A Collaborative Report Presenting Air Quality Strategies for Further Consideration by the State of New Jersey

Prepared by the Diesel Initiatives Workgroup

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Executive Summary

This report summarizes the recommendations of the Diesel Workgroup, which was tasked with developing a menu of diesel control strategies to be submitted to NJDEP Management for consideration as the NJDEP develops its State Implementation Plan (SIP) for PM2.5 and Ozone and simultaneously evaluates strategies to reduce the localized impacts of PM2.5. The Diesel Workgroup consisted of an On-Road subgroup, a Non-Road subgroup, and a Stationary Source subgroup. After compiling a list of potential strategies and discussing the pros and cons of each, the Workgroup concluded that the following strategies could be the most promising and thus recommends that NJDEP formally evaluate them based on environmental benefits, technical feasibility, economic feasibility, implementation feasibility, enforceability and environmental justice/societal benefits. The Workgroup believes that these strategies will deliver localized benefits, improve public health, and assist in attaining the federal air quality standards.

On-Road

The on-road subgroup recommends a comprehensive, voluntary program that encourages vehicle owners to undertake fleet modernization, install tailpipe retrofits, and use alternative fuels such as biodiesel. Proven technologies, such as diesel oxidation catalysts with a 20-30% reduction in particulate matter and diesel particulate filters with a 90% reduction in particulate matter, were highly recommended but the group also emphasized newer technologies that reduce NOx in addition to PM (e.g., exhaust gas recirculation and lean NOx catalysts). The workgroup also encourages the Department to promote hybrid power train technology. The NJDEP should promote participation in such voluntary programs by offering financial incentives such as money from Supplemental Environmental Projects (SEPs), federal/state grants and/or tax incentives.

Building an idling-reduction infrastructure was also a prominent recommendation from this subgroup. The workgroup encourages NJDEP to provide financial assistance for truck drivers to purchase Auxiliary Power Units or other on-board idling alternatives, which achieve a “near 90%” reduction in emissions because they use approximately 10% as much fuel as an idling truck, yet provide ample heat, air-conditioning and electricity for drivers’ comfort. Increasing the number of installations of IdleAire or Shurepower at truck stops, warehouses, terminals was also recommended since the technology reduces emissions and saves fuel, making them cost-effective, long-term solutions.
The workgroup also recommends a corresponding strategy which would result in significant and permanent reductions in PM: phaseing out the sleeper berth exemption. At present, drivers who must run diesel engines for heat and air-conditioning while sleeping are exempt from the 3 minute idling regulation. If this exemption were phased out over the next few years, it would give drivers and the trucking industry adequate time to install or use any of the technologies identified above and should provide significant PM reductions.

In addition, there are strategies for reducing emissions from on-road vehicles that can be implemented immediately at relatively low cost to the state or vehicle owners/operators. These include: creating a driver training program to increase awareness of the need to reduce idling and save fuel; publicizing the existing process for reporting excessively smoking vehicles; bringing roadside opacity checks into cities instead of just interstates; targeting idling enforcement in non-attainment areas; and authorizing local police to enforce NJDEP’s idling regulations (accomplished by the recently signed Diesel Law).

In a slightly different vein, the workgroup recommended that NJDEP capitalize on its existing permitting authority by requiring that increases in emissions from new or existing stationary sources located in non-attainment areas be offset with emission reductions from mobile sources either at the same facility or in close proximity.

Finally, the workgroup recommended that NJDEP follow California’s recent example and consider controlling emissions from refrigerated trailers (also called Transportation Refrigeration Units or TRUs). These trailers use a separate diesel motor to power the refrigeration unit and although not necessarily a large emission problem unto themselves, they have the potential to cause local hot spots when concentrated at truckstops and ports. (Note that major terminal operators at the Port Authority of New York and New Jersey ("PANY/NJ") plug in their TRUs to electrical power and shut down their diesel engines.)

**Non-Road**

The non-road workgroup recommended that strategies to reduce PM from this sector be implemented voluntarily, with financial incentives from the state or federal government. For example, construction vehicles/equipment are a good candidate for emission control technologies such as diesel oxidation catalysts and diesel particulate filters although the variability and differences in equipment necessitate close attention to the particulars of each application. As these technologies are verified for nonroad use in the near future and they are installed on different types of equipment, it is expected that the cost of the units will drop. Combined with incentives for ultra low sulfur diesel fuel
(ULSD), which must be used with the emission control technologies, this strategy will result in the most significant reduction in particulate matter, without increasing other pollutants. The workgroup also recommends increased use of contract provisions by the state to require retrofits.

Other recommended strategies include the use of idle reduction or automatic shutoff technologies and outreach and education for vehicle operators regarding idle reduction. Nonroad vehicles/equipment have much higher idle rates than onroad vehicles and are good candidates for outreach with the construction industry and possibly using existing idling enforcement authority in the future.

Some strategies such as scrappage programs for nonroad equipment were only rated as "promising" instead of "most promising", but were a common theme through many of the workgroup discussions and thus should be further evaluated. For example, although the Port Authority of NY/NJ's tenants are already voluntarily implementing a small scale scrappage program, NJDEP should consider providing financial incentives to expedite and broaden this program. In addition, NJDEP should consider offering financial incentives to undertake this type of program at the Camden port which would result in localized PM reductions in an environmental justice region. In addition, a scrappage program could be applied to the agriculture sector to achieve reductions that might not otherwise be realized. A scrappage program for the agriculture sector would not only bring about PM reductions, but could provide an economic benefit to New Jersey's agricultural businesses.

While the Port Authority of NY/NJ and its tenants have implemented a number of diesel emission reduction strategies, the workgroup recommended that use of these strategies be expanded at the Port Authority of NY/NJ and also extended to the Camden Port due to the air pollution and environmental justice issues at that location. Potential strategies include electrification of cranes and yard equipment and incentives to spur expanded use of low sulfur fuel or begin use of ultra low sulfur diesel fuel earlier than otherwise required. The use of hybrid diesel/electric engines for tugboats is promising, but could be rated higher if additional information on the actual use of the technology can be shown.

The most cost-effective strategies for rail include idling reduction technologies on train engines, particularly on intrastate NJ Transit trains, and expanded use of diesel/electric hybrid engines. Both strategies could bring targeted reductions to urban areas and could be forced if the NJDEP has legal authority to establish and enforce idling limits for railroads. Similarly, the recommended strategies for airports are electrification of ground support equipment wherever feasible (voluntary or possibly mandatory) and use of 2007 compliant diesel/electric engines in shuttle
buses at airports. The workgroup recommended that the state "push the envelope" and explore use of existing legal authority to require emission reduction measures at airports to offset increases in flights.

**Stationary**
The majority of the strategies identified by the stationary diesel workgroup focused on regulatory or permitting changes. The Department currently has existing general permits and rules that regulate a portion of the stationary source population. Therefore, the most promising strategies were those options that were coupled with a level of regulatory relief or reduction in permitting requirements as incentives.

The group specifically recommended that the Department amend the NOx RACT rules (N.J.A.C. 7:27-19) to require that all permitted generators use ULSD fuel by 2007 and modify the General Permit requirements for emergency generators to require the use of ULSD for new sources. The subgroup also urged the Department to adopt the federal New Source Performance Standards (NSPS) regulations which will contain new engine standard requirements for emergency and non-emergency engines equal to those for non-road engines.
I. Introduction:

This workgroup was formed as a result of the SIP Workshop meeting held on June 29th, 2005. The purpose behind this meeting was to involve the regulated community in the SIP development process by soliciting their participation on one or more of the following workgroups: Diesel; Gasoline Cars and Trucks; Homes and Restaurants; Non-Automotive Gasoline Engines; Stationary Combustion Sources; and Volatile Organic Compounds from Processes and Consumer Products. The participants of each workgroup were asked to focus on emissions that contribute to nonattainment of federal air quality standards and to recommend control strategies to reduce these emissions.

II. Purpose and Goals

The Diesel Workgroup's mission was to reduce emissions from various sources of diesel combustion, which produce both fine particulates (PM2.5) and NOx, which is an ozone and PM precursor. In addition, the workgroup was also reminded that because diesel emissions from mobile sources are emitted at ground level and in densely populated areas, and thus have the potential to pose a localized health risk. Therefore, the diesel workgroup was also charged with looking specifically at strategies that would address local hot spots and identifying opportunities for reducing emissions in urban and environmental justice communities. According to the International Agency for Research on Cancer and the USEPA, diesel exhaust has been identified as a toxic air contaminant and a probable human carcinogen. The California Air Resources Board (CARB) has identified diesel PM as a toxic air contaminant. The USEPA, CARB, and others have determined that human exposure to diesel exhaust has been linked to premature death from lung cancer, and increased incidents of asthma, allergies, and other various cardiorespiratory disorders. Those most susceptible to diesel emissions include the elderly, the very young and those with pre-existing respiratory problems.

Diesel emissions contribute to exceedances of the federal National Ambient Air Quality Standards for PM2.5 and Ozone. Currently, thirteen New Jersey counties are designated as nonattainment areas for the PM$_{2.5}$ standard. Diesel exhaust contains fine particulate matter (PM$_{2.5}$). PM$_{2.5}$ is composed of particles less than 2.5 microns in diameter and is composed of both solid particles and liquid droplets. PM$_{2.5}$ is of special concern because these particles can be inhaled deep within the lung and can enter the blood stream. PM$_{2.5}$ can aggravate asthma, increase respiratory symptoms, such as coughing and difficult or painful breathing, cause chronic bronchitis and decreased lung function, contribute to cardiovascular problems such as heart attacks, and even result in premature death.
III. **Workgroup Prioritization of Measures for Further Consideration**

See Executive Summary.

IV. **Structure of Workgroup**

Given the number and variety of sources of diesel emissions, the Diesel Workgroup was divided into three subgroups:

- The On-Road subgroup addressed heavy-duty diesel vehicles that travel on the roadways of the state, such as long-haul trucks, buses and delivery trucks. This group met four times between June and September 2005 and the meetings are summarized in Attachment 2.

- The Off-Road subgroup addressed construction equipment, as well as the port, rail and airport sectors. This group met five times between June and September 2005 and the meetings are also summarized in Attachment 2.

- Finally, the Stationary Sources subgroup addressed internal combustion engines and external combustion boilers, which includes emergency generators. This subgroup met three times between June and August 2005 and the meetings are summarized in Attachment 2 as well.

During the first round of meetings the subgroups formulated several different emission control strategies and fuel/maintenance saving strategies. These strategies were then listed on a chart with pros and cons for each strategy. At the beginning of each of the subsequent meetings, the NJDEP would distribute the strategy chart that was generated from the previous meeting. As a result of the workgroup’s discussions, the chart was then edited to reflect those discussions and used as a starting point for discussion at the following meeting. The charts in Attachment 3 reflect the workgroups’ final discussions. Based on these charts, the NJDEP penned this report. It is important to note that this report reflects the opinions of the workgroups, even though NJDEP is the actual author of the report.

V. **Summary of Meetings/Conference Calls/Data Reviewed.**

See Attachment 2.

VI. **Initial Workgroup Control Measure Considerations.**

To the extent possible, each of the control strategies was analyzed according to the following criteria: environmental benefits, technical feasibility, economic feasibility, implementation feasibility, enforceability and environmental justice/societal benefits. Based on these discussions, the control strategies
were then ranked as “Less Promising,” “Promising,” or “Most Promising.” (see charts in Attachment 3).
ON-ROAD SOURCES
COMPLETE LIST OF STRATEGIES EVALUATED

Incentives to voluntarily install PM reducing technology:
This subgroup focused primarily on voluntary programs and incentives to encourage vehicle owners to apply the technology based strategies listed below. The subgroup recommended that financial incentives such as Supplemental Environmental Projects (SEPs) and federal or state grants and tax incentives be offered to targeted fleets in urban areas.

A SEP is a way for a defendant in an enforcement action to incorporate an environmentally beneficial project into its settlement. For example, if the defendant violated the Air Pollution Control Act, it could potentially spend up to 50% of the settlement amount on a diesel risk reduction project. Grants or tax incentives from governing bodies would also provide a monetary incentive for fleets to voluntarily retrofit their vehicles. In order to achieve this, there would have to be a high level of cooperation between government and industry.

V1. Diesel Particulate Filters - Most Promising
   See Section VII.

V2. Diesel Oxidation Catalysts (DOCs) - Most Promising
   See Section VII.

V3. Closed crankcase filtration system - Most Promising
   See Section VII.

V4. DOC or DPF with Fuel Catalysts - Promising
   A similar technology that involves either a DOC or DPF used in combination with a fuel catalyst was reviewed by the workgroup. A fuel catalyst is a substance added in the fuel system that reacts with the substrate within the DOC or DPF to enhance PM or NOx removal. This catalyst could be a chemical compound based on organic chemicals, such as benzene or xylene or a compound based on metals, such as platinum.

   The concern with fuel catalysts is that many of the ingredients in these catalysts are proprietary in nature, therefore the chemical compounds are unknown and the associated multi-media environmental impacts are also unknown. At a minimum, fuel borne catalysts should be verified by the California Air Resource Board (CARB) in order to provide some level of assurance as to the environmental impacts in other media areas (e.g., soil or water). Another concern is that the owner/operator must remember to add the catalyst when fueling, and it may be difficult for enforcement staff to determine whether the catalyst was actually added.
V5. **Liquefied Natural Gas (LNG) refueling program in Burlington County - Promising**

In this pilot project, methane gas is extracted from the Burlington County landfill and through a number of processes, the gas is filtered, purified and liquefied into LNG. The LNG is then used to fuel a number of refuse trucks specifically configured to burn LNG. According to a report published by INFORM in 2003, combustion of LNG produces about 90% less particulates, 45% less NOx, 76% less non-methane hydrocarbons and 8% less CO2 than diesel combustion. However, emissions of CO are 92% higher. The LNG program could potentially be expanded to other landfills or “digesters” in urban areas. Although the LNG production site would have to be at a landfill or anaerobic digester, the fuel could potentially be transported in refrigerated tankers to satellite fueling stations where it could be dispensed as either LNG or CNG. A drawback to this strategy is that the equipment used to refine the methane gas to LNG has a high capital cost. Vehicles that burn LNG cannot be retrofitted, so they would have to be purchased new. There are also potential odor problems with the landfills and digesters.

V6. **Hybrid Power Train Technology - Most Promising**

See Section VII.

V7. **Purinox™ emulsified fuel - Less Promising**

Purinox™ is conventional diesel fuel mixed with proprietary additives, which produces a fuel emulsion. Purinox™ would provide an approximate 50% reduction in particulate matter, as verified by USEPA and CARB. However, there are several limitations, including the following: an entire infrastructure needs to be in place to support Purinox™ use (e.g., Purinox™ storage tanks require agitators to keep the Purinox™ emulsion properly mixed); it should not be used in fleets with a long downtime since inactivity will cause the emulsion to separate; cold weather may adversely affect the emulsion; and the current cost of Purinox is high because there is no blending facility on the East Coast.

V8. **Biodiesel - Most Promising**

See Section VII.

V9. **Ediesel - Less Promising**

Ediesel is a blend of ethanol and diesel fuel. Ethanol’s primary feedstock is corn, so as with biodiesel, the energy consumed in the growing and the processing of the feedstock crop has to be considered. There may be additional safety issues associated with the storage and handling of an ethanol blended fuel due to ethanol’s volatility, however the benefit is that it will reduce reliance on foreign oil since it's made from a renewable resource. The Engine Manufacturers Association (EMA) does not
approve the use of Ediesel because it has the potential to pose significant safety problems when used in diesel engines.

V10. Scrappage program - Promising
A scrappage or fleet modernization program is a method to replace older, higher emitting diesel vehicles with new (or newer) lower emitting vehicles. The replacement vehicle could be retrofitted to ensure additional reductions. Since diesel vehicles are very durable, they could be on the road for 30 years or more. A monetary incentive, such as a grant or tax incentive to purchase a newer vehicle should be put in place in order to get these older vehicles off the road sooner. This strategy could be focused on medium duty vehicles, which historically haven't been the focus of state regulatory programs. Fleet modernization could also be offered to independent truckers that call on port facilities or that travel heavily through environmental justice communities. The drawbacks are that it requires a large capital investment on the part of the agency administering the program, and it's questionable whether partially offsetting the cost of the new vehicle is a sufficient incentive for vehicle owners to take part in this program (i.e., would the cost of the new vehicle need to be completely subsidized).

In addition, providing incentives to purchase 2007 compliant engines may avoid the potential for stockpiling of pre-2007 vehicles. 2007 compliant engines will only emit 10% of the PM of today's engines without the aftermarket addition of retrofit equipment. However, because the 2007 engines will carry a high capital cost, it is possible that many fleet owners will purchase new engines now, or postpone the purchase of the 2007 vehicles to avoid the higher costs.

Regulatory Mandates:
R1. Mandate emission reductions for stationary or mobile sources located in areas designated as non-attainment for ozone or PM - Promising
The NJDEP should require that increases in emissions from new or existing stationary sources located in non-attainment areas be offset with emission reductions from mobile sources either at the same facility or in close proximity. This approach is strongly supported by representatives from the environmental justice community. Some workgroup members voiced the opinion that it seemed to make no sense to be asking mobile sources to install technologies to reduce PM and NOx emissions when new, stationary sources are still being issued permit approvals in non-attainment areas. Given that a non-attainment situation means that existing concentrations of pollutant are too high, no permit approvals should be issued by NJDEP unless the new emissions are offset by more than 100%. If the offsets cannot be provided, the permit should be denied.
The workgroup believes that there is adequate authority in existing regulations to deny permits for pollutants in non-attainment areas.

In addition to an intra-facility trading program, the NJDEP should also consider an inter-facility trading program, with a mandatory retirement component so that there is a net decrease in PM emissions. However, representatives from the environmental justice community expressed concern that this may result in high local emissions.

Finally, the Port Authority supported a program that would allow agencies to reduce mobile source emissions and bank them for future conformity credit or trade those reductions for stationary source credits.

R2. Reschedule refuse collection at night - Less promising
This would reduce traffic during work hours and PM emissions during daylight hours, when PM emissions are the highest. However, excessive noise in suburban and rural areas and worker safety may be concerns. Also paying refuse workers a night differential wage could prove to be too expensive.

R3. Halt construction on Ozone Action Days - Less Promising
This strategy would reduce PM emissions from construction equipment and reduce emissions from motorists stuck in traffic. This was discussed as a strategy to reduce ozone and PM for that given day. However some contracts may carry financial consequences with missed workdays.

R4. Changing tolls on Ozone Action days - Less Promising
Removing tolls on ozone action days may reduce traffic buildup in some areas where tolls are collected, thus reducing ozone and PM in that particular area. On the other hand, this may encourage more people to drive on that day if they know there are no tolls. Another possibility was to double the price of tolls on Ozone Action Days. This would provide a financial incentive not to drive on that particular road. However, there would be minimal public support for the doubling of toll roads and there would be difficult enforcement issues.

R5. Implement a dual speed limit on Interstates, such as 65 mph for cars and 55 for trucks - Less Promising
The State of California is currently implementing this dual speed limit on their major highways. The reduction in speed for the trucks has shown a significant decrease in NOx emissions and an increase in fuel economy because of the decreased air resistance associated with the decreased road speed. In addition to this strategy, the broader strategy of enhanced police enforcement of the existing speed limit was discussed, since increased speed translates to increased fuel consumption and increased
emissions. The trucking industry has voiced safety concerns regarding dual speed limits and therefore opposes this strategy.

R6. **Implement rules that govern the PM emissions of Transportation Refrigeration Units (TRUs) - Most Promising**  
See Section VII.

**Idling Strategies:**

I1. **Phase out the sleeper berth exemption - Most Promising**  
See Section VII.

I2. **Target idling trucks in non-attainment areas - Most Promising**  
See Section VII.

I3. **Implement a driver training program to reduce idling - Most Promising**  
See Section VII.

I4. **On board battery technology - Promising**  
This involves a large battery pack mounted on the truck to run the truck’s electrical systems so that the truck can be shut off. Typically, these batteries can be very heavy; therefore a weight penalty is involved. However, the recently signed federal Energy Law will allow truckers to deduct the weight of an on-board battery (up to 400 pounds) from their Gross Vehicle Weight. There is a large capital expense associated with these battery packs and the technology is not widespread.

I5. **Auxiliary Power Units (APUs) - Most Promising**  
See Section VII.

I6. **Truck Stop Electrification (TSE) - Most Promising**  
See Section VII.

I7. **Expand the anti-idling program enforcement to the local police - Most Promising**  
See Section VII.

**Other Strategies:**

Some of these technologies may not affect PM directly, but save fuel and, in turn, reduce emissions.

O1. **Wide based tires - Less Promising**  
These tires are extra wide and could be substituted for the two-tire configuration typically seen on most trucks. These tires typically have an 800-1000 pound weight savings to the truck, thus a fuel savings is realized. However these tires are currently outlawed in Canada and may
not comply with “inch-width” laws in certain states. These tires are typically used in trucks carrying bulk liquids. This technology may be more widespread in the future and may be applied in conjunction with other fuel saving technologies.

O2. **Lubricant technology in the form of low viscosity (synthetic) lubricants – Less Promising**
These lubricants may extend engine life and time between oil changes but may also cause “blow by” in the engine cylinders, thus producing more emissions. This condition may be exacerbated by stop and go driving conditions, such as a refuse truck.

O3. **Automatic tire inflation systems - Promising**
This is a system mounted on the truck that maintains the optimal tire pressure. A fuel savings is realized when a truck operates with properly inflated tires, however this savings may be negated due to the additional weight that this system may have. Newer systems may not carry this weight penalty.

O4. **Truck aerodynamic improvements - Promising**
This is a low – cost technology where as much as 10% fuel savings could be realized. Much of this technology is already in use today, such as roof spoilers and the shrouding of the side fuel tanks.

O5. **Publicize the process for reporting excessively smoking vehicles - Most promising**
See Section VII.

O6. **Bring roadside opacity checks into the cities - Most promising**
See Section VII.

O7. **Partnerships with other government agencies such as Dept of Transportation, Dept of Education, Dept of Health. Leverage relationships with outside groups such as school PTAs. - Promising**
With the implementation of these partnerships, the NJDEP could expand their public outreach and enforcement capabilities. Possible voluntary programs such as grants could also be expanded through these partnerships.
NON-ROAD SOURCES
COMPLETE LIST OF STRATEGIES EVALUATED

Construction vehicles/equipment
This subgroup focused primarily on voluntary programs and incentives to encourage vehicle and equipment owners to apply the technology based strategies listed below. The subgroup recommended that financial incentives such as Supplemental Environmental Projects (SEPs) and federal or state grants and tax incentives be offered to targeted fleets in urban areas.

C1. Diesel Particulate Filters - Most Promising
   See Section VII.

C2. Diesel Oxidation Catalysts - Most Promising
   See Section VII.

C3. Combined DOC or DPF with fuel catalyst - Promising
   A similar technology that involves either a DOC or DPF used in combination with a fuel catalyst was reviewed by the workgroup. A fuel catalyst is a substance added in the fuel system that reacts with the substrate within the DOC or DPF to enhance PM or NOx removal. This catalyst could be a chemical compound based on organic chemicals, such as benzene or xylene or a compound based on metals, such as platinum.

   The concern with fuel catalysts is that many of the ingredients in these catalysts are proprietary in nature, therefore the chemical compounds are unknown and the associated multi-media environmental impacts are also unknown. At a minimum, fuel borne catalysts should be verified by the California Air Resource Board (CARB) in order to provide some level of assurance as to the environmental impacts in other media area (e.g., soil or water). Another concern is that the owner/operator must remember to add the catalyst when fueling, and it may be difficult for enforcement staff to determine whether the catalyst was actually added.

C4. Outreach and education for construction operators - Most Promising
   See Section VII.

C5. Idle reduction technologies - Most Promising
   See Section VII.

C6. Provide incentives for low or ultra low sulfur fuel use - Most Promising
   See Section VII.

C7. Use of biodiesel or Ediesel - Promising
   See V8 and V9 under On-Road strategy section.
Both of these fuels are rated as “promising”, since there is a limited infrastructure in place to make the fuels in the Northeast and store them on construction sites. However, continued federal tax credits or subsidies make them worthy of consideration.

C8. Mandatory contract provision requiring retrofits on construction equipment - Most Promising  
See Section VII.

C9. Scappage program - Promising  
A scappage or fleet modernization program is a method to replace older, higher emitting diesel vehicles with new (or newer) lower emitting vehicles. The replacement vehicle could be retrofitted to ensure additional reductions. Since diesel vehicles are very durable, they could be in use for 30 years or more. A monetary incentive, such as a grant or tax incentive to purchase a newer vehicle should be put in place in order to get these older vehicles replaced sooner. This strategy could be focused on medium duty vehicles which historically haven't been the focus of state regulatory programs. Fleet modernization could also be offered in a port or an environmental justice community. The drawbacks are that it requires a large capital investment on the part of the agency administering the program, and it's unclear whether partially offsetting the cost of the new vehicle is a sufficient incentive for vehicle owners to take part in this program (i.e., would the cost of the new vehicle need to be completely subsidized).

While there is a high capital cost involved, this strategy could be used on a voluntary basis to target agricultural vehicles as well as construction vehicles. If the cost can be offset at least in part, use of a newer vehicle would result in increased efficiency and would be an economic benefit to the agriculture sector.

C10. Halting construction on Ozone Action Days - Less Promising  
This strategy would reduce PM emissions from construction equipment and reduce emissions from motorists stuck in traffic. This was discussed as a strategy to reduce ozone and PM for that given day. However some contracts may carry financial consequences with missed workdays.

General port strategies

gp1. Scappage program for old yard equipment - Most Promising  
See Section VII.

gp2. Incentives/regulations to use low sulfur or ultra low sulfur fuel for yard equipment - Most Promising
See Section VII.

GP3. **New emission/permit fees for “Diesel Risk Mitigation Fund” - Promising**
A new fee placed on diesel offroad mobile sources should be considered that would provide two functions. First, payment of a fee would be an incentive to upgrade or replace equipment with less polluting, newer engines. Second, the fee would be used as a funding source for the purchase of retrofit or replacement engines. However, it is unclear whether NJDEP has authority to impose such a fee.

GP4. **Timeshifting/expanded hours at ports- Promising**
This strategy is expected to reduce congestion and idling, thereby improving efficiency of the port and reducing PM emissions. In Los Angeles, a surcharge on peak hour use has been extremely effective at shifting truck traffic to offpeak hours. One possible limitation to successful implementation of this strategy is the need for related businesses, primarily warehouses, to adjust hours to accept offpeak deliveries. There may be additional costs to staff the port and warehouses and the time shift may conflict with local ordinances. The large, expected increase in port shipping makes this strategy viable and it receives a ranking of “promising”.

GP5. **Electronic gate/computer scheduling at port (voluntary effort by terminal operators) - Most Promising**
See Section VII.

GP6. **Crane electrification (voluntary effort by terminal operators and the PANY/NJ) - Most Promising**
See Section VII.

GP7. **Short haul barging to satellite locations - Less Promising**
This alternative reduces truck traffic but is a slower method of transporting cargo out of the port on a one-for-one basis. However, as the number of continuous movements by barge increases, the average transit time per box will be improved and ultimately be better than by truck. PANY/NJ stated that detailed environmental analyses were conducted and demonstrated that the service should result in a net environmental benefit (in terms of NOx and fuel reductions) once volumes reach a level where financial self-sufficiency would be possible. Currently, containers are being barged to Albany on a trial basis and could be barged to other locations. This would be a long-term solution and although it’s more efficient on a container per vehicle move, it is currently slower and more expensive than trucking, so it is ranked as “less promising”.

GP8. **Shared chassis pools - Promising**
Although Governor Codey recently signed A1478 which will result in improved chassis safety and maintenance, the group also suggested implementing a shared chassis pool to improve port efficiency and reduce truck idling time. Currently, each carrier provides a different chassis, but under the "pool" concept, a truck driver would only have to go to one location to retrieve a chassis for their load. A chassis pool was developed at the port in VA and is expected to improve efficiency and safety and reduce idling times. The difficulty is that it would require agreement among many different entities at the port and would require good management so that there is no additional driving time for a trucker to retrieve a chassis from the pool.

**Strategies for ships**

**S1. Voluntary speed reduction - Less Promising**
California requires that ships reduce their speed in ocean channels, thereby saving fuel and producing a small reduction in emissions. This option would be voluntary, since the state has no legal authority to require it. It was decided that speed reduction would be difficult to enforce and would produce little emissions reduction in the port area, since vessels traveling through the NY/NJ harbor are already limited by the tight turns and heavy traffic. For these reasons, this strategy is rated as "less promising".

**S2. Cold ironing - Promising**
Cold ironing is a strategy for ships to “plug in” to onshore electrical power while they are dwelling at berth to provide energy for the ship’s needs. While this is a long-term solution due to the need to create an International Maritime Organization (IMO) standard for the electrification of both ships and docks, it is rated as “promising” because it could provide a significant reduction in PM emissions, particularly in the Newark non-attainment area. The percent of emissions that dwelling vessels contribute compared to the contribution from all marine vessels and overall emissions within the NJ/NY/LI non-attainment area has yet to be determined. Cold ironing is particularly good where there are dedicated vessels returning to the same location, such as cruise ship docks. Seattle has cold ironing in place for one cruise ship line and the Port of Los Angeles recently announced a cold ironing program for China Shipping Terminals. The biggest obstacle to implementation is the high capital cost, since modifications are required to the ship and dock. The Port Authority of NY/NJ is currently analyzing data regarding dwelling times of docked ships to determine the magnitude of emissions from ships dwelling at berth. This data should be used to determine the feasibility of cold ironing for the port.

**S3. Incentives to use low sulfur or ultra low sulfur fuel - Promising**
Ocean vessels typically use “bunker” fuel, which is the cheapest and has the highest sulfur content of any fuel (ranging from to 10,000-30,000 ppm
At least one shipping line calling on the north Jersey port is voluntarily using low sulfur fuel. Incentives could be a financial subsidy from the state to the shipping lines for the cost differential or voluntary agreements among the state and shipping lines where they agree to use lower sulfur fuel in exchange for some (to be determined) benefit. One issue to be explored further is where the fuel used by ships calling at the port actually comes from and whether there will be sufficient supply given the mandate of the recently signed Diesel Law required ULSD for non-road equipment. This option is rated as “promising”, with a note that international agreements (i.e., MARPOL Annex VI) are being developed to reduce the sulfur content of ship fuel.

The American Association of Port Authorities supports US ratification of MARPOL Annex VI. Annex VI contains provisions allowing for special SOx Emission Control Areas (SECAs) to be established with more stringent controls on sulfur emissions from oceangoing vessels, and US ratification of the treaty could eventually lead to the establishment of North America as a SECA. Currently, oceangoing vessels use 30,000 to 45,000 ppm sulfur fuel, compared to 500 ppm sulfur fuel currently used by highway vehicles nationwide.

Use of a tax on fuel emissions could spur the switch from bunker fuel to less polluting fuels including low and ultralow sulfur fuel. While this concept is a good one that can be targeted directly at the use of less polluting fuels, it would be difficult to collect unless the ships are purchasing their fuel in New Jersey. Given the variety of port facilities in and around the Port of NY/NJ, a tax might shift purchases away from NJ facilities. For this reason, this portion of the strategy is rated as "less promising".

**S4. Provide incentives to repower tugboats - Promising**

Use of hybrid engines for tugboats may be efficient and cost-effective due to the reduced cost of fuel. It is believed that these engines may have a high purchase price and possibly a horsepower penalty. Battery replacement cost may also be an issue, although more research is needed.

The PANYNJ is currently repowering tugboats with newer diesel engines as an emissions offset requirement for harbor dredging emissions. If financial incentives were available or it could be demonstrated that repowering tugs is cost-effective, this would help offset the high capital cost of this strategy. This strategy was rated as “promising” due to its potential cost-effectiveness.
S6. Provide incentives to retrofit ferry engines with DPFs, DOCs or SCR - Promising
The use of SCR devices is being implemented in Los Angeles and on the Staten Island ferries as a NOx reducing strategy, but DOCs and DPFs should also be considered as PM reducing strategies. The New York State Energy Research and Development Authority (NYSERDA) is currently evaluating DOCs and DPFs for diesel emission reductions on the NY/NJ private ferry fleet. This collaborative workgroup is cognizant that SCR is not yet a verified technology for mobile sources and therefore may not be eligible for SIP credit, however it shows promise based on existing applications. In-use testing performed by both NYSERDA and the PANY/NJ, and acceptance of the testing protocols by the interagency Regional Air Team may perhaps make SIP credits possible in the future.

S7. Strong arm dockers for ferries - Promising
Technology is available that holds ferries up against docks while loading and unloading, which normally requires engine use. The ferry engine could then switch to idle speed, which would reduce emissions and fuel use. NYSERDA explored the use of this technology, but more research is needed to determine cost-effectiveness, so this is rated as “promising”.

Rail strategies
R1. Provide incentives for trains to use low or ultra low sulfur fuel - Promising
ULSD is required by federal law beginning in 2012, but incentives could spur the use of it much sooner. While voluntary efforts that result in reduced PM emissions are well underway in the trucking and port sectors, there are few efforts underway by freight rail companies. NJTransit also accounts for a significant portion of rail emissions and may be a good target for achieving localized emission reductions. Any incentives would need to come from government or private settlements, or else the costs of these fuels will shift to the riders and discourage use of mass transit.

R2. Idling reduction for train engines - Most Promising
See Section VII.

R3. Expanded electrification of passenger rail lines by NJTransit - Promising
This strategy is rated as “promising” since it has a high capital cost and therefore has only been done where ridership is high. However, expanding the electrification of lines would provide PM reductions and would result in more people having access by rail to Manhattan, since only electrified trains can enter Manhattan’s tunnels.

R4. Expanded use of dual mode diesel/electric engines - Most promising
See Section VII.
R5. **Periodic emissions/opacity testing of locomotives - Less Promising**
This would be a mandatory strategy by the state which would be similar to onroad inspections. Either an opacity test or continuous opacity monitor might complement current inspections already performed for safety and preventative maintenance. Locomotives would have to be shipped for testing, since NJTransit lacks the ability to perform this testing as of now. The cost of such an inspection program would be partially offset by improvements in fuel efficiency, but the lack of experience with this option makes it “less promising”.

R6. **Congestion management/double track/grade separation - Promising**
The workgroup evaluated various methods currently being used or planned to relieve freight rail congestion, which is a concern in NJ. This includes adding another track, separating the grade of rail (lowering the tracks below street level), upgrading track to raise freight speed limit, etc. These strategies reduce idling of both locomotives and cars waiting at rail crossings and will also reduce the length of time that a crossing is closed. There is a significant cost involved with most of these infrastructure improvements, but this is a good candidate for combined public and private investment. It should be noted that some NIMBY groups are opposing efforts to increase freight rail.

R7. **Scrappage program - Promising**
See non-road strategy C9.

New Jersey Transit pointed out that while a new locomotive that meets USEPA's current Tier 2 standards can cost $5 million, it only costs approximately $200,000 to bring an old, grandfathered locomotive up to Tier 0 standards. Considering that most of NJ Transit's fleet is from the 1960s and thus exempt from USEPA standards, it would make sense from an environmental perspective if the state offered financial incentives to rebuild these engines to meet Tier 0 or better standards.

R8. **Incentives for purchase of hybrid locomotives - Most Promising**
See Section VII.

**Airport Strategies**

A1. **Electrify airport ground support equipment - Most Promising**
See Section VII.

A2. **Provide incentives for alternative fuels for ground support equipment - Promising**
Use of low or ultralow sulfur diesel fuel or natural gas (which requires engine retrofits) would reduce PM emissions but require an upfront investment by the airlines. This equipment has a 12-15 year turnover, so
additional research into use of these technologies and financial payback periods is necessary to evaluate this strategy.

A3. Apply idling restrictions to ground support equipment - Promising
It may be possible to apply the current 3 minute idling law to offroad equipment including ground support equipment. This would result in fuel savings and reduction in engine wear and is a low cost strategy. There may be times when the restrictions would not apply, such as harsh weather conditions.

A4. Cap and trade limits on airport emissions (bubble concept) - Less Promising
This strategy would give airlines and airports some discretion in deciding which types of equipment are most appropriate for PM reduction strategies. This would also reduce emissions in the Newark non-attainment area. Research into legal or administrative requirements to make this a reality are needed to determine how feasible it is. Due to these limitations, this strategy is rated as “less promising”.

A5. Differential landing fees - Promising
The state or PANYNJ could charge fees to airlines based on their emissions, with more efficient planes paying less. This would provide a financial incentive to upgrade current fleets. Fees collected could possibly be used to partially fund purchase of newer, less polluting planes. There is a chance that this strategy would conflict with FAA rules and further research is needed to clarify legal feasibility. This strategy is rated as “promising” however may be considered "less promising" given the current state of the airlines' financial condition.

A6. Require efficiency improvements in airport lease agreements - Promising
While airline leases with the PANYNJ are negotiated infrequently (every 20 years or so), the Port could negotiate other parts of the lease agreement to secure efficiency improvements that would save fuel, reduce PM and provide long term cost savings. These conditions could be objectionable to airlines, so this strategy is rated as “promising”. However, PANY/NJ stated that leases can only require lessees to comply with expressed standards and requirements, such as existing NJ laws and regulations, therefore they asserted that this is not a viable strategy.

A7. Require stronger environmental review of airport emissions - Promising
The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet this requirement, federal
agencies prepare a detailed statement known as an Environmental Impact Statement (EIS). The Port Authority, as airport sponsor, submits environmental assessments to the FAA (the lead federal agency) for airport projects requiring a federal action, such as approval of airport expansion. If federal funds are being expended or if the project causes a change to the airport layout plan, then the environmental impacts are assessed in compliance with NEPA. The FAA issues either a finding of no significant impact or requires an environmental impact statement to be completed.

However, some members of the workgroup expressed concern that not all airport changes trigger an EIS and thus the criteria should be changed. Alternately, the state should independently review the environmental impacts from each airport and set airport-wide emission limits that take into consideration the impact of the airport on nearby residential areas. Some workgroup participants also recommended that the peripheral, general aviation airports be subject to a state or federal environmental impact analysis as well.

**A8. Diesel/electric shuttle buses at airport - Most Promising**

See Section VII.
STATIONARY SOURCES  
COMPLETE LIST OF STRATEGIES EVALUATED

Strategies identified by this subgroup include regulatory revisions at both the federal and state levels, alternative fuel use strategies, and incentives for use of control devices or replacing older equipment with newer, cleaner burning devices. It should be noted that each strategy identified needs a thorough assessment of the economic impact to determine if the strategies will affect the vitality of the businesses.

The strategies were then prioritized by the workgroup based on which ones provided the best reductions with the greatest potential for implementation.

Regulatory/Permitting Strategies

See Section VII.

R2. Amend NOx rules (N.J.A.C. 7:27-19) to require that all permitted generators use ULSD fuel by 2007. – Most Promising
See Section VII.

R3. Modify the General Permit requirements for Emergency Generators to require the use of ULSD for new sources. – Most Promising
See Section VII.

R4. Revise N.J.A.C. 7:27-9 requirements to lower the sulfur content of fuel. – Promising
This requirement could be associated with a decrease in monitoring and recordkeeping requirements in permits. Workgroup members questioned whether new recordkeeping and random sampling of fuel would be needed for enforcement. Current permits require the permittee to keep fuel records or bills of lading which should list the sulfur content of the fuel received. It is also understood that enforcement does not currently sample fuel oil unless required by the permit.

R5. Require generators/compressors to operate on timers as a permit condition. – Promising
This is an inexpensive and low technology option. However, there may be some limitations to the ability to quantify emission reductions. The EMA on the other hand stated that generators need to operate when needed to provide electricity and other engines used to provide compression or direct power must also operate as needed to fulfill their function, therefore
requiring the addition of timers does not alter this need or reduce emissions; this strategy will not reduce emissions.

R6. Develop an intra-facility emissions trading program for NOx and PM2.5 to allow facilities to offset stationary source emission increases by decreasing mobile source emissions through retrofits. – Promising
The new NOx RACT rule could be used as the incentive/trigger for this strategy. The trading program would allow a facility to ensure a “no net increase” of NOx/PM2.5 emissions at their facility by compensating for stationary source emission increases with mobile source emission decreases. The drawback is that current federal regulations do not allow for these types of “facility-wide” caps on emissions. Also, this program may increase the amount of monitoring and recordkeeping to ensure emissions are accounted for. At this time, mobile source emissions are not quantified by permittees.

Voluntary Strategies
V1. Develop a scrappage/incentive program to replace higher emitting engines controlled by Selective Catalytic Reduction (SCR)/Urea control systems with newer, more efficient, and less polluting engines. – Less Promising
The scrappage program would provide incentives to replace higher emitting engines controlled by Selective Catalytic Reduction (SCR)/Urea control systems with newer, more efficient burning engines. This would reduce or eliminate the need for the SCR, eliminate the use of a hazardous chemical (urea), reduce maintenance costs and decrease the regulatory burden by decreasing the operational requirements for emergency generators that emit greater than 5 tons per year. The drawback to this option is that grandfathered sources and any existing sources that emit greater than 5 tons per year would need to meet a 90% reduction with the new technology due to State of the Art (SOTA) requirements. Future discussion regarding possible incentives should include relief from SOTA analysis (see below) and providing the differential cost of the new technology/engine.

V2. Implement a temporary program to provide amnesty from SOTA requirements for grandfathered minor sources to allow them to upgrade to more efficient units. – Promising
This would encourage the purchase of new engines that burn more efficiently and are far less polluting and would reduce the workload on the Department since a SOTA review would not be needed. At this time, we cannot assess the numbers of units this strategy would affect to determine its worth. Also, this cannot be a federal requirement since a permittee may still need to meet BACT requirements if PSD or other regulations are triggered.
V3. **Convert diesel generators to burn natural gas. – Less Promising**
This strategy provides an economic, environmental and regulatory incentive since natural gas is cheaper, burns cleaner and therefore, would require less permitting requirements as well as stack testing requirements. The drawbacks are that natural gas has a lower heat input rating than diesel. Therefore, a bigger engine may be needed for a natural gas engine to perform the same amount of work as a diesel engine. Also, natural gas may actually increase the release of NOx emissions. Facilities may not have the means for amassing natural gas on-site, therefore, in cases of natural gas disruptions, the emergency generator would not be able to function as it is intended. EMA opined that NJDEP regulations should be based upon the ability to meet applicable emissions standards and not on the combustion technology or fuel used. Further, the type of engine used will be dictated by the specific application needs and performance requirements of the user which means that not all diesel engines can be replaced by a natural gas engine. Finally, with today’s aftertreatment systems, diesel engines can be as clean or cleaner than natural gas engines.

V4. **Require or provide incentives for non-emergency generators to retrofit with control devices or replace them with cleaner burning units. – Promising**
This project could be target new or modified sources and provides measurable reductions of NOx and PM2.5. Some control devices would require ULSD and certain older model engines would not be able to use DPF controls. The combination of certain control devices with the use of ULSD could provide significant reductions.

V5. **Biodiesel (mixtures with 20% or less)- See V8 under On-Road strategy section. –Promising**
Biodiesel is well suited for use in stationary engines because the fuel-to-air ratio or the engine timing can be adjusted to control NOx emissions from increasing. The workgroup recognizes that there is a limited infrastructure in place to make the fuel in the Northeast. However, continued federal tax credits or subsidies make them worthy of consideration.

Other Strategies

O1. **Develop contract requirements that ULSD be used in all state contracts including sources with a heat input of less than 1,000,000 BTU per hour. – Less Promising**
An example of this may be building leases. The State of New Jersey could act as the test subject for this demonstration project, thereby encouraging the private sector to switch to ULSD. The drawback is that there is no data on the number of contracts or pieces of equipment this
would capture. It also may be redundant with the proposed changes to the NOx RACT rule.

VII. Detailed Review of Promising Control Measures

It is the workgroup’s position that the following recommendations have the potential to reduce PM, thereby aiding the State of New Jersey in meeting its SIP requirements and reducing the health risk to the citizens of the State.

It is the workgroup’s position that the following strategies show the most promise and are worthy of further consideration by NJDEP. Given the constantly changing nature of technology coupled with the constant escalation of fuel prices, a “most promising” control or fuel saving strategy may become apparent in the near future that the workgroup has not yet considered. But for the time being, the workgroup considers the following strategies as “most promising.”
ON-ROAD SOURCES
MOST PROMISING STRATEGIES

Incentives to voluntarily install PM reducing technology:
This subgroup recommends that the NJDEP focus primarily on voluntary programs and incentives to encourage vehicle owners to apply the technology based strategies listed below. The subgroup recommended that financial incentives such as Supplemental Environmental Projects (SEPs) and federal or state grants and tax incentives be offered to targeted fleets in urban areas. The list of technologies below is not all inclusive as there are many other strategies, such as low pressure exhaust gas recirculation and filters with lean NOx catalysts that have been verified by USEPA and/or CARB to achieve significant PM as well as NOx reductions.

- Emission control equipment for tailpipe such as Diesel Oxidation Catalysts (DOCs) and Diesel Particulate Filters (DPFs).
  The first emission control strategy that the workgroup analyzed was the installation of Diesel Particulate Filters (DPFs) on trucks or buses. This device is installed in place of the engine muffler and collects the particulate matter from the exhaust. The particulate matter is trapped and accumulates within the filter, but is then removed from the filter by oxidation. Oxidation is basically a “burning off” of the particulate matter, which occurs at a temperature of approximately 380 degrees. Ultra Low Sulfur Diesel must be used in conjunction with the DPFs in order for them to work effectively. Unit costs for a DPF are approximately $7500 to $9000 installed. Also a maintenance plan must be implemented for DPFs to periodically clean the units at an additional cost.

DPFs are manufactured by several different companies and can be used in a variety of applications. DPFs can remove approximately 80% to 90% of particulate matter from the exhaust stream. Performance of the DPF can be relatively ensured if the device went through the USEPA or CARB verification process. Drawbacks of the DPFs are that the duty cycle of the engine must be evaluated prior to installation. A duty cycle is an evaluation of how the vehicle operates on a day to day basis. The duty cycle evaluation would include, but not be limited to, how many stops the vehicle makes in a typical day and/or how long the engine is under full power in a typical day. The duty cycle mapping is needed to identify the engine’s operating temperature, which in turn determines whether a DPF can be used. The engine temperature must be high enough to oxidize the trapped PM and regenerate the catalyst. Otherwise, the DPF will not function properly and will eventually clog and cause engine failure. DPFs must also be installed with a backpressure monitor (included in the unit price listed above) to ensure the filter is not clogging, thus preventing engine damage.
A DOC is a device that is attached to the exhaust system of a diesel engine that is designed to break down pollutants in the exhaust stream into less harmful components. The DOC has a porous ceramic honeycomb structure that is coated with a precious metal and/or metal oxide. The metal coating acts as a catalyst to oxidize the hydrocarbon portion of the particulate matter in the exhaust. Although it is less efficient in particulate matter removal than a DPF, there are minimal costs in terms of maintenance; essentially it is an “install and forget” technology. It is preferred that the DOC be used in conjunction with Ultra Low Sulfur Diesel for additional PM reduction, however it can be used with conventional diesel fuel (500ppm sulfur content). Typically, PM reductions using current highway diesel fuel would be approximately 25%-40%. Unit costs for a DOC are approximately $2000 to $3000 installed.

The DOCs and DPFs are proven technologies. A wide variety of DOCs and DPFs are produced by several manufacturers and have been customized for various applications. If a DOC or DPF has been verified by the USEPA or the California Air Resources Board (CARB) the purchaser of these products can be assured of their performance, if the device is used under the specified operating conditions and on the specified engine type. The workgroup would recommend DOCs be deployed on a large, fleetwide basis, due to the low unit cost and ease of maintenance. Although there is only 20% to 30% PM removal on an individual DOC, the aggregate PM removal over a large number of buses would be significant. DPFs could be deployed on a more limited basis, for example, either a demonstration project or deployed on a limited number of vehicles.

- **Emission control equipment for engine: Closed Crankcase Ventilation Filtration Systems**
  A closed crankcase ventilation system allows crankcase blow-by emissions to be recirculated into the combustion chamber after being filtered by a device installed between the engine breather port and air intake system, rather than being exhausted to the outside air or in some cases, partially exhausted into the vehicle’s interior. Crankcase emission reduction is important because studies have shown that crankcase emissions are getting trapped in the vehicle’s interior. This could be problematic in school buses where children, an especially sensitive population to diesel exhaust, are exposed to these emissions. Closing the crankcase and returning blow-by emissions to the combustion chamber will prevent the release of crankcase emissions into a vehicle’s interior. This technology can reduce total PM emissions by approximately 10%. Typically this technology is used in conjunction with a DOC and DPF for enhanced PM reduction.

- **Biodiesel**
Biodiesel is a fuel that is derived from common crops, such as soybean and other oilseed crops. Biodiesel can also be produced from waste grease which are yellow and brown grease. Yellow grease is spent cooking oil and brown grease is collected from grease traps in commercial, industrial or municipal sewage facilities to separate grease and oil from wastewater. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with few, if any, modifications. Biodiesel is simple to use, biodegradable, nontoxic and essentially free of sulfur and aromatics. The typical blend of biodiesel available is B20, which is a blend of 20% biodiesel and 80% conventional diesel.

It was originally thought that using biodiesel would increase NOx emissions but recent studies have shown conflicting results. The EMA explained that there are some new test on in-use vehicles that appear to show that NOx does not increase, however there are other recent tests that show a larger increase in NOx when ULSD fuel is used. There is no current understanding or reconciliation of these different results, but the EMA suspects that the NOx increase may be related to duty cycle and how the engine is operating. The EMA supports the use of blends up to 5% (B5) and notes that the recently signed federal energy bill allocates $25 million to the National Biodiesel Board to further study the effects of biodiesel on the new 2007 engines which use diesel particulate filters. There are PM reductions (10-12%) and fuel savings associated with biodiesel, however there may be storage problems with biodiesel blends in cold weather climates. Currently the Federal Government is subsidizing the use of biodiesel at the rate of a dollar per gallon as a blenders' tax excise credit.

The group recommends that the state take steps to make biodiesel commercially available statewide (or at a minimum create a biodiesel corridor along a major thoroughfare such as the NJ Turnpike). As an example, Minnesota recently passed a law requiring that all diesel sold in the state be B2 (2% biodiesel). Finally, the group recommends that the NJBPU continue to fund the difference between biodiesel and diesel, not just for the public sector, as they do currently, but for the private sector as well.

**Hybrid Power Train Technology**

This technology works best in "stop and go" applications, such as short haul delivery trucks and refuse trucks. UPS and FedEx have been experimenting with this technology with good results, including a 10-15% fuel savings. NJDEP should investigate whether it has the authority to require that all fleet owners purchasing new vehicles buy a certain percent of hybrids or alternatively fueled vehicles, similar to the existing mandate for state vehicle purchases. A similar, recent requirement imposed by the South Coast Air Quality Management District can be used as a model. However, the EMA notes that NJDEP is pre-empted by the Clean Air Act from imposing such a
They further assert that any new diesel vehicle already has to emit near-zero emissions limits and therefore there is essentially no air quality benefit to be gained from hybrids as opposed to traditional diesels. Rather, the benefit will be in fuel savings and conservation rather than explicit emissions reductions.

However there is a large initial capital cost of these engines and associated costs to train and equip mechanics to maintain these engines. NJ Transit believes that there is no payback even with a 20% fuel savings, however this will probably change given the sharp increase in fuel prices and the new 2007 engine emission standards.

This particular technology is attractive because it is a fuel savings strategy as well as emission saving strategy. Two more widely used versions of hybrid power come in the form of hydraulic or electric. One type of hybrid, known as a parallel hybrid, has a fuel tank, which supplies gasoline to the engine. But it also has a set of batteries that supplies power to an electric motor. Both the engine and the electric motor can turn the transmission at the same time, and the transmission then turns the wheels. In another type of hybrid, known as a series hybrid, the gasoline engine turns a generator, and the generator can either charge the batteries or power an electric motor that drives the transmission. Thus, the gasoline engine never directly powers the vehicle. Hydraulic Hybrid vehicles are currently in the demonstration project stage. Basically a hydraulic system is employed to store energy during the braking process. The stored energy is then used to help propel the vehicle during acceleration. The workgroup recommends that further research and deployment of hybrid vehicles is either made mandatory or carry favorable incentives to get them further into the marketplace. Currently, it appears that electric hybrids are making inroads to the marketplace on a limited basis. If tax incentives, grants or low interest loans are available to make hybrids more affordable to consumers, this would spur further development and subsequent improvement of the hybrid engine.

- **Auxiliary Power Units (APUs)**
  An APU is a small engine that is mounted on the truck chassis and can power the HVAC along with any smaller electrical appliances while the truck engine is off. This strategy will save fuel, since these motors burn much less fuel than a typical truck engine at idle. Also wear and tear is saved on the truck motor due to decreased idling. APUs come in a variety of configurations with could power all or some of the truck’s HVAC and electrical systems. Although expensive, they would pay for themselves in the long run in fuel and maintenance costs. There is a weight penalty associated with the installation of an APU, but the recently signed federal Energy Law allows an additional 400 pounds if it is dedicated to an auxiliary power source. There is also a large initial capital expense involved.
The workgroup recommends financial incentives to deploy APUs or other on-board idle reduction technologies due to their versatility for the long haul trucker. Although there is a weight penalty associated with the on-board APU, a trucker can stop anywhere and power all of his/her HVAC and electrical appliances without idling. Increased enforcement in combination with a tightening of the existing idling standards would force this technology to become more prevalent on New Jersey trucks.

- **Truck Stop Electrification (TSE)**
  This is a system employed at truckstops where electrical and/or HVAC is provided to the truck from an outside, stationary source. Fuel and maintenance savings are realized since the truck no longer has to idle. Currently two companies are at the forefront of this technology: IdleAire and Shurepower. The IdleAire™ system employs a large, flexible tube with a hatch like cover over the end of the tube. The end of the tube is installed in one window of the truck cab with an adaptor. When the hatch is opened, heated or air conditioned air flows into the cab of the truck. The inside cover of the hatch has a small screen with a keypad. The truck driver can access the Internet or watch movies on this screen. The Shurepower™ system is a pedestal equipped with electrical outlets. With a properly configured truck, the truck's electrical and HVAC system can run right off the pedestal without the truck idling. Shurepower can retrofit a truck with various HVAC and electrical equipment if the truck is not properly configured. The workgroup recommends TSE because is another option for not idling the truck engine. This option may be more attractive to the short haul trucker given there is no weight penalty or large capital expense as with an APU. However, they are less versatile due to the fact that there are a limited amount of TSE facilities throughout the country. In the future, the TSE facilities should increase in number and become more widely available to the long and short haul trucker.

Non-Technology Strategies:
- **Driver incentive/training program to reduce idling**
  As a habit, a large number of truck drivers constantly idle their engines on the assumption that it is necessary for proper operation. The conventional thinking of some truck drivers is that the truck must constantly be running for proper operation, or if it is shut down, it may not restart, especially in colder climates. In older diesel engines that employed glow plug technology this may have been true. But modern diesel engines, with electronic ignition systems, do not have this problem.

  In order to change the conventional thinking of drivers, one way is to start with new drivers. As part of Commercial Driver's License training, make anti-idling practices part of the training program. The fact that idling burns about a gallon of fuel per hour and also adds to wear and tear on the engine should also be emphasized to truck drivers during training and throughout their careers.
Driving methods that would save fuel, such as reduced speed and various braking methods could also be part of the commercial driving program.

In conjunction with this program, a public outreach program to promote anti-idling and its associated health issues and fuel savings issues should be implemented. This public outreach should include posting signs in strategic areas, such as truck stops and fuel stations. The workgroup recommends this strategy because it would be relatively easy and inexpensive to implement, if new drivers can be trained not to idle, this training would hopefully be carried out throughout the driver’s career. The driver should be taught how much of cost savings could be realized by either utilizing an APU; TSE or just engine shut down. This monetary incentive would be the best type of training retention.

- **Publicize the process for reporting excessively smoking vehicles.**
  An excessively smoking vehicle is a nuisance as well as a health risk to any else sharing the road. If reporting such a vehicle to the authorities was an easy and well known process, this would be brought to the attention to law enforcement much sooner. Thus the concern for being a target to law enforcement may encourage the owners of the smoking vehicles to get their vehicles fixed sooner. It is the belief of the workgroup that many more motorists would complain about smoking vehicles if they were more familiar with the reporting process and knew that there would be an official response to their complaint. A more intensive public outreach program, in cooperation with State and Local Police would have to be implemented in order for this strategy to be effective.

- **Bring roadside opacity checks into the cities**
  Currently, roadside inspections of heavy-duty diesel vehicles are performed by the State Police in cooperation with the NJ Motor Vehicle Commission and NJDEP, and are targeted at heavily smoking vehicles. These inspection points are typically set up on interstates. Setting up inspection points in cities would enable us to identify violators (such as local delivery trucks) which are often missed by the current program. The downside is that space constraints on small urban streets may limit the potential locations for checkpoints. In addition, the cooperation and resources of the state and local police would be required.

- **Expand the idling enforcement to local police**
  The recently signed NJ Diesel Law allows local police to enforce the NJDEP’s anti-idling laws on both public and commercial property. This will greatly expand the enforcement of these laws far beyond the NJDEP’s capabilities, travel and time constraints, due to the fact that the local police would have a much more intimate knowledge of their municipality than a NJDEP official who is not from that municipality. This intimate knowledge may include certain “hot spots” where motorists or trucks tend to park and idle. The workgroup’s position is that the enforcement of the idling laws by the local
police is crucial for many of these PM reduction strategies to be effective. Workshops or some other outreach program to get the police familiar with the idling rules should be implemented in order for proper enforcement to occur. However, the NJ Motor Truck Association is concerned about the police's ability to properly enforce the regulations and also fears that local police may abuse this new authority, even if properly trained.

• **Phasing out the sleeper berth exemption**
  Long haul truckers are required to rest 10 hours for every 12 hours on the road. Since the truck engine powers the heating, cooling and any electrical appliances on the truck, the driver often idles the engine in order to power this equipment.

  It is understood that without the deployment of the various technologies mentioned above, there is no way for the driver to operate the HVAC and electrical equipment in his or her truck without the engine running. However, in the near future technologies that provide an alternative to idling, such as APU's and on-board heaters are becoming more widely available. The workgroup recommends that in order for these various idling and fuel savings technologies to be more widely used, the NJDEP must tighten (by removing the sleeper berth exemption) and more aggressively enforce the idling regulations. Several states have already phased out the sleeper berth exemption. The trucking industry opposes this recommendation because they believe it may affect a driver's ability to get a good nights sleep. In addition, they believe that the problem will correct itself as more on-board technologies penetrate the market.

• **Targeted enforcement in non-attainment areas**
  This strategy would result in emission reductions being achieved in the areas that need it the most. Typically, these non-attainment areas would be concentrated in urban, environmental justice areas. This strategy would go in conjunction with phasing out the sleeper berth exemption and increasing local police enforcement of idling laws. The workgroup believes that this strategy would have favorable environmental justice impacts due to the fact that many of the areas in the State of NJ in non-attainment are in urban, environmentally challenged areas. An additional tool that could be used in this effort could be the use of remote sensing to detect localized “hot spots” of areas with high emissions. Thus law enforcement could be directed to that particular “hot spot”.

• **Emission Reduction rules regarding Diesel Powered Transportation Refrigeration Units (TRUs).**
  TRUs are refrigerated trailers or “reefers” which require a small motor to power the refrigerator. Although not a large emission problem unto themselves, when concentrated at truckstops and ports, the emissions become a concern. It is so much of a concern in California that in December
of 2004, CARB approved the Airborne Toxic Control Measure (ATCM) for Diesel Fueled Transport Refrigeration Units and TRU Generator Sets and Facilities where TRUs operate. The TRU ATCM is designed to use a phased approach over 15 years to reduce the PM emissions from in-use TRU and TRU generator set engines that operate in California. The workgroup suggests that the NJDEP adopt California's standards or work on similar measures (although EMA noted that it is their opinion that New Jersey can only opt in to the CA regulations and cannot independently adopt any requirements on TRUs). The Port Authority noted that the major terminal operators at its port “plug in” TRUs staged in their yard, thereby shutting down the TRU engines.
NON-ROAD SOURCES
MOST PROMISING STRATEGIES

Technology Strategies: Construction Vehicles/Equipment
This subgroup recommends that the NJDEP focus primarily on voluntary programs and incentives to encourage equipment owners to apply the technology based strategies listed below. The subgroup recommended that financial incentives such as Supplemental Environmental Projects (SEPs) and federal or state grants and tax incentives be offered to targeted fleets in urban areas. The list of technologies below is not all inclusive as there are many other strategies, such as low pressure exhaust gas recirculation and filters with lean Nox catalysts that have been verified by USEPA and/or CARB to achieve significant PM as well as NOx reductions.

- Emission control equipment for tailpipe such as Diesel Oxidation Catalysts (DOCs) and Diesel Particulate Filters (DPFs).

  Emission control equipment such as Diesel Oxidation Catalysts (DOCs) and Diesel Particulate Filters (DPFs) are highly recommended. The DOCs and DPFs are proven technologies, although some adjustments are required to install them in the wide variety of nonroad construction equipment. DPFs are installed in place of the engine muffler and collects the particulate matter from the exhaust. The particulate matter is trapped and accumulates within the filter, but is then removed from the filter by oxidation. Oxidation is basically a “burning off” of the particulate matter, which occurs at a temperature of approximately 380 degrees. Ultra Low Sulfur Diesel must be used in conjunction with the DPFs in order for them to work effectively. Unit costs for a DPF are approximately $7500 to $9000 installed. Also a maintenance plan must be implemented for DPFs to periodically clean the units at an additional cost.

  DPFs are manufactured by several different companies and can be used in a variety of applications. DPFs can remove approximately 80% to 90% of particulate matter from the exhaust stream. Performance of the DPF can be relatively ensured if the device went through the USEPA or CARB verification process. Drawbacks of the DPFs are that the duty cycle of the engine must be evaluated prior to installation. A duty cycle is an evaluation of how the vehicle operates on a day to day basis. The duty cycle evaluation would include, but not be limited to, how many stops the vehicle makes in a typical day and/or how long the engine is under full power in a typical day. The duty cycle mapping is needed to identify the engine’s operating temperature, which in turn determines whether a DPF can be used. The engine temperature must be high enough to oxidize the trapped PM and regenerate the catalyst. Otherwise, the DPF will not function properly and will eventually clog and cause engine failure. DPFs must also be installed with a backpressure monitor (included in the unit price listed above) to ensure the filter is not clogging, thus preventing engine damage.
A DOC is a device that is attached to the exhaust system of a diesel engine that is designed to break down pollutants in the exhaust stream into less harmful components. The DOC has a porous ceramic honeycomb structure that is coated with a precious metal and/or metal oxide. The metal coating acts as a catalyst to oxidize the hydrocarbon portion of the particulate matter in the exhaust. Typically, PM reductions using current highway diesel fuel would be approximately 25-40%. Unit costs for a DOC are approximately $2000 to $3000 installed.

Like the DPF, the DOC is a proven technology that is manufactured by several different companies, which can be used in a variety of applications. If the DOC has gone through the CARB or USEPA verification process, its effectiveness can be assured, if is used in the specified engine and application. Although it is less efficient in particulate matter removal than a DPF, there are minimal costs in terms of maintenance. Essentially it is an “install and forget” technology. It is preferred that the DOC be used in conjunction with Ultra Low Sulfur Diesel for additional PM reduction, however it can be used with conventional diesel fuel (500ppm sulfur content).

The DOCs and DPFs are proven technologies. A wide variety of DOCs and DPFs are produced by several manufacturers and have been customized for various applications. The workgroup would recommend DOCs be deployed on a large, fleetwide basis, due to the low unit cost and ease of maintenance. Although there is only 20% to 30% PM removal on an individual DOC, the aggregate PM removal over many pieces of equipment would be significant. DPFs could be deployed on a more limited basis, for example, either a demonstration project or deployed on a limited number of vehicles.

- **Idle Reduction Technologies.**
  Idle reduction technologies that shut engines off after a set period of time have already been included on new onroad and some nonroad equipment. This is a readily available technology that will reduce PM and save fuel. The cost of this technology may be significant, but could be required on only new equipment to reduce retrofit costs.

**Non-technology strategies: Construction Vehicles**

- **Outreach and education for construction operators.** Construction vehicles have extremely high idle rates compared to onroad vehicles, and a driver training program is an important tool to begin to educate construction vehicle operators. This training could be part of whatever kind of formal training is required for these operators. Outreach is an inexpensive way to educate construction vehicle operators, supervisors and construction companies and will result in fuel savings and reduced engine maintenance.
• **Provide incentives for low/ultralow fuel use.**
  A simple, easy to implement strategy to reduce PM would be to provide incentives to switch from offroad diesel fuel (3000 ppm sulfur) to low or ultralow sulfur fuel. This requires no engine modification or retrofits. The new diesel legislation requires that nonroad vehicles begin use of ULSD in 2007, but incentives to begin using it once it is widely available in 2006 would provide an immediate reduction in PM.

• **Mandatory contract provision requiring retrofits on construction equipment.**
  The use of mandatory contract provisions in state contracts could be a technology-forcing tool and could demonstrate the use of emission control equipment on nonroad vehicles. This concept should be implemented carefully, since if used as a preference tool in awarding contracts, it may hurt smaller contractors who are unable to overcome the initial investment hurdle and end up being excluded from bidding on contracts. A compromise would be to award additional points during the contract review process to companies that use retrofitted equipment.

**Technology strategies: General Port**
There are no technology strategies rated as “most promising”, due largely to the fact that the PANY/NJ’s terminal operators have been implementing new technologies as they become available, often as yard equipment reaches its useful life. Most improvements of this type are cost-effective for the terminal operators. As time goes on and more costly methods of PM reduction become necessary, government incentives or aid may be appropriate. Conversely, financial incentives may prove worthwhile in order to entice terminal operators to scrap vintage equipment before reaching the end of its useful life.

**Non-technology strategies: General Port**
• **Scrapage program for old yard equipment.**
  Some PANY/NJ tenants are modernizing their cargo handling equipment fleets (non-road engines) by ordering new yard pieces equipped with currently available, pre-2007 onroad engines. This is being done without any upfront financial subsidies to determine if the resulting improvements in efficiency make it a cost-effective strategy. NJDEP should consider providing financial incentives to tenants at PANY/NJ facilities to expedite their scrappage programs. In addition, NJDEP should consider offering financial incentives to undertake this type of program at the Camden port which would result in localized PM reductions in an environmental justice region.

• **Incentives/regulations to use low sulfur or ultra low sulfur fuel for yard equipment.**
  Some PANYNJ tenants are already using low sulfur fuel for yard handling equipment, but use of low or ultralow sulfur diesel fuel at the Camden Port would result in localized benefits. Allowing the port to generate emission
credits that it could later use as offsets to meet general conformity or transportation conformity requirements is a potential tool that should be considered. This strategy is rated as “most promising” due to relative ease of implementation.

- **Electronic gate/computer scheduling at port (voluntary effort by terminal operators)**
  An electronic gate and scheduling system is being installed at one shipping terminal in PANYNJ and it includes security screening, driver identification, load confirmation, and various related functions. This system will dramatically improve overall efficiency and security and reduce idling time. Estimates show a 50-75% reduction in time spent dropping off and picking up loads. Capital costs associated with installation are high but are considered cost-effective by terminal operators, so this strategy should be a largely voluntary effort with encouragement from the state and PANYNJ.

- **Crane electrification (voluntary effort by terminal operators and PANY/NJ)**
  This strategy is being voluntarily implemented due to improvements in efficiency that make it cost-effective for business. There is an associated cost to install infrastructure needed to support electrification of cranes. Again, this strategy is “promising” and should receive encouragement and support from the state and PANYNJ.

**Technology strategies for Rail**

- **Idling reduction for train engines**
  There are many idle reduction technologies commercially available that will produce fuel savings, emission reductions and reduced engine wear. These include gensets, fuel-fired heaters and Smartstart. The choice of technology is a function of how the engine is used (switch locomotives, freight or passenger). The group recommends that NJDEP investigate its legal authority to implement and enforce an idling limit for trains, which would serve as an incentive to use these technologies.

  It might be possible to develop a requirement similar to NJ’s idling requirement for vehicles that would prohibit idling of locomotive engines for more than a specified time period with certain exemptions. “Wayside” power or plugin power is available at many rail yards and is becoming cost effective as the price of fuel escalates.
• **Expanded use of dual mode diesel/electric engines.** These engines are currently in use on Metro North and the LIRR, with the diesel engine being shut off when entering congested areas. These engines are being studied by NJTransit, but efforts to encourage and possibly provide partial funding for their use would result in targeted PM reductions in urban areas.

• **Incentives for purchase of hybrid electric locomotives such as Green Goat**
  The Green Goat Hybrid Locomotive is a hybrid switcher locomotive that provides substantial environmental benefits and never runs under idle. The Green Goat employs a small internal-combustion engine, generator, batteries (336 cells) and electric motors. A small diesel-alternator charges the batteries only when necessary. The generator is Tier II certified and will be Tier III certified in September or October. A diesel switcher locomotive spends 80% of its time idling; the Green Goat does not idle. The Green Goat battery rack is rated equivalent to a 2000 hp locomotive used in switching service and provides a low-speed duty cycle similar to a switcher locomotive. Although the batteries add weight to the unit, this is actually an attractive quality for locomotives by reducing slippage and adding pull power. In addition, the batteries are associated with low noise level, no oily exhaust emissions and significant reduction in fuel use. The maintenance down-time of the Green Goat is significantly less than a diesel switcher. NJ Transit conducted a demonstration of the Green Goat which showed a maintenance downtime of 12 man-hours versus 90-200 man-hours for a typical diesel unit. The environmental benefits include an approximate 80 - 90% reduction of both NOx and diesel particulates. Fuel usage can be reduced by 40 -80%, with a corresponding reduction in greenhouse gas emissions.

  Shortcomings associated with the Green Goat are that it is limited in its loading capabilities and cannot be used for long haul use. Although the Green Goat has been tested in demonstration projects, the lifespan of the batteries is uncertain and a Green Goat has not been fully implemented into a railyard to get a full test of its limitations. Union Pacific Railroad in California has ordered 10 Green Goats to operate in its Southern California rail yard operations with delivery expected by early 2006. The purchase is part of their emission reduction goals associated with the Memorandum of Understanding with the California Air Resources Board (CARB) and the BNSF Railway.

**Technology strategies for Airports**

• **Electrify airport ground support equipment.** Many types of airline owned and operated ground support equipment can be electrified, as has been done at Dallas/Fort Worth airport. In addition, California's South Coast Air Quality Management District has asked airlines to convert 30% of their equipment to electricity by 2010 and Southwest Airlines has responded by agreeing to convert 98% of its equipment. Considering that STAPPA and ALAPCO withdrew from the USEPA/FAA stakeholder process to develop a voluntary
emission reduction program for the aviation sector, it is incumbent on the individual states to take aggressive action to pursue cost effective reductions from this sector. The cost of electrification could be offset with financial incentives such as SEPs. If NJDEP has sufficient authority, it can consider rules to require airlines to install electric infrastructure and purchase new electric ground support equipment, however more research into legal authority is needed. Absent direct legal authority, the port should consider this as a lease requirement, especially since many of the airlines' 20 year leases are coming up for renewal. The EMA noted their legal opinion which is that New Jersey is pre-empted from placing any requirements on these non-road mobile sources and thus cannot require electrification or purchase of hybrid or alternative fuel vehicles.

- **Diesel/electric shuttle buses at airport**
  The transit style diesel buses used at Newark airport (and owned by the airlines) are all 12-24 years old and nearing the end of their service life. These should be replaced with 2007 compliant diesel/electric engines, since these buses are a significant source of PM and NOx emissions. Funding for replacement may be available from an FAA program called VALE (Voluntary Airport Low Emissions), which provides funding to offset incremental costs for acquisition of low emissions equipment. VALE is limited to publicly owned vehicles or fire/snow/groundskeeping equipment, so other sources of funding such as penalty settlements could be used for buses.
• **Finalize the proposed (July 11, 2005) New Source Performance Standards (40 CFR 60, 85, 89, 94, 1039, 1065 and 1068).**

These federal standards are being revised to align stationary source engines with nonroad diesel engine standards (see chart in Attachment 4). The proposed rule also applies to stationary non-emergency diesel engines and emergency generator engines. Every new stationary engine will be required to meet Tier 1, 2, 3 or 4 starting in 2007, depending on engine size. This change will require smaller generating units to obtain an air permit that includes emission limitations, monitoring, recordkeeping and possibly reporting requirements. Therefore, reductions in PM2.5 and NOx would be quantifiable and verifiable.

• **Amend NOx rules (N.J.A.C. 7:27-19) to require that all permitted generators use ULSD fuel by 2007.**

This strategy is associated with quantifiable and verifiable reductions in PM and NOx. A benefit of this strategy is that it does not affect the performance of the equipment and is a strategy being investigated or implemented in other States. In addition, a permittee may need to use ULSD fuel for the control technology required to meet N.J.A.C. 7:27-19 or State Of The Art (SOTA). The only disadvantage of this strategy is that the existing regulation only applies to sources with a maximum heat input equal to or greater than 1,000,000 BTU per hour. This captures approximately 3700 permits however there are potentially thousands more sources that are less than 1,000,000 BTU per hour whose emissions could be reduced through use of ULSD. Amendments to N.J.A.C. 7:27-8.2 and 19 have been proposed that will capture more of this population.

The amendments will be published in the NJ Register on October 17, 2005. The amended rule N.J.A.C. 7:27-8.2 requires equipment 37 KW or greater to apply for a permit. It is impossible to estimate the number of generators this amendment will capture. The background document to N.J.A.C. 19 estimates non emergency generators greater than 50 hp and less than 200 hp, at existing major facilities, as 120 units total and subject to the requirements of amended N.J.A.C. 19. Emergency generators are not subject to revised emissions limits in N.J.A.C. 7:27-19 but are subject to new recordkeeping requirements. ULSD may be required, not specifically by the rule, but by permits issued with NOx control technologies which warrant its use.

Emissions benefits of amended NOx RACT rule published on October 17, 2005 are as follows:
• ICE boilers and other indirect heat exchangers - revised requirements for boiler tune ups results in 6.5 Tons per day reduction based on 25% reduction in NOx. A 1.0 tons per day NOx reduction is expected by retrofitting >100 MMBTU/hr boilers with modified low NOx or new burners.

• Stationary Combustion Turbines - Additional NOx controls required by amended N.J.A.C. 7:27-19 for turbines greater than 25 MMBTU/hr is 1.2 Tpd.

• Stationary Reciprocating Engines - 82 generators powered by reciprocating engines in the state at major NOx facilities are expected to reduce NOx by 3.7 Tpd by meeting the requirements of amended N.J.A.C. 7:27-19.

• **Modify the General Permit Requirements for Emergency Generators to require the use of ULSD for new sources.**
  The revision could provide an incentive to use ULSD by decreasing the amount of monitoring and record keeping requirements in the General Permit. This would also be consistent with the ULSD fuel requirement in the General Permit for non-emergency generators. This change would not require a rule change. This also has quantifiable and verifiable reductions of PM2.5 and NOx. The negative to this would be conflicting requirements between newly issued permits and the existing ones. This would ultimately resolve itself through the renewal process.

• **Biodiesel (mixtures with 20% or less)**
  There are some concerns with the stability, gelling and reduced lubricity of biodiesel. However, biodiesel mixtures of less than 20% do not exhibit these problems. In addition, unlike mobile sources, stationary engines can adjust their fuel-to-air ratio or the engine timing to ensure that NOx emissions do not increase. The position of the Engine Manufacturers Association (EMA) is to support the use of biodiesel up to 5% blends, with no affect on the engine warranty if the biodiesel blend meets the diesel fuel specification. The workgroup recognizes that there is a limited infrastructure in place to make the fuel in the Northeast. However, continued federal tax credits or subsidies make them worthy of consideration.

VIII. **White Papers Submitted from Individual Members of the Workgroup**
See Attachments 6-9

IX. **List of attachments**

Attachment 1: List of workgroup members
Attachment 2: Meeting minutes
Attachment 3: Strategy charts
Attachment 4: Requirements for stationary engines
Attachment 5: Mobile Source Inventory Information
Attachment 6: White paper from Burlington County
Attachment 7: White Paper from Environmental Justice Alliance
Attachment 8: Recommendation from NJ Coalition Against Aircraft Noise
Attachment 9: White Paper from Ellen Garvey regarding transit bus strategies
ATTACHMENT 1

List of Workgroup Members

NON-DEP PARTICIPANTS

1. John Adair, NJ Council on Special Transportation
2. Atef Ahmed, Port Authority of NY/NJ
3. Linda Albolino, HydroGen Innovations
4. Rich Albolino, HydroGen Innovations
5. Brett Alkins, Johnson Matthey
6. Charlie Amorosi, NJ Motor Truck Association
7. Angelo Aprile, NJ Transit
8. Robert Belzer, NJ Coalition Against Aircraft Noise
9. Michelle Bicek, Environmental Defense
10. Faye Blondin, US EPA, Region 2
12. Valorie Caffee, NJ Work Environment Council
13. Robert Caputi, HydroGen Innovations
14. Ted Carrington, Thomas Edison State College
15. James Cobb, New York Shippers Association
16. Brian Connors, Chevron Products Company
17. Gary Conover, ACUA
18. Benjamin Cook, TIAX LLC
20. John Damron, Army-Northeast Region IMA
21. Talvin Davis, NJDOT
22. Gregory Dierkers, Center for Clean Air Policy
23. Cheryl Drach, United States Postal Service
24. Dee Ducharme, HydroGen Innovations
25. Grant Ducharme, HydroGen Innovations
26. Michael Egenton, State Chamber
27. John Elston
28. Emi Faloughi, DVRPC
29. Michael Figura, Navy Lakehurst
30. Bob Frank, Compliance Monitoring
31. Carol Fulton, NJ Assoc of General Contractors
32. Kim Gaddy, NJEJ Alliance
33. Jenine Gallo, USACE-NYD
34. Helen Ginzburg
35. Alexander Gorel, STT Emtec
36. Priscilla Hayes, Rutgers
37. Sharon Heller, Port Authority
38. Deena Holland, Mercer County Health Dept
39. Dan Horton, Exxon Mobil
40. Marc Houdashelt, CCAP
41. Bonnie Hulkower, US Army Corps
42. John Hummer, North Jersey Transportation Planning Authority
43. Marty Judd, NJ Transit
44. Steve Jurow, NJ Transit
45. Mike Klewin, NJMVC
46. Steven Levy, Sprague Energy Corp.
47. Don Lotz, Port Authority
48. James Lowry, Freedom Int. Truck
49. Scott Matthews, Trigen-Trenton Energy Co.
50. Jennifer Maund, NCS
51. John Maxwell, New Jersey Petroleum Council
52. Wilbur McNeil, Weequahick Park
53. Kerry Miller, ANJEC
54. Joe Monaco, Port Authority
55. Chris Moog, NJ Transit
56. Gabriela Munoz, NY Academy of Sciences
57. Sandra Neis, NY Academy of Sciences
58. William Nowack, Chevron Asphalt
59. Bill Nurthen, Port Authority
60. Doug O'Malley, NJPIRG
61. Tony Palacios, NJ Transit
62. Judi Parrish, NJDOT
63. Norman Pecan, Waste Management Inc.
64. Helene Pierson, Heart of Camden
65. Lisa Pongnon, Connectiv Energy
66. Stefanie Potapa, NJDOT
67. Glen Reid, Clean Diesel Technologies
68. Kimberly Rightler, US Army Corp
69. Matthew Safer, NJ Transit
70. Antonio Santos, MECA
71. Nicky Sheats, Thomas Edison State College
72. Robert Simkins, County of Burlington
73. Robert Shinn, S2 Concepts
74. Carol Skiba, Councilwoman, Borough of Hasbrouck Heights
75. Brandi Sloss, US Army Corp
76. Ben Smith, NJ Transit
77. Joe Suchecki, Engine Manufacturers Association
78. Gail Toth, NJ Motor Truck Association
79. Art Vatsky, New West Technologies
80. Sandra Valle, NY Acad of Sciences
81. Katie Watson, Watson Consulting
82. David Wetmore, NJ Transit
83. Steve Winkelman, CCAP
84. Mac Wubben, CCAP
DEP PARTICIPANTS
1. Peg Hanna – Workgroup Leader
2. Melinda Dower – Facilitator
3. Ralph Bitter
4. Jeff Cantor
5. Bill Etherington
6. Sharon Davis
7. Bob Marcolina
8. Negib Harfouche
9. Doug Bruckman
10. Willy Davis
11. Serpil Guran
12. Amy Hillman
13. Jim Koroniades
ATTACHMENT 2
Meeting Minutes
Materials:
1. Further information on inventory
2. EPA guidance on incorporating voluntary mobile source measures into SIP

Introduction/Announcements.
1. DEP reminded everyone that the purpose of the workgroup is to develop a menu of control strategies to be submitted to Commissioner Campbell for consideration as the DEP develops its State Implementation Plan. The workgroup will evaluate each strategy based on technical and economic feasibility and environmental and health benefits, but will not eliminate any strategy. DEP will pen the report, but the report will be the voice of the workgroup, not the voice of the DEP writers.
2. DEP distributed a boilerplate chart that will be used for recording each of the strategies discussed.

Discussion


Discussion: None.

Topic 2: Boilerplate template for recording ideas.

Discussion: None.


**Discussion**

See strategy chart for comprehensive list of each item discussed. Specific discussions not captured on the chart are as follows:

1. **E-diesel:**
   - 41% reduction in PM. Registered with EPA, but not "verified" through their mobile source technology verification program or CARBs. Concern regarding multi-media impacts that might be eliminated if go through CARB verification, which includes a multi-media component. Cheaper than diesel and no fuel penalty.
   - Port of Long Beach is using e-diesel with DOCs. Vendor will use data to satisfy "durability" requirement of CARB verification process.

2. **Biodiesel:**
   - Is there any information regarding use of biodiesel in non-road equipment? Atlantic County Utilities Authority reported that it uses biodiesel in its non-road equipment with no problems. In California, some marine vessels are using biodiesel. Go to [www.biodiesel.org](http://www.biodiesel.org) for a list of reports regarding biodiesel.
   - The Port Authority of NY/NJ offered biodiesel to tenants but tenants were reluctant since they're already gearing up for use of ULSD. They also expressed concern regarding voiding the engine warranty. Port representative heard concerns about Nox increase. Most tenants voluntarily use highway diesel (500 ppm sulfur) which has lower sulfur content than non-road diesel (3000 ppm sulfur).
   - DEP mentioned lack of production infrastructure in NJ and questioned whether it was still a viable option.
   - Consensus that we should have biofuels speaker at next meeting.

3. **Idling**

   - Group not sure if non-roads idle out of necessity or habit, although the port believes that idling at its location is mainly out of necessity. At the port, newer non-road equipment is equipped with automatic shut off devices.
   - TIAX suggested looking at West Coast Diesel Collaborative website for additional information: [www.westcoastdiesel.org](http://www.westcoastdiesel.org)

4. **Other categories of non-roads.**

   - DEP mentioned that there are other sizable non-road sources of PM emissions besides construction equipment and suggested that the group may want to consider: AC/refrigeration, commercial landscaping, agricultural tractors, gensets/pumps/compressors.

5. A diesel subgroup that met on July 29 suggested that this subgroup might be interested in reviewing an Environmental Defense publication that summarizes a lot of information regarding non-road retrofits. The link is: [http://www.environmentaldefense.org/cleanairforlife.cfm?subnav=handbook](http://www.environmentaldefense.org/cleanairforlife.cfm?subnav=handbook)

**Wrap-up**

Next meeting is Wednesday, August 17 from 10:00 am to 1:00 pm at a location in northern NJ to be announced shortly. Conference call information is as follows, but keep in mind that there is a maximum of 6 callers allowed:

Call-in # (609) 826-3600  
Bridge # 19205  
Password # 456789
SUMMARY
Prepared by Bob Marcolina

Diesel Initiatives Non-Road Workgroup Meeting
Held August 17, 2005 from 10:00-1:00
Meeting Location: NJ Regional Planning Agency, Newark
Meeting called by: Peg Hanna
Facilitator: Melinda Dower

Materials:
1. Further information on inventory:
   ♦ Table L-4: Combined Line-haul and switch for the 5 major railroad operations in NJ
   ♦ North New Jersey Commercial Marine Vessels (CMV) emissions and comparison with Port Activity & NJ Inventory
2. NESCAUM/Center for Clean Air Policy report: “Controlling Airport-Related Air Pollution”
3. PM 2.5 Emission Benefits of Diesel Non-road Scrappage Program

Introduction/Announcements.
1. DEP reminded everyone that the purpose of the workgroup is to develop a menu of control strategies to be submitted to Commissioner Campbell for consideration as the DEP develops its State Implementation Plan. The workgroup will evaluate each strategy based on technical and economic feasibility and environmental and health benefits, but will not eliminate any strategy. DEP will pen the report, but the report will be the voice of the workgroup, not the voice of the DEP writers.

Discussion

Topic 1: Ellen Bourbon of the Board of Public Utilities gave a presentation on state efforts to promote biodiesel, its availability, characteristics and use. She stated that most grant money to fund the incremental cost of biodiesel has been spent, but she is actively pursuing other sources of funding.

Discussion: Sprague Energy was asked to confirm the availability of an adequate supply of biodiesel for the state. In a subsequent conversation with Sprague Energy, they have stated that there is an adequate supply of biodiesel.
**Topic 2:** Inventory information on various diesel sources.

**Discussion:** There was some discussion about how emissions are calculated from locomotive fuel use. Jim Koronaides of the Air Planning program explained that any additional data from freight companies would be useful in refining this data and was more than welcome. NJ Transit is a significant source of locomotive emissions, since they travel within state exclusively.

**Topic 3:** Diesel/electric buses at airport

**Discussion:** Participants believed that VALE program funding from the FAA was used to fund diesel/electric buses at Newark airport (this program gives offset credits to offset increases in emissions from flight traffic). Currently, the DEP is working with Newark-Liberty airport to obtain VALE funding to help modernize the parking lot bus fleet. These are transit-style diesel buses that service the airport facilities, mostly for the parking lots, and are apparently all about 12-24 years old and are nearing the end of their service life. The airport would purchase hybrid-diesel electric Orion 7 buses meeting the 2007 standards. The incremental cost of these hybrid buses would be paid for by the VALE funding. Newark-Liberty has to submit a proposal to DEP for the purchase of these buses. This proposal is still pending.

VALE is a pot of funding that can be used to offset incremental costs for acquisition of low emissions equipment. The catch is that the VALE money can only be used on publicly-owned equipment. The ground support equipment at Newark Airport is owned by the airlines. The exceptions are fire/snow/groundskeeping equipment and the buses.

**Topic 4:** Locating trucking warehouse/distribution facilities.

**Discussion:** There was discussion of the need for DEP to support brownfields redevelopment for warehouse/distribution facilities, rather than locate these facilities in areas without infrastructure to support them. While this will result in lower vehicle miles traveled, this raises environmental justice issues as well as economic development issues.

**Topic 5:** Miscellaneous assgts

Bonnie Hulkower to send link to group for article on cold ironing in California.

Faye Blondin to ascertain IMO-SECA status.

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**Wrap-up**

Next meeting is Monday, September 26 at NJTPA from 10:00 am to 1:00 pm. Conference call information is as follows, but keep in mind that there is a maximum of 5 callers allowed:

Call-in # (609) 826-3600

Bridge # 19201

Password # 567890
Diesel Initiatives Non-Road Workgroup Meeting  
Held September 26, 2005 from 10:00-1:00  
Meeting Location: North Jersey Transportation Planning Agency, Newark  
Meeting called by: Peg Hanna  
Facilitator: Melinda Dower

Materials:  
1. Updated strategy chart from 8-17-05 meeting.  
2. Summary from EPA Region 2 of IMO-SECA status.

Introduction/Announcements.  
1. This is last meeting of the workgroup. DEP will update strategy chart based on today's meeting then use it to draft a narrative report which will be submitted to DEP management at end of October. Draft report will be circulated to workgroup participants within next week or two. Reminder that whitepapers are due by Oct 7.

Discussion  
Topic 1: Wilbur McNeil of Weequahick Park Association expressed concern that many of the strategies being discussed are long term and thus insufficient for EJ areas. However, Joseph Monaco of the Port Authority's Port Commerce Department clarified that the Starcrest Cargo Handling Equipment Emissions Inventory indicates that although cargo has increased by 25% between the years 2002 and 2004, overall emissions have decreased by at least one third at the marine terminals during that period. He also clarified that there are many vessel movements within the harbor that have nothing to do with the Port Authority's facilities.

Topic 2: Robert Belzer from NJ Coalition Against Aircraft Noise expressed concern that no one from the airport community was at the table. (Note that a representative from the Port Authority's Aviation Department was represented at this meeting.) The earlier FAA/STAPPA/EPA effort to develop strategies to control airport emissions failed in November 2004 when STAPPA walked away saying that the strategies being developed were inadequate (see attached article and letter). He would like to see an analysis of the emission benefits of the airport related strategies being discussed by this workgroup. He also expressed concern that the Lehigh Valley airport is expanding and the FAA is not including environmental issues in its analysis.

Carol Skiba, Councilwoman from the Borough of Hasbrouck Heights, expressed concern that there is little data on airport PM emissions and mentioned that DEP and Environ are studying Teterboro emissions. She also recommended that the state require Environmental Impact Statements (EIS) when airports, including the general aviation airports on the periphery, are expanding. Although EIS's are a NEPA/Port Authority requirement when expansions are underway, there's debate over whether "upgrades" should also trigger an EIS since upgrades are typically analogous to expansions. EIS's/EA's (environmental assessments) are a requirement of NEPA and are submitted to the FAA for review by the Port Authority as the Airport Sponsor. EA's are done for all projects for which the Port Authority receives federal funding or requires a change to the Airport Layout Plan.

Topic 3: Assignments  
1. Bob Frank suggested looking at DEP Air monitoring data from September 11, 2001 to see impact of airports. Peg Hanna will talk to Charlie Pietarinen, DEP Chief of Air Quality monitoring.
Diesel Initiatives On-Road Workgroup Meeting
Held July 27, 2005 from 10:00-12:00
Meeting Location: DEP, Trenton
Meeting called by: Peg Hanna
Facilitator: Melinda Dower

Materials:
1. Further information on inventory
2. EPA guidance on incorporating voluntary mobile source measures into SIP

Introduction/Announcements.
1. DEP reminded everyone that the purpose of the workgroup is to develop a menu of control strategies to be submitted to Commissioner Campbell for consideration as the DEP develops its State Implementation Plan. The workgroup will evaluate each strategy based on technical and economic feasibility and environmental and health benefits, but will not eliminate any strategy. DEP will pen the report, but the report will be the voice of the workgroup, not the voice of the DEP writers.
2. DEP distributed a boilerplate chart that will be used for recording each of the strategies discussed.

Discussion


Discussion: Question as to whether we compare the monitoring data to the inventory projections for each county. DEP responded that generally we don’t unless there is a red flag, as there is with wood burning stoves. DEP also explained that diesel particulates don’t have a signature per se so it can be difficult to distinguish diesel particles from non-diesel particles. Burlington County mentioned that their data on the number of garbage trucks in the state are different than NJDEP’s data and they will submit their information to NJDEP. DEP distributed an additional chart regarding the on-road inventory, as well as definitions of the different on-road categories.

Topic 2: Boilerplate template for recording ideas.

Discussion: Recommendation that we need to consider the health impacts of each measure. DEP responded that health impacts would be considered under the "environmental benefits" and the "EJ" category. Recommendation that the template be modified to distinguish between local versus statewide measures; mandatory versus voluntary measures; and episodic/seasonal strategies.
Topic 3: Discussion of strategies proposed by the Center for Clean Air Policy and e-mailed to all participants on July 27, 2005.

Discussion: See strategy chart for comprehensive list of each item discussed. Specific discussions not captured on the chart are as follows:

1. Accelerated Vehicle Retirement (AVR) Programs:
   - TIAXX Consulting spoke of their experience in implementing an AVR program in California. Most people participating in the program are independent owners/operators as opposed to fleets. The cost effectiveness is $9000 per ton of Nox removed (assuming a 5 year life of new vehicle) and they are currently working to calculate PM cost effectiveness. The program pays 2/3 the cost of a "newer" truck including tax, license, etc. and they are considering adding retrofits to the "newer" trucks so that the environmental benefits are even greater. Current benefits are 40% Nox and 87% PM reduction per vehicle. Much of the funding for this program comes from a lawsuit settlement with the port. Working to install GPS on replacement vehicles to determine whether they're traveling within the air basin. Pre-84 is the criteria for trading in a truck, but the program may be expanded so that pre-87 are eligible as well.
   - The NJ Motor Truck Association mentioned that the average container movement at the NY/NJ port is 100 miles or less.
   - Question regarding the number of pre-84 vehicles in the state. DEP responded that there were a few hundred. Clarification: Based on information from the diesel inspection and maintenance program, there are approximately 4000 vehicles that are 1984 and older and 450 that are 1974 and older.

2. Mobile Source Credit Trading Program: Would a NJ program have to be EPA approved? DEP responded that it wasn't sure.

3. Biodiesel:
   - CARB is encouraging biodiesel in combination with tailpipe controls and MECA (Manufacturers of Emission Controls Association) put out a call for pilot projects using EPA/CARB verified products in combination with biodiesel.
   - Someone in Texas received a grant to use a fuel borne catalyst in combination with B20 blended with ultra low sulfur diesel.

4. Driver Incentives/Training for idling:
   - Add question regarding idling regulations on Commercial Driver License test.
   - NJ Motor Truck Association recommended a partnership with EPA's Smartway Transport Program, which encourages companies to implement energy efficiency measures.
   - Suggestion to install detailed "No Idling" signs at commercial fueling stations (to target independent owner/operators) and fleet fueling stations.
   - Need to specifically target out of state drivers since they're unfamiliar with regulations so post at truck stops along Turnpike where out of state drivers usually congregate.
   - NJDOT to determine whether we can install signs when enter the state or on electronic message boards above certain roadways. Answer: Initial feedback from NJDOT was that the Welcome to NJ sign is the most appropriate message to convey to motorists entering the state and a No Idling sign is not useful on a highway (it's better suited to a truck stop or other location where vehicles are idling). In addition, electronic message boards are reserved for Homeland Security issues. DEP postscript: DOT has recently approved the use of these signs to convey information regarding bad air quality days.
   - Need incentives for local police to enforce idling. Do locals keep the penalties? DEP wasn't sure. Answer: Yes, the police retain the penalties.

Wrap-up
Next meeting is Wednesday, August 10 at the Burlington County EcoComplex from 10:00 a.m. to 1:00 p.m. Directions can be found at: http://www.ecocomplex.rutgers.edu/about_us_directions.php

Conference call information is as follows, but keep in mind that there is a maximum of 6 callers allowed:
Call-in # (609) 826-3600
Bridge # 19205
Password # 456789
Diesel Initiatives On-Road Workgroup Meeting
Held August 10, 2005 from 10:00-1:00
Meeting Location: Rutgers Eco-Complex,
Burlington County
Meeting called by: Peg Hanna
Facilitator: Melinda Dower

Materials:
1. Revised Chart of On-Road Strategies based on discussions from July 29th Meeting.

Discussion: The discussion was a review of the updated chart on the various strategies to reduce diesel emissions on various on-road vehicles. Additional topics that were discussed included not only ways to reduce diesel emissions directly, but also methods that vehicles could use to save fuel and reduce maintenance intervals, thus indirectly reducing diesel emissions. There were several strategies added to the July 29th chart that would directly reduce on-road PM emissions, such as truck stop electrification, high voltage systems on trucks and mandatory PM reductions in non-attainment areas. Other strategies discussed would decrease fuel consumption, thus reducing PM emissions, such as: wide-based single tires, speed reduction and frictionless braking equipment.

See updated strategy chart for comprehensive list of each item discussed. Specific discussions not captured on the chart are as follows:

- Implement maintenance program for trailer chassis at the port. Typically these chassis are not owned by the trucking companies and do not currently require any type of inspection. As a result these chassis often fall in disrepair in terms of tires, brakes and bearings. Currently the Governor is scheduled to sign a Roadability Bill A-1478 which would require chassis maintenance. This Bill will bridge the gap until a federal mandate is enacted which is scheduled in approximately 2 to 3 years. It was suggested that the tenants at the port form a “chassis pool”, so that the truck driver will only have to go to one location to pick up a chassis and the tenants could pool their resources and centralize a maintenance program for the chassis. A well-maintained chassis would increase fuel mileage and be safer on the roads. Go to the following link for a copy of the legislation:
  http://www.njleg.state.nj.us/2004/Bills/A1500/1478_R1.HTM

- Telma Brake Retarder – An electromagnetic device used in heavy duty diesel applications where there is a lot of stop and go operation, such as transit buses and refuse trucks. The device assists the trucks existing braking system, saving money on brake maintenance and replacement. Waste Management installed some at cost of $8000 each, but they expect to break even in less than 5 years because they’re tripling their brake life.
• Automatic tire inflation - Gail Toth will try to get additional information on this strategy. Also look at the following link:  www.tireinflation.com/html/design/howdoesitwork.html

• Wide based tires - Look at the following link for more information: http://www.epa.gov/smartway/documents/supersingles.pdf

• Hybrid vehicles - NJ Transit has 7 hybrids which have shown 20% fuel savings (~$4000 per year per vehicle) and average reliability. Maintenance is problematic but can be solved with better engineering. Hybrids were $100,000 more than diesel bus. Even though fed govt contributed 80% cost share, the payback period is not sufficient to justify wide scale purchase. EMA stated that the emission benefits from a hybrid are negligible compared to 2007 vehicles which are near zero emission vehicles. NJDEP pointed out that the improved fuel economy will produce emission benefit even when compared to 2007 vehicles.

• Mobile Source Credit Trading - Require stationary sources to offset emission increases or comply with new, more stringent permit limits by reducing emissions from their mobile fleet. Should require that certain percent of credits generated be retired or offset ratio be >1:1 in order to ensure environmental benefit. Europe has a trading program for CO2. Netherlands are investing $200 million per year in reducing greenhouse gases 6% below 1990 baseline, and are also devaluing credits by 20%. Perhaps we can piggyback on NJ's Regional Greenhouse Gas Initiative (RGGI).

• Automatic engine shutoff systems on buses to prevent excessive idling. This would be effective but can be defeated by increasing engine RPMs in idling mode. Much public objection because the public wants to step into a temperature controlled bus. NJDEP will send information to NJ Transit regarding proposed changes to existing idling regulations.

• Utilizing the cameras that exist at the tollbooths to possibly photograph excessively smoking vehicles. The difficulty is that the exhaust pipe in medium duty and light duty trucks could be located in various places throughout the vehicle, thus photographing the smoke could be problematic. Also the tractor license plates on heavy duty vehicles could be difficult to read due to their placement on the truck and the ever present dirt and grime that partially conceals the license plates.

• Trucks pay proportionately more in tolls than cars do; for example trucks on the NJ Turnpike pay approximately 30% of the tolls, but only make up approximately 10% of the traffic. Therefore, some of these funds could be dedicated to a truck HOV lane in an attempt to relieve congestion.

• Increase the infrastructure for natural gas for use as an alternative or dual fuel for heavy-duty vehicles.

• Making South Jersey part of the Philadelphia Clean Cities Program. This would make certain bus fleets eligible for grant monies for retrofits.

• Work with the Department of Education on strategies to reduce diesel emissions on school buses.

• Utilizing remote sensing to find PM and haze “hot spots” throughout the state, then focus enforcement activities or PM reduction strategies in those areas. (An alternative is for DEP to develop criteria for defining hot spots.) Information from diesel inspection centers not necessarily indicative of hot spots because trucks inspected at that location don't necessarily drive in that location. Burlington County rep thought there had been some work on satellite imagery to show hot spots (just like NARTSO did for ozone). NJDEP and Burlington County will try to get additional information.

Wrap-up
Final meeting is Tuesday, September 13th from 10-1 at the NJ Department of Transportation Building in Ewing. We will be meeting in Training Room B on the 2nd floor of the E&O building (Directions were sent out previously).
Diesel Initiatives Stationary Workgroup Meeting
Held July 29, 2005 from 1:00-3:00
Meeting Location: DEP, Trenton
Meeting called by: Peg Hanna
Facilitator: Melinda Dower

Materials:
1. Further information on inventory
2. EPA guidance on incorporating voluntary mobile source measures into SIP

Introduction/Announcements.
1. DEP reminded everyone that the purpose of the workgroup is to develop a menu of control strategies to be submitted to Commissioner Campbell for consideration as the DEP develops its State Implementation Plan. The workgroup will evaluate each strategy based on technical and economic feasibility and environmental and health benefits, but will not eliminate any strategy. DEP will pen the report, but the report will be the voice of the workgroup, not the voice of the DEP writers.
2. DEP distributed a boilerplate chart that will be used for recording each of the strategies discussed.

Discussion


Discussion: The inventory information that was distributed did not break out stationary diesel engines. NJDEP will provide additional information as requested before the next meeting.

Topic 2: Boilerplate template for recording ideas.

Discussion: None

Topic 3: Discussion of potential strategies

Discussion: See strategy chart for comprehensive list of each item discussed. Specific discussions not captured on the chart are as follows:

- Someone questioned the energy density of LNG versus propane. See Table 1 at bottom of these meeting minutes for specific information.
Wrap-up
Next meeting is Tuesday, August 16 in Trenton, NJ at the main NJDEP building from 10:00 a.m. to 12:00 p.m. We'll be in the small conference room (Assistant Commissioner Skacel's conference room) in the 4th floor east wing. Conference call information is as follows, but keep in mind that there is a maximum of 6 callers allowed:
Call-in # (609) 826-3600
Bridge # 19205
Password # 456789

Table 1: Properties of Conventional and Alternative Fuels

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Diesel</th>
<th>Gasoline</th>
<th>Methanol</th>
<th>Ethanol</th>
<th>Propane</th>
<th>CNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Content (MJ/kg&lt;sup&gt;1&lt;/sup&gt;)</td>
<td>42.5</td>
<td>44.0</td>
<td>20.0</td>
<td>26.9</td>
<td>46.4</td>
<td>50.0</td>
</tr>
<tr>
<td>Liquid Density (kg/l&lt;sup&gt;2&lt;/sup&gt;)</td>
<td>0.8-0.88</td>
<td>0.7-2.078</td>
<td>0.792-0.785</td>
<td>0.51-0.4225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Energy Density (MJ/l&lt;sup&gt;3&lt;/sup&gt;)</td>
<td>36.55</td>
<td>33.0</td>
<td>15.84</td>
<td>21.12</td>
<td>23.66</td>
<td>21.13</td>
</tr>
<tr>
<td>Gas Energy Density (MJ/l&lt;sup&gt;3&lt;/sup&gt;) @ Atmosphere</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.093</td>
<td>0.036</td>
</tr>
<tr>
<td>Gas Energy Density (MJ/l&lt;sup&gt;3&lt;/sup&gt;) @ 200 Bar</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>7.47</td>
<td></td>
</tr>
<tr>
<td>Boiling Point, °C</td>
<td>140-360</td>
<td>37-205</td>
<td>65</td>
<td>79</td>
<td>-42.15</td>
<td>-161.6</td>
</tr>
<tr>
<td>Research Octane No.</td>
<td>~25</td>
<td>92-98</td>
<td>106</td>
<td>107</td>
<td>112</td>
<td>120</td>
</tr>
<tr>
<td>Motor Octane No.</td>
<td>80-90</td>
<td>92</td>
<td>89</td>
<td>97</td>
<td>97</td>
<td>120</td>
</tr>
<tr>
<td>Cetane No.</td>
<td>45-55</td>
<td>0-5</td>
<td>5</td>
<td>5</td>
<td>~2</td>
<td>0</td>
</tr>
</tbody>
</table>

<sup>1</sup>MJ/kg=megajoule per kilogram
<sup>2</sup>kg/l=kilogram per liter
<sup>3</sup>MJ/l=megajoule per liter

Source: STAPPA, 1996
Introduction/Announcements.

1. DEP reminded everyone that the purpose of the workgroup is to develop a menu of control strategies to be submitted to Commissioner Campbell for consideration as the DEP develops its State Implementation Plan. The workgroup will evaluate each strategy based on technical and economic feasibility and environmental and health benefits, but will not eliminate any strategy. DEP will pen the report, but the report will be the voice of the workgroup, not the voice of the DEP writers.

2. Serpil Guran of DEP’s Division of Science, Research and Technology gave a short presentation on biodiesel fuel: how it is made, its characteristics, use and availability.

Discussion

Topic 1: There were some questions posed about biodiesel following the presentation.

Discussion: Serpil confirmed that biodiesel is certified as a fuel by EPA for up to 20% biodiesel mixture. There are some concerns with stability, gelling, and reduced lubricity of the fuel, but these don’t seem to be problems for mixtures with 20% or less. There is a pilot project to retrofit stationary generators in Jersey City. Biodiesel is well suited to use with stationary engines because you can reduce the fuel to air ratio or engine timing to control Nox emissions and make sure they don’t go up (can’t do that with mobile engines).

EMA supports the use of biodiesel up to B5, but they still maintain that it increases Nox emissions, especially for mobile sources. There is currently no specification for stability and it gels at higher temperatures so cold starts may be an issue. EMA’s position is that if the biodiesel blend meets the diesel fuel spec then the warranty isn't voided. Don't know effect on 2007 technology such as particulate filters although the recently signed federal energy bill gave the National Biodiesel Board $25 million to study this issue.

Topic 2: Regarding the inventory information labeled "Summary of 2002 major point source emissions from diesel fired units," NJDEP will try to determine how many of those sources are emergency generators and how many of each of these point sources exist.
**Topic 3:** Can we use NJEMS data to see whether there are concentrations of stationary sources in urban areas (which might be an appropriate target for strategies)?

**Discussion:** Doug Bruckman was asked to find out whether NJEMS data can be sorted to identify stationary diesel sources in urban areas.

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**Topic 3: Discussion of potential strategies**

**Discussion:** See strategy chart for comprehensive list of each item discussed. Specific discussions not captured on the chart are as follows:

♦ EPA is aligning New Source Performance Standards (NSPS) for stationary engines with nonroad diesel engine standards. In other words, every new stationary engine has to meet Tier 1 standards as of June 2005, etc. Starting in January 2007, all new stationary diesel engines will have to meet the prevailing and applicable-Tier nonroad emissions standards (either Tier 2 or Tier 3 depending on engine size). Once we reach Tier 4 standards that require aftertreatment, these standards will not apply to emergency generators (presumably too expensive for infrequent use). These standards are not as restrictive as many state requirements.

♦ June 2005 Nox RACT proposal - Doug Bruckman was asked to provide summary of emission benefits of rule proposal and number of sources affected.

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**Wrap-up**

It was decided that no more meetings would be necessary, but rather DEP will revise the strategy evaluation chart and send it to workgroup members for review. It is expected that development of the final report will follow a similar process.
ATTACHMENT 3
Strategy Charts
### Criteria for evaluating each measure:
- Environmental Benefits
- Technical Feasibility
- Economic Feasibility
- Implementation Feasibility
- Societal Benefits/Env Justice
- Enforceability

<table>
<thead>
<tr>
<th>DESCRIPTION OF CONTROL MEASURE</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>***Provide incentives for alternative fuel use</td>
<td>Simple to implement. Reduction of 13% PM compared to off-road (3000 ppm) fuel, without any retrofit or engine modification needed.</td>
<td>May not get large participation if voluntary. Ultra low sulfur diesel already required by diesel legislation. Until ULSD becomes widely available in the fall of 2006, there may be fuel delivery problems due to limited purveyors of ULSD. Increased cost (~10-15 cents/gallon).</td>
</tr>
<tr>
<td>**Oxygenated diesel/biodiesel/ediesel</td>
<td>Federal tax credit may spur use; easy to implement; PM reduction; renewable sources.</td>
<td>Higher cost than diesel. May not get large participation if voluntary. E-diesel and biodiesel infrastructure is mostly limited to midwest due to proximity of the crop source (Corn and soybeans)</td>
</tr>
<tr>
<td>***Retrofits (DOCs, DPFs) on offroad equipment</td>
<td>Proven technology, generally available, known reductions in PM and Nox</td>
<td>Must use ULSD, exhaust gas temperature and duty cycle limits use of some technologies.</td>
</tr>
<tr>
<td>***Mandatory contract provision or contract preference for retrofits</td>
<td>Depending on where applied, use of mandatory contract is within state control, could be technology forcing. Even playing field if everyone required to retrofit.</td>
<td>Preference concept hurts low bid process</td>
</tr>
<tr>
<td>***Idling reduction: outreach and education to reduce time spent idling</td>
<td>Extremely high idle rates for offroad equipment. Outreach is inexpensive</td>
<td>Difficult to change old habits, need buy-in from construction companies</td>
</tr>
<tr>
<td>***Install idle reduction technology on offroad equipment</td>
<td>Already implemented on new on-road and off road port equipment. Readily available technology. PM reduction, fuel savings, possible engine wear</td>
<td>Cost of retrofits may be high, but can require only on new equipment. Many engines may still employ glow-plug</td>
</tr>
</tbody>
</table>
savings. technology thus causing engine startup problems. Engines on some construction equipment also power electric generators therefore idling reduction may not be an option. After job is finished, may need to idle to allow engine to cool down.

**Incentives to replace old engines with less polluting ones/scrappage program**

Could be used for agriculture with emission and economic benefit to farmers. Good business case (improved efficiency). Fuel savings due to newer, more fuel efficient engines. Must find funding source to offset the replacement or repower costs. (new grant money in federal energy bill?)

**Electrification of equipment**

Demonstrated by cranes at NY/NJ port. Some applications would have direct health benefits (carnivals). Noise reduction. Fuel savings. Cannot be used where no power at site or too expensive to run power lines.

*Halt construction on ozone action days (call it weather delay)*

Targeted benefit when needed most. Expensive for construction industry (who will pay?); delays may increase project cost.

*Less promising strategy

**Promising strategy

*** Most promising strategy
**Voluntary speed reduction (ships)**
Voluntary, little if any cost.

**Pros:**
- Voluntary, little if any cost.

**Cons:**
- Difficult to enforce. Speed already limited in NJ Ports due to high amount of ship traffic and the ships having to negotiate through the Arthur Kill and Kill Van Kull. California requires speed reduction in ocean channels, not harbor. Prevailing wind is away from land so env benefit to NJ is questionable.

**Cold ironing (long term solution)**
Reduction in regional and local emissions may be significant.

**Pros:**
- Reduction in regional and local emissions may be significant.
- Appropriate for dedicated vessels. The Port Authority is examining whether to do a study with Starcrest Consulting to determine the percent of air emissions contributed by vessels at berth at Port Authority facilities compared to harbor wide marine-related emissions and overall emissions within the non-attainment area.

**Cons:**
- High cost due to changes on both ships and docks.
- No IMO standard for electrification/power

**Incentives to use alternative fuels (low sulfur or ULSD)**
Some port authority tenants are already using low sulfur for yard handling equipment. Ship fuel comes from local refinery. International agreements are being worked out to reduce the sulfur in the ship fuel (MARPOL Annex 6. Some West Coast

**Pros:**
- Some port authority tenants are already using low sulfur for yard handling equipment. Ship fuel comes from local refinery. International agreements are being worked out to reduce the sulfur in the ship fuel (MARPOL Annex 6.

**Cons:**
- Not all ships fuel in port. Ships typically use the highest sulfur, least expensive fuel available (bunker fuel) so not sure if they can use ULSD without technical modifications/problems?
<table>
<thead>
<tr>
<th><strong>Hybrid engines (diesel electric)</strong></th>
<th>May be efficient and cost-effective to use battery power for tugs. Lower fuel cost.</th>
<th>High purchase price, potential horsepower penalty. High cost for battery replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engine retrofits for ferries (SCR, DOCs, DPFs)</strong></td>
<td>SCR is a Nox strategy that was used on NY’s Alice Austen ferry as an offset for emissions projected from dredging project. DOCs and DPFs used in LA for nonroad cargo handling equipment.</td>
<td>SCR not verified and equipment takes up a lot of storage space. SCR not effective unless engine reaches a high enough temperature. NYSERDA is currently evaluating DOCs and DPFs for diesel emission reductions on the NY/NJ private ferry fleet.</td>
</tr>
<tr>
<td>*<strong>Scrap old yard equipment and replace with newer models equipped with on-road engines</strong></td>
<td>Cost-effective; is being done voluntarily by Port Authority tenants coincident with their business cycle; dramatic reduction in emissions; can be targeted in EJ communities. Emission fees may generate funding source &amp; provide incentive to modernize more quickly to reduce emissions.</td>
<td>Cost differential between old non-road engine and new on-road engine. A voluntary program would need to provide sufficient financial incentive to offset cost of newer, more expensive machine ahead of business cycle. Grants don't coincide with business cycle so vehicle owners would prefer tax write-offs.</td>
</tr>
<tr>
<td><strong>Extended gate hours at port</strong></td>
<td>Reduces congestion/idling, high rate of adoption in LA due to surcharge during peak hours (Pier Pass). Some terminals at PA NY/NJ are already doing this voluntarily. DOT &amp; EPA workgroup are already studying this option.</td>
<td>Teamster raised this as an issue at LA because independent truckers would not receive additional pay for working off-hours and might violate new hours of service rules. Warehouses would have to adjust hours to accept off-peak deliveries. Additional costs to staff ports and warehouses. Time shift may conflict with local ordinances for noise and traffic.</td>
</tr>
<tr>
<td>*<strong>Electronic gate and scheduling</strong></td>
<td>Has the potential to improve port efficiency (Port of Georgia is saving 3000 gallons of fuel per day due to gate efficiencies including mandatory appts.); improves security; reduces idling time.</td>
<td>Capital costs high, limited land available</td>
</tr>
<tr>
<td>*<strong>Crane electrification</strong></td>
<td>Already underway, cost-effective for business as well as emission reduction</td>
<td>High cost of infrastructure and cost differential for electric crane and supporting infrastructure compared to diesel.</td>
</tr>
<tr>
<td><strong>Shared chassis pools/centralized locations</strong></td>
<td>Done in Va, Hampton Roads port. Reduced turnaround times, improved safety, reduced idling</td>
<td>Requires cooperation among different businesses. Different carriers provide different chassis. Requires good management so no additional drive times for truckers to retrieve chassis. May be difficult for a landlord port, such as the Port</td>
</tr>
<tr>
<td>Action</td>
<td>Description</td>
<td>Authority</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>Provide incentives to repower tugs.</strong></td>
<td>Port Authority is repowering tugboats with modern, cleaner burning diesel engines (not hybrid) as an offset for emissions during the harbor dredging project. High capital cost. Repowered tugs are required to operate within the non-attainment area and therefore can't be moved to another location.</td>
<td>Authority of NY/NJ.</td>
</tr>
<tr>
<td><strong>Provide incentive for cleaner fuel (ULSD required beginning 2012) for trains.</strong></td>
<td>PM benefit, use enables retrofits Localized, urban benefits Limited legal authority to require; need incentives or funding otherwise cost will shift to riders.</td>
<td></td>
</tr>
<tr>
<td>*** Require that all freight or passenger locomotives parked for more than minimum hours in NJ use an idling alternative (i.e., plug in, on-board APU, gensets, or fuel fired heaters).</td>
<td>Technologies are commercially available and loco owner could choose one that best suits their needs. Fuel savings and engine wear savings. Idling limit would be easy to enforce. Need behavioral changes (many new engines can be shut off in cold weather but drivers don't realize). Switch locos need to go at a moments notice so may be not conducive to APUs or Kim Hotstart device ($10,000 each). Question on legal authority although some states are enforcing and haven't been challenged.</td>
<td></td>
</tr>
<tr>
<td><strong>Idling reduction for ferries through use of &quot;strong arm docker&quot;</strong></td>
<td>Would allow ferry vessel to dock with engines at idle instead of under power. May be short payback period. High initial capital cost. Hasn't been tested yet, but NYSERDA is exploring.</td>
<td></td>
</tr>
<tr>
<td>***Incentives for green goat or similar hybrid locomotives</td>
<td>Voluntary, large PM reductions, good power, proven technology. Single supplier (Green Goat) with production issues. NJT had concerns with quality of subcontractor's work/materials. Currently, technology is restricted to “Switcher or Yard Engines”; cannot yet be used in long haul applications. Port Authority states it's not powerful enough for all switcher operations.</td>
<td></td>
</tr>
<tr>
<td>*Short haul barging of materials/containers to satellite locations. (Port of NY/NJ currently barging containers up Hudson to Albany on a trial basis)</td>
<td>Reduction in traffic due to containers being transported by barge instead of truck. Long term solution, need partners, not necessarily faster than truck, but more efficient on a container-per-vessel move.</td>
<td></td>
</tr>
<tr>
<td><strong>Continued electrification of passenger rail lines</strong></td>
<td>Within control of NJ Transit/state. Will it provide improved service? PM reduction. Gives more people access to Manhattan because only electric High cost. Only installed now where ridership is high enough to be cost-effective</td>
<td></td>
</tr>
<tr>
<td><strong>Scrappage program to replace or upgrade old locomotives.</strong></td>
<td>NJT's fleet is from the 1960s and thus exempt from EPA standards, but they rebuild every 6-8 years. $5 million for new one, but &lt;$200,000 to bring to Tier 0 standards. New ones are Tier 2 compliant.</td>
<td></td>
</tr>
<tr>
<td><strong>Dual mode locomotives</strong></td>
<td>More cost effective than electrifying the lines.</td>
<td></td>
</tr>
<tr>
<td><strong>Periodic opacity inspections of locomotives (similar to onroad inspections). Feds mandate safety, but not emissions, inspection every 92 days.</strong></td>
<td>Increase in fuel efficiency due to optimal engine operation. Penalties can be used to fund a PM reduction program specific to railroads.</td>
<td></td>
</tr>
<tr>
<td><strong>Congestion management for freight rail: upgrading track to raise speed limits, grade separating road and rail, etc.</strong></td>
<td>Significant reduction in locomotive and other vehicle idling. (S. California's Alameda corridor project is good example.)</td>
<td></td>
</tr>
<tr>
<td><strong>Electrify (or use rechargeable batteries) on airport ground support equipment, possibly through lease incentives.</strong></td>
<td>An electrification program has been or is being performed at the Dallas/Ft. Worth Airport. PM reduction. Funding available under federal energy bill.</td>
<td>Portability limitations. Cost. Do we have authority currently or do we need new legislation?</td>
</tr>
<tr>
<td><strong>Provide incentives for alternative fuels, low sulfur fuels and retrofits on airport ground support equipment which has 12 year turnover.</strong></td>
<td>PM reduction; fuel savings.</td>
<td>Cost to retrofit. Technology may not be proven in this application. Do we have authority currently or do we need new legislation?</td>
</tr>
<tr>
<td><strong>Idling restrictions for airport ground support equipment.</strong></td>
<td>PM reduction, fuel savings, reduction in engine wear. Low cost.</td>
<td>Difficult to enforce. May not be practical in harsh weather conditions. There may be operational concerns where some equipment may have to constantly run.</td>
</tr>
<tr>
<td><strong>Cap and trade on airport emissions. “bubble concept”</strong></td>
<td>Would potentially reduce concentrated emissions in high PM/non-attainment areas.</td>
<td>Reductions in PM emissions may be minor to nonexistent on a large scale. Emissions are just being moved from one area to another.</td>
</tr>
<tr>
<td><strong>Charge fees to airplanes based on their emissions (i.e., differential landing fees)</strong></td>
<td>Financial incentive to upgrade the current aircraft fleet to newer, fuel efficient, less PM emission aircraft.</td>
<td>Expense of enforcement. May conflict with current FAA rules. The Port Authority's (landlord) rules and fees must be approved by FAA.</td>
</tr>
<tr>
<td><strong>Make efficiency improvements/upgrading a part of the airline or airport lease agreement.</strong></td>
<td>Fuel saving/PM savings. Long term cost savings. Leases are typically 20 years.</td>
<td>Possible legal ramifications associated with these lease conditions. Maybe objectionable to airlines</td>
</tr>
</tbody>
</table>
due to increased costs.

*Less promising strategy
**Promising strategy
*** Most promising strategy
**DEVELOPMENT GROUP**
CONTROL STRATEGIES FOR ON-ROAD SECTOR
(Last revised September 13, 2005)

Criteria for evaluating each measure:
- Environmental Benefits
- Technical Feasibility
- Economic Feasibility
- Implementation Feasibility
- Societal Benefits/Env Justice
- Enforceability

<table>
<thead>
<tr>
<th>DESCRIPTION OF STRATEGY ON-ROAD</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>***Diesel Particulate Filters (DPFs)</td>
<td>Large Particulate Matter (PM) Reduction (&gt;80%)</td>
<td>Requires Duty Cycle Evaluation of the engine to be retrofitted. Would also require the use of backpressure monitors. High equipment and maintenance costs Requires the use of Ultra Low Sulfur Diesel (ULSD). Better suited for diesel engines with horsepower ratings between 175HP and 400HP.</td>
</tr>
<tr>
<td>***Diesel Oxidation Catalysts (DOCs)</td>
<td>Minimal maintenance costs (install and forget) Could be fitted to most common diesel engines Much lower unit cost than DPFs</td>
<td>Particulate Matter Reduction less than that of a DPF (approx. 30%). Does not reduce ultrafine particles and in fact, may create them.</td>
</tr>
<tr>
<td>**Combined hardware and fuel additives (combustion catalyst)</td>
<td>Increased PM reduction over conventional DOCs and less maintenance and capital costs than that of a DPF.</td>
<td>Dependence on driver’s/operator’s/owner’s memory to add catalyst to fuel system each time diesel vehicle is being fueled. Possible added infrastructure to support the fuel catalyst. Enforcement difficult - how to tell if fuel borne catalyst was added. May have toxic health effects.</td>
</tr>
<tr>
<td>**Voluntary retrofits of local delivery trucks or tri-state trucks calling on port using financial incentives from SEPs, EZ Pass tax incentives, etc.</td>
<td>Overall PM reduction throughout several different sectors of the busing/motor truck industry. Federal energy bill includes $1 billion in grants for states to reduce diesel emissions.</td>
<td>Funding source. Cooperation from local governments and private industry.</td>
</tr>
<tr>
<td>*Incentives for early purchase of 2007 Engines, perhaps in combination with a trading program</td>
<td>90% reduction of PM emissions without the cost and maintenance of retrofit equipment, alternative fuels or fuel borne catalysts. Would avoid potential high capital cost. Need funding source to offset the increased cost of the 2007 engine.</td>
<td></td>
</tr>
</tbody>
</table>
**Scrapage Programs**
Can target Environmental Justice Communities. Can focus on medium duty vehicles which haven't been focus of state programs. Provides venue to install retrofits on the replacement vehicles.

High cost (approx. $9000 per ton of PM removed). Difficulty in finding source of funding (could use SEPs or fee increases). Is 2/3 offset a sufficient financial incentive?

**Expanding Burlington County Refuse truck LNG program**
Approx. 90% reduction in PM. Showcase for alternative/renewable fuel source. Lower fuel costs in the long run. Potential to extract fuel from solid waste “digesters” either from an existing wastewater treatment plant or a remote digester that could be placed in virtually any location.

High initial capital cost to extract and purify LNG from Landfill. Current refueling location is at a landfill but there may be potential to expand to other types of sites. Potential odor problems with the digesters. The “Not in my backyard (NIMBY)” principle associated with locating these digesters.

**Mobile and Stationary Source Credit Trading**
Provides incentive to reduce PM emissions from mobile sources which is a largely untapped sector compared to stationary sources. Could require stationary source in non-attainment area to obtain credits in order to comply with new, more stringent permit/emission limits (therefore not an emission increase per se).

Would allow facilities to expand PM emissions from their stationary sources, but could ensure net environmental benefit if some of credits are devalued or offset ratio is greater than 1:1 (E.g. if credited for 20 units of reduction of mobile source emissions, could only increase stationary emissions by 15 units.) EJ representatives concerned regarding localized impact.

**Mandatory mobile source reductions in non-attainment areas, otherwise permit denied**
Reduction in PM. May already be implemented in Europe

Potential enforcement and implementation problems.

**Purinox® Emulsified Fuel**
Approx. 50% reduction in PM.

Need dedicated infrastructure for this fuel. Fuel must be constantly agitated to keep uniform fuel/emulsion mixture. Historically there were problems in colder temperatures. Cost differential high because no blending facility on East Coast. Power loss.

**Create biodiesel corridor (e.g., truck stops along 95)**
Renewable source. No engine modifications needed. No NOx increase when used in stationary sources. 10-12% PM reduction. Fuel displacement. At least one retrofit vendor's product has been CARB verified with biodiesel.

Potential for slight increase in NOx still being debated/studied. Biodiesel above 20% (B20) may have storage problems in colder weather. May be more expensive than regular diesel therefore no incentive to use.

**E-diesel**
Possible safety issues associated with ediesel.

**Driver incentive/training program to reduce idling, coupled with strong enforcement. Target school buses, CDL training, fuel stops, truck stops,**
Change the conventional thinking that diesel engines have to be constantly idling in order for proper operation. Modern diesel engines with Adversion to change in the motor transport industry: i.e. “it has always been done that way…” Needs to be implemented long term because always
<table>
<thead>
<tr>
<th><strong>placards for visors</strong></th>
<th>electronic ignition do not require the use of glow plugs; thus idling is not necessary. No cost to driver. Fuel savings through idle reduction and improved driving habits. PM emissions saving through idle reduction. Decreased engine wear.</th>
<th>new drivers.</th>
<th><strong>Publicize the process for reporting excessively smoking vehicles</strong></th>
<th>Low cost.</th>
<th>Difficult to track down the actual vehicle to determine if smoke violates standards (however an informational letter can be sent to vehicle owner at a minimum).</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><strong>Bring roadside opacity checks into the cities instead of only on interstates</strong></em></td>
<td>Would enable us to target portion of population that is missed by the roadside checks (e.g., local delivery trucks)</td>
<td>Would need cooperation of locals. Space constraints on small urban streets.</td>
<td><strong>Expand idling program-enforcement (esp. local police)</strong></td>
<td>Would greatly expand the enforcement of idling laws beyond DEP capabilities.</td>
<td>Local police may not be knowledgeable on the state law, or may conflict with local ordinances.</td>
</tr>
<tr>
<td><strong>Collection of refuse at night.</strong></td>
<td>Would reduce traffic during working hours. Less PM emissions output during working hours.</td>
<td>Excessive noise, especially in suburban and rural areas.</td>
<td><strong>Halting construction on Ozone Action Days to reduce number of motorists stuck in traffic.</strong></td>
<td>Reduce PM and ozone production for that particular day.</td>
<td>Scheduling delays associated with project, which may have financial consequences.</td>
</tr>
<tr>
<td><strong>Remove all tolls on Ozone Action Days.</strong></td>
<td>Good public support</td>
<td>Small revenue loss. May encourage more people to drive on these days. Implementation may cause confusion among drivers.</td>
<td><strong>Double cost of tolls on Ozone Action Days</strong></td>
<td>Reduction of number of vehicles on road, thus reduce PM.</td>
<td>Lack of public support and possible enforcement issues (irate motorists).</td>
</tr>
<tr>
<td><strong>Incentive (e.g., waive tire tax) for wide-based tires for high mileage vehicles.</strong></td>
<td>Overall weight reduction of truck of approximately 800-1000 pounds and a 2-5% fuel reduction. Currently predominant in trucks carrying bulk liquids, due to the fact that more product can be transported without weight penalty. Payback is less than 2 years.</td>
<td>For some non-tandem trucks, these tires may not comply with “inch-width” laws in certain states. Truck drivers and fleet managers not familiar with the technology. Not yet widely available. Currently outlawed in Canada. Not universally available if have a flat. High cost to retrofit because need new rims.</td>
<td><strong>Low viscosity lubricants</strong></td>
<td>Potential for better distribution of lubricant throughout engine thus less engine wear.</td>
<td>Blow-by of lubricant between piston and cylinder wall, increases PM emissions. More expensive</td>
</tr>
<tr>
<td><strong>Highway speed reduction</strong></td>
<td>Possible fuel savings. 50% Nox decrease from 65 to 55 mph. California has dual speed limit of 55 for trucks and 75 for cars.</td>
<td>Very little public support. Trucks operate best in a narrow power band, which is usually above 55mph. Need to enforce otherwise no benefits.</td>
<td><strong>Tax incentive for automatic tire inflation or monitoring systems</strong></td>
<td>Fuel savings because optimal tire pressure is maintained. Potential safety measure because may</td>
<td>Added expense and weight on truck.</td>
</tr>
<tr>
<td>****Truck aerodynamic improvements</td>
<td>Built in incentive to purchase because potential for up to 10% in fuel savings. Can target to long haul truckers who will benefit the most.</td>
<td>Applicable to only certain category of truck. Additional expense especially if installed as aftermarket strategy. Enough incentives exist already.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>***Hybrid power train technology</td>
<td>10-15% fuel savings. PM emissions savings. UPS and FedEx have been experimenting with this technology with good results. Best in “stop and go” applications (short delivery, refuse trucks). Good strategy to target to Env Justice areas. Could require that all fleets purchasing new vehicles must buy a certain percent of hybrids or alternate fuel vehicles (similar to existing state purchase requirement).</td>
<td>Large capital expense. Training of staff mechanics on hybrid engine technology. Currently, no payback even with a 20% fuel savings. This is subject to change given the 2007 engine emissions standards and rising fuel costs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Incentive for on board batteries (high powered voltage systems). Batteries power AC/Heating unit and electrical while engine is off. Batteries get recharged by either the running engine or remote recharger.</td>
<td>Fuel savings through idle reduction. Recent energy bill allows for additional weight (400 lbs.) for trucks to allow for batteries or Auxiliary Power Units (APUs).</td>
<td>Large capital expense. Fleet owners not familiar with technology. Technology not readily available to retrofit existing engines.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*** Incentive for Auxiliary Power Units (APUs). A small diesel engine carried on board to power AC/Heat and electrical while main engine is off</td>
<td>Fuel savings through idle reduction. Recent energy bill allows for additional weight for trucks to allow for batteries or Auxiliary Power Units (APUs).</td>
<td>Large capital expense. Fleet owners not familiar with technology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Truck Stop Electrification (TSE)</td>
<td>Cost to use system is cheaper than cost of fuel burned while idling so built in incentive for drivers. PM emission reduction through idle reduction.</td>
<td>Large capital expense. Only a few TSE facilities located throughout the country. Driver and fleet owners not yet familiar with the technology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Enhanced enforcement of existing speed limit.</td>
<td>PM reduction and fuel savings associated with decreased speed.</td>
<td>Public resistance associated with increased ticketing. Costs associated with increased enforcement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>***Phase out sleeper berth exemption</td>
<td>PM reduction associated with idle reduction of long haul trucks.</td>
<td>Resistance from trucking industry.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Partnerships with other government agencies such as Dept of Transportation, Dept of Education, Dept of Health. Leverage relationships with outside groups such as school PTAs.</td>
<td>Expand the DEP’s public outreach and enforcement capabilities through these partnerships.</td>
<td>Possible resistance from potential partners. An associated cost in government employee’s time in generating and maintaining these partnerships.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
*** = More promising
** = Promising
* = Less Promising
Criteria for evaluating each measure:
- Environmental Benefits
- Technical Feasibility
- Economic Feasibility
- Implementation Feasibility
- Societal Benefits/Env Justice
- Enforceability

<table>
<thead>
<tr>
<th>DESCRIPTION OF STRATEGY</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed changes to Nox RACT rules (Subchapter 19) would require that all permitted generators use ULSD in 2007. Could extend to &lt;1mmBTU by amending definition in Subchapter 8.</td>
<td>Should be verifiable reduction in PM, Nox. Use of ULSD does not pose any performance or supply concerns (other states are pursuing this strategy as well) Other states have implemented</td>
<td>Only applies to generators over 1 million BTUs, approx. 1500 permits, which misses half or more of universe Slightly higher cost (.05-.10)</td>
</tr>
<tr>
<td>Require that use of ULSD be a criteria for getting a general permit for new emergency generators</td>
<td>Would provide an incentive to use ULSD (less reporting) General permits will require ULSD (with no rule change) for non-emergency generators</td>
<td>This might conflict with current criteria for general permits</td>
</tr>
<tr>
<td>Add fuel requirement for sulfur content to fuel subchapter 9.</td>
<td>Would apply to all generators, not based on size (including emergency) or use so could potentially pull in grandfathered sources.</td>
<td>May need separate fuel storage for separate uses (boiler, emergency generator, etc.). Are recordkeeping and random samples sufficient for Enforcement?</td>
</tr>
<tr>
<td>Develop contract requirement that ULSD be used in all state contracts including sources &lt;1 mil BTU (e.g., building leases)</td>
<td>Might incentivize switch to ULSD</td>
<td>Not known how many contract or pieces of equipment would be affected (may accomplish same thing as already proposed Nox RACT changes)</td>
</tr>
<tr>
<td>Require or provide incentives to retrofit with control devices or replace (emergency gens should be exempt)</td>
<td>Could be used on regular generators with new or modified sources Verifiable reductions of Nox, PM (60%)</td>
<td>Not know how cost-effective Need to use ULSD Old engines can’t use DPFs</td>
</tr>
<tr>
<td>Proposal / Recommended Action</td>
<td>Benefits / Considerations</td>
<td>Challenges / Limitations</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DEP Proposed New Source Performance Standard, Nox RACT for down to 50 hp engines (June 2005)</td>
<td>Scrappage/incentives for replacement of higher emitting engines with Selective Catalytic Reduction/urea control systems. Less regulatory burden, less operational requirements for emergency generators. Applies to &gt;5 ton/year.</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diesel would need 90% reduction. May be cost-effective for PM/Nox.</td>
</tr>
<tr>
<td>Limited amnesty for grandfathered generators to upgrade without triggering State of the Art requirements.</td>
<td>New models are far less polluting. Low cost to department. Financial incentive for owners because newer ones are more fuel efficient.</td>
<td>Can’t be a federal requirement. Unknown universe.</td>
</tr>
<tr>
<td>Nox trading of stationary with mobile retrofits using new Nox RACT rules as the incentive/trigger</td>
<td>Gives facilities more operational flexibility.</td>
<td>EPA doesn’t like facility level cap like this might be.</td>
</tr>
<tr>
<td>Put generators/compressors on timers (make this a permit condition?)</td>
<td>Very inexpensive, low tech.</td>
<td>Hard to predict emission reductions.</td>
</tr>
<tr>
<td>Converting diesel generators to natural gas fueled generators</td>
<td>Gas is cheaper, less polluting, less permit requirements.</td>
<td>Bigger engine, possibly more Nox? No amassed supply of gas onsite for emergency use.</td>
</tr>
</tbody>
</table>
## ATTACHMENT 4

### Requirements for stationary diesel sources

<table>
<thead>
<tr>
<th>Type/Size of Engine</th>
<th>Name of existing state reg that applies</th>
<th>Primary requirements of existing state reg</th>
<th>Summary of any changes proposed or expected to be proposed to existing reg</th>
<th>Name of existing federal reg that applies</th>
<th>Summary of any changes proposed or expected to be proposed to existing reg</th>
</tr>
</thead>
<tbody>
<tr>
<td>All emergency generators, regardless of horsepower</td>
<td>N.J.A.C. 7:27-9, Sulfur in Fuels.</td>
<td>0.2% or 0.3% Sulfur in Fuel depending on County.</td>
<td>New regulation and revision to N.J.A.C. 7:27-9 proposed; Must use Low Sulfur Diesel 500 ppm S as of 2007. ULSD required by 2010</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>All emergency generators, regardless of horsepower</td>
<td>N.J.A.C. 7:27-19 Reasonably Available Control Technology for Nitrogen oxides</td>
<td>Exemption for emergency generators &lt; 500 hrs/yr and 25 TPY NOx facility emissions otherwise 8 grams NOx/BHP-hr.</td>
<td>Revised regulation currently in proposal stage requires recordkeeping for emergency periods only.</td>
<td>None</td>
<td>Proposed NSPS Subpart III; beginning CY 2007 must meet Table 1 (non-road Tier 1, Tier 2, and Tier 4 with the exception of Tier 4) and not including fire pump engines. Fire Pump engines must be certified to meet standards based on non-road Tier 1 and Tier 2 with Tier 2 becoming effective around 2008-2011.</td>
</tr>
<tr>
<td>All emergency generators, regardless of horsepower.</td>
<td>N.J.A.C. 7:27-4, Particles from the combustion of fuel</td>
<td>Particulate emissions limit for TSP proportional to engines heat input rate.</td>
<td>None</td>
<td>Regulated by state rules</td>
<td>All stationary compression ignition engines must meet Tier 1- Tier 3 standards for mobile non-road diesel engines. 50-100 hp 0.3 g/bhp-hr. 100-175 hp 0.22 g/bhp-hr 175 &gt;=750 hp 2003 =-0.15 1996= 0.4</td>
</tr>
</tbody>
</table>
Requirements for Reciprocating Internal Combustion Engines (RICE):

**Federal:**
1. MACT (HAPs) for all types of stationary engines greater than 500 HP and located at major source for HAP emissions (40CFR63 Subpart ZZZZ, effective August 16, 2004). Compliance required after August 16, 2004 for new engines and 3 years after promulgation (June 15, 2007) for existing engines (4SRB).

2. NSPS 40 CFR Parts 60 (Subpart III), 85, 89, 94, 1039, 1065 and 1068(July 11, 2005 FR, in proposal stage) where most new stationary diesel engines (including electric power non-emergency and emergency generators) of all sizes to meet the Tiers 1-4 emission standards for mobile non-road engines (as outlined in preceding chart).

**State:**
1. SOTA for RICE (effective date 2003), applicable to engines that meet the following:
   a) Heat input rate (HHV) less than 100 million BTU/hr, and
   b) Combusting commercial fuel.

   RICE engines that do not meet the above criteria are required to perform a case by case SOTA analysis.

2. N.J.A.C. 7:27-19 RACT for NOx applicable to electric power generators greater than 500 HP (see preceding chart).
USEPA proposed NSPS requirements for stationary engines
[Excerpts from July 11, 2005- Part II- 40CFR Parts 60, 85, 89, et al. proposed rule]

Two groups of standards have been proposed: (1) for engine manufacturers, and (2) for engine owners/operators. Beginning with model year (MY) 2007, engine manufactures are required to emission certify stationary engines, and so they are responsible for compliance. During the transitional period before the MY 2007, engines can be sold that are not emission certified. In that case, the engine owner/operator is responsible for emission compliance.

**Standards for Engine Manufacturers.** Emission certification requirements for stationary non-emergency diesel engines are summarized in Table 1. From 2007, all stationary engines below 30 liters per cylinder must be certified to the respective standards, as applicable for the model year and maximum engine power (and displacement per cylinder in marine standards).

<table>
<thead>
<tr>
<th>Displacement (D)</th>
<th>Power</th>
<th>Model Year</th>
<th>Emission Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>D &lt; 10 liter per cylinder</td>
<td>( \leq 3000 \text{ hp} )</td>
<td>2007+</td>
<td>Nonroad Tier 2 - Tier 4</td>
</tr>
<tr>
<td></td>
<td>( &gt; 3000 \text{ hp} )</td>
<td>2007-2010</td>
<td>Nonroad Tier 1</td>
</tr>
<tr>
<td>10 ( \leq ) D &lt; 30 liter per cylinder</td>
<td>All</td>
<td>2011+</td>
<td>Marine Tier 2 (Cat. 2)</td>
</tr>
</tbody>
</table>

Emission certification requirements also apply to emergency engines from 2007, but the certification levels are less stringent:
- Emergency engines that are not fire pump engines must be certified to the standards shown in Table 1, with the exception of Tier 4 standards that require “add-on” control (such as diesel particulate filters or NOx reduction catalysts).
- Emergency fire pump engines must be certified to standards that are generally based on nonroad Tier 1 and Tier 2, with Tier 2 becoming effective around 2008-2011, depending on the engine power category.

**Standards for Engine Owners/Operators.** Depending on the engine category, owners and operators are responsible for emission compliance as follows:
- Engines < 30 liters per cylinder
  - Pre-2007:
    - Engines < 10 liters per cylinder must meet nonroad Tier 1 emission standards.
    - Engines \( \geq 10 \text{ liters per cylinder} \) must meet MARPOL Annex VI NOx limits (Tier 1 marine standards)
  - 2007 and later: owners/operators must buy emission certified engines
- Engines \( \geq 30 \text{ liters per cylinder} \): owners/operators are required to reduce NOx emissions by 90%, or alternatively they must limit NOx to 0.40 g/kWh (0.30
Owners/operators are also required to reduce PM emissions by 60%, or alternatively they must limit PM to 0.12 g/kWh (0.09 g/hp-hr).

Owners/operators of pre-2007 engines < 30 liters per cylinder can demonstrate compliance by purchasing a certified engine. If a non-certified engine is purchased, compliance may be demonstrated using emission test results from a test conducted on a similar engine; data from the engine manufacturer; data from the control device vendor; or conducting a performance test. If in-use performance test is conducted, the owner would be required to meet not-to-exceed (NTE) emission standards instead of the respective certification emission standards. Pre-2007 engines must meet NTE standards of $1.25 \times$ the applicable certification emission standard. The information which demonstrates engine compliance and the appropriate maintenance records must be kept on site.

Owners/operators of engines $\geq 30$ liters per cylinder must conduct an initial performance test to demonstrate emissions compliance (NOx is measured using EPA Method 7E, PM using EPA Method 5 [40 CFR part 60 appendix A]). The NTE standards do not apply to engines $\geq 30$ liters per cylinder.

**Fuel Program.** The affected engines would also have to switch to low sulfur fuels: no more than 500 ppm sulfur by October 2007, followed by ultra-low sulfur diesel (15 ppm sulfur) by October 2010. These fuel requirements are consistent with those for mobile nonroad engines.
ATTACHMENT 5
Mobile Source Inventory information

USEPA Designations of Nonattainment Areas for PM2.5 in New Jersey

Effective
April 5, 2005
DRAFT 2002 New Jersey PM$_{2.5}$ Emissions by Sector

- Area: 56%
- Point: 17%
- On-Road: 7%
- Non-Road: 20%

Total PM$_{2.5}$ Emissions - 29,103 tpy
( includes Adjusted Fugitive Dust Emissions)

DRAFT 2002 New Jersey NO$_x$ Emissions by Sector

- Area: 4%
- Point: 28%
- On-Road: 45%
- Non-Road: 23%

Total NO$_x$ Emissions - 1,009 tpd
(Anthropogenic sources only)
## DRAFT 2002 Statewide Emission Inventory by Source Sector and Pollutant

<table>
<thead>
<tr>
<th>Source Sector</th>
<th>Nox</th>
<th>PM2.5 *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tons per Summer Day</td>
<td>Tons per Year</td>
</tr>
<tr>
<td>Point</td>
<td>280.36</td>
<td>52,121</td>
</tr>
<tr>
<td>Area</td>
<td>35.92</td>
<td>26,742</td>
</tr>
<tr>
<td>On-road</td>
<td>461.04</td>
<td>170,939 (62,529 from diesel)</td>
</tr>
<tr>
<td>Non-road**</td>
<td>231.56</td>
<td>66,443 (45,509 from diesel)</td>
</tr>
<tr>
<td>Biogenic</td>
<td>3.78</td>
<td>1,382</td>
</tr>
<tr>
<td><strong>Total in State</strong></td>
<td>1,012.66</td>
<td>317,627</td>
</tr>
</tbody>
</table>

* These totals include adjusted emissions from fugitive dust categories.
**Non road includes locomotive and marine.

### Definitions of Source Sectors:

**Point source:** a stationary facility that emits or has the potential to emit at or above any of the following thresholds:

- 10 tons per year of VOC
- 25 tons per year of NO\textsubscript{x}
- 100 tons per year of CO, PM\textsubscript{2.5}, PM\textsubscript{10}, SO\textsubscript{2}, NH\textsubscript{3}

The remaining stationary sources are included in the area sources emissions inventory.

**Area sources:** emissions from numerous facilities or activities that individually release small amounts of a given pollutant, but collectively they can release significant amounts of a pollutant. This includes small stationary sources that fall below required emission reporting thresholds by the Emission Statement Program. Area sources are small and numerous and have emissions which are not readily associated with a single point or a small set of points. Some of the stationary sources in this sector are sometimes referred to as minor point sources.

**On-road sources:** exhaust (i.e., tailpipe) emissions, fuel evaporative emissions, and brake/tire fugitive emissions from all vehicles (both gasoline and diesel-fueled) operating on New Jersey roadways.

**Non-road sources:** equipment or vehicles that are not commonly operated on a roadway except when used for roadway construction or repair. This category includes construction equipment, such as bulldozers; agricultural equipment such as combines; aircraft and related airport equipment; locomotives; and marine vessels.

**Biogenic sources:** Emissions produced by living organisms or biological processes, including emissions from plant matter as well as humans, domestic, animals and wild animals.
### DRAFT - On-road sources of diesel PM 2.5

<table>
<thead>
<tr>
<th>On-road sector</th>
<th>PM 2.5 (tons per year)</th>
<th>NOx (tons per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light duty diesel cars</td>
<td>30</td>
<td>230</td>
</tr>
<tr>
<td>Light duty diesel trucks</td>
<td>6</td>
<td>66</td>
</tr>
<tr>
<td>Heavy duty diesel trucks (&gt;8500 lbs)</td>
<td>1329</td>
<td>62,233</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1365</strong></td>
<td><strong>62,529</strong></td>
</tr>
</tbody>
</table>

### DRAFT - Non-road sources of diesel PM 2.5

<table>
<thead>
<tr>
<th>Non-road sector</th>
<th>PM 2.5 (tons per year)</th>
<th>NOx (tons per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, agricultural, industrial, commercial</td>
<td>2674</td>
<td>28,813</td>
</tr>
<tr>
<td>Commercial Marine</td>
<td>782</td>
<td>10,981</td>
</tr>
<tr>
<td>Locomotive</td>
<td>127</td>
<td>5716</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3,584</strong></td>
<td><strong>45,510</strong></td>
</tr>
</tbody>
</table>
DRAFT 2002 Statewide *On-road* Source Emission Inventory

by County and Pollutant

<table>
<thead>
<tr>
<th>County</th>
<th>PM 2.5 Tons per Year</th>
<th>Nox Tons per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic</td>
<td>53</td>
<td>5,347</td>
</tr>
<tr>
<td>Bergen</td>
<td>166</td>
<td>16,677</td>
</tr>
<tr>
<td>Burlington</td>
<td>158</td>
<td>11,325</td>
</tr>
<tr>
<td>Camden</td>
<td>137</td>
<td>9,796</td>
</tr>
<tr>
<td>Cape May</td>
<td>20</td>
<td>1,862</td>
</tr>
<tr>
<td>Cumberland</td>
<td>31</td>
<td>2,413</td>
</tr>
<tr>
<td>Essex</td>
<td>107</td>
<td>10,176</td>
</tr>
<tr>
<td>Gloucester</td>
<td>92</td>
<td>6,736</td>
</tr>
<tr>
<td>Hudson</td>
<td>66</td>
<td>5,807</td>
</tr>
<tr>
<td>Hunterdon</td>
<td>69</td>
<td>5,260</td>
</tr>
<tr>
<td>Mercer</td>
<td>116</td>
<td>8,277</td>
</tr>
<tr>
<td>Middlesex</td>
<td>250</td>
<td>21,002</td>
</tr>
<tr>
<td>Monmouth</td>
<td>142</td>
<td>12,447</td>
</tr>
<tr>
<td>Morris</td>
<td>141</td>
<td>12,589</td>
</tr>
<tr>
<td>Ocean</td>
<td>79</td>
<td>7,519</td>
</tr>
<tr>
<td>Passaic</td>
<td>71</td>
<td>6,216</td>
</tr>
<tr>
<td>Salem</td>
<td>39</td>
<td>2,730</td>
</tr>
<tr>
<td>Somerset</td>
<td>85</td>
<td>7,096</td>
</tr>
<tr>
<td>Sussex</td>
<td>42</td>
<td>2,803</td>
</tr>
<tr>
<td>Union</td>
<td>99</td>
<td>9,855</td>
</tr>
<tr>
<td>Warren</td>
<td>82</td>
<td>5,008</td>
</tr>
<tr>
<td><strong>Total in State</strong></td>
<td><strong>2,044</strong></td>
<td><strong>170,939</strong></td>
</tr>
</tbody>
</table>

* These totals include adjusted emissions from fugitive dust categories.
## DRAFT 2002 Statewide *Non-road* Source Emission Inventory by County and Pollutant

<table>
<thead>
<tr>
<th>County</th>
<th>PM$_{2.5}$ Tons per Year</th>
<th>Diesel PM$_{2.5}$ tons per year</th>
<th>Nox Tons per Year</th>
<th>Diesel Nox tons per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic</td>
<td>225</td>
<td>82</td>
<td>1,771</td>
<td>1078</td>
</tr>
<tr>
<td>Bergen</td>
<td>478</td>
<td>318</td>
<td>6,707</td>
<td>4117</td>
</tr>
<tr>
<td>Burlington</td>
<td>413</td>
<td>283</td>
<td>3,776</td>
<td>2744</td>
</tr>
<tr>
<td>Camden</td>
<td>228</td>
<td>178</td>
<td>2,669</td>
<td>1968</td>
</tr>
<tr>
<td>Cape May</td>
<td>468</td>
<td>109</td>
<td>1,959</td>
<td>1358</td>
</tr>
<tr>
<td>Cumberland</td>
<td>374</td>
<td>197</td>
<td>2,574</td>
<td>2053</td>
</tr>
<tr>
<td>Essex</td>
<td>393</td>
<td>287</td>
<td>8,137</td>
<td>3619</td>
</tr>
<tr>
<td>Gloucester</td>
<td>222</td>
<td>173</td>
<td>2,200</td>
<td>1804</td>
</tr>
<tr>
<td>Hudson</td>
<td>345</td>
<td>312</td>
<td>5,976</td>
<td>5280</td>
</tr>
<tr>
<td>Hunterdon</td>
<td>103</td>
<td>70</td>
<td>1,223</td>
<td>962</td>
</tr>
<tr>
<td>Mercer</td>
<td>203</td>
<td>148</td>
<td>2,427</td>
<td>1667</td>
</tr>
<tr>
<td>Middlesex</td>
<td>346</td>
<td>244</td>
<td>4,849</td>
<td>3212</td>
</tr>
<tr>
<td>Monmouth</td>
<td>501</td>
<td>252</td>
<td>4,316</td>
<td>3266</td>
</tr>
<tr>
<td>Morris</td>
<td>280</td>
<td>155</td>
<td>3,151</td>
<td>1764</td>
</tr>
<tr>
<td>Ocean</td>
<td>409</td>
<td>104</td>
<td>2,138</td>
<td>1341</td>
</tr>
<tr>
<td>Passaic</td>
<td>178</td>
<td>127</td>
<td>2,413</td>
<td>1491</td>
</tr>
<tr>
<td>Salem</td>
<td>122</td>
<td>78</td>
<td>932</td>
<td>777</td>
</tr>
<tr>
<td>Somerset</td>
<td>149</td>
<td>100</td>
<td>2,097</td>
<td>1393</td>
</tr>
<tr>
<td>Sussex</td>
<td>89</td>
<td>41</td>
<td>615</td>
<td>451</td>
</tr>
<tr>
<td>Union</td>
<td>333</td>
<td>286</td>
<td>5,883</td>
<td>4732</td>
</tr>
<tr>
<td>Warren</td>
<td>64</td>
<td>39</td>
<td>631</td>
<td>434</td>
</tr>
<tr>
<td><strong>Total in State</strong></td>
<td><strong>5,922</strong></td>
<td><strong>3,584</strong></td>
<td><strong>66,443</strong></td>
<td><strong>45,510</strong></td>
</tr>
</tbody>
</table>
EXPLANATION OF INVENTORY DEVELOPMENT
FOR ON-ROAD AND NON-ROAD MOBILE SOURCES

I. On-road Sources

The onroad source component of the 2002 emission inventory is an estimate of exhaust (i.e., tailpipe) emissions, fuel evaporative emissions, and brake/tire fugitive emissions from all vehicles (both gasoline and diesel-fueled) operating on New Jersey roadways. In general, the emissions from this component of the emission inventory are calculated by multiplying an activity level by an emission factor. In the case of onroad mobile sources, the activity level is daily vehicle miles traveled (DVMT). The emission factors are calculated using the latest version of the USEPA MOBILE computer model.

A. Daily Vehicle Miles Traveled

The DVMT used in this emission inventory was calculated with the travel demand models (TDMs) used by the three Metropolitan Planning Organizations (MPOs) in the State. MPO’s are charged with developing transportation plans and programs that promote the safe and efficient management, operation and development of transportation systems while minimizing fuel consumption and air pollution. The three MPOs with jurisdiction in New Jersey are the North Jersey Transportation Planning Authority (NJTPA), the Delaware Valley Regional Planning Commission (DVRPC) and the South Jersey Transportation Planning Organization (SJTPO).

In general, the TDMs use demographic data, such as population, employment, housing density, and shopping patterns, to estimate the demand for travel in the modeled area. This travel demand is then distributed throughout the available roadways and transit routes, referred to as links. The model is based on an algorithm which takes into account factors such as transit fares, tolls, traffic volume, and time of day to estimate how many people travel from one point to another on any given link. The number of vehicles traveling on each link is then used to estimate the speed of travel and the total number of vehicle miles traveled (VMT) in a day.

B. MOBILE Model and Model Inputs

The USEPA MOBILE computer model estimates vehicle emission factors for carbon monoxide; exhaust, brake and tire wear direct particulate matter; and ozone and particulate matter precursors.

The emission factors calculated by the MOBILE6 model are dependent on a variety of data, including temperature, humidity, distribution of travel speeds, fuel type, vehicle age distribution, type of inspection and maintenance (I/M) program and roadway type. The model is designed so that the user can input State-specific data for many of the variables that affect vehicle emissions. If State-specific data is unavailable, default values are also available for many of the inputs required for the model.
II. Non-road Sources

A. Non-road Equipment Emissions From NONROAD Model

Non-road equipment emissions for VOC, NOx, CO, PM_{10}, PM_{2.5} and SO2 for the 2002 inventory were calculated using the NONROAD Emissions Equipment Model (NNEM), Version 2.3c (April 2004) developed by the USEPA for use by the states in estimating emissions from nonroad sources. The NNEM includes more than 80 basic and 260 specific types of non-road equipment, which are stratified by equipment types, horsepower rating and fuel. Fuel types include gasoline, diesel, compressed natural gas (CNG) and liquefied petroleum gas (LPG).

The NNEM contains default equipment population data. The default equipment population values were used except for the population of airport ground support equipment (GSE). An actual inventory of ground support equipment (GSE) for Newark Liberty International Airport (NLIA) was used, since it was available. Using this approach is believed to enhance the accuracy of the inventory since it is based upon an actual equipment count for the largest airport operation within the state.

The NNEM also contains default human population data, however, the NJDEP input state specific 2002 human population data for New Jersey. The human population data is the same as those used by the metropolitan planning organizations in their travel demand models to calculate on-road sector emissions. For certain SCCs, the NNEM uses human population as a factor in calculating equipment activity levels.

B. Aircraft Emissions

Aircraft emissions for VOC, NOx, CO, PM_{10}, PM_{2.5} and SO2 were calculated based on the number of landing and take-off (LTO) cycles generated at each airport. The six major airports in New Jersey, Newark Liberty International, Teterboro, Atlantic City, Morris Municipal, Essex County and Mercer County, supplied the NJDEP with their aircraft fleet mix. These values were used as inputs to the Emissions and Dispersion Modeling System (EDMS), the Federal Aviation Agency (FAA) modeling tool.

C. Locomotive Emissions

Locomotive emissions for VOC, NOx, CO, PM_{10}, PM_{2.5} and SO2 were calculated based on the estimated fuel consumption of individual railroad systems operating in New Jersey.

D. Commercial Marine Vessel Emissions

Commercial Marine Vessel (CMV) emissions for VOC, NOx, CO, PM_{10}, PM_{2.5} and SO2 for Northern New Jersey were taken from the CMV Emissions Inventory Report prepared
by Starcrest Consulting Group, LLC.¹ This inventory was prepared as a part of the New York Harbor Deepening Project. This report relied on actual operational data, to the extent such information was available, and then used local activity parameters to extend emission estimates to those portions of the CMV not directly inventoried. Actual operational data was obtained from extensive interviews with vessel operators, crew, pilots and the United States Coast Guard’s vessel traffic system that tracks oceangoing CMV from points of origin and destination. From this information emissions estimates were prepared based on estimated horsepower demand.

CMV emissions for the Southern New Jersey were estimated using fuel purchases for diesel and residual fuels and the number of trips of self propelled vessels along the Delaware River. Emissions on the Delaware River were split between Pennsylvania and New Jersey by assuming that all northbound emissions were in New Jersey and all southbound emissions were in Pennsylvania. This allocation process was agreed to by the two states as part of the 1990-emission inventory submittal.

### DRAFT - On road sources of diesel PM 2.5 with indication as to whether they're affected by diesel law (PL 2005, c219)

<table>
<thead>
<tr>
<th>On-road sector</th>
<th>PM 2.5 (tons per year)</th>
<th>NOx (tons per year)</th>
<th>Affected by Law?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light duty diesel cars</td>
<td>30</td>
<td>230</td>
<td>No</td>
</tr>
<tr>
<td>Light duty diesel trucks</td>
<td>6</td>
<td>66</td>
<td>No</td>
</tr>
<tr>
<td>Heavy duty diesel trucks (&gt;8500 lbs)</td>
<td>1329</td>
<td>62,233</td>
<td>Partially, as follows: 1. all school buses; 2. all transit buses; 3. garbage trucks that are publicly owned or used in public contract (2180 out of 2862*); 4. publicly owned other trucks such as dump trucks (1458 out of 133,400**)</td>
</tr>
</tbody>
</table>

**TOTAL** 1365 62,529

---

*Note: *i.e., there are 2862 garbage trucks in NJ and 682 would not be affected by the legislation because they are privately owned and NOT used in a public contract.

**Note: *i.e., there are 133,400 heavy duty diesel trucks in NJ that are not school buses, transit buses or garbage trucks. Only 1458 of this total universe of 133,400 are affected by the legislation.

### DRAFT - Non-road sources of diesel PM 2.5 with indication as to whether they're affected by diesel law (PL 2005, c219)

<table>
<thead>
<tr>
<th>Non-road sector</th>
<th>PM 2.5 (tons per year)</th>
<th>NOx (tons per year)</th>
<th>Affected by law?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, agricultural, industrial, commercial</td>
<td>2674</td>
<td>28,813</td>
<td>Only publicly owned construction equipment &gt;100 horsepower. (This represents approx 680 out of 57,437 total pieces of construction equipment in the state.)</td>
</tr>
<tr>
<td>Commercial marine</td>
<td>782</td>
<td>10,981</td>
<td>No</td>
</tr>
<tr>
<td>Locomotive</td>
<td>127</td>
<td>5716</td>
<td>No</td>
</tr>
</tbody>
</table>

**TOTAL** 3,584 45,510
<table>
<thead>
<tr>
<th>MEASURE</th>
<th># of Vehicles targeted</th>
<th>REDUCTIONS (TONS PER YEAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrofits of school buses, publicly &amp; privately owned ¹</td>
<td>16,470</td>
<td>11 ²</td>
</tr>
<tr>
<td>Retrofits of garbage trucks, publicly owned or privately owned and used in a public contract ¹</td>
<td>2,180 (out of 2862 in total universe)</td>
<td>14</td>
</tr>
<tr>
<td>Retrofits of NJ Transit buses ¹</td>
<td>1,993</td>
<td>20</td>
</tr>
<tr>
<td>Retrofits of privately owned transit buses ¹</td>
<td>7,588</td>
<td>70</td>
</tr>
<tr>
<td>Retrofits of publicly owned on-road and non-road vehicles ¹</td>
<td>2,138</td>
<td>15</td>
</tr>
<tr>
<td>Ultra-low sulfur diesel fuel for non-road vehicles</td>
<td>N/a</td>
<td>600 in the first year; 70 in each of the following three years</td>
</tr>
<tr>
<td>Compliance with idling regulations</td>
<td>N/a</td>
<td>200</td>
</tr>
</tbody>
</table>

¹Only vehicles prior to Model Year 2007 would be affected.
²Reductions attributable to control of tailpipe emissions
ATTACHMENT 6
White paper from Burlington County

State of New Jersey
Organic Waste-To-LNG/CNG Transportation Fuel Initiative
A Novel Cross Media Environmental Management Approach
To Reduce Diesel Emissions and Improve Air Quality

Prepared For the On Road Diesel SIP Workgroup
New Jersey Department of Environmental Protection
Division of Air Quality
Bureau of Air Quality Planning

By The Solid Waste Subcommittee
Cook College Executive Dean's Advisory Committee On The Environment
Robert Simkins, Chairman
P.O. Box 429
Columbus, New Jersey 08022
609-499-1001, Ext: 269
Rsimkins@co.burlington.nj.us

A significant opportunity for cross media environmental management and local production of clean, renewable transportation fuel has surfaced in New Jersey as a result of demonstration and commercialization work carried out at the Rutgers EcoComplex by Acrion Technologies, Mack Trucks/AB Volvo, Chart Industries, Air Products and Chemicals Inc., Waste Management Inc. and the Brookhaven Laboratory of the US Department of Energy. Clean transportation fuel in the form of liquid methane or compressed methane, better known as liquid natural gas (LNG) and compressed natural gas (CNG) respectively, can now be produced from biogas generated by anaerobic digestion of organic waste. These fuels, when utilized in trucks, buses and automobiles can significantly reduce mobile source air emissions, improve the quality of our air and surface waters, reduce greenhouse gas emissions and increase recycling of organic waste.

Refuse vehicles are ideally suited to utilize LNG produced from biogas. The trucks pickup the feedstock everyday and deliver it to landfills where the biogas is produced. Fuel production and dispensing facilities located at the landfills make refueling convenient. In northern New Jersey where landfills are limited, field erected anaerobic digesters can be deployed to produce biogas and harvest clean transportation fuel prior to transfer of waste to more distant landfills. Moreover, refuse truck manufacturers now offer a line of LNG fueled refuse collection vehicles which are designed to meet the 2007, and in some cases, 2010, federal emission standards for heavy duty trucks.
Refuse collection trucks are the most polluting of all mobile sources and are a major source of air pollutants, including smog forming compounds, particulate matter and toxic chemical constituents. The refuse truck sector would benefit more than any other by switching from diesel fueled trucks to LNG fueled trucks. Switching to an LNG fueled refuse truck has been shown to reduce particulate matter emissions by 99%, nitrogen oxides emissions by 73% and non-methane hydrocarbons emissions by 83%. Such significant improvement in exhaust emissions could be an important component towards efforts to improve the air quality in non-attainment areas within New Jersey.

Each refuse collection truck, on average, consumes 8,650 gallons of diesel per year and travels an average of 25,000 miles per year. The average fuel efficiency is 2.9 miles per gallon, the lowest of all vehicle types. The low fuel efficiency is attributable to the unique service duty of the refuse collection trucks: moving at a slow average speed of just 10 miles per hour, constantly stopping and starting to pickup waste, regularly compacting its load and idling for nearly 70 percent of its operating time. This unique service duty is also an important factor in the poor quality of exhaust emissions from refuse trucks.

In 2005 there were 4,219 public and 5,418 private refuse collection trucks (frontend loaders, rearend loaders, side loaders and roll-off trucks) licensed to collect solid waste in New Jersey. There are 4,104 additional licensed truck tractors used to transfer waste, generally to out-of-state facilities and 3,516 New York City Sanitation Department collection trucks that haul waste into New Jersey that are not included in this analysis. The total annual amount of diesel fuel currently consumed by the solid waste industry to collect (not transfer) refuse in NJ is in the order of 83,360,000 gallons per year. This amount of diesel is equivalent to 155,880,000 gallons of LNG (1.87 gallons of LNG equals one gallon of diesel or an equivalent Btu basis).

New Jersey has the potential to produce LNG from the organic fraction of municipal solid waste (MSW organic waste) now being disposed and displace diesel fuel used for solid waste collection. Transit and school buses, light duty fleet trucks and automobiles could utilize this fuel as well in the form of CNG. It should be noted that LNG can be dispensed as LNG or as CNG. LNG is transportable by refrigerated tankers thereby allowing LNG produced at a landfill or anaerobic digester to be transported to satellite fueling facilities capable of dispensing either LNG, CNG or both.

At least 4.8 million tons per year of MSW organic waste are produced and disposed in New Jersey. Another 2.7 million tons are already being recycled. Stoichiometrically, the 4.8 million tons of organics being disposed of have the potential to yield 777,600 tons of liquid methane (LNG) or 501,716,000 gallons LNG (268,320,000 diesel equivalent gallons) and 1,904,010 tons of liquid carbon dioxide. Available commercial technology for anaerobically digesting organic wastes yields product quantities considerably less than the 100% stoichiometric yield, however, the quantities are still significant. Current technology (landfills and field erected anaerobic
digesters) is capable of producing from New Jersey MSW organic waste, 81,970 tons of LNG per year or 52,884,000 gallons LNG (28,280,213 diesel equivalent gallons) and 305,100 tons of liquid carbon dioxide. Research and demonstration work to increase the biogas yield from anaerobic digestion of organic waste is very active in academia and the anaerobic digestion industry in the US, Europe and Asia. Increasing biogas yields can increase the yield of LNG and CO₂ products, proportionately. New technologies now being demonstrated and commercialized have increased total biogas yields by as much as two folds.

With currently available commercial technology, the 4.8 million tons of MSW organic waste not being recycled could produce LNG equivalent of 28.3 million gallons of diesel per year which could displace 34% of the diesel fuel now used by the 9,637 refuse collection vehicles. If New Jersey pre-treated this organic waste prior to anaerobic digestion in order to increase gas yields and assumed a two fold increase in yield, it could produce enough fuel to power two thirds of the refuse collection vehicles. It should be noted that biosolids, agricultural, pharmaceutical and various organic industrial waste streams have not been included in this statewide analysis, but represent major quantities of materials which are prime candidates for anaerobic digestion and could significantly increase LNG/CNG fuel production capabilities.

Production of LNG/CNG transportation fuel from organic waste will offer New Jersey many benefits including:

1. Switching to LNG fuel in refuse trucks will assist the State in reducing PM₂.₅ and 8-Hour Ozone in its non-attainment areas and significantly improve local air quality.
2. Locally produced, clean, renewable transportation fuel will be available at a relatively fixed price over the life of the production facilities. This will translate into more stable and predictable costs for the collection and transportation of solid waste while at the same time improve local air quality.
3. A significant reduction of greenhouse gas emissions will be realized by sequestering carbon dioxide due to the use of a renewable fuel and from fuel switching. Using currently available technology, if the 4.8 million tons of MSW organic waste were converted to 52,884,000 gallons of LNG and used to displace diesel fuel, the annual carbon dioxide sequestered would be in the order of 314,131 tons per year.
4. The increased use of LNG/CNG transportation fuel can help improve water quality in our estuaries. Increased nitrogen loading in surface water bodies accelerates eutrophication which leads to oxygen depletion and reduces fish and shell fish populations. NOₓ emissions in the air, for instance, is one of the largest sources of nitrogen pollution in the Chesapeake Bay.
5. The production of LNG transportation fuel and liquid carbon dioxide from organic waste would substantially increase the tonnage of materials recycled in New Jersey. The anaerobic digestion of 4.8 million tons of MSW organic waste would yield at least 81,970 tons of liquid methane (LNG) and 305,100 tons of liquid carbon dioxide per year. These tonnages could be potentially doubled if the waste were pre-treated prior to digestion. In addition, if the
organics are source separated and processed in a field erected anaerobic digester, the solids remaining are suitable for marketing as compost. The tonnage of compost produced from the digestion of 4.8 million tons of organic waste would be approximately 2 million tons/year (assuming a moisture content of 40%).

A statewide initiative to produce LNG/CNG from organic waste is taking form in the State of New Jersey. Since the successful production and utilization of LNG truck transportation fuel from landfill gas at the Rutgers EcoComplex in 2004, two New Jersey landfills have agreed to feasibility studies for LNG production at their sites and three other landfills are considering the idea. In addition, a major waste management company and a leading European MSW organic waste anaerobic digestion vendor, are collaborating to evaluate the feasibility of co-locating anaerobic digesters at, or near, transfer stations in the urban areas of northern New Jersey to produce LNG truck fuel. In another case, a major liquid waste hauler in the NJ-NY-CT region, who is currently involved with a project to produce biodiesel from fats, oils and grease, is considering expansion of the project to digest the residuals with animal manure and food wastes for the purpose of producing LNG transportation fuel.

New Jersey is also in the process of reviewing and updating its Statewide Solid Waste Management Plan at the same time it is preparing its State Implementation Plan (SIP) for the USEPA for PM$_{2.5}$ and 8-Hour Ozone. The entire State is currently non-attainment for 8-Hour Ozone and thirteen out of twenty one counties are non-attainment for PM$_{2.5}$. The New Jersey Department of Environmental Protection should embrace the idea of using its organic waste resources to produce clean LNG/CNG transportation fuel as a means to reduce both PM$_{2.5}$ and 8-Hour Ozone.

A significant impediment to the widespread use of natural gas as a transportation fuel in general has been the lack of fueling infrastructure. The current initiative to develop LNG/CNG fuel production and dispensing facilities at landfills and transfer stations will eliminate the infrastructure barrier for at least the refuse collection vehicle sector. There is no reason, however, not to expand the use of LNG/CNG fuel in other vehicle sectors. As mentioned earlier, LNG produced at a landfill or anaerobic digester is transportable via refrigerated tankers and can be shipped to LNG/CNG fueling stations. In addition, the existing natural gas pipeline throughout New Jersey offers a convenient means to distribute natural gas to fueling stations. Biogas, properly cleansed of contaminants and carbon dioxide, can be directly introduced to the existing natural gas pipeline and compressed or liquefied at the fueling station. The organic wastes generated within the state can provide a significant renewable source of natural gas to supplement existing non-renewable sources already carried by the pipeline.

The Department should consider including a number of elements to its Solid Waste and Air Quality Management Plans (SIPs) which would foster the deployment and use of technology for the production of renewable LNG/CNG transportation fuel from organic waste and increase fueling infrastructure. These include:
1. The development and implementation of a “mobile source emission reduction credits” (MSERC) program. Under such a program, refuse collection companies and other vehicle fleet owners who purchase new low emissions vehicles for the purpose of adding to their fleet or replacing existing vehicles within the fleet, can generate MSERCs provided that the new vehicles have emissions below the current government standards. MSERCs would qualify as air pollution offsets that could be sold under certain conditions to industries needing to a) improve the air emissions from their stationary facilities, b) seeking a permit for a new source, or c) complying with emission reductions required by new Department regulations to meet national air quality standards within the State.

2. The development and implementation of voluntary vehicle scrappage programs for certain classes and ages of diesel vehicles utilizing an economic incentive package.

3. Products produced from biogas, such as LNG, CNG, methanol and liquid carbon dioxide should be considered by the Department as recycled products and count towards the County and State recycling goals. Biogas derived from either sanitary landfills or field erected anaerobic digesters utilized to derive these recycled products should be able to qualify. The use of source separated organic waste should not be a prerequisite feedstock in order to qualify the products as recycled, otherwise, landfill biogas would not qualify.

4. Technical assistance and educational outreach to the solid waste hauling sector and other selected vehicle sectors should be provided by the Department working with vehicle manufacturers, non-profit organizations with expertise in the area of alternative fuel vehicles (such as Inform, Inc., Clean Cities Programs and the Natural Gas Vehicle Coalition), Rutgers EcoComplex and the County Solid Waste Management Districts to assist in the transition to LNG/CNG fueled vehicles.

5. The Department and the New Jersey Board of Public Utilities (NJBPU) should recommend federal and/or state legislation designed to encourage and support, through financial incentives, the development of field erected anaerobic digesters that produce transportation fuel and infrastructure for the dispensing of the fuels. Currently incentives are geared toward the production of electricity only. The energy conversion efficiency of organic waste to transportation fuel is much higher than organic waste to electrical power production. The Department and NJBPU should recognize this fact and shift incentives and funding accordingly.

6. The Department should develop permitting requirements for anaerobic digestion systems in anticipation of new applications within the State.

7. The Department should support and encourage the co-digestion of MSW organic waste with other organic waste streams, including biosolids, agricultural, pharmaceutical and industrial organic wastes for the purpose of transportation fuel production.

8. The Department should consider, on a case-by-case basis, the limited use of biosolids in bioreactor landfills to enhance biogas generation for the purpose of production of transportation fuels. Current State policy does not view landfiling of biosolids as a beneficial use and therefore has prohibited landfill disposal. Landfills in New Jersey are nitrogen deficient in terms of the carbon-to-nitrogen...
ratio for optimal anaerobic digestion and gas production. The addition of biosolids would increase the amount of nitrogen in the landfill.

9. The Department should work with public and private stakeholders to identify, research, demonstrate and evaluate technologies which will increase biogas yields from the anaerobic digestion of organic wastes. The Department should request Rutgers University to focus research in this area and request the State Legislature to fund this effort.

10. The Department should undertake a study to identify other solid, semi solid and liquid organic waste streams in New Jersey, particularly in the industrial, pharmaceutical and agricultural sectors that are suitable for treatment by anaerobic digestion and encourage the deployment of this technology as a means of increasing the local renewable sources of LNG/CNG.

11. The Department should work with the NJBPU to consider: a) establishing a renewable portfolio requirement for all providers of pipeline natural gas in the State which would require providers to include a certain amount of renewable natural gas to users, similar to renewable portfolio requirements for electrical producers in the State, b) establishing open access to the natural gas pipeline for all renewable natural gas producers with a minimum compensation paid to the renewable natural gas producer by the pipeline gas providers at the avoided cost for non-renewable natural gas, c) establishing standards for the quality of renewable natural gas for introduction in the natural gas pipelines in New Jersey, and, d) funding a comprehensive study to, i) identify all sources of organic waste generated or handled in the state of New Jersey which are amenable to conversion to renewable natural gas and ii) evaluate technologies for conversion of organic waste and other biomass to renewable natural gas including technologies designed to increase gas yields.

New Jersey has a unique opportunity at hand with the co-development of new solid waste and air quality management plans to launch an organic waste-to LNG/CNG transportation fuel initiative. We should take advantage of this moment.

Notes

1. For more information on the Acrion CO₂ Wash Technology and the work carried out at the Rutgers EcoComplex go to www.acrion.com.
4. Tables A-1 and A-3 of the Draft Statewide Solid Waste Management Plan were utilized to determine the amount of organic waste disposed per year. The following waste categories were included: yard waste; food waste; newspaper; corrugated cardboard; office paper; and other paper. Total tonnage calculated was
4,842,800 tons of organic waste disposed annually and 2,687,579 tons recycled annually.

5. Assumes that organic waste is carbohydrate and the decomposition reaction \(2\text{CH}_2\text{O} \rightarrow \text{CH}_4 + \text{CO}_2\) provides 100% yield. Under these conditions 1 ton of carbohydrate will yield 24,000 cubic feet of biogas at 50% CH\(_4\) and 50% CO\(_2\). LNG conversion factor is 3.9 gallons LNG per 1,000 cubic foot of biogas.

6. A biogas yield of 2,800 cubic feet per ton of organic waste was utilized for this calculation. Typical gas yields for landfills and anaerobic digesters is in the range 2,200 cf/ton to 3,600 cf/ton.


10. Assumed 11.88 lbs. CO\(_2\) sequestered per gallon of LNG utilized. – Acrion Technologies Inc.

11. USEPA Fact Sheet, “Health and Environmental Impacts of NO\(_x\)”
    www.epa.gov/air/urvanair/nox/hlth.html
    7/12/2004
The New Jersey Environmental Justice Alliance, the New Jersey Environmental Federation and the Center for the Urban Environment of the Watson Institute for Public Policy of Thomas Edison State College request that the New Jersey Department of Environmental Protection (NJDEP) consider the pollution control strategies discussed below for inclusion in New Jersey’s State Implementation Plan (SIP) for PM2.5. Given the scientific evidence that links fine particulate matter (PM) to serious detrimental health effects (see Pope et al. 2004; Brock et al. 2004) we urge the state to take aggressive action to significantly reduce concentrations of this deadly pollution. We are particularly concerned about PM2.5 pollution in urban areas since the disproportionate number of poor, and Of Color, people that populate our cities (see Massey and Denton 1993) appear to be disproportionately burdened and affected by air pollution (see Institute of Medicine 1999; Godish 1997).

Retrofits

The recently enacted diesel emissions reduction legislation (S1759/A3182) provides a good starting point in retrofitting primarily publicly owned diesel powered on and off-road vehicles with emission reduction devices. However, it achieves only modest reductions and more extensive retrofitting and reductions are needed. Therefore, we recommend that, in conjunction with the use of alternative fuels, actions be taken to mandate the retrofitting of privately owned diesel powered on and off-road vehicles and construction equipment. To initiate this process the state should issue an executive order requiring retrofitting as a precondition to a public contract award. We further recommend that catalyzed particulate filters should be the type of retrofit required in New Jersey because they would reduce emissions more than other retrofit devices. This is especially important in the state’s urban areas where diesel soot levels can be dangerously high.

We also urge the NJDEP to adopt a Scrapage Program, a strategy discussed in the Diesel On-Road Work Group. While Scrapage Programs may be difficult to establish because of their high cost, we believe the SIP should include a recommendation for a plan to retire older diesel vehicles in the public fleet as a high priority, if such vehicles cannot accommodate catalyzed particulate filters and use the ultra low-sulfur fuel required in the new diesel emission reduction law. Traffic-congested cities would benefit from an accelerated program to retire such vehicles and replace them with vehicles that emit no more PM pollution than vehicles that utilize these pollution controls.

The diesel emissions reduction law contemplates requiring the retrofitting of school buses if tailpipe emissions significantly affect air quality inside the vehicles. While we believe that retrofitting school buses is the preferred pollution control policy
and a justifiable use of state resources our priority is protecting the health of children riding on the buses.

Ports and Trains

We recommend that the NJDEP create a comprehensive strategy to reduce fine particulate matter emissions from ports and trains that are located, or operate, in the state. We believe these pollution sources probably affect cities disproportionately since state ports and many train stations are located in or near urban areas. We recognize that a SIP working group discussed pollution control strategies that would reduce PM emissions from these sources and hope that implementation of the best policies that were considered will occur in the near future.

A starting point with respect to ports would be mandatory retrofitting of diesel powered equipment and harbor-craft, such as tugboats, that consistently operate in or near a state port. If it is not technically feasible to retrofit then electrification, re-powering or early retirement of diesel engines should be considered.

A similar strategy could be used for trains that travel through New Jersey. Where it is legally and technically feasible trains should be retrofitted. However, electrification, re-powering or replacement with a more environmentally friendly engine should also be considered if they are more feasible or provide a greater reduction in PM emissions.

While we would be delighted to engage the NJDEP in a detailed discussion of pollution control strategies for ports and trains, the primary thrust of our recommendation here is that the state needs to ensure that its working group discussions are translated to real world action.

Community Based PM2.5 And Diesel PM Monitoring System

We recommend the development and installation of a comprehensive community based PM2.5 and diesel particulate matter monitoring system as part of New Jersey’s SIP. To the best of our knowledge there are approximately 22 PM2.5 samplers in 18 locations (see NJDEP 2003a; 2003b) in the state that are currently operated by the NJDEP. Our concern is that this is an insufficient number of monitors to verify that ambient PM2.5 concentrations are actually below federal standards throughout urban areas and to capture any “hotspots” or intra-city variation in fine or diesel PM that may exist (see Kinney et al. 2000; Brock et al.2004). As organizations who are concerned about environmental justice issues we are particularly worried about variations in inner city air pollution concentrations because it has been determined that living near a major highway is more highly correlated to general and cardiopulmonary mortality than background concentrations of traffic related air pollution (Hoek et al. 2002) and that poor, and Of Color, children are more likely than other children to live in areas with high amounts of traffic (Gunier et al. 2003).

The monitoring program should use a community-based participatory approach (see O’Fallon and Darrar 2002) in its design and implementation and be a meaningful collaboration among the NJDEP, including its the Environmental Justice Task Force and
Advisory Council, members of affected communities, environmental/environmental justice organizations, health providers and institutions, and academic institutions. If concentrations of PM2.5 or diesel particulates are found that exceed federal standards, or pose a health threat to the community, then a pollution reduction plan should be developed and implemented through the cooperation of all participating parties.

“Moratorium” On The Issuance Of New Air Pollution Discharge Permits

We urge the NJDEP to include in its SIP a recommendation that the State adopt a rule that allows the NJDEP to refuse to issue a new air pollution discharge permit in an area that exceeds federal PM2.5 standards. The rule would strictly delineate when and under what circumstances the NJDEP could refuse to issue an air pollution discharge permit based on already existing levels of pollution in an area. We understand that the NJDEP has taken the position that it does not have the legal power to take this type of action but we believe that a “moratorium” on the issuance of air pollution discharge permits would be a reasonable strategy to employ if the health of neighborhood residents is threatened by fine PM concentrations. We urge the NJDEP, Department of Health and Senior Services (DHSS) and Attorney General’s office to be aggressive in defending the health of New Jersey residents and in this instance to interpret their legal power as broadly as possible in order to develop and implement a rule that would benefit those disproportionately burdened with environmental hazards.

Developing A Plan To Utilize Alternative Energy Sources

Some good dialogue on alternative energy sources has been exchanged in the NJDEP’s work groups, but the suggestions that have thus far emerged indicate that more discussion and action is needed. We recommend that the state be proactive in developing and utilizing as soon as possible a wide range of environmentally friendly alternative energy sources such as hydrogen, solar power, compressed and liquefied natural gas, biodiesel and the electrification of selected vehicles as part of the effort to reduce PM2.5 concentrations in New Jersey.

The NJDEP, in partnership with others, should study both the short and long-range feasibility of using the aforementioned, and other, alternative energy sources in New Jersey. The study and discussion would also present an excellent opportunity to enlist the aid of universities and colleges located in the state in our air pollution reduction efforts. Our local institutions of higher learning have the technical expertise and capacity to become a helpful and respected resource in the state’s fine PM reduction campaign.

Beyond The SIP

New Jersey Should Institute California’s Lower Mean Annual Standard For PM2.5

Although this policy may not be appropriate for inclusion in the SIP we recommend that in the near future the state lower the federal mean annual PM2.5 standard of 15.0 μg/m³ that it now uses to the more protective 12.0 μg/m³ standard that California employs. The linear relationship between PM2.5 concentrations and detrimental health effects (Pope et al. 2002), and the lack of an apparent lower threshold concentration for airborne PM (see Brock et al. 2004; Danials et al. 2000; Pope 2000), below which there are no negative
human health consequences, justify the utilization of the 12.0 \( \mu \text{g/m}^3 \) standard and provide evidence that this lower standard would decrease suffering and deaths caused by airborne PM. In a position paper written for the American Heart Association, Brock et al. (2004) seem to support the idea of lowering the federal 15.0 \( \text{g/m}^3 \) standard when they comment that “...because a number of studies have demonstrated associations between particulate air pollution and adverse cardiovascular effects even when levels of ambient PM2.5 were within current standards, even more stringent standards for PM2.5 should be strongly considered by the EPA.”

**Summary**

In summary, the New Jersey Environmental Justice Alliance, the New Jersey Environmental Federation and the Center for the Urban Environment of the Watson Policy Institute of Thomas Edison State College recommend that the following pollution control strategies be included in New Jersey’s State Implementation Plan for PM2.5:

1) All diesel powered-vehicles in urban areas in the public fleet should be required to utilize catalyzed particulate filters and ultra low sulfur diesel fuel. If they cannot accommodate these pollution controls they should be subjected to accelerated retirement and replaced with vehicles that emit no more pollution than diesel powered vehicles equipped with the aforementioned pollution controls.

2) School buses should be retrofitted with catalyzed particulate filters if it is at all possible but the priority of the state should be to protect the health of the children riding on the buses.

3) Retrofitting of privately owned on-road and off-road diesel powered vehicles in New Jersey should be mandated. As a minimum first step, the state should require by executive order that all privately owned diesel vehicles must be retrofitted as a precondition of a public contract award.

4) The NJDEP should create and implement a comprehensive strategy to reduce fine particulate matter emissions from ports and trains that includes the mandatory retrofitting, electrification, re-powering or early retirement of diesel powered trains, equipment and harbor-craft.

5) A community based PM2.5 and diesel particulate matter monitoring system should be established in New Jersey, especially in urban areas.

6) The NJDEP, DHSS and Attorney General’s Office, with EJ advocates’ input, should work together to devise a rule that under certain circumstances would allow the state to refuse to issue new air pollution discharge permits in an area that exceeds federal PM2.5 standards.

7) The NJDEP, in collaboration with universities and colleges located in the state, and others, should develop short and long-term strategies for the use of alternative
energy sources. The short-term strategies should be implemented as soon as possible.

8) The state should replace the federal mean annual PM2.5 15.0 ug/m$^3$ standard that it currently uses with California’s more protective 12.0 ug/m$^3$ standard.

Respectfully submitted on October 7, 2005.

Contact Information

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Sources Cited


Ms. Peg Hanna  
Manager  
New Jersey DEP  
P.O. Box 423  
Trenton, NJ 08625

Dear Ms. Hanna:

The New Jersey Coalition Against Aircraft Noise (NJCAAN) appreciates the New Jersey Department of Environmental Protection’s effort to reduce diesel emissions in the state and the opportunity to participate in the diesel emissions reduction workgroups.

Unfortunately, emissions for the metropolitan area airports are expected to rise materially given the Federal government’s lack of effective aircraft emissions strategies*. In addition, a five-year negotiation to reduce aircraft emissions between state and local regulators and the Environmental Protection Agency (EPA) and Federal Aviation Administration (FAA) failed in November of 2004. The State and Territorial Air Pollution Program Administrators (STAPPA) and Association of Local Air Pollution Control Officials (ALAPCO) were so dissatisfied with the EPA and FAA’s proposal that they walked away from the negotiations. Their letter to the EPA and FAA included the following statement: "The final proposal offered this summer was inadequate in terms of scope and stringency and placed unacceptable constraints on state and local air agencies' abilities to protect the public from the adverse health impacts associated with aviation-related pollution."

In response to the failed negotiations, Richard Marchi, senior vice president of technical and environmental affairs for the Airports Council International (an organization affiliated with the Port Authority of New York and New Jersey), provided the following commentary: states can extract bigger reductions in emissions by challenging plans airports have for expansion. Or they can pursue reductions through lawsuits, setting emissions "bubbles" over airports, or striking deals with individual airports -- the very things the talks were designed to avoid**.
We have introduced the airport bubble concept and emissions fees as proposed recommendations to the workgroup. Given the lack of Federal level initiatives to control and reduce aircraft emissions, it is up to states to address the problem at this point in time. As a result, we believe that the NJ DEP should “push the envelope” on potential legal issues that may arise from potentially implementing emissions mitigation strategies.

Robert Belzer

President

Cc: Ms. Kim Gaddy
    Mr. Wilbur McNeil, president, Weequahic Park Association
    Ms. Carol Skiba, Coalition for Public Health & Safety

* The emissions inventory included in the study “Aircraft NOx Emissions: Analysis of New Certification Standard and Options for Introducing an Airport Bubble” undertaken by The Center For Clean Air Policy estimates a 46% increase in nitrogen oxides emissions for Newark Airport over a 19 year period.

** Aviation Emissions Reform Has Trouble Taking Off By Cindy Skrzycki, Washington Post—Tuesday, December 14, 2004 (article attached to this email).

"The final proposal offered this summer was inadequate in terms of scope and stringency and placed unacceptable constraints on state and local air agencies’ abilities to protect the public from the adverse health impacts associated with aviation-related pollution." (Quote from STAPPA/ALAPCO state and local air agency group letter dated November 22, 2004 to the EPA and FAA.)
Aviation Emissions Reform Has Trouble Taking Off
By Cindy Skrzycki, Washington Post
Tuesday, December 14, 2004

The agreement just didn't fly.

For the past five years, the Environmental Protection Agency and the Federal Aviation Administration tried to negotiate with the airline industry, airport operators, environmental groups and state regulators to reduce emissions from the aviation sector, both aircraft and ground equipment.

About a dozen participants took part in the talks, which started as a discussion on reducing aircraft emissions but became a project directed solely at reducing pollution from older ground equipment owned by the airlines. State and local air pollution officials were so dissatisfied with the shift and the planned reductions for the equipment that they withdrew in late summer from what one called the "world's longest regulatory negotiation."

That meant that what could have been a nationwide consensus on how to cut pollution at airports likely will become a state-by-state effort -- something the industry wanted to avoid.

The proposed agreement committed the industry to curbing emissions of oxides of nitrogen, or NOx, a major source of ozone pollutants, by 50 percent by 2010. It would cover 40,000 pieces of equipment made before 1999, such as fuel trucks, aircraft tugs and baggage carts that would have to be retired or retrofitted at about 50 airports in polluted areas of the country. Newer models already are regulated.

In a Nov. 22 letter to the FAA and EPA, state and local pollution officials said: "The final proposal offered this summer was inadequate in terms of scope and stringency and placed unacceptable constraints on state and local air agencies' abilities to protect the public from the adverse health impacts associated with aviation-related pollution." The letter expressed disappointment that "no progress was made concerning the primary objective of reducing aircraft emissions." (The full letter Internet link is listed below.)

The two organizations representing states and localities -- State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials -- thought the industry offer would have made cuts that were not deep enough, at too few airports, and took too long to implement.

They also worried that the agreement would allow airlines to move "dirty" pieces of equipment to airports where pollution problems might not be as severe.

S. William Becker, executive director of the state and local regulatory groups, said the states wanted at least a 60 percent reduction in NOx emissions on the ground equipment.
Becker said the states voted to pull out when they realized that the industry offer was a "take it or leave it" proposition. "We don't have the luxury of ignoring any major source of air pollution," he said.

State regulators have no authority over aircraft emissions, but they count them when they are developing plans to comply with Clean Air Act rules. The voluntary agreement was supposed to be a way to extract aircraft emission cuts that would avoid states, airlines and airports making individual deals, such as those struck in Texas, California and Massachusetts.

Generally, the airline industry and regulators differ over whether aviation is a major contributor to the formation of ozone. States view emissions from airports as worrisome and likely to increase as air travel does. They also view the aircraft pollution rules issued by the EPA, with the FAA's concurrence, as weak, compared with those that apply to other transportation sectors.

Airlines and engine makers say it's not easy to reduce emissions because engine safety and noise has to be taken into account. They point to major reductions in hydrocarbons and carbon monoxide, as well as increased fuel efficiency, over the past 20 years. The Air Transport Association, which represents the airlines, said the industry accounts for just 0.4 percent of NOx in the United States -- although NOx emissions can be higher at individual, busy airports.

The airlines said they were surprised the state and local officials dropped out of the talks and regarded it as somewhat cheeky since the agreement would cost the industry about $1 billion to retrofit and replace the equipment at a time when carriers are financially strapped.

"The airlines are sucking air. We don't have two dimes to rub together," said Nancy Young, ATA's managing director of environmental programs. "But our CEOs stood behind a proposal that would cost $1 billion. And it was controversial."

Donald Zinger, EPA chief of staff for the Office of Air and Radiation, said it will be difficult, if not impossible, for the talks to continue now.

Airport owners, managers and the airlines would like the states to reconsider. Young said it may be possible to approach the governors or other state entities to keep the talks going.

Richard Marchi, senior vice president of technical and environmental affairs for the Airports Council International, said the states can extract bigger reductions in emissions by challenging plans airports have for expansion. Or they can pursue reductions through lawsuits, setting emissions "bubbles" over airports, or striking deals with individual airports -- the very things the talks were designed to avoid.
ATTACHMENT 9
White Paper from Ellen Garvey regarding transit bus strategies

New Jersey Department of Environmental Protection
Diesel Risk Reduction Program
On-Road Strategies Work Group
Transit Bus Project Proposal to reduce NOx and PM
Prepared for Peg Hanna, Manager, New Jersey Risk Reduction Program
Prepared by Ellen Garvey, Environmental Consultant
October 6, 2005

Background
As an environmental consultant, my work focuses on air quality issues in CA, and nationally. Of particular interest are ozone and particulate attainment opportunities. From 1996 – 2002, as the Executive Officer of the Bay Area Air Quality Management District, and from 1979 – 1981 as an engineer for the New Jersey Department of Environmental Protection, I have had first-hand opportunities to participate in emission reduction strategies to improve air quality.

At present, New Jersey faces serious air quality challenges, including being designated non-attainment for both 8-hour ozone and PM 2.5. New Jersey DEP is to be commended for the good work being done to develop a Diesel Risk Reduction Program. As we have seen in other parts of the country, aggressive strategies aimed at reducing in-use diesel NOx and PM emissions can create significant progress toward attainment of both ozone and particulate and can do so quickly and cost-effectively. One of the projects I worked on as a consultant involves the local Bay Area Air Quality Management District (BAAQMD), the MPO in the Bay Area (the Metropolitan Transportation Commission - MTC), and all Bay Area transit providers. This Proposal discusses the Bay Area project, and offers the opportunity for a similar project in New Jersey.

Air quality improvements resulting from this type of project are cost-effective, produce immediate emission reductions, and are proven.

Project Proposal
The partnership formed with the BAAQMD and MTC involved retrofitting 1600 transit buses from a variety of transit providers, including SF MUNI, Santa Clara Valley Transit, Golden Gate Transit, San Mateo County Transit, Alameda County Transit, and Contra Costa County Transit, and several smaller transit providers. MTC provided funding to these transit districts to retrofit their in-use diesel buses with a durable muffler replacement device that reduces both NOx and PM. This retrofit device, the Cleaire Longview, has been Verified by the California Air Resources Board (CARB) for a 25%
NOx reduction and an 85% PM reduction. This CARB Verification is also recognized by the US EPA.

Air quality improvements from this project are immediate, quantifiable and permanent, and can be used in conformity determinations, and for ozone and PM attainment plans. The PM emission reductions are also in conformance with CARB’s Diesel Risk Reduction program, and have resulted in reduced community toxics exposure.

The transit agencies are very pleased with their retrofits and the incentive funding provided. This project has been a “win” for all agencies involved, and has resulted in 360 tons per year of NOx reductions, and 35 tons per year of PM reductions. The attached one-page summary provides an overview of this project, and includes quotes from transit providers and others involved in the project (see attachment: “Cost Effective Attainment and Conformity in the Bay Area”). The transit providers believe Cleaire’s Longview is the ideal solution for regions that need to reduce both NOx and PM.

Emission reductions from this project have also been very cost-effective. A review of cost effectiveness comparisons of various CMAQ eligible projects indicates that diesel retrofit solutions are very cost effective (see second attachment: “Cost Effectiveness of various CMAQ eligible emission reduction strategies”).

Given New Jersey’s ozone and particulate levels, it seems prudent to be mindful of both NOx and PM reduction potential when contemplating reducing emissions from transit buses.

New Jersey Transit’s 3700 transit and commuter buses have a tremendous emission reduction potential for both NOx and PM, and a Verified retrofit solution is available and proven. Many of these buses are 1999 and older, and retrofitting these buses would result in very substantial reductions of both NOx and PM. Further, nearly all of the New Jersey Transit bus fleet is diesel fueled and the fleet makes an excellent candidate for cost-effective retrofits. Finally, New Jersey Transit exclusively uses low sulfur fuel for its bus fleet which will enable the maximum emission reduction potential from installation of Longview, without any need for new fueling infrastructure and associated employee training.

These reductions could be achieved very quickly. The distributor for the Cleaire Longview® in the New Jersey area is Cummins Metropower. Metropower has already installed these retrofit devices on refuse equipment operated by the Department of Sanitation in New York City and is ready and able to support use of these systems by New Jersey Transit.

**About Cleaire and the Longview**
Cleaire is focused on designing, developing, and manufacturing retrofit emission control systems for today’s in-use diesel engines. Each system maximizes emission reductions for specific vehicle fleet applications. While there is no “one size fits all” device, there
are solutions available and in development to essentially eliminate diesel soot from millions of diesels in daily operation.

The Cleaire Longview was specifically designed to provide cost-effective NOx and diesel particulate reductions from in-use diesel engines. The Longview integrates a NOx reduction catalyst and a catalyzed wall-flow silicon carbide diesel particulate filter to provide simultaneous reduction of NOx, PM, hydrocarbon, and carbon monoxide emissions configured in a modular user-friendly design. Longview is proven in service on a wide variety of applications including transit buses, refuse trucks, utility, and line haul.

**Maintenance of the Longview**
A key component to the efficient, long lasting operation of advanced, high efficiency diesel particulate filters is proper maintenance. Periodic cleaning or de-ash maintenance is critical to keeping your investment in good working order. To support users of advance diesel particulate filters, Cleaire has developed a patent pending cleaning station that automatically cleans the diesel particulate filter and also meets rigorous Cal OSHA worker requirements.

**Cleaire contacts**
If you would like additional information about Cleaire, or the bay area transit retrofit project, please contact:

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2. Tim Taylor, Director – Strategic Market Development  916-296-7049
3. Ellen Garvey, environmental consultant  650-868-5174
4. Sarah Sewik, transportation and environmental consultant, 310-417-6660 ext. 24