# AIR RESOURCES BOARD SYMPOSIUM ON CALIFORNIA'S DEVELOPMENT OF ITS PHASE 2 GREENHOUSE GAS EMISSION STANDARDS FOR ON-ROAD HEAVY-DUTY VEHICLES

## *2B/3 MANUFACTURERS PERSPECTIVE*


***CYNTHIA WILLIAMS,***
***FORD MOTOR COMPANY***


**April 22, 2015**

# *Heavy-Duty GHG Phase II*

## 2B/3 Products






## GHG Stringency Level Considerations

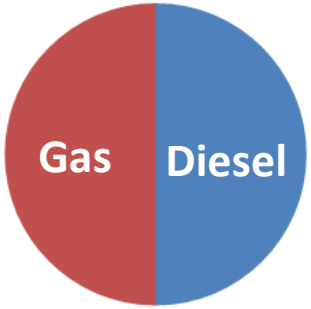
- Each offer essentially two products: a pick-up truck and van (w/many variants)
- Heavy Duty product renewal cadence typically is longer than Pass car/Light duty fleets.
- In additional to being feasible, changes in HD GHG stringency must be implemented in a timeframe aligned with heavy-duty vehicle cadence.

2018 Model Years 2025

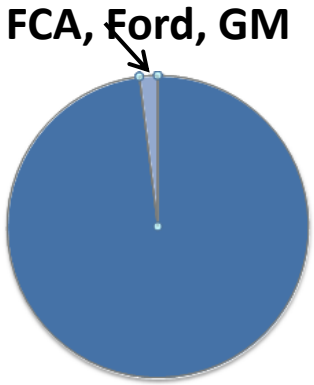
**FCA/Ford/GM Support A Continuation Of The Single National Program For Heavy-Duty With Market-Supportable Technology And Stringency Increases**

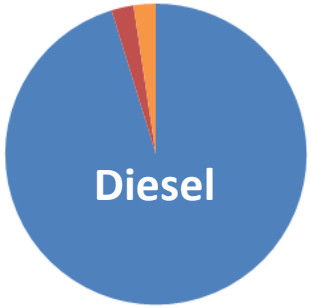
# *Heavy-Duty Market Overview*

## Class 2b/3
## Under 14,000 lbs


## Larger Vocational and Class 8
## Over 14,000 lbs


*Data Source: R.L. Polk*

**Heavy-Duty Vehicle Miles Traveled Is Greater Than 150,000 Miles Annually; Efficiency Benefits Provide Significant GHG Reductions**

# *Heavy-Duty Segment Fuel Consumption*

**65% of HD Fuel Consumption and GHG Inventory (together)**

**Line-Haul Tractors**

**Line-Haul Trailers**
(currently unregulated Federally)

**Vocational Vehicles**

**Large Pickups & Vans**
**14% of HD Fuel Consumption and GHG Inventory**

*Source EPA April 22, 2015 CAAC ""Phase 2 HD GHG Standards and LDV GHG Trends/Compliance"*

**EPA notes the Class 2b/3 Work Trucks and Vans are only responsible for about 14% of the HD Segment's Overall Fuel Consumption**

# *Heavy-Duty Consumers Pay For Capability, Unlike Light-Duty*

**Hauling**

**Cargo mover**

**Service**

**Utility**

**Construction**

**People Mover**

**Work Trucks Need To Maintain Customer Expectations For Cargo/People Carrying, Payload And Towing To Meet Consumer Needs**

# *Maintain Separate Standards For Gas And Diesel Applications*

CNG

LPG

- **A single standard for both could lead marginalization or elimination of gasoline engines in segment**
- **Development of alternative fuel variants can be more cost-effective for gasoline engines than for diesel engines**
- **Complementary Policies are also needed to help meet the goals of the nation**

**Strongly Supports Continued Use Of Separate SI (Gasoline) And CI (Diesel) Standards. Customers Buy The Powertrains For Different Reasons**

# *Why Customers Buy Spark Ignition Engines*

- **Lower initial vehicle costs**
- **Cost effective for lighter-load, low-mileage applications**
- **Easier and less costly to service and repair**
- **Payload advantage at comparable power**
- **Lower NVH concerns (especially at idle)**
- **No particulate filters  or diesel exhaust fluid used /needed.**
- **Less susceptible to cold weather**

**Spark Ignition Engine Vehicles Offer Consumers A Different Set Of Attributes**

# *Why Customers Buy Compression Ignition Engines*

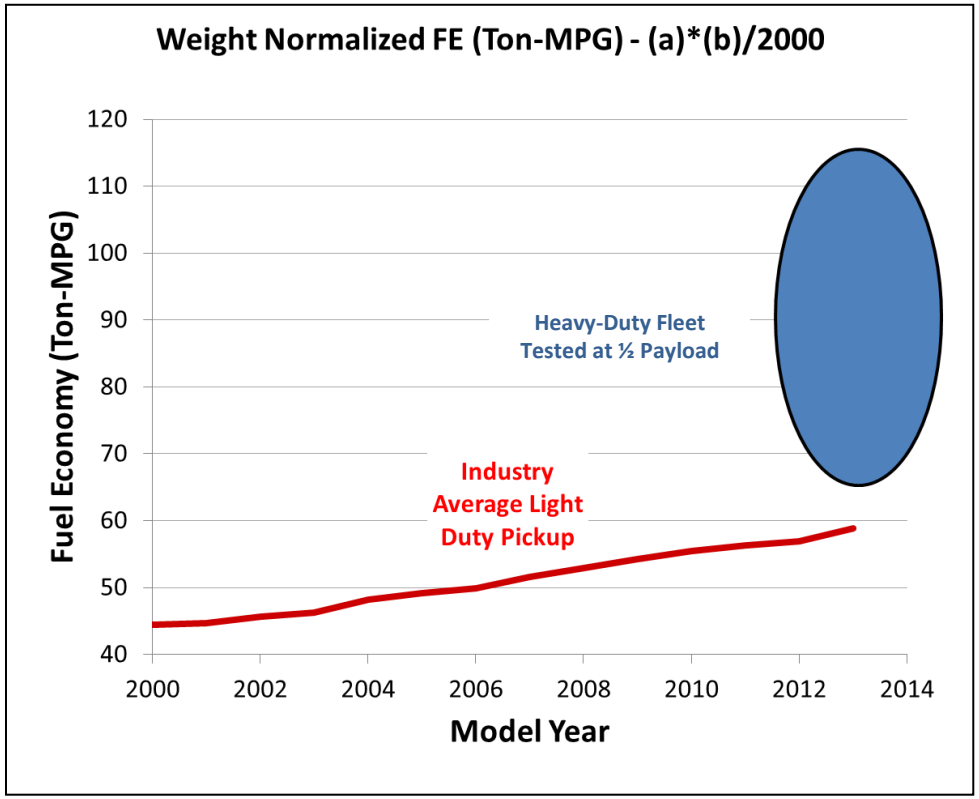
- **Diesel is “advanced” fuel economy technology**
- **Desired technology for heavier payload and towing**
- **More robust solution for extreme heavy duty cycle applications**
- **Continued economic growth requires a diverse upfit portfolio for services, industrial trades, and unique applications**

**Compression Ignition Engine Vehicles Offer Consumers A Different Set Of Attributes**

# *Stringency Metrics For Heavy-Duty*

**<u>On a percentage basis</u>, potential for HD GHG improvement is significantly less than for LD:**

- **Testing at ½ payload reduces benefit of HD technologies that address engine pumping losses.**
- **Using an EPA measure of efficiency (ton-mpg), HD vehicles are more efficient than LD vehicles.**
- **HD fleet is already 56% advanced diesel technology compared to 1% for LD fleet.**




*LD data source: EPA Fuel Economy Trends Report*

**Year Over Year Stringency Increases In HD Are Not An Apples To Apples Comparison To LD. Program Benefits Should Be Expressed As Tons of $CO_2$ Or Fuel Saved <u>Not</u> Percent Improvements**

# *Electrification In The Heavy-Duty Segment*

- **Severely limits payload and towing, creating customer acceptance concerns (so technology has little fleet impact).**
- **HEV penetration in light-duty car is approximately 3% after almost 15 years.**

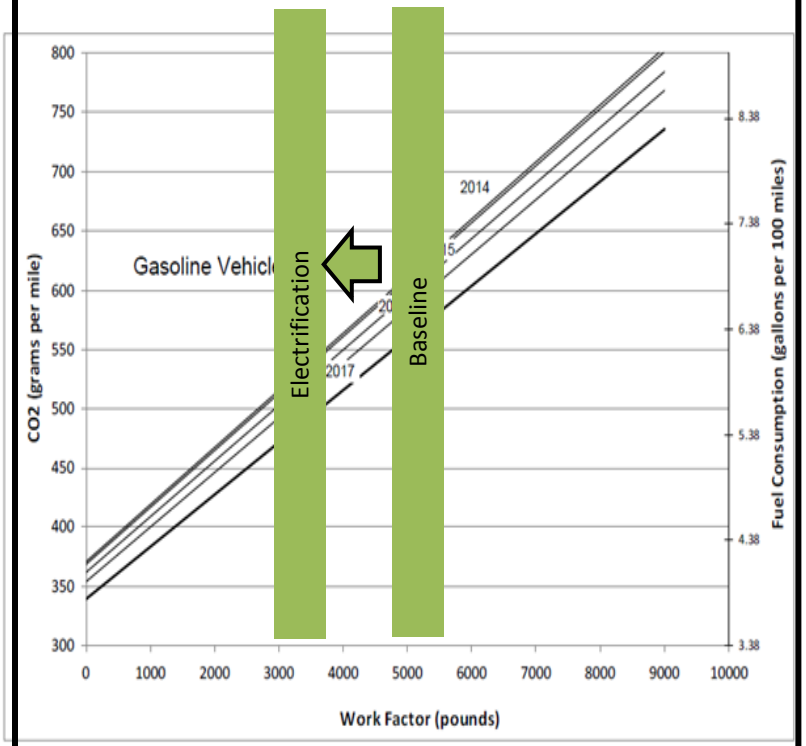



Figure II-3: EPA $CO_2$ Target Standards and NHTSA Fuel Consumption Target Standards for Gasoline HD Pickups and Vans[115]

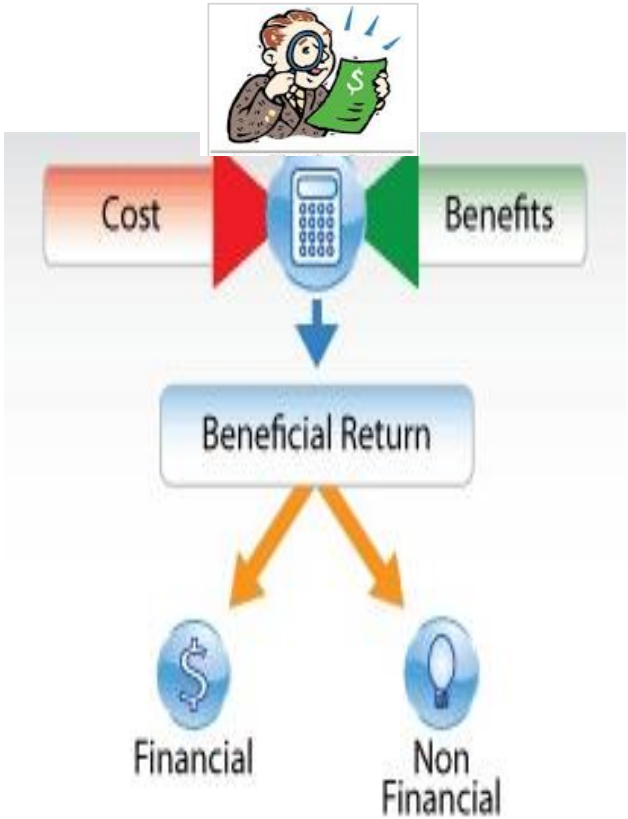
**2B/3 Manufacturers Have Significant Concerns About Consumer Acceptance Of Electrification In This Segment**

# *Heavy-Duty Customer – Driven By ROI And/Or Budget*

## Fleet Manager Considerations

- **Access to increased capital is difficult**
  - **A 3 year payback is considered aggressive, many want 1 year**
- **New technology slow adoption – driven by multiple unknowns**
  - **Fuel costs uncertainty**
  - **Residual forecasts go down**
  - **Driver behavior impact savings**
  - **Unexpected Maintenance costs**
  - **Unexpected downtime causing immediate impact on revenue**
  - **On Road Fuel Economy varies (load, idle time, driver, mileage type)**
  - **Change in tax laws**
- **"Tried and True" is a good thing**
  - **The vehicle must do the job.**

## Fleet Manager Process

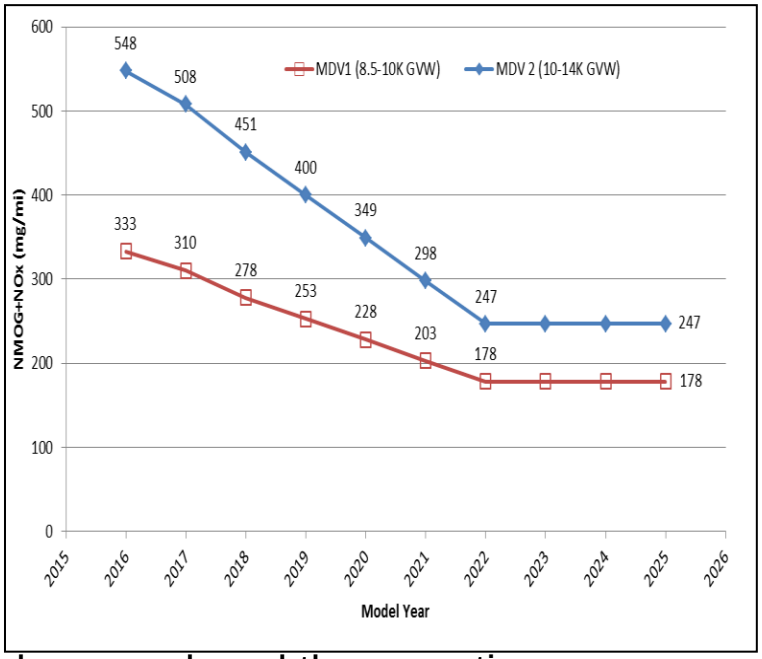



**Fleet Managers #1 Goal Is Total Cost Of Ownership And Often See More Downside Risk In Something New - The Prove Out Process Is Rigorous**

# *Other Phase 2 Challenges*

## *Criteria Emissions, OBD, Unique Technology Challenges,….*

MDV - FTP - Criteria Emissions Phase-In




### New Emission Standards and Unique Test Methods

- Emission regulatory reductions can result in increased GHG emissions (e.g., add mass).
- Running fuel consumption and emission test at ½ payload (instead of curb weight) requires balancing catalyst light-off vs. over-temp concerns.
- Stringent NOx standards limit the opportunities to run lean.

### OBD

- OBD automatically increases in stringency as standards are reduced thus creating significant certification challenges for highly-efficient lean aftertreatment systems.

### Implementing Technology Example

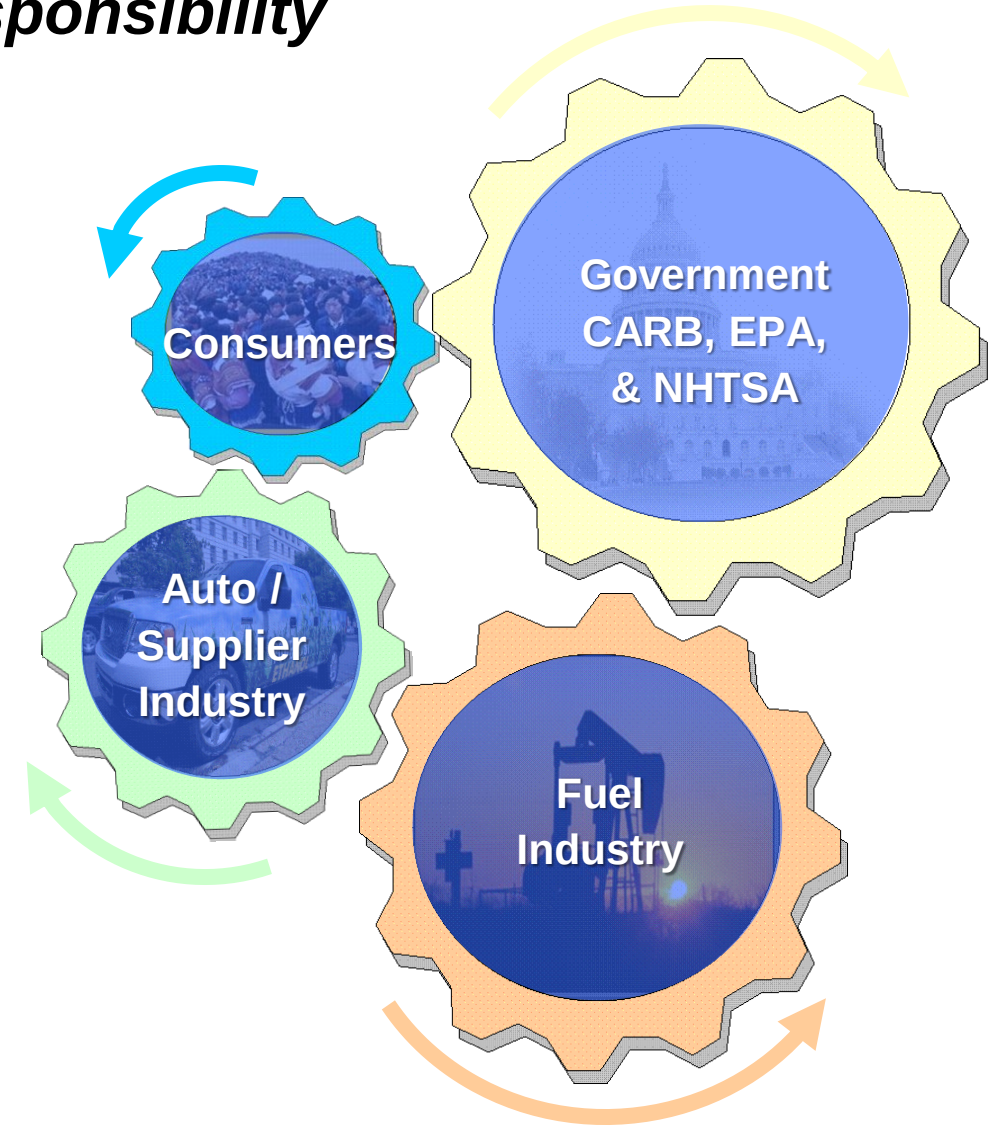
- Cylinder deactivation has large potential, however testing at ½ payload (ALVW), does not fully capture on-road benefit.

**Opportunities To Implement Fuel Saving Technologies Are Hindered By Competing Emissions Requirements**

# *Heavy-Duty Customer – Varied And Essential*


**Heavy-Duty Vehicles Play Essential Roles In The Community – A Hero To Those Most In Need, An Enabler Of Services And Driver Of The Economic Engine**

# *Integrated Approach With Shared Responsibility*




**The development of a sustainable heavy-duty market will be dependent on close cooperation between manufacturers, fuel industry, suppliers, the government and consumers.**

**A Sustainable Heavy-Duty Market Requires An Integrated Approach With Shared Responsibility**

# *KEY MESSAGES*

- Standards must align with customer's priorities and affordability providing manufacturers with adequate lead-time and regulatory flexibility to meet national goals.

- The regulatory rate of change must reflect the reality of the highly complex HD market, fewer vehicle lines, multiple models, longer product cadence and lower volumes to recover upfront capital and development costs.

- Building from Phase I, there is a need to account for the utility/capability of people-carrying and cargo volume in addition to current payload and towing weight.

- Year-over-year targets drive increasing material and program costs, outweighing design efficiencies and economy of scale benefits.

- Regulatory requirements should consider all future requirements so that one rule does not negatively impact another.