



Proposed State Strategy for the California State Implementation Plan (SIP)

Air Resources Board
Planning and Technical Support Division
June 22, 2007
Los Angeles



Proposed State Strategy

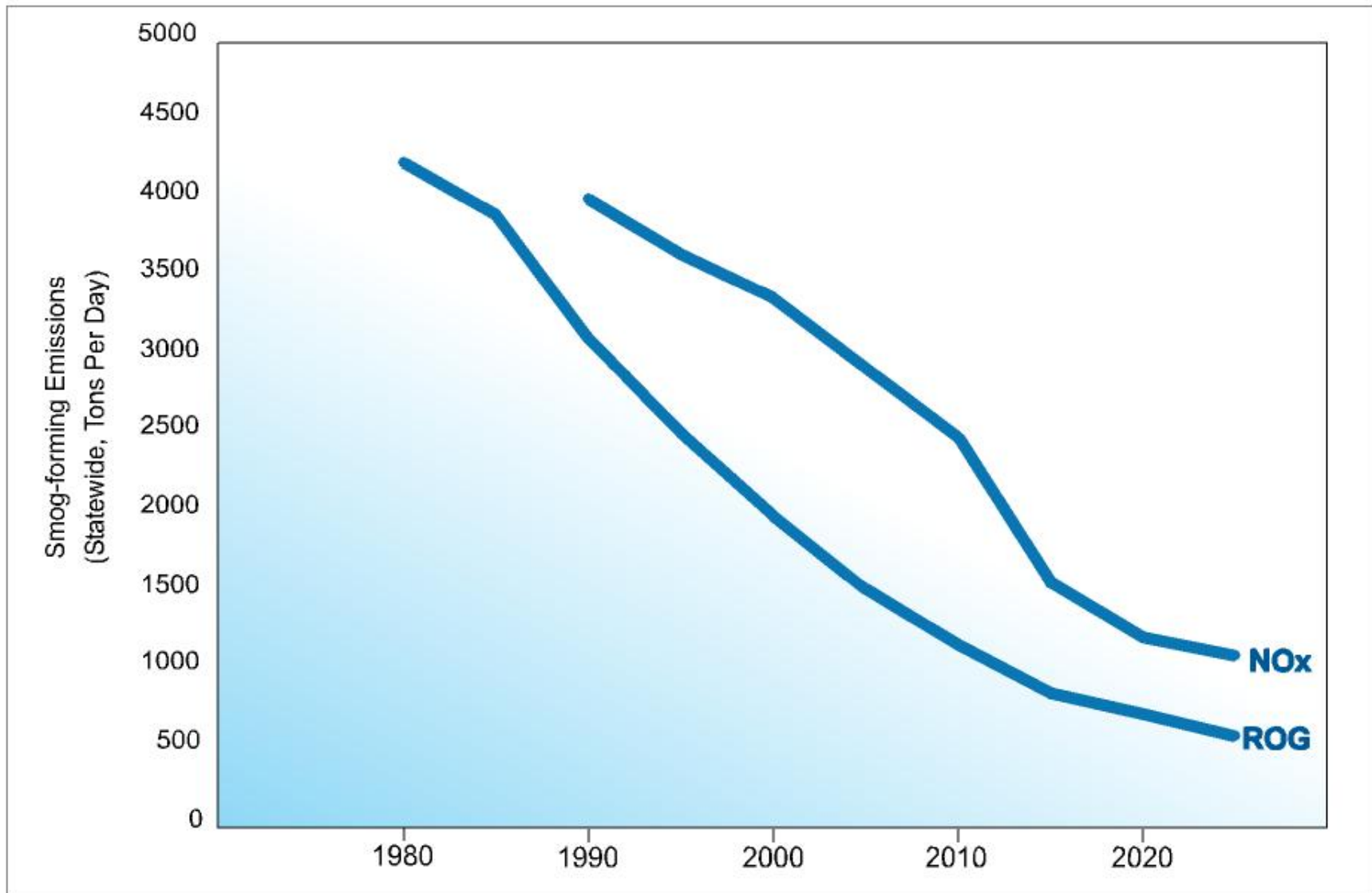
- Pollution sources under State and federal control
- Adopted control measures
- Proposed new measures
- Provides 90% of SIP reductions



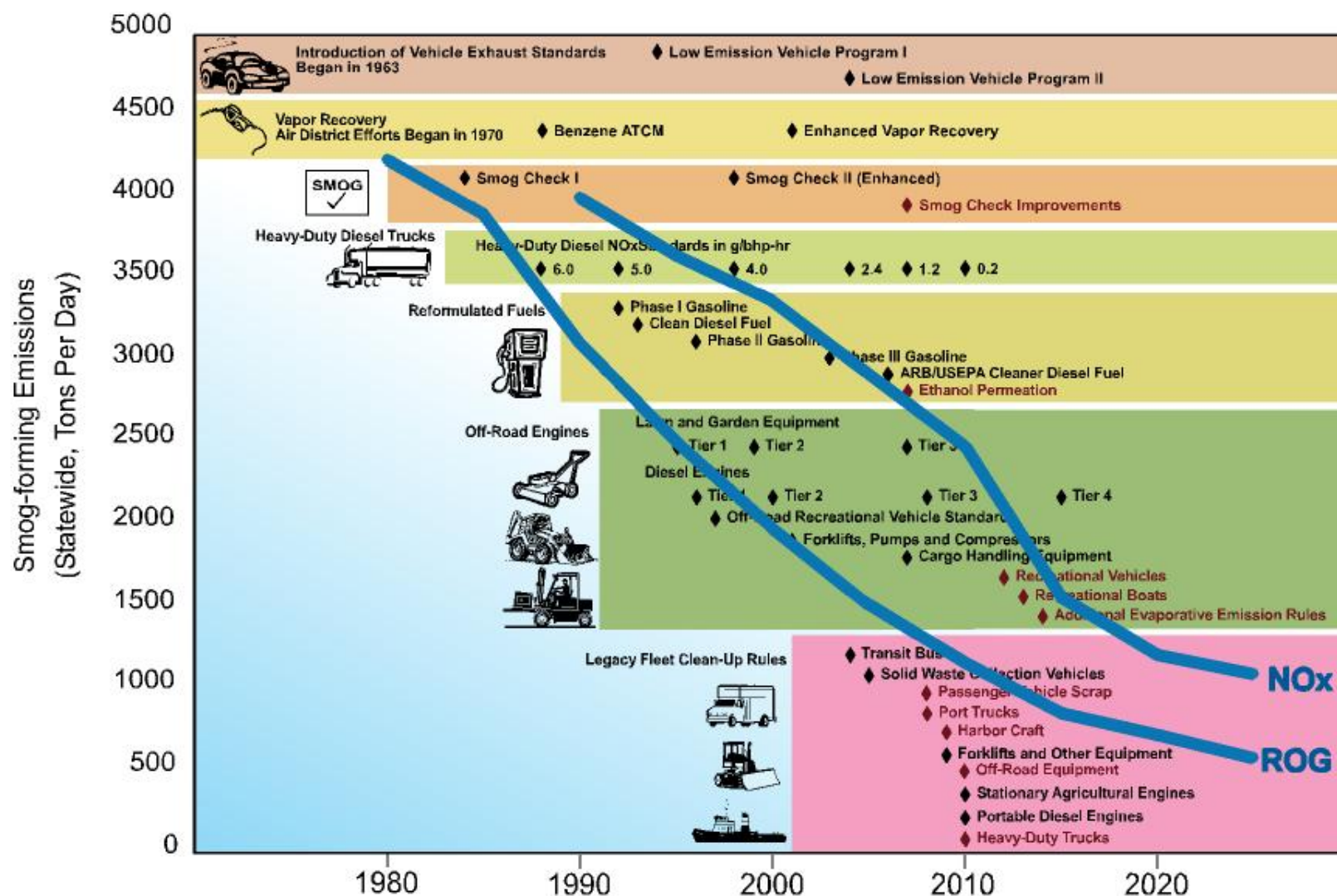
State Strategy Profile

- Comprehensive
 - All major categories of emissions
- Innovative
 - Ground-breaking legacy fleet measures
 - Anticipates tomorrow's technology
- Aggressive
 - Reduces emissions at unparalleled rate

Air Resources Board Increasingly Stringent Emission and Fuel Standards



Air Resources Board Increasingly Stringent Emission and Fuel Standards

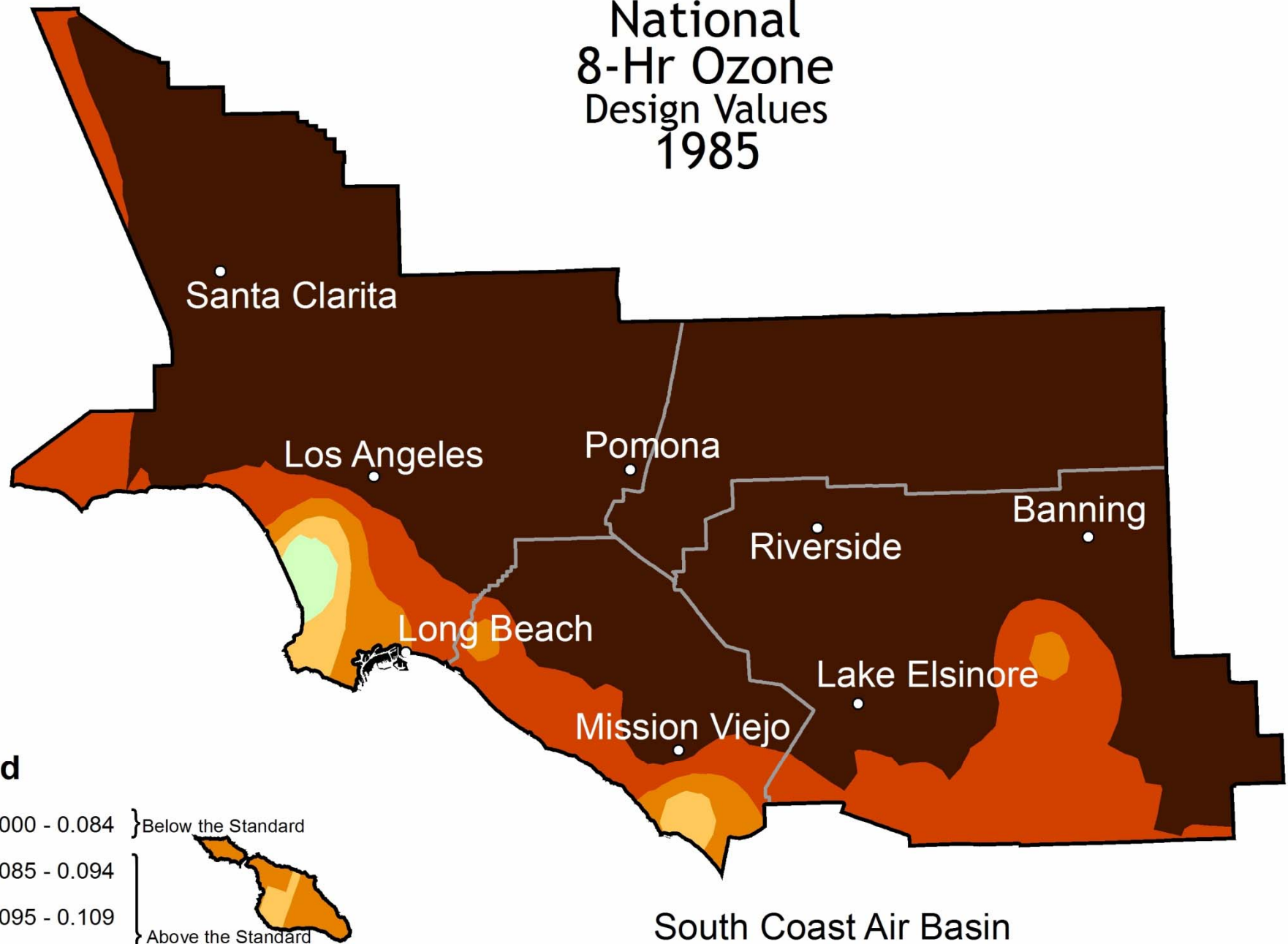


Programs in red are proposed in the 2007 State Strategy
 Diamonds (◆) represent beginning of implementation
 Not all ARB programs are shown

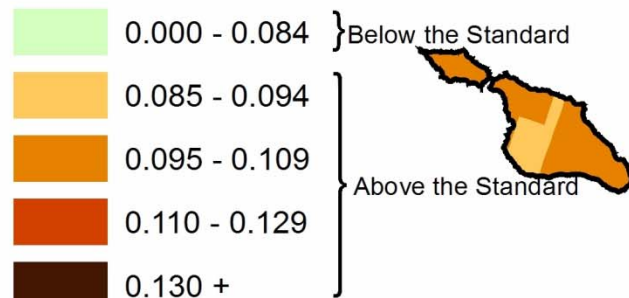


The Results of ARB's Existing Control Program: Improving Air Quality

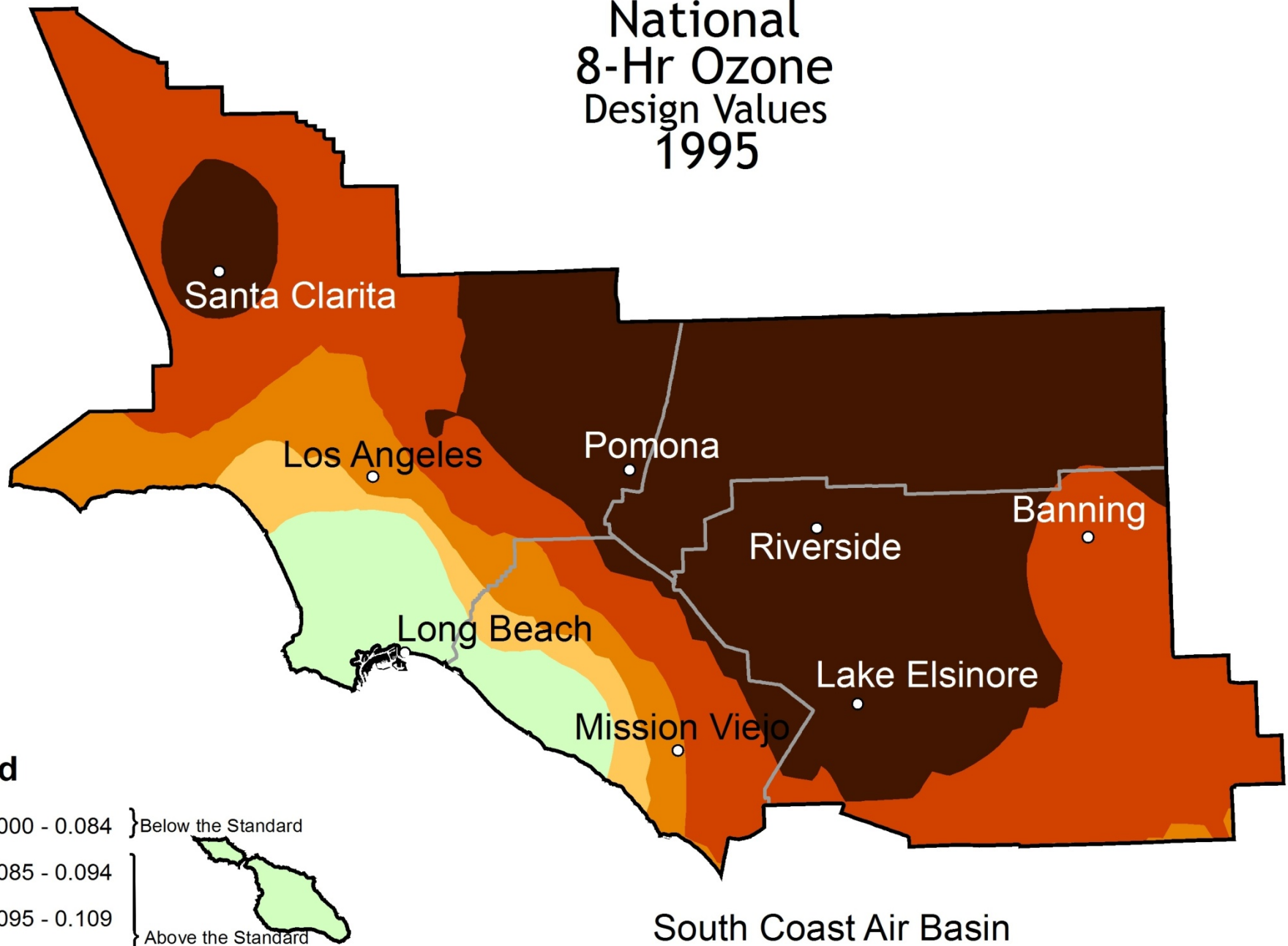
National 8-Hr Ozone Design Values 1985



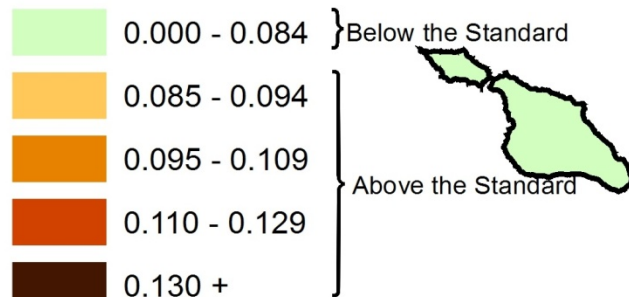
Legend



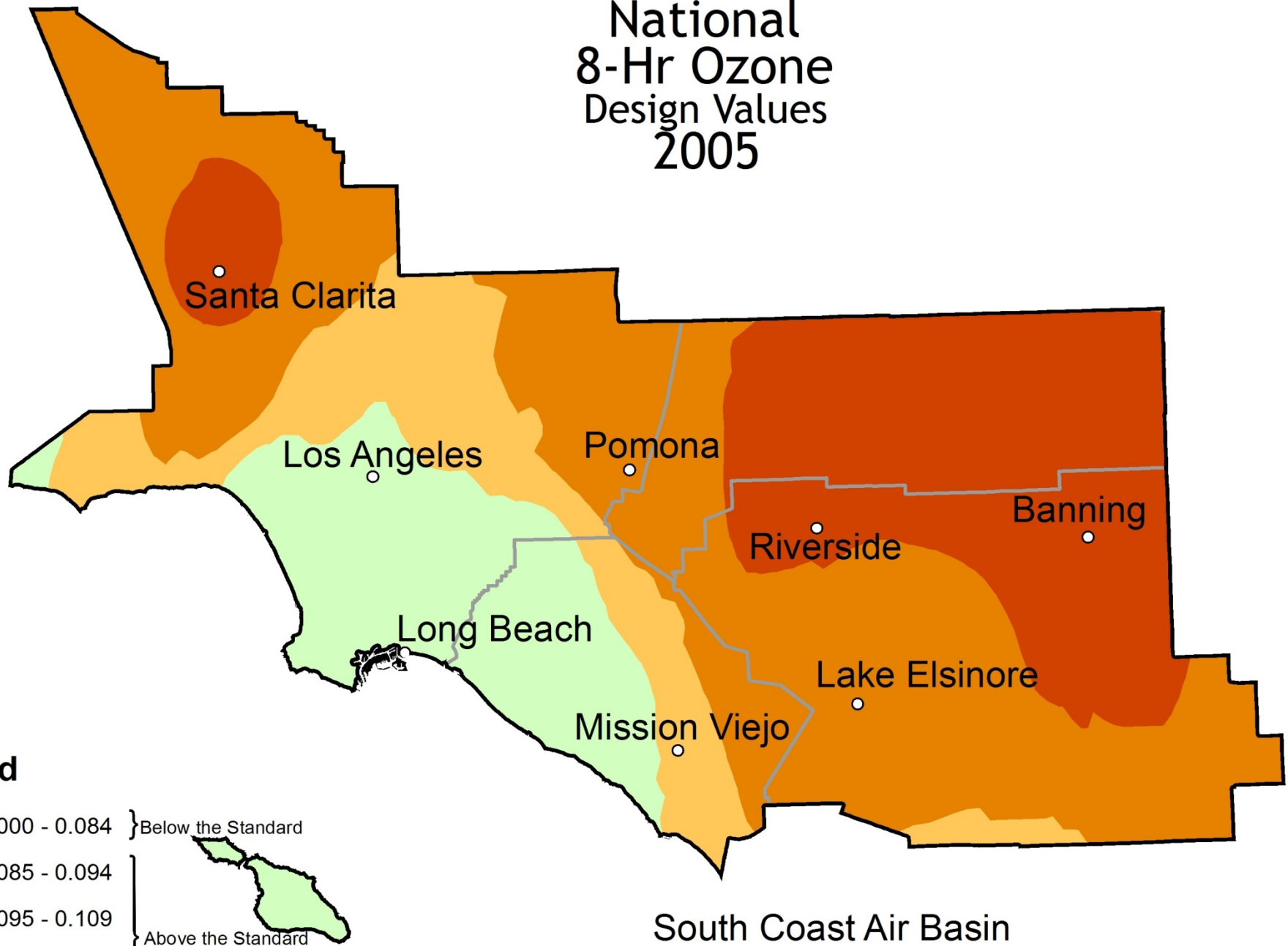
National 8-Hr Ozone Design Values 1995



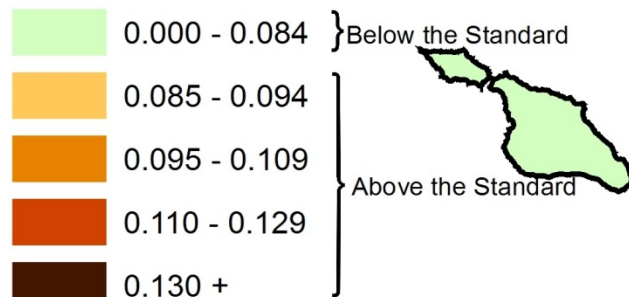
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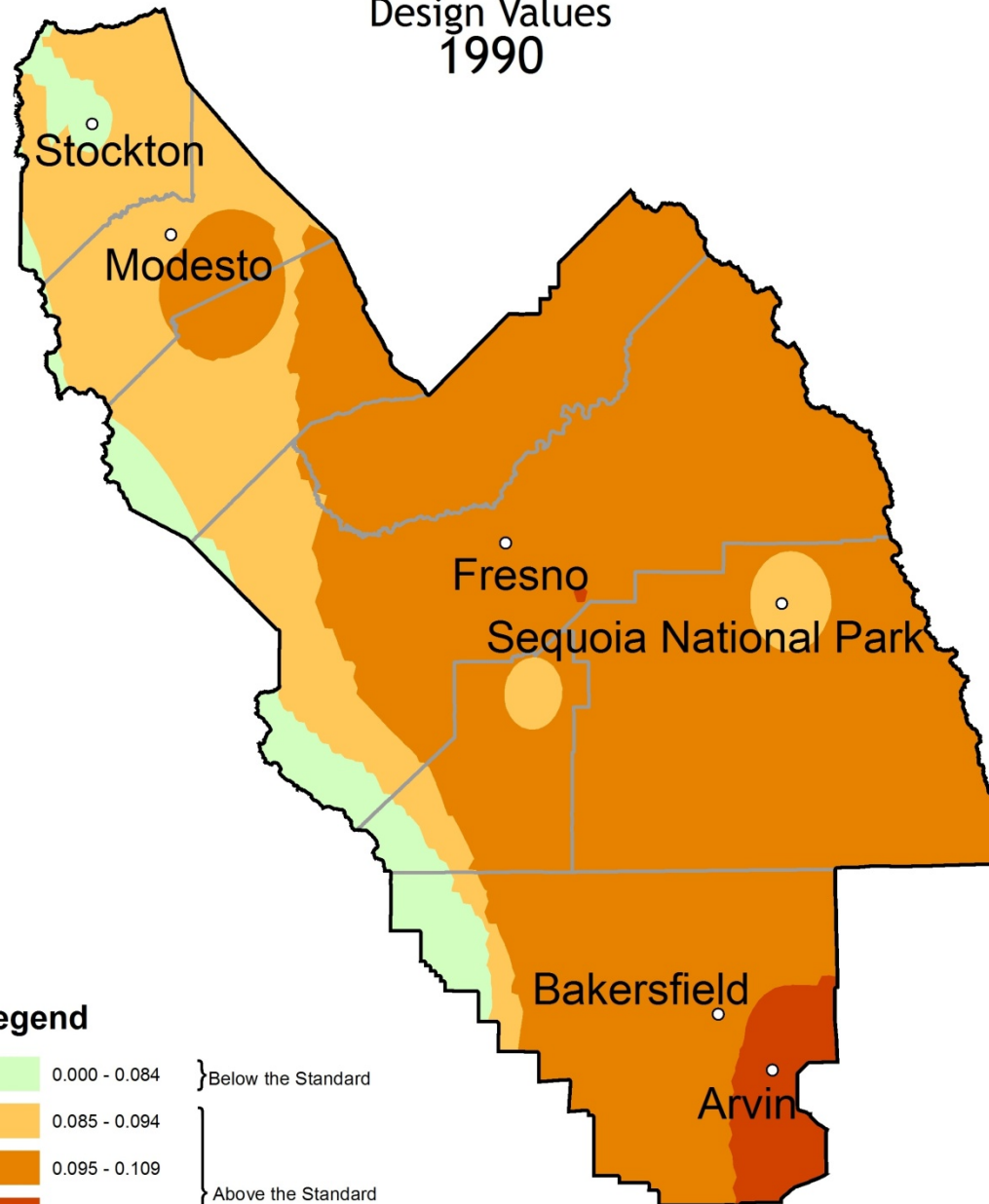
National 8-Hr Ozone Design Values 2005



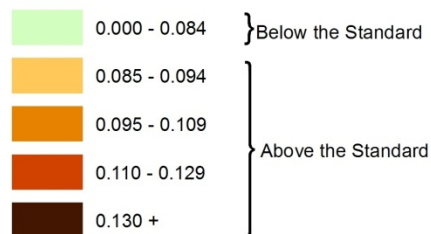
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National 8-Hr Ozone Design Values 1990

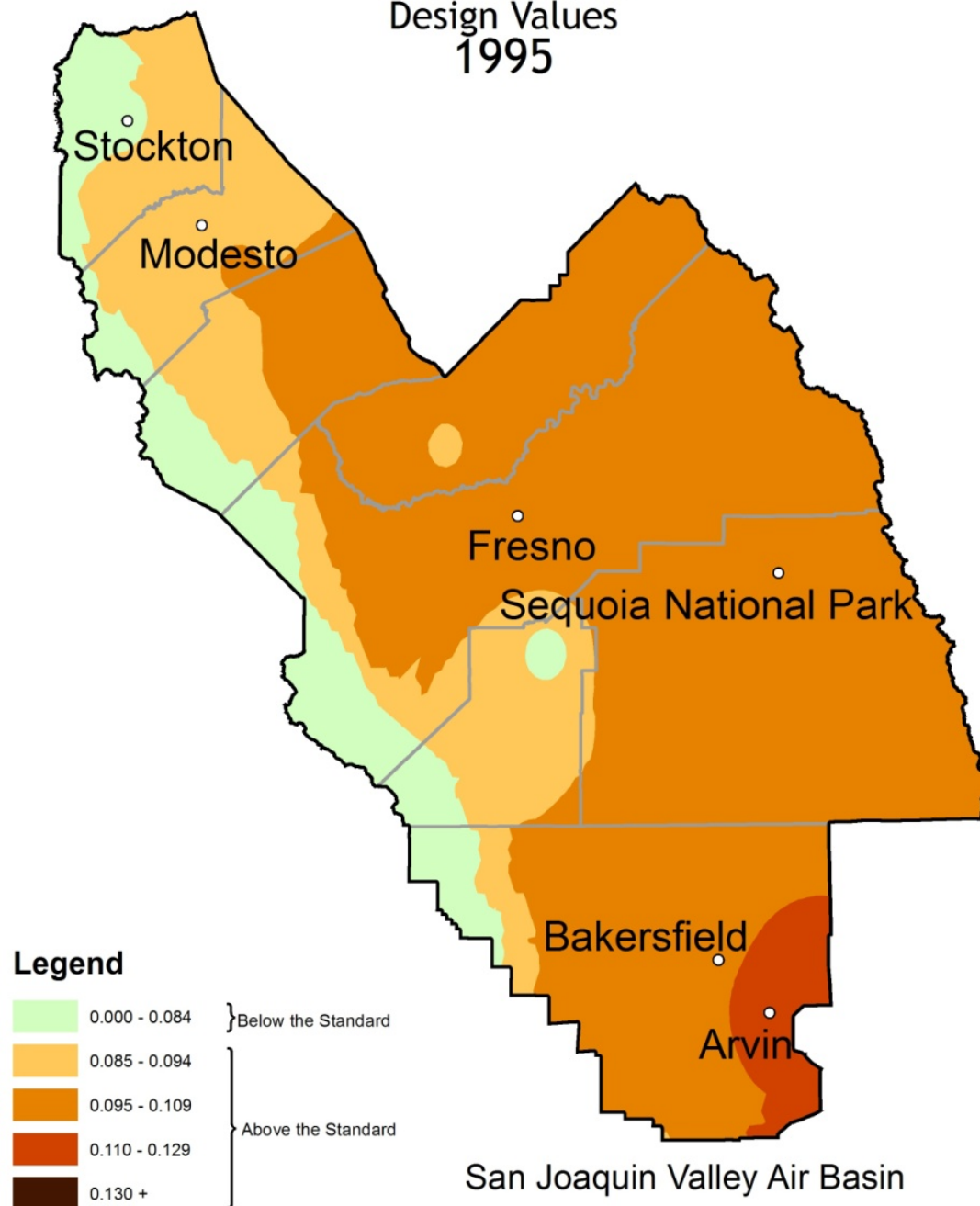


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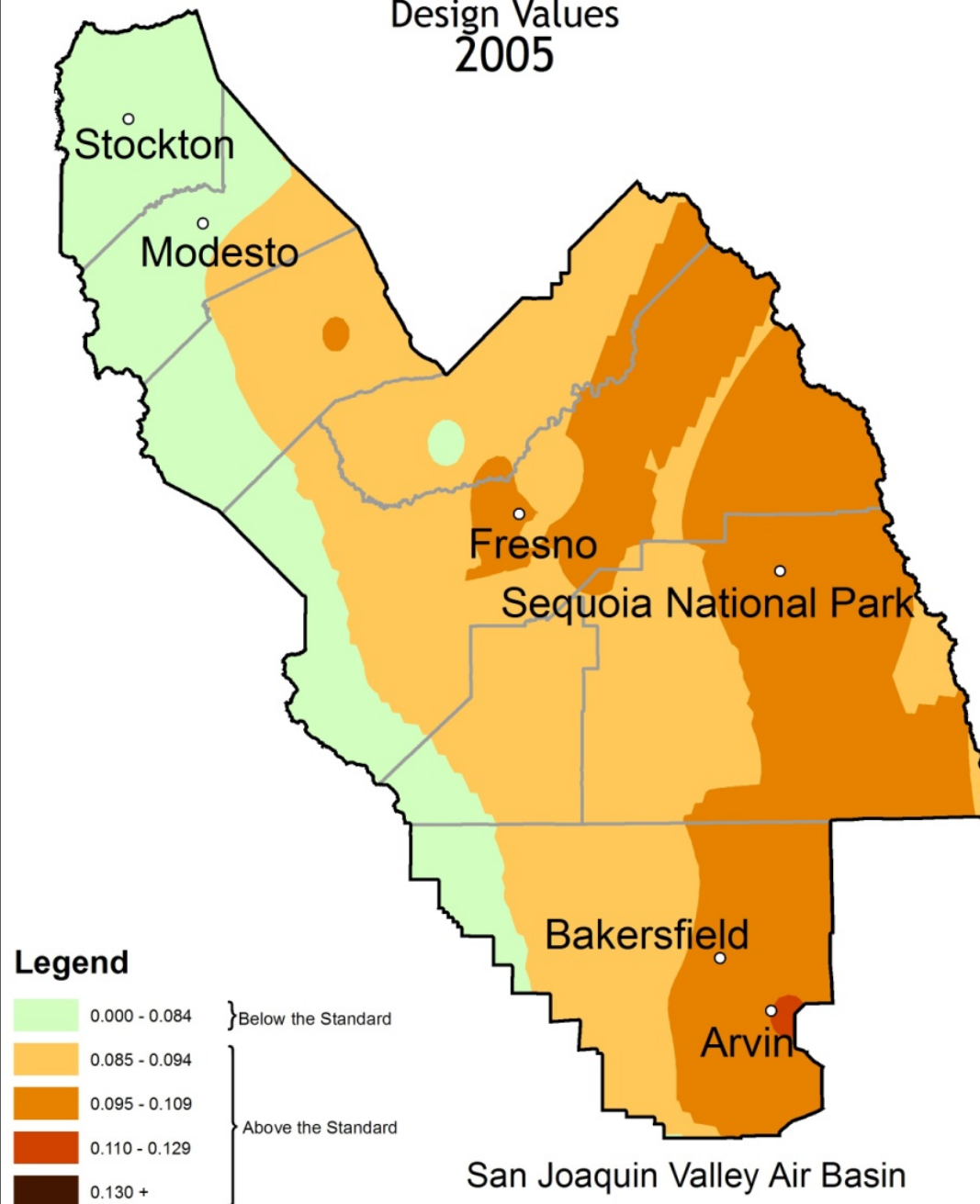


San Joaquin Valley Air Basin

National 8-Hr Ozone Design Values 1995



National 8-Hr Ozone Design Values 2005





Ozone Progress

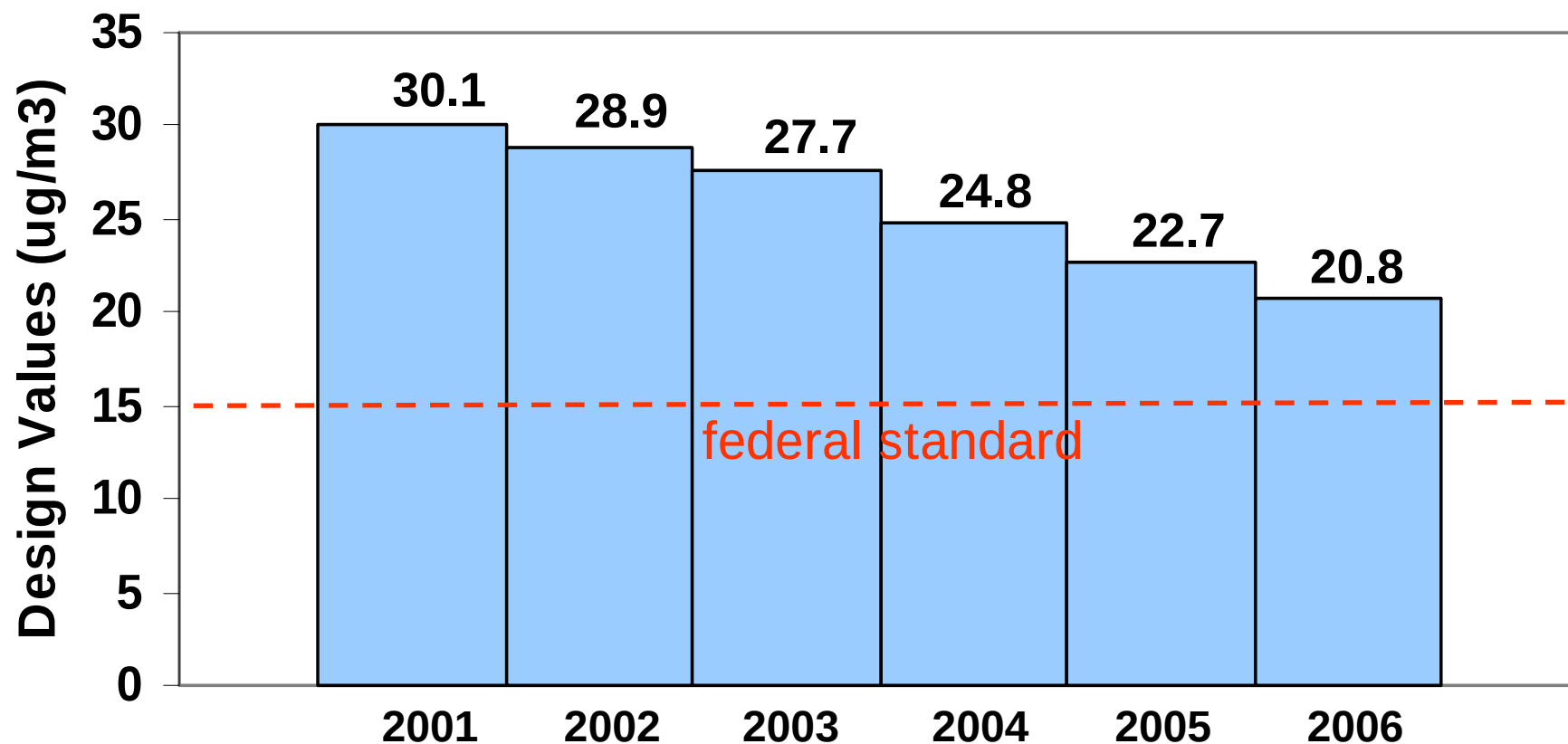
- Decreased population exposure since 1990:
 - 75% in South Coast
 - 50% in San Joaquin Valley
- Decreased days above standard since 1990:
 - 70% in South Coast
 - 60% in San Joaquin Valley
- Large portions of coastal areas now meet the standard
- South Coast inland area emission levels are down almost 50% in last ten years



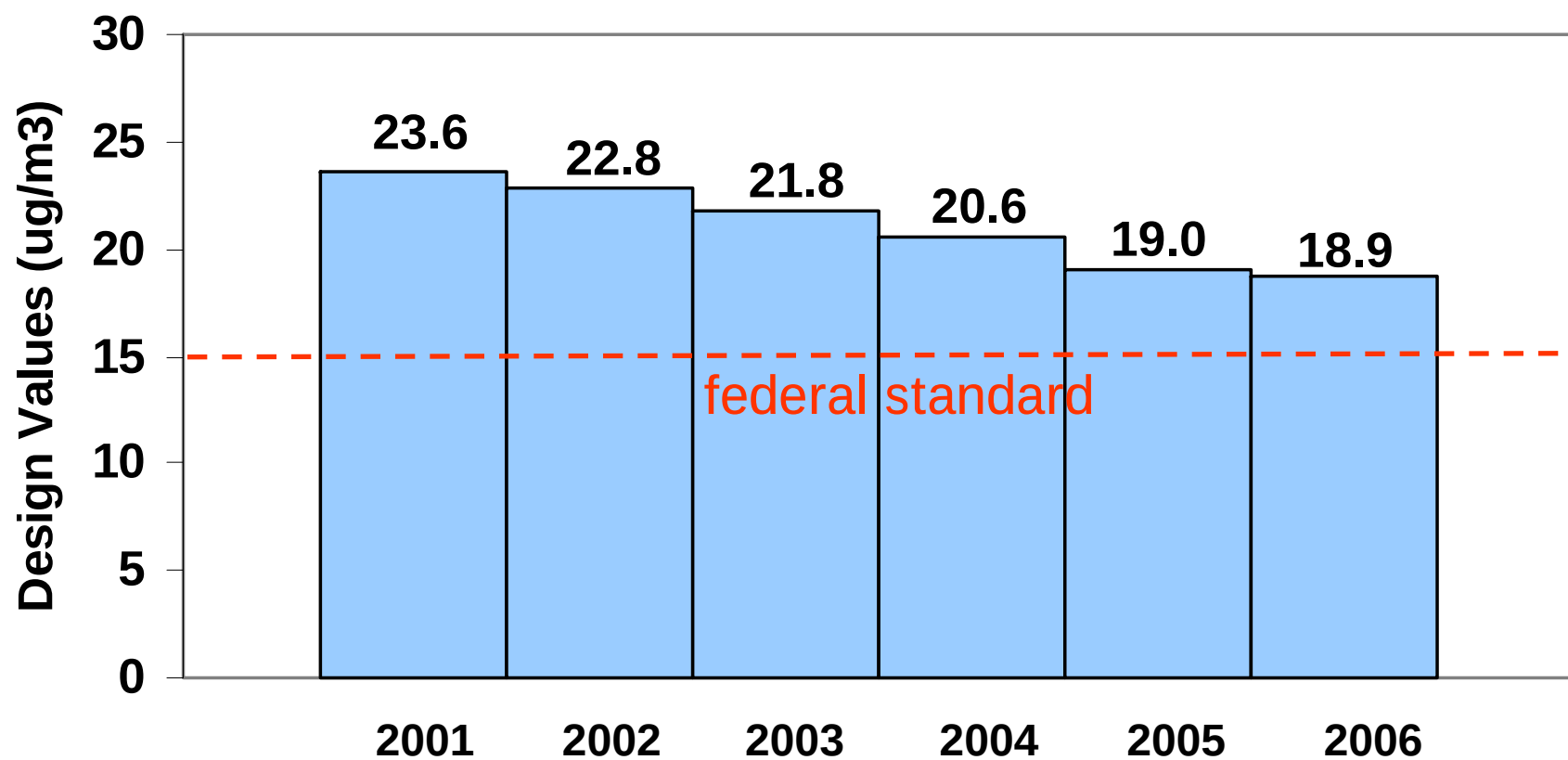
PM2.5 Progress

- Steady decline in annual average levels
- South Coast and San Joaquin Valley meet 24-hour standard as of 2005

South Coast PM2.5 Levels -- Annual Average (Rubidoux - Riverside)



SJV PM2.5 Levels -- Annual Average (Bakersfield)



SIP Requirements

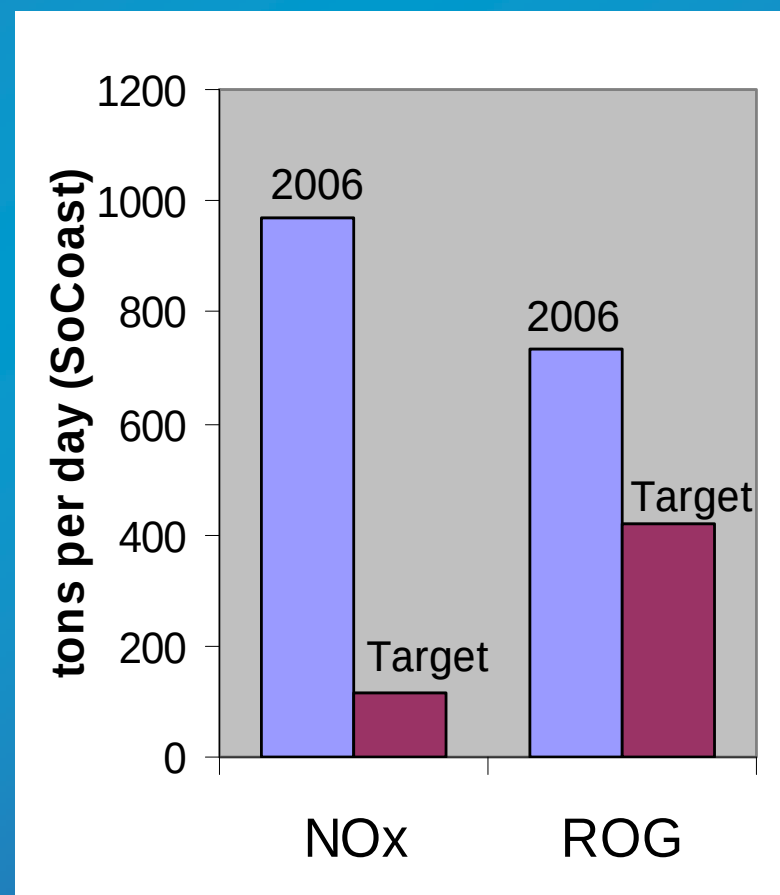


Ozone Framework

- **Standard: 0.08 parts per million for 8 hours**
- **Attainment deadline based on ozone severity**
 - **Marginal to Extreme**
 - **2007-2024**
 - **Working deadline is 1 year early**

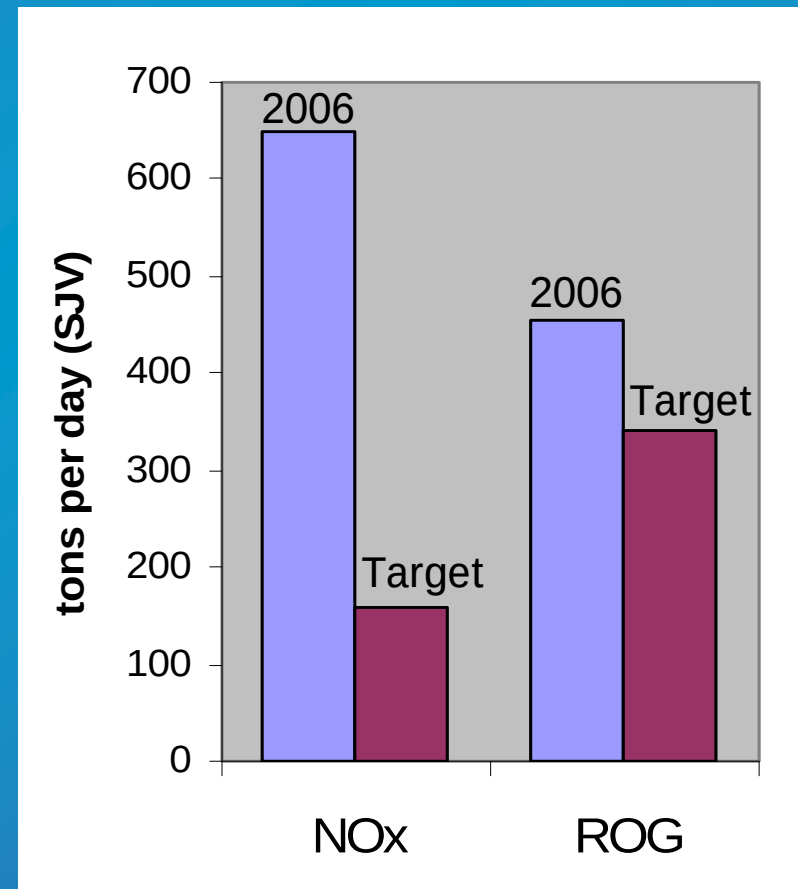
Defining the Ozone Problem (South Coast)

- **South Coast reduction target:**
 - **88 % NO_x**
 - **43 % ROG**
- **South Coast must attain by 2023**



Defining the Ozone Problem (San Joaquin Valley)

- San Joaquin reduction target:
 - 75% NO_x
 - 25% ROG
- San Joaquin must attain by 2023





Defining the PM_{2.5} Problem

- Standard: 15 ug/m³ annual average
- Attainment date 2014
- Need NO_x, ROG, SO_x, direct PM_{2.5}
- South Coast: 40% over standard
- San Joaquin: 25% over standard



SIP Development Process

- Districts adopt local elements
- ARB adopts State Strategy
- Ozone SIPs in 2007
- PM2.5 SIPS due April '08
 - So. Coast doing joint ozone/PM2.5 plan
 - San Joaquin PM2.5 SIP next year



Proposed State Strategy



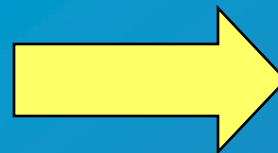
State Strategy NOx Emphasis

- NOx is common to both ozone and particulate pollution
- NOx reductions critical to help reach both ozone and PM2.5 standards
- Most NOx is from mobile sources
- ARB fleet rules essential

Comprehensive

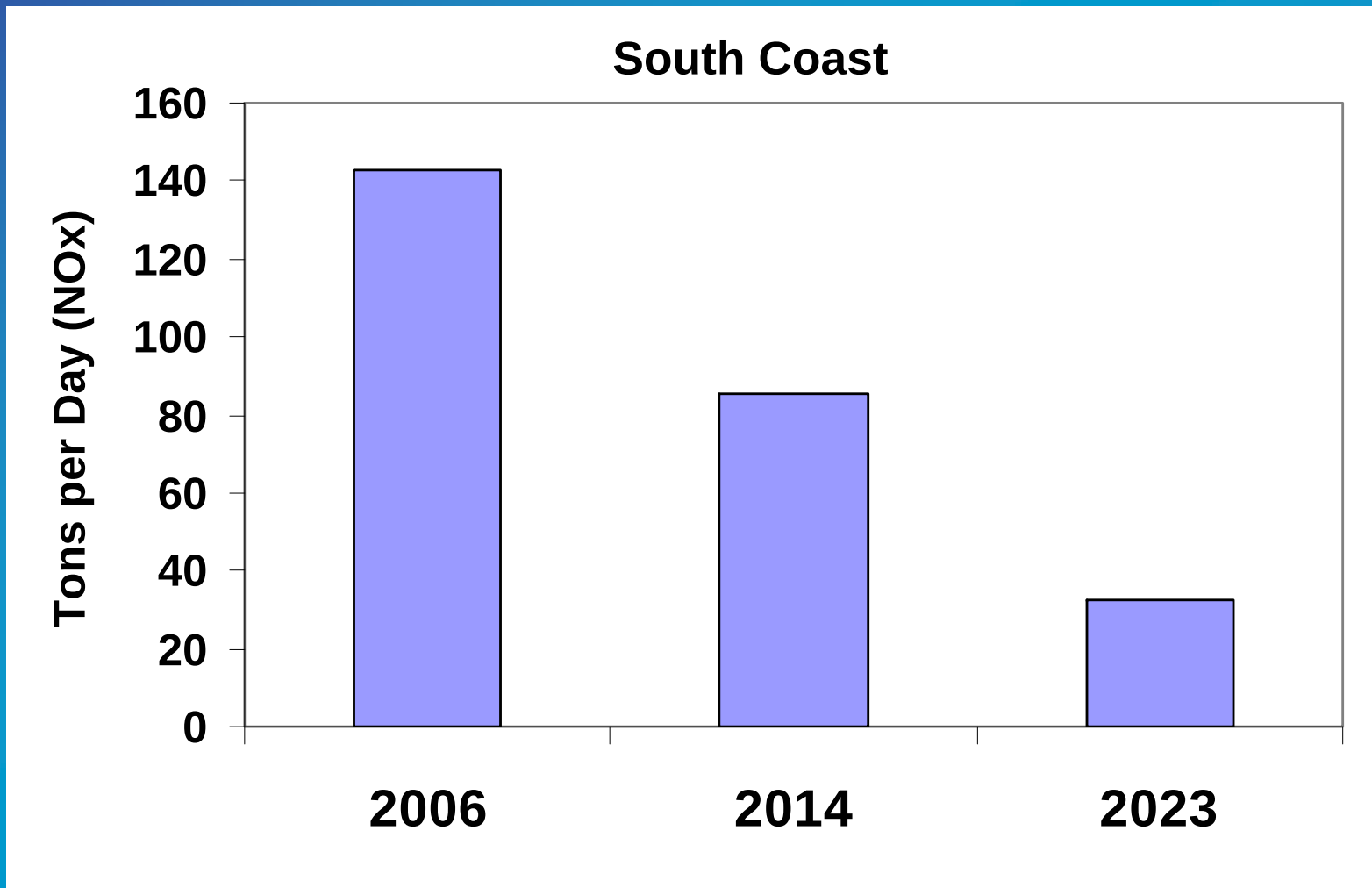
Proposed State Strategy categories:

- Construction Fleet
- Heavy-Duty Trucks
- Passenger Vehicles
- Ships
- Locomotives
- Evaporative and exhaust standards and consumer products



**90 % of
South Coast
NOx
Emissions**

Proposed State Strategy Impact on Construction Equipment





Construction Fleet Strategy

- Adopted emission standards becoming increasingly more stringent
- Cleanest standards not until 2013-15

Proposed new measures:

- Fleet average; retrofit and turnover
- Maximizes early diesel PM benefits
- Maximizes NOx reductions over time



Construction Fleet Rulemaking

- Board will consider in July
- Impacts fleets from largest to owner-operator
- Staff worked to maximize PM and NOx reductions



Construction Fleet Measure: NOx Emission Reductions

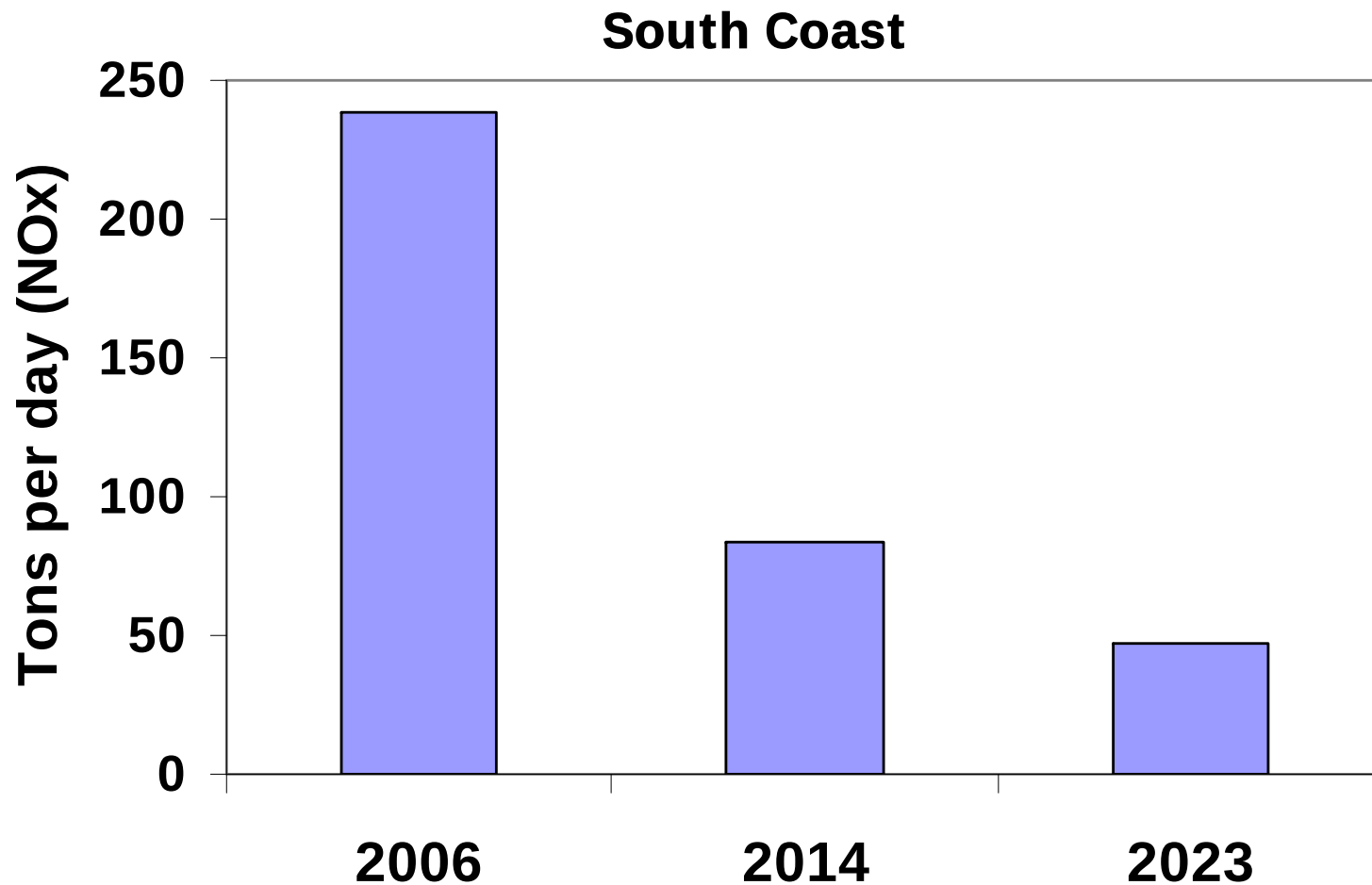
	2014	2023
Adopted Measures	47 tpd	97 tpd
Proposed New Measure	10.5 tpd	14 tpd
Total % Reductions	40 %	77 %

Reductions are for South Coast NOx emissions.

Adopted measure reductions and total % reductions are from 2006 baseline.

Proposed new measure reductions are from 2014 and 2023 baselines.

Proposed State Strategy Impact on Heavy-Duty Trucks



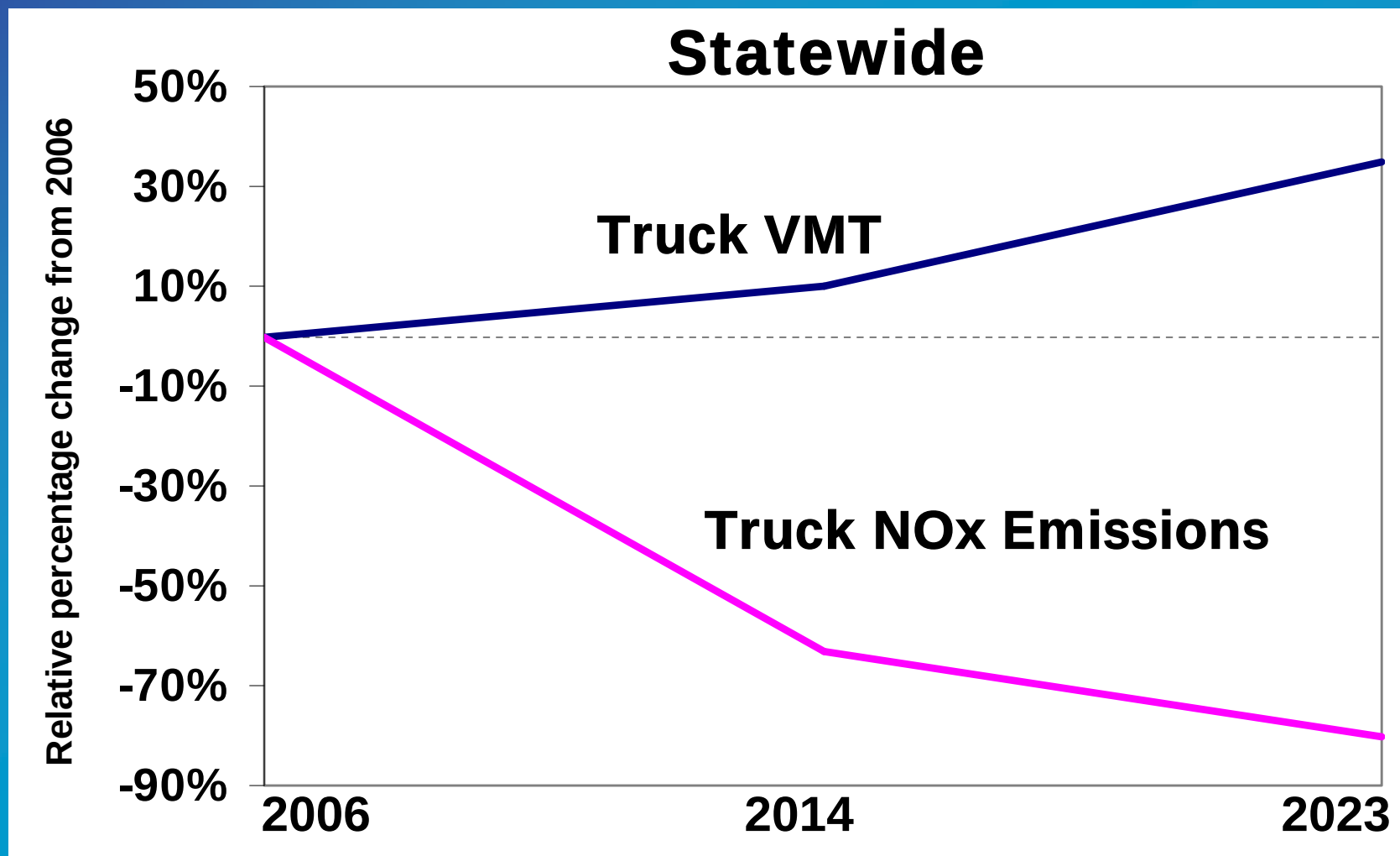
Private Truck Fleet Strategy

- Truck emission standards tightened steadily over last 20 years

Proposed new measures:

- Fleet average
 - designed around 2010 cleanest standard
 - retrofit and turnover
- Need to maximize PM and ozone benefits
- 2008 Board hearing
- Port truck rule – 2008

Overcoming Truck Travel Growth





Heavy-Duty Truck Strategy: NOx Emission Reductions

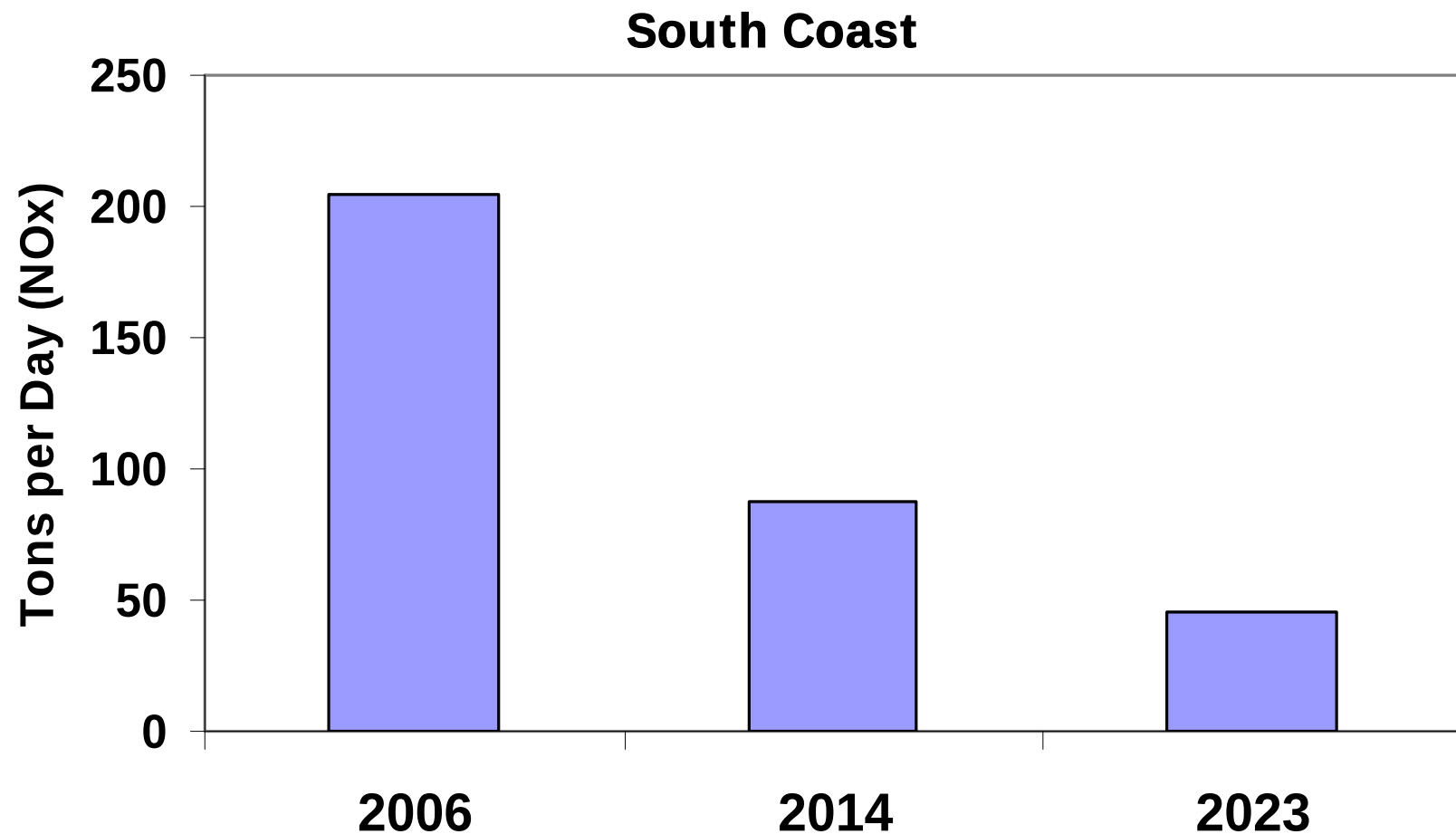
	2014	2023
Adopted Measures	107 tpd	173 tpd
Proposed New Measure	47 tpd	18 tpd
Total % Reductions	63 %	80 %

Reductions are for South Coast NOx emissions.

Adopted measure reductions and total % reductions are from 2006 baseline.

Proposed new measure reductions are from 2014 and 2023 baselines.

Proposed State Strategy Impact on Passenger Vehicles





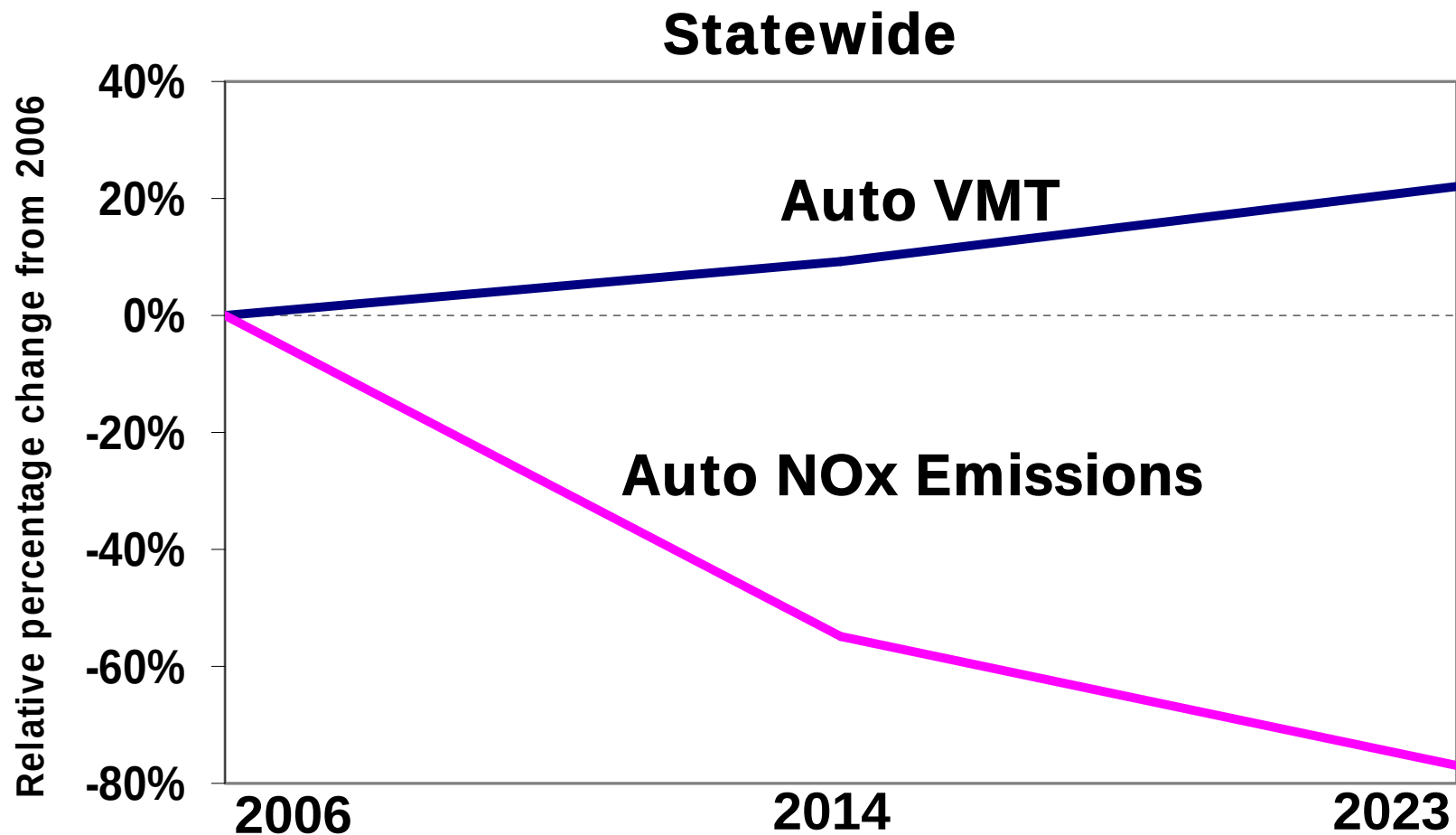
Passenger Vehicle Strategy

- New cars are 99% cleaner

Proposed new measures:

- Smog check improvements and enhancements
 - Annual testing: older & high-mileage vehicles
 - More stringent pass/fail cutpoints
 - Add small diesels and motorcycles
 - Evaporative emissions and visible smoke testing
 - Proposal for increased vehicle scrapping

Overcoming Auto Travel Growth



Passenger Vehicle Strategy: NOx Emission Reductions

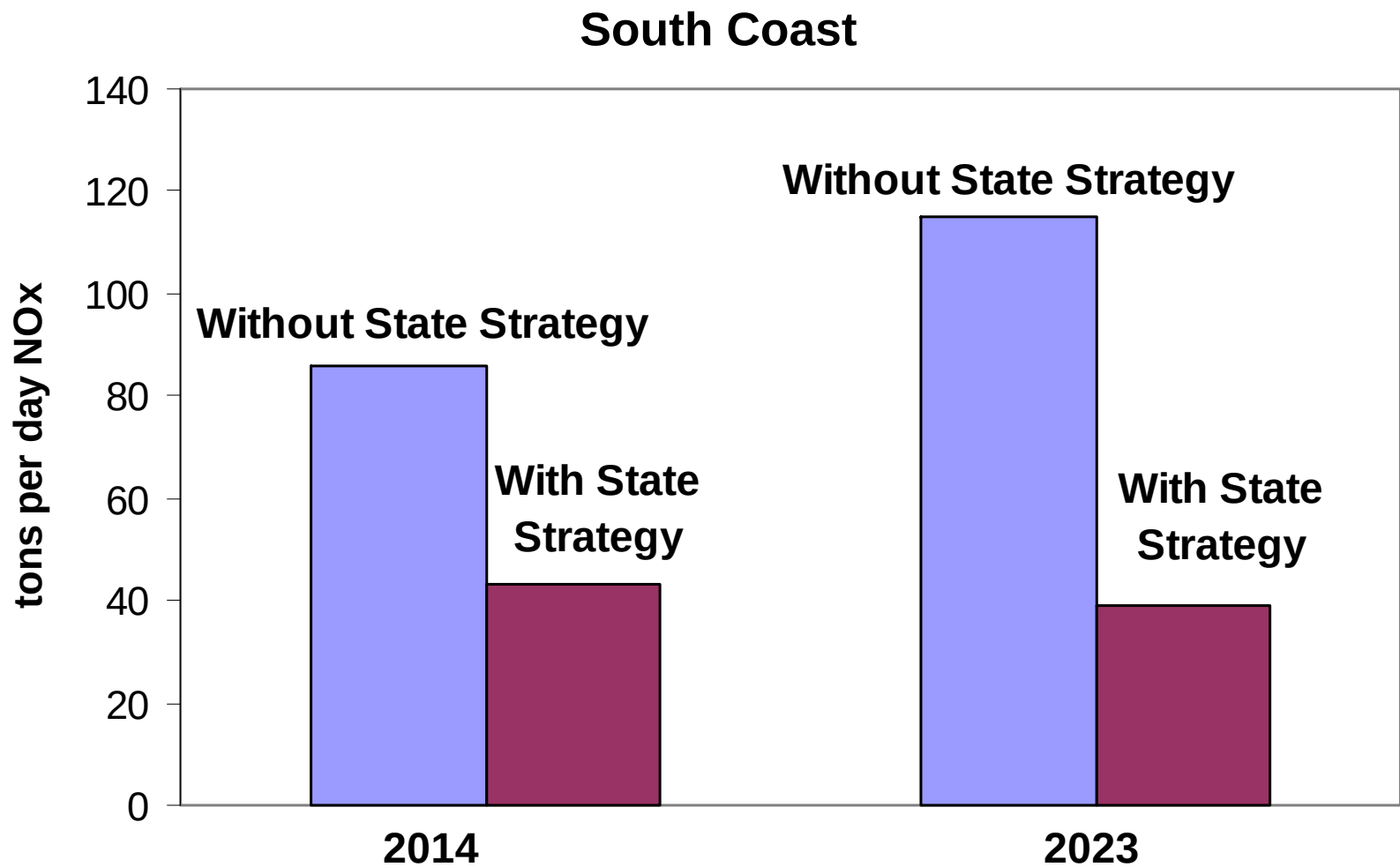
	2014	2023
Adopted Measures	103 tpd	151 tpd
Proposed New Measures	14 tpd	7 tpd
Total % Reductions	57 %	77 %

Reductions are for South Coast NOx emissions.

Adopted measure reductions and total % reductions are from 2006 baseline.

Proposed new measure reductions are from 2014 and 2023 baselines.

Proposed State Strategy Impact on Ships & Harbor Craft





Ship Strategy

- ARB Goods Movement Plan set goals
- Rulemakings underway

Proposed new measures:

- Reductions from main ship engines and auxiliary engines
- Cleaner fuels, cleaner engines, electrification, speed reduction
- Need local, State, federal, and international action



Harbor Craft Strategy

- Harbor craft engine standards (began '04)

Proposed new measure:

- Repowers and retrofits
- Consider diverse fleets
- Rulemaking to Board later this year

Ship and Harbor Craft Strategy: NOx Emission Reductions

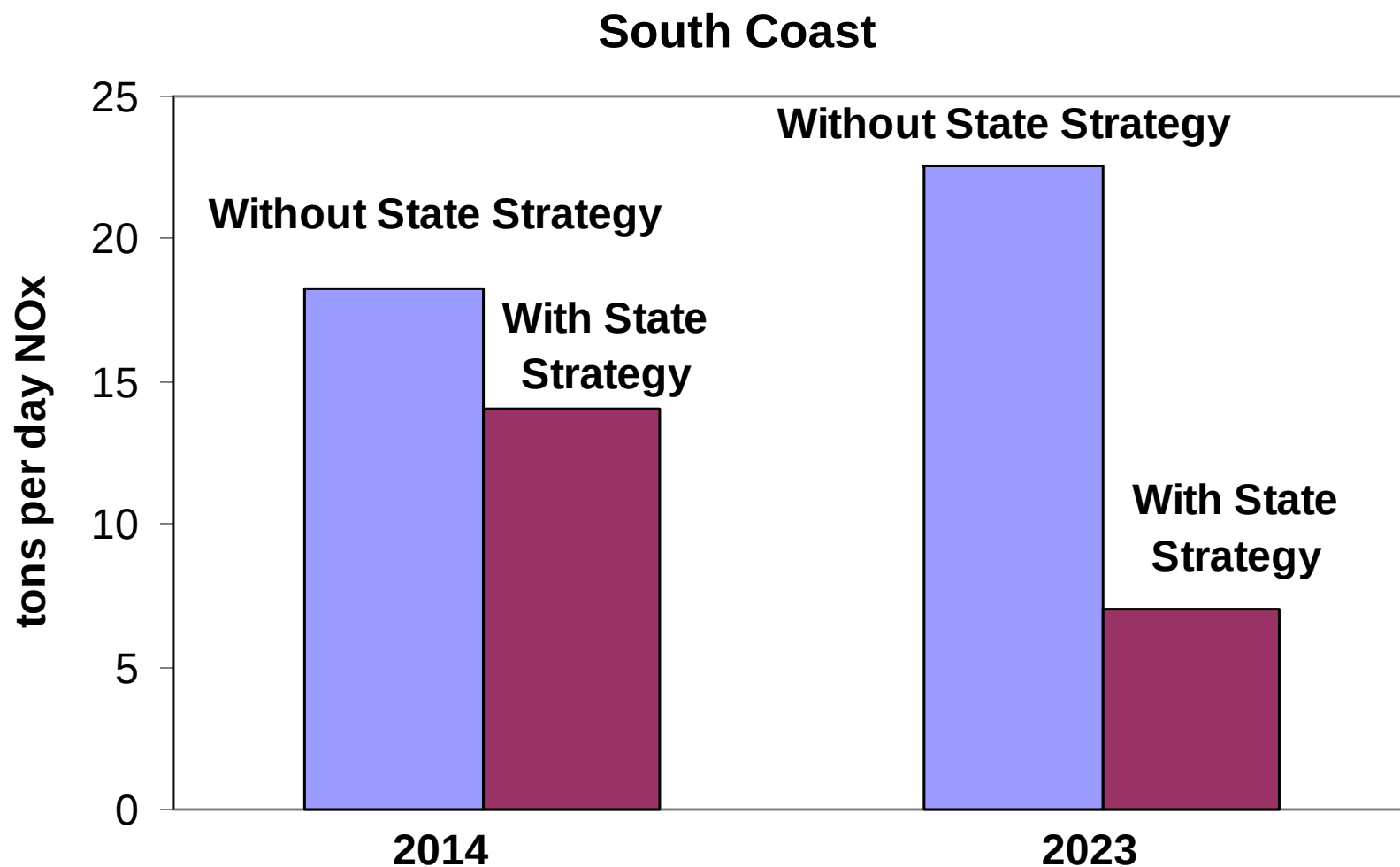
	2014	2023
Proposed New Measures	43 tpd	76 tpd
Total % Reductions	50 %	66 %

Reductions are for South Coast NOx emissions.

Proposed new measure reductions are from 2014 and 2023 baselines.

Total % reductions are from 2006 baseline.

Proposed State Strategy Impact on Locomotives





Locomotive Strategy

- ARB recommended U.S. EPA set 2012 implementation for NOx standard; U.S. EPA has proposed 2017
- Pursue agreement with railroads to accelerate fleet turnover



Locomotive Strategy: NOx Emission Reductions

	2014	2023
Proposed New Measures	4 tpd	16 tpd
Total % Reductions	24 %	69 %

Reductions are for South Coast NOx emissions.
Proposed new measure reductions are from 2014 and 2023 baselines.
Total % reductions are from 2006 baseline.



New Proposal for NOx Reductions Needed for South Coast PM2.5 Attainment

- Staff proposes 14 tpd more NOx reductions in South Coast in 2014
- Modification included in today's proposal
- Staff will pursue additional emission reductions during rule development for each measure

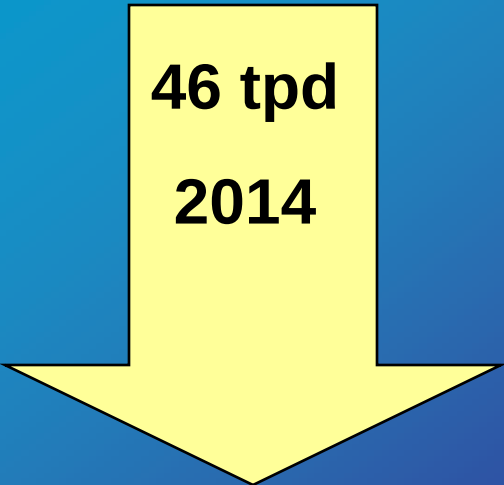


ROG Strategies

- Recreational boats
- Off-road recreational vehicles
- Additional evaporative standards
- Consumer products

ROG Strategies (cont.)

- Reformulated gasoline program
- Passenger vehicles strategies
- 46 tons per day ROG reductions in 2014 from new measures (South Coast)



**46 tpd
2014**



Diesel PM Reductions

	2014	2023
Heavy-Duty Trucks	82 %	85 %
Ships & Harbor Craft	80 %	94 %
Locomotives	35 %	77 %

Reductions are for South Coast diesel PM emissions from 2006



Reducing SOx

	2014	2023
Ships	95 %	95 %

Reductions are for South Coast SOx emissions from 2006



Benefit of the Proposed Strategy



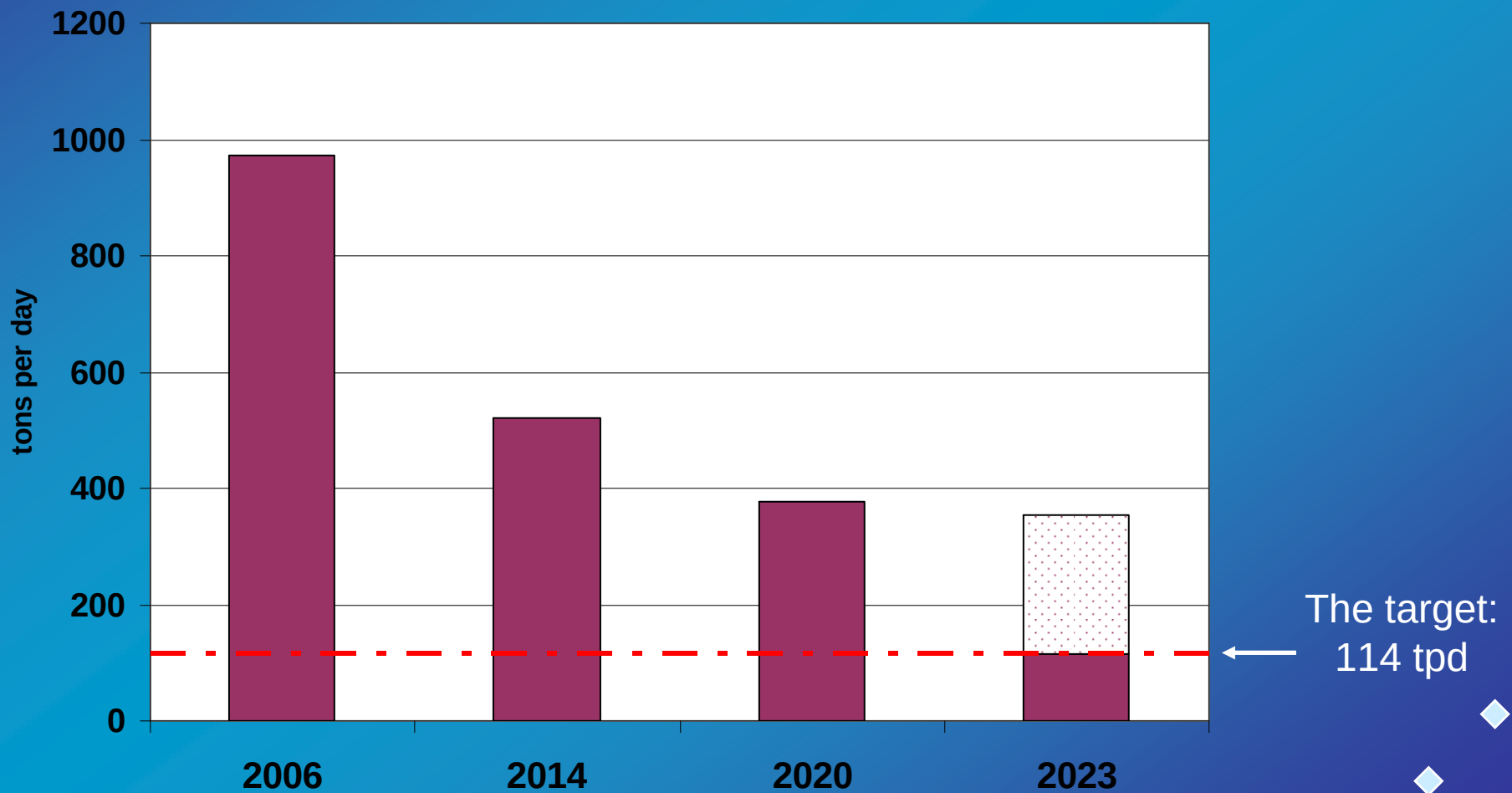
Rapid Progress

**The proposed State Strategy
will reduce NOx emissions
50 % by 2014**

State Strategy Reductions South Coast

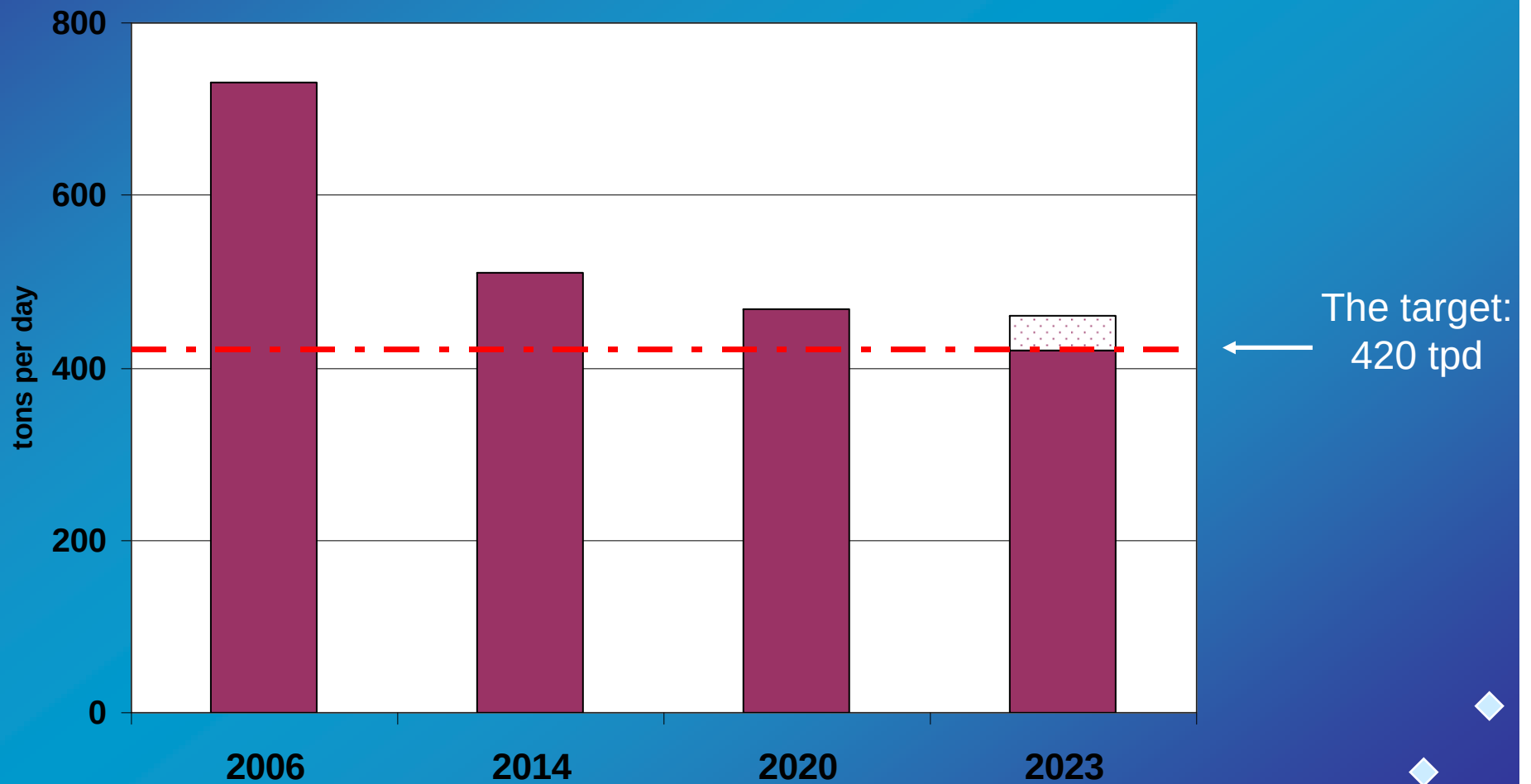
	2014		2023	
	NOx	ROG	NOx	ROG
Reductions from Adopted State Measures	306	164	448	211
Reductions from Proposed New State Measures	136	46	141	54
Total Emission Reductions from State Strategy	442	210	589	265

South Coast NOx Emissions with State Strategy



The target:
114 tpd

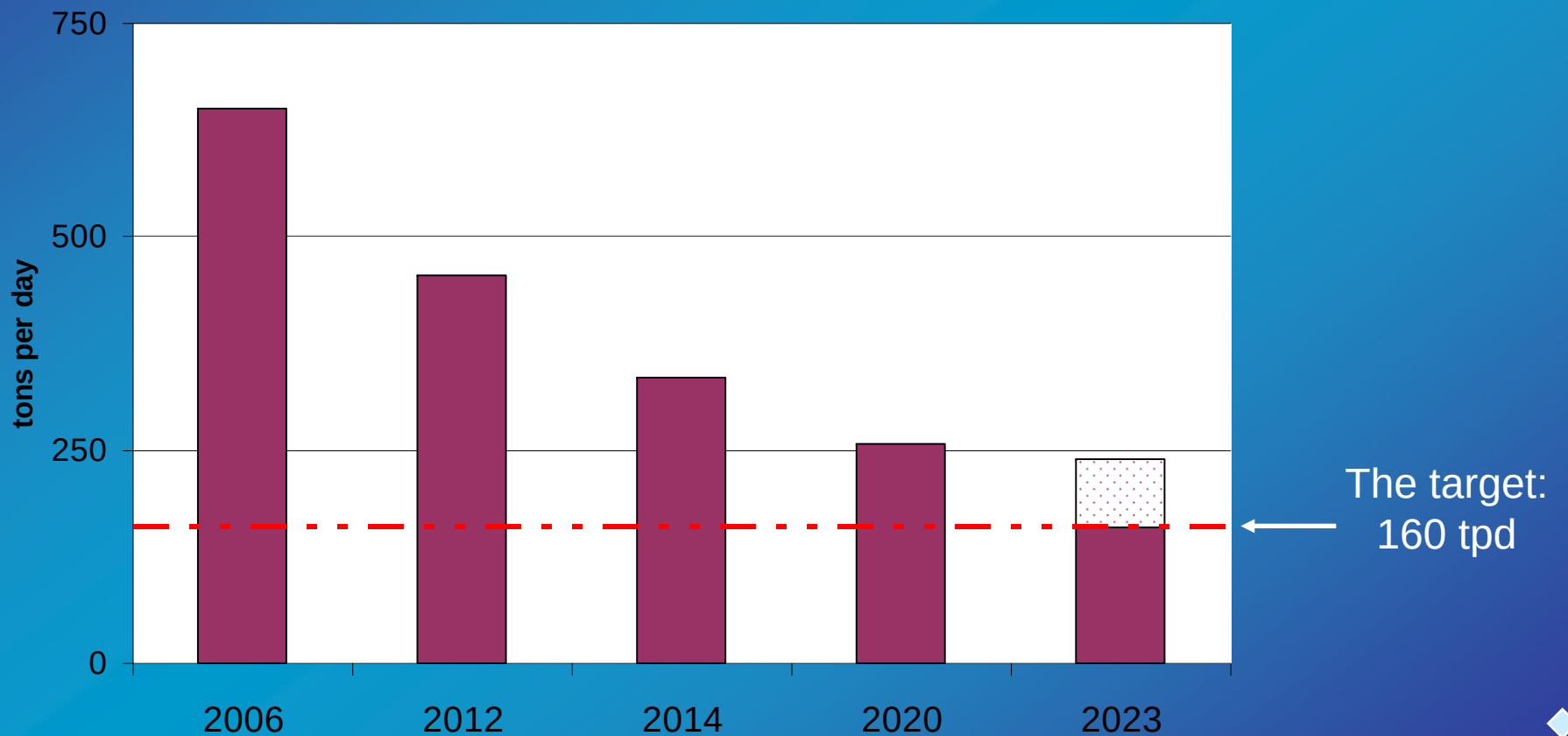
South Coast ROG Emissions with State Strategy



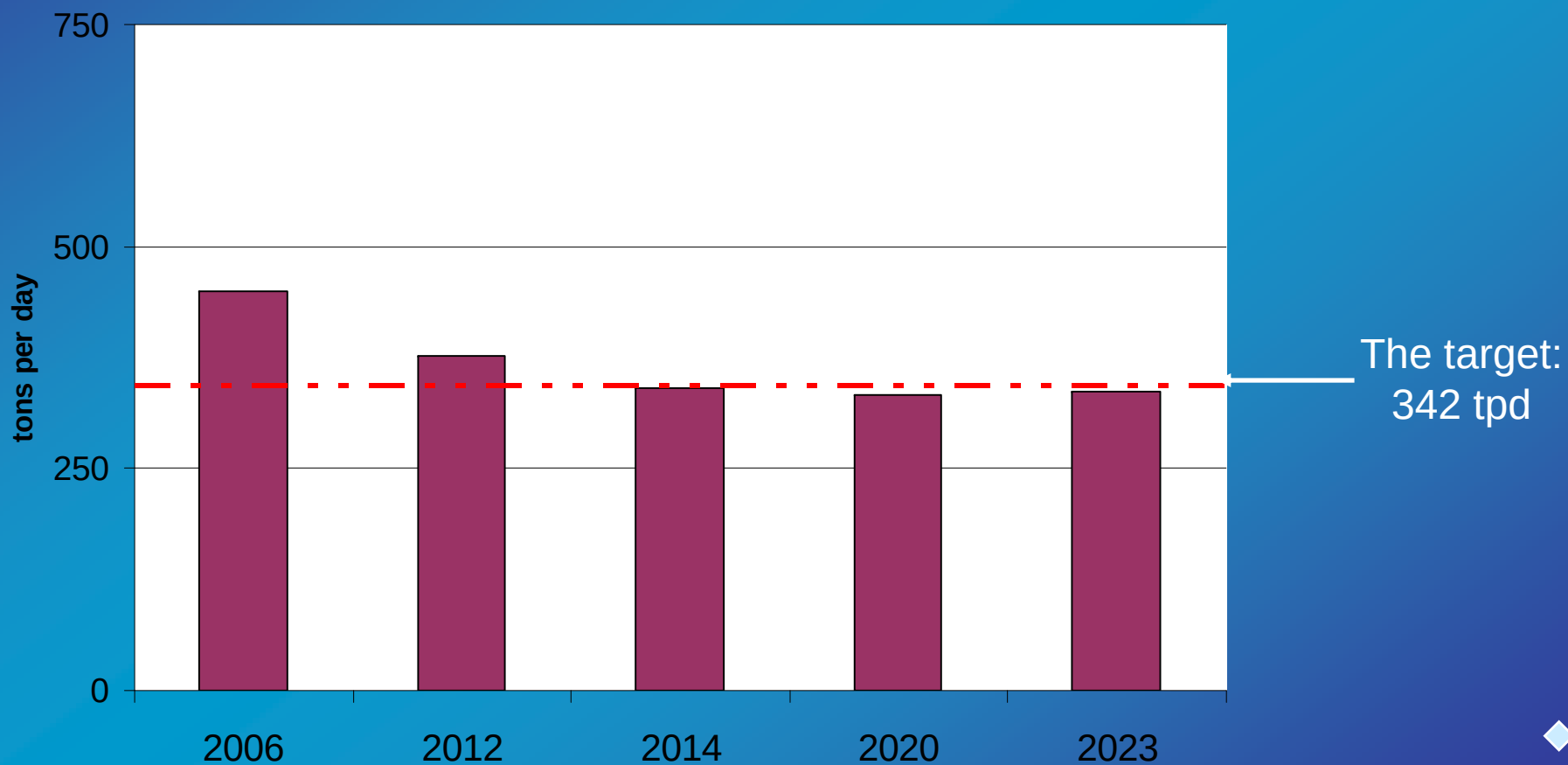
State Strategy Reductions San Joaquin Valley

	2014		2023	
	NOx	ROG	NOx	ROG
Reductions from Adopted State Measures	211	49	355	43
Reductions from Proposed New State Measures	76	23	46	25
Total Emission Reductions from State Strategy	287	72	401	68

SJV NOx Emissions with State Strategy



SJV ROG Emissions with State Strategy





Need for New Technology Development

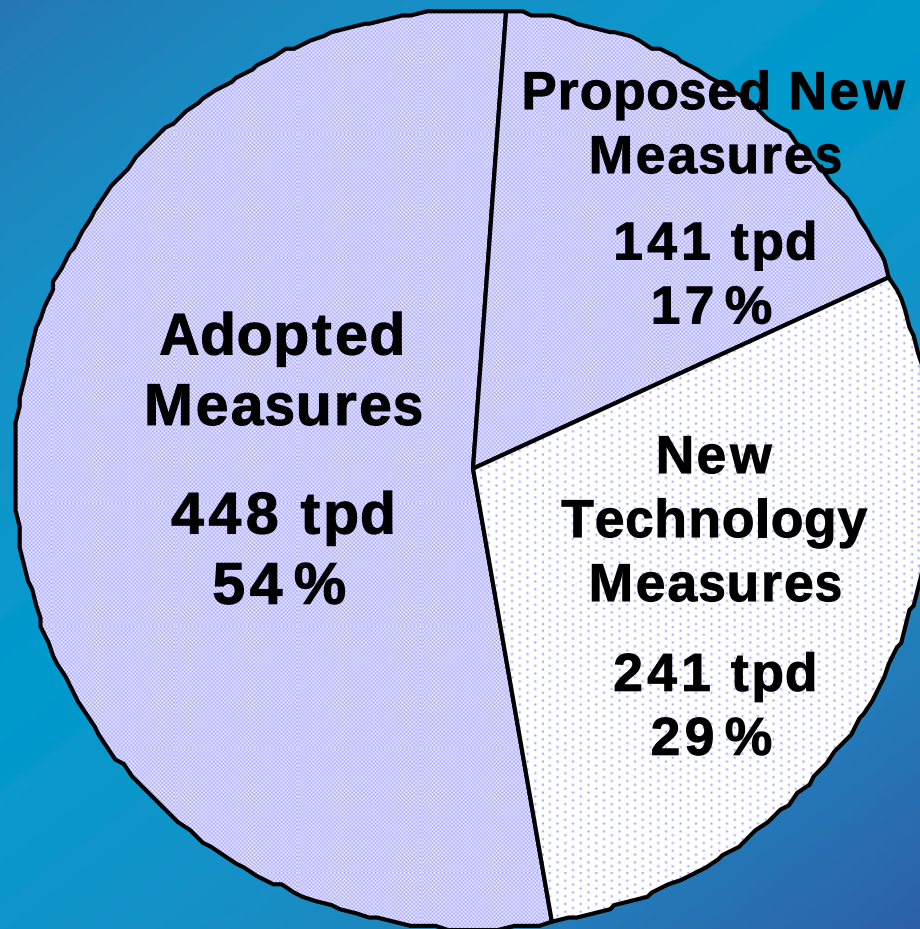
- SIP anticipates innovation
 - South Coast: 241 tpd NOx + 40 tpd ROG
 - San Joaquin: 81 tpd NOx
- Analysis confirms new technologies needed in South Coast and San Joaquin Valley



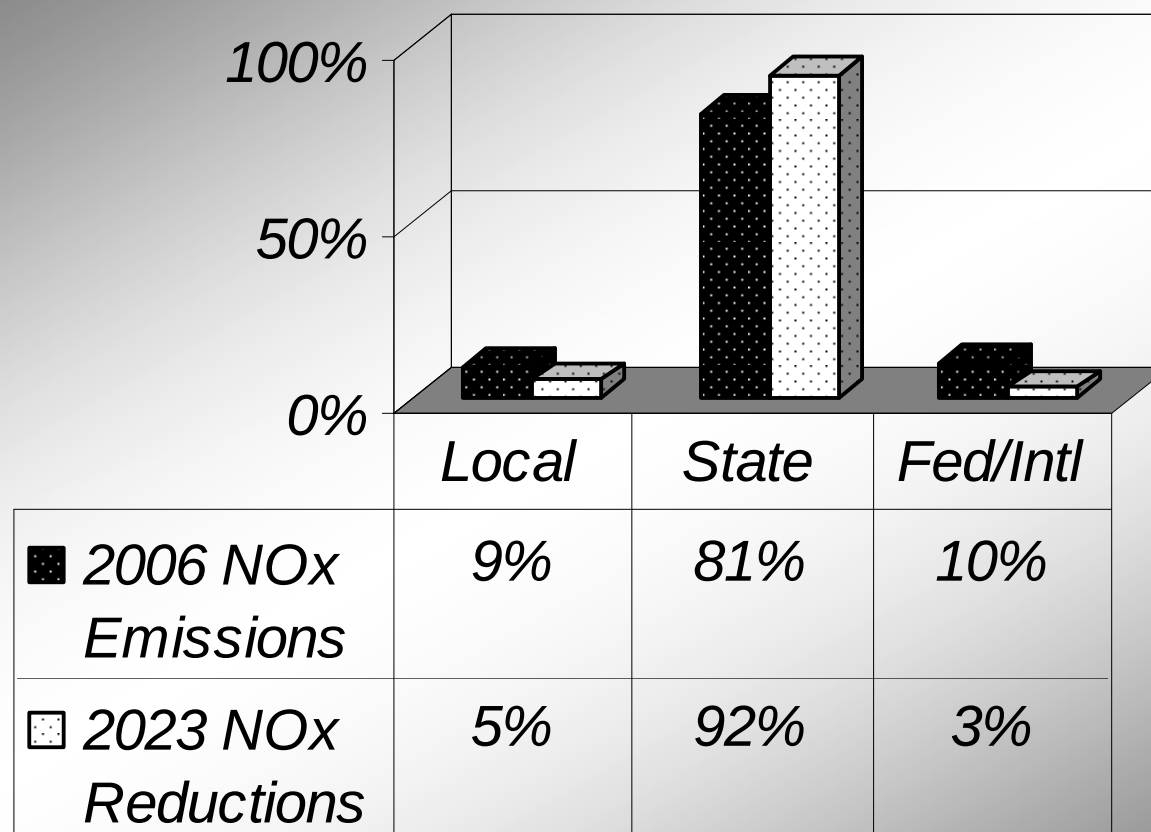
Advancing Technology and Accelerating Progress

- Innovation essential
- Incentives would speed progress
- \$5-10 billion would fund South Coast proposed 63 tpd NOx in 2014

2023 NOx Commitment South Coast



Relative Shares



South Coast



SIP Commitments

- Achieve emission reductions by specific dates
- Propose defined new SIP measures by specific dates
- Long-term strategy commitment (new technology)



State Strategy and San Joaquin Valley SIP

- State Strategy needed to complete San Joaquin Valley SIP
- Provides emission reductions needed for ozone attainment



Environmental Impact Analysis

- Identifies potential adverse impacts
 - Detailed quantitative impacts during rulemaking
- Positive environmental benefits



Economic Impact Analysis

- Cost-effective estimates of new measures
- Direct cost
 - \$4.6 billion in 2014
- Overall impact
 - Will reduce CA economic output 0.2-0.3%
- CA's air quality regulation history
 - Benefits exceed costs by 3 to 1



SIP Administrative Actions

- Infrastructure SIP
- Interstate Transport SIP

Dept. of Pesticide Regulation SIP Elements

- Dec. '07 regulation to require BACT and regional emissions caps
- Reductions included in San Joaquin 8-hr SIP
- DPR request to increase Ventura 1-hr SIP cap by 1 tpd to address unanticipated acreage growth
- Benefit of regulation will be in Ventura 8-hr SIP
- Ventura attained 1-hr standard in 2005

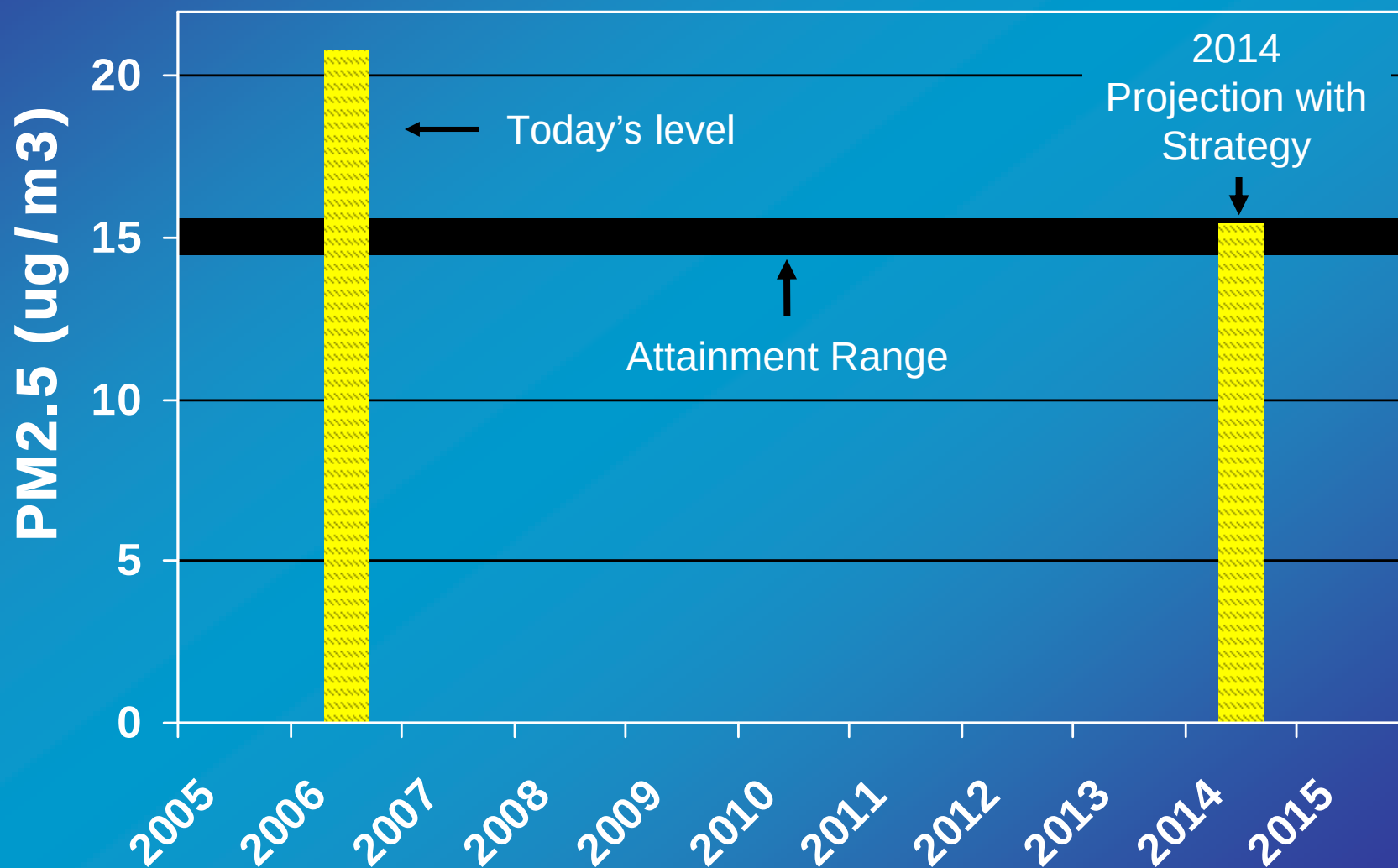
Issues



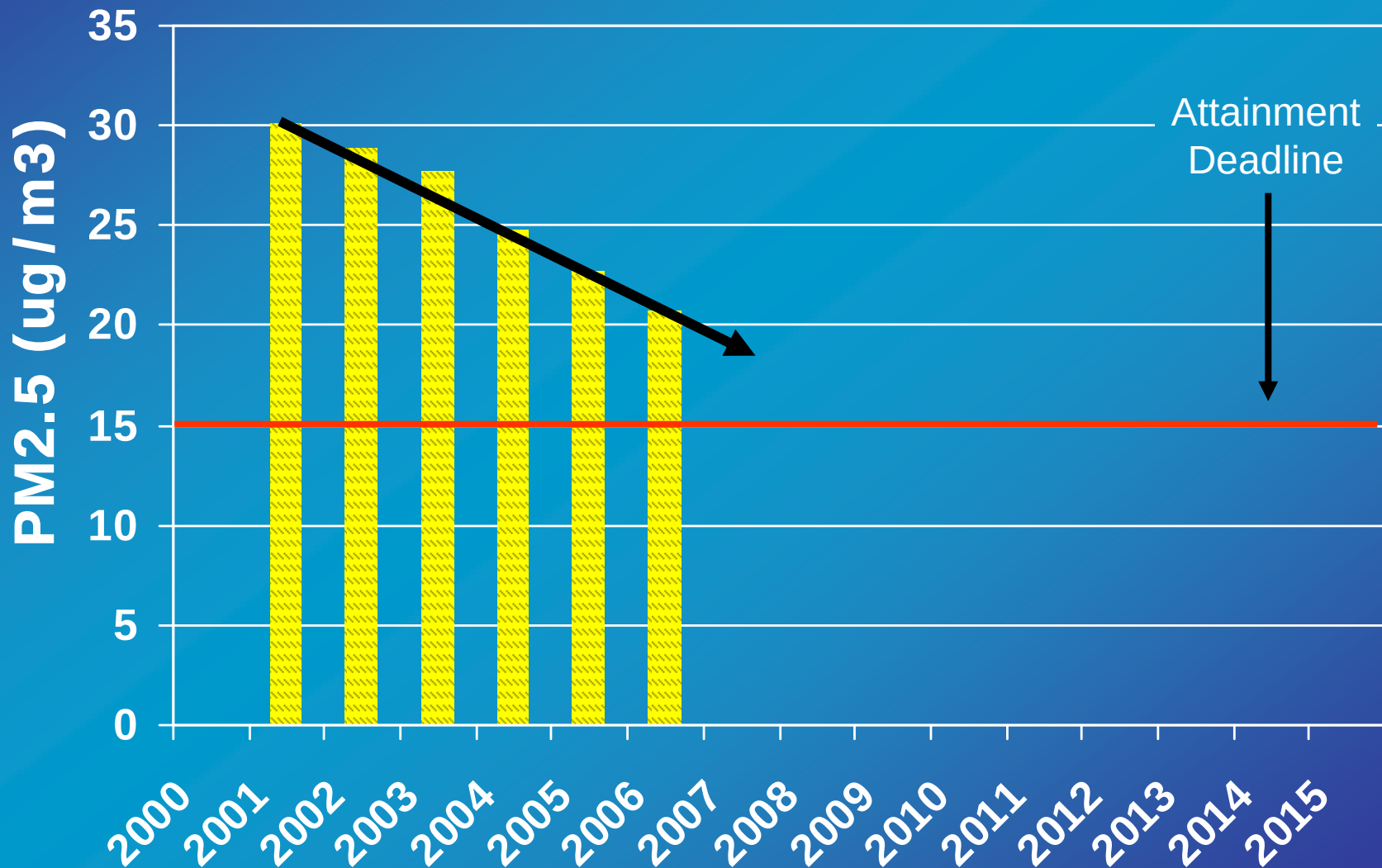
Issues

- South Coast's proposed 63 tpd NOx
- Additional suggested measures
- Timing of South Coast SIP
- Consumer products, pesticides, and other issues

PM2.5 Attainment with Proposed Measures



Air Quality Trend Supports Attainment Projection





SCAQMD

Suggested Measures

- Require 100,000 plug-in hybrids by 2014
- Require on-board diagnostic retrofits on passenger vehicles
- Require more aggressive turnover of trucks
- Implement Ports Plan for trucks
- Double turnover of construction fleet
- Implement Ports Plan for cargo handling equipment



SCAQMD

Suggested Measures (cont.)

- Accelerate introduction of cleaner locomotives
- Require electrification of airport equipment
- Further control transport refrigeration units
- Adopt tighter catalyst controls and early retirement for pleasure craft
- Account for SOx reductions from gasoline
- Require diesel fuel reformulations, blends, or alternative fuels



Other Measure Suggestions

- Strengthen measures
 - Fleet rules, scrap, smog check, consumer products, marine vessels, rec. boats, fuels
- Include reductions from agricultural equipment



Other Issues

- Reliance on future technology
- Contingency measures
- Pesticide commitment
- Consumer product inventory and control approaches
- Pollution transport and growth



Consideration of South Coast Air Quality Management Plan

- ARB consideration delayed because SCAG measures incomplete
- September hearing is next available date

Recommendations



Recommendations for Board Action

- Adopt proposed State Strategy for California's 2007 SIP
- Adopt SIP administrative documents (Infrastructure SIP, Interstate Transport SIP)

Next Steps



Board Action: 2007

- Modifications to Reformulated Gasoline Program (done)
- Enhanced Vapor Recovery for Above-Ground Storage Tanks (done)
- Cleaner In-Use Off-Road Equipment
- Cleaner Main Ship Fuel
- Ship Speed Reduction
- Shore Power for Ships (electrification)
- Clean Up Existing Harbor Craft



Board Action: 2008

- Cleaner In-Use Heavy-Duty Trucks
- Port Truck Modernization
- Cleaner Ship Auxiliary Engines
- Cleaner Line-Haul Locomotives (enforceable agreement)
- Consumer Products Program I



Board Action: 2009-2012

2009

- Cleaner In-Use Agricultural Equipment
- New Emission Standards for Recreational Boats
- Expanded Off-Road Recreational Vehicle Emission Standards
- Additional Evaporative Emission Standards

2010-2012

- Consumer Products Program II