Successes and Regional Programs

A variety of regional programs have proven successful at reducing harmful diesel pollution. This section of the handbook provides examples of voluntary government or private sector leadership in retrofitting construction equipment: such as Boston's Big Dig Project, Connecticut's Q-Bridge, Project, the Port of Houston Retrofit Program, and New York's World Trade Center Site Program and Local Law 77. Additionally, this section examines examples of successful economic or market incentive programs that provide financial support for cleaner technology or fuels, such as the Texas Emissions Reduction Plan or the Carl Moyer program in California.

1. "Best Available Retrofits": World Trade Center and New York City Local Law 77[i]

Lower Manhattan is a thriving mix of apartments, art galleries, shops and restaurants, where more than 4000 children live throughout lower Manhattan in neighborhoods as diverse as TriBeCa, Chinatown and Battery Park City. During the rebuild of the World Trade Center site, lower Manhattan is going to be one of the nation's largest construction sites, teeming with diesel engines. These diesel engines will be operating just steps from school, playgrounds, parks, homes and offices.

Governor Pataki and New York City have pledged to use best available retrofits and cleaner diesel fuel in all of the reconstruction efforts. In 2002, Governor Pataki committed to the use of ULSD and best available retrofits in all state-controlled lower Manhattan construction projects, including at the World Trade Center site. Both the New York State Assembly and Senate followed Governor Pataki's lead and passed legislation on June 22, 2004 codifying Governor Pataki's commitment.[ii] The law was unanimously approved in both the House and the Senate and was recently signed into effect by the governor.[iii] It requires that contractors and subcontractors using diesel-powered nonroad vehicles with an engine horsepower rating of 60 HP and above to use only ultra-low sulfur diesel fuel and to retrofit, where practicable, their equipment with oxidation catalysts, particulate filters, or technology with "comparable or better effectiveness."[iv]

At World Trade Center 7, retrofits and other pollution control measures are already taking place. In October of 2002, the site converted to ultra low sulfur diesel fuel for all equipment. Six pieces of construction equipment have already been retrofitted, and one electric crane is being used in lieu of the typical diesel engine crane technology because it does not create any emissions. It is important to note that these emissions control strategies target PM reductions, and none of them address NOx emissions.

In March of 2003, a stationary generator was been equipped with a DOC. Also in March of 2003, a Caterpillar 245D 14.7 liter 3406 diesel engine Excavator and a Komatsu PC200 5.9 liter engine Excavator were retrofitted with DOCs. In January of 2004, a125 kilowatt Rudox stationary generator with a 6.8 liter turbo diesel engine was recently retrofitted with a Rypos RT500 active DPF. This retrofit produced reductions in PM, CO, and HC emissions of 80-90% across the board. Further, in May and June of 2004, two cranes (one with a 4-stroke and one with a 2-stroke engine) with difficult daily duty cycles were retrofitted with high performance DOCs, known by the trade name of "diesel particulate reactors."[v] NESCAUM is verifying the initial PM reduction rates for the cranes, but the target reduction rates are between 45-55% PM, and approximately 55% for HC and CO. The site has plans to retrofit one more piece of equipment, a concrete pump, with a DOC. Rather than purchasing a new DOC, the retrofit will reuse a high-efficiency DOC from one of the cranes after crane use is finished.[vi]

The Clean Air Communities Diesel Emissions Reduction Project at World Trade Center 7 is the first public-private endeavor of its kind in the city. Indeed, NESCAUM Executive Director, Ken Colburn says, "through the application of advanced emission control technology and the use of ultra low sulfur diesel fuel, this Clean Air Communities initiative demonstrates that innovative, clean air progress is possible even at large-scale urban construction sites across the nation." (http://www.cleanerfuture.com/pressreleases.htm#)

Recently, New York City committed to emissions reduction measures for city-funded construction. New York City Local Law 77 calls on New York City to use clean fuels and advanced emissions-control technologies in all city construction fleets and contracts. The law requires two fundamental steps.[vii] First, it requires the use of ultra-low sulfur diesel (ULSD) fuel with a maximum sulfur content of 15ppm in all city contracts, on a schedule set forth in the law. Second, it requires use of "best available" emissions control technology for any class of engine to which the law applies.

Local Law 77 provides a high standard for what shall constitute "best available" technology, calling on the City to use technologies that reduce both fine particulate matter (PM) and oxides of nitrogen (NO_x). Specifically, Local Law 77 requires that agencies use technologies that "shall be primarily based on the reduction in emissions of particulate matter and secondarily based upon the reduction in emissions of nitrogen oxides."[viii] The DEP is in the process of promulgating rules defining "Best Available Technology."

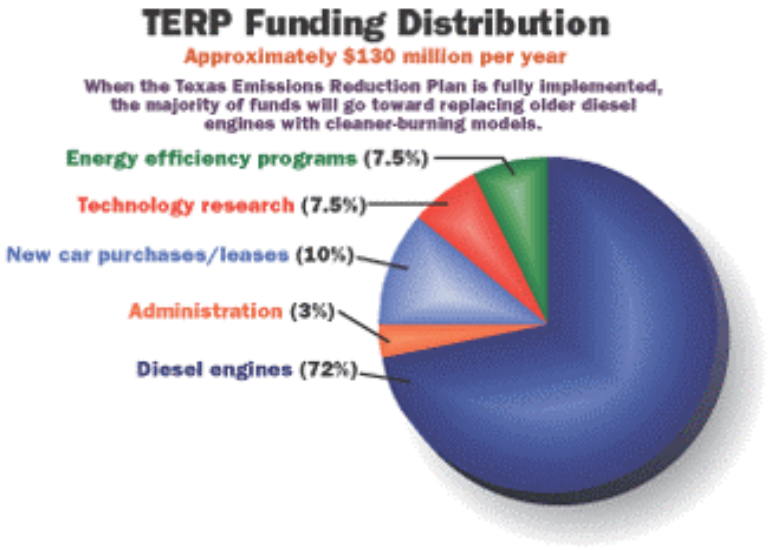
Retrofits and ULSD have been tested at the World Trade Center 7 site, incorporated into Lower Manhattan Development Corporation design guidelines, and now every Environmental Impact Statement for major reconstruction projects in lower Manhattan, from the Fulton Street transit center to Route 9A, has committed to using advanced retrofits in their environmental impact statements. For example, the Fulton Street Transit Center draft environmental impact statement requires the use of Tier 2 compliant equipment with PM emissions reductions at 85%.[ix] Additionally, many projects in lower Manhattan are already moving ahead with emissions-reduction strategies based on a wide range of technologies.

2. The Texas Emission Reduction Program[x]

In 2001, the Texas State Legislature established the Texas Emissions Reduction Program, enacted through Senate Bill (SB) 5. The goals of the TERP, as stated in SB 5, are to: "assure that the air in the state is safe to breathe and meets minimum federal standards established under the Federal Clean Air Act (42. U.S.C. Section 4707); develop multi-pollutant approaches to solving the state's environmental problems; and adequately fund research and development that will make the state a leader in new technologies that can solve the state's environmental problems while creating new business and industry in the state."[xi]

The TERP covers forty-one counties in the state where air quality violates or is close to violating EPA standards.[xii] Projects are eligible for financial assistance through a number of programs, including: the Emissions Reduction Initiative Grants Program, which offers incremental funding for NOx emission reduction activities; the Small Business Program, which offers grants to small businesses for pollution reduction measures; the Heavy-Duty Motor Vehicle Purchase or Lease Incentive Program, which allows the Texas Commission on Environmental Quality to reimburse a purchaser or lessee of a new onroad heavy-duty vehicle for the difference in price between that vehicle or a higher-emitting diesel-powered vehicle; and the Light-Duty Motor Vehicle Purchase or Lease Incentive Program, which (though currently unfunded) is intended to provide financial incentives for the purchase of light-duty motor vehicles that are EPA-certified at a lower NOx emissions standard than regular light-duty motor vehicles.

TERP will offer a total of approximately $130,000,000.00 in funding for emissions reductions programs each year over the next three years.[xiii]



In the 2004 grant application period, the Texas Commission on Environmental Quality administered a total of approximately $97,000,000 in grants offered under the Emissions Reduction Grant Incentive Program.[xiv] The projects from the first round of grants are expected to reduce NOx emissions by over 3,500 tons over their lifetime, at an average cost of about $5175.00 per ton reduction.[xv] The projects funded by the second round of these grants are expected to reduce NOx emissions by almost 13,600 tons over the life of the projects, at an average cost of $5,960.00 per ton reduction.[xvi] In 2004, the average cost per ton reduction of NOx emissions was approximately $5,800.00. This represents a lower average cost per ton NOx emission reduction than achieved by 2002-2003 grants funds, which offered over $28,000,000.00 in funding to reduce NOx emissions by over 4,100 tons over the life of the projects at an average cost of approximately $8362.00 per ton.[xvii]

Grant award details are available at: http://www.tnrcc.state.tx.us/oprd/sips/terp.html and more information can be found at http://www.tnrcc.state.tx.us/oprd/sips/terp.html.

3. The Big Dig Project[xviii]

"The Big Dig diesel construction retrofit program has proven that retrofitting construction equipment with DOCs is very feasible, and provides beneficial air quality improvements in terms of emission reduction and odor control."

—Alex Kasprak, Environmental Engineer, Massachusetts Turnpike Authority, CA/T Project

The Central Artery Project in Boston, also known as the "Big Dig," is building 161 lane miles of highway in a 7.5-mile corridor directly through the middle of densely populated downtown. The project began in September 1991 (and is currently scheduled to be completed in November 2005[xix]) and presented an historic opportunity to test and demonstrate the feasibility of pollution control retrofits. Use of these retrofits helps to minimize the impact of such a large- scale project by reducing air pollution and lessening the health impact of a major construction project on workers, neighborhoods and regional air quality.

The Massachusetts Turnpike Authority (MTA) in collaboration with the Massachusetts Department of Environmental Protection (DEP) and the Northeast States for Coordinated Air Use Management (NESCAUM), chose to retrofit construction equipment with diesel oxidation catalysts. Although other technologies achieve higher particulate reduction rates than DOCs, the MTA preferred DOCs for several reasons, but primarily because the very clean diesel fuel (15ppm of sulfur or less) needed to operate other technologies was not available at the time the Big Dig began.

The Big Dig retrofit project has resulted in the installation of DOCs on approximately 200 pieces of construction equipment — this includes small in-tunnel cranes[xx], lifts, excavators, bulldozers, generators and compressors. This effort will achieve air emissions reductions that are the equivalent of removing 1,300 diesel buses off Boston streets for a full year[xxi].

The Big Dig is a true success. **No adverse operational problems or additional maintenance costs have been experienced by Big Dig construction equipment retrofitted with DOCs[xxii].** Additionally, preliminary estimates of area-wide emission reductions from the retrofitted equipment amount to approximately 36 tons/year for carbon monoxide, 12 tons per year of hydrocarbons, and 3 tons per year of particulate matter.[xxiii]

The Massachusetts Highway Department provided funding to contractors to purchase the emission control devices. According to Alex Kasprak, Environmental Engineer, Massachusetts Turnpike Authority, one of the lessons learned from the Big Dig project is that it is best to include the requirement for emission control equipment as of the contract's bid package. By doing so, the cost of the retrofit equipment can be included as part of the overall contract cost. This will also ensure that the maximum number of offroad pieces of equipment can be retrofitted.[xxiv] Overall, the Big Dig retrofit program is now being used as a model by regulatory agencies to encourage other construction projects to utilize retrofitted diesel equipment.[xxv]

4. I-95 New Haven Harbor Crossing Corridor Improvement Program (Q-Bridge Project)[xxvi]

"I am very proud of Connecticut's success in this Clean Air Construction Initiative. The State of Connecticut's various Departments and Connecticut Construction Industry Association (CCIA) worked and are still working to benefit the people of Connecticut by trying to improve the quality of life in locations where transportation projects are occurring. We are sensitive to those that live or work in an area were construction is going on, day after day, and how it affects those people's lives. This Initiative is a step in the right direction. As technologies improve, greater air quality can be achieved."
—Donna Weaver, Transportation Planner, Office of Environmental Planning, Connecticut Department of Transportation

Sixty-four diesel oxidation catalysts have successfully been installed at the Connecticut Q-Bridge project. In addition, Construction Contractors have volunteered to use low sulfur diesel (500 ppm sulfur content) on all their nonroad equipment. The Q-Bridge project is part of Connecticut's Clean Air Construction Initiative and was launched to protect laborers as well as residents from harmful construction emissions along a densely populated corridor. Construction began in 2001 and is scheduled to end in 2013.

The Connecticut Clean Air Initiative was a mutual effort of the ConnDOT, ConnDEP, ConnDMV and CCIA to come up with real world solutions to air quality problems. With compromise, a specification was evolved from the above mention agencies to improve the quality of life through this long duration construction project. ConnDOT is requiring all contractors and sub-contractors to take part in the Connecticut Clean Air Construction Initiative. The cost to purchase the DOCs and/or using Clean Fuels such as PuriNOx were included in the overall contract cost, as bid by each contractor. At present, all contractors have decided to install DOCs. Estimates for reduced emissions during the I-95 NHHC Corridor Improvement Program are 20 tons/year for carbon monoxide and 2 tons/year for fine particulate matter (with clean fuels or oxidation catalysts) and 8 tons/year for hydrocarbons (with oxidation catalysts only).[xxvii]

5. Port of Houston[xxviii]

The Port of Houston is the sixth largest port in the world[xxix], and a significant contributor to NOx emissions in the eight counties in the Houston-Galveston area. The EPA classified this area in 1990 as a non-attainment area for the one-hour ozone standard of the Clean Air Act.[xxx] Although the Port of Houston Authority is not the largest contributor to emissions in the area, they have become the region's leader in emission reduction activities and commitments.

Through demonstration testing of the alternative fuel PuriNOx on rubber-tire gantry crane with a 550 horse-power engine, the Port of Houston Authority (PHA) has reduced NOx emissions by 25% and PM emissions by 50%.[xxxi] In September of 2003, the Port Authority converted 39 yard tractors and yard cranes to PuriNOx and enacted the requirement that any new equipment purchased be able to use the technology.[xxxii] Approximately 49 pieces of cargo-handling equipment are currently operating on PuriNOx for a NOx emissions reduction of approximately 21 tons per year at a total cost of $216,000. According to Roger Guenther, container facilities manager at Barbours Cut Container Terminal "It's just a different fuel, nothing special has to be done to the equipment. I could put diesel back in any of the offroad vehicles and they would run just fine. I can't tell any difference from one to the other."[xxxiii]

The PHA has also applied for and received $337,000 in TERP funding to replace two Fireboat FARNSWORTH propulsion engines with engines that produced 5.6 tons less NOx per year.[xxxiv] Additionally, the PHA has purchased several new yard tractors and container handlers with clean engine technology, resulting in NOx emissions reductions of 6.9 tons per year at a cost of $21,500.[xxxv] Further, the PHA purchased 33 Ultra Low Emission Vehicles and/or propane vehicles for their onroad fleet.[xxxvi] The PHA plans to extend its retrofit program (which involves either retrofitting vehicles with oxidation catalysts, switching their fuel use to PuriNOx, or both) to between 50 and 250 vehicles .[xxxvii] In total, the PHA has reduced NOx emissions by 33.5 tons per year with the assistance of $574,000 in TERP funding.

6. California's Carl Moyer Program[xxxviii]

The **Carl Moyer Memorial Air Quality Standards Attainment Program** provides funds on an incentive-basis for the incremental cost of cleaner than required engines and equipment. Funding is available for nonroad equipment 50 hp or greater. Eligible projects include cleaner onroad, offroad, marine, locomotive and stationary agricultural pump engines, as well as forklifts, airport ground support equipment, and auxiliary power units. The program achieves near-term reductions in emissions of oxides of nitrogen (NOx), which are necessary for California to meet its clean air commitments under the State Implementation Plan. In addition, local air districts use these NOx emission reductions to meet commitments in their conformity plans, thus preventing the loss of federal funding for local areas throughout California. The program also reduces particulate matter (PM), a component of diesel exhaust the Air Resources Board recently identified as a toxic air contaminant.

The California Air Resources Board (CARB) is responsible for the development and oversight of the majority of the Carl Moyer Program. CARB distributes Carl Moyer funding to California's 35 local air districts, which then screen applications and distribute the funding to diesel engine owners. Through year six of the Carl Moyer Program, it had received approximately $154 million dollars in total funding.[xxxix] Program examples include: repower of nonroad equipment/ refuse trucks, compressed natural gas (CNG) buses, agriculture pumps, sweepers, tractors and some marine repowers. More information is available on the Carl Moyer Program website, at: http://www.arb.ca.gov/msprog/moyer/moyer.htm.

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For more examples of retrofit projects around the country, please see a project map of nationwide EPA-funded retrofit projects (onroad and nonroad). This resource covers projects through the Spring of 2004, and is available online, at: http://www.epa.gov/otaq/retrofit/projectmap.htm.

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