

Potential General Concepts: Innovative Technology Regulation (ITR) Eligibility and Implementation

Objective: Provide near-term, targeted certification and on-board diagnostics (OBD) compliance flexibility to accelerate market launch of key truck and bus technologies California needs to meet its long term air quality and climate goals.

1) Optional Low NOx Heavy-Duty Engines

Six Technology Categories			
Engine Type	g/bhp-hr NOx		
	0.10	0.05	0.02
CI	√	√	√
Otto Cycle	√	√	√

Within each of the six potential low NOx engine technology categories (above), an engine family would be eligible for two model years (MY) of Tier 1 flexibility and two MYs of Tier 2 flexibility.

- **Tier 1:** Modest OBD flexibility
- **Tier 2:** Progress towards full OBD

Sunset Provisions: Eligibility for each of the low-NOx technology categories would sunset four MYs after two low-NOx engines within that technology category are first certified.

Annual Sales Allowance: Each manufacturer's California sales allowance of *either* low-NOx engines or hybrid engines receiving ITR flexibility in a MY, respectively = 10% of its annual California heavy-duty engine sales volume, or 200 engines, whichever is greater.

Each manufacturer's California sales allowance for *both* low-NOx + hybrid engines receiving ITR flexibility in a MY = 12.5% of its annual California heavy-duty engine sales volume, or 250 engines, whichever is greater.

2) Hybrid Heavy-Duty Engines

Six Technology Categories and Associated Tier 1 Sales Allowance		
	<35 Mile All-Electric Range (AER)	35+ Mile AER
Vocational (Class 4+)	100	200
Class 8 Urban Bus	tbd	100
Class 8 Tractor	50	100

Within each of the six hybrid engine technology categories (above), a manufacturer would be eligible to sell Tier 1 California sales volumes of engines meeting EMD rather than OBD. Vehicle/chassis emission testing must demonstrate no criteria pollutant increase prior to proceeding beyond Tier 1 volumes. Tier 2 would require significant progress towards full OBD.

Sunset Provisions: Engine families with <35 mile AER would receive at least four MYs and those with 35+ miles AER at least six MYs of Tier 1 and 2 flexibility.

3) Heavy-Duty Engine Technology Diversity Provisions

Engine families with an innovative engine technology that achieves a NOx or CO₂ emission benefit may apply to the Executive Officer for ITR flexibility.

Flexibility would depend on level of innovation:

- **Existing Engine Architecture:** One MY each of modest Tier 1 and Tier 2 flexibility. Maximum 200 engines per manufacturer per MY. *Examples:* Waste heat recovery, engine downsizing, predictive cruise
 - Would sunset two MYs after technology first certified.
- **Novel HD Propulsion Technology:** Two years of significant Tier 1 and Tier 2 flexibility. Maximum 200 engines per manufacturer per MY. *Examples:* microturbine, camless engine, hybrid off-road engine range extender (steady-state operation powers generator, would not propel vehicle)
 - Would sunset four MYs after technology first certified.

4) Hybrid Aftermarket Conversion Systems

Six Technology Categories and Associated Tier 1 and Tier 2 Sales Allowances				
	<35 Mile AER		35+ Mile AER	
	Tier 1	Tier 2	Tier 1	Tier 2
Class 2b/3	10	500	25	1,000
Vocational (Class 4+)	10	500	25	1,000
Class 8 Truck	10	500	25	1,000

Within each of the six hybrid conversion system technology categories (above), a manufacturer would progress through Tier 1 → chassis dynamometer or PEMS testing (indicating no criteria pollutant disbenefit) → Tier 2 → Tier 3 with increasing diagnostics, warranty, and other requirements in each tier.

- Tier 3 would require base vehicle be fully OBD compliant and conversion system use basic diagnostics
- Tier 3 would have no sales volume restriction.
- Potential for ARB to certify CO₂ benefit of conversion systems meeting more robust durability requirements in Tier 3.
- No criteria pollutant benefit would be recognized given potential NO_x issues with hybridization.
- Tier 2 flexibility would sunset for each of the six technology categories above four calendar years after two conversion systems within the category first come to market.