Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards

Follow-up Discussion with NACAA Mobile Sources and Fuels Committee

MARCH 22, 2022

PRESENTED BY US EPA, OTAQ

Summary of the Alternative

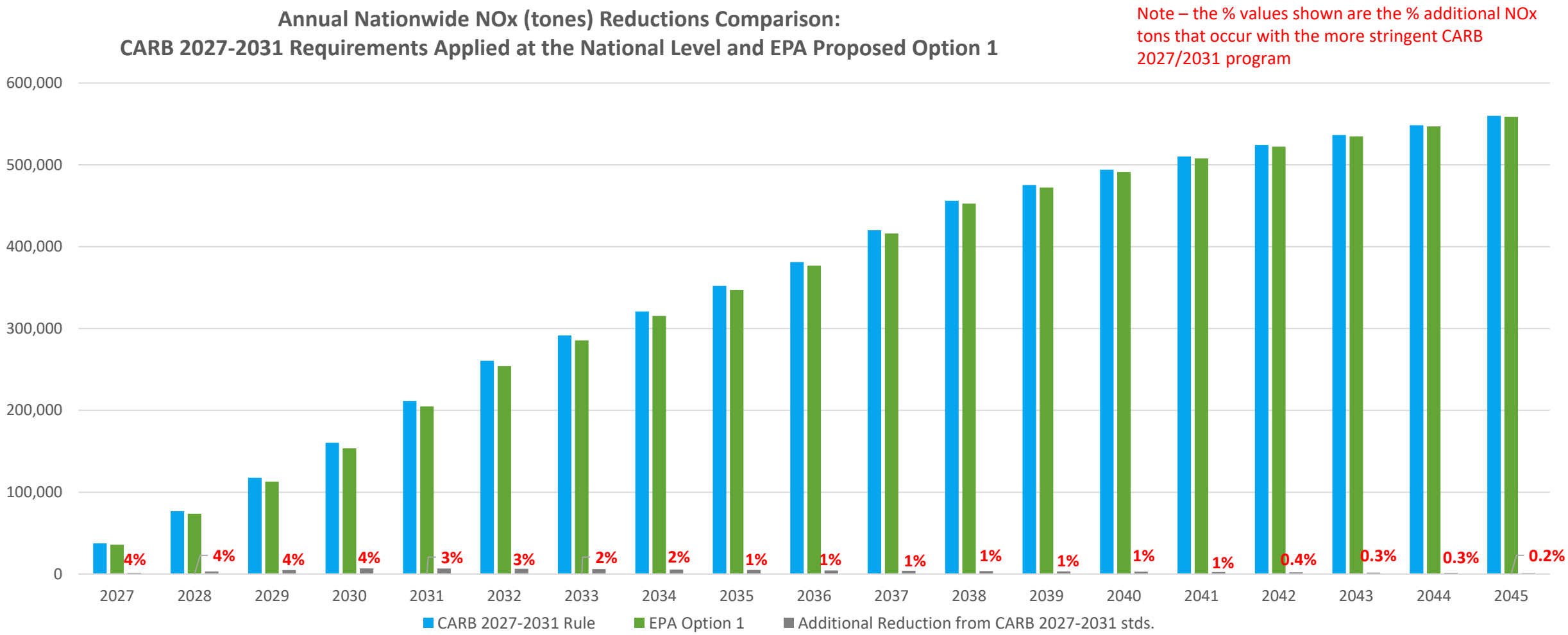
- Significantly more stringent than the proposed Options 1 and 2, and the CARB Omnibus Standards due to combination of numeric level NO_X emission standards, useful life periods, and lead time of the Alternative
  - 20 mg/hp-hr NOx standard for full useful life
  - Longest useful life periods and emission warranty periods for all engine categories compared to EPA Option 1, EPA Option 2, and CARB Omnibus Low NOx program

- Currently EPA is unable to conclude that the Alternative is feasible in the MY 2027 timeframe over the useful life periods in the Alternative
  - Due to deterioration in the emission control technologies that we have evaluated to date
  - We would need additional supporting data or other information in order to determine that the Alternative is feasible in the MY 2027 timeframe to consider adopting it in the final rule

Comparison of EPA Proposal and CARB Omnibus: Heavy Heavy-Duty Engine Service Class

	EPA Option 1	EPA Option 2	EPA Alternative	CARB HD Omnibus Rule
MY 2027				
FTP & SET cycle NOx standards (mg/hp-hr)				
@ Intermediate Useful Life	request comment	request comment		20
@ Full Useful Life	35	50	20	35
Low Load Cycle NOx standard (mg/hp-hr)	90	100	100	90
Idle NOx standard (g/hr)	5 (optional)	10 (optional)	10	5
In-use moving average window NOx std.	2x lab cycle value	1.5x lab cycle value	1.5x lab cycle value	2x lab cycle value
Intermediate Useful Life (miles)	-	-		435,000
Full Useful Life (miles)	600,000	650,000	850,000	600,000
Emissions Warranty (miles)	450,000	350,000	800,000	450,000
MY 2031				
FTP & SET cycle NOx standards (mg/hp-hr)		Same as MY 2027	Same as MY 2027	
Intermediate Useful Life	20			20
Full Useful Life	40			40
Low Load Cycle NOxstandard (mg/hp-hr)	100			100
Idle NOx standard (g/hr)	5 (optional)			5
In-use moving average window std.	1.5x lab cycle value			1.5x lab cycle value
Intermediate Useful Life (miles)	435,000			435,000
Full Useful Life (miles)	800,000			800,000
Emissions Warranty (miles)	600,000			600,000

Comparison of EPA Option 1 and CARB Omnibus NOx Reductions



Data from draft RIA Table 5-49

Goals of EPA's Proposed SCR Inducement Requirements

- One of EPA's objective with the proposed SCR inducement provisions is to ensure emission controls function and emission reductions occur in-use while reducing unintended impacts for operators

- EPA's inducement approach should result in (excerpts from Preamble Section IV.D.3)
  - Operators maintaining an adequate supply of high-quality DEF **while discouraging tampering of SCR systems**,
    - *"… would help prevent tampering with the SCR system by requiring increased levels of inducement to occur in stages for reasons related to insufficient quantity of high-quality DEF or tampering with the SCR system. This approach creates an immediate and increasing incentive to remedy the problem. Operators would keep tanks full of high-quality DEF prior to the inducement process starting and avoid tampering with the SCR system.*
  - A vehicle speed derating schedule for inducement that **balances impacts to operators while still achieving required emission control**,
    - *"An appropriate inducement speed and schedule should be low enough to ensure that operators maintain a supply of high-quality DEF, while allowing engines to operate at a limited speed over a restricted timeframe that restricts commercial operation (e.g., highway operation) but allows for safely operating the vehicle to return home for repair and to perform the necessary post-repair diagnostic checks to avoid "come-back" repairs. Almost all heavy-duty vehicles are engaged in commercial activity for which it would be completely unacceptable to operate indefinitely at vehicle speeds that do not allow for travel on limited-access highways. This principle should result in an inducement schedule that would allow a reduced level of operation over a sufficient period of time for operators when there is a need to get a driver home from a distance, deliver critical freight (e.g., passengers, livestock, or concrete) or for scheduling repairs in a time or area of limited openings in repair shops. Establishing an inducement policy that would be consistent among manufacturers would improve operator experiences.."*

Proposed SCR Inducements Requirements

- Proposed requirements would codify existing EPA Guidance that SCR-equipped engines must meet critical emission-related scheduled maintenance requirements and limit the physically adjustable range under the adjustable parameter requirements by triggering inducements

- Inducements would be triggered for fault conditions including:
  - (1) DEF supply is low, 2) DEF quality does not meet manufacturer specifications, or 3) tampering with the SCR system

- Would provide separate inducement schedules for low- and high-speed vehicles (excerpts from Preamble Section IV.D.4)
  - *"For example, our data show that combination long-haul vehicles spend nearly almost 40 percent of their driving time over 65 mph. Based on this operation, an inducement speed of 65 mph will cause a significant impact on the ability of the vehicle to be used for commercial purposes, which means that any speed restriction below this threshold is less likely to further incentivize operators to keep emissions systems compliant."*
  - *"One of the considerations in choosing the stepped speed decreases is allowing drivers time to safely adjust to operation at a lower speed while also adequately incentivizing action by vehicle owners and operators, and we are proposing that 5 mph increments achieve this balance. Commenters noted that even small changes in allowable speeds are sufficient incentive to use high quality DEF."*

- EPA's proposal would also:
  - Include a NO_X override to prevent false inducements
  - Require manufacturers to improve information provided to operators regarding inducements.
  - Allow operators to remove inducement conditions after repairing the engine either through the use of a generic scan tool or through a drive cycle to ensure that repairs have been properly made
  - If multiple repeat fault conditions are detected the inducement schedule would not restart with each new fault

EPA's Low NOx System Demonstration Project

- EPA's demonstration project built on CARB's multi-year demonstration program at Southwest Research Institute
- Modifications made to CARB Stage 3 aftertreatment system to improve performance:
  - Additional diesel exhaust fluid mixer for underfloor SCR system
  - Zone coated soot filter was replaced with a separate diesel oxidation catalyst and diesel particulate filter that was aged to the equivalent of 435,000 miles
- The complete aftertreatment system was aged to the equivalent of 800,000 miles