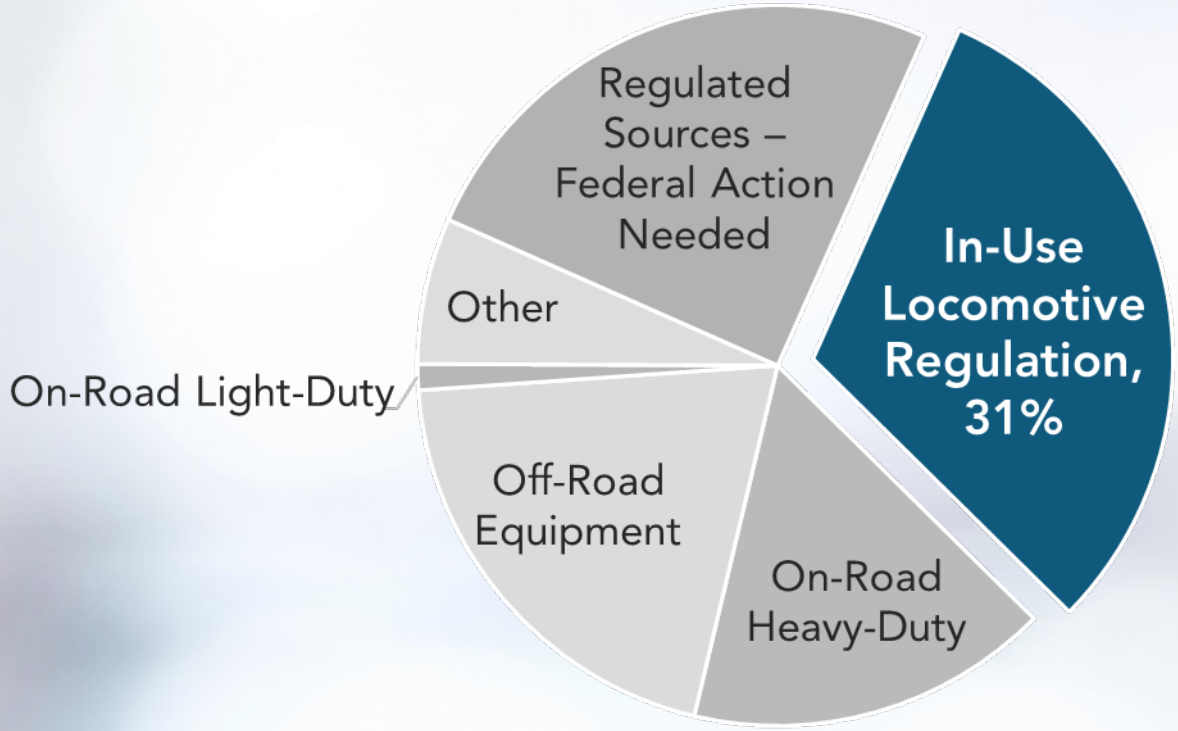
In-Use Locomotive Regulation

November 18, 2022

Video

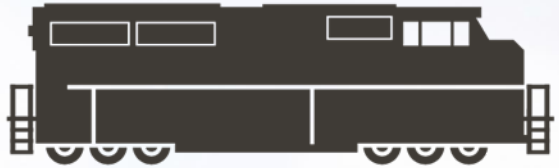
Emission Reduction by 2037 in 2022 State SIP Strategy



CARB

Zero Emission Operations

Locomotives
Still need ZE operations



TRUs
Transitioning to ZE

Truck Fleets
Transitioning to ZE

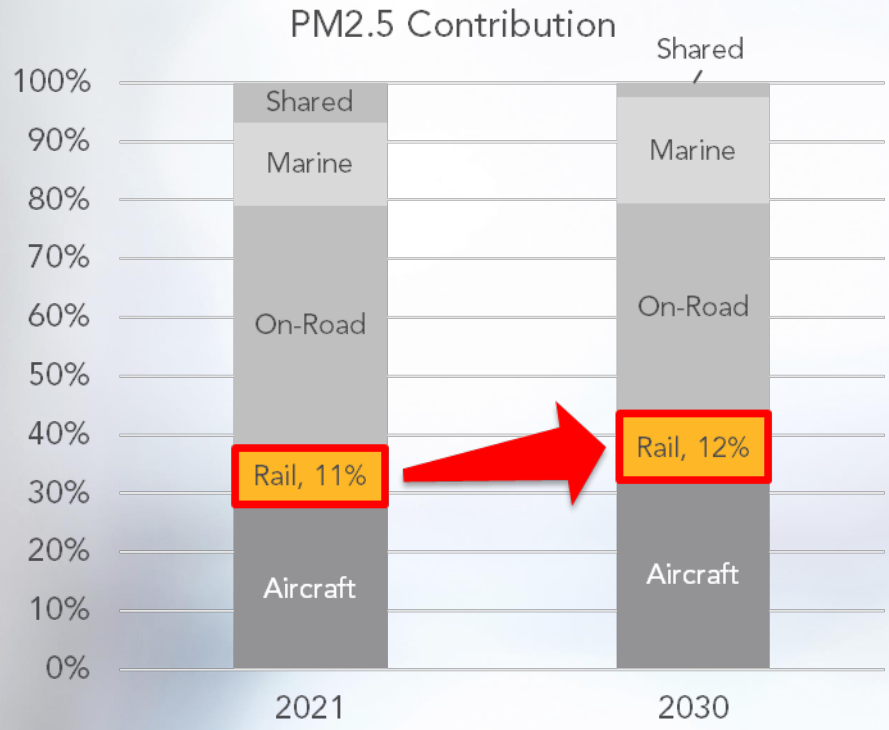
Forklifts
Transitioning to ZE

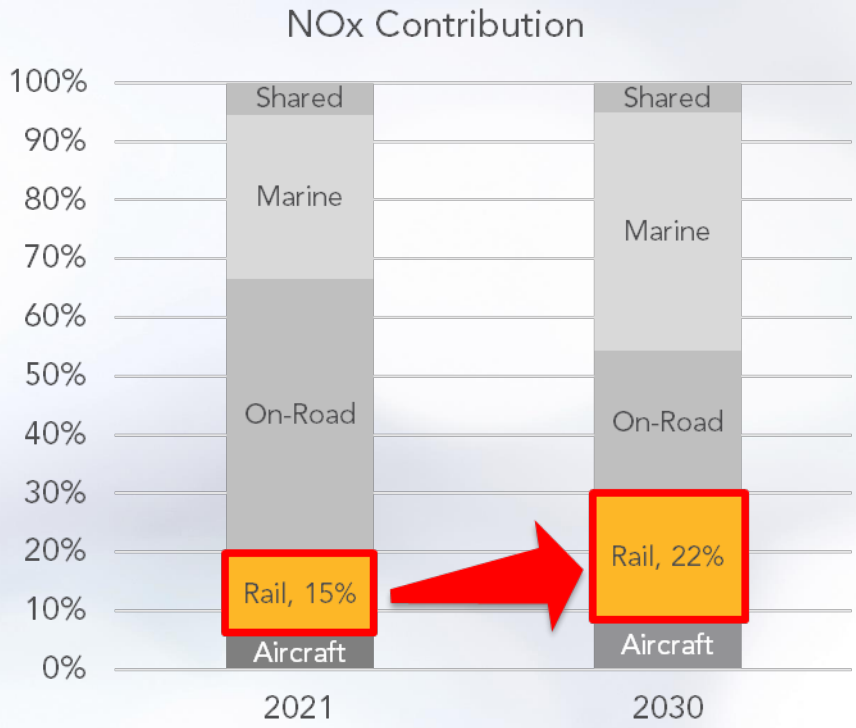
Cargo Handling Equipment
Transitioning to ZE

Drayage Trucks
Transitioning to ZE

CARB

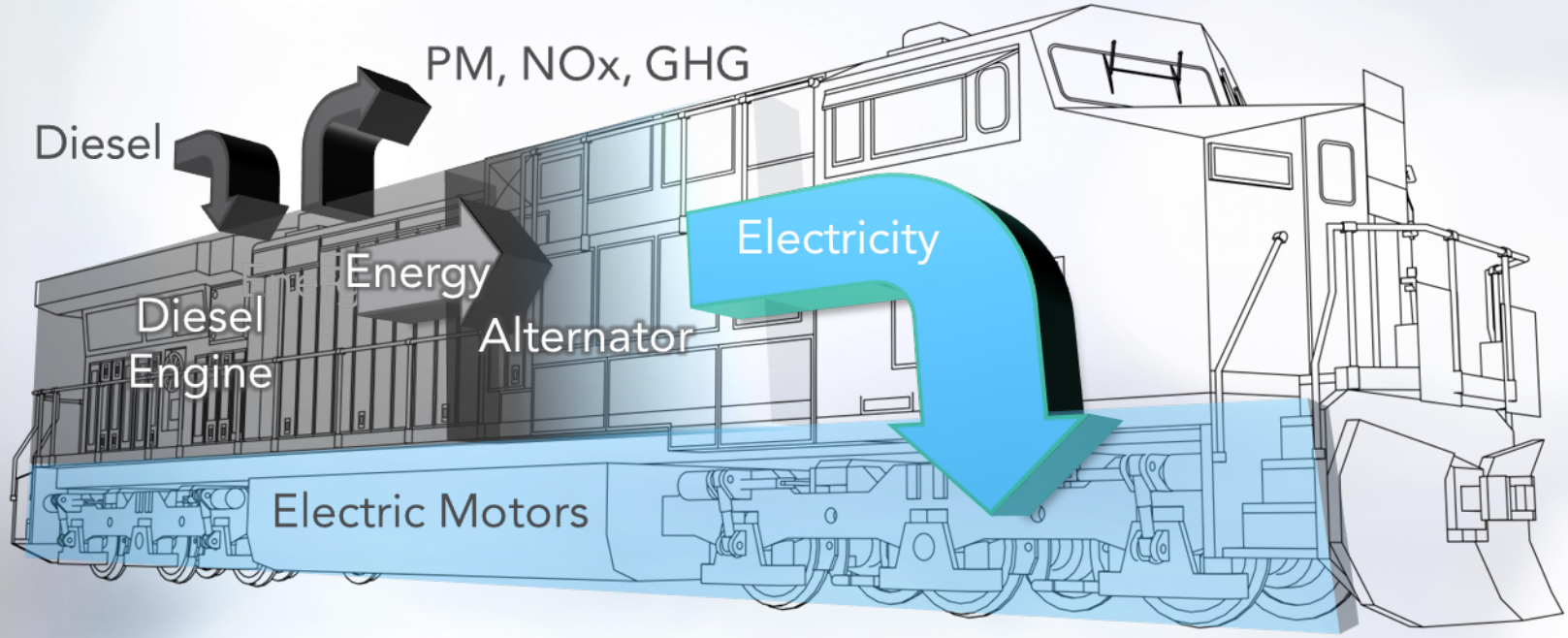
California Freight Sector Emissions





CARB

Diesel Electric Locomotive

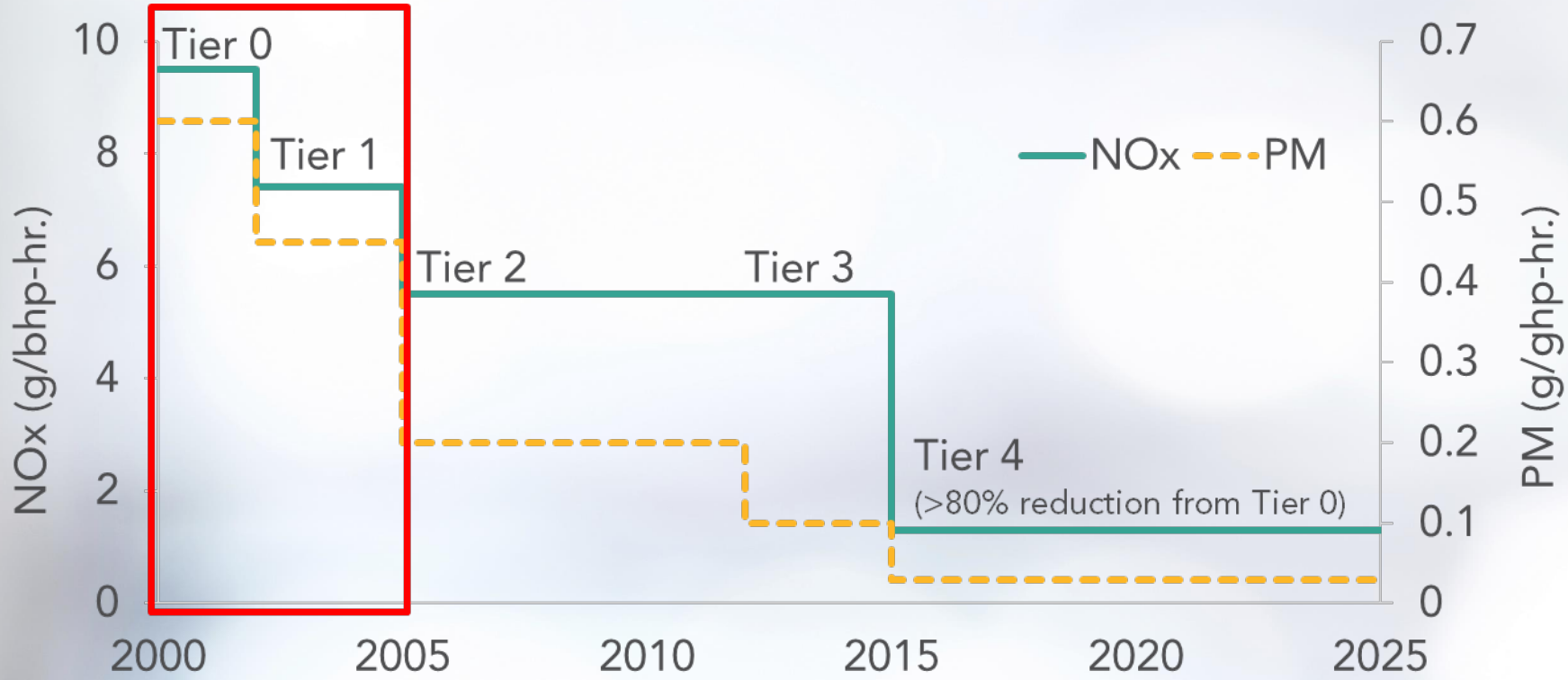


CARB

Types of Locomotives

	Line Haul	Switcher	Passenger	Historic
				
Power	High (~3,000hp+)	Low (~<3,000hp)	High	Low-High
Operation	Moving heavy freight	Moving railcars in and around railyards	Higher speed Lighter load Engine for A/C, lights etc.	Used for historic and educational experiences
Distance (Range)	Nationwide or Local	Local (railyards or industrial facilities)	Nationwide or Local	Local
Used by	Class I-III	Class I-III, Industrial, and Passenger	Passenger Agencies	Historic and Heritage Railroads

Example Locomotive Emission Tiers

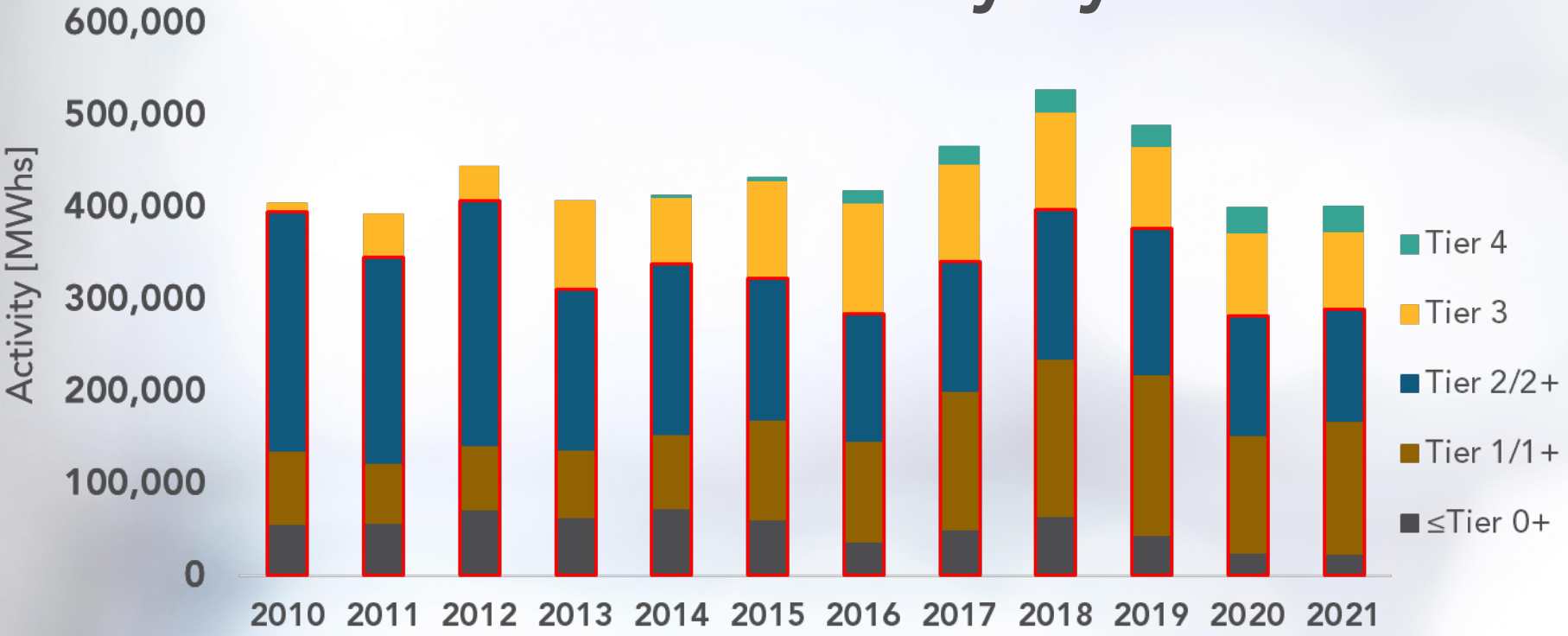


CARB

Remanufacture vs New Purchase

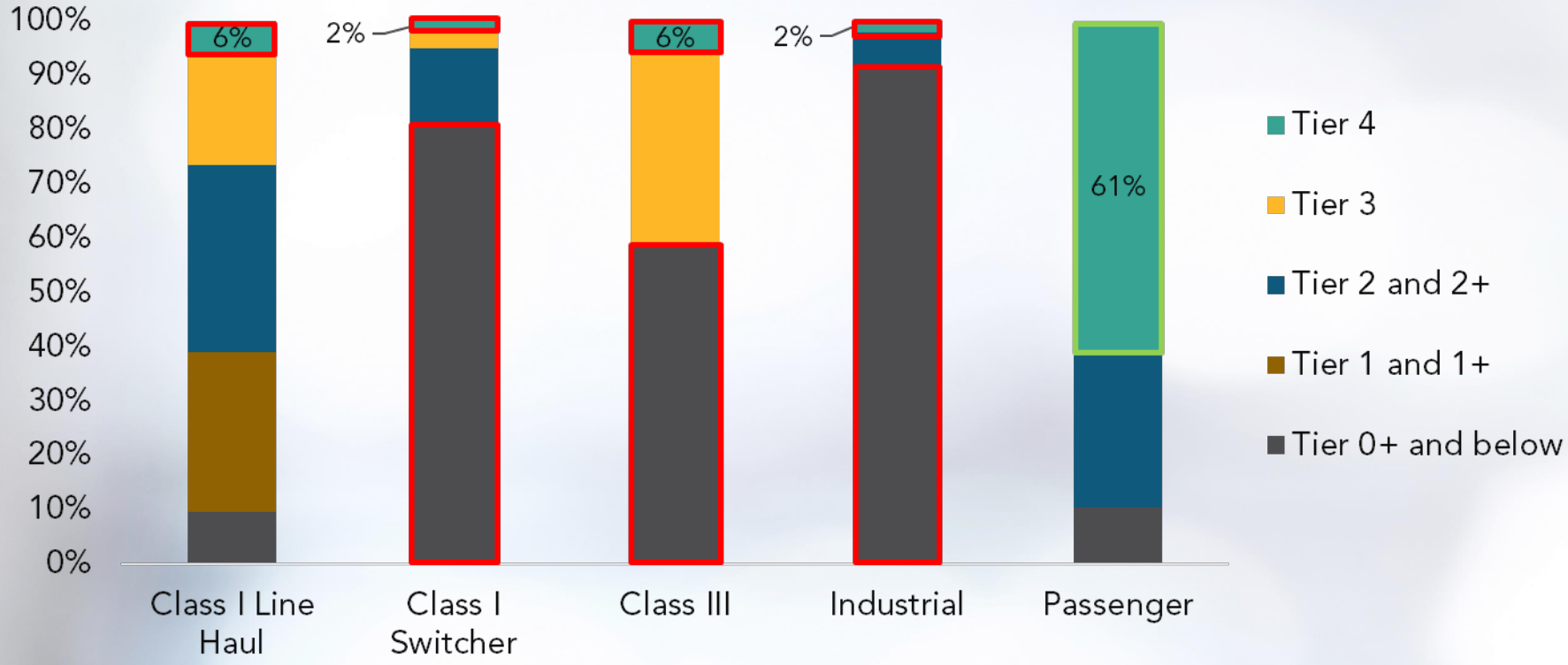
Scenario	Remanufacture	New Purchase
 100x Tier 0	 100x Tier 0+	 100x Tier 4
Cost to the Railroad	$150 million	$300 million
Cost to California Communities	**200 more premature deaths $2B more in health costs**	

South Coast Air Basin Class I Locomotive Activity by Tier



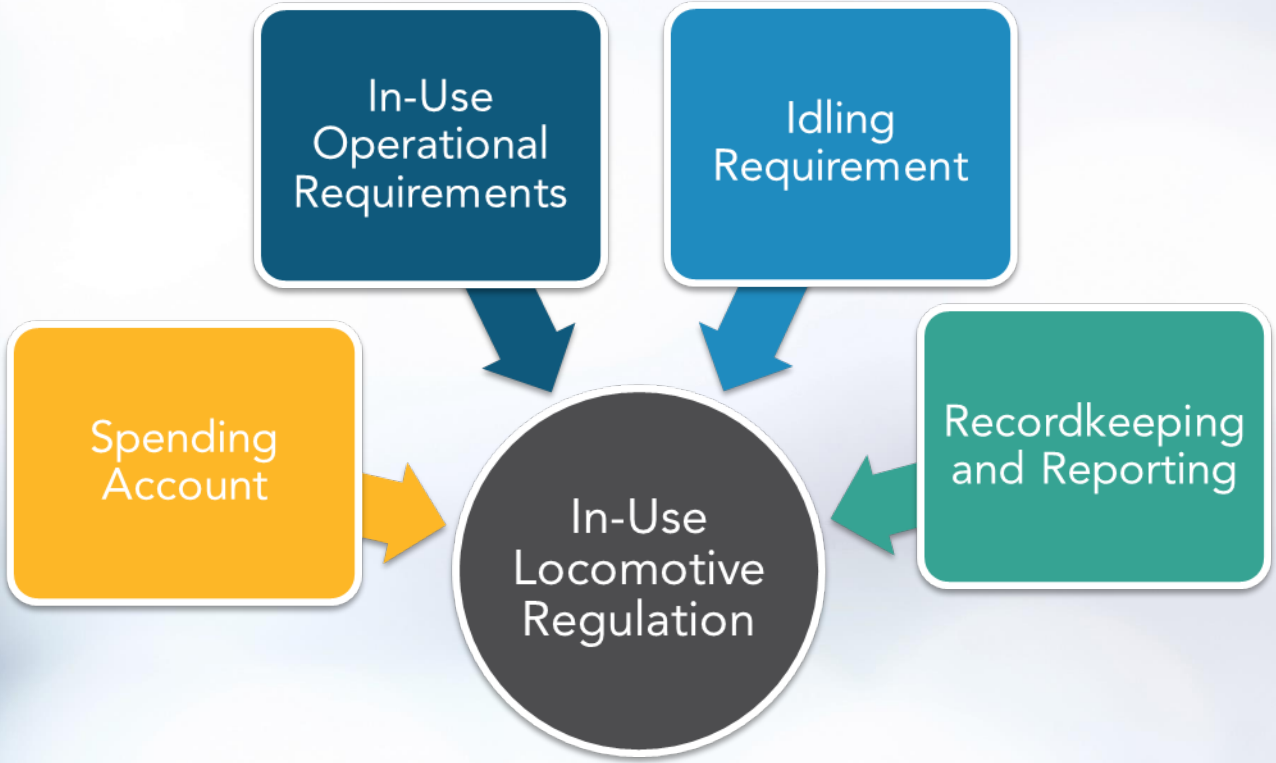
CARB

2021 Tier Breakdown of Locomotive Activity in California



CARB

Proposed Regulation



Spending Account (2023+)

- Funding Requirement = PM & NOx Emission Factor x Usage (MWh)
- Funds are held in internal account
- Alternative Compliance Plan can be used instead

Zero Emission Spending Account Credit

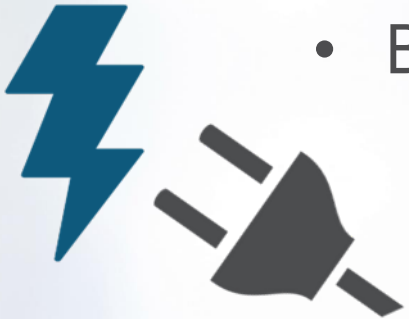
- Spending Account Credit for use of ZE locomotives, ZE rail vehicles, and wayside power
- **2x** credit in disproportionally affected communities

CARB

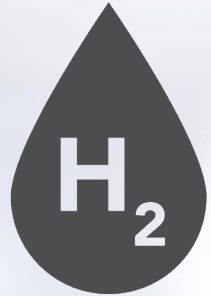
In-Use Operational Requirements (2030+)

- Locomotives must be less than 23 years old
- 2030 and 2035 ZE operations are required for some locomotives
- Alternative Compliance Plan can be used instead
- 2027 and 2032 technology assessments

Zero Emission Locomotives



- Battery Electric
  - Good for railyard and local operations
    - Switchers and Industrial Locomotives
    - Short freight and passenger routes
- Hydrogen Fuel Cell
  - Better suited for longer distances
    - Interstate freight line haul and passenger routes



IRJ International Railway Journal

Caltrans

California orders 29 hydrogen trains inter-city services

September 2

Progress Rail and PHL sign agreement for ba locomotive

Submitted on Friday, November 13, 2020 - 8:31am

Progress Rail
A Caterpillar Company

Pacific Harbor Line
Gateway to the World

Metra

August 17, 2022

Metra to create battery-powered locomotives

Progressive RAILROADING

Progress Rail
A Caterpillar Company

BNSF RAILWAY

Rail News: Mechanical

9/26/2022

Progress Rail to provide BNSF with zero-exhaust emission locomotives

RAILWAY AGE

January 25, 2022 | Locomotives

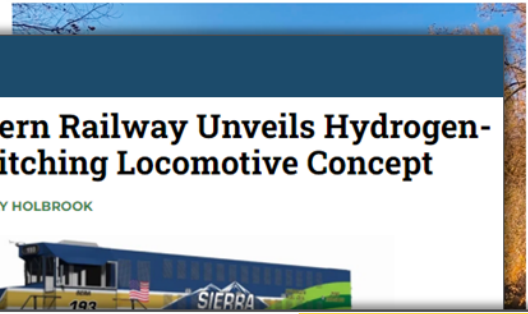
CP's Hydrogen Locomotive Powers Up

BNSF and Wabtec commence battery-electric locomotive pilot test in California

DATE
JAN 4, 2021

Wabtec CORPORATION

BNSF RAILWAY



OmniTRAX
POWERED BY RAIL & REAL ESTATE

OmniTRAX Ushers in New Chapter for All Electric Locomotives

POSTED ON: APRIL 14, 2022

Environment + Energy LEADER 15 YEARS

Sierra Northern Railway Unveils Hydrogen-Powered Switching Locomotive Concept

SEPTEMBER 8, 2022 BY EMILY HOLBROOK

MASS TRANSIT

North America's first hydrogen-powered train coming to SBCTA

The Stadler-manufactured FLIRT H2 will serve the Arrow Line as part of the Redlands Passenger Rail System in 2024.

Sept. 22, 2022

sbcta San Bernardino County Transportation Authority

News Releases

Environment

Progress Rail
A Caterpillar Company

Wabtec CORPORATION

Union Pacific BUILDING AMERICA

Union Pacific Railroad to Assemble World's Largest Carrier-Owned Battery-Electric Locomotive Fleet

OMAHA, NEB., JANUARY 28, 2022

Plans to get to Zero Emission

sbcta San Bernardino County Transportation Authority
Hydrogen Fuel Cell Train in 2024

METROLINK
100% ZE Fleet by 2028

Caltrans
100% ZE Fleet by 2035

AMTRAK
GHG Net Zero by 2045

Zero Emission Rail

BNSF RAILWAY
30% GHG Reduction by 2030


Class I and II Railroads GHG Reduction Targets

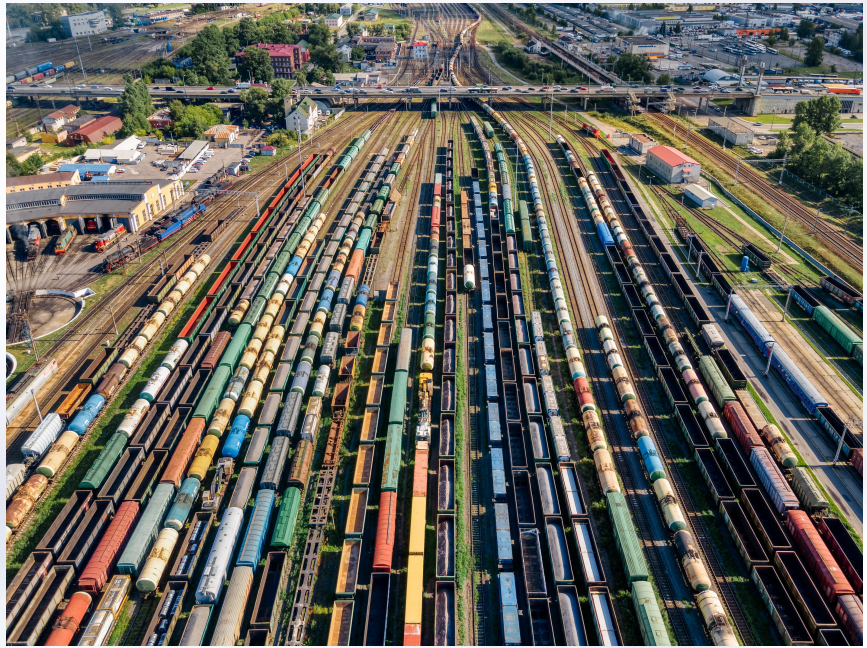
UNION PACIFIC
GHG Net Zero by 2050

U.S. Department of Transportation
Federal Railroad Administration
GHG Net Zero by 2050

CARB

Locomotive Idling (2023+)

- 30 minute idle limit for AESS equipped locomotives
- Enforcement by Air Districts possible through enforcement MOU



Registration, Reporting, and Annual Payment

- One time registration for locomotives operating in California
- Annual locomotive reporting by Air District
- Annual $175 per locomotive administrative payment

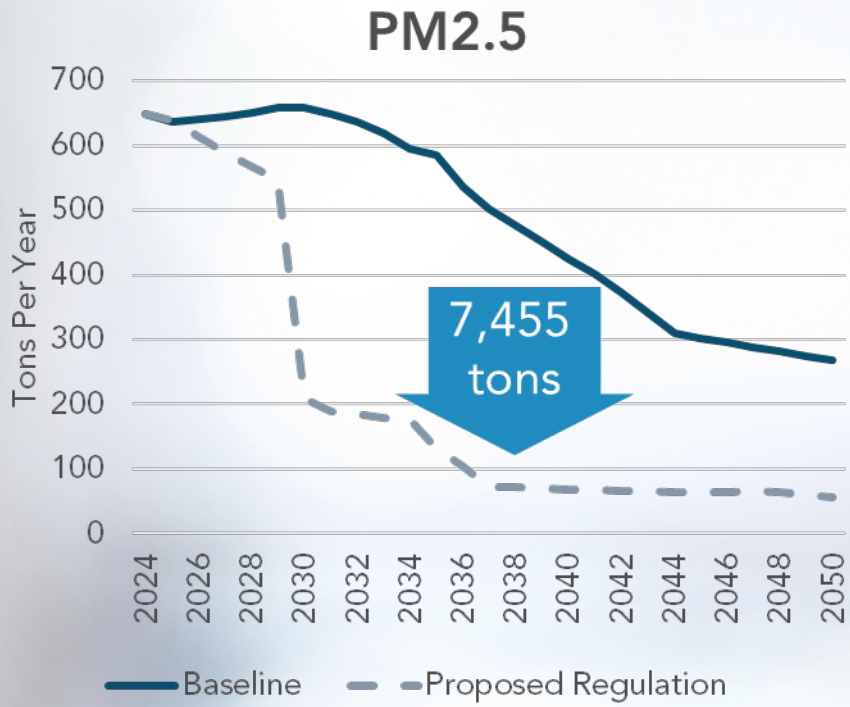
Flexibility and Safeguards

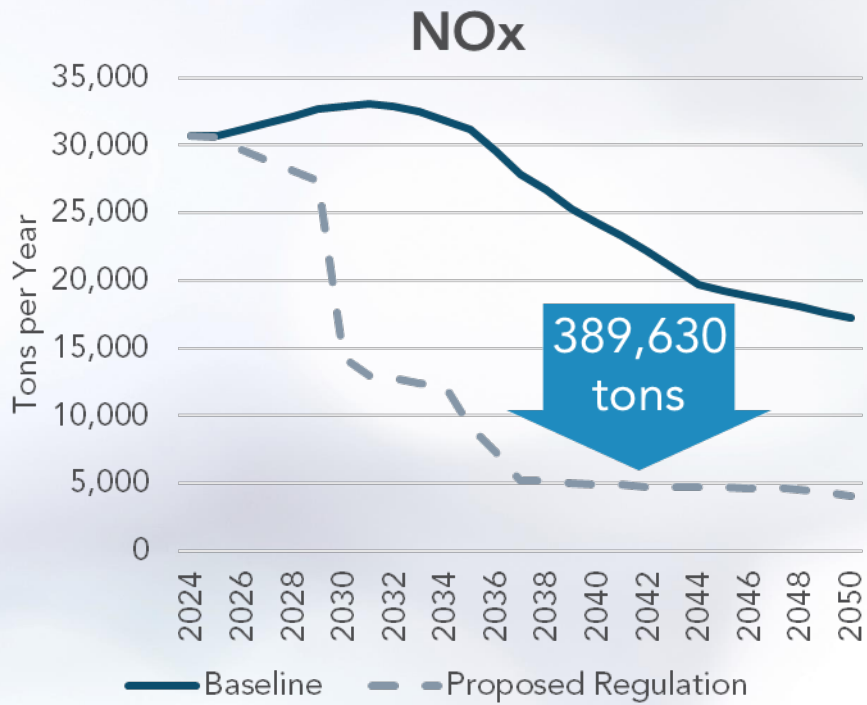
- Temporary Operating Waivers
- Small Business Hardship Extension
- Historic Locomotive Low-Use Exemption
- 2027 and 2032 Technology Assessments
- Alternative Compliance Plans

Alternative Compliance Plans

- Replaces the Spending Account and/or the In-Use Operational Requirements
- Plan must reduce equivalent or greater emissions
- Five-year verification period allows for reevaluation and modifications as necessary

Estimated Emission Reductions

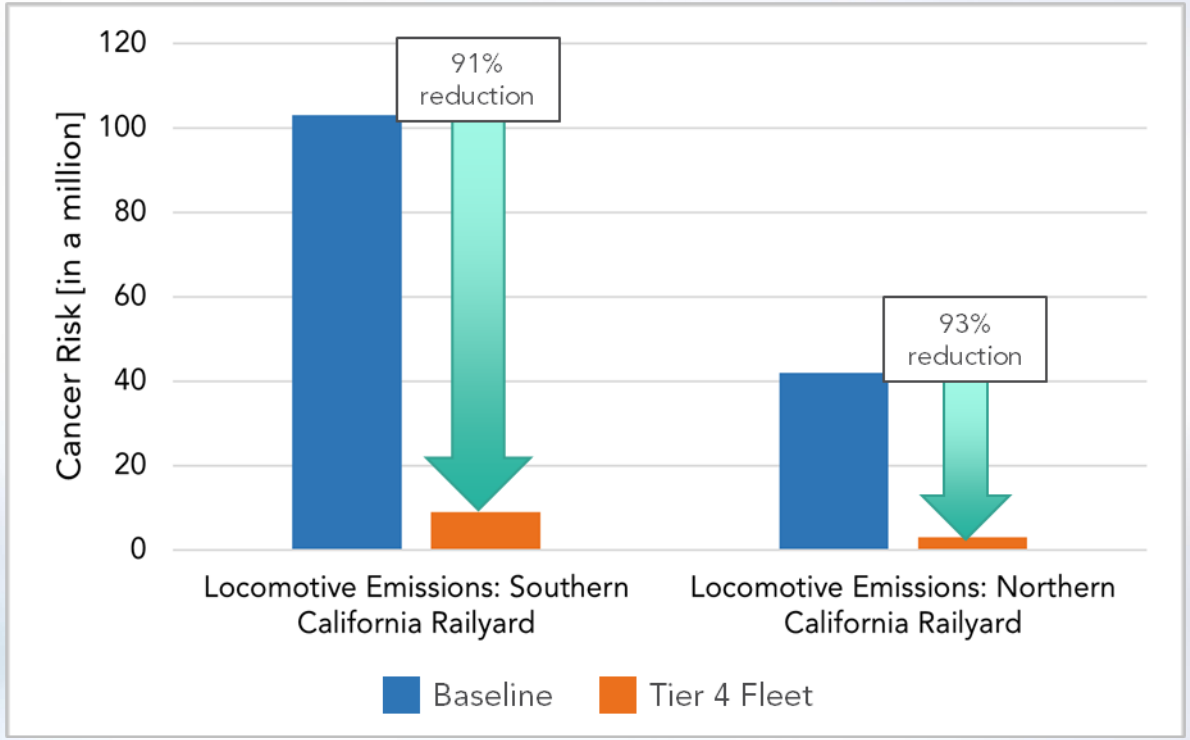




and 21.9 MMT GHG

CARB

Cancer Risk Reduction Near Railyards



CARB

Monetized Benefits and Costs

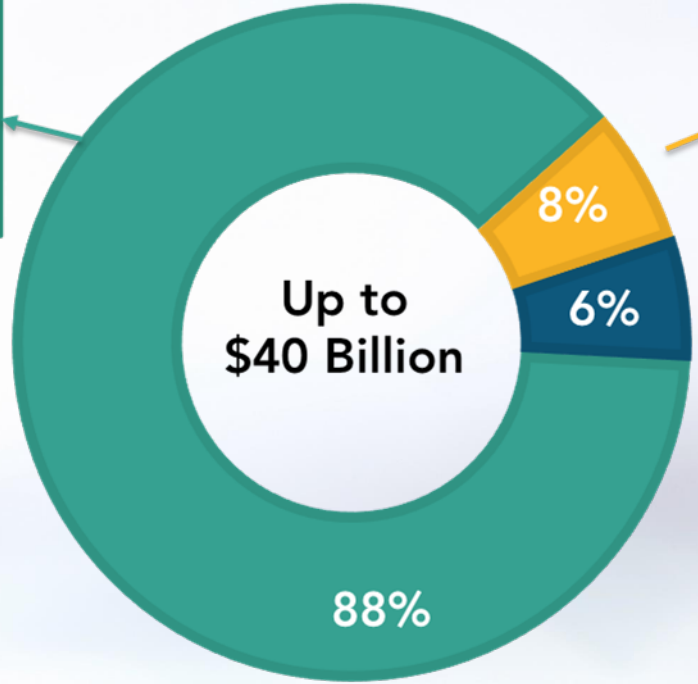
- 3,233 fewer deaths
- 1,097 less hospital stays
- 1,486 fewer ER visits

- $32 average per household annually
- $0.39 to $2.27 average fare increase if cost is passed through to consumers

CARB

2022 Locomotive Funding

- Inflation Reduction Act
- Consolidated Appropriations Act



- Clean Off Road Equipment Voucher
- Clean Transportation Incentives

- ZE Transportation Manufacturing (CEC)
- Innovative Hydrogen Fueling Solutions for Heavy Transport

Environmental Analysis

- Draft Environmental Analysis
  - Released for public comment September 23, 2022 – November 7, 2022

- Next Steps:
  - Prepare written responses to comments
  - Present Final Environmental Analysis and written responses to comments to the Board

Next Steps

- Make non-substantive changes
- Clarify intent to collaborate with transit agencies to both transition to zero emission and increase ridership
- Include federal safety approvals as part of the technology assessment
- Return with a final proposal Spring 2023

Conclusion

- The Proposed In-Use Locomotive Regulation is a comprehensive plan to help us meet the goal of clean locomotive transport.
- We ask for your support.