





San Joaquin Valley Public Advisory Workgroup

Mobile Source Measures

January 25, 2017

California Environmental Protection Agency

Air Resources Board

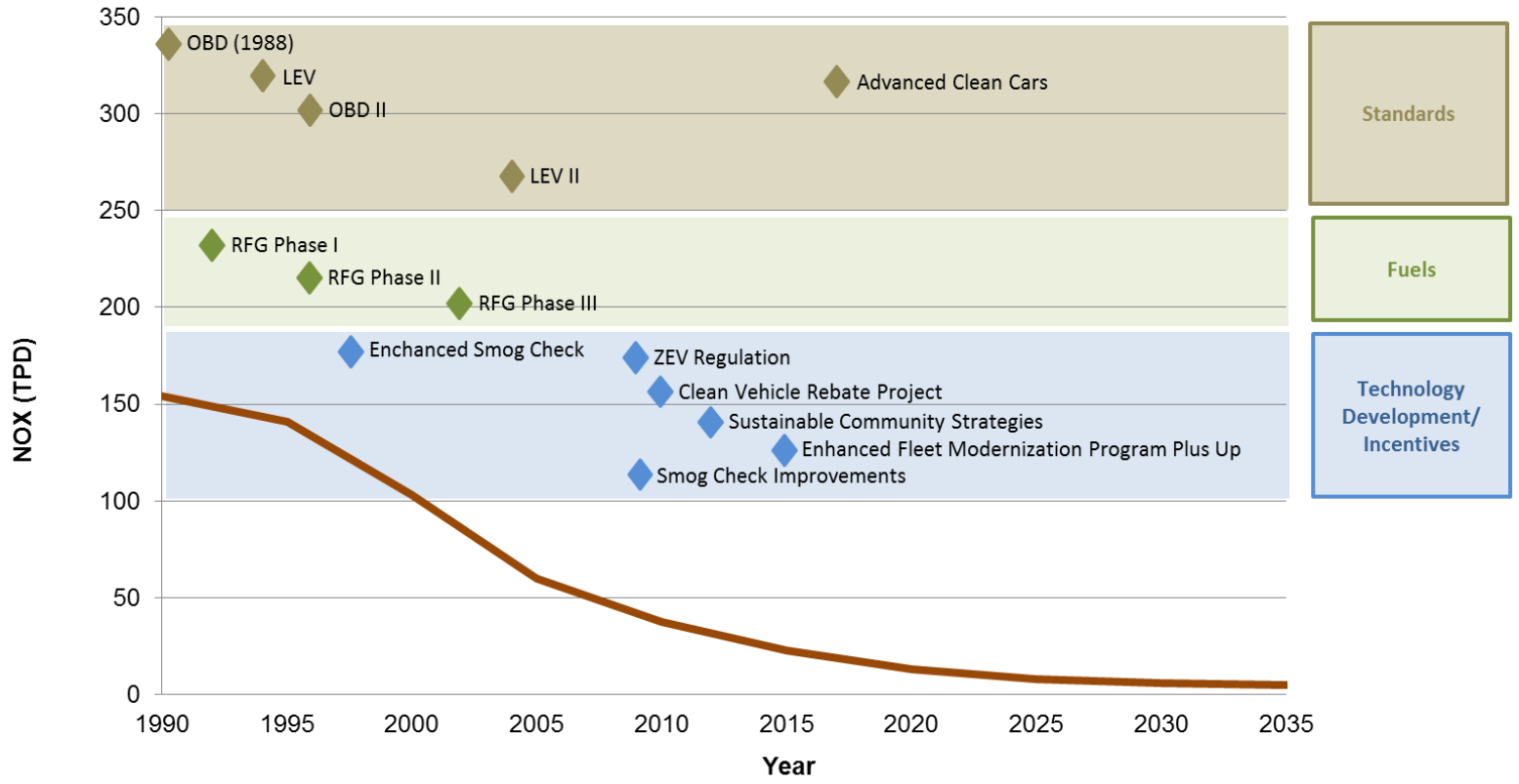
Developing the Mobile Source Strategy

* **Step 1:** Define ongoing reductions from current control program which serve as foundation for attainment strategy
* **Step 2:** Specify new regulatory measures to establish requirements for next generation of cleaner technologies
* **Step 3:** Incentivize early introduction to enhance penetration of cleanest technologies

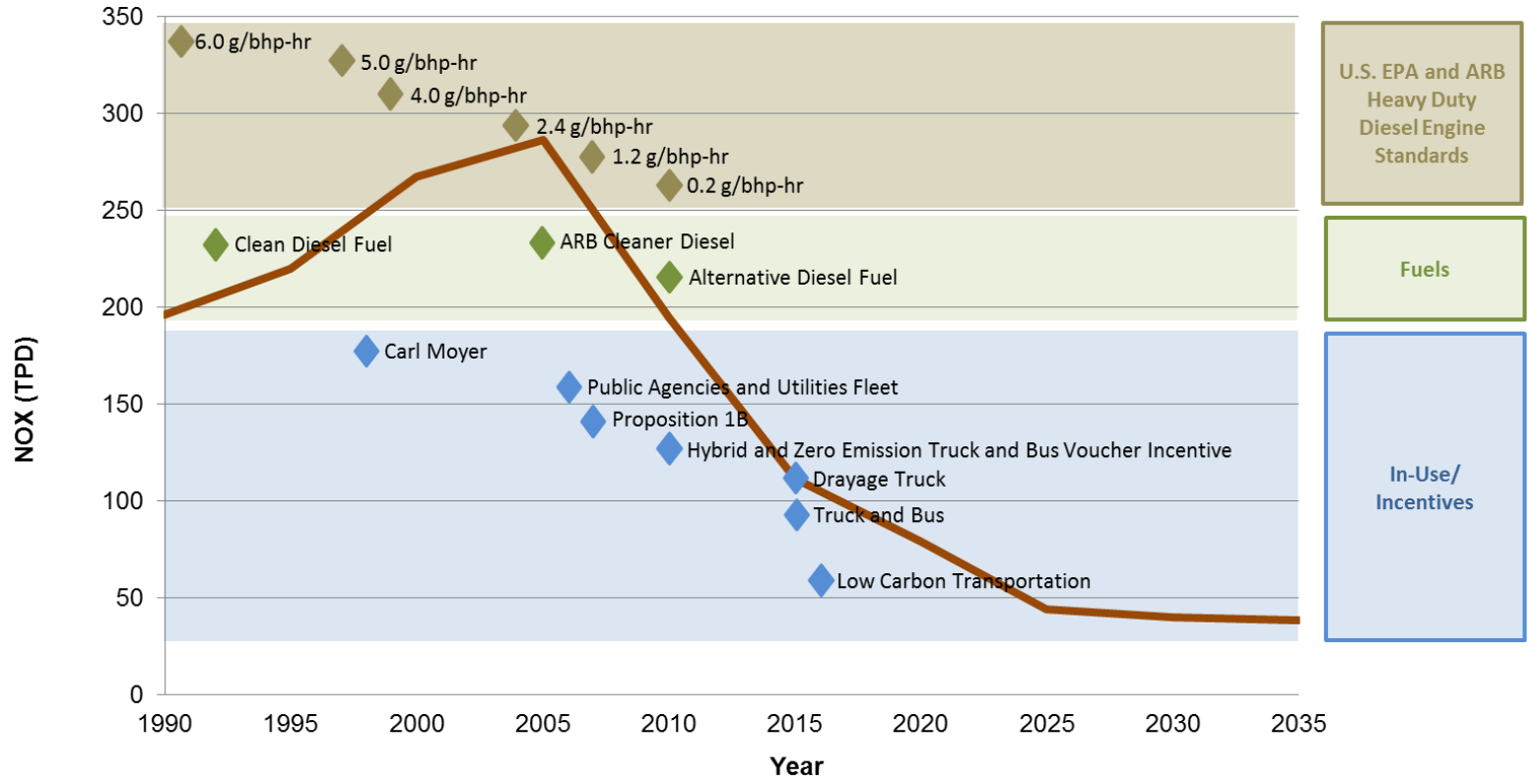
Benefits of Current Mobile Source Control Programs

* Mobile source emissions in the Valley have decreased 60 percent since 1990
* Current control program will continue to provide significant reductions going forward
* Existing incentive programs provide additional reductions

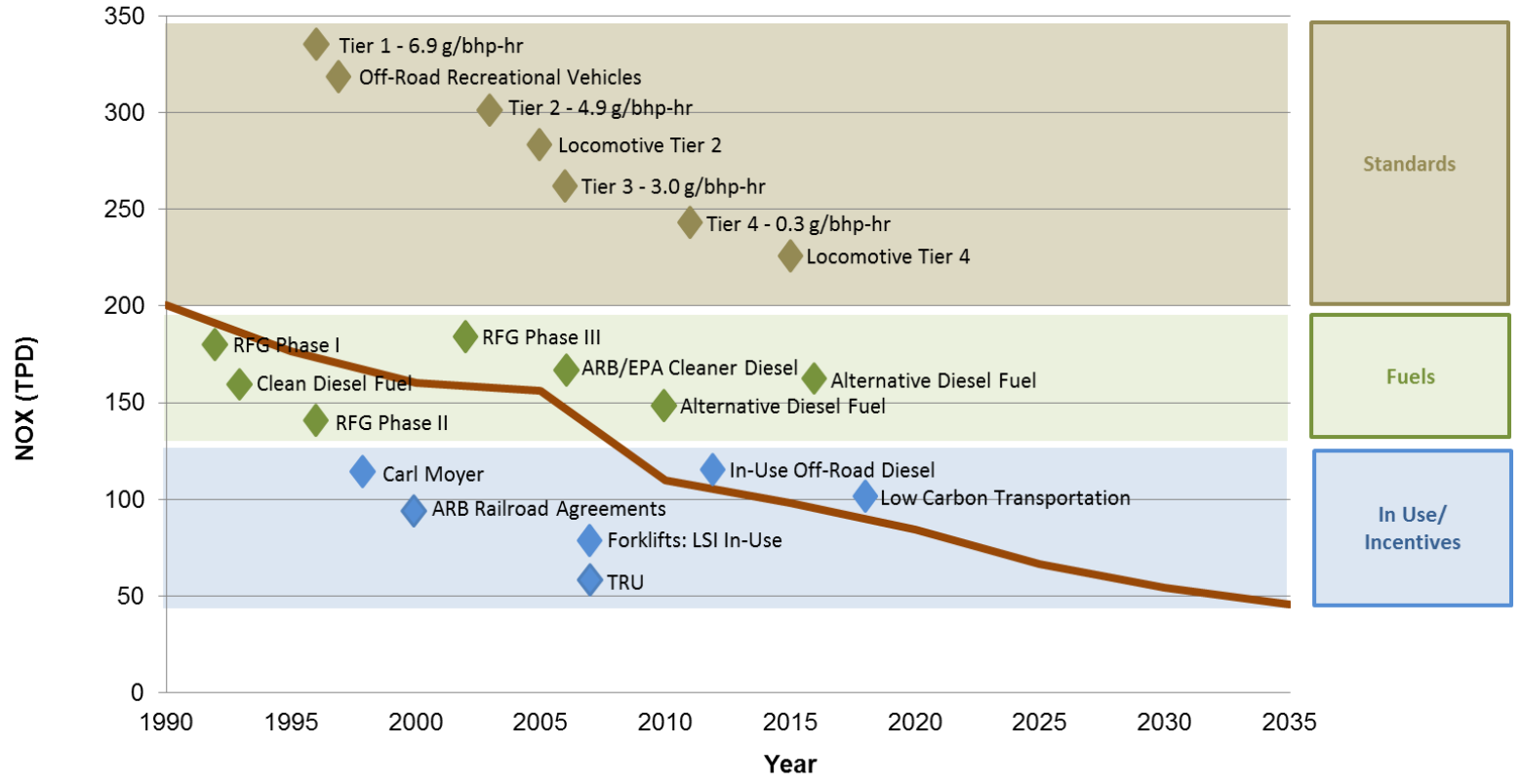
Programs Reducing Light Duty On-Road NOx Emissions



Programs Reducing Heavy-Duty On-Road NOx Emissions



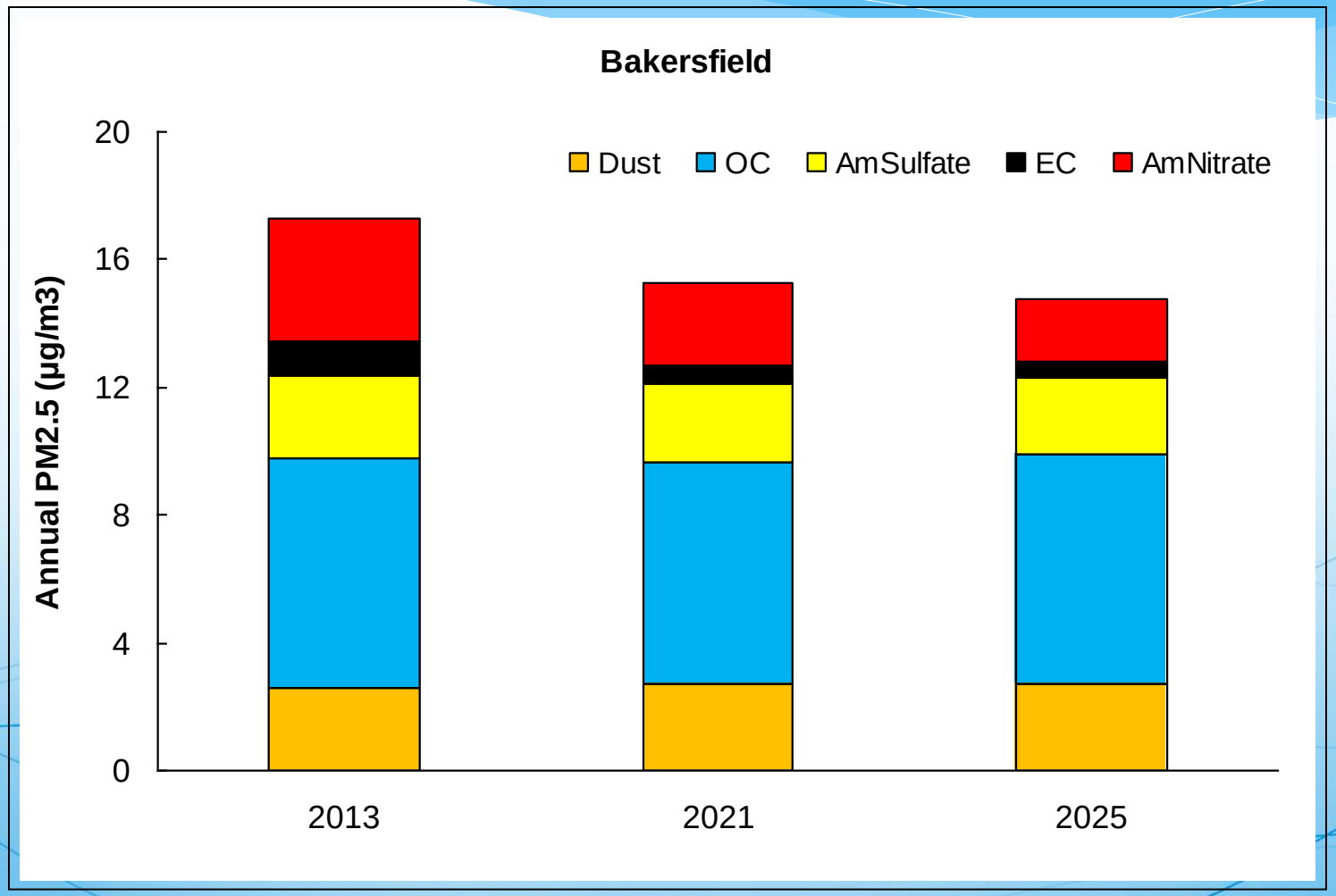
Programs Reducing Off-Road Mobile NOx Emissions



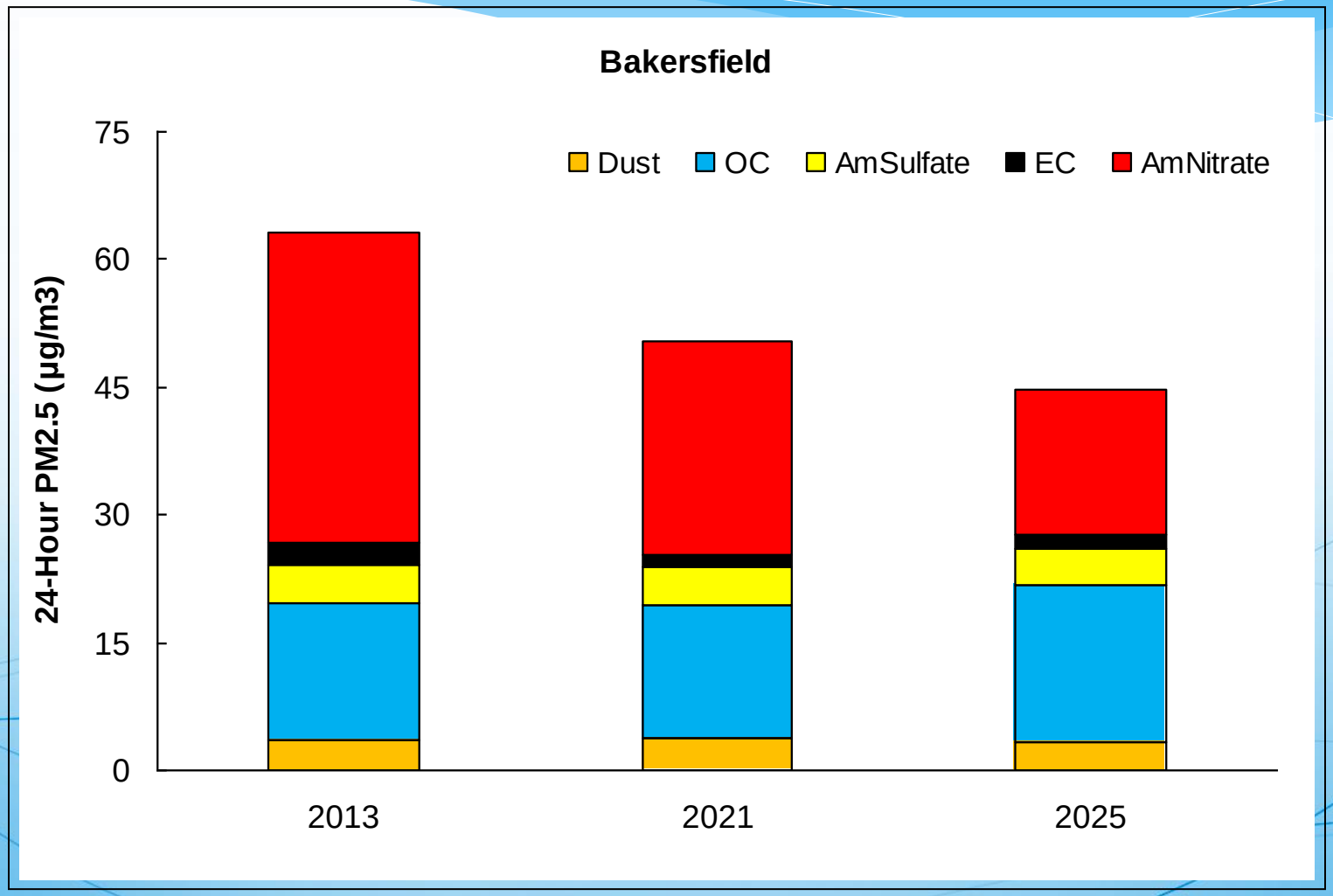
Technical Foundation of Mobile Source Strategy

* Air quality modeling informs emission reduction needs
* Current programs provide blueprint for successful strategy approaches
* Technology assessments identify status of advanced technologies and fuels

Benefits of Current Control Program: Annual Average

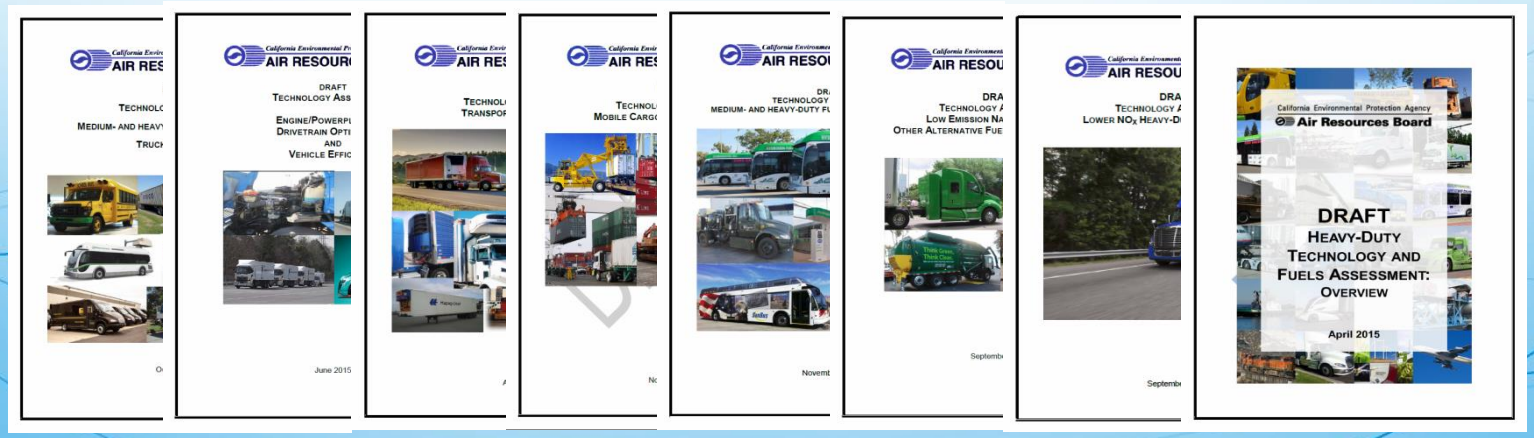


Benefits of Current Control Program: 24-Hour Average



Technology Assessments

- Comprehensive review of technology status and feasibility
- Next generation of advanced technologies and fuels are here
  - Light-Duty ZEV commercialization well underway
  - Low-NOx truck engine has been certified
  - Heavy-duty zero emission technologies being demonstrated



New Measures in State SIP Strategy

- Establish more stringent engine standards
- Increase penetration of zero emission technologies
- Ensure emission control durability
- Expand use of cleaner fuels
- Conduct pilot studies to demonstrate new technologies
- Incentivize deployment of cleanest technologies

Comprehensive Rule Making Calendar Over Next Five Years

Proposed Measure	Agency	Action	Implementation Begins
On-Road Light-Duty			
Advanced Clean Cars 2	ARB	2020 – 2021	2026
Lower In-Use Emission Performance Assessment	ARB / BAR	n/a	ongoing
Further Deployment of Cleaner Technologies*	ARB / SCAQMD / U.S. EPA	ongoing	2016
On-Road Heavy-Duty			
Lower In-Use Emission Performance Level	ARB	2017 – 2020	2018 +
Low-NOx Engine Standard – California Action	ARB	2019	2023
Low-NOx Engine Standard – Federal Action*	U.S. EPA	2019	2024
Medium and Heavy-Duty GHG Phase 2	ARB / U.S. EPA	2017 – 2019	2018 +
Innovative Clean Transit	ARB	2017	2018
Last Mile Delivery	ARB	2018	2020
Innovative Technology Certification Flexibility	ARB	2016	2017
Zero-Emission Airport Shuttle Buses	ARB	2018	2023
Incentive Funding to Achieve Further Emission Reductions from On-Road Heavy-Duty Vehicles	ARB / SCAQMD	ongoing	2016
Further Deployment of Cleaner Technologies*	ARB / SCAQMD / U.S. EPA	ongoing	2016
Off-Road Federal and International Sources			
More Stringent National Locomotive Emission Standards *	U.S. EPA	2016	2023
Tier 4 Vessel Standards *	ARB / IMO	2016 – 2018	2025
Incentivize Low Emission Efficient Ship Visits	ARB	2018 – 2020	2018 +
At-Berth Regulation Amendments	ARB	2017 – 2018	2023
Further Deployment of Cleaner Technologies*	ARB / SCAQMD / U.S. EPA	ongoing	2016
Off-Road Equipment			
Zero-Emission Off-Road Forklift Regulation Phase 1	ARB	2020	2023
Zero-Emission Off-Road Emission Reduction Assessment	ARB	2025 +	--
Zero-Emission Off-Road Worksite Emission Reduction Assessment	ARB	tbd	--
Zero-Emission Airport Ground Support Equipment	ARB	2018	2023
Small Off-Road Engines	ARB	2018 – 2020	2022
Transport Refrigeration Units Used for Cold Storage	ARB	2018 – 2019	2020 +
Low-Emission Diesel Requirement	ARB	by 2020	2023
Further Deployment of Cleaner Technologies*	ARB / SCAQMD / U.S. EPA	ongoing	2016
Consumer Products			
Consumer Products Program	ARB	2019 – 2021	2020 +

Estimated Emission Reductions

Proposed Measure	2025		2031
	NOx	PM2.5	NOx
On-Road Light-Duty			
Advanced Clean Cars 2	--	--	0.2
Total Category Reductions	**--**	**--**	**0.2**
On-Road Heavy-Duty			
Lower In-Use Emission Performance Level	NYQ	<0.1	NYQ
Low-NOx Engine Standard – California Action	2	--	7
Low-NOx Engine Standard – Federal Action	2	--	8
Innovative Clean Transit	<0.1	<0.1	<0.1
Last Mile Delivery	<0.1	<0.1	0.2
Zero-Emission Airport Shuttle Buses	--	--	<0.1
Total Category Reductions	**4**	**<0.1**	**15**
Off-Road Federal and International Sources			
More Stringent National Locomotive Emission Standards	0.3	<0.1	1
Total Category Reductions	**0.3**	**<0.1**	**1**
Off-Road Equipment			
Zero-Emission Off-Road Forklift Regulation Phase 1	--	<0.1	<0.1
Zero-Emission Airport Ground Support Equipment	<0.1	<0.1	<0.1
Small Off-Road Engines	0.2	<0.1	0.3
Transport Refrigeration Units Used for Cold Storage	NYQ	NYQ	NYQ
Low-Emission Diesel Requirement	1	0.1	0.5
Total Category Reductions	**1**	**0.1**	**0.8**
Aggregate Emission Reductions	**6**	**0.1**	**17**

"NYQ" denotes emission reductions are Not Yet Quantified

"—" denotes no anticipated reductions

Passenger Vehicles

* Increase stringency of fleet-wide emission standards
* Expanded requirements to increase sales of ZEV's and plug-in hybrids
* Improve in-use performance, focused inspection procedures, and durability of emission repair work

Heavy Duty Trucks: Low-NOx Engine Standard

* Establish California low-NOx engine standard
* Federal action needed to address interstate trucks operating in California
* On December 20, 2016 EPA provided commitment in response to ARB efforts and district petitions

Heavy Duty Trucks: Ensure Engine Durability

* **Innovative Technology Certification Flexibility:**
  * Provide regulatory flexibility for innovative technologies that expand zero emission technologies in heavy-duty truck applications
* **Lower In-Use Emission Performance Level:**
  * Revise periodic smoke inspection program
  * Revise certification requirements
  * Revise warranty and useful life provisions

Heavy Duty Trucks: Enhanced ZEV Deployment

* **Last Mile Delivery**
  * Increase penetration of ZEV technologies in Class 3-6 trucks used in last mile delivery
* **Airport Shuttle Buses**
  * Encourage early introduction of ZEV in shuttle buses and other vehicles operating at airports

Innovative Clean Transit

* Continue to support near-term deployment of zero-emission buses
* Secure binding commitments from transit providers for long-term transition to zero emission transit options
* Partner with transit agencies on use of zero emission first/last mile options and shared ridership services

Off-Road Mobile: More Stringent Locomotive Standards

* Petition EPA to establish new Tier 5 national emission standards for newly manufactured locomotives
* More stringent national requirements for remanufactured locomotives

Off-Road Mobile: Enhanced ZEV Deployment

* **Forklifts**
  * Accelerate deployment of zero emission for forklifts <8000 lbs
* **Airport Ground Support Equipment**
  * Transition diesel equipment to zero emission technologies
* **Small Off-road Engines**
  * Set more stringent engine standards
  * Increase penetration of zero emission equipment
* **Transport Refrigeration Units**
  * Establish run-time limitations
  * Increase operational efficiencies

Low-Emission Diesel Fuels

* Establish performance requirements for low emission diesel fuel
* Focus on reducing criteria pollutants, especially from the off-road fleet
* Support transitioning to cleaner mix of diesel substitute fuels

Incentivizing Turnover to Cleaner Technologies

* Define benefits of new regulatory requirements under natural turn over
* Quantify benefits of current incentive programs
  * Moyer, AQIP, Low Carbon Transportation, NRCS, …
* Evaluate opportunities for additional near-term reductions
  * Vehicle/equipment populations
  * Current control technology levels
  * Emission benefits of cleaner technologies
  * Timing of technology development

Next Steps

* Propose commitment for new regulatory measures as part of SIP Strategy
* Determine scope of enhanced deployment of cleaner technologies to support near-term reductions
* Evaluate funding needs, and other programmatic actions
* Identify funding mechanisms and partnerships at local, State, and federal level

Mobile Source NOx Emissions Inventory

	2013	2019	2021	2025
On-Road				
LD cars	10	6	5	4
LD/MD Trucks	20	10	8	5
HD Trucks	146	85	72	43
Buses	6	4	3	2
Off-Road				
Aircraft	2	5	5	5
Trains	13	10	10	8
Shipping	1	1	1	1
Rec Boats and Vehicles	2	1	1	1
Construction and Mining	11	10	10	8
Oil Drilling and Workover	4	3	2	1
Remaining Off-Road	7	5	5	4
Farm Equipment	48	39	34	27

Mobile Source PM2.5 Emissions Inventory

	2013	2019	2021	2025
On-Road				
LD cars	1.0	1.2	1.2	1.4
LD/MD Trucks	0.9	0.8	0.8	0.8
HD Trucks	4.4	1.4	1.1	0.9
Buses	0.2	0.2	0.1	0.1
Off-Road				
Aircraft	1.2	1.7	1.7	1.7
Trains	0.2	0.1	0.1	0.1
Shipping	0.0	0.0	0.0	0.0
Rec Boats and Vehicles	0.4	0.3	0.3	0.2
Construction and Mining	0.5	0.5	0.4	0.3
Oil Drilling and Workover	0.2	0.1	0.1	0.0
Remaining Off-Road	0.5	0.3	0.3	0.2
Farm Equipment	2.8	2.2	2.0	1.6

Mobile Source SOx Emissions Inventory

	2013	2019	2021	2025
On-Road				
LD cars	0.2	0.2	0.2	0.2
LD/MD Trucks	0.2	0.2	0.2	0.2
HD Trucks	0.2	0.3	0.3	0.3
Buses	0.0	0.0	0.0	0.0
Off-Road				
Aircraft	0.1	0.2	0.2	0.2
Trains	0.1	0.1	0.1	0.1
Shipping	0.1	0.0	0.0	0.0
Rec Boats and Vehicles	0.0	0.0	0.0	0.0
Construction and Mining	0.0	0.0	0.0	0.0
Oil Drilling and Workover	0.0	0.0	0.0	0.0
Remaining Off-Road	0.0	0.0	0.0	0.0
Farm Equipment	0.0[26]	0.0	0.0	0.0