

Reducing Idling Emissions From New and In-use Heavy-duty Trucks



Public Hearing
October 20, 2005



Sacramento, California

Today's Presentation

- Background
- Staff's Proposal
- Regulatory Impacts
- Air Quality and Other Benefits
- Issues
- Summary

Reasons for Truck Idling

- Operate power takeoff e.g. cement mixers, fire trucks, trash trucks
- Cabin climate control
 - Waiting
 - Sleeping
- Power in-cabin appliances
- Warm up engine in cold weather

Emission From Idling Sleeper Trucks Are Significant

■ Smog emissions

2010 Statewide (tons per day)		
NOx	HC	PM
53	4.6	0.73

■ Greenhouse gas emissions (CO₂)

- 2010 GHG emissions = 1.1 megatons per year

■ Fuel consumption

- Typically 1 gallon per hour
- 2100 gallons per year per truck

Current Regulations Restrict Idling: Sleeper Trucks Excluded

■ School buses

- Prohibits idling at or near schools
- Applies to other vehicles too



■ Commercial vehicles (diesel-fueled)

- 5 minute limit
- Sleeper trucks excluded



Summary of Staff's Proposal

- Limits idling of all sleeper trucks to 5 minutes
 - Same limit as currently applies to other trucks
- New engine requirements
 - Equip with automatic engine shutoff device
 - Or demonstrate low engine idle emissions
- New and existing trucks
 - Sets emission requirements for alternative devices that provide cabin comfort and power
- Begins in 2008

New Engine Requirements

- Applies to
 - Heavy-Duty Diesel Engines
 - 14,001+ pounds
 - 2008+ model year
- Exemptions:
 - motorhomes
 - buses



New Engine Requirements

- Automatic engine shutdown system required
 - After 5 minutes
 - Non adjustable
 - Tamper resistant
 - Similar devices used on some engines today
- Alternative compliance
 - Limit main engine idle NOx emissions to 30 grams/hour
 - May be technically possible for 2010+ engines

Engine Shutdown System - New Engines

- Activates when vehicle stops, transmission is in “neutral” or “park” position
- Allows manual reset
- Use of power takeoff overrides shutdown
- Engine warm up overrides shutdown (up to 60°F)

Benefits of Automatic Engine Shutdown – New Engines

- Helps ensure compliance with idling restrictions
 - Sleeper and non-sleeper trucks
- Encourages use of cleaner, alternative technologies for cabin comfort and power
- Helps assure emission reductions achieved

Optional NOx Idling Limit - New Engines

- Auto-shutdown device not needed if idle emissions low
 - 30 g/hour standard ~ 80% reduction
- Engine manufacturers requested option
- Transparent to trucker
- Eliminates cost of alternative technologies to provide cabin comfort and power
- Not yet clear if technically feasible

In-use Idling Restrictions - New and Existing Trucks

- Ends exemption for sleeper trucks
 - 5 minute limit applies to CA and out-of-state registered sleeper trucks
 - Exceptions for traffic congestion, during repairs, power take-off, etc.
- Establishes emission limits for alternative technologies that provide cabin comfort and power
 - More stringent limits for technologies used on 2007+ trucks

Alternative Technologies That Provide Cabin Comfort and Power

- Small auxiliary power system (APS) engines
 - Run A/C, provide electricity
- Battery powered A/C and power
- Fuel fired heaters
- Thermal storage devices
- Plug-in at electrified parking spaces
- Off board power, heating, and cooling, e.g. IdleAire

Special Emission Considerations for Diesel APUs

- Pre-2007 truck: Meet current new diesel engine emission standard
- 2007+ truck (low PM emissions):
 - Plumb exhaust through truck's PM filter, or
 - Install verified level 3 retrofit device
 - Without this requirement, PM emissions would be higher than main engine
 - Note: This requirement a major issue with EMA

Special Emission Considerations for Fuel Fired Heaters

- Pre-2007 truck:
 - Any heater
- 2007+ truck:
 - Meet ULEV standards
 - Currently commercially available

Cost of Engine Shutdown Devices

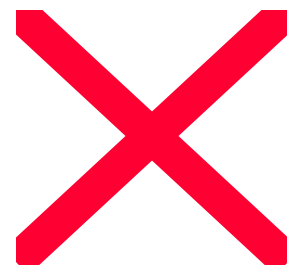
2008+ Engines

- Shutdown system is a standard feature in current electronic engines
 - No significant cost to develop the technology
- Cost to track engines destined for sale in California and minimal engine shutdown reprogramming cost:
 - \$ 100 per engine

Cost of Alternative Technologies for Cabin Comfort and Power

Fully Integrated Diesel-Fueled APS

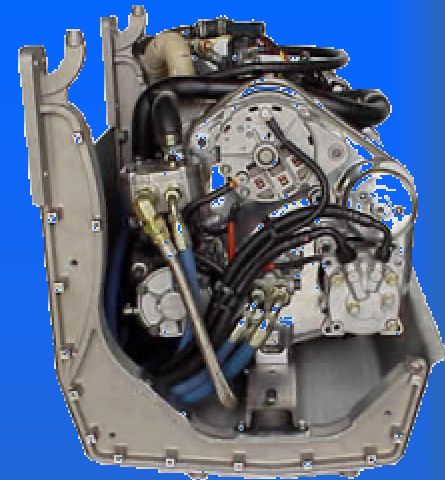
- OEM option, available on new trucks only
- Cost less than aftermarket APSs
- Heating, Cooling, Electrical Power
- Fuel use: ~ 0.2 gal/hour
- Manufacturers: Caterpillar, Cummins



Cost of Alternative Technologies for Cabin Comfort and Power

Diesel-Fueled APS

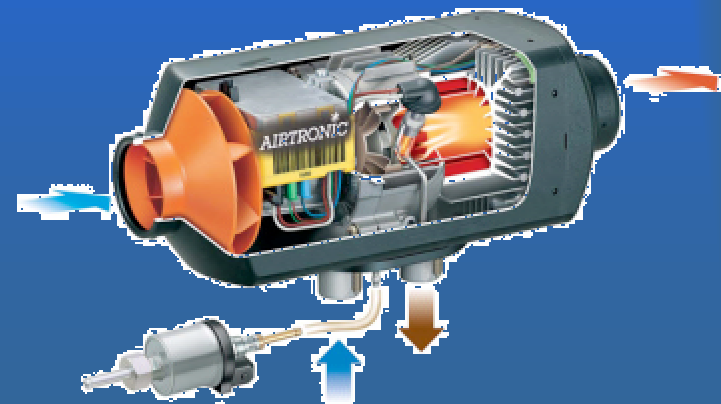
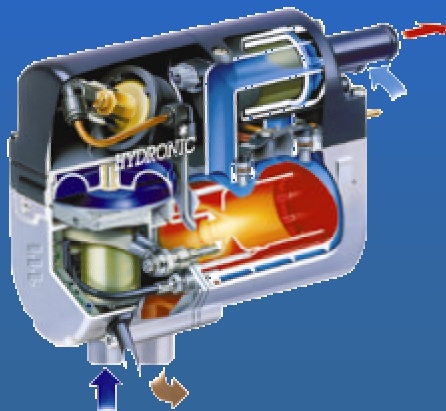
- Heating, Cooling, Electrical Power
- Fuel use: ~0.2 gallon/hour
 - Main engine ~ 1 gallon/hour
- Cost including installation : \$6,000 - \$8,500
- Cost of APS with verified PM control device \$8,000 to \$10,500



Cost of Alternative Technologies for Cabin Comfort and Power

Fuel Fired Heaters

- Engine and/or cab heating only
- Fuel use: 0.02-0.16 gal/hour
- Cost: ~ \$1,000 - \$3,000



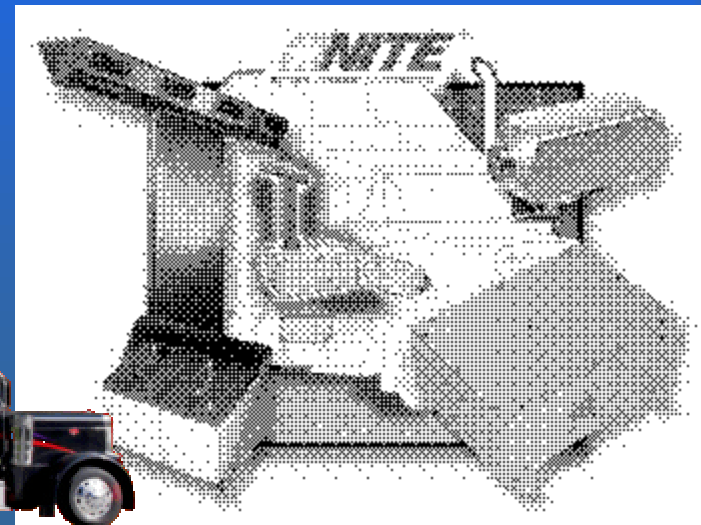
Cost of Alternative Technologies for Cabin Comfort and Power

Battery Electric APS

- Heating, cooling, electrical power
- Battery recharged while driving
- Cost: \$4,000 - \$10,000



Power Pack



Cost of Alternative Technologies for Cabin Comfort and Power

Thermal Energy Storage

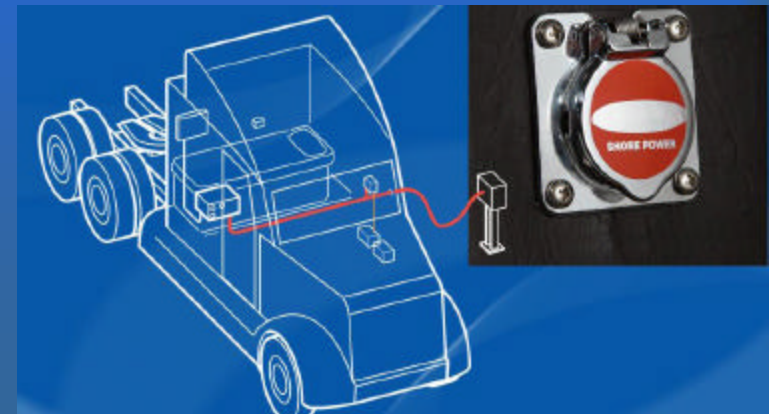
- Cooling energy stored while driving
- Cab cooling only
- Cost: ~ \$3,600
- Can be integrated with fuel-fired heater for heating (Cost for cooling and heating: \$4,600)



Cost of Alternative Technologies for Cabin Comfort and Power

Shore Power with On-Board Truck Equipment

- 110 Volts electrical power, internet, cable television
- Cost ~ \$3,500-\$6,000 per parking space
- Cost of electric AC unit, inverter/charger, electrical connections: ~\$4,000 per truck



Cost of Alternative Technologies for Cabin Comfort and Power

Off-Board Power Infrastructure

- Heating, cooling, 110 Volt electrical power, internet, telephone, television
- Cost for truck operator \$1.60 to \$1.88 per hour, for basic services (climate control)
- Cost ~ \$12,000 - \$20,000 per parking space



Payback Time With Fuel Savings

Manufacturer	Technology	Cost (\$)	Payback (years)
Thermoking	Diesel APS	8500	1.7
	(APS+PM trap)	(10500)	(2.1)
Pony Pack	Diesel APS	7000	1.4
	(APS+PM Trap)	(9000)	(1.8)
Idling Solutions	Battery Electric	10000	1.6
Bergstrom (NITE System)	Battery Electric for AC + Fuel Fired Heater	4200	0.7
Webasto (BlueCool Truck + Air Top 2000)	Cold Storage for AC + Fuel Fired Heater	4600	0.7
Xantrex/Dometic	Inverter/charger + Electric AC and Heat	4000	0.6

Idle Hours/year = 2100; Fuel Use = 1 gal/hour; Fuel Cost: = \$3.05/gal

Availability of Carl Moyer Funding

- Funding possible for technologies that go beyond the proposed requirements
 - Cleaner than diesel APS
 - Battery electric APS
 - Thermal energy storage
 - Truck on-board equipment for use with on-shore power
- ; Carl Moyer Program guidelines will be revised in November 2005
 - Staff still evaluating guidelines for alternative technologies

Emission Benefits

2010 Statewide Emission Reductions*

	NOx	HC	PM	CO2
Reductions (tons per day)	46	4.2	0.42	1930

*Sleeper truck population = 75,000

Other Benefits

- Consistent with Board adopted SIP, Diesel Emission Reduction Plan, EJ Policy
- Consistent with Governor's GHG reduction plan
 - 2010 GHG reductions of ~1 megaton per year
- Reduces petroleum use consistent with ARB/CEC policy recommendations
 - 160 million gallons/year saved

Issues

- EMA: Changes current practice of aligning new engine standards with USEPA
 - Tier 4 standards for off-road engines in the 0 to 25 hp category
 - New NOx idling emissions standard for on-road heavy-duty diesel engines
- Staff Response:
 - Requirement for use of filter on APS (2007+) applies to truck operator, not engine manufacturer
 - NOx idling emission standard is optional

Issues

■ ATA and CTA :

- More lead time needed to adjust to requirement
- Nationwide requirements would provide consistency for truck operators

■ Staff Response:

- Emissions are significant and need to be addressed
- Alternative technologies already available
- US EPA has no plans for adopting nationwide idling rule (model rule for states only)

Staff Recommended Modifications

15-day Changes

- New Engine Requirements
 - Minor change to PTO override provisions
- In-Use Idling Requirements
 - Exempt battery-electric and electric infrastructure technologies from EO approval requirement
 - Clarification on electric shore power availability as a compliance option

Summary

- Provides needed smog emission reductions
- Consistent with SIP, DRRP, EJ policy
- Consistent with achieving Governor's GHG reduction goals
- Consistent with ARB/California Energy Commission's recommendation to reduce demand of petroleum use
- Feasible technologies provide cabin comfort and power w/o engine idling
- Payback to typically 2 years or less
- Staff recommends Board approval