Video

this video is now available at:

https://www.youtube.com/watch?v=21pVFp2yaPs
Emission Reduction by 2037 in 2022 State SIP Strategy

- In-Use Locomotive Regulation, 31%
- Regulated Sources – Federal Action Needed
- Off-Road Equipment
- On-Road Heavy-Duty
- Other
- On-Road Light-Duty

Other regulated sources require federal action.
Zero Emission Operations

- **Locomotives**
  - Still need ZE operations

- **TRUs**
  - Transitioning to ZE

- **Forklifts**
  - Transitioning to ZE

- **Cargo Handling Equipment**
  - Transitioning to ZE

- **Truck Fleets**
  - Transitioning to ZE

- **Drayage Trucks**
  - Transitioning to ZE
## California Freight Sector Emissions

<table>
<thead>
<tr>
<th>Sector</th>
<th>2021 PM2.5 Contribution</th>
<th>2030 PM2.5 Contribution</th>
<th>2021 NOx Contribution</th>
<th>2030 NOx Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>11%</td>
<td>12%</td>
<td>15%</td>
<td>22%</td>
</tr>
<tr>
<td>On-Road</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **PM2.5 Contribution**
  - 2021: Aircraft 11%, On-Road, Marine, Shared
  - 2030: Aircraft 12%, On-Road, Marine, Shared

- **NOx Contribution**
  - 2021: Aircraft 15%, On-Road, Marine, Shared
  - 2030: Aircraft 22%, On-Road, Marine, Shared
Diesel Electric Locomotive

- Diesel Engine
- Alternator
- Diesel, Energy
- PM, NOx, GHG
- Electricity
- Electric Motors

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# Types of Locomotives

<table>
<thead>
<tr>
<th></th>
<th>Line Haul</th>
<th>Switcher</th>
<th>Passenger</th>
<th>Historic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power</strong></td>
<td>High (~3,000hp+)</td>
<td>Low (~&lt;3,000hp)</td>
<td>High</td>
<td>Low-High</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td>Moving heavy freight</td>
<td>Moving railcars in and around railyards</td>
<td>Higher speed Lighter load Engine for A/C, lights etc.</td>
<td>Used for historic and educational experiences</td>
</tr>
<tr>
<td><strong>Distance (Range)</strong></td>
<td>Nationwide or Local</td>
<td>Local (railyards or industrial facilities)</td>
<td>Nationwide or Local</td>
<td>Local</td>
</tr>
<tr>
<td><strong>Used by</strong></td>
<td>Class I-III</td>
<td>Class I-III, Industrial, and Passenger</td>
<td>Passenger Agencies</td>
<td>Historic and Heritage Railroads</td>
</tr>
</tbody>
</table>
## Remanufacture vs New Purchase

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Remanufacture</th>
<th>New Purchase</th>
</tr>
</thead>
<tbody>
<tr>
<td>100x Tier 0</td>
<td>100x Tier 0+</td>
<td>100x Tier 4</td>
</tr>
<tr>
<td><strong>Cost to the Railroad</strong></td>
<td>$150 million</td>
<td>$300 million</td>
</tr>
<tr>
<td><strong>Cost to California Communities</strong></td>
<td><strong>200 more premature deaths</strong></td>
<td><strong>$2B more in health costs</strong></td>
</tr>
</tbody>
</table>
South Coast Air Basin Class I
Locomotive Activity by Tier

Activity [MWhs]

- Tier 4
- Tier 3
- Tier 2/2+
- Tier 1/1+
- ≤Tier 0+

Years: 2010 to 2021

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2021 Tier Breakdown of Locomotive Activity in California

Class I Line Haul
- Tier 4: 6%
- Tier 3: 2%
- Tier 2 and 2+: 6%
- Tier 1 and 1+: 2%
- Tier 0+ and below: 0%

Class I Switcher
- Tier 4: 2%
- Tier 3: 10%
- Tier 2 and 2+: 30%
- Tier 1 and 1+: 40%
- Tier 0+ and below: 20%

Class III
- Tier 4: 6%
- Tier 3: 2%
- Tier 2 and 2+: 61%

Industrial
- Tier 4: 2%
- Tier 3: 20%
- Tier 2 and 2+: 30%
- Tier 1 and 1+: 20%
- Tier 0+ and below: 10%

Passenger
- Tier 4: 61%
Proposed Regulation

- In-Use Operational Requirements
- Idling Requirement
- Spending Account
- Recordkeeping and Reporting

In-Use Locomotive 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

~50 ft
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
Progress Rail and PHL sign agreement for battery-powered locomotive
Submitted on Friday, November 13, 2020 - 8:31am

Progress Rail to provide BNSF with zero-exhaust emission locomotives
January 25, 2022 | Locomotives

CP’s Hydrogen Locomotive Powers Up

OmniTRAX Ushers in New Chapter for All Electric Locomotives
POSTED ON: APRIL 14, 2022

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

Sierra Northern Railway Unveils Hydrogen-Powered Switching Locomotive Concept
SEPTMBER 8, 2022 BY EMILY HOLDROOK

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 Rail

- **SB CTA (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

**Class I and II Railroads GHG Reduction Targets**
- **BNSF Railway**: 30% GHG Reduction by 2030
- **Union Pacific**: GHG Net Zero by 2050
- **U.S. Department of Transportation Federal Railroad Administration**: GHG Net Zero by 2050

**GHG Net Zero Targets**
- **San Bernardino County Transportation Authority**: GHG Net Zero by 2050
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

**PM2.5**

- Baseline
- Proposed Regulation

- Estimated reduction: 7,455 tons

**NOx**

- Baseline
- Proposed Regulation

- Estimated reduction: 389,630 tons

and 21.9 MMT GHG
Cancer Risk Reduction Near Railyards

Cancer Risk [in a million]

- Locomotive Emissions: Southern California Railyard
- Locomotive Emissions: Northern California Railyard

Baseline vs. Tier 4 Fleet

91% reduction
93% reduction
Monetized Benefits and Costs

Total Health Benefits
$32.0 Billion

Total Costs
$13.8 Billion

- 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
2022 Locomotive Funding

- Inflation Reduction Act
- Consolidated Appropriations Act

Up to $40 Billion

- 88%
- 8%
- 6%

- Clean Off Road Equipment Voucher
- Clean Transportation Incentives

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

Federal
CARB
State
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.