THE CARL MOYER PROGRAM GUIDELINES PROPOSED REVISIONS 2005

WORKSHOP

August 17
Sacramento

On-Road Controls Branch
Mobile Source Control Division




CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Air Resources Board

Webcast Communication Information

- Please send questions and comments to:
  - Email address: OnAir@arb.ca.gov

Workshop Agenda

- Wednesday (August 17, 2005)
  - Background/Overview, Administration, Cost-Effectiveness, On-Road, Idling Reduction Strategies, Fleet Modernization
- Thursday (August 18, 2005)
  - Off-Road Engines (CI, LSI, GSE), Goods Movement (locomotives and marine vessels)
- Friday (August 19, 2005)
  - Agricultural Sources, Agricultural Assistance Program, Voluntary Accelerated Vehicle Retirement

Today's Agenda

- Background/Overview
- Administrative Procedures
- Cost-Effectiveness
- On-Road Heavy-Duty Vehicles
- Idling Reduction Strategies
- Fleet Modernization

Carl Moyer Program
Background

- Provides grants to offset the incremental cost of lower emitting technologies
- Early introduction of low-emission technologies
- Carl Moyer Program's objective
  - Improve air quality
  - Supplement, not replace, regulations

Carl Moyer Program
Core Principles

- A state and local partnership
  - ARB sets guidelines
  - Local districts receive applications, make grants, and monitor projects
- Emission reductions must be real, quantifiable, surplus, and enforceable
- Environmental justice funding requirement

Carl Moyer Program
Eligible Emission Reductions

- Emission reductions must be real, quantifiable, surplus, and enforceable
  - Certified engines and/or verified retrofit kits
  - Cannot be used in alternative compliance strategies (e.g., ABT)
  - Cannot be used to comply with other regulations (e.g., fleet rules)
  - Cannot be used to comply with legally binding agreements (e.g., MOUs)

Carl Moyer Program Changes

- Increased and continued funding
  - Adjustment to Smog Check and tire fees through 2015
  - Local districts may increase motor vehicle registration surcharge by $2
- Program expansion
  - Add PM and ROG
  - Add light-duty vehicles
  - Add agricultural sources (HSC 39011.5)
  - Add fleet modernization program

On-Going Incentive Funding

- FY 04/05 (year 7) ~ $30.5 million
- FY 05/06 (year 8)
  - ARB: ~ $88 million for Carl Moyer Program
  - ARB: $25 million for school buses
  - Air Districts: up to $55 million for incentives
- FY 06/07 (Year 9)
  - ARB: ~$81 million for Carl Moyer Program
  - Air Districts: up to $55 million for incentives

Schedule

- Workshops on Carl Moyer Guideline Revisions
  - November/December 2004
  - April/May 2005
  - August 2005
- Release Proposed Project Criteria -- August 2005
- Release Proposed Guidelines -- Oct 2005
- Board Hearing -- Nov 2005

Carl Moyer Program
2005 Proposed Revisions

Overview of Proposed Revisions

- Project Criteria Revisions
- Engine Scrapping/Core Recycling
- Zero-Emission Technologies
- PM Retrofits on Repower Projects

Project Criteria Revisions

- Program Administration
- Cost-Effectiveness
- On-Road HDV Fleet Modernization
- Off-Road CI and LSI Projects
- Agricultural Sources
- Light-Duty Vehicles
- Other Project Categories

Engine Scrapping/Core Recycling

- No current statewide policy for engine scrapping under the Carl Moyer Program
  - Some districts require engine destruction; others do not
  - Certain engine cores have significant salvage value
- Proposing that engine cores be destroyed
  - Core value can be included in grant amount and cost-effectiveness calculation

Zero-Emission Technologies
Benefits

- Key element of California's plan for attaining health-based air quality standards
- Significantly reduce:
  - Criteria pollutants, toxic emissions, greenhouse gases, and petroleum consumption
- Other benefits
  - No emission control deterioration
  - Lower upstream emissions
  - Less monitoring and enforcement required

Zero-Emission Technologies
Opportunities

- New technologies emerging (marine cold ironing, truck stop electrification)
- Tightening emission standards
- High petroleum prices
- Should ARB require districts to encourage zero-emission projects?
  - Set-aside
  - Set percentage for zero-emission projects
  - Priority funding

PM Retrofit

- Require PM retrofit with all repowers
  - Where retrofit is available, verified, and cost effective
  - Obtain maximum NOx and PM reductions
  - New cost-effectiveness formula would count PM emission reductions
  - Cost of retrofit included in total project cost

Program Overview

Discussion

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Carl Moyer Program

Administration

Project Criteria

Administration

Responsibilities for the Carl Moyer Program

- ARB administers the program
  - Establish guidelines
  - Distribute, track and audit funds
  - Oversee implementation
- Districts implement the program
  - Adhere to the guidelines or be more stringent
  - Obligate and expend funds on eligible projects
  - Ensure reductions are captured

Administration
Chapter Development

- District working group meetings to develop chapter
  - Urban and rural working groups
  - Total of 7 meetings
  - Reached agreement on contents of chapter
  - Provided input on drafts of chapter
- District Incentive Program Implementation (IPI) Team
  - Providing input on draft chapter

Administration
Goals

- Ensure funds are distributed and spent as required by State law
- Ensure integrity of the program
  - Emission reductions must be real, quantifiable, surplus and enforceable
- Continue successful implementation of the program in partnership with the districts

Administration

Provisions to Meet Requirements in State Law

- Districts to provide notification of incomplete applications within 5 business days
- Expenditure of funds within 24 months
- Districts to monitor/audit projects to ensure reduction or recapture of funds
- ARB to monitor districts for compliance with guidelines or recapture of unobligated funds

Administration

Provisions to Maintain Integrity of Program

- District monitoring
  - Pre-inspections
  - Post-inspections
  - Baseline engines must be scrapped
- District auditing
  - Near and/or at end of contract term
  - All engine owners that fail to report annually
  - All projects not performing within an acceptable range of the contract specifications

See project criteria handout for a complete list of proposed criteria

Administration

Provisions to Maintain Integrity of Program (continued)

- ARB monitoring
  - Regularly review districts' reports
  - Check owner and engine data across the State
- ARB audits
  - Thorough audits of at least 4 districts per year
  - District audits include audits of a sample of projects
  - May audit projects throughout project life

See project criteria handout for a complete list of proposed criteria

Administration
Continue Successful Implementation

- Propose statewide standards as minimum requirements
- Propose provisions for District non-performance
- Propose provisions to exclude applicants
- Provide Districts with flexibility to establish more stringent requirements

See project criteria handout for a complete list of proposed criteria

Administration
Proposed Minimum Contract Requirements

- Contract term
- Scrapping baseline engine & documentation
- Payment conditions
- Owners' obligation to meet program requirements & maintain engine/equipment
- Record keeping and retention
- Repercussions for non-performance
- Monitoring and audits

See project criteria handout for a complete list of proposed criteria

Administration

Proposed Provisions for District Non-performance

- Districts with unobligated funds are “At-Risk”
  - Districts must develop a remedial action plan
  - ARB provides training and technical assistance
  - If unobligated funds remain, ARB reallocates funds to other districts
- Districts with unresolved audit findings are “At-Risk”
  - ARB holds a public meeting to recapture unobligated funds and limit future funding

See project criteria handout for a complete list of proposed criteria

Administration
Proposed Provisions to Exclude Applicants

- Fraudulent behavior
- Failure to comply with contract terms
- Failure to submit timely annual reports
- Significant deviation from proposed project criteria

See project criteria handout for a complete list of proposed criteria

Administration

Districts May Establish More Stringent Standards

- For eligible applicants
  - Focus on specific categories
  - Focus on particular entities or types of projects
  - Focus on particular emissions
- For project specifications
  - Percent of operation in district
  - Lower cost-effectiveness levels
  - Caps on incremental cost by categories

See project criteria handout for a complete list of proposed criteria

Administration

Discussion

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Carl Moyer Program

Cost-Effectiveness

Project Criteria

Cost-Effectiveness
Background

- Current Carl Moyer Guidelines
  - Emissions reduction based only on NOx
  - C/E = Annualized Cost / Annual Emission Reduction of NOx ($/ton)
- New legislation directs ARB to develop new formula based on NOx, ROG, and PM
  - C/E = Annualized Cost / Annual Emission Reduction of (x NOx + y ROG + z PM)

Cost-Effectiveness
Proposed Revisions

- Inflation Adjustment
- Discount Rate Adjustment
- Cost-Effectiveness Formula

Cost-Effectiveness
Inflation Adjustment

- Health & Safety Code authorizes ARB to adjust C/E for inflation
- Current C/E Limit: $13,600/ton of NOx
- Data from U.S. Dept. of Finance (2003-05)
  - (2003 – 2005) CPI: +5%
- Proposed New C/E Limit:

  $14,300/weighted ton

Cost-Effectiveness
Discount Rate Adjustment

- Health & Safety Code authorizes ARB to adjust discount rate
- Current discount rate: 3%
- Data from U.S. Dept. of Treasury (2003-05)
  - U.S. Treasuries: 3-yr, 5 yr, 7 yr, and 10-yr maturation
- Proposed new discount rate: 4%

Cost-Effectiveness
Interim Formula

- Previous formula: $\frac{\text{Annualized Cost}}{\text{NOx}}$
- Interim formula: $\frac{\text{Annualized Cost}}{\text{NOx} + \text{ROG} + \text{PM}_{nc} + 10\text{PM}_{c}}$
- PM weighting based on cost to control diesel PM

Cost-Effectiveness
Proposed Formula

- Cost-Effectiveness ($/ton) =

$$\frac{\text{Annualized Cost}}{\text{NOx + ROG + (WF * PM}_c\text{)}}$$

Where:
- NOx = Annual NOx emissions (tpd)
- ROG = Annual ROG emissions (tpd)
- PM_c = Combustion PM (tpd)
- WF = weighting factor

- WF may be based on many factors
- Range of weighting factor for PM_c: 10 - 30
- Non-combustion PM not included
  - Guideline criteria not available for non-combustion PM projects

Cost-Effectiveness
Weighting Factor

- C/E of different regulations or programs
  - Diesel ATCMs
- Health impacts
  - Direct Combustion PM
  - Secondary PM
  - Ozone
- Exposure
- Socioeconomic indicators

Weighting Factors
Program Cost-Effectiveness

- Ratio of C/Es -- PM to NOx:
  - Carl Moyer Program: PM/NOx = ~ 15
  - Diesel ATCMs: PM/NOx = ~ 13

Weighting Factors
Health Impacts

- Health impacts – Monetary values assigned for various health endpoints
  - Premature deaths
  - Asthma-related ER visits
  - Work loss days
  - Minor restricted activity days
  - School absence days
- Direct PM, secondary PM, ozone

Weighting Factors
Health Impacts

- PM reductions provide more health benefits than NOx and ROG reductions
- PM health impact
  - Reducing direct PM provides 48 times more health benefits than reducing NOx
- PM and ozone health impact
  - Reducing direct PM provides 13 times more benefits than reducing NOx and ROG

Weighting Factors
Exposure

- Exposure Consideration
  - Preliminary data available
  - Source-specific exposure (on-road/off-road)
  - Air basin-specific exposure data
  - No weighting factor assigned for C/E
- Districts may consider exposure
  - Prioritize projects to account for exposure
  - Prioritize projects adjacent to sensitive receptors

Weighting Factors
Socioeconomic Indicators

- Current funding allocations already direct Moyer grants to:
  - Areas with worst air pollution
  - Areas with large population
- Existing Moyer EJ requirements
  - Large districts have to expend 50% of funding in EJ areas
  - Moyer projects benefiting EJ communities
- Current mechanism addresses socioeconomic considerations for C/E

Cost-Effectiveness
Summary

- Wide range of issues considered
- PM weighting range from 10 to 30
  - Lower end accounts for cost to control
  - Upper end accounts for health benefits
- Soliciting comment on appropriate weighting factor

Cost-Effectiveness

Discussion

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Carl Moyer Program

On-Road Heavy-Duty Vehicles

Proposed Criteria

On-Road Heavy-Duty Vehicles
Background

- Over 2,000 projects funded
  - Urban transit buses, refuse haulers, street-sweepers, heavy-duty trucks
  - Typical projects have high annual mileage
  - Often operate in urban areas where residents are exposed to higher levels of air pollution
- Project types include new purchases, repowers and retrofits

On-Road Heavy-Duty Vehicles
General Requirements

- Early or extra emission reductions
- Cost-effectiveness of $14,300/weighted ton
- Project life of at least 3 years
- New Purchases - 30% NOx reduction
- Retrofits & Repowers - 15% NOx reduction
- Minimum 75% of the annual miles in CA
- Certified &/or verified by ARB

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles

Heavy-Duty Vehicle Emission Standards

	Heavy-Duty Vehicles		Heavy-Duty Optional Standard	
Model Year	**NOx**	**PM**	**NOx + NHMC**	**PM**
2004 -2006	2.2	0.1	1.8-0.3	0.03-0.01
2007	1.2	0.01	-	-
2010	0.2	0.01	-	-

Complete information on HDV emission standards provided in title 13, CCR, section 1956.8.

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles

Urban Bus Emission Standards

	Diesel Urban Bus		Alt Fuel Urban Bus		Alt Fuel Urban Bus Optional Standard	
Model Year	**NOx**	**PM**	**NOx**	**PM**	**NOx + NHMC**	**PM**
2004 - 2006	0.5	0.01	2.2	0.01	1.8-0.3	0.03-0.01
2007	0.2	0.01	0.2	0.01	-	-
2010	0.2	0.01	0.2	0.01	-	-

Complete information on HDV emission standards provided in title 13, CCR, section 1956.1.

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles
Solid Waste Collection Vehicle (SWCV)

- Subject to a statewide control measure
- Group 2b and 3 have funding possibilities
  - Group 2b = fleets totaling < 15 collection vehicles with engine model years 1960-1987
  - Group 3 = fleets with engine model years 2003-2006
- All SWCVs have funding possibilities for NOx reductions from retrofits

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles
Transit Fleet Vehicles

- Subject to a statewide control measure
- New purchase, repower, and retrofit potentially eligible if:
  - Fleet average of 2.4 g/bhp-hr NOx, and
  - PM reduction of 80 percent for fleets established before 1/1/07
  - PM reductions of 50 percent through 2007, for fleets established after 1/1/07
  - PM reductions of 80 percent beginning 2008, for fleets established after 1/1/07

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles
Urban Buses

- Subject to a statewide control measure
- New purchase, repower, and retrofit potentially eligible if:
  - Diesel fuel-path - fleet average of 4.8 g/bhp-hr NOx and PM reductions of 85 percent
  - Alternative fuel-path - fleet average of 4.8 g/bhp-hr NOx and PM reductions of 60 percent

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles
Urban Buses (continued)

- Fleets established after 1/1/05 - fleet average of 4.0 g/bhp-hr NOx and does not exceed 0.01 g/bhp-hr PM times the total number of diesel-fueled buses in the active fleet.

- Hybrid electric buses considered on a case-by-case basis

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles
Other Proposed Criteria

- Light HDVs - 8,501 ≤ 14,000 lbs GVWR
- Repowers for 1990 MYs or newer ONLY
- Core charges up to $5,000
- Retrofit required on repower projects if cost-effective

See project criteria handout for a complete list of proposed criteria

On-Road Heavy-Duty Vehicles
Upcoming Regulations

- South Coast Fleet Rules
  - September 2005
- Urban Bus Emission Standards
  - September 2005
- Public Fleet Rule
  - November 2005
- Private Fleet Rule
  - 2006

On-Road Heavy-Duty Vehicles

Criteria
Discussion

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On-Road Heavy-Duty Vehicles

Example 1 – Street Sweeper Repower

Baseline engine information:

- Engine Model Year: 1993
- Emission rate (g/mile): 12.2 NOx, 0.11 ROG, 0.29 PM
- GVWR: < 19,000 lbs
- Cost of rebuild: $14,000
- Activity: 7,667 gal/yr
- Conversion factor: 2.3 bhp-hr/mile

Reduced-emission engine information:

- Engine Model Year: 2006
- Emission standard (g/mile): 5.1 NOx, 0.06 ROG, 0.22 PM
- Cost of Repower: $47,750
- Activity: 7,667 gal/year
- 100% operation in California

On-Road Heavy-Duty Vehicles
Example 1 – Emissions

Emission calculations - baseline:

- NOx = (12.2/2.3) * 7,667 * 18.5 / 907200
  = 0.83 tons/yr
- ROG = (0.11/2.3) * 7,667 * 18.5 / 907200
  = 0.007 tons/yr
- PM10 = (0.29/2.3) * 7,667 * 18.5 / 907200
  = 0.02 tons/yr

Emission calculations – reduced technology:

- NOx = (5.1/2.3) * 7,667 * 18.5 / 907200
  = 0.35 tons/yr
- ROG = (0.06/2.3) * 7,667 * 18.5 / 907200
  = 0.004 tons/yr
- PM10 = (0.22/2.3) * 7,667 * 18.5 / 907200
  = 0.015 tons/yr

On-Road Heavy-Duty Vehicles
Example 1 – Emission Reductions

- NOx Reductions = 0.83 - 0.35
  = 0.48 tons/yr
- ROG Reductions = 0.007 – 0.004
  = 0.003 tons/yr
- PM Reductions = 0.02 – 0.015
  = 0.005 tons/yr

On-Road Heavy-Duty Vehicles
Example 1 – Cost-Effectiveness

- Project Life: 7 years → CRF = 0.167
- Incremental Cost:
  $47,750 - $14,000 = $33,750
- Annualized Cost:
  0.167 * $33,750 = $5,636/year
- Project Cost-Effectiveness:
  ($5,636/year)/[(0.48 tons/year NOx) +
  (0.003 tons/year ROG) +
  (10*0.005 tons/year PM)] **=**
  $10,574/weighted surplus ton

On-Road Heavy-Duty Vehicles

Example 2 – New Purchase CNG Bus

Baseline Bus information:

- Engine Model Year: 2005
- Emission standard (g/bhp-hr): 2.2 NOx, 0.3 ROG, 0.01 PM
- Cost: $350,000*0.20 = $70,000
- Activity: 50,000 mi/yr
- Conversion factor: 4.3 bhp-hr/mile

Reduced Bus information:

- Engine Model Year: 2005
- Optional Standard (g/bhp-hr): 1.2 NOx, 0.3 ROG, 0.01 PM
- Cost: $390,000*0.20 = $78,000
- Activity: 50,000 miles/year
- 100% operation in CA

On-Road Heavy-Duty Vehicles
Example 2 – Emissions

Emission calculations - baseline:

- NOx = (2.2 * 4.3) * 50,000/907200
  = 0.52 tons/yr

Emission calculations – reduced technology:

- NOx = (1.2 * 4.3) * 50,000/907200
  = 0.28 tons/yr

- ROG and PM calculations are not necessary there are no ROG and PM emission reductions obtained

On-Road Heavy-Duty Vehicles
Example 2 – Emission Reductions

- NOx Reductions = 0.52 – 0.28
  = 0.24 tons/yr
- ROG Reductions = 0 tons/yr
- PM Reductions = 0 tons/yr

On-Road Heavy-Duty Vehicles
Example 2 – Cost-Effectiveness

- Project Life: 12 years → CRF = 0.107
- Incremental Cost:
  $78,000 - $70,000 = $8,000
- Annualized Cost:
  0.107 * $8,000 = $856/year
- Project Cost-Effectiveness:
  ($856/year)/[(0.24 tons/year NOx) +
  (0 tons/year ROG) + (10*0 tons/year PM)] =
  $3,567/weighted surplus ton

On-Road Heavy-Duty Vehicles

Sample Calculations
Discussion

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Carl Moyer Program

Reducing Idling Emissions from On-Road Heavy-Duty Vehicles

Proposed Criteria

Reducing Idling Emissions from Heavy Duty Diesel Vehicles

- Idling emissions are significant
  - 8 percent of total NOx emissions from heavy-duty diesel trucks
- Contributes to ozone and toxics air pollution
- Environmental justice implications

Reducing Idling Emissions
Regulations

- Adopted regulations limit unnecessary idling of school buses and diesel trucks to 5 minutes
- Idling to heat or cool sleeper berths is currently exempted
- Board will consider a proposal to limit most idling for sleeper berths in October 2005
  - Vehicles would be able to operate certain auxiliary power unit systems

Reducing Idling Emissions
General Requirements

- Early or extra emission reductions
- Cost-effectiveness of $14,300/weighted ton
- Project life of at least 3 years
- Retrofits & Repowers - 15% NOx reduction
- Minimum 75% of the operation in CA
- ARB certified engines &/or verified retrofits

See project criteria handout for a complete list of proposed criteria

Reducing Idling Emissions
Project Criteria

- APU installation costs are eligible for Carl Moyer Program funding
  - Maximum of $1,700 per diesel installation,
  - Maximum of $3,400 per alternative fuel, electric motor, or fuel cell installation
- Incremental cost of electric option (for diesel APUs) may be added to the $1,700 installation cost

See project criteria handout for a complete list of proposed criteria

Reducing Idling Emissions
Zero-Emission Technologies

- Installing off-vehicle climate control systems (e.g., IdleAire)
  - Structure grant reimbursements to be paid out in installments based on system utilization
  - Case-by-case project evaluation
- Districts may use matching funds for projects to electrify vehicle parking spaces at truck stops

See project criteria handout for a complete list of proposed criteria

Reducing Idling Emissions

Criteria Discussion

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Reducing Idling Emissions

Example 1 - Auxiliary Power Unit

Existing information:

- Main engine model year: 2004
- Main Engine emission rate (g/hr): 178 NOx, 16 ROG, 1.1 PM
- Activity: 1,800 hours/year
- Heavy Heavy-Duty Diesel Truck

Reduced-emission information:

- Auxiliary power unit with emission rate (g/kW-hr): 6.4 NOx, 0.75 ROG, 0.66 PM
- Load requirement: 7.24 kW
- Activity: 1,800 hours/year
- Level 3 PM trap (85% control)
- 100% operation in California

Reducing Idling Emissions

Example 1 - Emissions

Emissions Calculation – Baseline Emissions

- NOx =(178 g/hr)(1800hr/yr)/(907200g/ton) = 0.35 tons/yr
- ROG = (16 g/hr)(1800hr/yr)/907200g/ton = 0.032 tons/yr
- PM = (1.1 g/hr)(1800hrs/yr)/907200g/ton = 0.002 tons/yr

Emissions Calculation – Reduced Emissions

- NOx = (6.4g/kW-hr)(7.2kW)(1800hr/yr)/907200g/ton
  =0.09 tons/yr
- ROG = (0.75g/kW-hr)(7.2kW)(1800hr/yr)/907200g/ton
  =0.01ton/yr
- PM = (0.66g/kW-hr)(7.2kW)(1800hr/yr)/907200g/ton
  =0.009tons/yr; add Level 3 PM trap = .001tons/yr

Reducing Idling Emissions

Example 1 – Emission Reductions

- NOx Reductions = 0.35 tons/yr - 0.09 tons/yr
  = 0.26 tons/yr
- ROG Reduction = 0.032 tons/yr - 0.01 tons/yr
  = .022 tons/yr
- PM Reduction = 0.002 tons/yr - 0.001 tons/yr
  = 0.001 tons/yr

Reducing Idling Emissions

Example 1 – Cost-Effectiveness

- Project Life = 3 years → CRF = 0.360
- APU installation cost = $1,700
- Annualized cost =

  ($1,700 * 0.360) = $612/year
- Project cost-effectiveness =

  ($612/year)/[0.26 tons NOx/yr +
  0.022 tons ROG/yr +10*0.001 tons PM/yr]
  = **$1,901/weighted surplus ton**

Reducing Idling Emissions

Example 2 - Battery-Powered APU

Existing information:

- Main engine model year: 2004
- Main Engine emission rate (g/hr): 178 NOx, 16 ROG, 1.1 PM
- Activity: 1,250 hours/year
- Heavy Heavy-Duty Diesel Truck

Reduced-emission information:

- Battery-powered auxiliary power unit with zero emissions
- 110 VAC, 60 Hz HVAC (8300 BTU) ; 270 A alternator; lead acid battery pack; inverter/charger
- Activity: 1,250 hours/year
- 100% operation in California

Reducing Idling Emissions

Example 2 - Emissions

Emissions Calculation – Baseline Emissions

- NOx =(178 g/hr)(1250hr/yr)/(907200g/ton) = 0.35 tons/yr
- ROG = (16 g/hr)(1250hr/yr)/907200g/ton = 0.032 tons/yr
- PM = (1.1 g/hr)(1250hrs/yr)/907200g/ton = 0.001 tons/yr

Emissions Calculation – Reduced Emissions

- NOx = 0 tons/yr
- ROG = 0 tons/yr
- PM = 0 tons/yr

Reducing Idling Emissions

Example 2 – Emission Reductions

- NOx Reductions = 0.35 tons/yr - 0.0 tons/yr
  = 0.35 tons/yr
- ROG Reduction = 0.032 tons/yr - 0.0 tons/yr
  = 0.032 tons/yr
- PM Reduction = 0.001 tons/yr - 0.0 tons/yr
  = 0.001 tons/yr

Reducing Idling Emissions

Example 2 – Cost-Effectiveness

- Project Life = 5 years → CRF = 0.225
- APU Installation cost = $2,000
- Annualized cost =

  ($2,000 * 0.225) = $450/year
- Project cost-effectiveness =

  ($450/year)/[0.35 tons NOx/yr +
  0.032 tons ROG/yr +10*0.001 tons PM/yr]
  = **$1,148/weighted surplus ton**

Reducing Idling Emissions

Sample Calculations

Discussion

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Carl Moyer Program

Fleet Modernization Program
for
On-Road Heavy-Duty Vehicles
Proposed Criteria

Fleet Modernization
Background

- Created pursuant to AB 1394
  - Replace old, high-emitting vehicle early with one certified to cleaner emission standards
  - Retire the oldest trucks
- Pilot programs for heavy-duty vehicles
  - Sacramento Metropolitan AQMD
  - Coalition of Gateway Cities
- ARB Fleet Mod. Workgroup convened

Fleet Modernization

On-Road Projects versus Fleet Mod. Projects

- On-road projects
  - New purchases must meet optional standard
  - Repowers must reduce emissions by 15%
- Fleet modernization projects
  - Replaced truck target: vocations with the oldest trucks
  - Purchase may be a used replacement truck

Fleet Modernization
Parameters

- Use experience gained from the pilot programs
- Retire the oldest, dirtiest vehicles that would not have been replaced anyway
  - Target vocations that use the oldest trucks
  - Agriculture, construction, mining forestry, port and rail yard haulers

Fleet Modernization
Parameters (continued)

- Build-in assurance that the replacement vehicle will stay in the same vocation and location
  - Strict eligibility, performance and monitoring requirements

Fleet Modernization
Project Criteria

- Cost effectiveness of $14,300/weighted ton
- Must meet all on-road criteria
- 3 year project life for any vocation
- 5 year project life for targeted vocations
  - Agriculture, construction, mining, forestry, port, rail haulers

See project criteria handout for a complete list of proposed criteria

Fleet Modernization
Project Criteria (continued)

- Old vehicle requirements:
  - 1990 or older (engine and chassis)
  - Registered in California for the last 3 years
  - In operating condition, with cost of needed repairs deducted from grant award
  - Owned by the applicant, not leased
  - Must be scrapped

See project criteria handout for a complete list of proposed criteria

Fleet Modernization
Project Criteria (continued)

- Replacement vehicle requirements
  - 1999 and newer (engine and chassis)
  - Horsepower cannot be >120% the old vehicle
  - Same weight class as the old vehicle
  - Same body and axle configuration as old vehicle
  - Warranty for one year or 100,000 miles
  - Diesel Emission Control System required
  - Electronic Monitoring Unit required

See project criteria handout for a complete list of proposed criteria

Fleet Modernization
Project Criteria (continued)

- Application requirements
  - Proof of vocation
  - Proof of mileage for the last 3 years
  - Target vocations can use standardized mileage of 27,500 mi/yr
- Performance requirements
  - Stay in the same vocation for the project life
  - Cannot exceed historic mileage by 150%
  - 80% minimum mileage requirement
  - Provide annual reports, including proof of insurance, vocation, and maintenance

See project criteria handout for a complete list of proposed criteria

Fleet Modernization
Project Criteria (continued)

- Funding requirements
  - Grant awards based on the average mileage for previous 3 years or standardized mileage
  - Project life must be equal to the contract life
  - Funding based on NADA value (72% for used, 80% for new)
- Dealer and salvage yard requirements

See project criteria handout for a complete list of proposed criteria

Fleet Modernization
Tiered Transactions

- Combination of two transactions
  - Purchase of a new vehicle meeting the optional standard by one owner
  - Replacement of a 1990 or older vehicle by a second owner
- Incentives to offset the cost of the optional standard vehicle
- Subject to all fleet modernization requirements
- Districts are allowed to design the mechanism for tiered transaction for approval through ARB

See project criteria handout for a complete list of proposed criteria

Fleet Modernization
District Requirements

- Submit fleet mod. guidelines for ARB approval
- District guidelines must address:
  - Contracts with participants, dealers and salvage yards
  - Recovery of incentive funds
  - Compliance checks
  - Tiered transaction mechanism, if desired

See project criteria handout for a complete list of proposed criteria

Fleet Modernization

Criteria
Discussion

Email address: OnAir@arb.ca.gov

Fleet Modernization
Example 1

Old Truck:

- Model Year: 1983
- Emission rates (g/mi): 22.2 NOx, 0.79 ROG,1.40 PM
- Activity: 27,500 mi/yr

Replacement Truck:

- Model Year: 1999
- Truck Cost: $24,000
- DECS Cost: $3000 (Level 1, 25% PM reduction)
- EMU Cost: $1000
- Emission rates (g/mi): 18.5 NOx, 0.15 ROG, 0.39 PM

Fleet Modernization

Example 1 - Emissions

Emission Calculation – Old Truck

- NOx = 22.2 g/mi * 27,500 mi/yr * 1 ton/907,200 g = 0.673 ton/yr
- ROG = 0.79 g/mi * 27,500 mi/yr * 1 ton/907,200 g = 0.024 ton/yr
- PM = 1.40 g/mi * 27,500 mi/yr * 1 ton/907,200 g = .042 g/mi

Emission Calculation – Replacement Truck

- NOx = 18.5 g/mi * 27,500 mi/yr * 1 ton/907,200 g = 0.561 ton/yr
- ROG = 0.15 g/mi *27,500 mi/yr * 1 ton/907,200 g = 0.005 ton/yr
- PM = 0.39 g/mi * 27,500 mi/yr * 1 ton/907,200 g = 0.012 ton/yr

Fleet Modernization
Example 1 – Emission Reductions

- NOx Reductions = 0.673 - 0.561
  = 0.112 tons/yr
- ROG Reductions = 0.024 – 0.005
  = 0.019 tons/yr
- PM Reductions (Level 1 DECS):
  = 0.042 – (0.012*0.75)
  = 0.033 tons/yr

Fleet Modernization

Example 1 – Cost-Effectiveness

- Project Life: 5 years →CRF = 0.225
- Incremental Cost

  72% of repl. truck cost: 0.72 x $24,000 = $17,280

  Replacement Truck Cost + DECS + EMU =

  $17,280 + $3,000 + $1000 = $21,280

- Annualized Cost:

  $21,280 x 0.225 = $4,788/yr

- Project Cost Effectiveness: ($4,788/yr)/ [(0.112 tons/year NOx) + (0.019 tons/year ROG) + (10*0.033 tons/year PM)] =

$10,386/weighted surplus ton

Fleet Modernization

Sample Calculations Discussion

Email address: OnAir@arb.ca.gov

Carl Moyer Program

Other Issues

Email address: OnAir@arb.ca.gov

Carl Moyer Program

- Please provide written comments by September 2, 2005
- For more information, visit the Carl Moyer Program web page
  - www.arb.ca.gov/msprog/moyer/moyer.htm

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