Association of American Railroads

Southern California's Good Movement System:

Policy Options and Implementation Challenges

July 11, 2006

Southern California Goods Movement

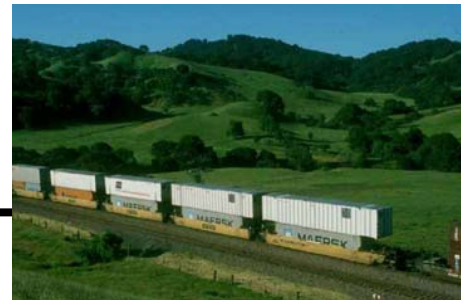
- In 2004, POLA and POLB handled 13.1 million TEUs
  - 5th largest in world and largest in US
  - 1/3 is International containerized cargo
  - 77% is through traffic
- Up to 40,000 trucks daily on the I-710, I-605, and SR91
- Union Pacific and BNSF make 5 Million intermodal lifts annually
  - 64% are international containers
  - 70 daily trains from LA to inland empire; 50 on Alameda Corridor
- 1.6 Billion square feet of warehouse and distribution space
  - Another 32 million square feet under construction (75% in Riverside and San Bernardino)

Source: http://www.metro.net/projects_programs/mcgmap/

Why Does it matter?

- Southern CA produces
  - 25% of the statewide Diesel PM from goods movement
  - 27% of the statewide NOx from goods movement
- Long-lived engines – a locomotive or ship engine is estimated to last 30-40 years.
- According to SCAG
  - Goods Movement industry provides one out of 12 jobs in Southern California
- Growing fast– container shipments are estimated to double over the next 15-20 years
- Large potion of goods are “transhipped”

Goods Movement: Logistics Building Blocks

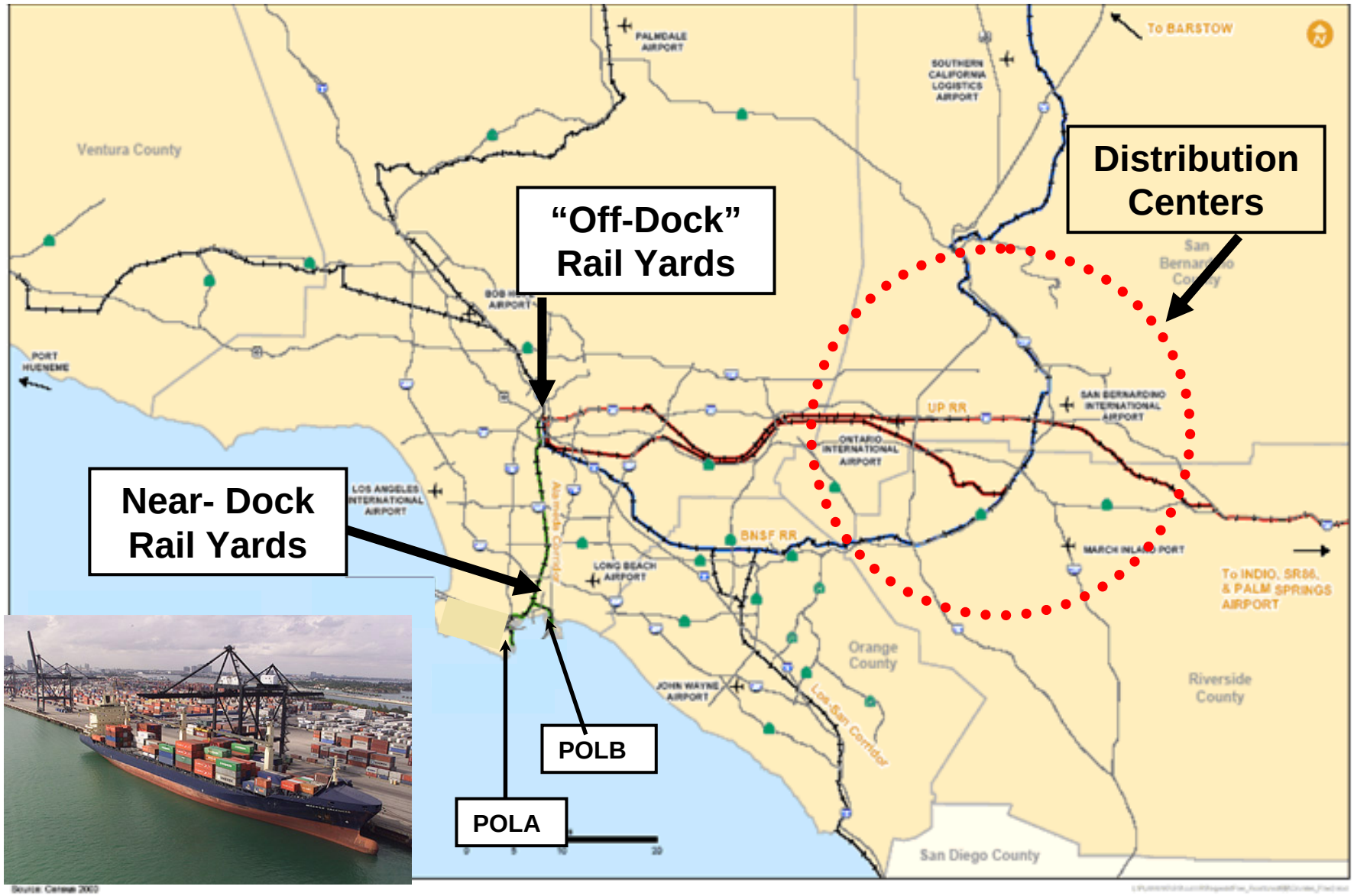


- Most goods arrive in Los Angeles in 40-foot marine containers (up to 8000 on a single ship)
- A standard 53-foot domestic rail container has 60% more useable space than a standard 40-foot marine container
- A standard 53-foot semi-trailer has 70% more useable space than a standard 40-ft marine container
- Rail and truck rates are not directly related to box size
- Cost per cubic foot is what matters to an importer

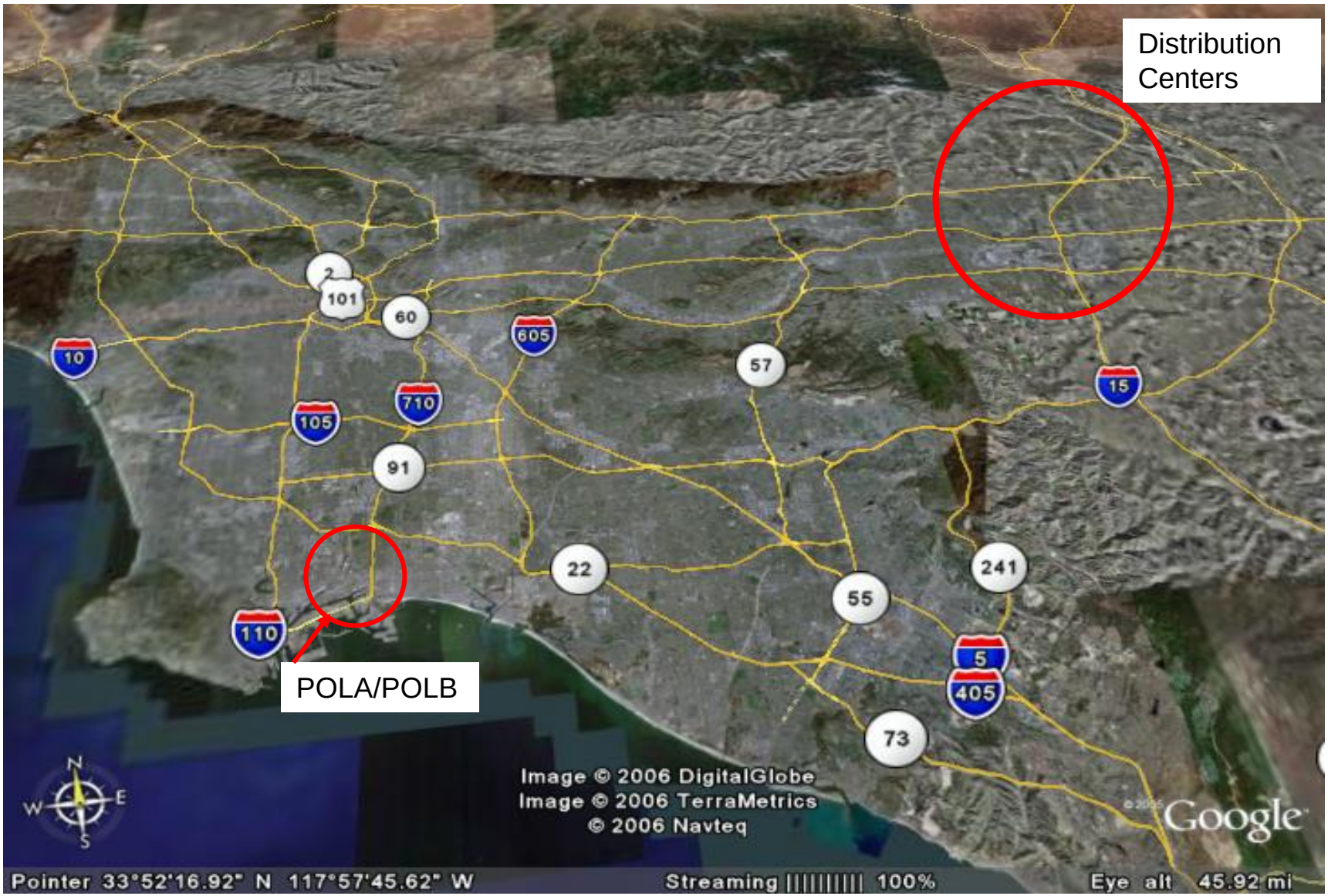
Result: huge incentive to repack marine containers into 53-foot domestic containers for trucks or trains

http://www.ieor.berkeley.edu/People/Faculty/leachman-pubs/PortModal.pdf

The Challenge: Goods Movement Flow



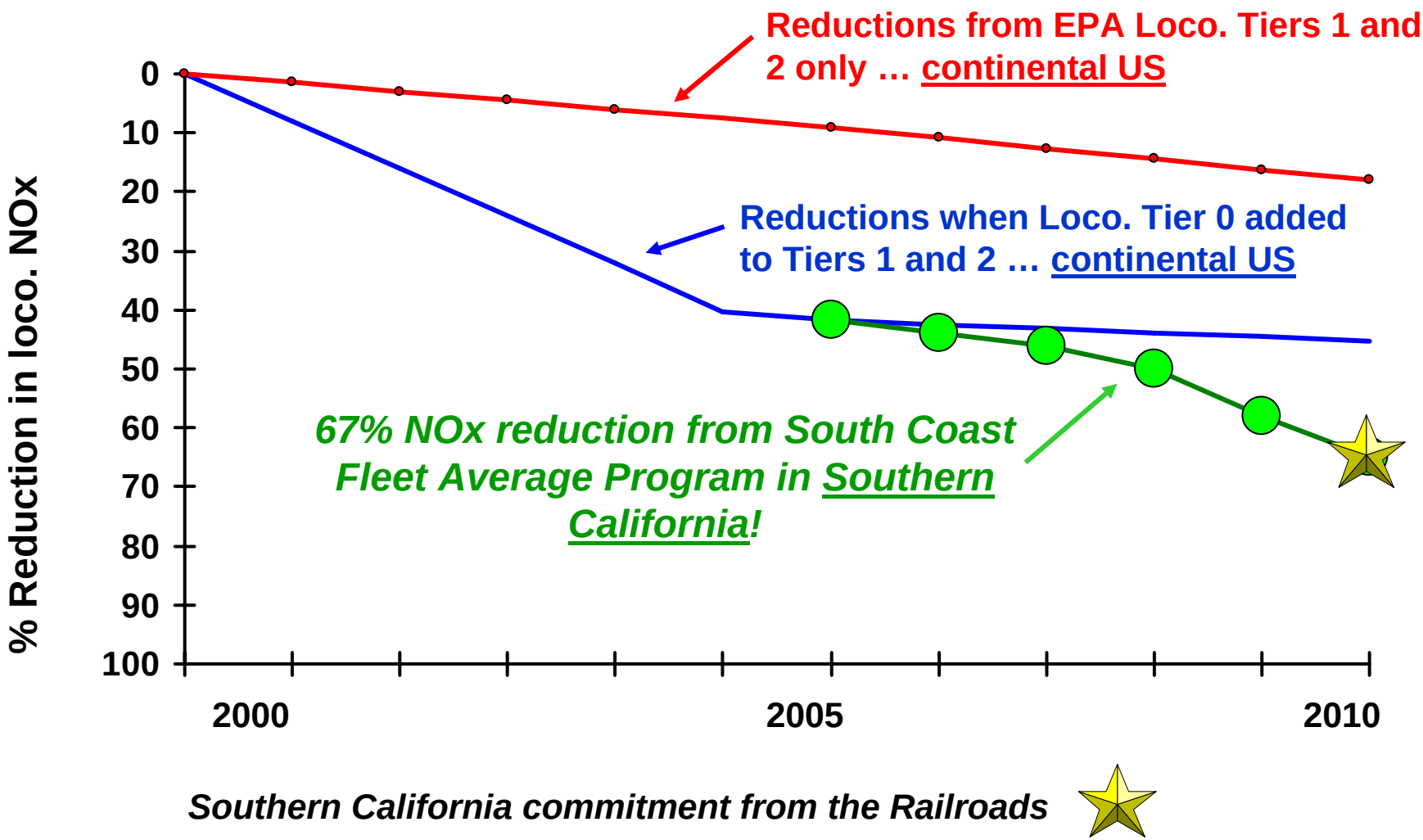
Another View



Railroads Environmental Improvement Program (1994 – Present)

- 1994 – Supported the US EPA's standards for new and re-manufactured locomotives
- 1998 – Signed MOU with the ARB to ensure on average the cleanest and best locomotives would operate in Southern California by 2010
- 2000 – Created $5 million end-user research & development program for new particulate trap research at Southwest Research Institute
- 2005 – Signed MOU with ARB projected to reduce PM at statewide railyards 20% by 2008
- Ongoing – Funding & demonstrating new locomotive technologies

South Coast Fleet Average from 1998 MOU



2005 CARB/Rail MOU – Outcomes: 20% Reduction of Railyard PM by 2008

- ~435 intrastate locomotives will be equipped with automatic shutdown devices with 15 minute idling limitation
- At least 80% of California fueling will be low-sulfur – six years earlier than required by federal regulation
- At least 99% of all locomotives will comply with stringent smoke regulations– a much higher rate than any other mobile source
- Health risk assessments will be carried out at the 16 major rail yards throughout CA

Purchasing & Demonstrating New Technologies

- **Switch Locomotive Purchases**: By 2007 57% in Southern CA will be emit at the ULEL rate
  - New “Gen Set” switch engines using nonroad and truck engine technologies
  - Hybrid switch locomotives (“Green Goats”)
  - Niche market for Spark ignited LNG technologies
- **Line Haul Locomotive Purchases**:
  - 840 Tier 2 units as of July 1, 2006
- **Research & Development**
  - Hybrid line-haul locomotives with a manufacturer
  - Testing of OxyCats on 3800 hp Line Haul units
- **Emission Reductions at Railyards**
  - Hood Development Program
  - Remote Sensing Feasibility Evaluation

What are the near-term greener technologies being implemented today?

- Dedicate/concentrate cleanest locomotives to service in CA
- Ultra Low-Emission switch locomotives
  - Hybrid Locomotives
  - Gen Set Switch
- Development of particulate traps
- Expanded near dock rail
- New “on-dock” rail

“Hybrid” light-medium duty switcher – 2000 peak horsepower from batteries

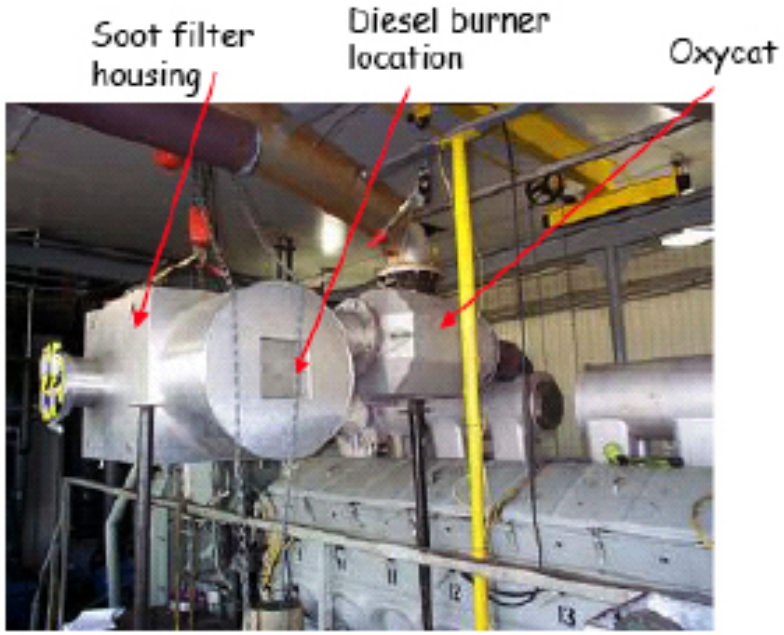
(2) 700 sustainable horsepower diesel gen sets

Source: Goods Movement Action Plan, Phase II Draft Framework for Action, March 2006

Liquefied Natural Gas Switcher Locomotive

1200 sustainable horsepower, spark ignited

Diesel Particulate Filter (DPF) R&D



- Two UP 1500 horsepower switchers will be equipped with DPF technology in 3Q ‘06
- Units will be tested for maintainability, durability and performance in California

- Railroads have been co-funding 5-year R&D project investigating performance, durability and applicability of DPF to older switching locomotives
- R&D work being performed by Southwest Research Institute (“SwRI”) through Association of American Railroads
- There is no technical precedent for this work

How California MOUs Have Driven Air Quality Investments & Improvements

Locomotive Technologies	First Year Available	# of Units	% of CA Fleet	NOx Reduction from base line (per unit)	Incremental Air Quality Investment Nationwide to date	CA Incremental Air Quality Investment Driven by MOUs	Are Other Mobile Sources Required to Do?
Mandatory Re-Build –Tier 0 (22% Complete Nationally)	2000	2940		30%	$147 million		NO
Buy New Units – Tier 1	2002	1655		45%			YES
Buy New Units -- Tier 2	2005	640		60%			YES
Future Additional Line-haul Units to comply with 1998 MOU	2005	80				$160 million	NO
Ultra Low-Emitting California Switchers (Today)	2000	9	6%	80%		$10.8 million	NO
Additional ULEL California Switchers (By12/07)	2005	77	51%	80%		$92.4 million	NO
Automatic Shutdown Devices							NO
Line-haul units nationally (35%Complete)	2001	4500			$17 million		
California units (Completed)		230	53%			$ 4.5 million	NO
California units (Future by 6/08)		208	47%			$ 4.2 million	NO
Total Air Quality Investment					$164 million	$ 271.8 million	

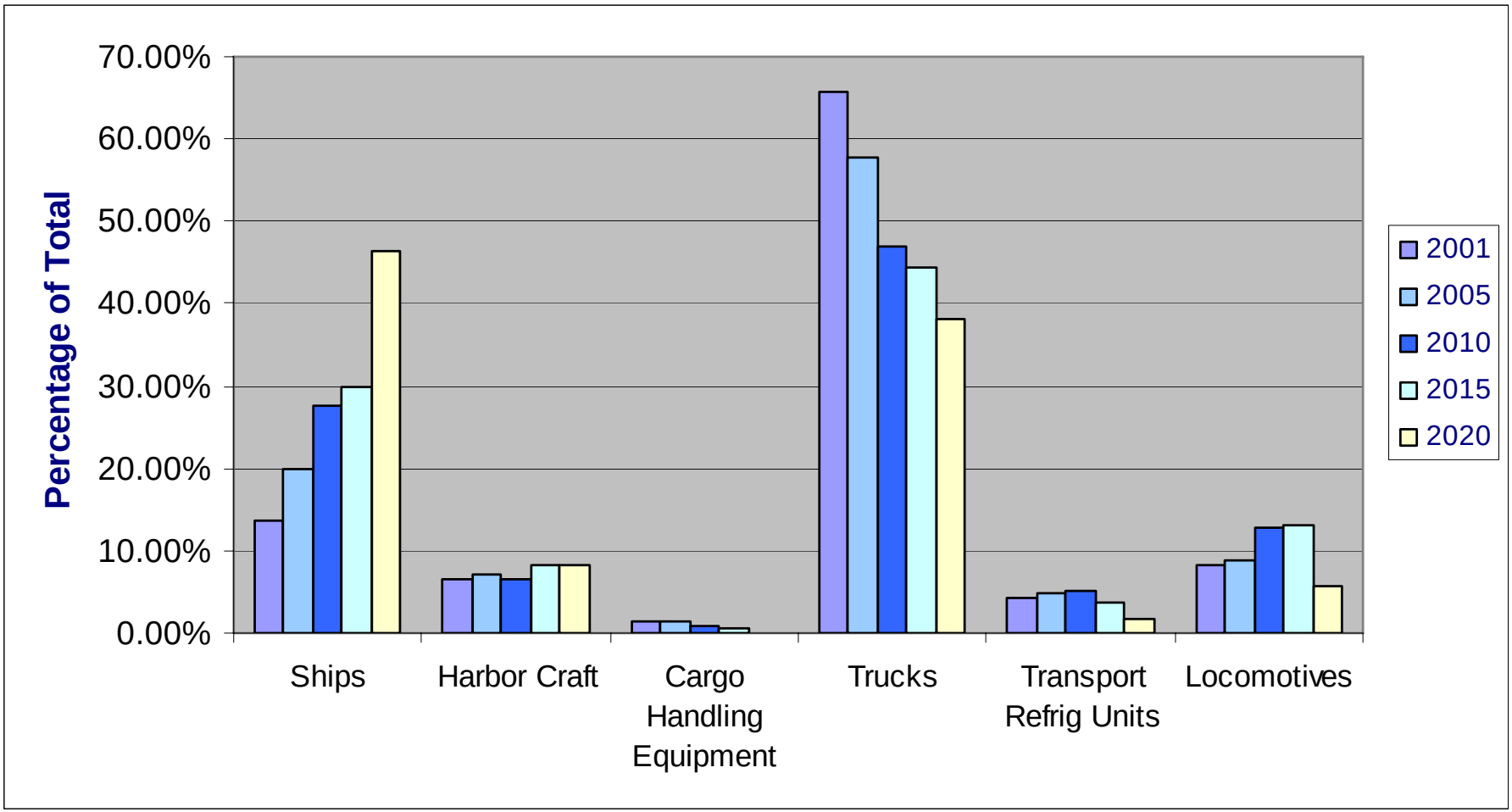
1998 MOU 2005 MOU 1998 and 2005 MOU

Reductions in Rail Yard Diesel PM

Sources	EMISSIONS (tpy) & Reductions			
	2005 (Base)	2010	% Reduction	Strategy
Through Trains	10	5	50%	'98 MOU
Switcher Locomotives	7	0.7	90%	'98, '05 MOU, CARB Diesel
Loco Refueling	2	0.5	75%	'98, '05 MOU
Cargo Equipment	34	13.6	60%	ARB Rule
Container Truck	7	0.7	90%	Bond (or Moyer) Funding
Total	60	20	65%	

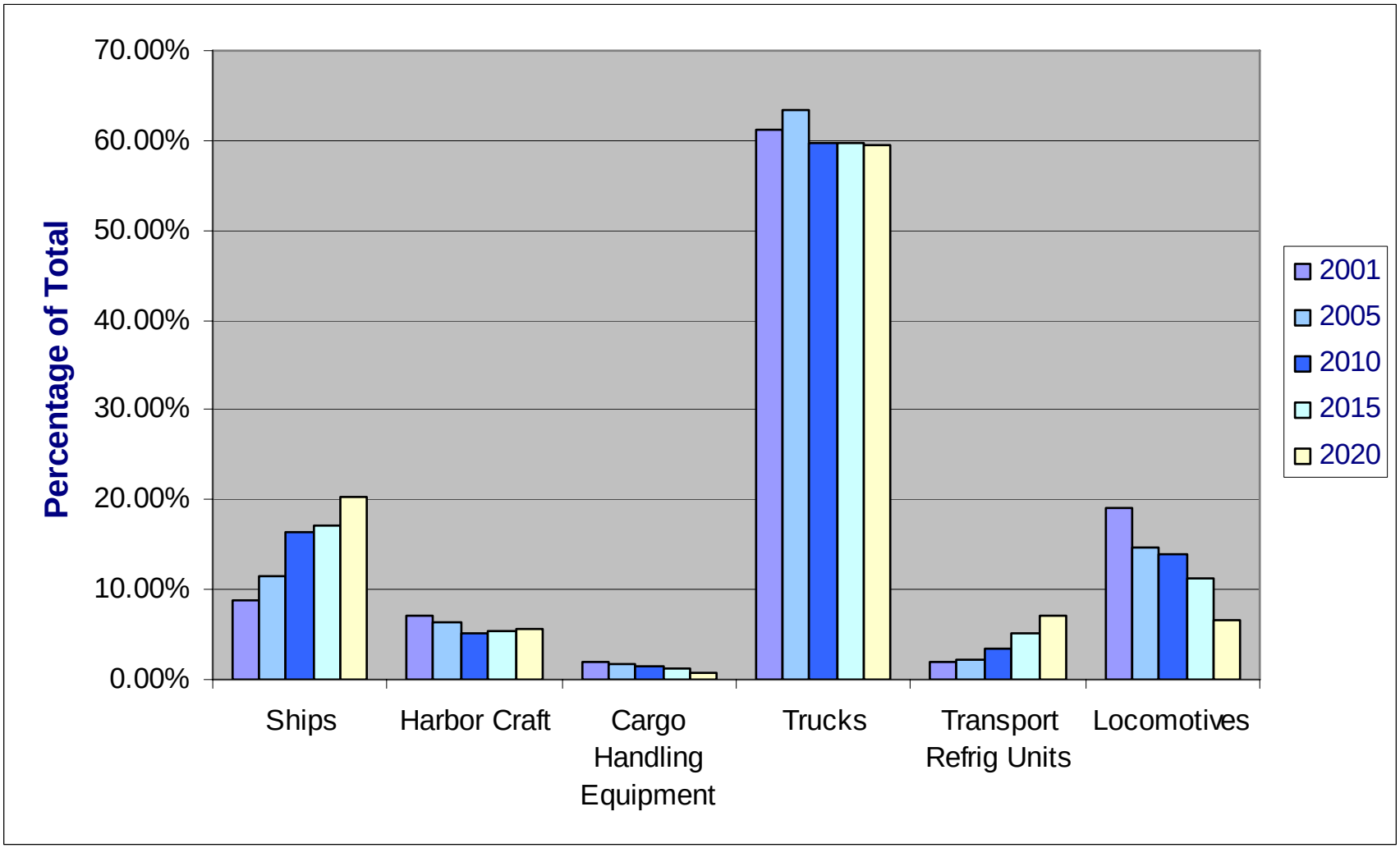
Based on information the California Air Resources Board staff presented in 1/27/06 ARB Meeting

Projected Statewide Goods Movement Diesel PM Emissions w/ Implementation of CARB Strategies



Source: CARB Draft Emission Reduction Plan for Ports and International Goods Movement in CA, 3/21/6

Projected Statewide Goods Movement NOx Emissions w/ Implementation of CARB Strategies



Source: CARB Draft Emission Reduction Plan for Ports and International Goods Movement in CA, 3/21/6

Most Difficult Challenge: Evaluate Possibilities from a Systems Perspective

- System design must balance the needs of shippers, transporters, commuters, adjacent communities, regulators, and many other stakeholders
- Altering one part of the system can cause disruption to the entire goods movement system of ship, rail and truck operations throughout California
  - International port calls, labor opportunities, freeway traffic patterns, and even commuter rail operations
- Unintended economic and environmental consequences of various public policy choices must be squarely addressed
  - Mode shift, Port Shift, Country Shift
- This issue needs a statewide focus and management team, as the Governor has said

Please contact me if you would like additional information

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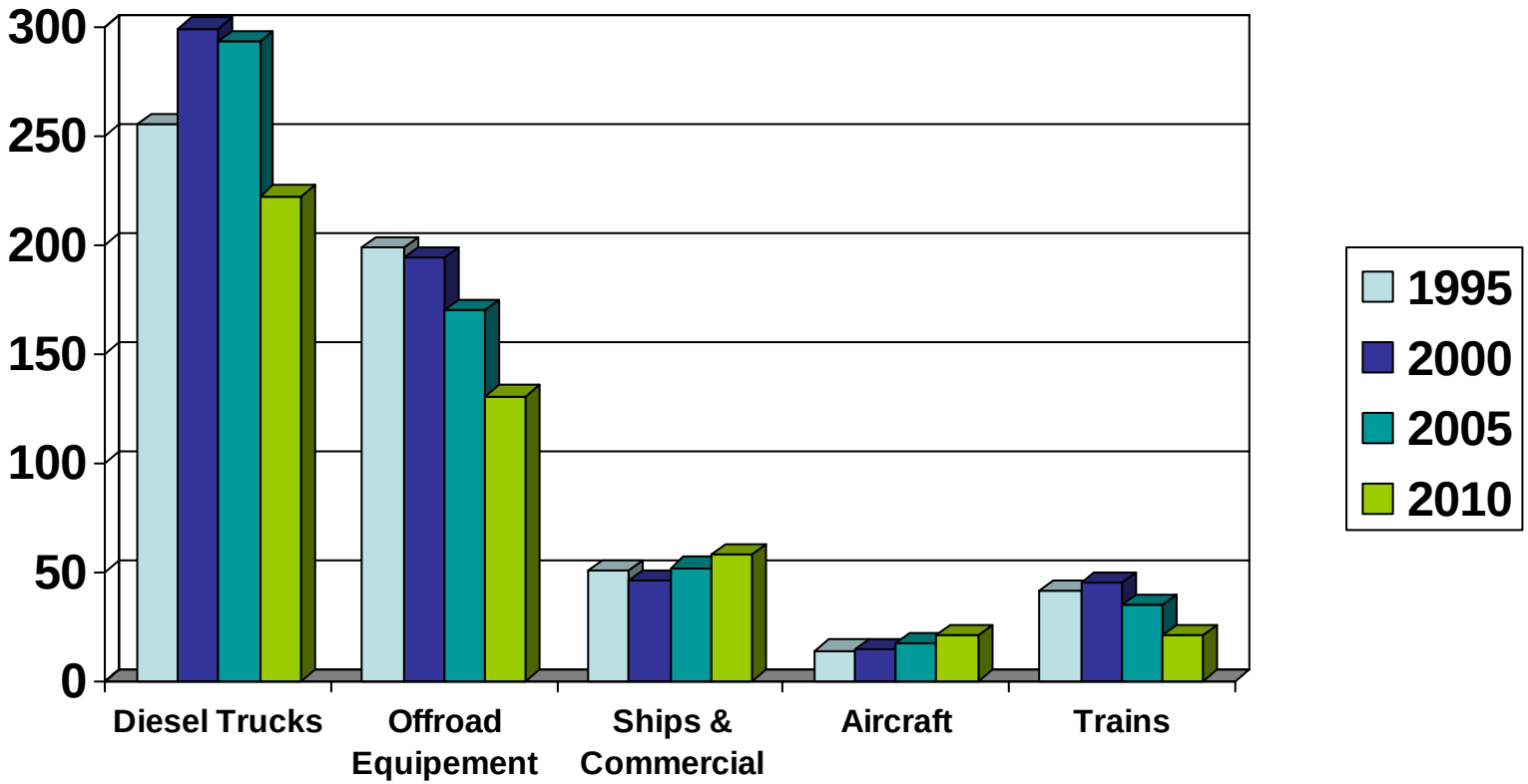
SCAQMD NOx Inventories

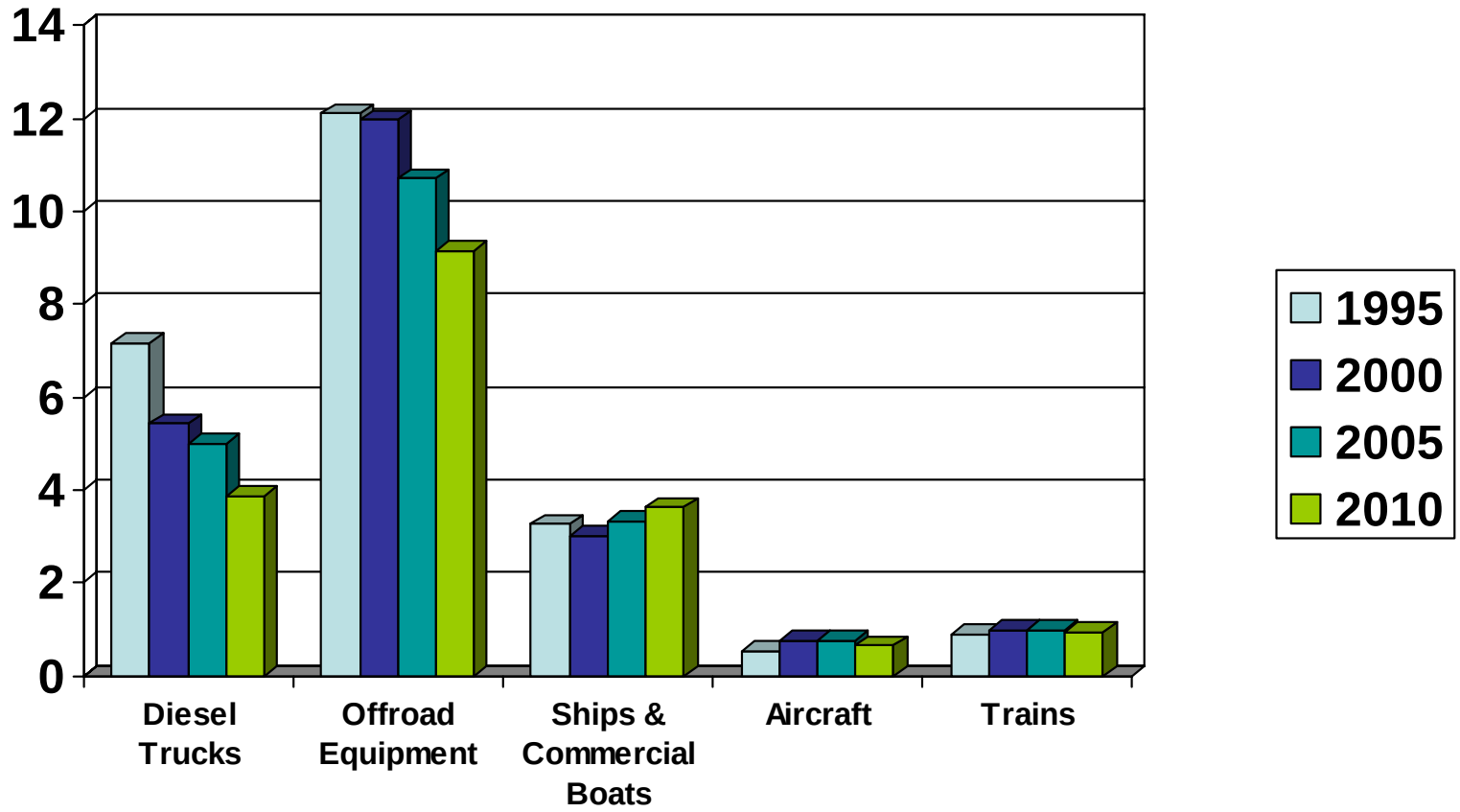


2005	Diesel Trucks	Offroad Equip	Ships	Aircraft	Trains
% SCAQMD NOx Inventory	29.5%	17.1%	5.2%	1.7%	3.5%

Data Source: ARB – Almanac Emission Projection Data (Published in 2005).

Diesel Trucks – LHDD1, LHDD2, MHDD, HHDD

SCAQMD PM2.5 Inventories

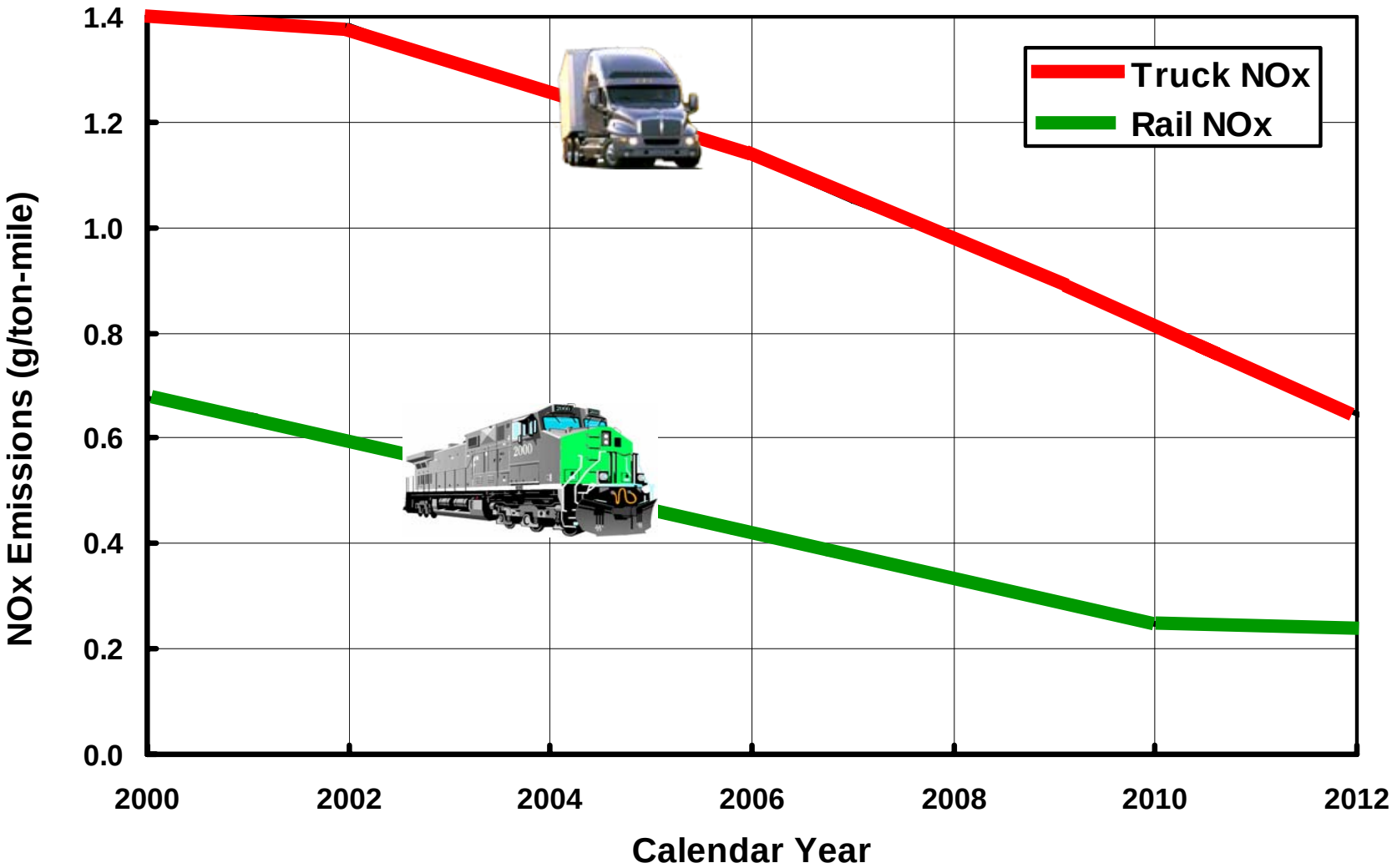


2005	Diesel Trucks	Offroad Equip	Ships	Aircraft	Trains
% SCAQMD NOx Inventory	4.1%	8.9%	2.8%	0.6%	0.8%

Data Source: ARB – Almanac Emission Projection Data (Published in 2005).

Diesel Trucks – LHDD1, LHDD2, MHDD, HHDD

NOx Emissions per ton Mile of Freight South Coast Air Basin



PM Emissions per ton Mile of Freight
South Coast Air Basin