CALIFORNIA
AIR RESOURCES BOARD

2025 Mobile Source Strategy
2nd Public Webinar

October 23, 2024

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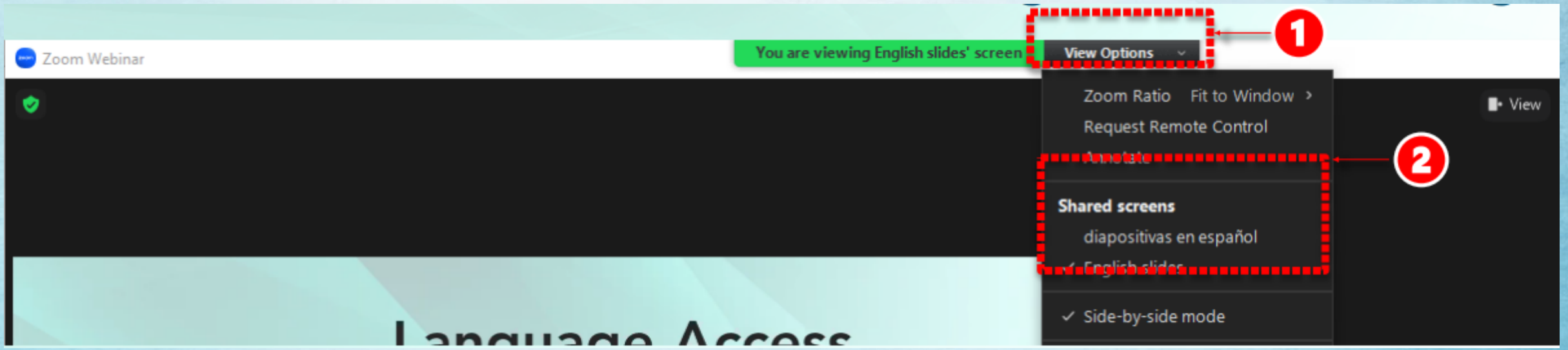


Purpose of Today's Webinar

- Provide background and inform the public about the development of the Mobile Source Strategy
- Discuss the building blocks of scenario development
- Provide summary of each mobile source emissions category, controls, and opportunities
- Solicit input and feedback on Mobile Source Strategy, public engagement process, and concept/scenario suggestions

Today's Agenda

Background
Scenario Building Blocks
Questions & Feedback
On-Road Vehicles
Off-Road Equipment
Off-Road Primarily-Federally and Internationally Regulated Sources
Questions & Feedback
Next Steps

Background

What is the Mobile Source Strategy?

- Identifies potential pathways for mobile source reductions needed to meet CARB's air quality, climate, and community risk reduction mandates via a conceptual planning document
- Uses scenario planning tools to model levels of clean technologies needed
- Identifies regulatory and programmatic concepts to achieve cleaner technologies
- Updates required every 5 years

California's Air Quality, Climate, and Community Air Protection Mandates

2024 - 2029:
CERP targets
(18 communities)

2030:
GHG
40 percent
below 1990,

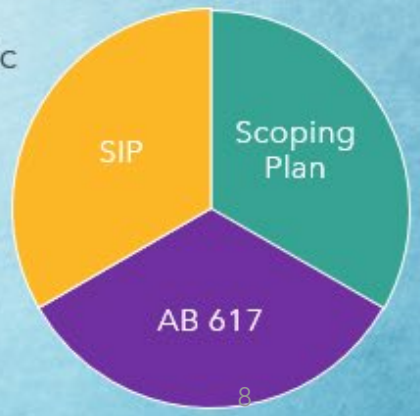
12 ug/m3
PM2.5 South
Coast & SJV

2031:
South Coast &
SJV Ozone

2032:
New PM2.5
standard
attainment year

2037:
South Coast &
SJV Ozone

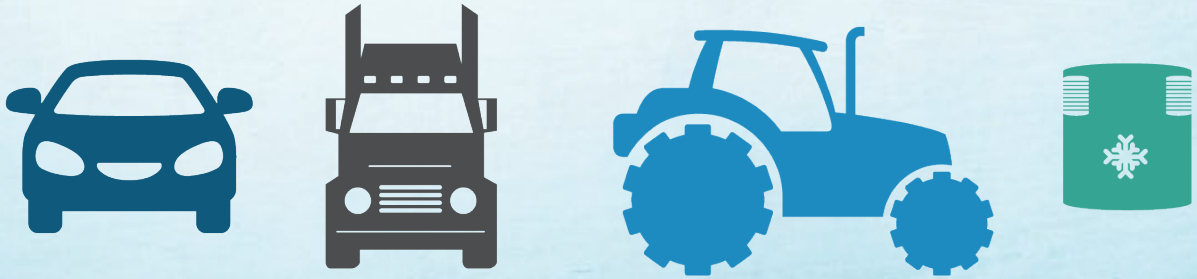
2045:
Carbon
Neutrality,
85% reduction
GHG
anthropogenic
emissions



CARB

California's Unique Authority Ensures our Ability to Meet Mandates

- California has unique authority under the federal Clean Air Act to set mobile source emissions standards that are more stringent than federal standards
- CARB utilizes this authority to adopt the regulations needed to reduce emissions at the pace required to meet federal air quality standards that also benefit greenhouse gas and risk reduction targets
- EPA must grant California's request for waivers and authorizations to unlock CARB's ability to achieve the maximum amount of emissions reductions



Mobile Source Strategy Informs Other Planning Efforts

2025 Mobile Source Strategy

- Builds on 2020 MSS
  - 2037 and 2045 still the furthest targets
- Will update scenario modeling and potential future technology mixes
- Will reflect ZEV goals and requirements under SB 44
- Can inform future policy development

Purpose of Discussion Draft

- Establishes foundation for this process
- Provides an overview of scenario planning
- Summarizes each mobile source category including baseline emissions, current control programs, and available technologies with emissions reduction potential

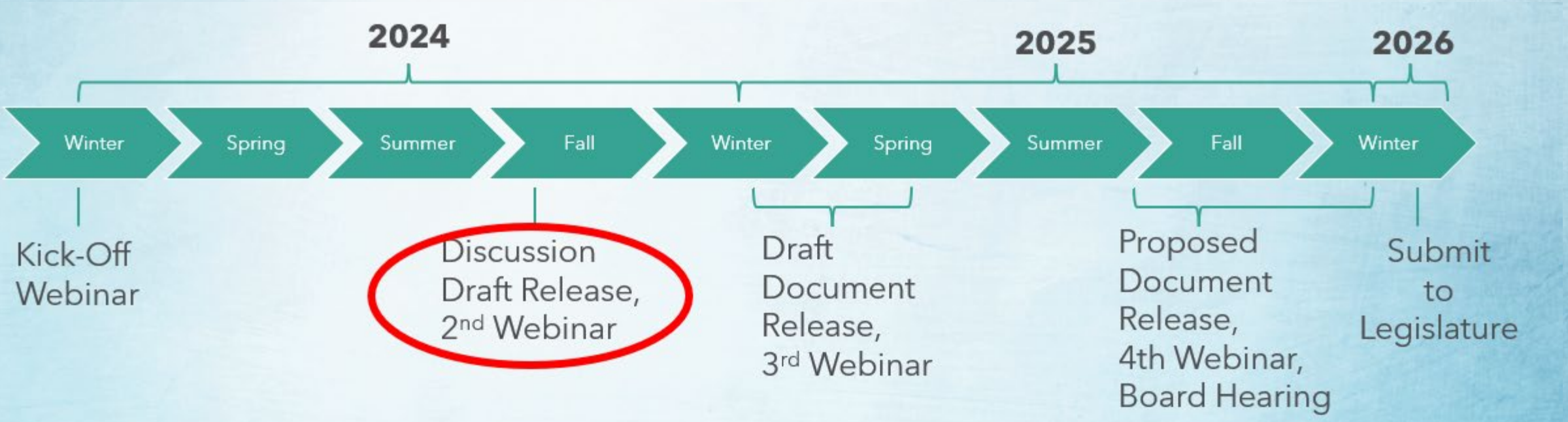
Racial Equity and Environmental Justice

- CARB continues efforts to advance racial equity
- Staff will consider equity and EJ throughout development of the 2025 MSS
  - Conduct analyses to evaluate effects on highly-impacted communities
- Staff will utilize Racial Equity Lens

Public Engagement and Outreach

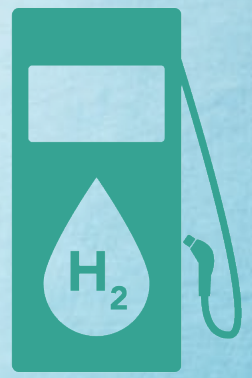
- Efforts to date
  - Factsheet and webpage
  - January 2024 Kick-Off Webinar
  - Participation in existing stakeholder meetings
- Looking to engage with all interested parties about the 2025 MSS
  - Public releases/webinars
  - Existing meetings
  - New recurring small group, or 1:1 meetings

Planned Public Releases and Webinars



Zero-Emission Infrastructure Considerations

- Charging and fueling infrastructure are critical to successfully deploy zero-emission vehicles and equipment
- CARB supports infrastructure deployment through incentive programs and close coordination with our State and government partners on planning efforts
- Significant progress has been made in the planning needed to coordinate widespread zero-emission infrastructure deployment over the last 5 years



California's Whole-of-Government Approach

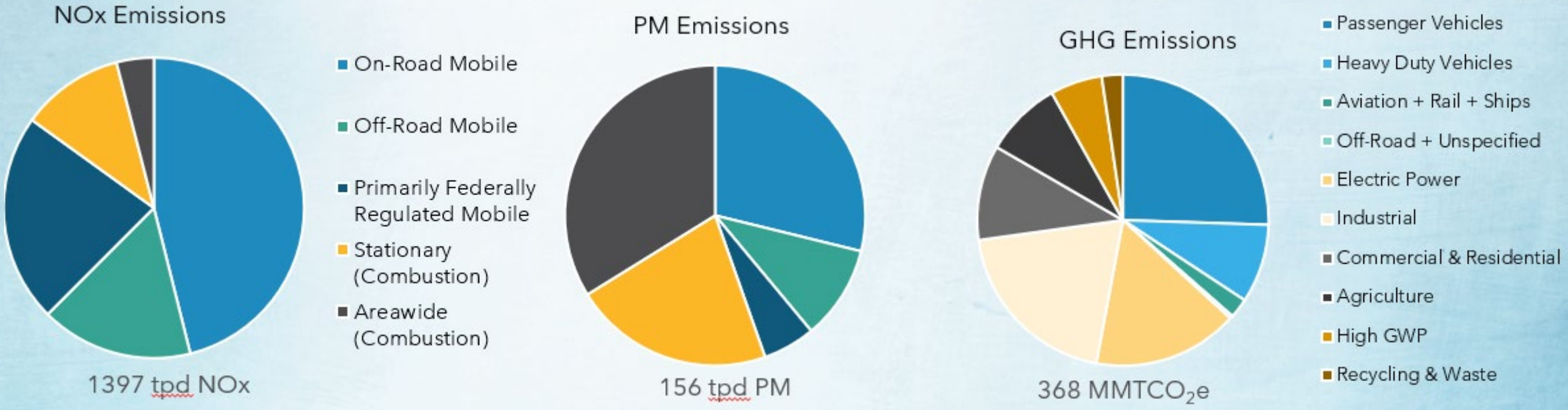
CARB

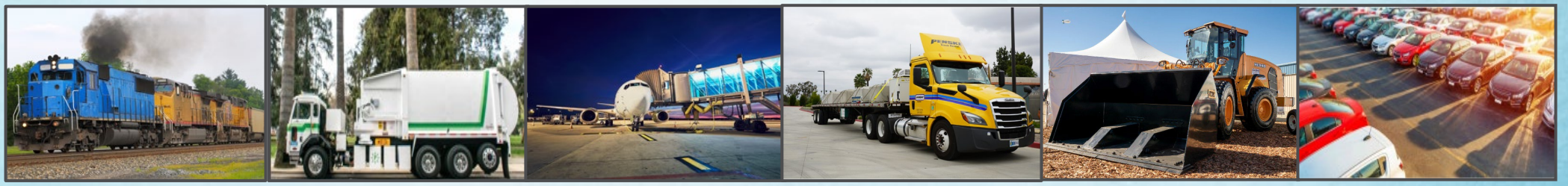
Scenario Building Blocks

What is a Mobile Source Strategy Scenario?

- Top-down approach – driven by level of emissions reductions needed to meet various mandates in future years
- Illustrates the mix of technologies that will reduce emissions to the levels needed
- Technology mixes can be achieved and adjusted depending on the regulatory and non-regulatory tools selected
- May go beyond levels of clean technologies achieved from current regulations and regulatory proposals

California Mobile Source Emissions Inventories
(2020)





NOx = oxides of nitrogen, PM = particulate matter, GHG = greenhouse gas

Regulatory and Non-Regulatory Tools

New Vehicle/Engine Standards

Manufacturer Sales Mandates

Fleet Purchase Requirements

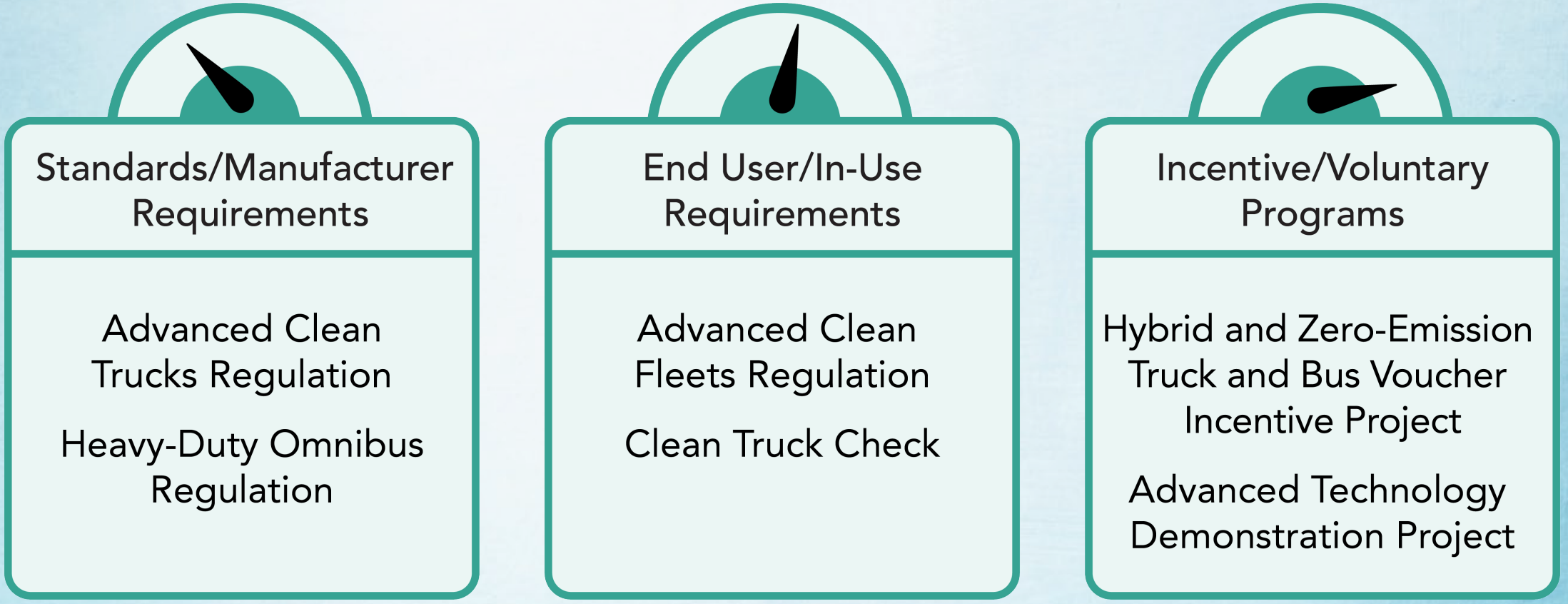
In-Use/Operational Requirements

Fuel Requirements

Incentive Programs

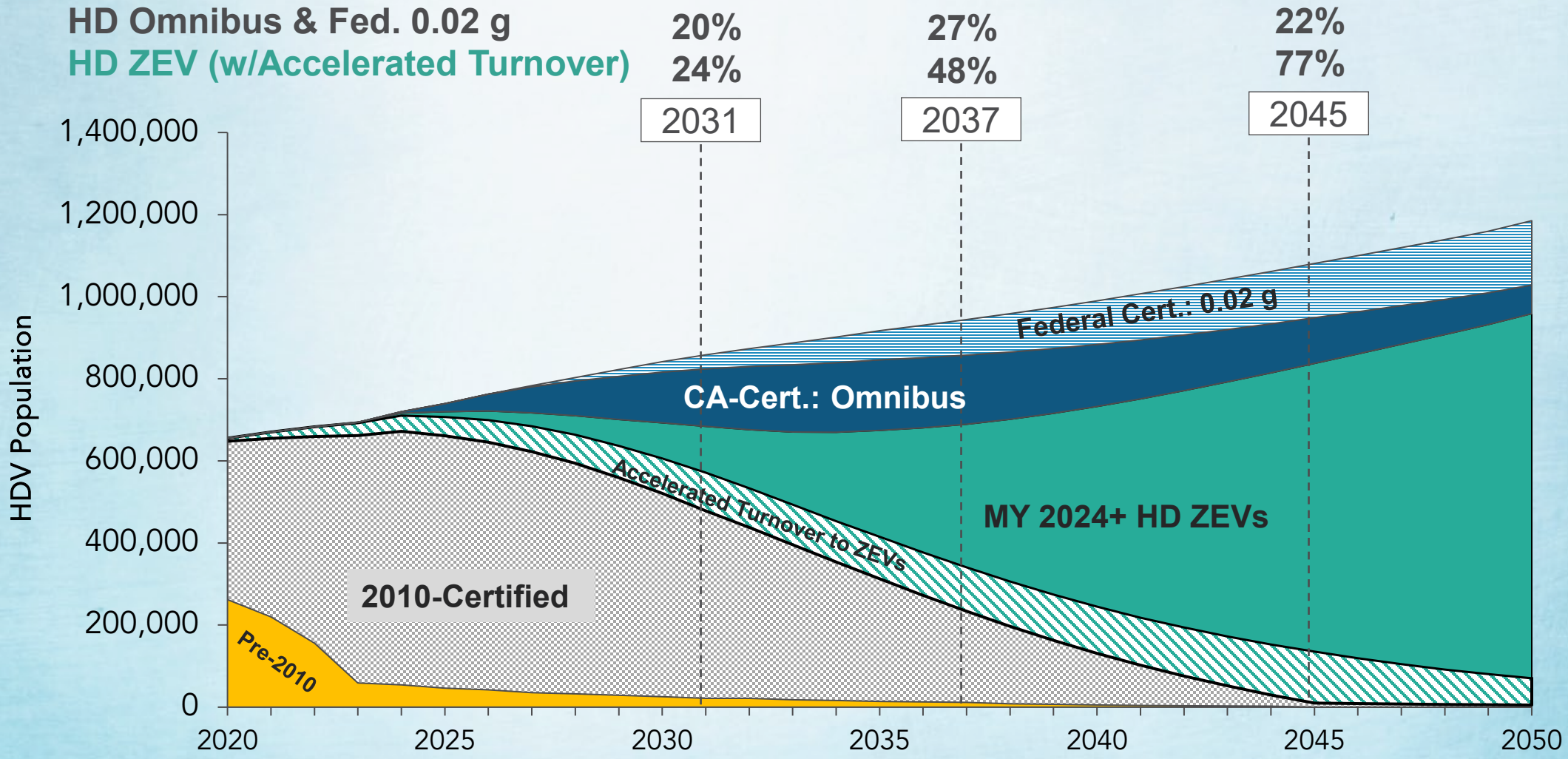
Developing a Scenario

Heavy-Duty Truck Example



Example:

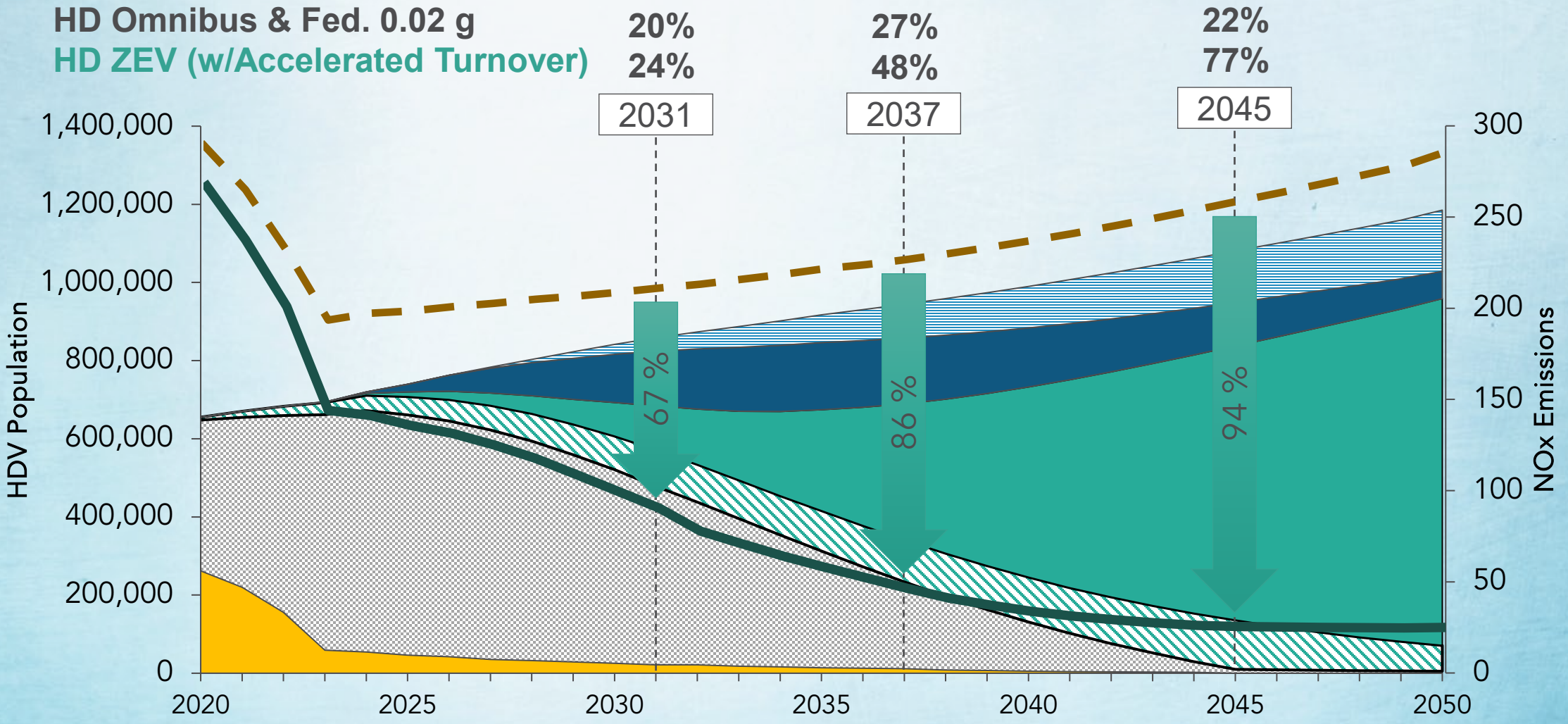
2020 MSS On-Road Heavy-Duty Scenario



CARB

Example:

2020 MSS On-Road Heavy-Duty Scenario



CARB

Questions for Consideration

Engagement Opportunities

- What ongoing meetings that you participate in should CARB join to discuss the 2025 MSS?
- Would you be interested in regularly-scheduled meetings in a small group or 1:1 with CARB staff to discuss the 2025 MSS?

Questions & Feedback

Zoom:
Use “Raised Hand” feature, or type in “Q&A” box

Phone:
*9 to “Raised Hand”
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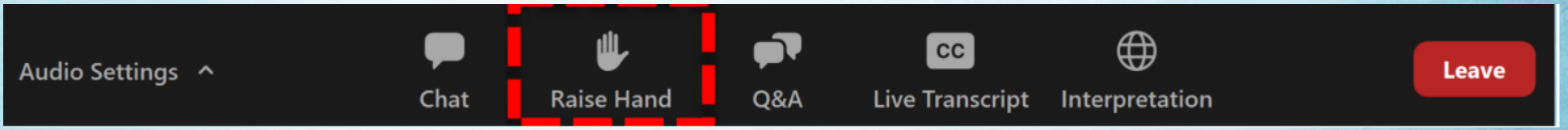


Questions for Consideration

Concepts/Scenarios

- Are there any category current controls or emission reduction potential that we overlooked?
- Are there concepts/scenarios that you strongly support, or don't think are necessary?
- What additional ideas or concepts would you like CARB to explore or consider?

On-Road Vehicles

On-Road Vehicle Summary

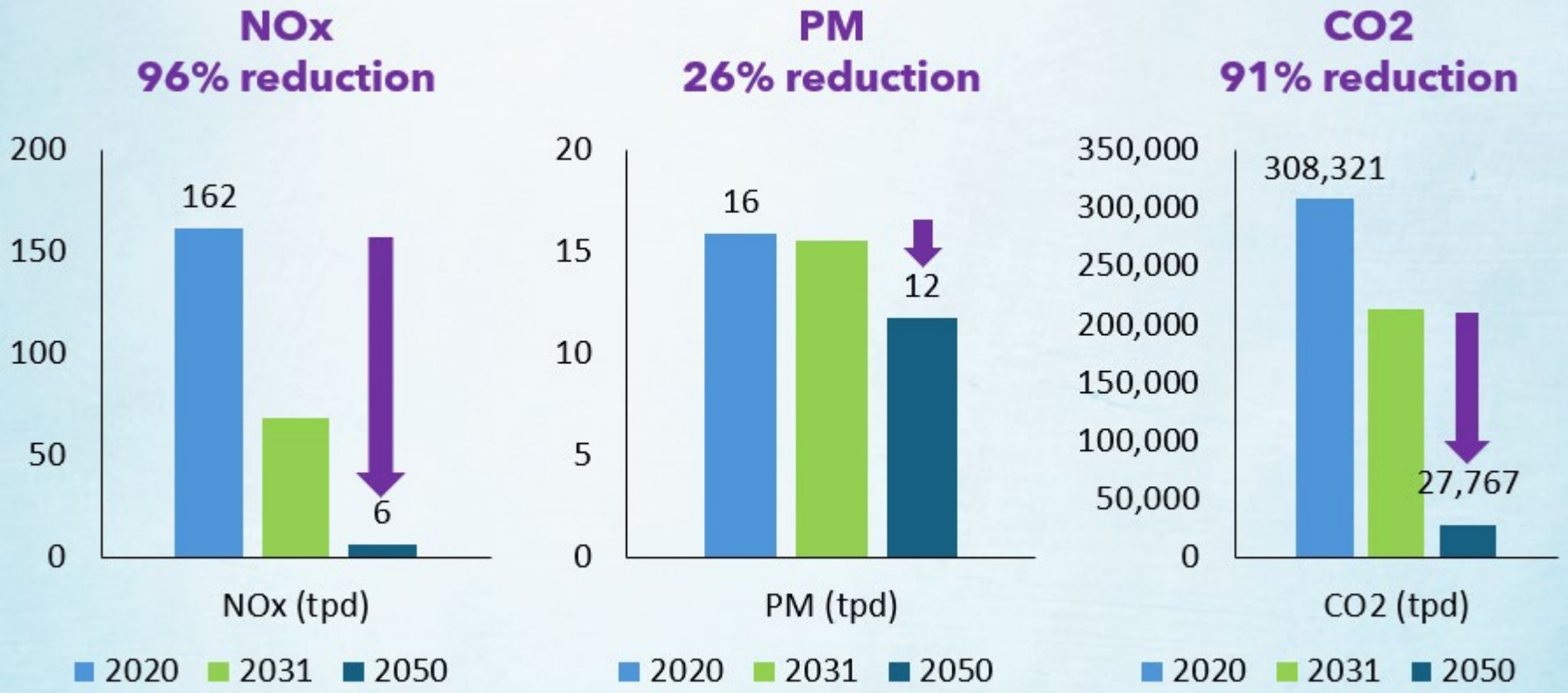
- Light-Duty Vehicles (LDV)
  - GVWR < 8,500 lbs.
  - Fuel Mix in 2020[1]: ~96% gasoline, 2% electric, with remainder diesel, hydrogen, and natural gas

- Motorcycles (MCY)
  - 280 cc or greater
  - Fuel Mix in 2020[1]: ~99.5% gasoline, with remainder electric

- Medium-Duty (MDV) and Heavy-Duty (HDV) Vehicles
  - GVWR > 8,500 lbs.
  - Fuel Mix in 2020[1]: ~55% diesel, 44% gasoline, with remainder electric, and natural gas

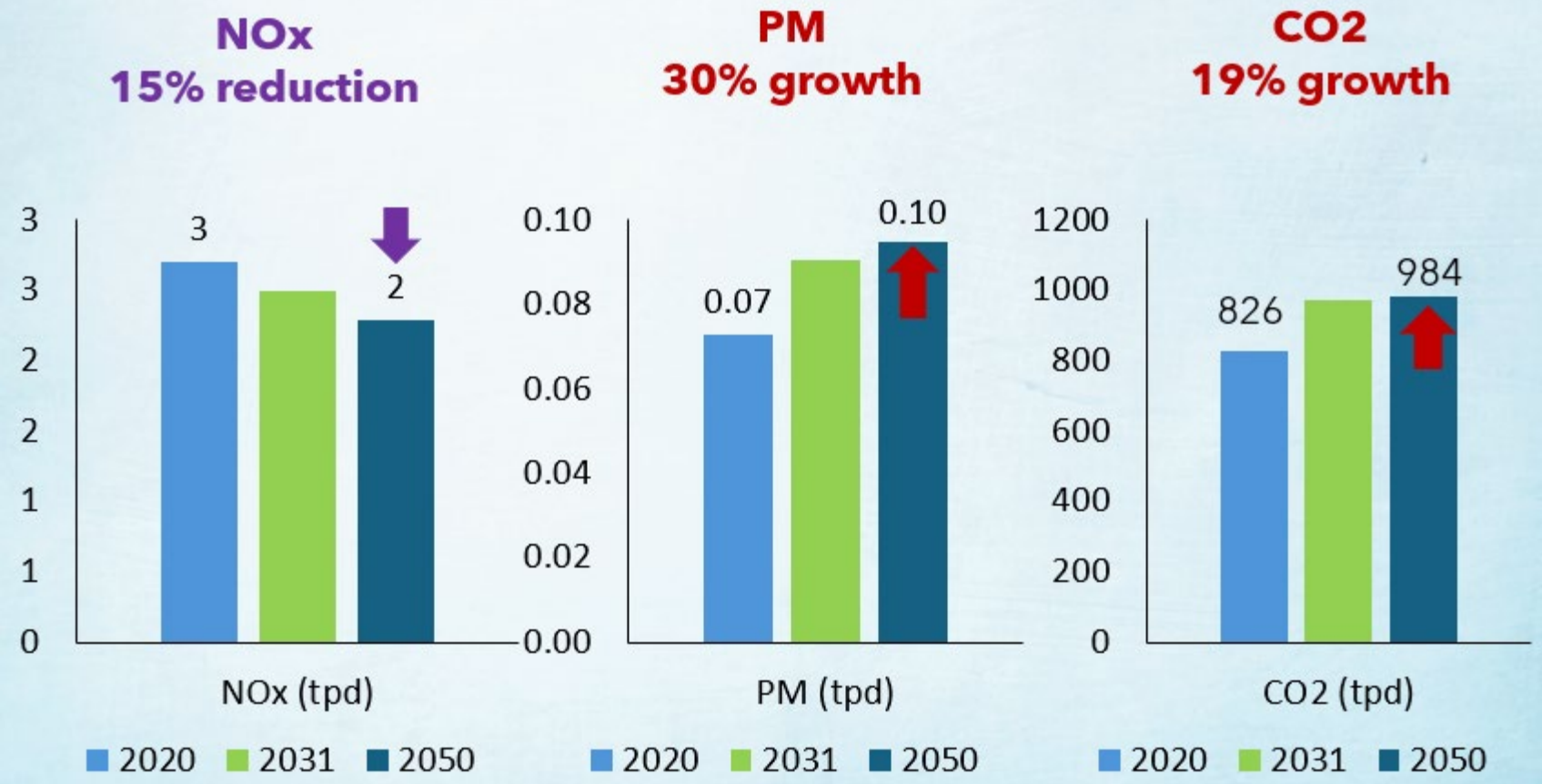
[1]Based on latest DMV registration data

Light-Duty Vehicles



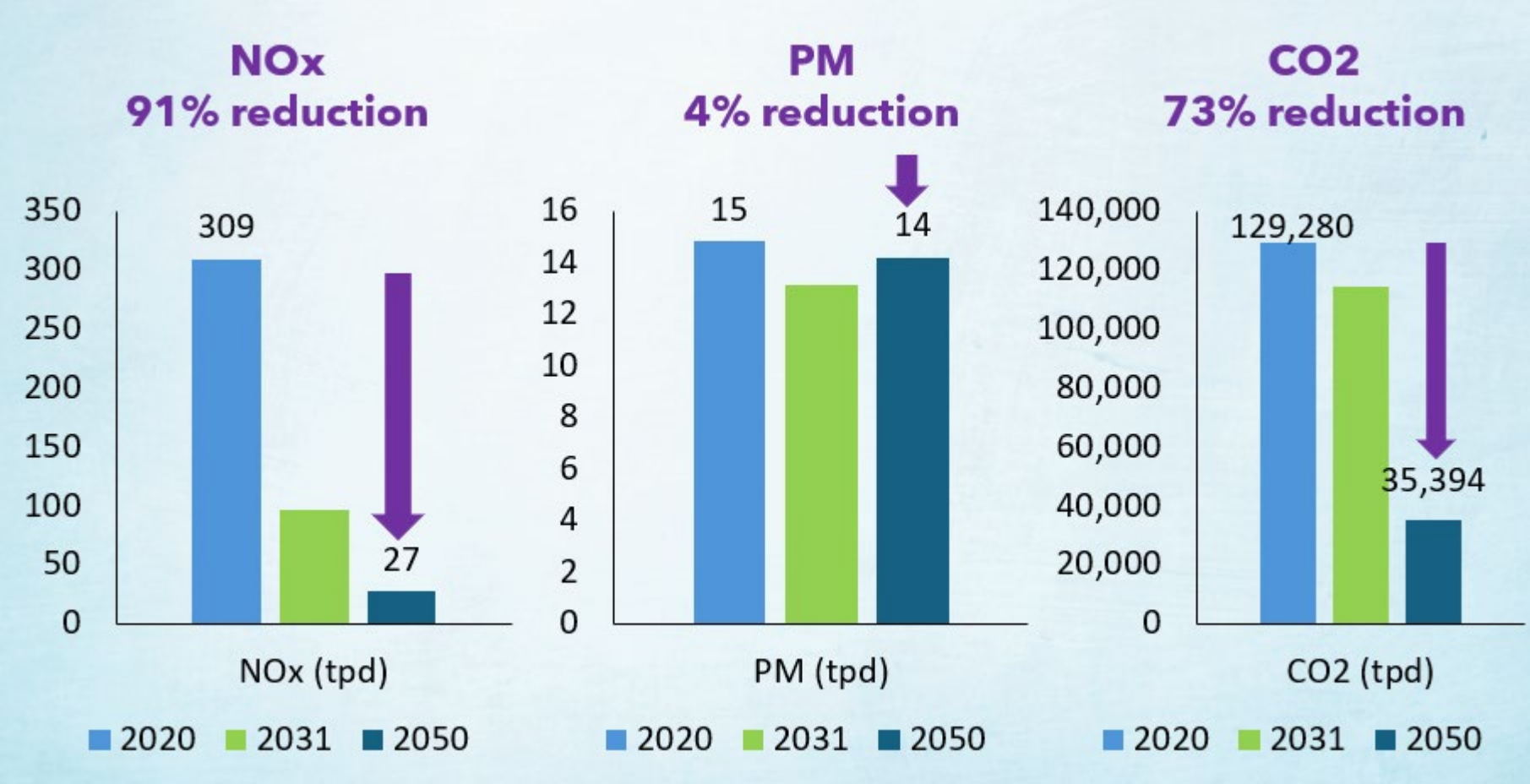
Baseline emissions projections (current control program)

Motorcycles



Baseline emissions projections (current control program)

Medium-Duty and Heavy-Duty Vehicles



Baseline emissions projections (current control program)

Current Status of On-Road Vehicles

Current Control Programs

- Advanced Clean Cars II
- Advanced Clean Trucks
- Advanced Clean Fleets
- Heavy-Duty Omnibus

Emission Reduction Potential

- CARB is tracking efforts to reduce PM tire wear emission like those in the EU Euro 7 standards
- Advanced Technology Demonstration Program
- Reducing vehicle miles traveled (VMT) will be necessary to achieve climate and emission goals in California.
- **(In-Progress)** Zero-Emission Motorcycle targets set to go to the board in November 2024
  - More stringent exhaust and emissions standards for motorcycles (like EU Euro 5 standards)

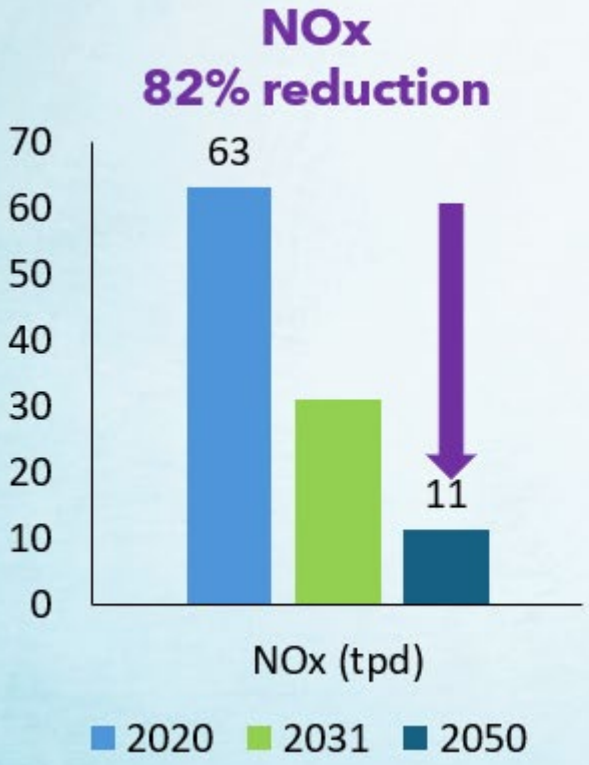
Off-Road Equipment

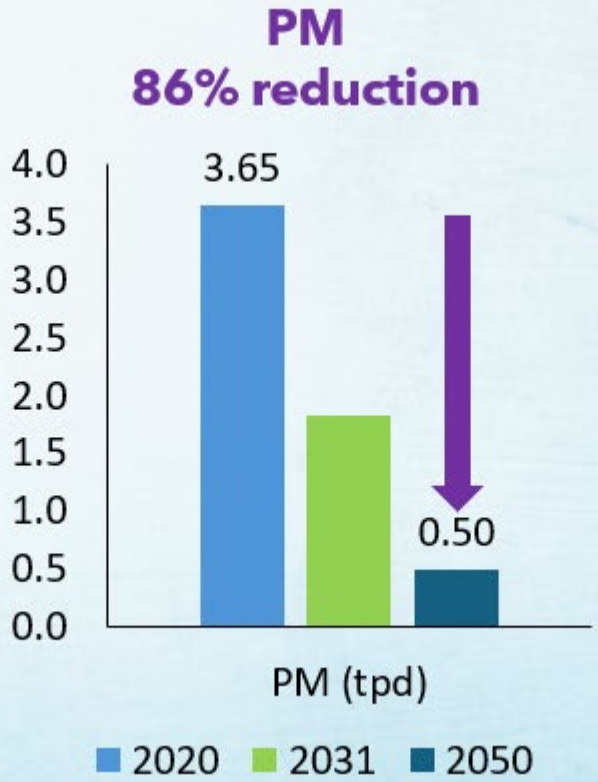
Off-Road Equipment Summary

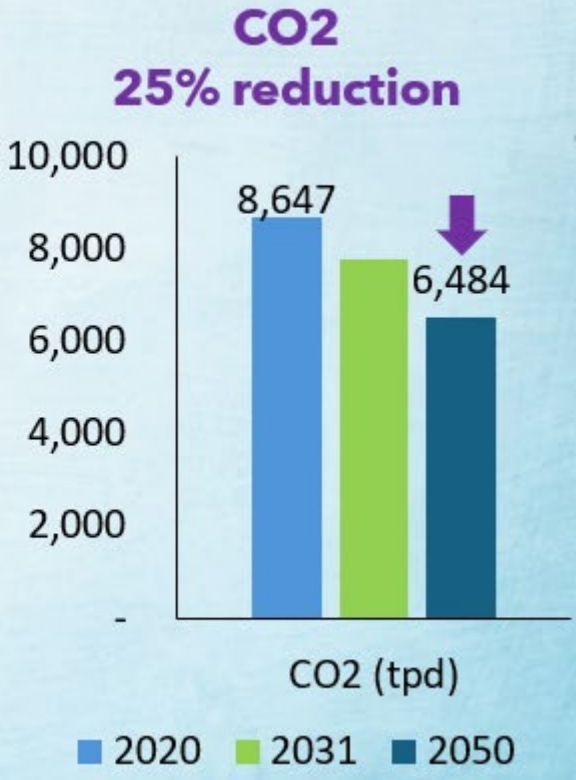
- Agriculture
- Cargo Handling Equipment
- Commercial Harbor Craft
- Construction and Mining, Oil Drilling, Airport Ground Support Equipment, and Industrial
- Forestry
- Lawn and Garden
- Large Spark Ignition (LSI) Forklifts
- Light Commercial and Recreational
- Portable Equipment
- Recreational Marine Vessels
- Transport Refrigeration Units

Agricultural Engines

- **Equipment**: Tractors, Harvesters, Balers, and more
- **Fuel**: 99% Diesel, 1% Gasoline in 2020
- **Population**: 170,000



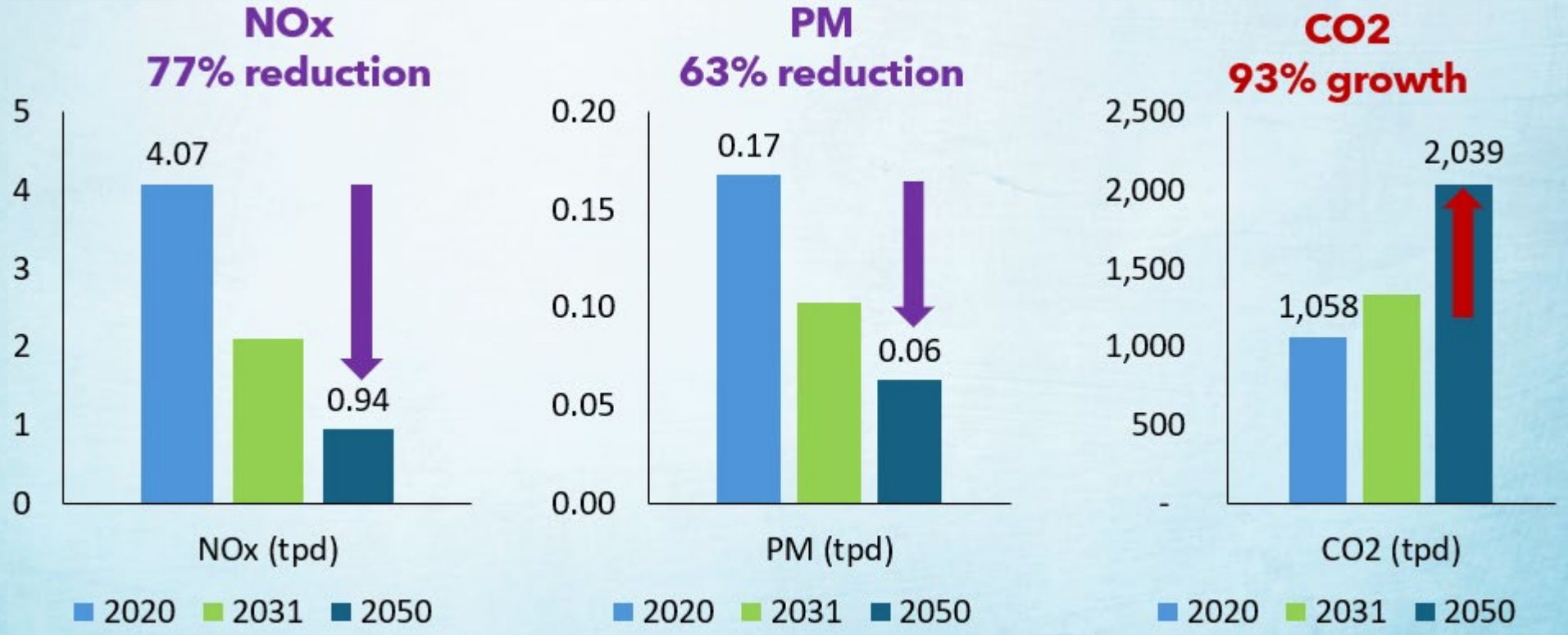




Baseline emissions projections (current control program)

Cargo Handling Equipment

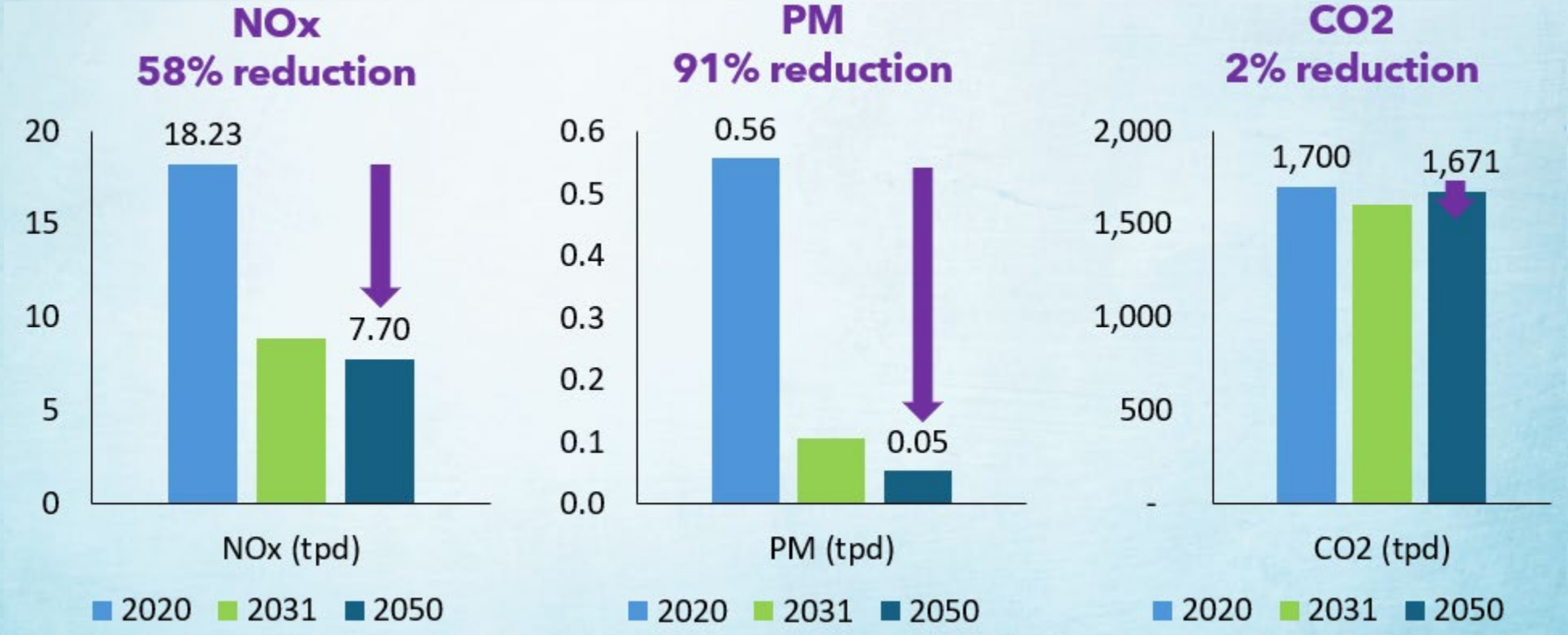
- **Equipment**: used at seaports and intermodal rail yards, and includes equipment types such as yard trucks, container handling equipment, cranes, forklifts, and more
- **Fuel**: 89% Diesel, 11% Electric in 2020
- **Population**: 5,600 and growing



Baseline emissions projections (current control program)

Commercial Harbor Craft

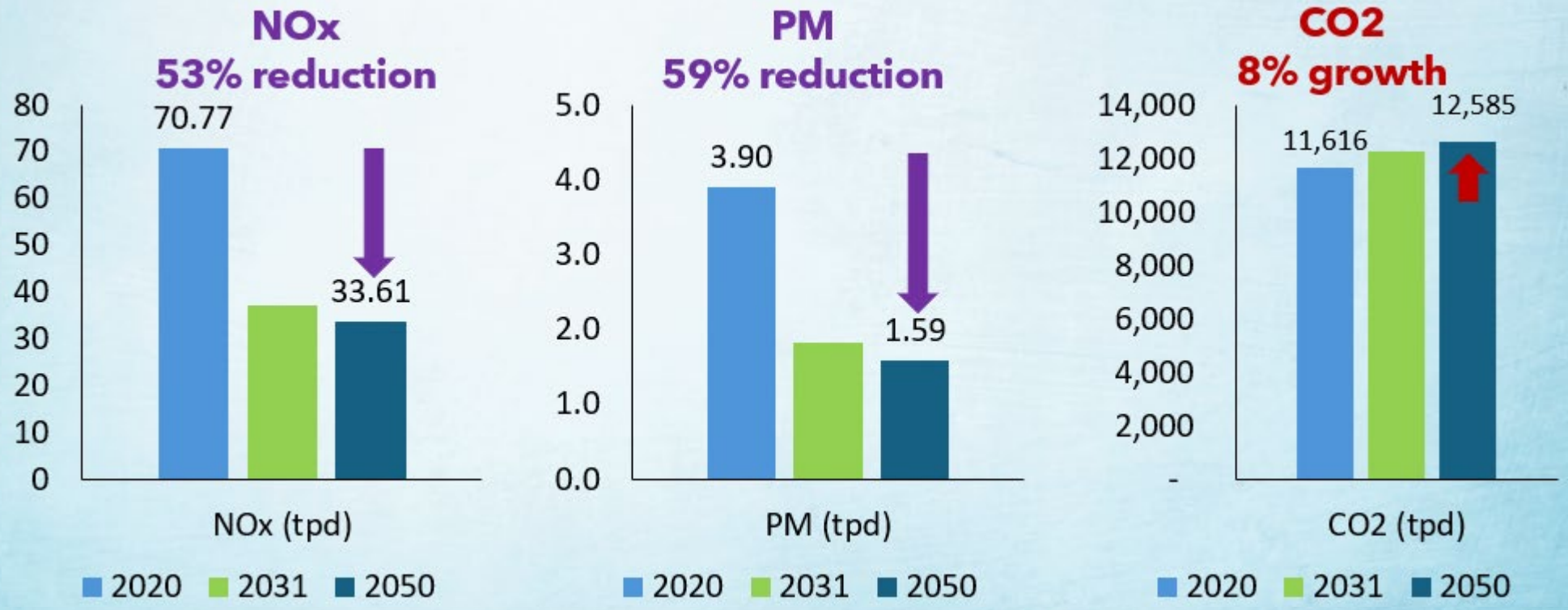
- **Equipment**: commercial fishing, ferries, tugboats, and more
- **Fuel**: 99% Diesel, 1% Electric in 2020
- **Population**: 3,300 Vessels with a hailing port in California



Baseline emissions projections (current control program)

Construction and Mining, Oil Drilling, Airport Ground Support Equipment, Industrial

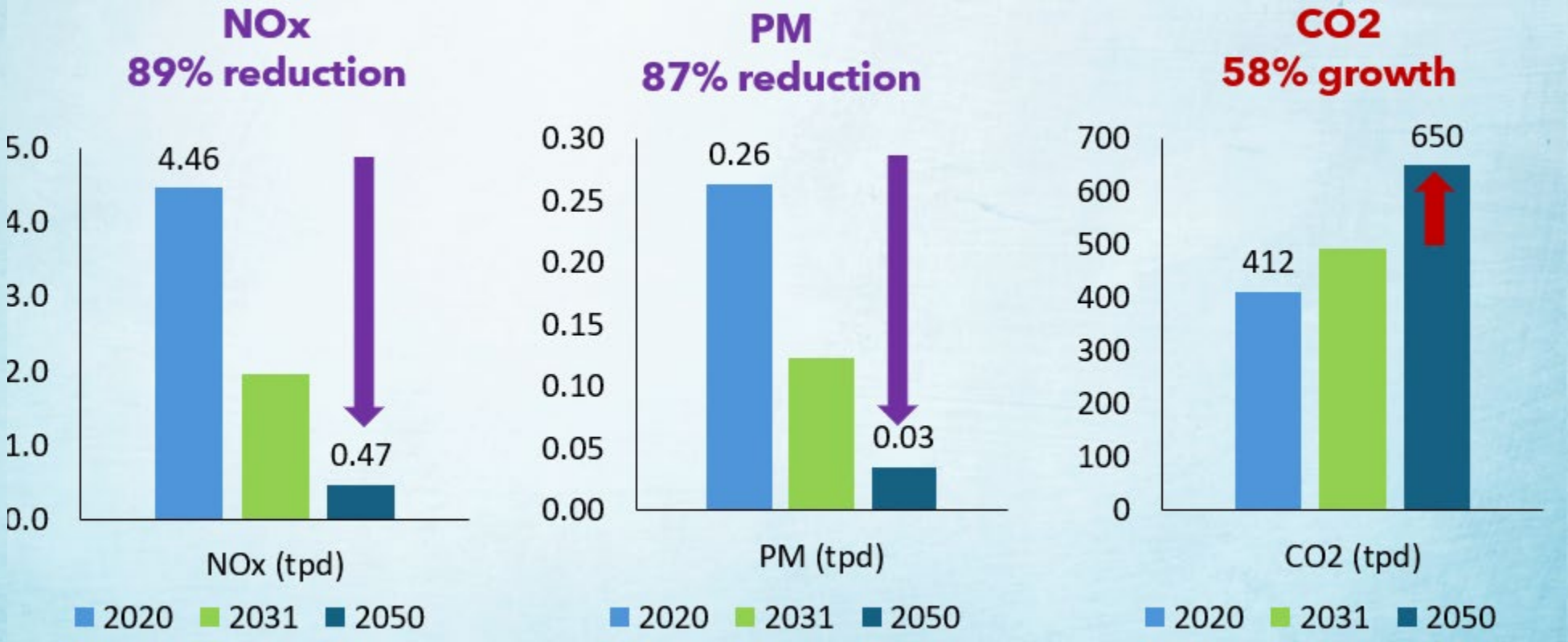
- **Equipment**: Backhoes, loaders, diesel forklifts, paving equipment, oil rigs, aircraft tugs, and other types of off-road diesel equipment subject to the In-Use Off-Road Diesel-Fueled Fleets Regulation (In-Use Regulation)
- **Fuel**: 55% Diesel, 36% Gasoline, and 9% Natural Gas in 2020
- **Population**: 345,000



Baseline emissions projections (current control program)

Forestry Equipment

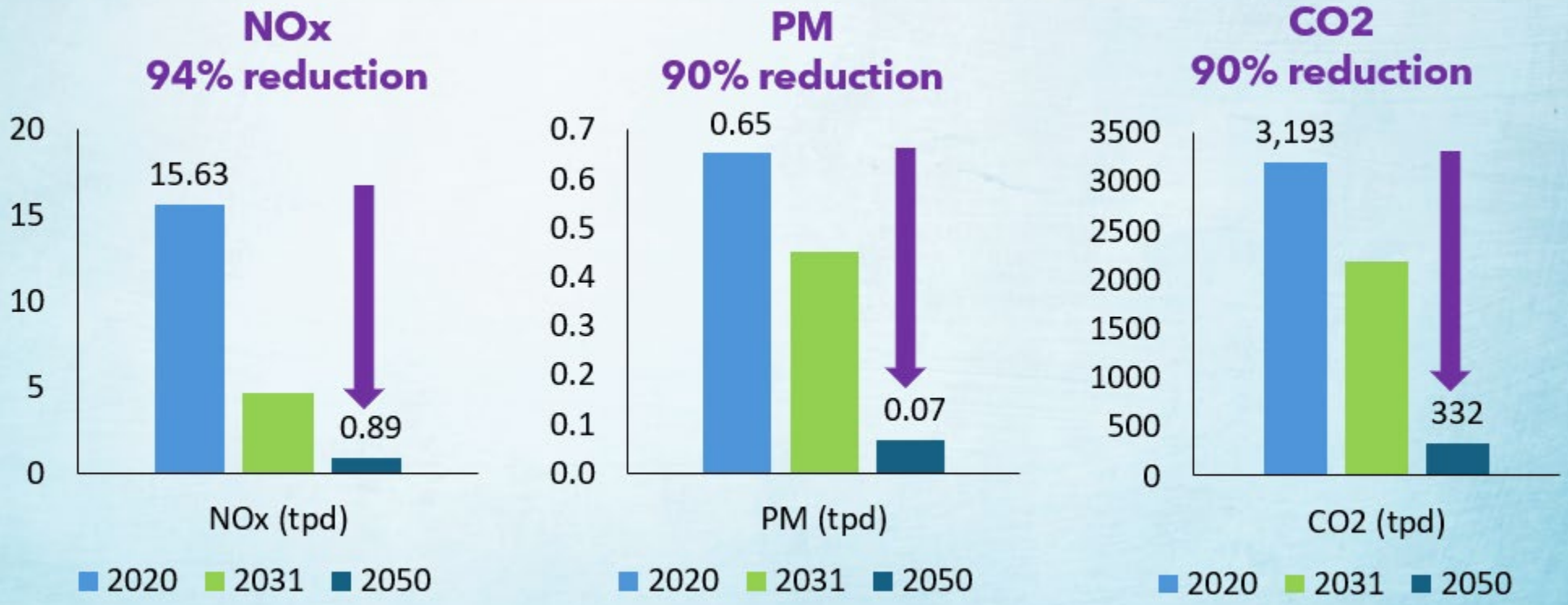
- **Equipment**: Tree-fellers, cranes, de-limbers, excavators, grinders, and more
- **Fuel**: 100% Diesel in 2020
- **Population**: 2,300



Baseline emissions projections (current control program)

Large Spark Ignition Forklifts

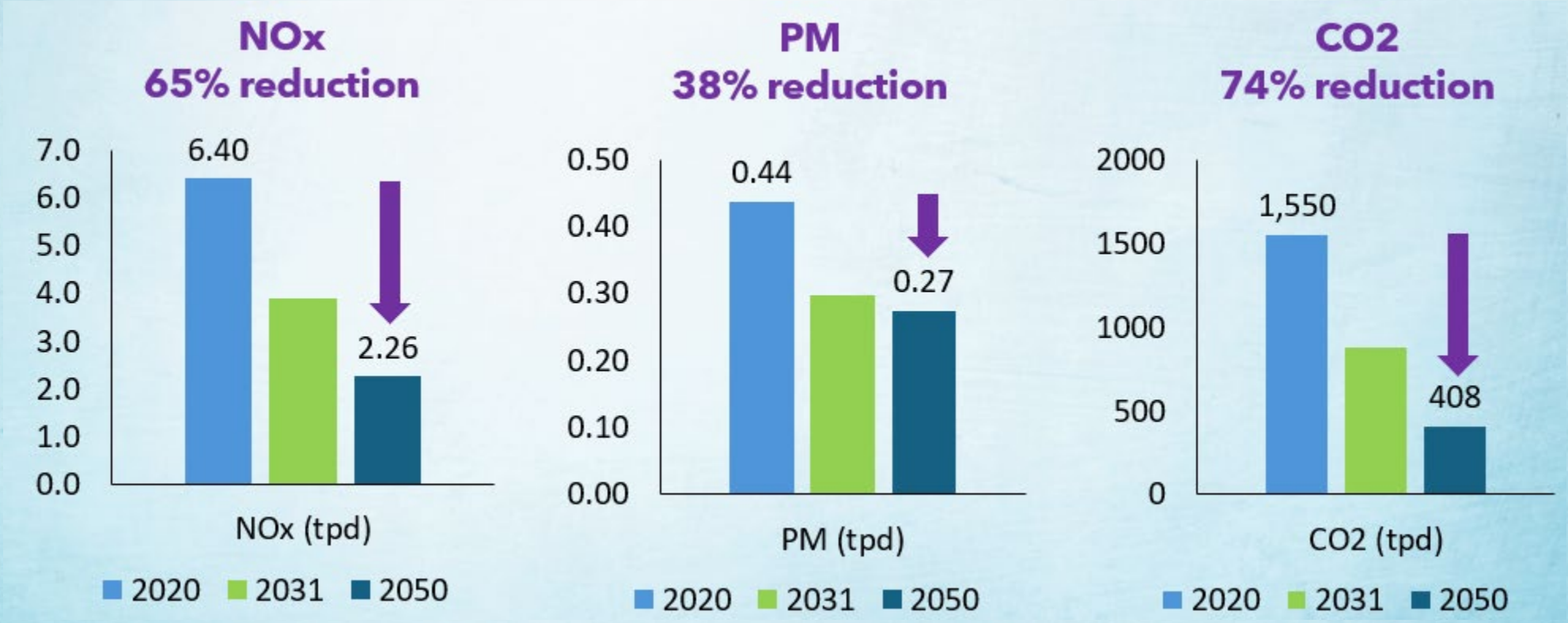
- **Equipment**: Forklifts used in indoor and outdoor industrial operations, including but not limited to manufacturing, wholesale, utilities, and retail. Excludes rough terrain forklifts and diesel forklifts.
- **Fuel**: 92% Propane and 8% Gasoline in 2020
- **Population**: 94,700



Baseline emissions projections (current control program)

Lawn and Garden Equipment

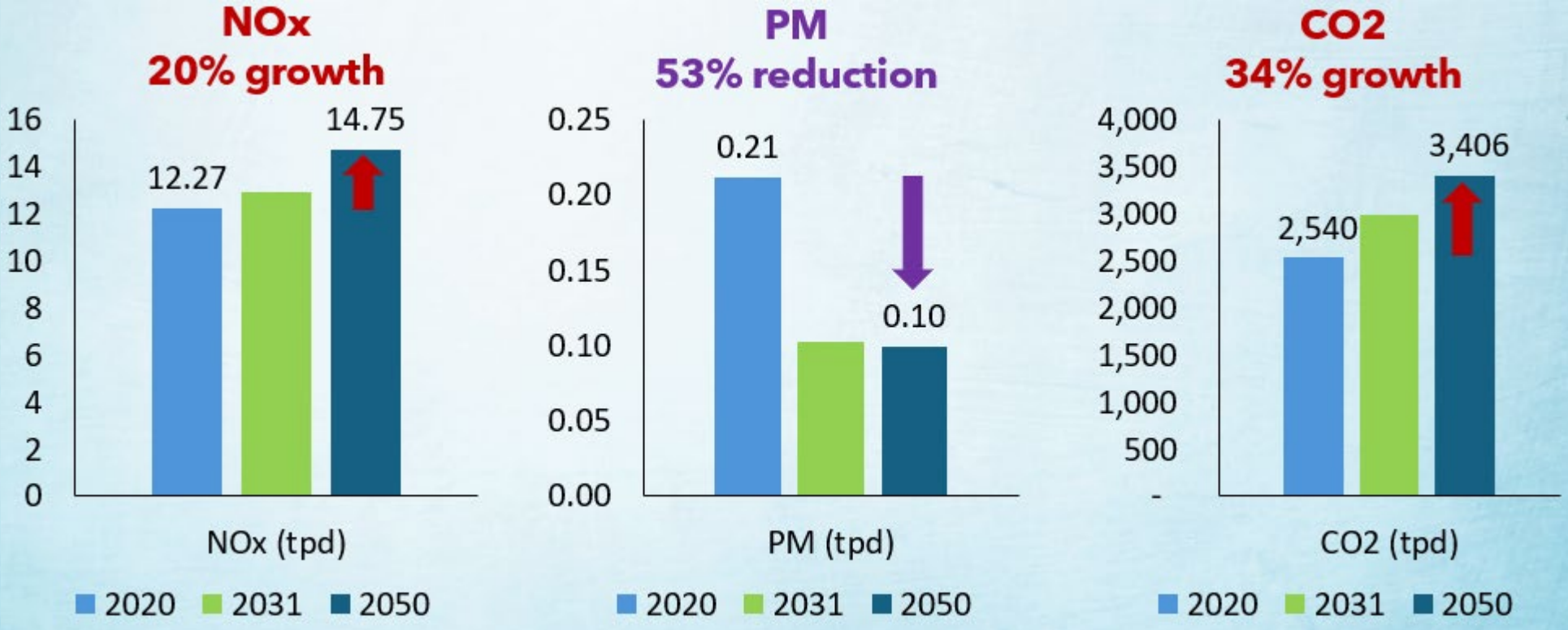
- **Equipment**: lawn mowers, leaf blowers, chainsaws, trimmers, and riding mowers
- **Fuel**: 52% Gasoline, 0.3% Diesel, and 48% Electric
- **Population**: 22 million



Baseline emissions projections (current control program)

Light Commercial and Recreational

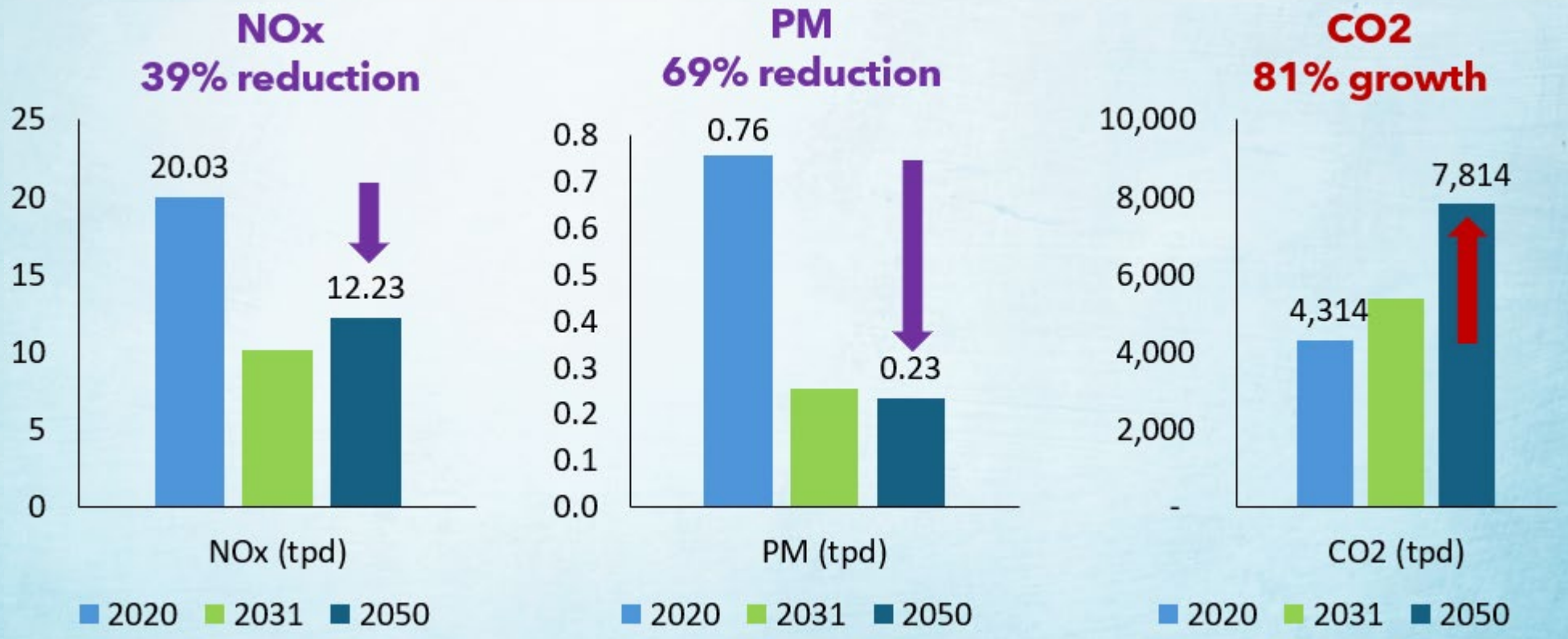
- **Equipment**: Air compressors, gas compressors, generator sets, pressure washers, pumps, and welders
- **Fuel**: 29% Gasoline, 0.3% Diesel, and 70% Electric in 2020
- **Population**: 11.9 million



Baseline emissions projections (current control program)

Portable Equipment

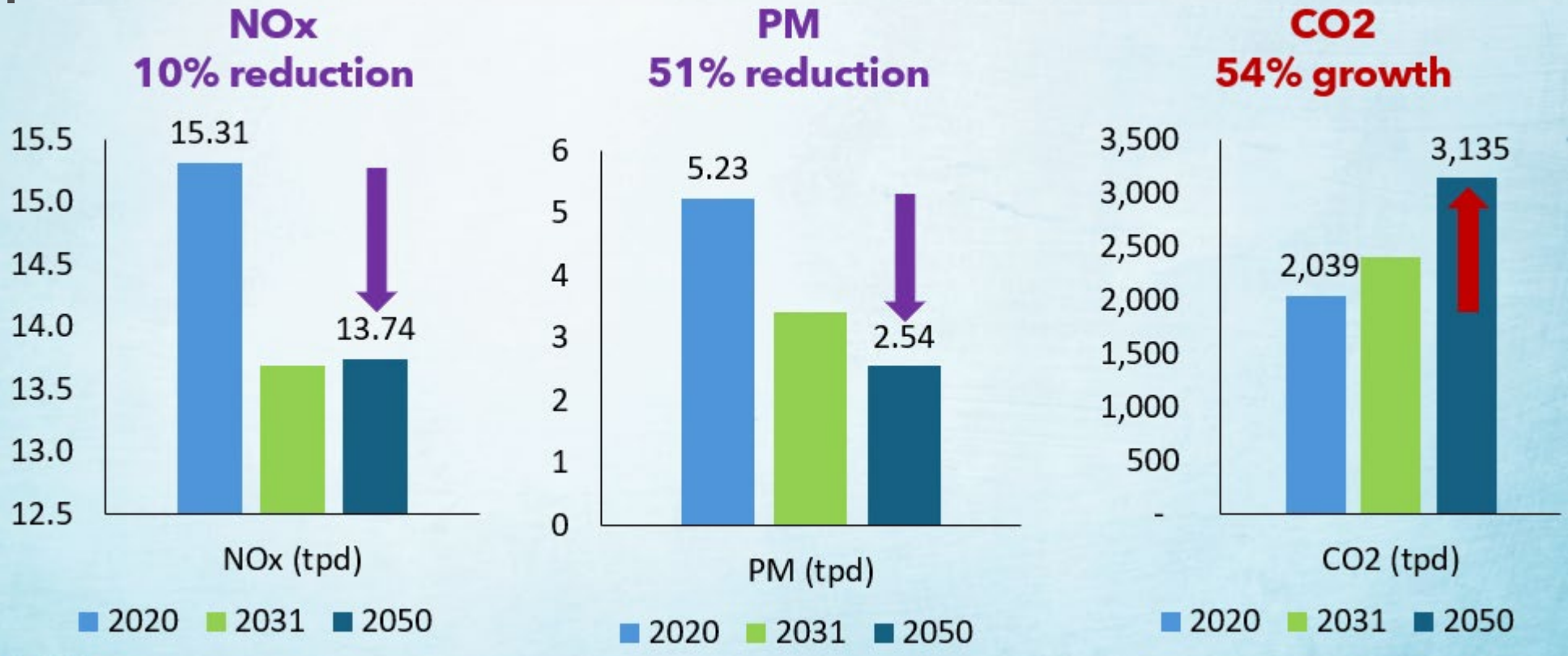
- **Equipment**: Generators, Pumps, Compressors, and similar
- **Fuel**: 100% Diesel in 2020
- **Population**: 34,000



Baseline emissions projections (current control program)

Recreational Marine Vessels

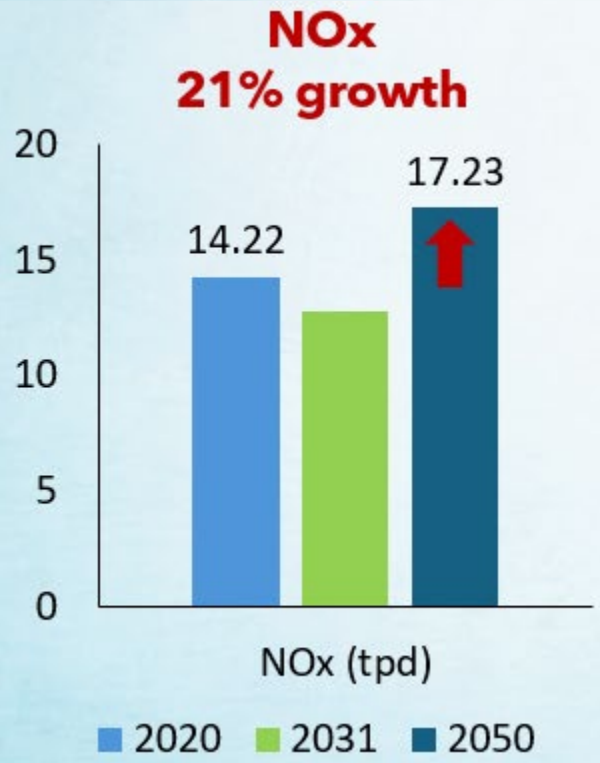
- **Equipment**: Outboard, Inboard, Sterndrive, Personal Watercraft, Jet Boat, and Auxiliary Sailboat
- **Fuel**: 98% Gasoline, 2% Diesel or Electric
- **Population**: 780,000

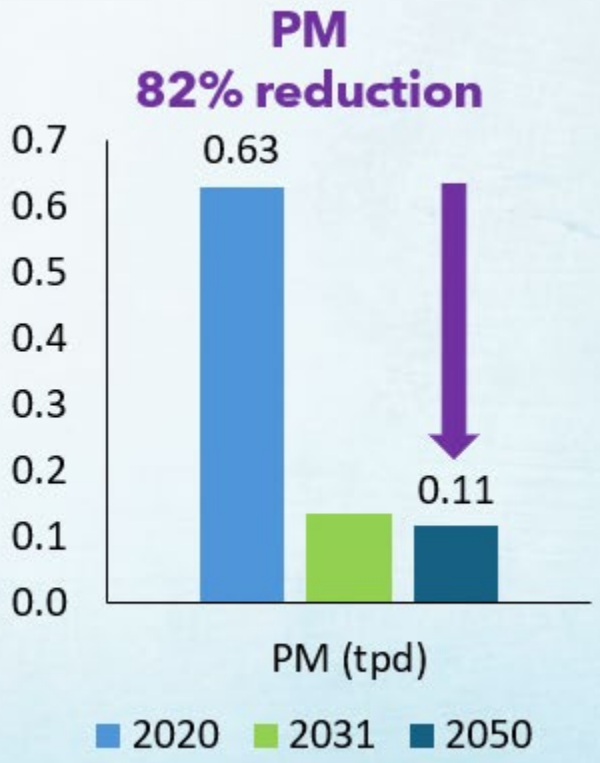


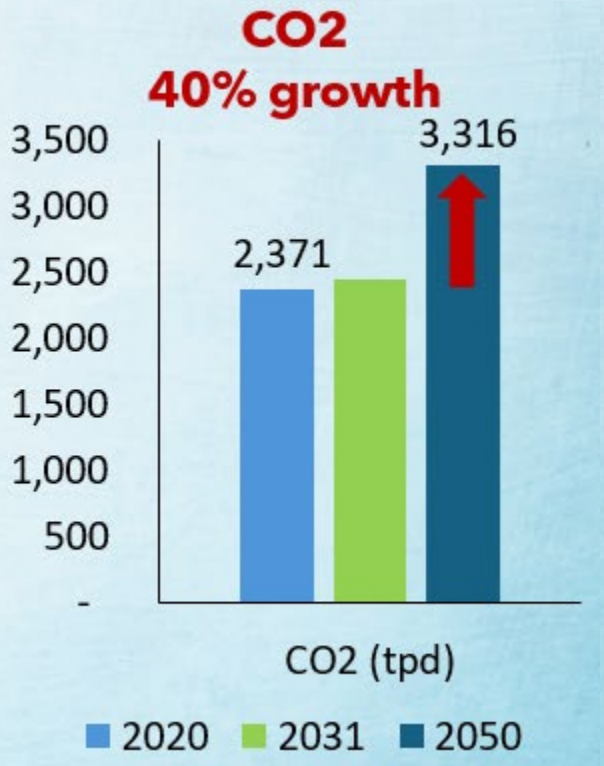
Baseline emissions projections (current control program)

Transport Refrigeration Units

- **Equipment**: Single-Body Truck, Trailer, Shipping Container, and Railcar TRUs; TRU Generator Sets
- **Fuel**: 96% Diesel and 4% Electric by 2030 (Single-Body Trucks)
- **Population**: 200,000







Baseline emissions projections (current control program)

Current Status of Off-road Engines

Control Programs

Incentive Programs

- CARB Programs
  - Carl Moyer Program
  - FARMER Program
  - Clean Off-Road Equipment (CORE) Voucher Incentive Project

Regulations

- Reporting requirements
- Limits on use of older, dirtier equipment

Demonstration Projects

- Demonstration of zero and near zero emission equipment

Further Emission Reduction Potential

Cleanest Diesel

- Use of cleaner combustion engines
- Renewable diesel is estimated to achieve 5% NOx and 30% PM emission reductions

Tier 5 Emission Standards

- Additional reductions for newly purchased equipment, when available

Low and Zero Emission Equipment

- Hybrid and zero emission equipment availability varies by sector

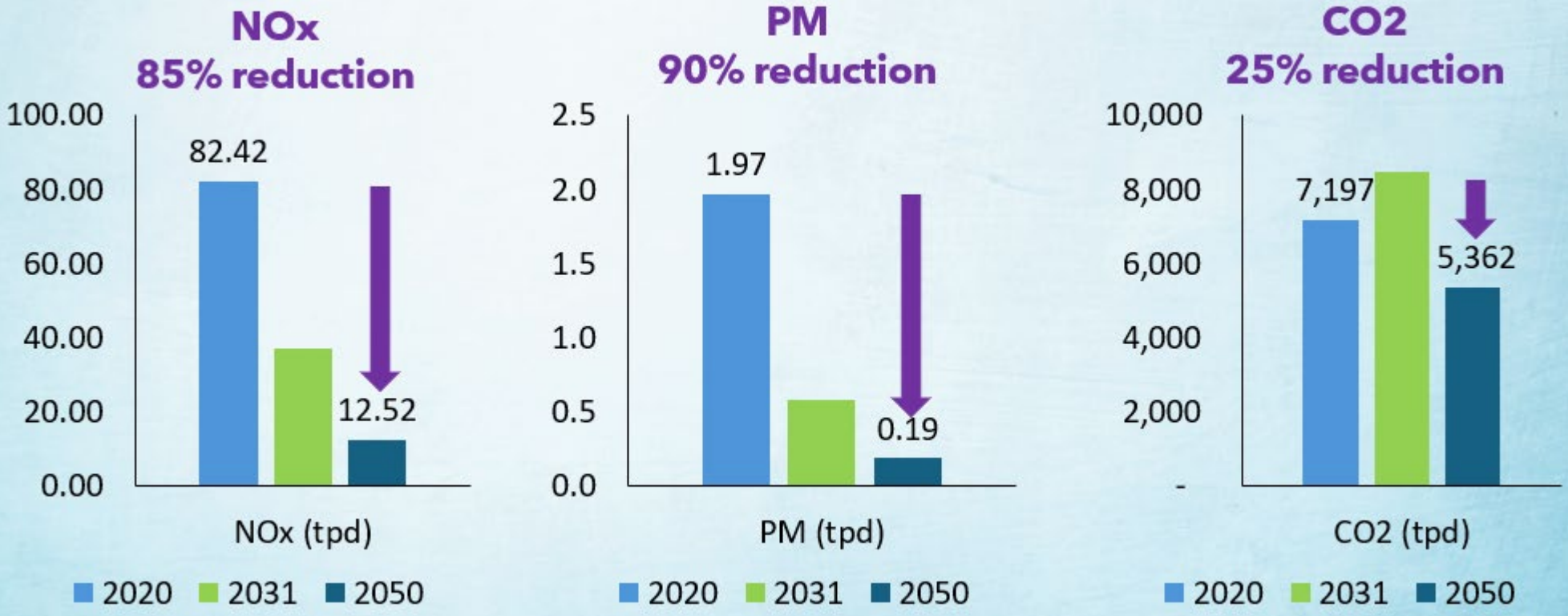
Off-Road Primarily-Federally and Internationally Regulated Sources

Off-Road Primarily-Federally and Internationally Regulated Sources Summary

- Locomotives
- Ocean-Going Vessels
- Aviation

Locomotives

- **Equipment**: Class I Line Haul, Class I Switchers, Short Line Freight, Passenger, and Industrial rail
- **Fuel**: 100% Diesel in 2020, moving to 20% Diesel and 80% Electric by 2050
- **Population**: 11,000 Line Haul locomotives, 600 Class I Switchers, 160 Short Line Freight, 130 Passenger, and 70 Industrial locomotives

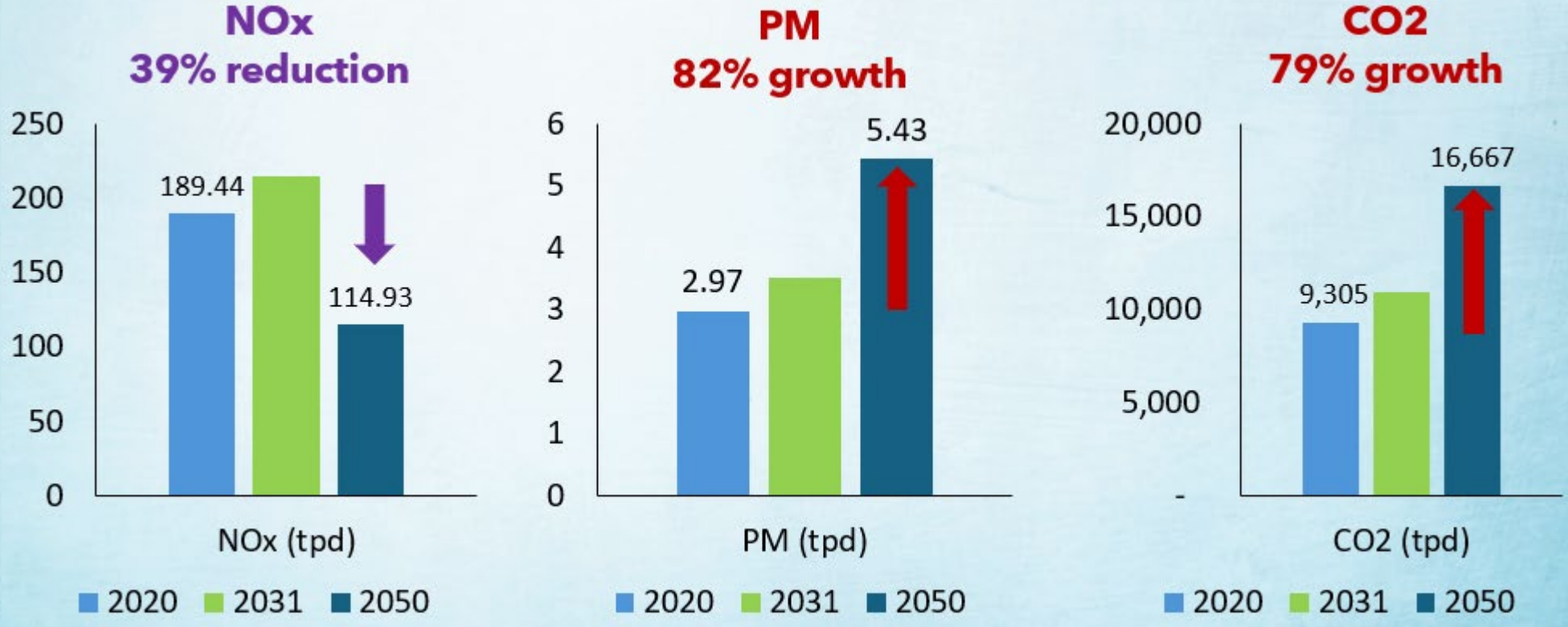


CARB

Baseline emissions projections (current control program)

Ocean-Going Vessels

- **Equipment**: Container, Cruise, Refrigerated Cargo, Bulk Cargo, Tankers, and Auto Carriers (roro)
- **Fuel**: 100% Marine Diesel Oil (MDO) - distillate grade, 0.1% sulfur in 2020
- **Population**: 1,470 unique vessels per year, roughly 7,800 vessel visits per year



Baseline emissions projections (current control program)

Current Status of Off-Road Primarily-Federally and Internationally Regulated Sources

Control Programs

Locomotives

- CARB's In-Use Locomotive Regulation increases use of cleaner locomotives

Ocean-Going Vessels

- Established Tier III engine standards
- At Berth emission control strategies
- Vessel Speed Reduction

Further Emission Reduction Potential

Locomotives

- Increase purchase and use of Tier 4 Final locomotives
- Build zero-emission infrastructure to support zero-emission locomotives
- Demonstration Projects

Ocean-Going Vessels

- Incentivizing more Tier III vessel visits
- Use of alternative fuels
- Operational changes
- Supplemental zero-emission options

Aviation

- **Equipment**: Commercial aviation, military, general aviation, agricultural crop dusting, and rotorcraft (helicopters)
- **Fuel**: high-octane leaded gasoline (avgas) and gas turbine engines, which run on jet fuel (Jet-A fuel)
- **Population**: ~6.4 million operations per year (operation = 1 landing + 1 takeoff)

Baseline emissions projections (current control program)

Current Status of Off-Road Primarily-Federally and Internationally Regulated Sources (Continued)

Current Control Programs

Aviation

- CARB's airport shuttle bus regulation
- Sustainable Aviation Fuel (SAF) producer credits
- CARB is pursuing a Zero-Emission Ground Operations Regulation would include three requirements:
  - Aircraft to "plug-in" at gate requirement;
  - Zero-emission ground support equipment (GSE) requirement
  - Zero-emission taxiing of aircraft to tow the aircraft to and from the runway

Further Emission Reduction Potential

Aviation

- Direct cleaner aircraft to California
- Advocate to EPA and ICAO for stricter engine emissions standards
- Develop and deploy more zero-emission aircraft

Questions for Consideration

Concepts/Scenarios

- Are there any category current controls or emission reduction potential that we overlooked?
- Are there concepts/scenarios that you strongly support, or don't think are necessary?
- What additional ideas or concepts would you like CARB to explore or consider?

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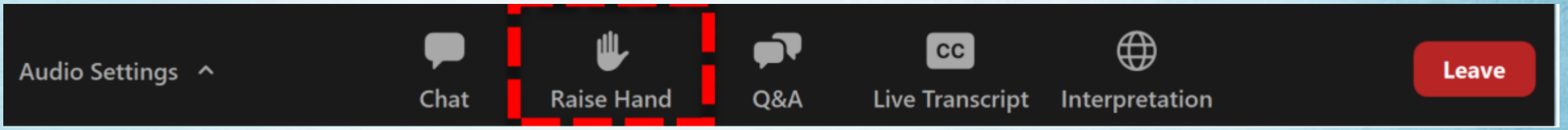
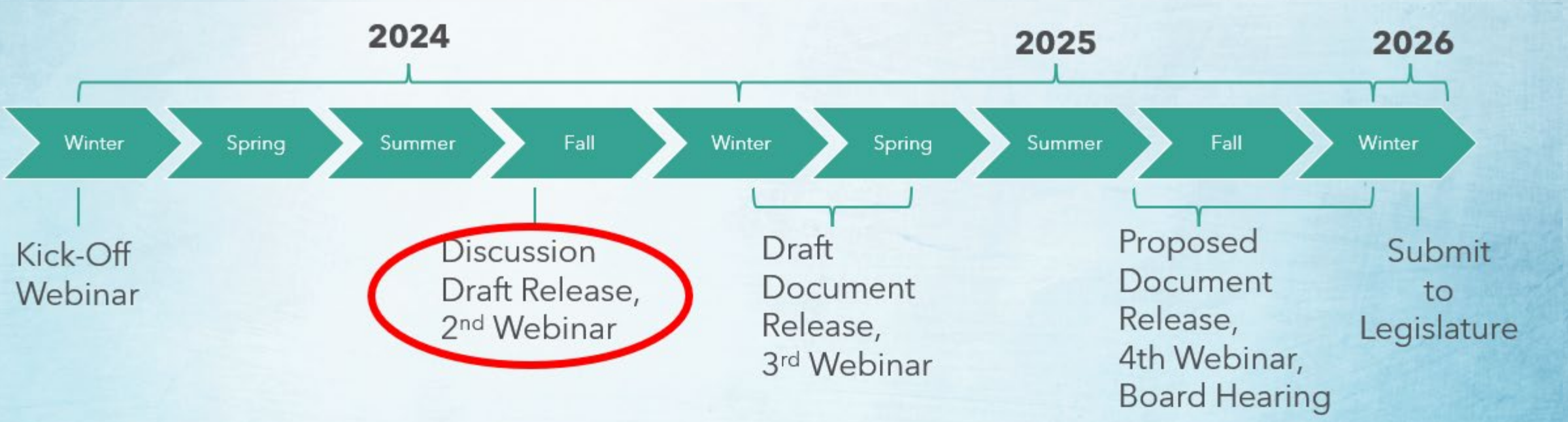


Next Steps

Planned Public Releases and Webinars



Next Steps and Staying Connected

- Next Steps:
  - Discussion Draft Comment Period: closes November 22, 2024
  - Continue engagement & Incorporate feedback
  - Release Draft 2025 MSS and hold Webinar in Spring 2025
- Website: https://ww2.arb.ca.gov/resources/documents/2025-mobile-source-strategy
- Listserv: Subscribe to CARB's Mobile Source Strategy GovDelivery topic to stay informed: https://public.govdelivery.com/accounts/CARB/subscriber/new?topic_id=mobilesourcestrategy
- Questions: email MSS@arb.ca.gov