



California Tier 5: Off-Road Diesel Small-Volume Engine Manufacturer Concept

August 8, 2022

Outline

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Need for Small-Volume Manufacturer Allowances

- Small-volume manufacturers may have insufficient engineering resources to develop Tier 5 engines just for California
- Small-volume manufacturers may have insufficient compliance resources to certify Tier 5 engines just for California
- Manufacturers who sell few engines in California may not be able to recoup their Tier 5 investments without federal or international alignment due to economies of scale
- Alternative provisions for small-volume engine manufacturers may be necessary to protect California businesses, employees, and clients who depend on the availability of their engines and the equipment they power for livelihood and infrastructure

Current Small-Volume Definition

Title 13, California Code of Regulations, § 2421 (a)(53) defines a “small-volume engine manufacturer” as:

“... a small business engine manufacturer that had engine families certified to meet the requirements of 40 CFR part 89 before 2003, had annual U.S.-directed production of no more than 2,500 units in 2002 and all earlier calendar years, and has 1000 or fewer employees. For manufacturers owned by a parent company, the production limit applies to the production of the parent company and all its subsidiaries, and the employee limit applies to the total number of employees of the parent company and all its subsidiaries.”

Current Tier 4 Small-Volume Allowances

- Alternate Tier 4 standards - 1039.104(c) of the California Test Procedures
 - May continue to certify to previous tier standards, e.g., Tier 3 for up to two years
 - Full Tier 4 compliance required after the delay
- Not required to comply with Not-To-Exceed Limits
- Not required to report Nitrous Oxide (N₂O) or Methane (CH₄) emissions in the certification application
- May use assigned deterioration factors
- Eligible for more generous Transition Program for Equipment Manufacturers (TPEM) flexibility allowances
- Eligible for longer economic and non-economic hardship allowances

Federal vs. State Volumes

- Why are California small-volume off-road diesel engine manufacturers currently defined by federal sales volumes?
 - Simplicity
 - Standards are currently harmonized in all 50 states
 - Cumbersome for some manufacturers to independently track California volumes
 - Efficiency
 - Averaging, Banking, and Trading (ABT) credits are currently calculated based on nationwide sales volumes
 - Transition Program for Equipment Manufacturers (TPEM) allowances are currently based on nationwide sales volumes
 - Small-volume manufacturers are defined universally and are eligible for the same small-volume exemptions nationwide

Need for a California-Specific Definition

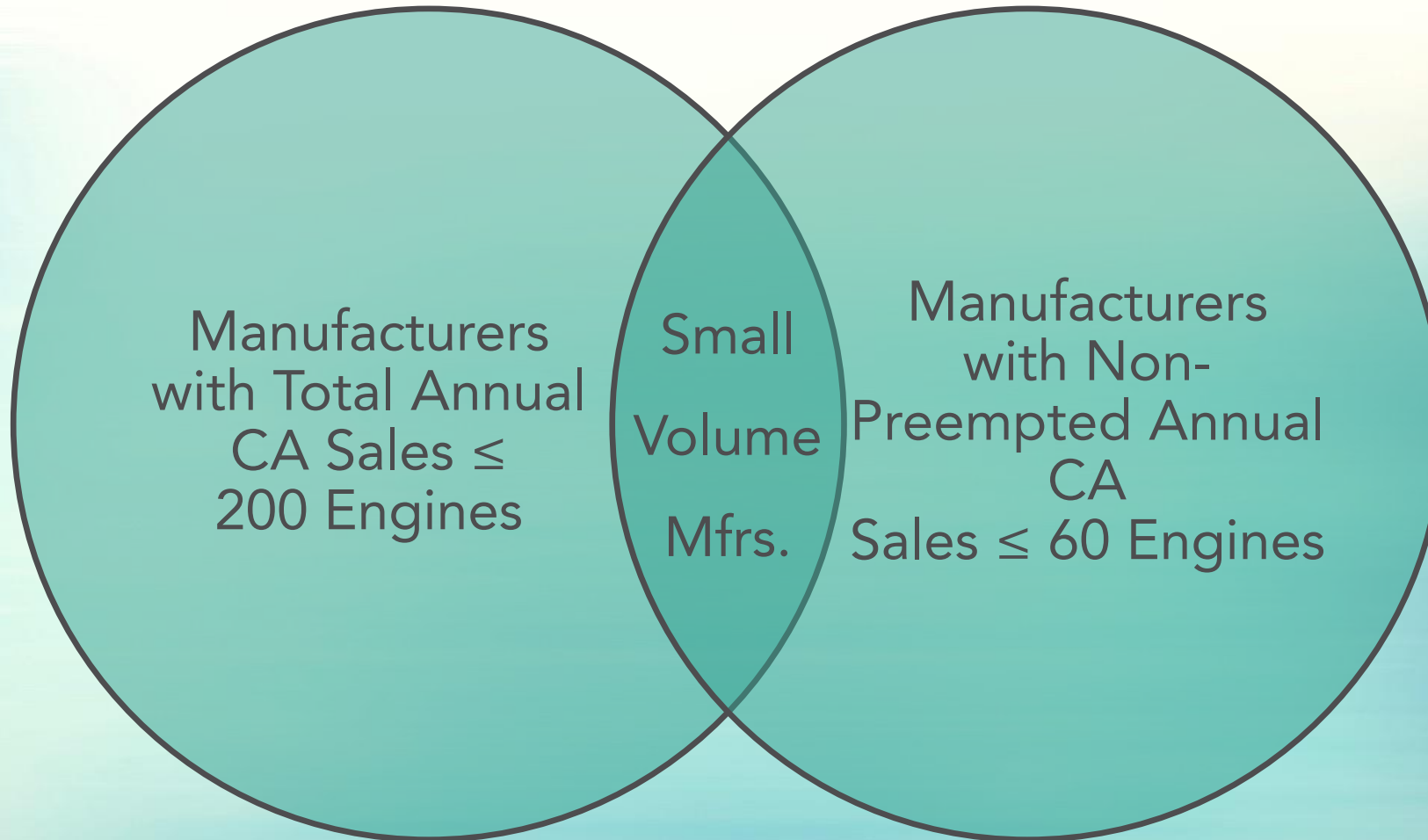
- Tier 5 will introduce unique standards for off-road diesel engines in California
- Federal standards will likely remain at Tier 4 levels for at least a few years
- Tier 5 would therefore necessitate State-level credit calculations, Low Load Cycle (LLC) testing, Carbon Dioxide (CO₂) standards, On-Board Diagnostics (OBD), and other requirements specific to CA-certified engines

Defining a CA Small-Volume Engine

Mfr.: Must Meet All Three Criteria

- Total annual CA-directed off-road diesel engine sales volumes \leq 200 total units AND \leq 60 non-preempted units prior to the 2020 MY
 - Includes all new engines for a model year including TPEM and ABT certified
 - Includes new replacement engines produced under § 1068.240 of the California Off-Road Diesel Engine Test Procedures
 - Includes total production volumes from the parent company and all subsidiaries
- 1,000 or fewer employees including the parent company and all subsidiaries
- Has not previously certified Tier 5 engines in California as a non-small-volume engine manufacturer

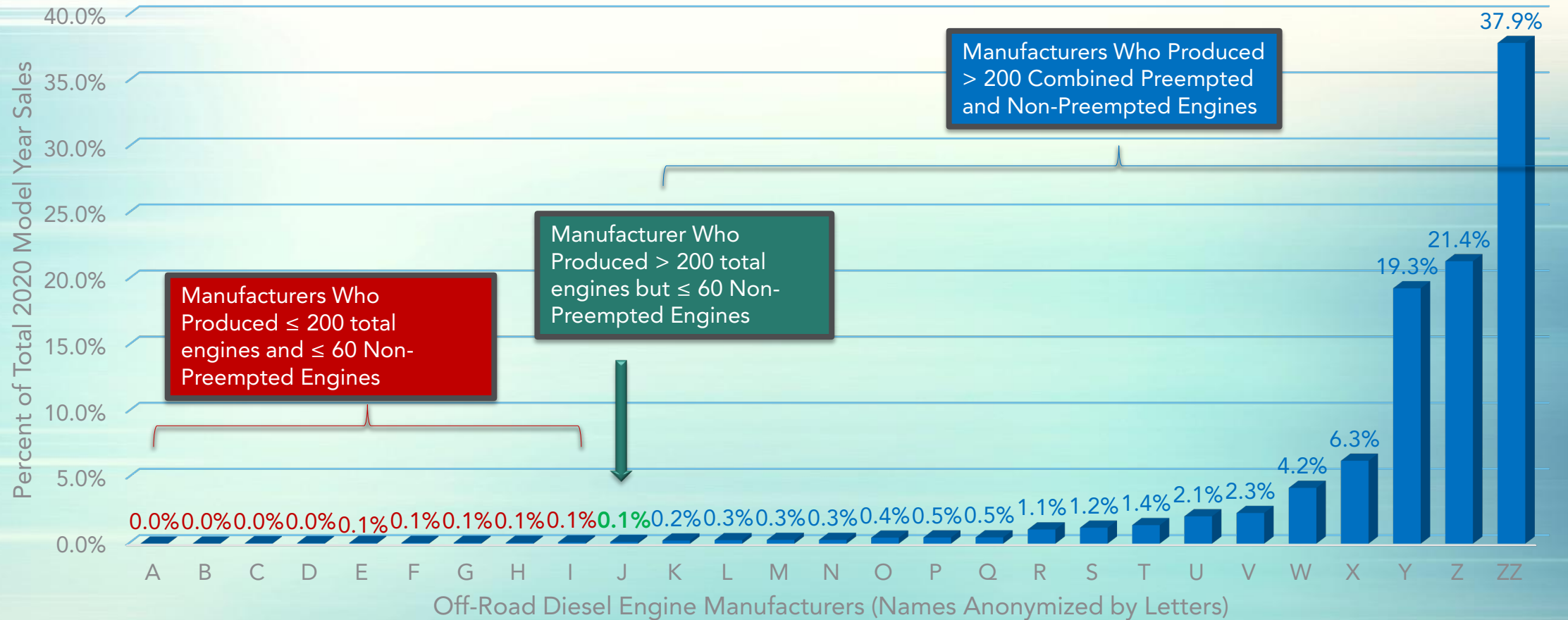
Two-Criteria Definition of a California Small-Volume Manufacturer



Why 200 / 60 Engine Cut-Points?

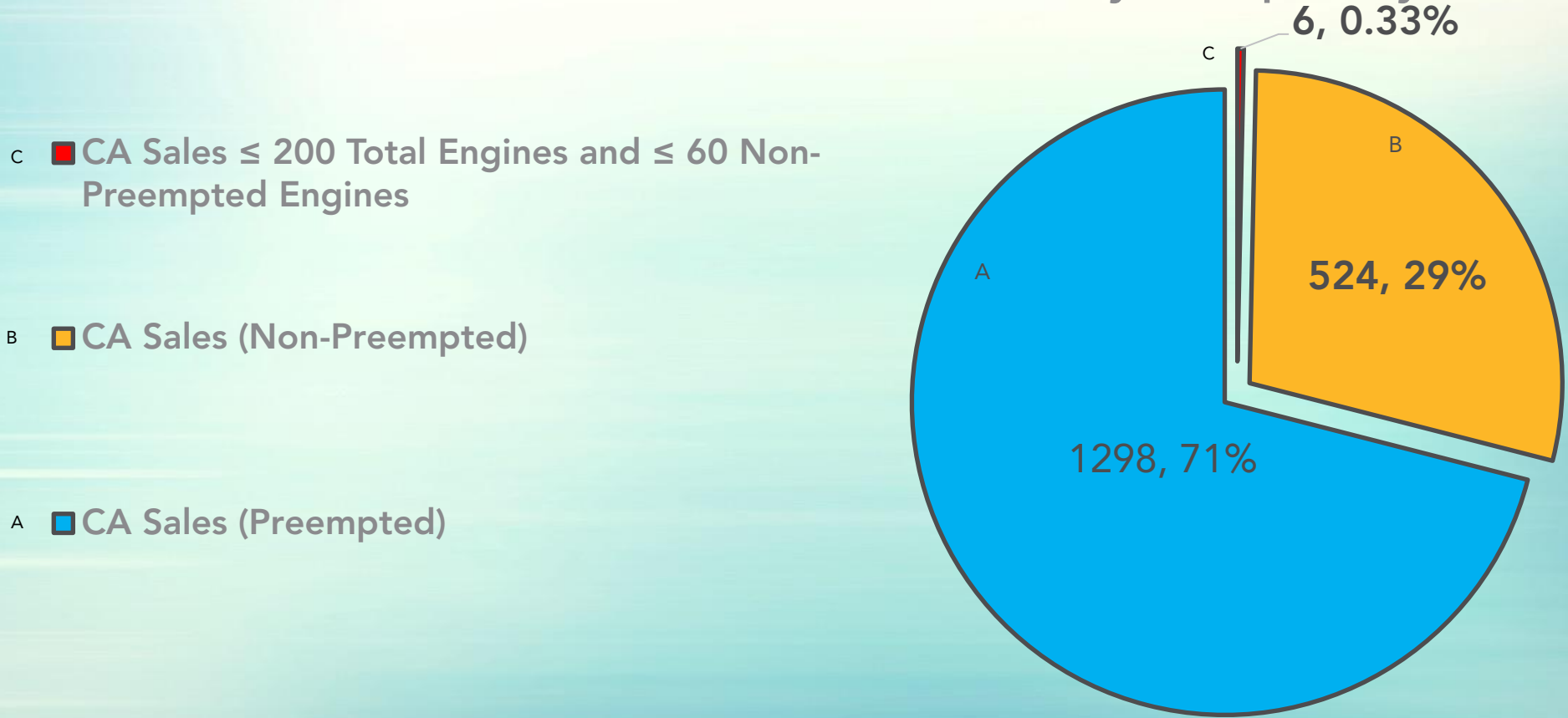
- The sum of NO_x emissions in 2020 from all off-road diesel engine manufacturers producing ≤ 200 total engines AND ≤ 60 non-preempted engines in California was approximately 0.31% of the total statewide California NO_x emissions inventory from off-road diesel engines (5.75 tons per day)
- The percentage of diesel engine sales from manufacturers producing ≤ 200 total engines AND ≤ 60 non-preempted engines in California was approximately 0.5% of total sales and 1.6% of non-preempted sales in 2020
- 200 units correlates well to the federal definition of a small-volume engine manufacturer based on 2,500 annual units
- 60 units correlates to the current average percentage of non-preempted engines estimated to be produced in California for 2028

Distribution of California Off-Road Diesel Engine Manufacturers by Percentage of Engine Sales



NOx Impact by Engine Sales Volume

Total 2020 California NOx Inventory (tons per day)



Includes preempted and non-preempted engine sales

CA Small-Volume Mfr. Concept (Standards)

Conceptual Tier 5 Normal vs Small-Volume Manufacturer Standards (g/kW-hr)						
Pollutant	19 ≤ kW < 56 kW		56 ≤ kW ≤ 560		> 560 kW	
	NORMAL	SMALL	NORMAL	SMALL	NORMAL	SMALL
NO _x	1.2 (75%)	3.5 (25%)	0.04 (90%)	0.10 (75%)	0.35/1.8 (50%)	0.5/2.7 (25%)
PM	0.008 (75%)	0.008 (75%)	0.005 (75%)	0.005 (75%)	0.015 (50%)	0.015 (50%)
NMHC	0.19 (new)	0.19 (new)	0.19 (n/c)	0.19 (n/c)	0.19 (n/c)	0.19 (n/c)
CO	5.0 (n/c)	5.0 (n/c)	5.0/3.5 (n/c)	5.0/3.5 (n/c)	3.5 (n/c)	3.5 (n/c)
CO ₂	TBD (cap)	n/a	TBD / (5-8.6% below cap)	n/a	TBD (cap)	n/a

CA Small-Volume Mfr. (SVM) Concept (Other Requirements)

- Delayed Implementation
 - Compliance with Tier 5 Small Volume NOx standards could be delayed up to two years
- Useful Life
 - Minimal or no changes for small-volume manufacturers
- Test Cycles
 - Certification on the LLC would not be required for small-volume manufacturers
- In-Use
 - Options are being considered in lieu of Off-Road In-Use Testing
- OBD
 - Options are being considered in lieu of full OBD compliance