FUELS AND MOBILE SOURCE OZONE REDUCTION STRATEGIES TO HELP PROTECT HUMAN HEALTH FROM OZONE POLLUTION

November 7, 2007

Developed by
A Coalition of Colorado's Local Governments
and
Environmental Groups

Including:

Boulder County Public Health
Denver Environmental Health
City of Fort Collins Air Quality Program
Jefferson County Environmental Health
Environmental Defense
Rocky Mountain Clean Air Action

I. Fuel Strategies

A. *Adoption of a Lower Reid Vapor Pressure Gas*

Colorado can significantly reduce production of VOCs by lowering the reid vapor pressure (RVP) of all gasoline sold in high ozone pollution areas. CO currently caps the RVP of gasoline sold during the summer months at 7.8 pounds per square inch (psi). Capping the RVP of fuel at 7.0 psi is likely to produce ozone reduction benefits by reducing the amount of VOCs emitted from fuel. We recommend the RAQC work with fuel suppliers to the Front Range to begin voluntary production of 7.0 psi RVP fuel in time for next ozone season. In addition, we recommend the Air Quality Control Commission include a requirement in the December 2008 SIP that all fuel supplied to the Front Range meet a 7.0 psi RVP starting in 2009.

In order to adopt a lower vapor pressure, Colorado must obtain EPA approval.[1] Approval requests are submitted by including the lower RVP fuel measure in a SIP or SIP revision. EPA will approve the request so long as CO can demonstrate that the state low RVP fuel program is necessary to achieve the NAAQS for ozone. "Necessary" means that no other

[1] The CAA prohibits states from adopting fuel RVP different from that permitted under federal law absent a waiver. While the Energy Policy Act of 2005 also places some limitations on the ability of a state to adopt a lower RVP than the federal, the Energy Policy Act specifically exempts 7.0 RVP fuels from this requirement. Accordingly, the only impediment to CO adopting a lower RVP fuel is the need to obtain a waiver from EPA under the CAA.

measures exist that would bring about timely attainment or other measures exist, but are unreasonable or impracticable.

Several states around the country have obtained waivers from EPA and implemented 7.0 RVP state fuel programs in their ozone-problem communities. For example, Kansas City, Missouri; Kansas City, Kansas; El Paso, Texas; Birmingham, Alabama; and Detroit/Ann Arbor, Michigan all have 7.0 RVP state fuel programs. Other communities also utilize 7.0 RVP gasoline incorporated with other gasoline controls such as sulfur reductions (Atlanta, Georgia) and a Clean Burning Gasoline program (Phoenix, Arizona). These states have seen "significant reductions in targeted emissions at a very low cost."[2]

B. Removal of the Ethanol Waiver

As part of an initiative to reduce the volatility of gasoline, Colorado should also consider removal of the 1.0 psi ethanol waiver. Under 40 C.F.R. § 80.27, gasoline that contains at least 10 percent ethanol by volume qualifies for an additional 1.0 psi above the approved RVP. For example, if a state fuel program provides for an RVP of 7.8 psi during the summer season, the ethanol waiver allows the overall RVP of the gasoline to be 8.8 psi as long as the fuel contains 9-10% ethanol by volume. Gasoline blended with ethanol evaporates more readily than non-blended gasoline which results in higher VOC emissions. Colorado can decrease emissions of ozone precursors by requesting a removal of the ethanol waiver.

A state has two options for removing the 1.0 psi ethanol waiver. First, in accordance with the process outlined above for requesting a lower RVP fuel program, the state can implement a fuel program that does not incorporate the ethanol waiver. Specifically, when CO asks for EPA approval of a 7.0 psi RVP program it may also request to opt-out of the ethanol waiver. El Paso, Texas utilizes a 7.0 RVP program that does not provide for an ethanol waiver.

Alternatively, a state can opt-out of the ethanol waiver under Section 211(h)(5) of the federal Clean Air Act.[3] This section allows the governor of a state to notify the EPA with "supporting documentation" that the ethanol waiver "will increase emissions that contribute to air pollution in any area of the State."[4] If shown, the Administrator may, by regulation, apply a lower RVP limitation on all gasoline, including gasoline containing 10% ethanol.

Removal of the ethanol waiver would not restrict ethanol from being blended with gasoline. Instead, it would require that refiners reduce the overall volatility of gasoline that can include ethanol. A recent report for Congress determined that the costs of opting out of the ethanol waiver "are not likely to be large."[5]

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[2] U.S. EPA, Task Force on Boutique Fuels, Report to the President, p.6 (June 2006).
[3] 42 U.S.C. § 7545(h)(5).
[4] Id.
[5] S. REP. NO. 108-57 at 30 (2003).

C. Enhanced Stage II Vapor Recovery for Larger Stations

Significant evaporative emissions of VOCs and air toxics can occur during the refueling of vehicles at the pump. An effective method for reducing refueling evaporative emissions is the use of Stage II vapor recovery systems installed on pumps at gas stations. This method works by capturing gasoline vapors when a vehicle is being fueled and returning the vapors through the pump hose to the petroleum storage tank instead of releasing them into the air. On some vehicles, Stage II vapor recovery systems help capture up to 95 percent of harmful gasoline vapors that may otherwise be released to the atmosphere. [6]

Other states, such as Illinois, require the use of Stage II recovery systems within nonattainment areas and at gas stations that dispense, on average, more than 10,000 gallons of gasoline per month for the last 12 months of operation.[7] California also requires Stage II recovery systems at gas stations throughout the state and expects to continue the use of such systems until at least 2020. [8]

Costs for the equipment and installation of Stage II recovery systems range from approximately $17,000 for two dispensers to $50,000 for twelve. There are obvious economies of scale for multi-installation. The chart below includes estimates of costs for equipment and installation as well as in-station diagnostic costs.

Estimated Phase II EVR and ISD Costs[9]				
Number of Gasoline Dispensers	2	4	6	12
Total Cost for Equipment and Installation*	$17,240	$24,925	$32,765	$56,285
In-Station Diagnostic Costs (ISD)*	$13,600	$16,500	$19,700	$28,900
Total (rounded to nearest $100)	$30,800	$41,400	$52,500	$85,200

*Required for stations dispensing >600,000 gallons/yr

While it is hoped that other controls such as On Board Recovery Systems (ORVR) may eventually make the need for Phase II vapor recovery systems obsolete, it will be at least ten years before ORVR systems are widely in place. In addition questions remain regarding the functionality of ORVR systems over the life of a vehicle. To address these issues, installation of Phase II vapor recovery systems (i.e., only those compatible with ORVR) should be required on the larger fueling stations in the Front Range.

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[6] See http://www.tceq.state.tx.us/implementation/air/vaporrecovery/vapor_recovery.html.
[7] Illinois Environmental Protection Agency, Stage I and Stage II Vapor Recovery Programs, http://www.epa.state.il.us/air/stage-ii-vapor-recovery.html (October 2007).
[8] Id.
[9] California Air Resources Board Air Monitoring and Laboratory Division, Update on Enhanced Vapor Recovery (EVR) and In-Station Diagnostics (ISD) at Gasoline Dispensing Facilities (August 2, 2007), at http://www.arb.ca.gov/vapor/arb_evrtalk080207.pdf.

II. Mobile Source Strategies

A. *Revise Motor Vehicle Emissions Inspection Cut Points*

EPA's IM240 guidance proposes two different motor vehicle emission pass/fail points (cutpoints) for Hydro Carbons (HC) and NOx. States may either choose to adopt EPA's less stringent "start-up" cutpoints or the more stringent "final" cutpoints. Both sets of cutpoints are designed to identify vehicles with malfunctioning emission control systems that contribute to excess pollution, albeit at differing levels.

Colorado currently uses EPA's less stringent "start-up" cutpoints. Specifically, as of Jan 1, 2006 Colorado matches EPA Final Cut Points only for model years 1996 and newer light duty gas vehicles (LDGV) measured in grams per mile (gpm). As indicated in the table below, there is an enormous discrepancy for light-duty gasoline vehicles and trucks between Colorado and EPA's cutpoints and for both HC and NOx. In fact, NOx cutpoints for light duty trucks model year 1996 and beyond are approximately 5x higher than EPA's final cutpoints though 2015.

Model Year	Colorado HC Cut Points (gpm)	EPA Final HC Cut Points (gpm)	Colorado NOx Cut Points (gpm)	EPA Final NOx Cut Points (gpm)
1996 and Newer Light Duty *Vehicles*	1.2	0.6	3.0	1.5
1984 – 1995 *Vehicles*	2.0 – 3.0	0.8	6.0	2.0
1996 and Newer *Trucks* (< 8500 lbs)	4.0	0.6 – 0.8	9.0 (thru 2015)	1.5 - 2.0
1988-1995 *Trucks* (< 8500 lbs)	4.0	0.8	9.0 (thru 2015)	2.5 – 3.5

CO's comparatively lenient cutpoints do not reflect the state of modern emissions control technology. Light duty vehicles make up approximately 37 percent of the fleet in the metropolitan Denver counties.[10] Therefore the lenient cutpoints for light duty vehicles are significant in terms of emissions contribution from the on-road mobile sector.
We recommend Colorado adopt EPA's final cutpoints used to determine compliance with Regulation 11 (Motor Vehicle Emissions Inspection Program). CDPHE should perform a pass-fail analysis based on lower cut points to better inform this discussion.

[10] Colorado Dept. of Public Health and Environment analysis of Colorado Dept. of Revenue 2001 vehicle registration database.

B. Clean Car Program

States may either follow the federal motor emissions standards or those adopted by over a dozen other states. The standards adopted by numerous states, including a number in the west, include the following components: (1) exhaust emission standards for carbon monoxide, NOx, particulate matter and formaldehyde; (2) a declining fleet-average emission standard for non-methane organic gases (NMOGs); and a zero emission vehicle (ZEV) mandate.11 The program also includes greenhouse gas (GHG) emission standards that require reductions in methane, carbon dioxide (CO2), nitrous oxide and hydrofluorocarbons from passenger cars, light duty trucks and medium duty passenger vehicles.12 Section 177 of the Clean Air Act requires that states implementing clean car programs provide automobile manufacturers with a two year lead time. Accordingly, were CO to adopt a clean car program in 2008, the standards could not take effect until 2010.

The adoption of a Colorado clean car program would result in greater reductions of ozone precursors, as well as other pollutants such as air toxics and GHGs than those attainable under the federal standards. As the graph below demonstrates, VOC reductions of approximately 7% are likely to be seen immediately, with benefits increasing over time.[13] Modeling done by OR and WA predict that implementation of state standards will result in additional VOC reductions from new vehicles ranging from 12% to 21% in 2020.[14]

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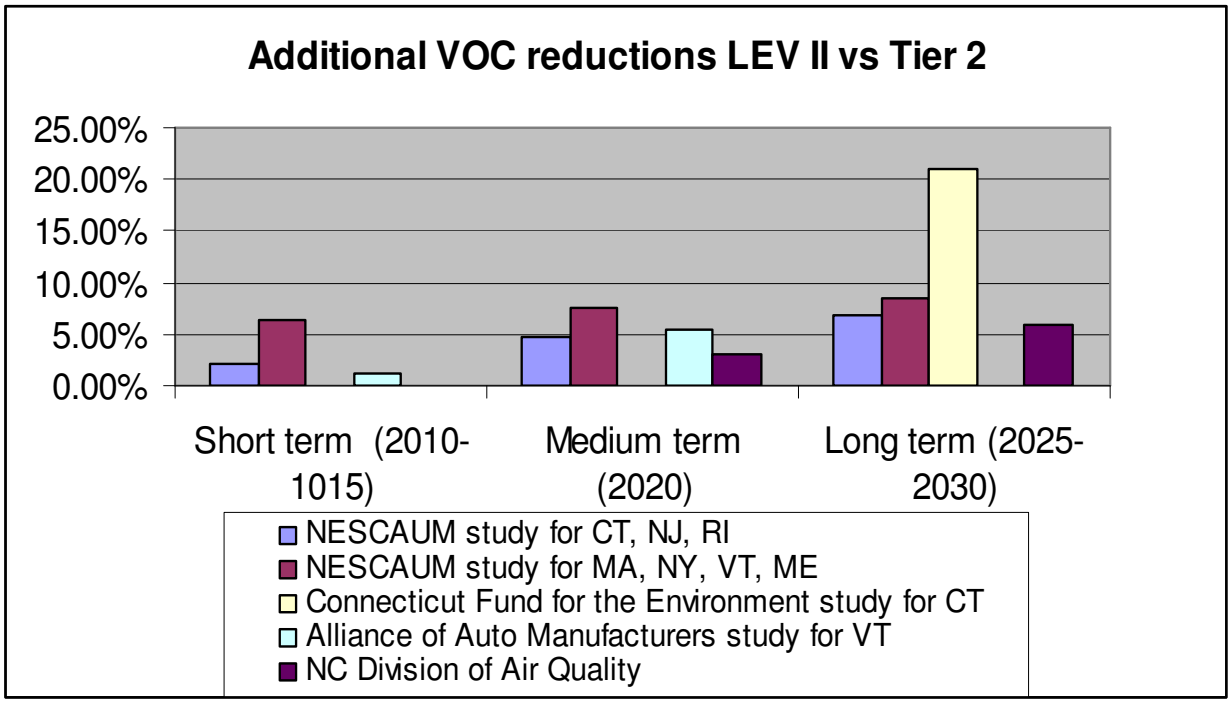
[11] The current ZEV standard requires that 10% of a manufacturer's light-duty fleet be ZEV in 2005 and 16% in 2018.

[12] To date, the following states have adopted, or are in the process of adopting, state clean car programs: NY, NJ, CT, MD, VT, MA, RI, ME, OR, WA, AZ, NM, and UT.

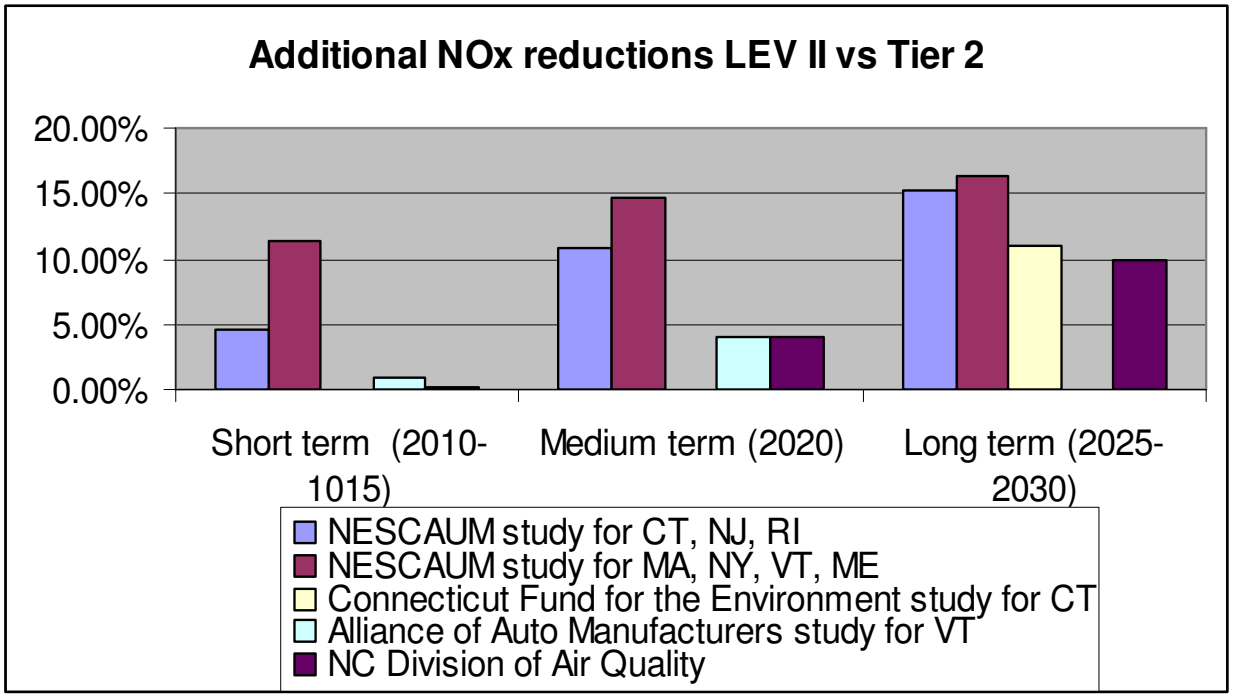
[13] Studies cited in graph for VOC and NOx reductions are taken from the following sources: The Clean Air Association of the Northeast States Summary of NESCAUM Analysis Evaluating the NOx, HC, and CO Emission Reduction Potential from Adoption of the California Low Emission Vehicle (LEV II) Standards (June, 2005); David R. Brown, Sc.D, Rebecca M. Jensen, MPH, MEM, Dana M. Young, Curtis P. Johnson, Donald S. Strait. *The Drive for Cleaner Air in Connecticut: The Benefits of Adopting the California Low-Emission Vehicle Standard for Cars and Light Duty Trucks* (September, 2003); Jeremy Heiken, Air Improvement Resource, Inc. Memorandum to Greg Dana, Alliance of Automobile Manufacturers, *Emissions comparison between the Federal and California motor vehicle programs in Vermont* (March 30, 2004); Mike Abraczinskas, Phyllis Jones, Vicki Chandler, Pat Bello, North Carolina Department of Environment and Natural Resources Division of Air Quality, *Emissions and Air Quality Analysis of the California Low Emission Vehicle II (CA LEV-II) Standards in North Carolina* (January, 2007).

[14] State of Oregon, Governor's Vehicle Emissions Workgroup Report, p.26 (OR Workgroup).



Additional NOx benefits are also realized with the implementation of LEV II. As the following graph shows, NESCAUM predicts an 11% additional NOx benefit between 2010 and 2015 and a 15-16% greater reduction between the years 2025-2030. Modeling done by OR and WA predicts reductions of 30 to 33% by 2020, only 11 years after implementation.[15]

[15] Id. at 3.



All studies reveal considerably greater air toxic reductions due to the near-zero evaporative emission standards. Most studies show considerable reductions by 2020 ranging from approximately 18% to 25%.[16] Adoption of the ZEV sales mandate is expected to produce an additional 3% reduction overall.[17]

Implementation of the GHG standards will result in a 22% reduction of GHGs by 2012 and a 30% reduction by 2016 and will reduce GHG emissions from the light duty passenger fleet by 87,000 CO2 equivalent tons per day in 2020 and 155,200 CO2 equivalent tons per day in 2030.[18]

The adoption of a Colorado clean car program would result in net savings to the consumers at the pump over the life of the vehicle. Because cars certified to GHG standards must be more fuel efficient, consumers would save $20.37 to $25.68 per month in 2016, assuming fuel prices consistent with current prices of $3.00 a gallon.[19]

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[16] See Northeast States for Coordinated Air Use Management, Comparing the Emissions Reductions of the LEV II Program to the Tier 2 Program (October, 2003); Elizabeth Ridlington, Tony Dutzik, Brad Heavner, MaryPIRG Foundation, *Cleaner Cars, Cleaner Air: How Low-Emission Vehicle Standards Can Cut Air Pollution in Maryland*; (February, 2005); Mike Abraczinskas, Phyllis Jones, Vicki Chandler, Pat Bello, North Carolina Department of Environment and Natural Resources Division of Air Quality, *Emissions and Air Quality Analysis of the California Low Emission Vehicle II (CA LEV-II) Standards in North Carolina* (January, 2007); See also OR workgroup, *supra* note 14 at 27 (air toxic benefits in 2020 range from 4%-9% without inspection and maintenance (IM) program to 6% to 11% with IM program).

[17] OR Workgroup, *supra* note 14 at 54.

[18] Id.

[19] Id. at 34.

States that have adopted the clean car standards report relatively low implementation costs and ease of administration. According to NESCAUM, adoption and implementation of the program requires anywhere from ¼ to 4 full-time employees.[20] OR anticipated hiring 2 full time staff to adopt and implement a clean car program.[21]

C. Extend Existing Inspections and Maintenance Program to the Northern Front Range Area[22]

We recommend that a motor vehicle inspections and maintenance (IM) program be extended to those parts of the Northern Front Range Nonattainment Area not currently included in the Denver metro IM program. EPA modeling indicates that even outdated IM tests such as the two speed idle test is capable of delivering a 5.8% reduction in VOC emissions and a 1.2% reduction in NOx in 2007.[23] Furthermore, low-cost portable evaporative system pressure testers are coming on the market which will enable inexpensive, quick evaporative inspections. We propose the Northern Front Range area evaluate both of the following IM tests and implement the one that is most cost-effective and achieves the highest emissions reductions: (1) the IM240 test or (2) an on-board diagnostics program with visual and other inspection of evaporative components.

D. Anti-Idling Ordinances, Financial Incentives and Voluntary Measures to Reduce Truck Idling

EPA estimates that idling trucks consume, annually, over 950 million gallons of diesel fuel, and emit approximately 200,000 tons of NOx and over 10 million tons of carbon dioxide (CO2). The average emissions per a heavy duty diesel truck are 12 grams per hour of HC, 140 gallons per hour of NOx and 8200 gallons per hour of CO2. Heavy duty diesel trucks are also considerable gas-guzzlers, consuming no less than 0.80 gallons per hour.[24]

There are a number of ways to reduce truck idling. We examine four below: anti-idling regulation; voluntary measures; and financial incentive programs.

1. Anti-Idling Ordinances

Anti-Idling ordinances can play an important role in reducing truck idling and emissions. The trucking industry has identified inconsistency in state and local idling laws as a barrier to greater implementation of idle reduction technologies and strategies. Approximately fifteen states and dozens of local jurisdictions currently have idling laws. In order to address the confusion created by multiple, non-uniform laws and ordinances,

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[20] Christine Kirby, MA DEQ, Presentation on behalf of NESCAUM before the Denver RAQC (September 20, 2007).

[21] OR Workgroup, *supra* note 14 at 72.

[22] A fuller description of this strategy is included in our white paper.

[23] LSA Associates, Fort Collins I/M Program Mobile6 Inputs and Results (Dec. 15 2003).

[24] These data are based on 42 unique test scenarios that represent actual long-duration truck idling conditions, for a typical 1980s to 2001 model year idling truck. U.S. EPA, Emissions Facts: Impacts of Truck Idling on Air Emissions and Fuel Consumption, EPA420-F-03-002 (February 2003).

EPA developed a model state idling law. [25] EPA intends the adoption of this model law to foster greater compliance with idling requirements and raise awareness of the available idle-reduction strategies among regulatory agencies and the trucking industry.

Key components of EPA's model state idling law include:

- Provides for no more than 5 minutes of idling in any 60 minute period**,** except during required loading and unloading and specified exemptions for health, safety and law-enforcement.[26]
- Provides for no more than thirty minutes of idling during periods of loading and unloading, such as distribution centers, retail stores and ports.

2. Voluntary Measures

A significant portion of the trucking industry has embraced various idling technology to save fuel and decrease emissions. A few examples of voluntary steps truck companies can take to reduce idling emissions are:

- Install auxiliary power units that produce electricity to run Auxiliary cab-powered devices such as heaters, air conditioners and microwave ovens. According to EPA, in a study of 100 trucks, diesel-fired auxiliary cab heaters provided 2.4% fuel savings and a two year payback given fuel prices of $2.40/gal.
- Phase-change systems, an auxiliary technology that cools truck cabs while the engine is off**,** is capable of cooling for 10 hours at 85ºF and 7 hours at 90ºF ambient and also reduces idling by 3%[27]
- Battery-powered cab system can cool for 6.5 hours and reduce idling by 3% while only requiring 6-8 hours of recharge
- Improvements to cab insulation, A/C performance, and airflow
- Travel America truck center in Commerce City, Colorado recently installed 50 shore-power stations (Idle-Aire stations) that allow truckers to heat, cool and power their cabs without idling. Efforts such as these should be recognized and rewarded as they significantly decrease the need for truck idling in dense urban areas
- Schneider National installed 6,000+ auxiliary-powered heaters and expects to have approximately 80% of its fleet equipped with such units this winter. Wal-Mart also plans to outfit its entire fleet with diesel heating and electric cooling auxiliary power units[28]

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[25] U.S. EPA, Model State Idling Law, EPA420-S-06-00 (April 2006), at http://www.epa.gov/smartway/documents/420s06001.pdf.

[26] The specified exemptions include: traffic conditions; safety or health emergencies; emergency or law enforcement vehicles; maintenance, repair or diagnostic purposes; state or federal inspection programs; work-related mechanical or electrical operations other than propulsion; armored vehicles.

[27] U.S. EPA, Emissions Facts: Impacts of Truck Idling on Air Emissions and Fuel Consumption, EPA420-F-03-002 (February 2003).

[28] Glenn Keller, Linda Gaines, Terry Levinson, Argonne National Lab, *Idling Reduction Technologies, Presentation to National Academy of Sciences Committee Review of the 21stCentury Truck Partnership*

3. Financial Assistance Programs

Numerous technologies are currently available to help companies reduce fuel consumption and install idling technology. However, one of the major barriers to widespread adoption of retrofits, auxiliary power units (APUs) and other voluntary measures is a lack of investment capital. State loan programs can greatly assist trucking companies interested in doing the right thing to attain their idling reduction goals.

Examples of state loan programs to reduce investment capital requirements for small and medium firms include:

- Arkansas and Minnesota offer loans to small businesses for idle reduction technologies[29]
- Oregon provides low-cost lease-to-own or no-interest arrangements on auxiliary power units for truckers[30]
- Wisconsin provides grants to freight motor carrier's newer truck tractors. The program is designed to award $1 million per year in grants for five years[31]
- California provides funds to support the incremental cost of cleaner diesel engines and equipment. Eligible projects include the installation costs for auxiliary power units[32]
- Pennsylvania provides up to 50% matching grants, to a maximum of $7,500, to enable small Pennsylvania businesses to adopt or acquire energy efficient or pollution prevention equipment[33]

4. State Diesel Retrofit Programs

EPA's diesel retrofit program, along with leading state programs like California's Carl Moyer Program and Texas' Emission Reduction Plan, have shown that diesel retrofits are a feasible and cost-effective means to reduce pollution from existing engines.

The Texas Emissions Reduction Project (TERP) focuses on reducing NOx emissions in areas violating the federal health-based ozone standard. TERP has committed almost $20 million to reduce locomotive emissions in the Houston-Galveston area, which suffers the highest ozone levels in the state. The Houston locomotive projects include replacement of old switching engines and repowering locomotives with cleaner hybrid technology. TERP officials expect these projects to reduce NOx emissions by more than 3,300 tons, at an average cost of about $5900 per ton.

(January 23-25, 2007).

[29] See State of Arkansas, Dept. of Environmental Quality, http://www.adeq.state.ar.us/poa/businessasst.htm; see also Minnesota Pollution Control Agency, http://www.pca.state.mn.us/programs/sbomb_loan.html.

[30] Lane Regional Air Protection Agency, at http://www.lrapa.org.

[31] Wisconsin State Legislature, at http://www/legis.state.wi.us/ (click on "Wisconsin Law").

[32] California Environmental Protection Agency, Air Resources Board, Carl Moyer Memorial Air Quality Standards, at http://www.arb.ca.gov/msprog/moyer/moyer.htm.

[33] See http://www.dep.state.pa.us/dep/deputate/pollprev/Ombudsman/Advantage/ADVANTAGE.htm.

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F. Feebate

A feebate is a financing mechanism to encourage the purchase of high fuel efficiency vehicles. A feebate charges users of less fuel efficient vehicles a fee. The revenue collected can be used as a rebate to purchasers of more fuel efficient vehicles, to subsidize mass transportation costs, or for other more energy efficient travel. Studies have shown that a national feebate program could reduce CO2 emissions from vehicles by 20%.

The benefits of a feebate program are that it is a relatively efficient way of promoting the purchase of more fuel efficient vehicles or the use of public transportation as users of less fuel efficient vehicles directly pay for the externalities they incur upon society. The program is likely to be met with substantial opposition from the auto manufacturing industry and consumers, however. Perhaps for this reason, while a feebate program has been considered by various state and federal lawmakers over the past fifteen years, it has yet to be implemented in any other jurisdictions.[36]

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[34] A fuller description of this strategy is included in our white paper.

[35] LSA Associates, Fort Collins I/M Program Mobile6 Inputs and Results (Dec. 15 2003).

[36] Several states, many of them in the Northeast, have actively considered feebates as a tool for greenhouse gas reduction, as is Canada.