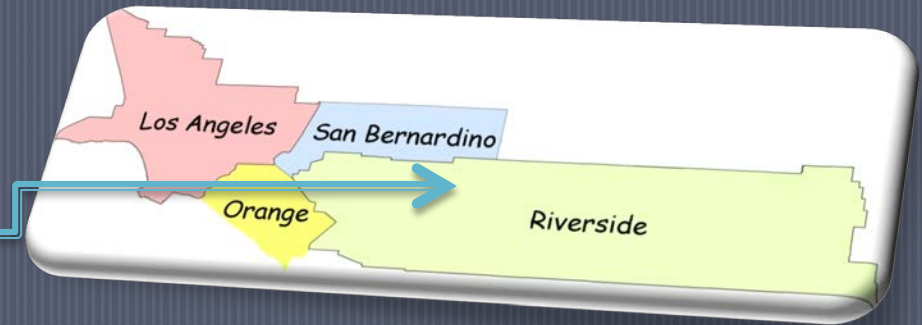


Mohsen Nazemi, P.E.
Deputy Executive Officer
South Coast Air Quality Management District

California Air Districts

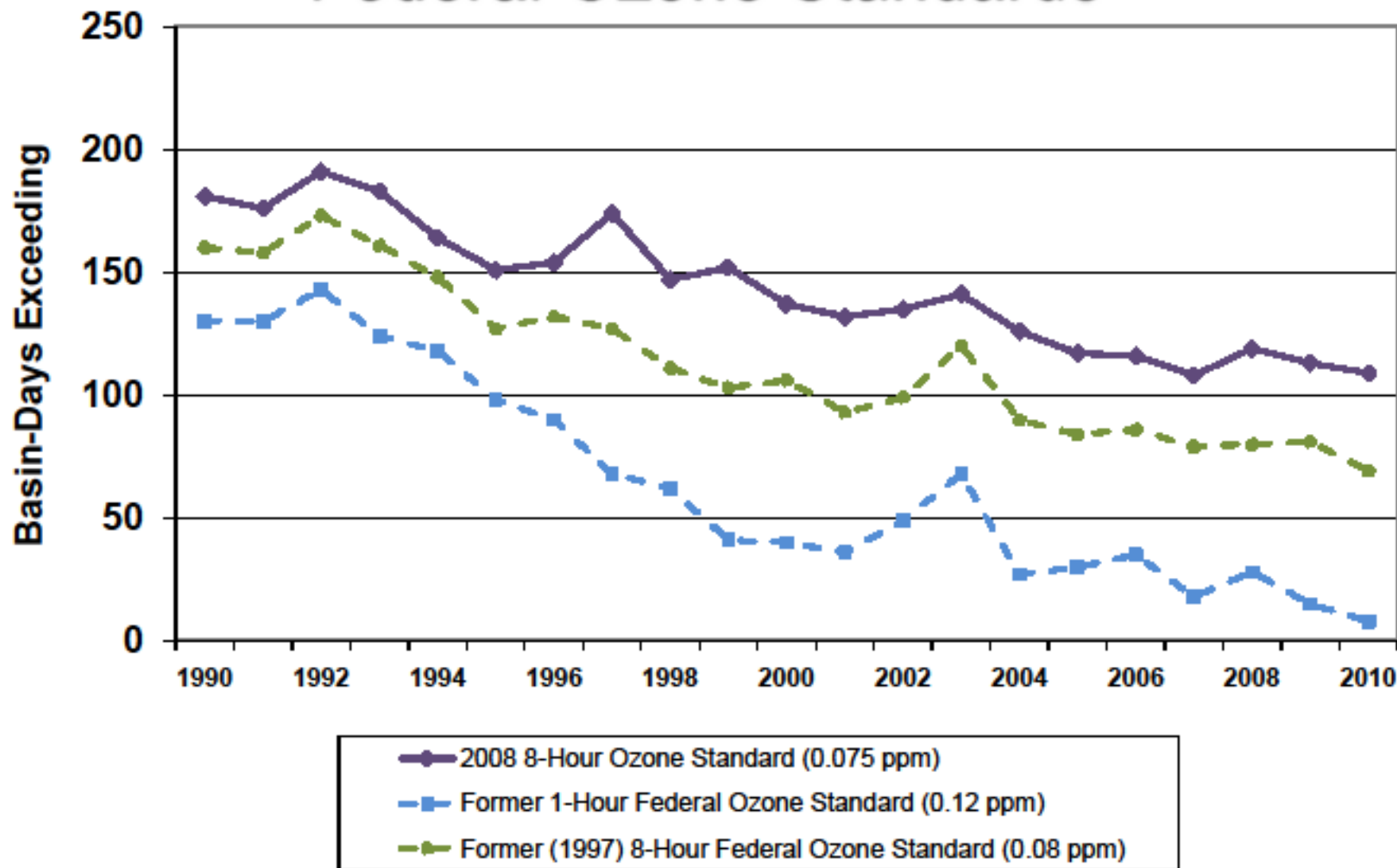


What is South Coast Air Quality Management District (SCAQMD)?



- Local Air Pollution Control District in Southern California (All of Orange & Non-Desert Portions of LA, Riverside & San Bernardino Counties)
- Population of over 17 million (about half of State's population)
- Covers 10,743 sq. miles
- **Worst air quality in the nation (Ozone & PM 2.5)**
- Receives and Process about 10,000 permits annually
- Regulates over 28,000 stationary sources

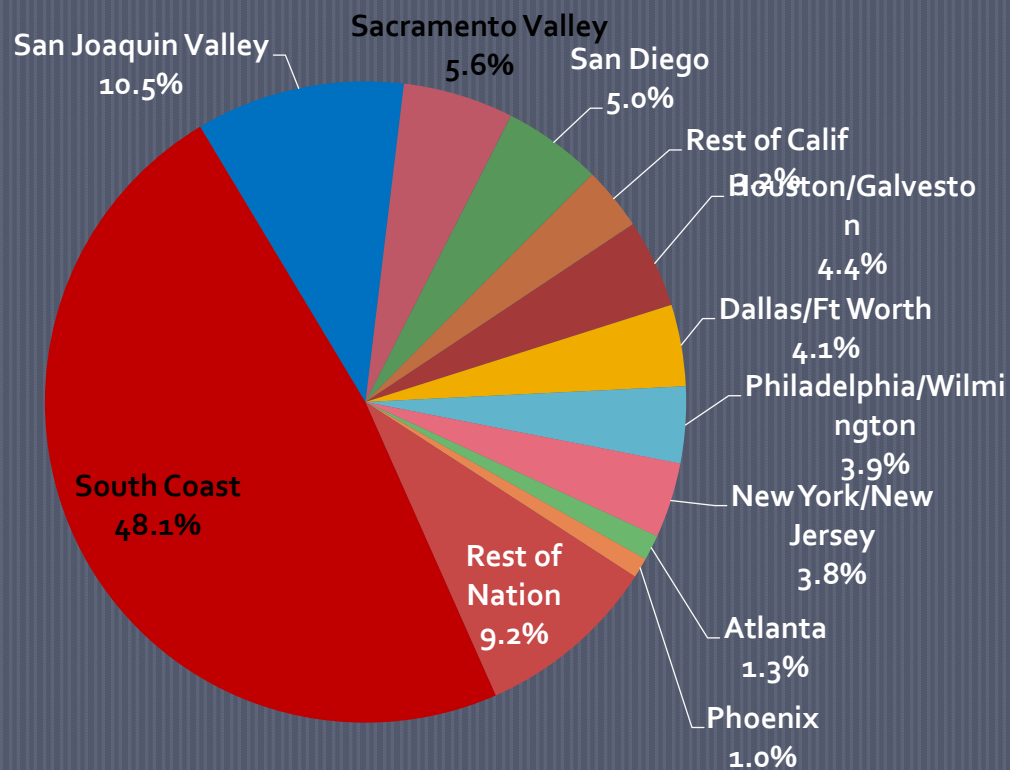
South Coast Air Basin Days Exceeding Federal Ozone Standards



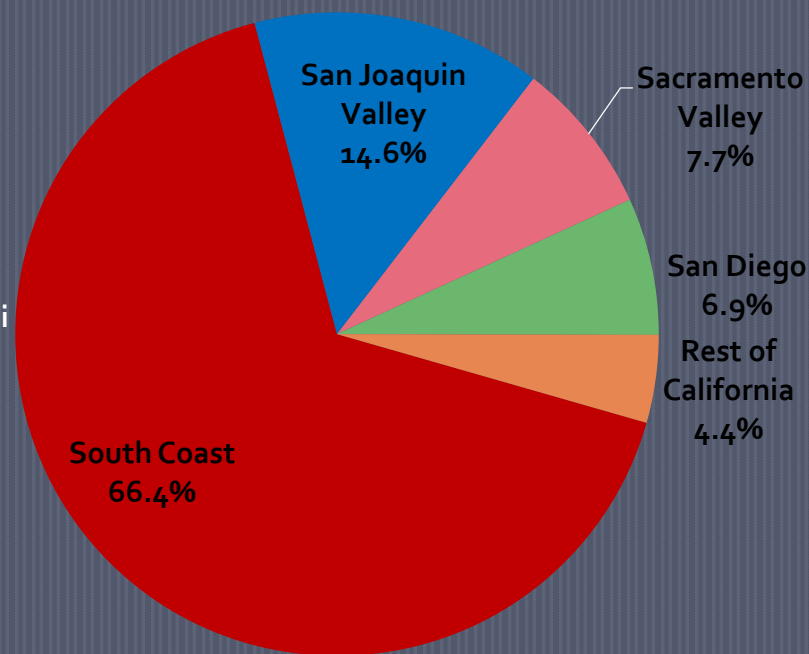
Ozone Exposures

8-Hour NAAQS = 75 ppb

Nationwide



California

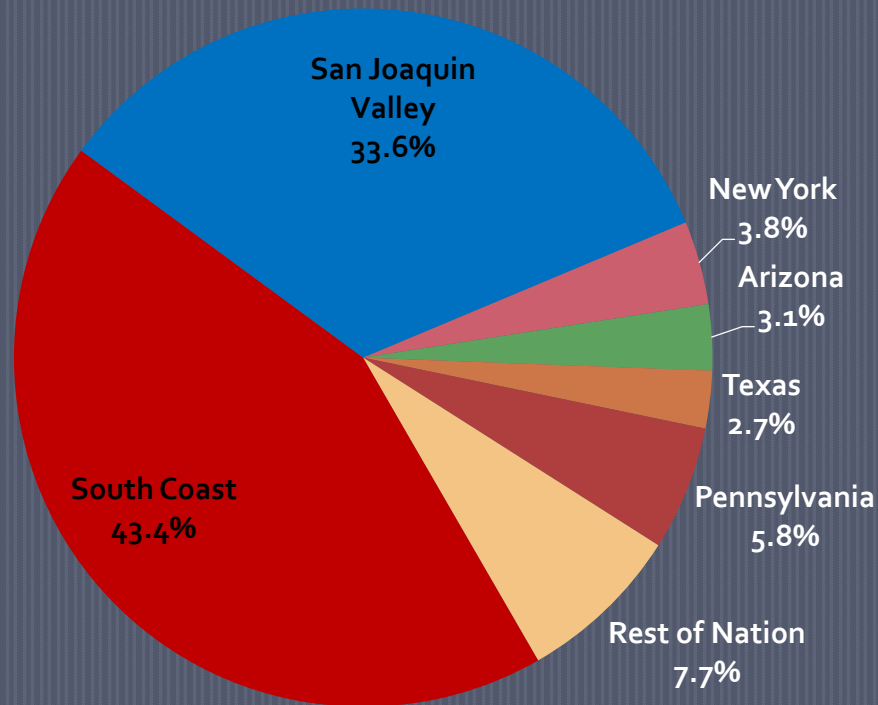


* Population-weighted incremental exposure to ozone above the 8-Hour NAAQS (> 75 ppb), based on 2008-2010 design values

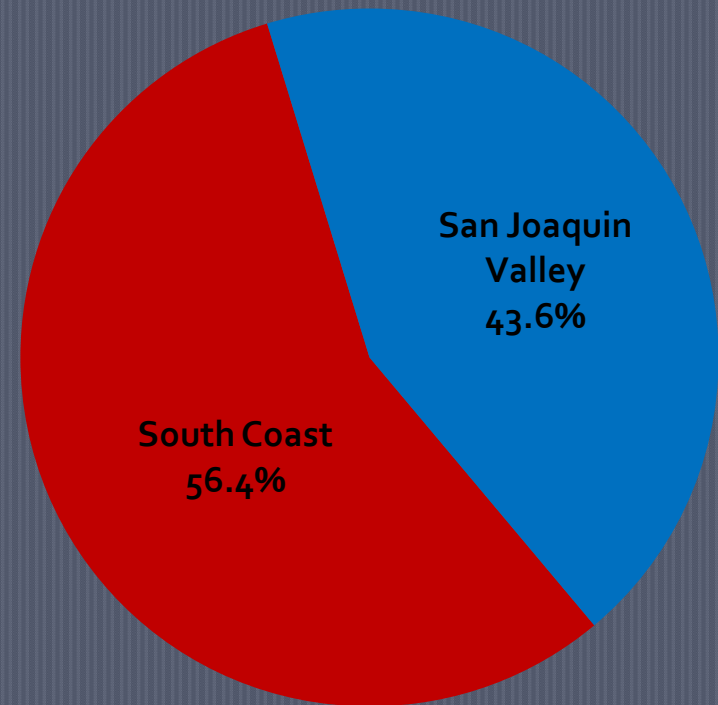
PM_{2.5} Exposure*

Annual Average NAAQS = 15 µg/m³

Nationwide



California



* Population-weighted incremental exposure to PM_{2.5} above the NAAQS annual standard, based on 2007-2009 data

Flaring at Refineries



Flaring at Refineries



Flaring at Refineries



Flaring at Refineries

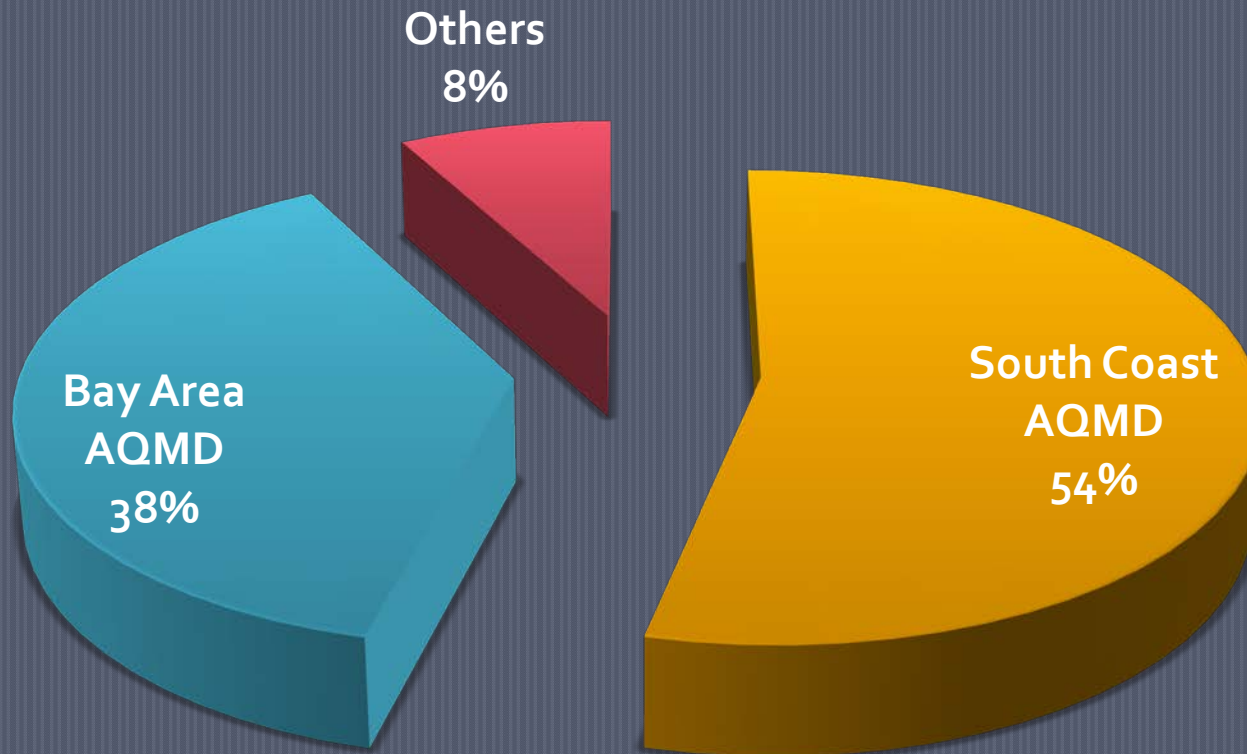


Refineries in California

Refinery Name	Crude Capacity (Barrels/Day)*	Air District
BP West Coast Products LLC, Carson Refinery	265,000	South Coast
Chevron U.S.A. Inc., El Segundo Refinery	260,000	South Coast
Chevron U.S.A. Inc., Richmond Refinery	242,901	Bay Area
Tesoro Refining & Marketing Company, Golden Eagle (Avon/Rodeo) Refinery	166,000	Bay Area
Shell Oil Products US, Martinez Refinery	155,600	Bay Area
ExxonMobil Refining & Supply Company, Torrance Refinery	149,500	South Coast
Valero Benicia Refinery	144,000	Bay Area
ConocoPhillips, Wilmington Refinery	139,000	South Coast
Tesoro Refining & Marketing Company, Wilmington Refinery	97,000	South Coast
Valero (Ultramar) Wilmington Refinery	80,887	South Coast
ConocoPhillips, Rodeo San Francisco Refinery	76,000	Bay Area
Big West of California LLC, Bakersfield Refinery	66,000	San Joaquin
Paramount Petroleum Corporation, Paramount Refinery	63,000	South Coast
ConocoPhillips, Santa Maria Refinery	44,200	Santa Barbara
Edgington Oil Company, Long Beach Refinery	35,000	South Coast
Kern Oil & Refining Company, Bakersfield Refinery	26,000	San Joaquin
San Joaquin Refining Company Inc., Bakersfield Refinery	15,000	San Joaquin
Others	27,100	

* Source: California Energy Commission (2008)

Refineries in California



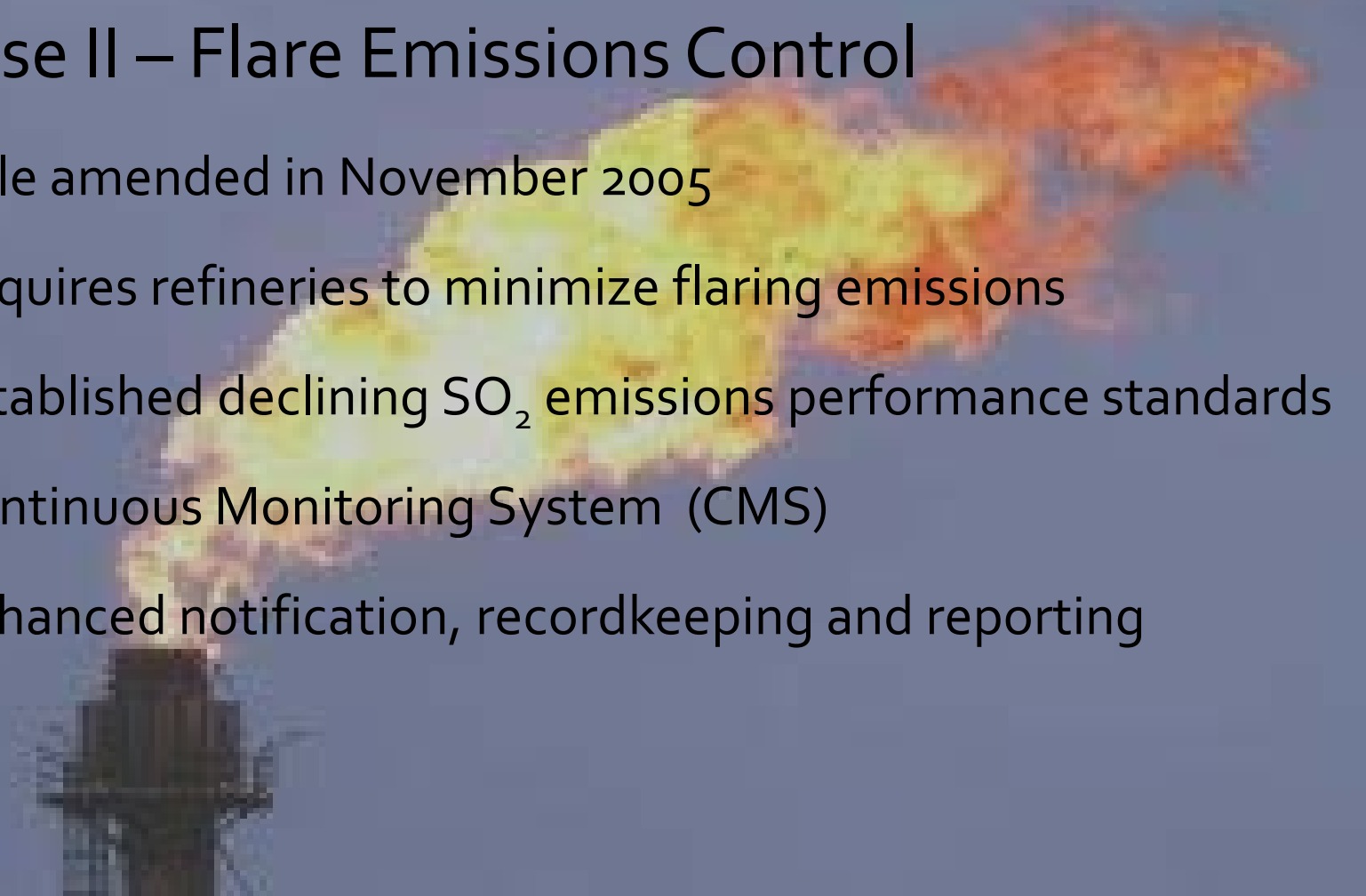
Total California Crude Throughput Capacity: 2,052,188 bbls/day

Rule 1118 – Control of Emissions from Refinery Flares

- Phase I – Flare Monitoring
 - Adopted in February 1998
 - Required to monitor, record and report emissions
 - SCAQMD to assess needs and feasibility of emission reductions



Rule 1118 – Control of Emissions from Refinery Flares (cont'd)

- Phase II – Flare Emissions Control
 - Rule amended in November 2005
 - Requires refineries to minimize flaring emissions
 - Established declining SO₂ emissions performance standards
 - Continuous Monitoring System (CMS)
 - Enhanced notification, recordkeeping and reporting
- 

Compliance with Refinery Flare Emission Controls

- Status Report and Update on:
 - Compliance with SO₂ Performance Targets
 - Implementation of Flare Continuous Monitoring Systems (CMS)
- Overall Refinery Flaring Performance



SCAQMD Refineries with CMS

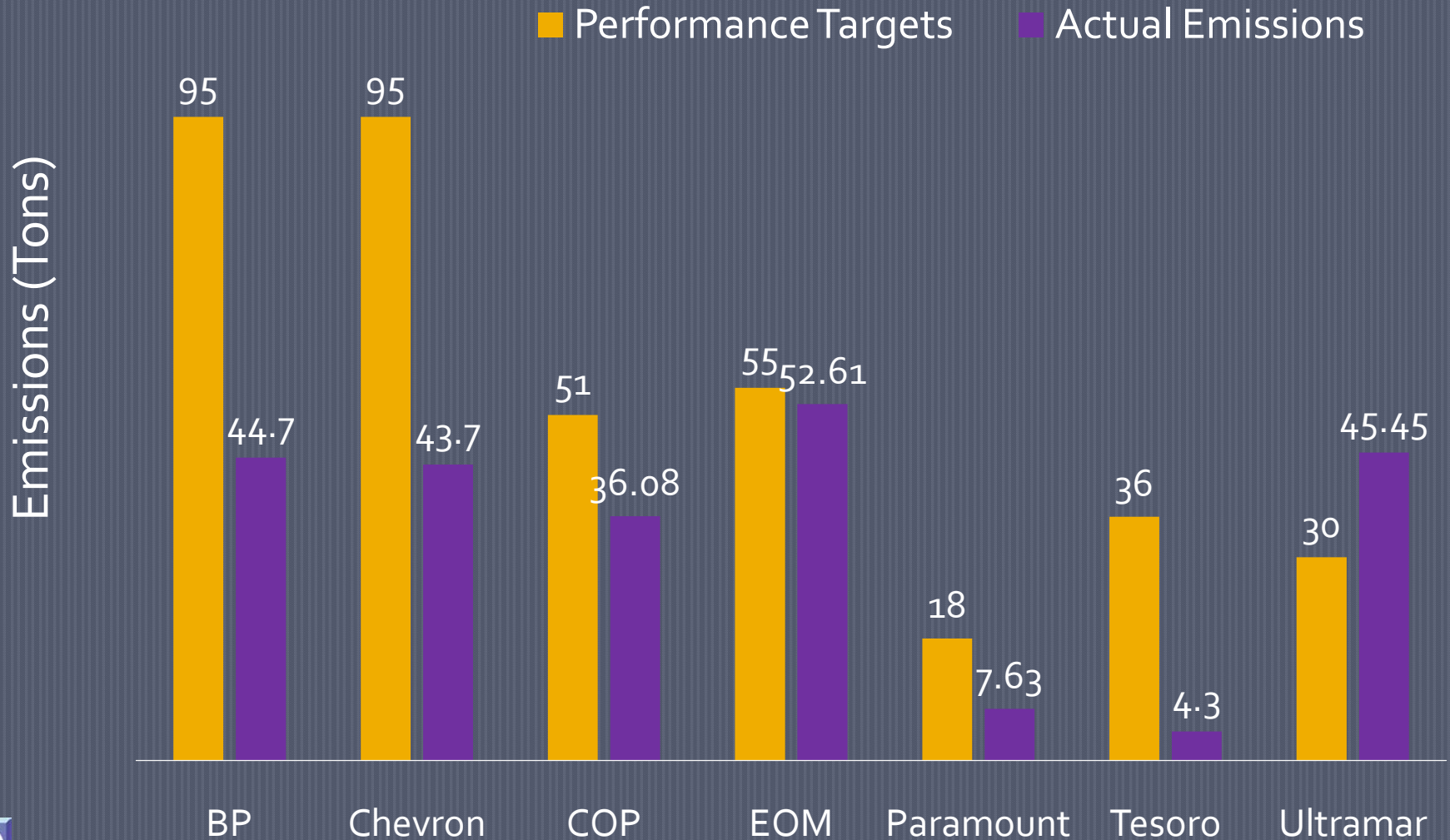
Refinery Name	Crude Capacity (Barrels Per Day)	No. of Flares w/ CMS
BP West Coast Products LLC, Carson Refinery	265,000	5
Chevron U.S.A. Inc., El Segundo Refinery	260,000	5
ExxonMobil Refining & Supply Company, Torrance Refinery	149,500	2
ConocoPhillips, Wilmington Refinery	139,000	3
ConocoPhillips, Carson Refinery	(Combined Wilmington)	2
Tesoro Refining & Marketing Company, Wilmington Refinery	97,000	3
Valero (Ultramar) Wilmington Refinery	80,887	3
Paramount Petroleum Corporation, Paramount Refinery	63,000	1
Edgington Oil Company, Long Beach Refinery	35,000	0
Lunday Thagard, South Gate Refinery	8,500	0
Valero Wilmington Asphalt Refinery	6,300	0
Total		24

Status of Refinery Performance Target for SO₂

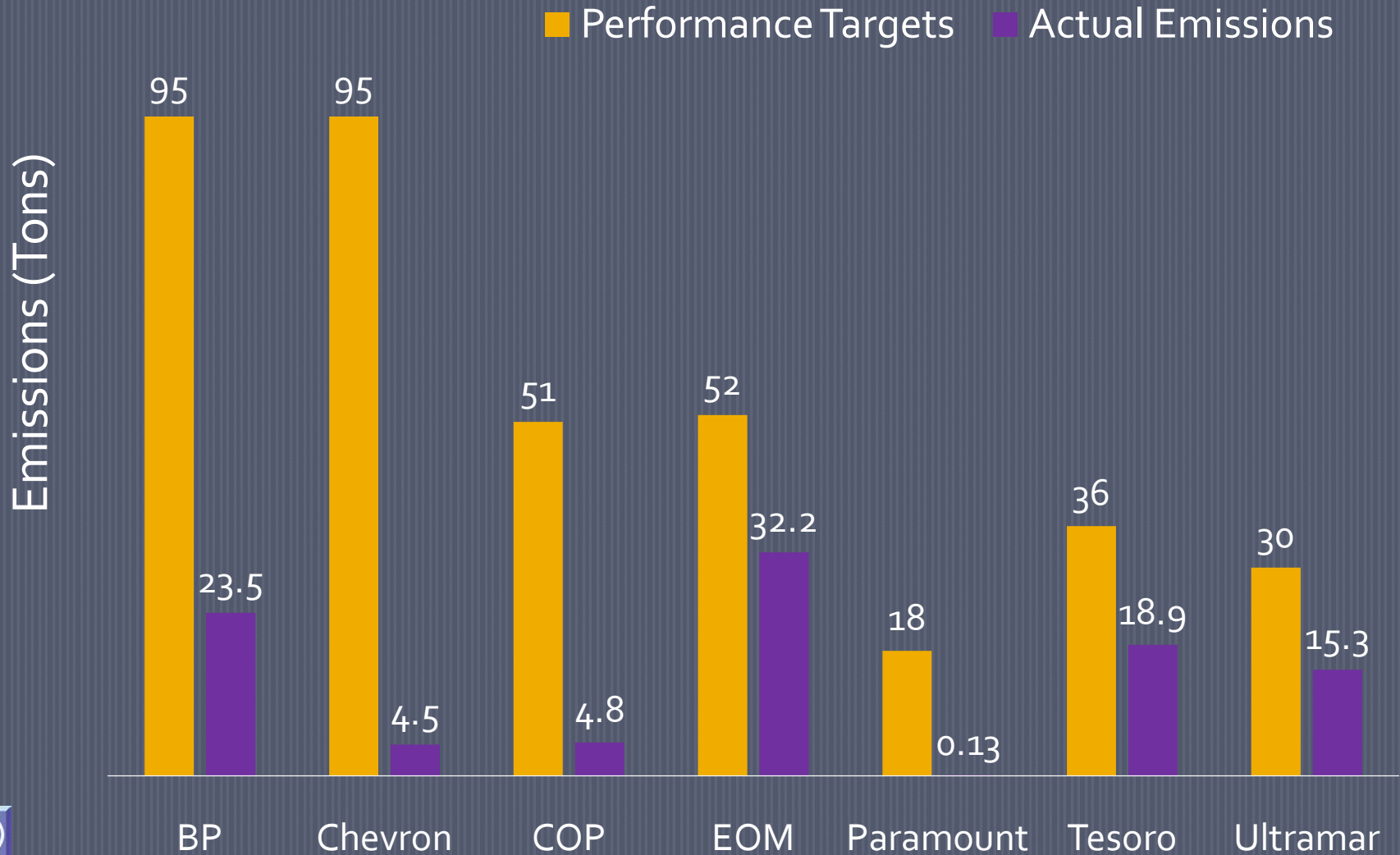
Calendar Year	2006	2007	2008	2009	2010	≥2012
SO₂ Performance Target (Tons/MM BBL)	≤ 1.5	≤ 1.5	≤ 1	≤ 1	≤ 0.7	≤ 0.5
Refineries Meeting Performance Target	7	7	6	7	6	—
Refineries Not Meeting Performance Target	0	0	1*	0	0	—

* Ultramar/Valero exceeded the 2008 SO₂ Performance Target

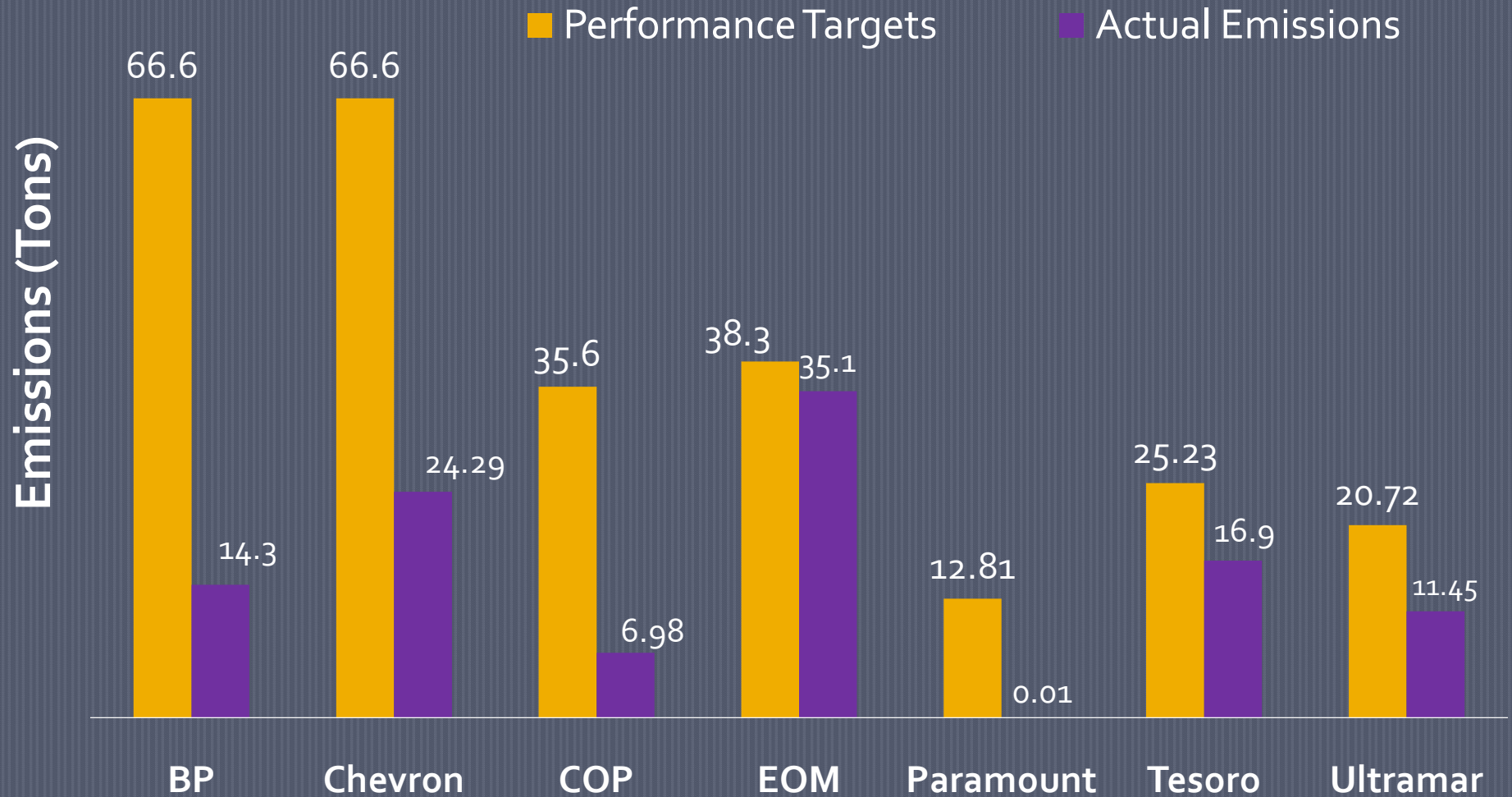
CY 2008 Emissions Comparison



CY 2009 Emissions Comparison



CY 2010 Emissions Comparison



If Refinery Exceeds Performance Standards

- Submit Flare Minimization Plan to specify all actions to be taken to meet performance targets
 - Refinery policies and procedure to minimize planned/unplanned flaring
 - Install new flare gas recovery and treatment systems
- Pay Mitigation fees to SCAQMD

Excess Emissions	Mitigation Fee per ton SO ₂
$\leq 10\%$	\$25,000
$>10\% \leq 20\%$	\$50,000
$>20\%$	\$100,000
Maximum	\$4 Million (Total)

Flare Emissions Monitoring Procedure

- For each flare event measure total sulfur, flow rate and heating value (App. A of Rule 1118)
- If total sulfur (SO₂) is not measured, use calculations (App. B of Rule 1118)
 - May submit alternative calculations methodology
 - AQMD to evaluate information provided
- Ultramar paid \$1.25M mitigation fee
- In 2010, four (4) flare events at ExxonMobil did not measure total sulfur. Staff reviewed and approved alternate calculations.

Examples of Major Flaring Events

Date	Refinery	Cause	SOx (tons)
2008	Chevron	Gas Compressor	19.64
2008	ExxonMobil	FCCU shutdown	26.65
2008 (2)	Ultramar/Valero	Failed O ₂ gas valve/SRU Shutdown	37.83
2009	Ultramar/Valero	Sulfur Recovery breakdown	4.61
2009	Tesoro	Fire at Delayed Coker Unit	2.92
2010	Exxon Mobil	Hydrotreater Breakdown	37.96
2010	BP	FCC Shutdown	8.06

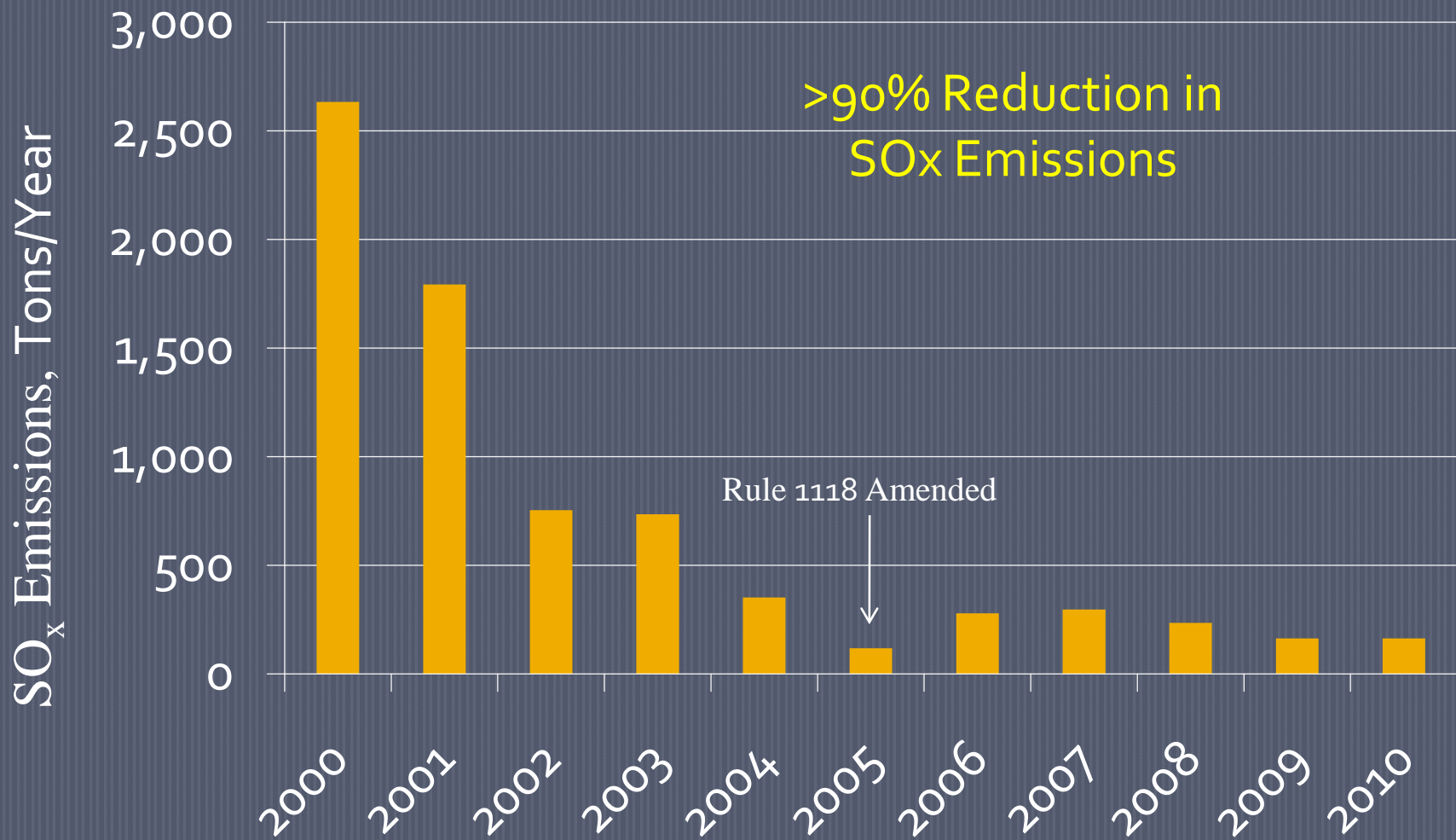
Rule 1118 Continuous Monitoring System Update

- Rule 1118 Resolution called for pilot projects to demonstrate Technical Feasibility of Total Sulfur (TS) and Higher Heating Value (HHV) for use as Continuous Monitors (CMS)
- Pilot projects successfully demonstrated
 - Total Sulfur Analyzer installed at BP Carson Refinery
 - High Heating Value Analyzer installed at Chevron Refinery
 - District approved both systems in 2008

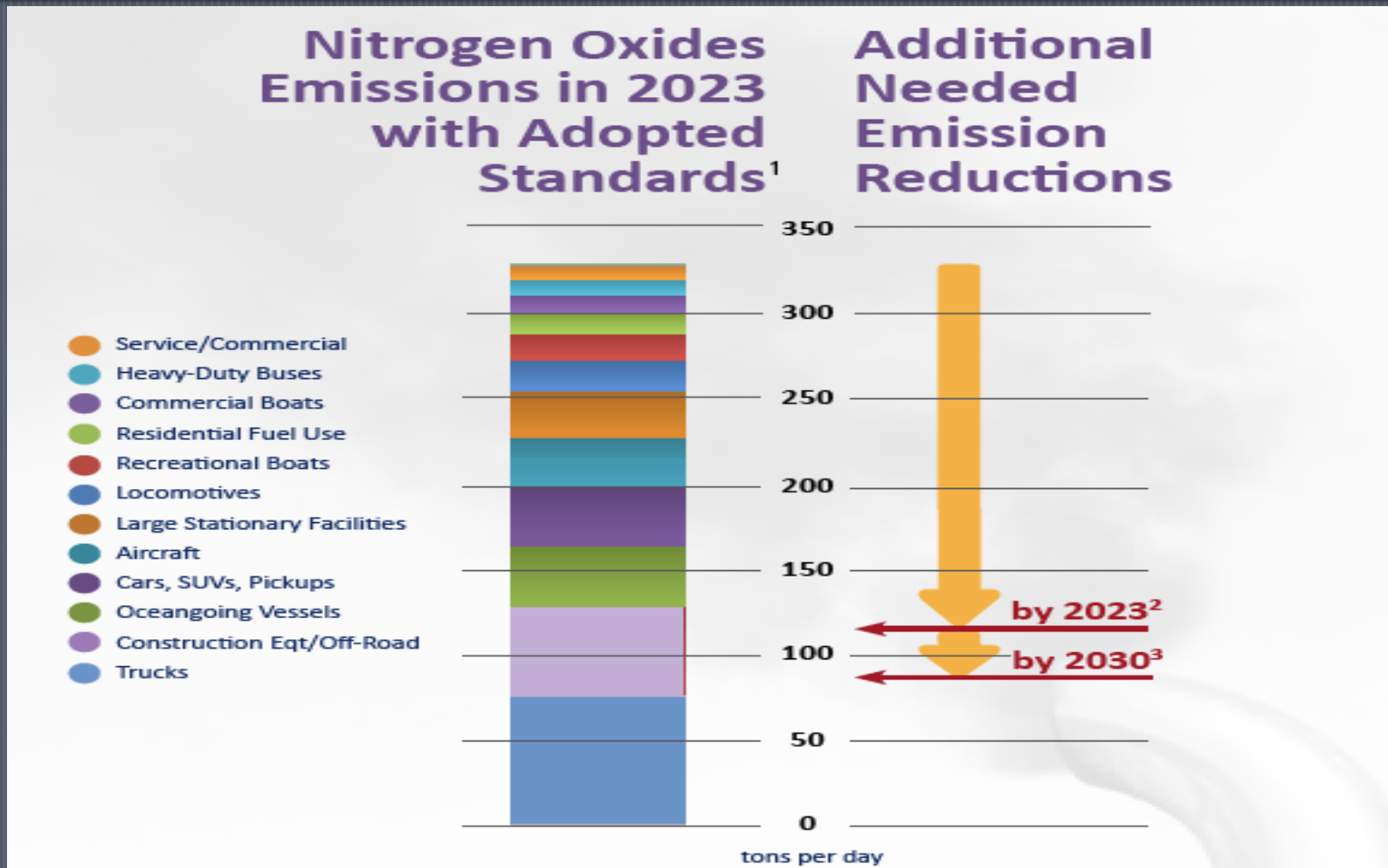
CMS Implementation Status

- Compliance Attainment Schedule:
 - 17 Flares with CMS on December 31, 2009
 - 7 Additional Flares with CMS on December 31, 2010
 - In total, 24 flares with CMS on December 31, 2010
- All refineries' CMS are certified

Overall Refinery Flare Emission Trends



NOx Reductions Needed to Meet Federal Ozone Standards




1. Preliminary emissions estimates based on data from 2007 AQMP, updated where more recent data available: CARB 2010 projections for trucks and off-road equipment; International Maritime Organization standards for vessels; EPA 2008 rule for locomotives; Vessels is average of high and low emissions estimates based on varying deployment assumptions for IMO vessels and range of ports' cargo forecasts. 2. Source: 2007 AQMP; analysis for 80 ppb fed standard. 3. Preliminary analysis for 75 ppb fed standard

Powering the Future

A Vision for Clean Energy, Clear Skies,
and a Growing Economy in Southern California



California Environmental Protection Agency

 **Air Resources Board**