



Draft In-Use Locomotive Regulation Workshop March 30, 2021

Draft Regulation Language and
Preliminary Cost Document

Listening to Language Interpretation

- In your meeting/webinar controls, click **Interpretation**. It can be located at the bottom of the screen.
- Click the language that you would like to hear. For this meeting, you will have English and Spanish as your options.
- To only hear the interpreted language, click **Mute Original Audio**.

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1. In your meeting/webinar controls, click **Interpretation**.



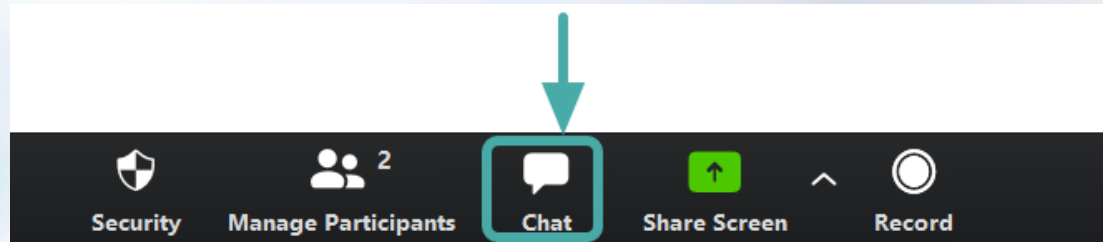
2. Click the language that you would like to hear.



3. (Optional) To hear the interpreted language only, click **Mute Original Audio**.

Language Interpretation Questions

- Please use the chat feature if you have a question. CARB staff will translate the question for you.
- If you are not able to use the chat box, raise your hand and CARB staff will interpret and type it into the chat box for you.



Tech Support

- Please reach out for help if you have any technical challenges!
- Use Zoom Chat to contact Chris Garcia or just message Everyone
- Meeting is being recorded
- Private chats are archived

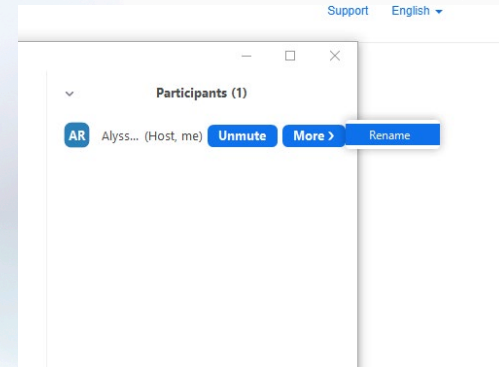
Staff Introductions

- Layla Gonzalez – Presenter
- Dillon Miner – Presenter
- Jennifer Kozumplik – Q & A Moderator
- Chris Garcia – Zoom Technical Assistance

Before We Get Started...

- Please **mute yourself** and make sure your full name and affiliation are showing as your screen name
- To **rename**, click on the top right side of your picture/video.
- Use this naming convention, **Affiliation - First Last (e.g. CARB - Jane Doe)**
 - P – for General Public (e.g. P - John Smith)

To rename, find your name on the participant list. Hover over the right side and click more for the rename option.



- **Need help?** Use the Chat function to request assistance

Mute/Unmute

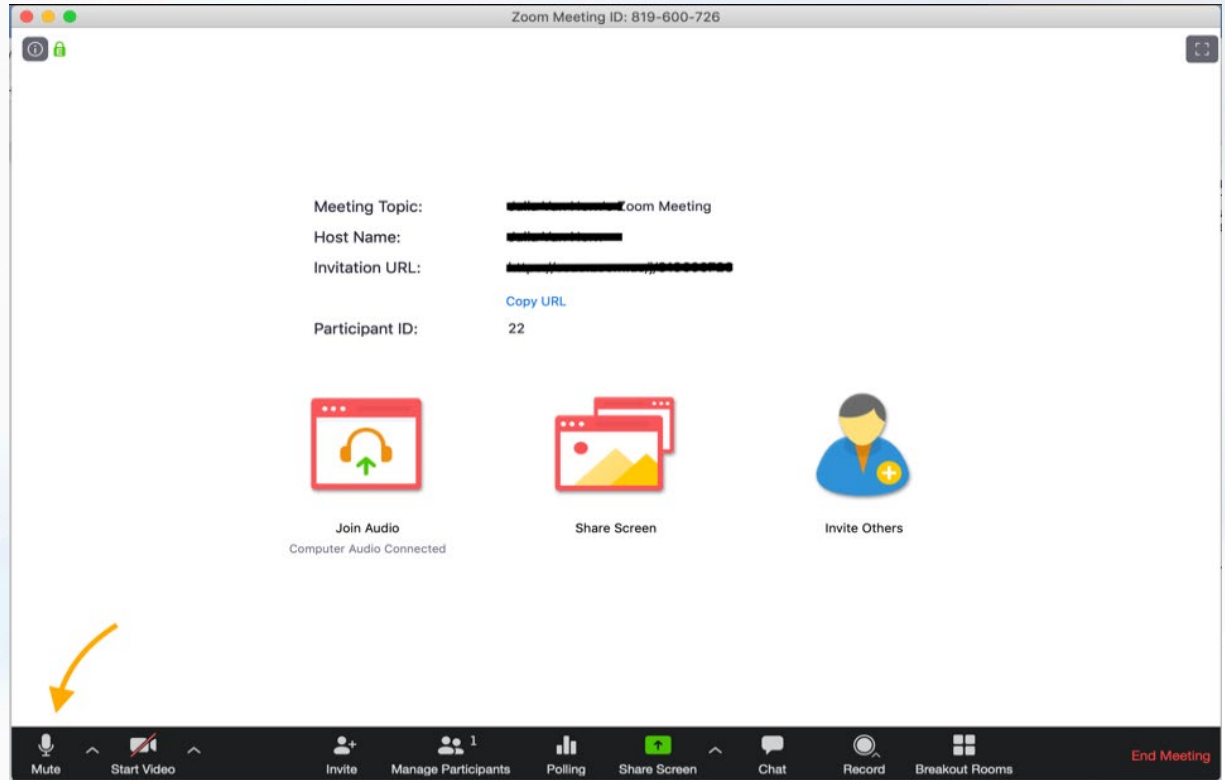
Please remain on mute unless you are called on to speak

Zoom:

Mute button at bottom left

Phone:

Dial *6 to mute/unmute



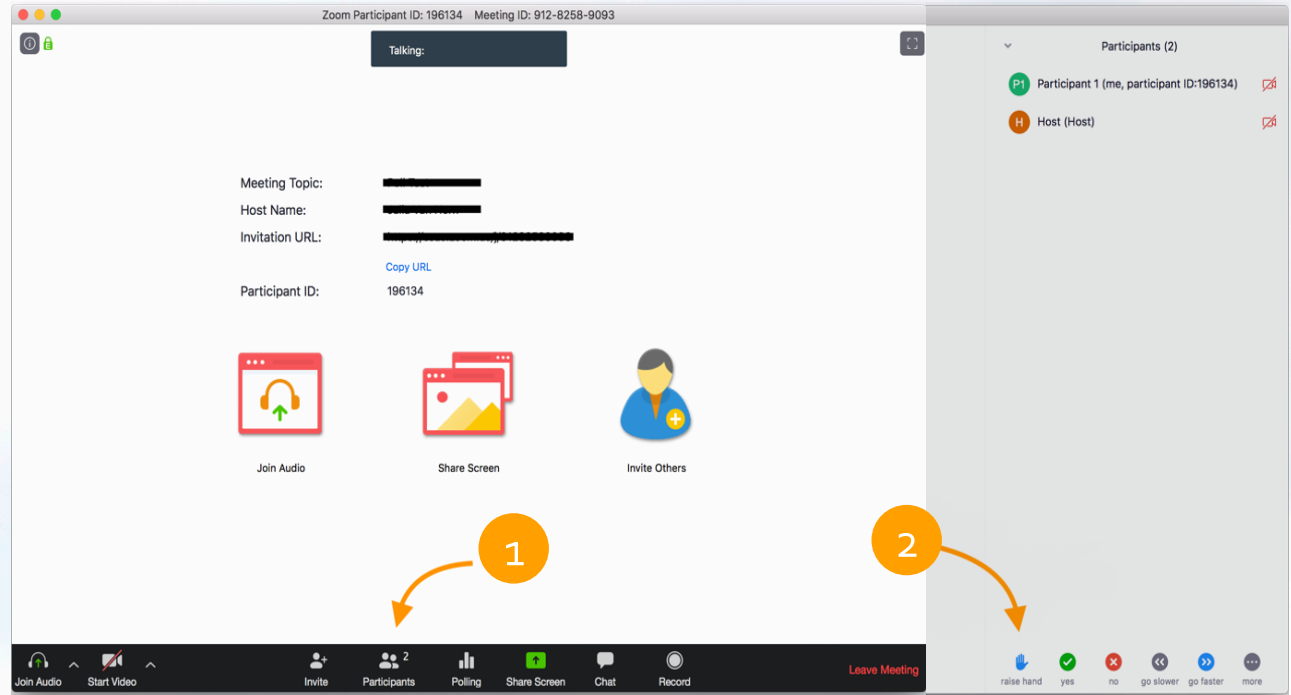
How to Ask a Question

Raise Hand

To be added to the speaking queue, please use Raise Hand

Click **Participants**, then **Raise Hand**.

On the phone press *9 to Raise your Hand



How to Submit Questions

- During the workshop please submit all questions to the participant named **“submit questions here”**
 - When possible, please identify slide number you want to discuss
- After the workshop please submit questions/comments to the [informal comment submittal](#) form, or email freight@arb.ca.gov.

Workshop Agenda

1. Locomotive Primer (1:15)
2. Draft Regulation and Regulatory Language (1:30)
3. Questions and Answers (2:00)
4. Preliminary Cost Document (2:15)
5. Question and Answers (2:30 to 3:30)

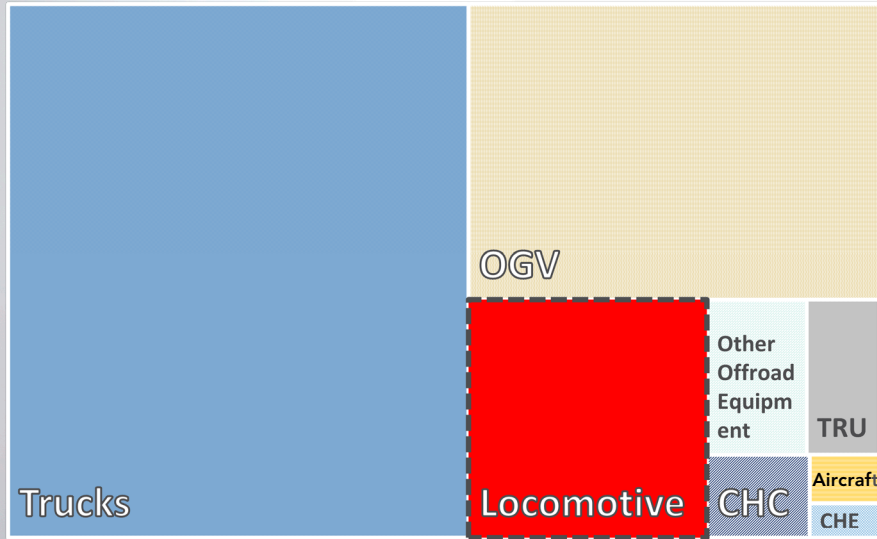


Locomotive Emissions

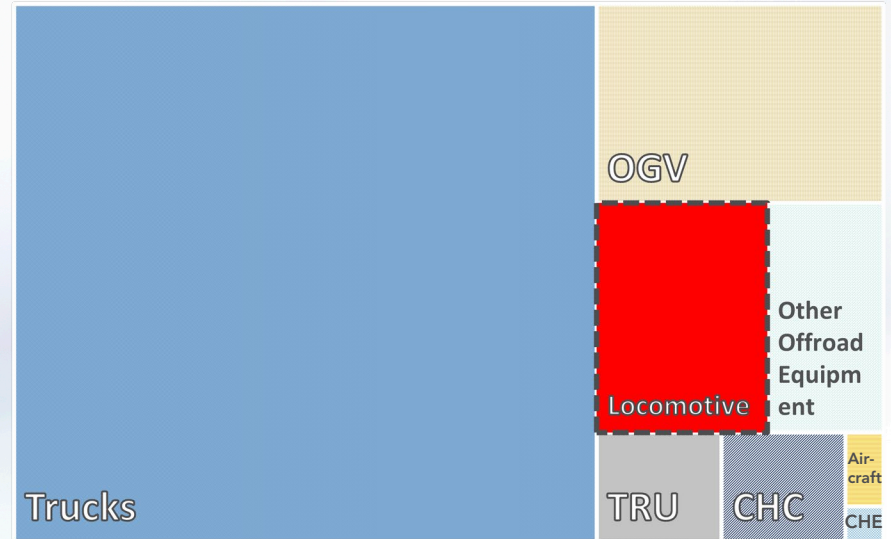
12% of Statewide NO_x

8% of Statewide PM_{2.5}

NO_x Emissions from Freight Source Categories

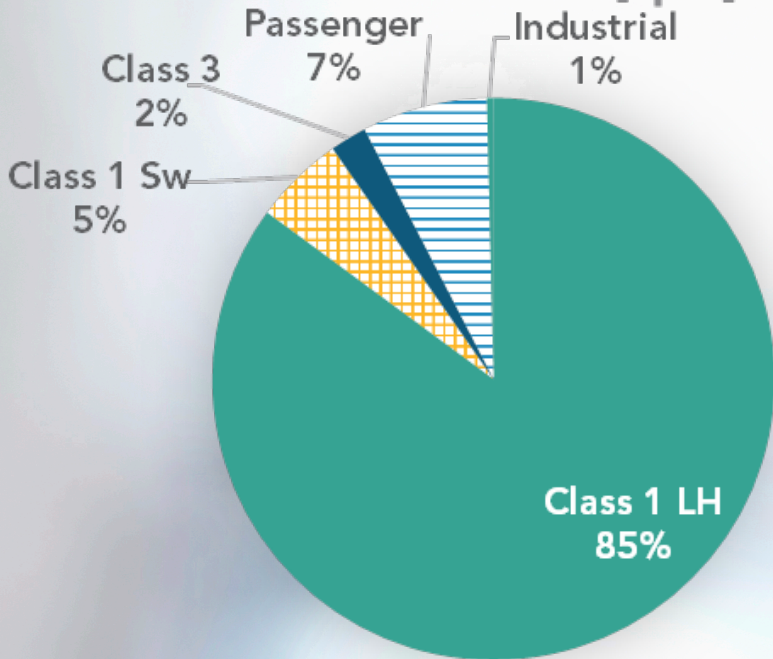


PM_{2.5} Emissions from Freight Source Categories

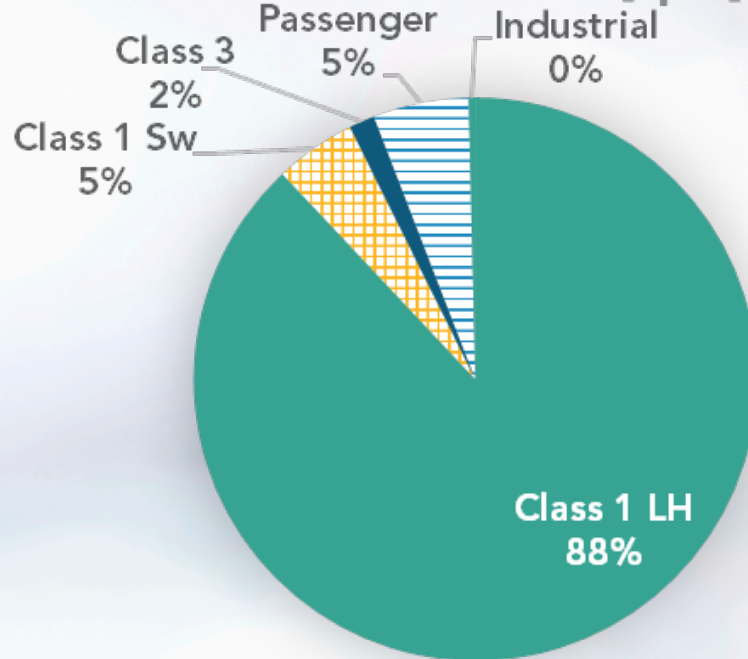


Locomotive Emissions by Class

CY2020 NOx [tpd]



CY2020 PM2.5 [tpd]

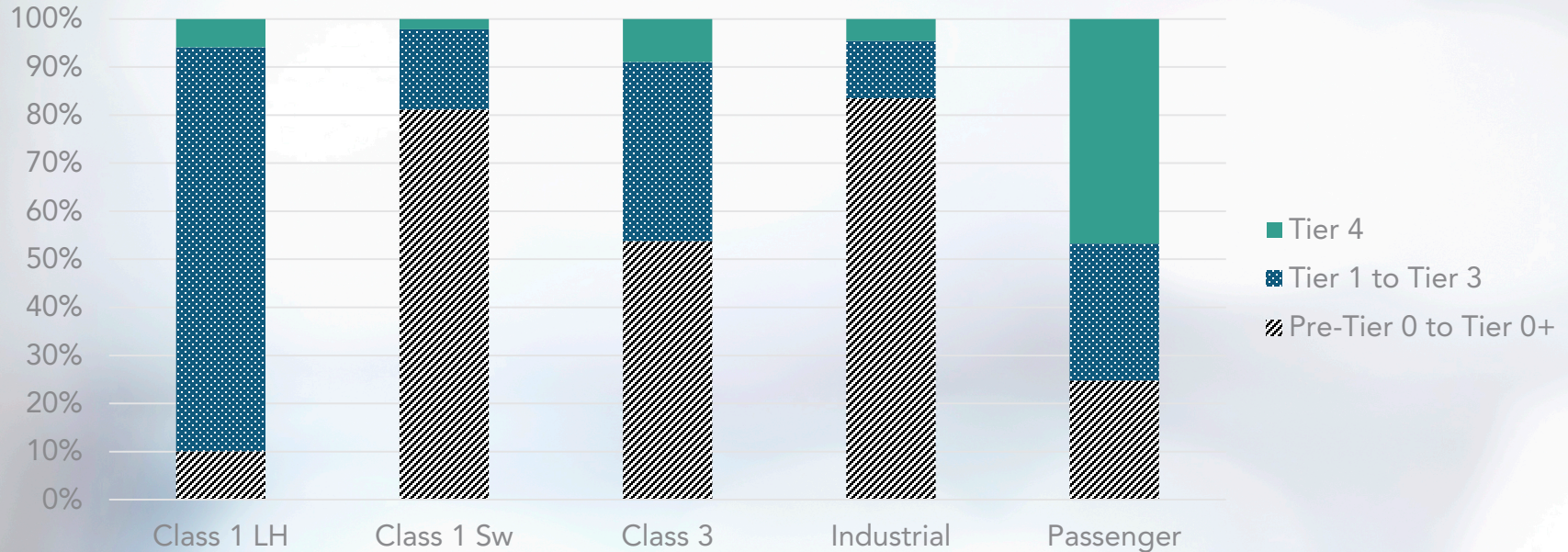


Locomotive Tiers

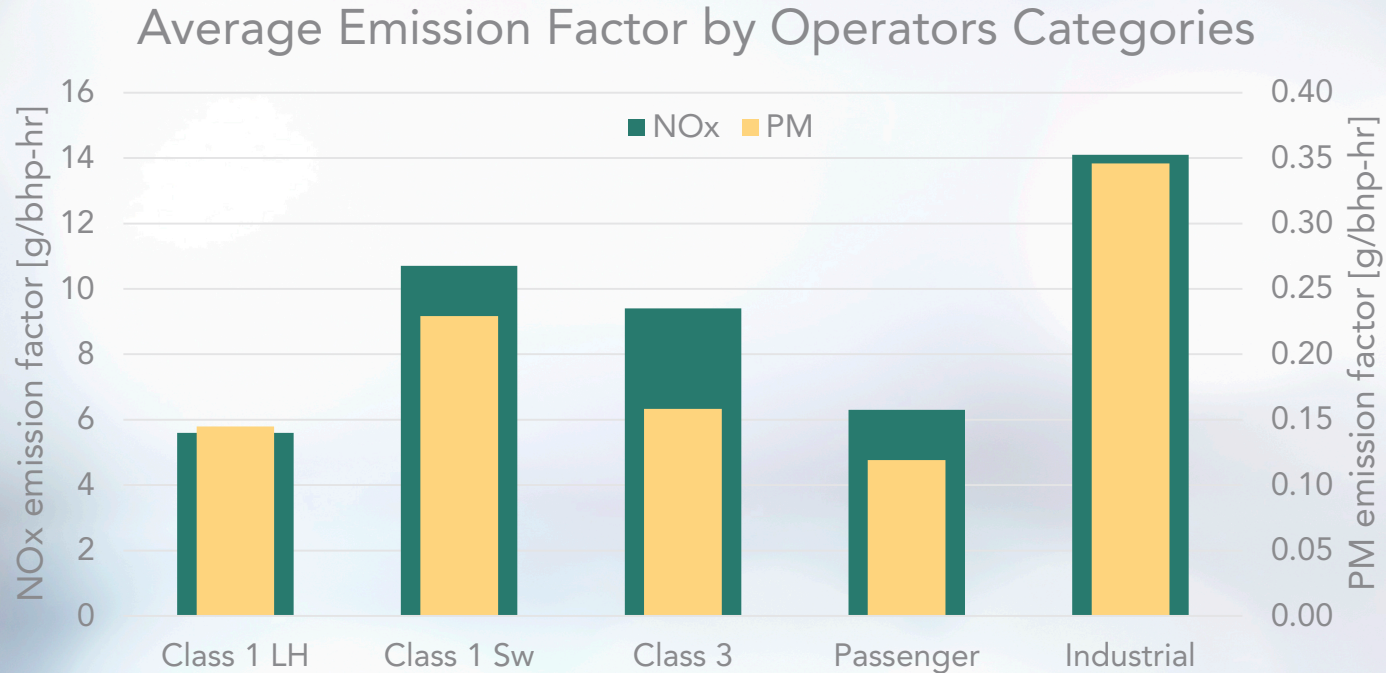
Emissions Tier	Year of Manufacture	Line Haul NO _x (g/bhp-hr)	Line Haul PM (g/bhp-hr)	Switcher NO _x (g/bhp-hr)	Switcher PM (g/bhp-hr)
Pre-Tier 0	1973-1999	13.5	0.6	17.4	0.72
Tier 0	2000-2001	9.5	0.6	14.0	0.72
Tier 0+	Ongoing	8.0	0.22	11.8	0.26
Tier 4	2015	1.3	0.03	1.3	0.03

Locomotive Emissions by Tier

Tier Activities by Locomotive Operator Categories



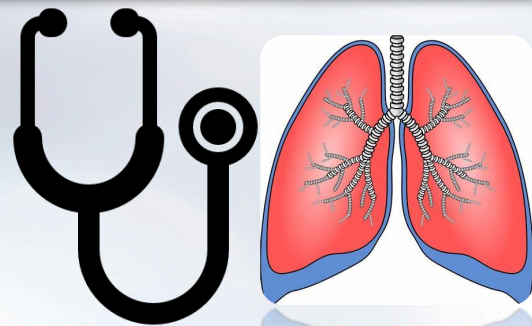
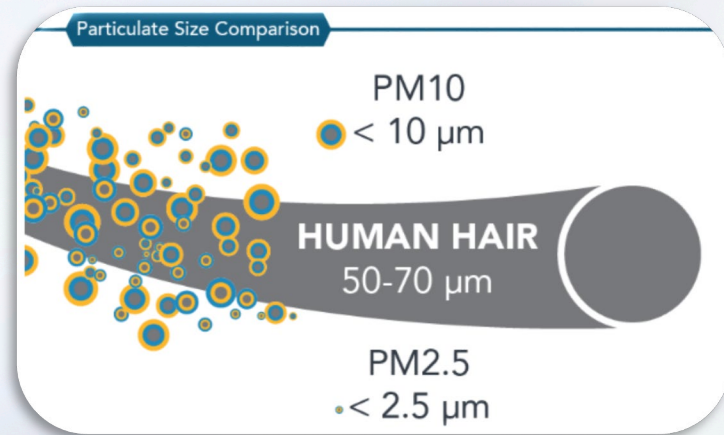
Locomotive Emissions by Emission Factor



Health Risks and Impacts

Exposure to diesel exhaust/PM2.5 and NOx can lead to:

- Acute respiratory symptoms
- Asthma exacerbations; emergency room visits for asthma
- Bronchitis; chronic obstructive pulmonary disease (COPD)
- Heart attacks
- Nervous system effects (e.g., cognitive deficits)
- Lost work days
- Premature death
- Increased risk for cancer



Health Benefits from Average Tier 4

Statewide, Cumulative for 2020-2050

Estimated Number of Fewer Cases	
Cardiopulmonary Mortality	4,887 Fewer Cases (3,821 – 5,973)
Hospitalizations for Cardiovascular and Respiratory Illnesses	1,576 Fewer Cases (201 – 2,921)
Emergency Room Visits for Asthma	2,303 Fewer Cases (1,457 – 3,149)

(Numbers in parentheses are the 95% confidence intervals)

Goals



Prioritize emission reductions in communities disproportionately impacted by locomotive emissions

Decrease locomotive emissions by increasing turnover to Tier 4 and cleaner locomotives

Move toward Zero Emission Locomotives in California

Outreach

- Since 2019 - 70 stakeholder meetings
- Railyard Listening Session March 4, 2021
- More Listening Sessions and stakeholder outreach coming
- [Meetings & Workshops Webpage](#)
- Email: freight@arb.ca.gov

Community Listening Session

Topic	Where to find more information
Railyard Equipment and CARB Programs	<u>Community Air Protection Program</u>
Funding Sources	<u>Supplemental Environmental Projects (SEPs)</u>
Noise Complaints	<u>CPUC Quiet Zone</u>
More Listening Sessions	<u>Community Air Protection Program Events</u>

Four Primary Actions of the Regulation



NOTE: This preliminary discussion draft of the proposed Locomotive Regulation is provided for review purposes only. The draft is subject to ongoing revisions and refinement.

DRAFT REGULATION ORDER

Adopt, title 13, California Code of Regulations, Chapter 9, Article 8, Section 2478 to read as follows:

(Note: The entire text of sections 2478 through 2478.19 set forth below is new language in "normal type" proposed to be added to title 13, CCR.)

Airborne Toxic Control Measure for In-Use Locomotive Engines Operating in California

Section 2478. In-Use Locomotive Regulation

2478.1 Applicability

Except as noted in section 2478.2, this regulation applies to the following:

- (a) Any Person that owns, operates, sells, leases, or rents, or is an original equipment manufacturer of a locomotive operating in the State of California.
- (b) Federal Requirements

Nothing in this Regulation shall be construed to amend, repeal, modify, or change any applicable federal laws or regulations, including any United States Environmental Protection Agency (U.S. EPA) regulations or requirements. Nothing in this Regulation shall be construed to require anyone to take any action prohibited by the United States Constitution or the California Constitution. Any person subject to this Regulation shall ensure compliance with both federal regulations (including any U.S. EPA regulations) and the requirements of this Regulation, including but not limited to, where applicable, obtaining any necessary approvals, exceptions, or orders from the U.S. EPA. To the extent any requirements in this Regulation conflict with any applicable federal regulation, the requirements of the federal regulation shall prevail.

2478.2 Exemptions

This regulation does not apply to:

- (a) Locomotives with an engine that has a total rated power of less than 1,006 horsepower (hp);
- (b) Locomotives used for instructional purposes such as diesel mechanics. The locomotive must be owned by an accredited college, university, or other

Timeline of the Regulation

Railroads track California locomotive activity starting in 2022

Railroads report previous year's locomotive activity, and set up and fund Spending Account starting in July 2023

Useful Life Limit starting in 2030

Draft Regulatory Language

- Establishes a Statewide Regulation for all owners, operators, sellers, leasers, renters, or manufacturers (OEMs).
 - Exemptions:
 - Locomotives with engines <1,006 horsepower (hp)
 - Training locomotive engines (e.g. mechanic training)
 - Equipment used on and off rail, military locomotives and any locomotive operating <10 hours per year

Section 2478.4 Spending Account (SA)

- In 2023, establish a spending account.
- All funds deposited must come from compliance with the regulation (i.e. no commingling of monies).
- Funds are to purchase the cleanest available locomotives or the development of zero emission technologies.
- Until the end of 2034, usage of zero-emission locomotives will generate a credit used to offset monies owed to the spending account.

Useful Life Limit

- Starting in 2030 all locomotives 23 years old or older are banned from operating in California.
 - Example: In 2030, locomotives built in 2007 or before can no longer operate in California.
- There is no useful life limit on Zero Emission Locomotives.

Scenarios

- Railroad A operates 5x Tier 0 switchers in CA.
 - Tier 0 locomotives will be over 23 years old by 2030
- All switchers operate 200 MWh per year.
 - For a switcher, 200 MWh = about 18,000 gallons of diesel
- Two scenarios are shown:
 - Tier 4 Scenario: Railroad A will purchase Tier 4 switchers with the SA.
 - ZE Scenario: Railroad A will purchase Tier 4 switchers with the SA.
- Numbers are representative- exact fees are determined by engine family.

Tier 4 Illustrative Example

		SA 1 st year							ULL 1 st year	
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Beginning Balance	-	-	\$1.5M	\$0.3M	\$1.8M	\$0.5M	\$1.8M	\$0.3M	\$0	\$0.8M
Annual Charge	-	\$1.5M	\$1.5M	\$1.6M	\$1.3M	\$1.4M	\$1.1M	\$1.1M	\$0.8M	\$0.1M
Fleet and SA Charge per Locomotive	\$290K	\$300K	\$310K	\$330K	\$340K	\$350K	\$370K	\$380K	\$26K	\$26K
	\$290K	\$300K	\$310K	\$330K	\$340K	\$350K	\$370K	\$380K	\$26K	\$26K
	\$290K	\$300K	\$310K	\$330K	\$340K	\$350K	\$370K	\$25K	\$26K	\$26K
	\$290K	\$300K	\$310K	\$330K	\$340K	\$23K	\$24K	\$25K	\$26K	\$26K
	\$290K	\$300K	\$310K	\$21K	\$22K	\$23K	\$24K	\$25K	\$26K	\$26K
Spent	-	-	\$2.7M	-	\$2.7M	-	\$2.7M	\$5.4M	-	-
Account Balance	-	\$1.5M	\$0.3M	\$1.8M	\$0.5M	\$1.8M	\$0.3M	\$0	\$0.8M	\$1.0M

5x Tier 4 = \$128,000 / year + annual increase
*Banned after 23 yrs

\$4M in addition to the SA balance and the annual charge is used to purchase 2x Tier 4 locomotives.

ZE Illustrative Example

	SA 1 st year								ULL 1 st year	
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Beginning Balance	-	-	\$1.5M	\$3.0M	\$0.7M	\$2.4M	\$3.6M	\$1.0M	\$0M	\$0.7M
Annual Charge	-	\$1.5M	\$1.5M	\$1.6M	\$1.6M	\$1.4M	\$1.4M	\$1.5M	\$1.1M	-
ZE Credit	-	-	-	-	-	(\$0.2M)	(\$0.2M)	(\$0.2M)	(\$0.4M)	(\$0.9M)
Fleet and SA Charge per Locomotive	\$290K	\$300K	\$310K	\$330K	\$340K	\$350K	\$370K	\$380K	\$0	\$0
	\$290K	\$300K	\$310K	\$330K	\$340K	\$350K	\$370K	\$380K	\$0	\$0
	\$290K	\$300K	\$310K	\$330K	\$340K	\$350K	\$370K	\$380K	\$0	\$0
	\$290K	\$300K	\$310K	\$330K	\$0	\$0	\$0	\$0	\$0	\$0
Spent	-	-	-	\$3.8M	-	-	\$3.8M	\$11.4M	-	-
Account Balance	-	\$1.5M	\$3.0M	\$0.7M	\$2.4M	\$3.6M	\$1.0M	\$0	\$0.7M	\$0

5x ZE Credit = \$0.9M / year + annual increase (until 2035)

*No charge
*May operate beyond 23 yrs

\$9M in addition to the SA balance and the annual charge is used to purchase 3x ZE locomotives.

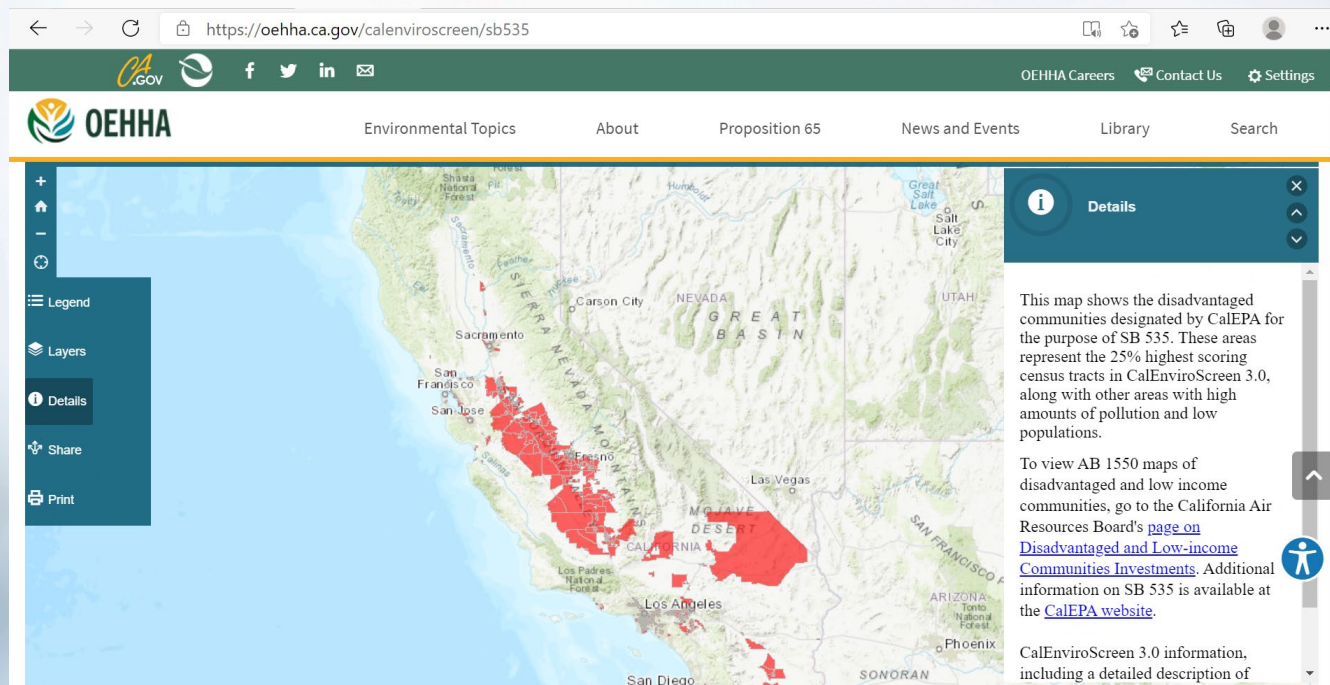
Illustrative Example Comparison

		Tier 4	ZE
Cost Estimate (switcher)		\$2,700,000	\$2,750,000-5,000,000
Spending Account Charge (switcher operating 200 MWh/yr)	2022	~\$19,000	~\$136,000 credit
	2030	~\$26,000	~\$184,000 credit
	2040	~\$38,000	\$0 (ZE Credit Expires in 2035)
Useful Life Limit		Banned after 23 years	Not banned

Benefit of Early Operation of Zero Emission (ZE) Locomotives in Disadvantaged Communities

- ZE operation in disadvantaged communities generate double credit (until the end of 2034).
- Incentivizes early deployment of ZE locomotives in areas experiencing the highest cumulative exposure burdens.
- Must report all ZE activity within Disadvantaged Communities separately to obtain credit used to offset monies owed to the spending account.

Example: Spending Account Credit for Operation in a Disadvantaged Community



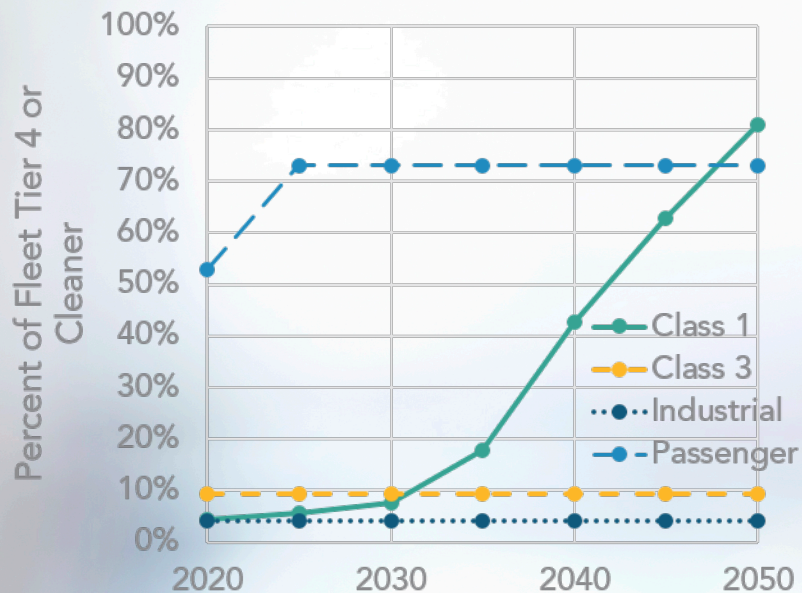
Section 2478.7

Alternative Spending Plan

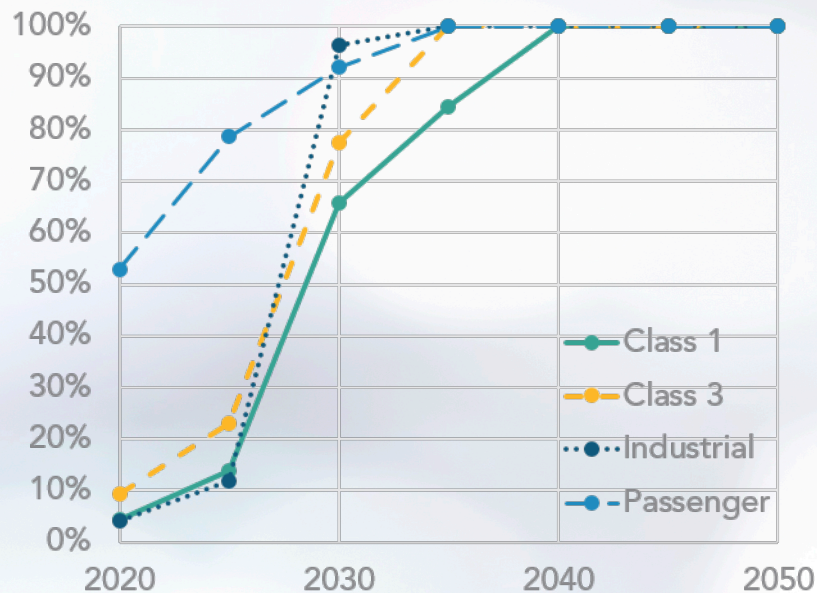
- To allow for flexibility spending account funds may be used towards the purchase of any zero emission equipment, or to advance zero emission technology by pilot or demonstration.
- If railroads would prefer to use spending account funds on alternative projects they may do so as long as the requirements in 2478.7 are followed and met.

Locomotive Turnover Rates

Predicted turnover rates without a regulation in place



Predicted turnover rates with regulation in place



2478.6 Idling Requirements

- A Locomotive Operator shall ensure an AESS equipped main locomotive engine is shut off no more than 30 minutes after the locomotive becomes stationary
 - Requirements based on Federal idling requirements
 - Makes the idling enforceable by CARB
 - Enforcement by Air Districts possible through enforcement MOU

Reporting/Recordkeeping Requirements

- **When:** Starts July 1, 2023, and every July 1 thereafter
- **What:** Information about each locomotive, for example:
 - Engine information
 - Total activity by local air district
 - Idling if over 30 minutes
- **How:** Submit to CARB electronically

District and Zero Emission Multiplier Reporting Requirements

- District-level reporting requirement
- Disadvantaged Community ZE multiplier requires additional community level reporting



2478.12 Administrative Payment

- CARB is authorized under Health & Safety Code 43019.1 to adopt fees to cover the reasonable costs associated with the certification, audit, and compliance of off-road or nonvehicular engines.
- The draft payment rate is based on costs of personnel, equipment, and operational costs for implementation and enforcement (~\$2 million/year)

Question and Answer Session



Send questions to
**“Submit your
question”** via the
chat function.

Preliminary Cost Document

- Costs presented will be used to establish:
 - Business-as-Usual
 - Incremental costs of the regulatory concepts and alternatives
- Please submit any additional cost data you have for us to consider in our regulatory cost analysis
- Importance of calculating the cost of the regulation:
 - “CARB's mission is to promote and protect public health, welfare, and ecological resources through effective reduction of air pollutants while recognizing and considering effects on the economy.”

Main Assumptions in the Cost Document

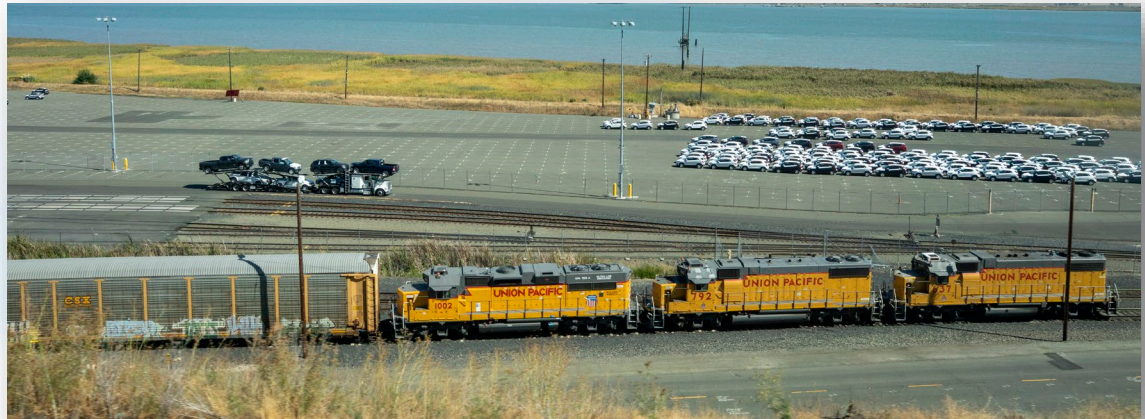
Assumptions address:

- Operational characteristics of railroads
- Railroads' actions in response to regulation
- Zero Emission Locomotive and infrastructure availability, design, and use



Investment in Advanced Technology

- What percentage of annual Spending Account funds should CARB expect railroads to voluntarily use to purchase the cleanest available locomotives 2023-2030?



Operational Assumption Question

Class I railroads adjusted operations and increased cleaner locomotives (Tier 2) entering the South Coast Air Basin for the 98 MOU.

If these regulatory concepts are implemented, how do you expect Class I operations to change on a per Tier basis?



Specific Questions we have on Costs

- Do costs identified reflect current prices?
- Are there additional data sources CARB should consider?
- Do advanced technology costs reflect your estimates, assuming commercial availability of cleaner locomotives in 2030, and zero emission locomotives in 2035?

Cost Data Development

- Staff will review comments and new data sources
- Follow-up meetings, where needed
- Staff refine cost model to determine the incremental cost of the regulatory concepts and alternatives

Standardized Regulatory Impact Assessment (SRIA)

- Official cost analysis for regulation
- Expected release in December 2021

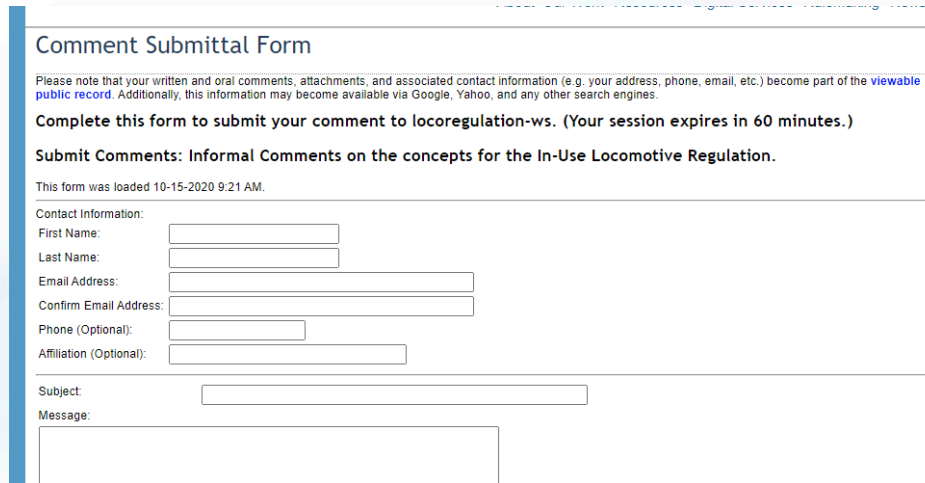
Regulatory Next Steps



- SRIA
- Continued work with stakeholders
- 1st Board Hearing Tentatively Scheduled April 2022
- Spending Account and Reporting starts July 2023 (for activities in 2022)

Comment Submittal Form on CARB's Website

- Informal comment submittal form



Comment Submittal Form

Please note that your written and oral comments, attachments, and associated contact information (e.g. your address, phone, email, etc.) become part of the [viewable public record](#). Additionally, this information may become available via Google, Yahoo, and any other search engines.

Complete this form to submit your comment to locoregulation-ws. (Your session expires in 60 minutes.)

Submit Comments: Informal Comments on the concepts for the In-Use Locomotive Regulation.

This form was loaded 10-15-2020 9:21 AM.

Contact Information:

First Name:

Last Name:

Email Address:

Confirm Email Address:

Phone (Optional):

Affiliation (Optional):

Subject:

Message:

For More Information

Visit CARB's
Reducing Rail Emissions
webpage

The screenshot shows the CARB website interface. At the top, there is a navigation bar with social media icons, a search bar, and a language selector. Below the navigation bar is a header with the CARB logo and a menu. The main content area features a title 'Reducing Rail Emissions in California' with a back button. A sidebar on the left lists various program components. The main text describes CARB's efforts to reduce locomotive and railyard emissions. A 'Concepts to Reduce Emissions from Locomotives and Railyards' section includes a 'LEARN MORE' button. Below this are three featured articles with images and titles: 'Draft Truck vs. Train Emissions Analysis', 'Beyond Tier 4 Locomotives', and 'Enforceable Agreements'. A 'PRIMARY CONTACT' section provides contact information for the Freight Transport Branch. A 'CATEGORIES' section lists topics and divisions.

Reducing Rail Emissions in California < BACK TO ALL PROGRAMS

Reducing Rail Emissions in California

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Concepts to Reduce Emissions

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PRIMARY CONTACT

Freight Transport Branch

Email freight@arb.ca.gov

Phone (916) 322-8382

CATEGORIES

Topics Freight & Goods Movement, Trains & Railyards

Division Transportation and Toxics Division

CARB has developed and implemented measures to understand and reduce locomotive and railyard emissions in California, including studies, regulations, enforceable agreements, and funding of clean technology.

[MORE ABOUT THIS PROGRAM >](#)

Concepts to Reduce Emissions from Locomotives and Railyards

In the absence of federal action to address harmful emissions from locomotives CARB is developing a regulation to reduce criteria pollutants, toxic air contaminants, and greenhouse gas emissions for locomotives in-use.

[LEARN MORE](#)

Draft Truck vs. Train Emissions Analysis
Comparison of Truck and Train Emissions

Beyond Tier 4 Locomotives
CARB Locomotive Petition to U.S. EPA

Enforceable Agreements
CARB Agreements with Class 1 Railroads

Final Q & A

- Raise hand or enter questions in chat
- Callers press *9 to raise hand

