

**Faster Freight Cleaner Air
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“Rail”
Breakout Session**

**California’s Locomotive
Emission Reduction Needs**

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California Environmental Protection Agency



Air Resources Board

Presentation Overview

- Characterizing California’s locomotive emissions
- California’s strategies to reduce locomotive and railyard emissions
- California’s locomotive emission reduction needs

2005 Statewide Locomotive Emissions (tons/day)

AIR BASIN	NOx	PM
Mojave Desert	39	1.3
South Coast	32	1.0
San Joaquin	24	0.7
Sacramento	20	0.6
Bay Area	13	0.3
Salton Sea	9	0.3
Rest of the State	21	0.6
Statewide Total	158	4.8
% of Statewide Mobile Sources	5%	3%

California's Locomotive Emissions

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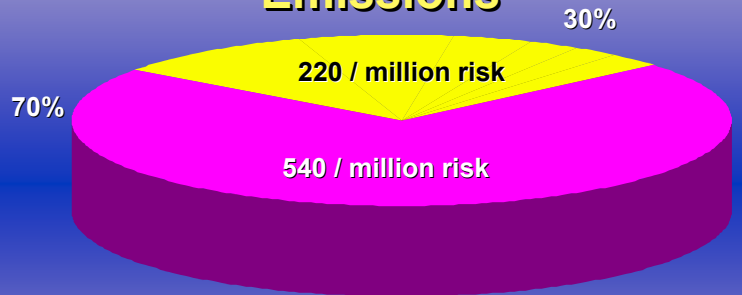
Which Types of Locomotives Contribute to California NOx Emissions?

YEAR	Statewide Locomotive *	Line Haul	Switch	Passenger
	NOx			
2000	6%	90%	5%	5%
2010	4.5%	88%	5%	7%
2015	6%	86%	5%	9%
2020	8%	86%	4%	9%

* % of statewide mobile source emissions.

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Diesel PM Responsible for 70% of Year 2000 Statewide Risk from Air Toxic Emissions*



- Diesel Exhaust PM₁₀ (70%)
- 1,3 Butadiene (10%)
- Benzene(8%)
- Carbon Tetrachloride (4%)
- Formaldehyde (3%)
- Hexavalent Chromium (2%)
- All Others (3%)

*Air Resources Board Risk Reduction Plan

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UP Commerce Railyard
(near I-710)



California's Railroad Strategies

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California's Locomotive and Railyard Strategies

- Statewide Railyard Agreement (2005)
- California's Goods Movement Emission Reduction Plan (2006)
- CARB Diesel Fuel Regulation Extended to Intrastate Locomotives (2007)
- ARB Cargo Handling Equipment Regulation (2007)
- State Implementation Plans (2007)
- U.S. EPA locomotive rulemaking (2008-2017)
- Locomotive NOx Fleet Average Agreement (2010)
- Goal: > 85% reduction in diesel PM and NOx by 2020

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California's Goods Movement Emission Reduction Plan

- ARB Board approved Goods Movement Emission Reduction Plan (April 2006)
- Proposed locomotive provisions include:

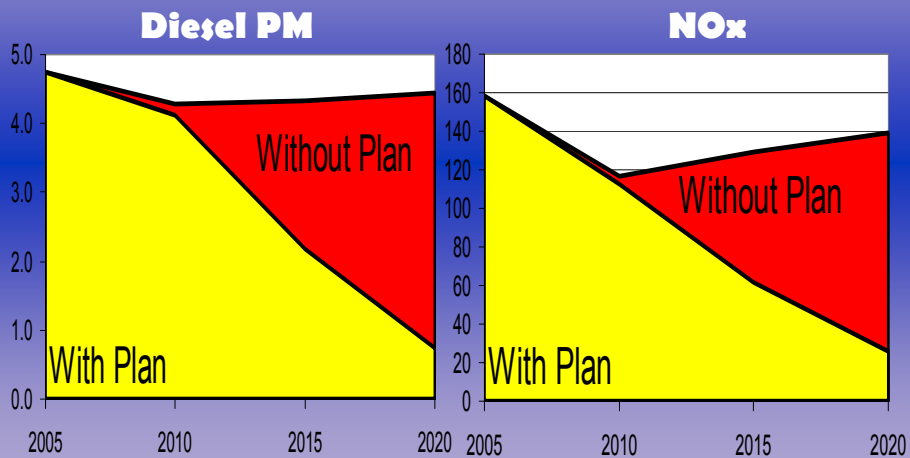


- Tier 4 locomotives on an accelerated basis (2012-2021)
 - 10% annual fleet turnover to Tier 4
- Tier 2 locomotives upgraded to Tier 2.5
 - 5% annual remanufacturing
- Replace switchers by 2010

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Strategy Impact on Locomotives

(Emissions in tons per day, 2005-2020)



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CA Low Emitting Switch Locomotives

- 450 California-based locomotives (UP and BSNF).
- New low emitting gen-set switch locomotives.
 - 61 now in service (Southern CA).
 - 11 in service (Northern CA).
 - Up to 90% reduction in NOx and diesel PM.
- 12 Electric-Hybrids (Green Goats).
- 4 LNG's in service in LA since 1990's.
- Goal to turnover intrastate fleet by 2010.

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California's Locomotive Emission Reductions Needs

U.S. EPA Locomotive Rulemaking

- ARB submitted comments on proposed rulemaking.
- ARB supportive of most elements
 - Believe several portions should be strengthened, expanded, and accelerated.
 - Tier 0-3 locomotives may still comprise up to 90% of national fleets by 2020.
 - California has shortfall of 60-80% NOx and 25-50% PM.
 - Need to accelerate Tier 4 introduction.
 - Need process to certify and require aftertreatment on existing line haul locomotives.
- Final rule anticipated in early 2008.

U.S. EPA Locomotive Exhaust Temperature Tunnel Testing – Donner Summit – August 2007



California's Needs for New and Existing Line Haul Locomotives

- Need 60-80% NOx and 25-50% PM beyond NPRM
- Need a certification program for aftertreatment to retrofit to existing line haul locomotives
 - Could certified aftertreatment be required upon remanufacturing (about every 4-8 years)?
- Need acceleration of Tier 4 locomotives into California
 - Earlier introduction (prior to 2015 – 2017)
 - Greater rate of fleet turnover

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ARB Railyard Website:

- www.arb.ca.gov/railyard/railyard.htm



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