Clean Air Excellence Award Recipients: Year 2008

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Clean Air Technology

Caterpillar D7E with Electric Drive — Caterpillar Inc., Peoria Ill.

Designed completely from the ground up, the Caterpillar D7E is a revolutionary track-type tractor that incorporates more than 100 patents and focuses on maximizing efficiency. Fuel consumption has been reduced by 10 to 30 percent (depending on work load/cycle) and dozing efficiency increased by 25 percent (cubic yards moved/gallon of fuel) compared to previous models. This machine also uses fewer parts and fluids during its useful life. Together, these changes significantly reduce CO2 and gaseous emissions.

The most significant innovation behind this leap forward in technology is a very compact AC electric drive train. This drive train replaces the power shift transmission that is typically used in this size track-type tractor. The technological challenges for electric drive trains in track-type tractors include frequent directional shifts, the need to have very powerful electrical components in a small amount of space (power density), the need to operate in mud and partially submerged in water, as well as making these components work under strong vibration levels.

The innovation of the D7E electric drive train is centered on AC electric technology controlled by solid-state semiconductors. This continuously variable speed, brushless motor design, combined with sealed and liquid-cooled components are the key breakthroughs that make this technology viable in a track-type tractor.

By overcoming the challenges involved with the designing of the D7E, Caterpillar has opened the door to new applications for electric drives in construction equipment. Now workers on jobsites across the Unites States can look forward to higher productivity and fewer emissions.

Kenworth Green Power Solutions — Kenworth Truck Company, Renton, Wash.

Kenworth Truck Company is committed to providing a broad range of products for the commercial vehicle market that minimize environmental impact through reduced emissions, greenhouse gases, and fuel consumption. This effort is epitomized by three products released in 2008: Kenworth's Clean Power System,

Medium Duty Hybrid, and Natural Gas Powered Vehicle.

The Kenworth Clean Power System is a no-idle, battery-powered system that provides 10 hours of continuous operation during mandatory rest periods for truck drivers. The system is comprised of enhanced insulation, cooling storage capacity for air conditioning, auxiliary heat, high efficiency LED lighting, and 110 volt AC outlets. By eliminating idling during rest periods, the system reduces fuel use by one gallon per hour.

The Kenworth Medium Duty Hybrid Truck is powered by a parallel diesel-electric system. This system, developed in partnership with the Eaton Corporation, also utilizes braking energy to recharge its batteries in preparation for vehicle acceleration. Fuel consumption can be decreased up to 1,500 gallons per year and CO2 by 38 percent for specific applications. The utility configuration can run a hydraulic boom directly from the hybrid batteries, resulting in even greater savings.

The Kenworth Natural Gas Powered Vehicle was developed in partnership with Westport Innovations. This truck uses a small injection of diesel to ignite the high pressure natural gas, which gives the performance and longevity equivalent to a diesel engine, while using domestically available fuel. Fuel is stored as liquid natural gas (LNG) for increased energy density. The factory-built Kenworth T800 LNG truck reduces emissions for NOx by 27 percent, particulate matter by 40 percent, and CO2 by 24 percent.

LEHR Eco Trimmer — LEHR Inc., Los Angeles, Calif.

LEHR Incorporated has developed the LEHR Eco Trimmer, the first hand-held garden tool fueled by propane. The benefits of this fuel have previously only been available for vehicles, forklifts, and large equipment over 12 horsepower. LEHR's new technology addresses the need for the clean air benefits of propane in the handheld and portable power tool market.

The Environmental Protection Agency (EPA) has identified that emissions from gas-powered grounds keeping equipment are a significant source of air pollution. Compared to gasoline combustion, propane combustion produces 97 percent less particulates, 96 percent less carcinogens and less CO, hydrocarbons, and NOx. In addition, it has zero ozone depleting potential. According to tests conducted by an EPA approved laboratory, the Eco Trimmer surpasses the 2011 exhaust emissions standards for hydrocarbons by over 65 percent and carbon monoxide by nearly 75 percent.

Using the standard 16.4 ounce propane canister as its fuel source, the Eco Trimmer eliminates the possibility of spillage and leakage. The sealed fuel system results in zero evaporative emissions, which is the most difficult to control source of emissions in this product category. This reduces smog-producing pollution created each season by fumes associated with filling/spilling gasoline into lawn products and from fumes escaping from gas cans. Through the use of propane fuel, LEHR has created a cost effective way to help consumers reduce dangerous emissions and their associated health risks.

"miniHybrid" Thermal Systems for Municipal Transit Buses — Tri-County Transportation District of Oregon, Portland, Ore. — Engineered Machined Products, Escanaba, Mich.

The Tri-County Metropolitan Transportation District of Oregon (TriMet) has partnered with Engineered Machined Products, Inc. (EMP) to develop EMP's "miniHybrid" Thermal Systems for use in municipal transit

buses to improve fuel efficiency and reduce emissions. TriMet approached EMP with the idea of using their technology in the transit sector in 2006. TriMet's Bus Maintenance Department and EMP have worked together to develop and improve the concept of electrifying the cooling system on transit fleets throughout North America.

The thermal system replaces the bus's hydraulic fan with efficient, controllable electric fans and replaces the standard alternator with EMP's advanced, high-efficiency Power 450, reducing the horsepower (hp) required from 45 hp to 10 hp. The system also uses reversible fans to clean debris from the radiator to further improve engine efficiency. The technology reduces maintenance and improves safety by eliminating the use of hydraulic fluid. Transit authorities have experienced fuel economy improvements up to 10 percent, depending on location and use, which directly reduces the emissions associated with exhaust from diesel and compressed natural gas (CNG) buses.

The technology can cost effectively retrofit existing buses for $15,000 or be installed at the time of production for $7,500. EMP's miniHybrid thermal system fits all existing transit bus drive train technologies, including hybrid and compressed natural gas, allowing universal application in new and retrofitted buses. The opportunity to retrofit fleets with a cost effective technology offers the promise of accelerating emission reductions throughout the transit sector. The potential savings is substantial; transit fleets currently consume over 1.3 billion gallons of gasoline equivalent annually.

Renewable Biogas Fuel Cell Project — City of Tulare Public Works Department, Tulare, Calif.

The City of Tulare, in California's San Joaquin Valley, is committed to the adoption of clean air technology. The city shows this commitment with their Renewable Biogas Fuel Cell Project that uses digester gas from the city's wastewater treatment plant for cogeneration of electricity, while maintaining a nearly zero emission standard. The project was designed and constructed by Alliance Power Inc. of Littleton, Colorado and consists of three Fuel Cell Energy 300 kW DCF300MA biogas fuel cells preceded by a biogas treatment system designed by Applied Filter Technology.

Each of the three fuel cells in the plant generates approximately 300 kilowatts (kW), which together equate to approximately $2,500 worth of electricity per day. In addition to generating electricity with little to no emissions, the fuel cells give use to digester gas that was previously burned in a flare. The fuel cells serve as an energy source for the wastewater treatment facility. Fuel cells release 99 percent less NOx, 99 percent less SOx, and 99.98 percent less PM10 than conventional methods of cogeneration. This project is even more important in the San Joaquin Valley, which is an extreme non-attainment air basin where there is an excessive number of hospitalizations due to air pollution related diseases. Tulare anticipates the addition of a fourth fuel cell to further reduce emissions from its facility.

VOC Elimination Project — Garlock Sealing Technologies, Palmyra, N.Y.

Garlock Sealing Technologies embarked on a project to eliminate the use of an Environmental Protection Agency regulated volatile organic compound (VOC), or hazardous air pollutant (HAP), solvent from the manufacture of its sheet gasket products. This project has promoted a better factory work environment and improved environmental stewardship at its Palmyra, New York facility, and involved changing a process that has been virtually the same since 1905.

Sheet gasket products are manufactured by compressing mixtures of fibers and solvated rubber, resulting in the release of over 100 tons of VOC/HAP emissions per year. During the five-year, $3 million project, many solvent substitutes were investigated and a non-VOC/HAP solvent was found, tried, and proved, resulting in the development of a new manufacturing process. The project included high-efficiency recovery systems to capture and reuse the new non-VOC solvent. The system has realized an average efficiency of 95 percent year-to-date.

The project also resulted in a gasket product with better branding for accurate identification, non-stick properties for easy removal, and most notably a gasket that seals 20 percent better. A better sealing gasket further extends the positive result of VOC/HAP emission elimination. Sheet gaskets are used to seal many thousands of flange joints present in the pipe lines of a typical oil refining, chemical, pulp and paper, or power plant. A better seal means lower fugitive emissions from the flange joints of these and other industrial processing facilities. In November 2007, Garlock's Palmyra, New York facility made its last VOC/HAP based sheet gasket, resulting in the production of a better product with significantly lower environmental impact.

Renaissance Rumford 1,000 — Renaissance Fireplaces, Bellevue, Wash.

Renaissance Fireplaces has produced the world's first certified clean burning open fireplace. First introduced to the fireplace industry at the Hearth Patio and BBQ Association trade show in February 2008, the Renaissance Rumford 1,000 has been specifically developed to surpass the low emissions performance requirements of the new ASTM low mass fireplace standard. It incorporates a positive sealing outside air intake, a gasketed guillotine style glass door, and utilizes an insulated chimney to prevent uncontrolled cold air leakage from the chimney system. In addition to surpassing the national standards for woodstove emissions, the Renaissance Rumford fireplace surpasses the most stringent state standard of 4.5 g/hr set by the State of Washington.

Independent certification testing shows that with the door open emissions were 70 percent less than a typical fireplace, but with the door closed reductions were even more significant with 93 percent less emissions (surpassing EPA Phase 2 standards). Within two minutes of lighting a fire there is no visible smoke exiting the chimney, even with the door open. This technology enables the Renaissance Rumford to burn cleanly and heat large rooms.

Delivering a clean burning fireplace with these performance capabilities is extremely important to the future of wood burning and the environment. Renaissance Fireplaces offers the modern homeowner the ability to burn wood in an environmentally friendly manner.

Community Action

Greater Boston Breathes Better — The Consensus Building Institute, Cambridge, Mass.

The Greater Boston Breathes Better (GB3) partnership is a multi-stakeholder partnership dedicated to improving air quality and reducing emissions from transportation and construction. GB3 provides a forum for sharing experiences, concerns, and lessons learned, while offering funding opportunities and technical resources. Through voluntary partnerships, expanding networks, and increasing collaboration among the

area's diverse sectors, GB3 is able to educate the public and apply innovative technologies to reduce emissions from transportation and construction sources in the City of Boston.

Partner projects have significantly reduced the local impact of diesel emissions, including: training over 1,000 school bus drivers in anti-idling procedures; the adoption of construction contract language requiring retrofits and cleaner fuels at several significant construction projects; the use of biodiesel in Harvard University's vehicles; and retrofitting the Medical Academic and Scientific Community Organization's 17 shuttle buses and Boston's 600 diesel school buses with advanced pollution control technology.

GB3 hosted sector-based workshops providing technical assistance and facilitating discussion on emission control strategies. These workshops educated a large community of stakeholders beyond GB3's members and resulted in quantifiable emission reductions. GB3's partners include Boston area academic institutions, federal, state, and municipal government representatives, hospitals, technology and energy vendors, construction firms, environmental non-profits, and community organizations.

The GB3 partnership is a successful model for fostering collaborative actions to address local environmental issues. The partnership has begun to share experiences, resources, and tools with communities beyond Greater Boston and has promoted similar partnerships in Manchester, New Hampshire and Providence, Rhode Island.

Education/Outreach

Air- The Search for One Clean Breathe — Ventura County Air Pollution Control District, Ventura, Calif.

Air – The Search for One Clean Breath is a high definition film created by the Ventura County Air Pollution Control District with support from Media 360, the Port of Long Beach, Loma Linda University Medical Center, the British Antarctic Survey Core Programme, the National Geographic Society, the United States Environmental Protection Agency (EPA), and many others. Narrated by Tony Award winning actor Joe Mantegna, the film showcases air as a vital resource to be protected. As executive producer and co-writer Barbara L. Page says, "We want to let audiences see air; to tell them the amazing story of air, up close and personal." Viewers take a guided tour of the story of air, from its ancient beginnings to today's clean air technologies. On this journey, they meet renowned scientist and scholars worldwide who are discovering the mysteries of air.

The goal is to instill in viewers the idea that they have a personal choice to help clean our air, and that personal action is an ongoing responsibility of everyone who breathes on this planet. A DVD was provided to every state and local air agency in 2008, and was officially released in April at the EPA Air Now Conference in Portland. Since then, it has been shown nationally to thousands of viewers via theater venues, community screenings, local cable access television, classrooms, museums, and libraries. In addition, a teacher's guide to the film will be available in summer 2009 that will contain lessons in social science, science, and history and can be located on the film's Web site at www.airthefilm.org.

Air North Texas — North Central Texas Council of Governments, Arlington, Texas

Air North Texas is a regional clean air partnership between public, private, and non-profit sectors designed to inform residents and encourage them to make clean air choices. The goal of the partnership is to offer the public a comprehensive air quality resource while promoting a consistent regional air quality message. By leveraging existing resources and program strengths, the partnership increases public awareness of specific opportunities to reduce ozone-forming emissions.

The partnership formed a task force to develop the Air North Texas goals into a comprehensive and versatile regional public awareness campaign utilizing print, radio, Internet, and non-traditional communication strategies, such as gasoline pump toppers at refueling stations.

Air North Texas members participate in community events and outreach in an effort to promote clean air choices. Educational and marketing materials like "Go Green-Breathe Clean" bracelets and Air Quality Index crayons are distributed to citizens. These materials encourage people to think about air quality and to visit the Web site, www.airnorthtexas.org. This site serves as a comprehensive resource for the general public and Air North Texas partners. Here, residents can sign up for Clean Air Mail, a monthly e-mail with air quality information and tips for reducing emissions, as well as air quality warnings. Another campaign element crucial to the success of Air North Texas has been performance measures such as Web traffic tracking, which is continuously implemented to monitor and evaluate campaign effectiveness. This measure, along with the use of surveys and focus groups, allow the coalition to identify new opportunities to enhance the initiative, all the while promoting clean air choices.

Cool School Challenge — Puget Sound Clean Air Agency, Seattle, Wash.

Simple actions, taken together, can create a climate of change. This is the founding principle of the Cool School Challenge, a climate education program that engages students and teachers in practical strategies to reduce carbon dioxide emissions school-wide. The program also encourages student leadership and empowerment, fostering a new generation of air quality advocates.

The Puget Sound Clean Air Agency and partners Puget Sound Energy and Northwest Clean Air Agency built the program around an idea created by environmental science teacher Mike Town and the students of Redmond High School. Inspired by the U.S. Mayor's Climate Protection Agreement spearheaded by Seattle Mayor Greg Nickels, the Redmond High students decided, "if mayors and cities can take action on climate change, so can students and schools."

In the Cool School Challenge, student teams conduct energy audits of classrooms, assessing the greenhouse gas emissions of electricity use, waste and recycling practices, transportation, and heating. Classrooms then pledge to shrink their carbon footprint through simple but effective behavior changes, such as turning off one panel of lights, using durable coffee tumblers instead of disposable cups, or carpooling instead of driving alone. The Web-based program is designed for grades 7-12 and includes a Web site (http://www.coolschoolchallenge.org EXIT Disclaimer), a Challenge toolkit, classroom carbon calculator, classroom activities, and supplemental resources.

To introduce the program into schools, the partners offer free teacher training workshops throughout western Washington, which to date have drawn nearly 200 teachers and educators. Subsequently, more than 30

schools have pledged to reduce their carbon footprints, reporting nearly 600,000 pounds in potential greenhouse gas reductions.

Regulatory/Policy Innovations

Nez Perce Tribe Air Quality Program — Nez Perce Tribe Environmental Restoration and Waste Management Division, Meridian, Idaho

The Nez Perce Tribe Environmental Restoration and Waste Management Division's Air Quality Program is a model program that has developed and implemented a number of significant innovative air quality programs that go beyond applicable laws and regulations. An example of this leadership is the Nez Perce Tribe's smoke management program. This program promotes community awareness of air quality concerns in connection with agricultural, open, and forestry burning.

The Nez Perce Tribe's smoke management program, which has been in place since 2002 in a voluntary capacity, has achieved compliance through collaboration. The policies implemented by the program provide flexibility to the regulated community by allowing input, ownership, and responsibility to them as the affected public. There are also collaborative meetings with the Environmental Protection Agency (EPA), states, and tribes in the region to amend the program's policies and procedures.

The voluntary nature of the program allowed the agricultural community to prepare for the Federal Air Rules for Reservations (FARR) implementation in 2005. The agricultural community, which initially resisted the new FARR rules, now fully supports the program and is encouraging the State of Idaho to parallel the Nez Perce Tribe's smoke management program. The vision of the program is that the technical guidance and burn prescriptions will always be living documents to be revisited when warranted to implement changes as necessary.

The Nez Perce Tribe has initiated a better understanding of the need for the tool of burning to include protection of the public's health and welfare. The Nez Perce Tribe continues to provide leadership through their collaborative air quality policies.

Green Flag Incentive Program — Port of Long Beach, Long Beach, Calif.

The Port of Long Beach's Green Flag Incentive Program is an innovative air quality initiative that provides incentives for ships to voluntarily slow down within 20 nautical miles of the harbor to decrease fuel consumption and reduce air pollution in communities surrounding the Port. The $2.2 million per year program, which began in January 2006, reduces air pollution through a creative partnership with the shipping industry.

The program incentives include reduced dockage rates and environmental recognition for vessel operators who voluntarily reduce speeds when arriving or departing from the Port. Ocean carriers (the companies that operate the vessels) who achieve 90 percent compliance in a calendar year are eligible for a 15 percent reduction in their dockage rates. Individual vessels earn a "Green Flag" award when they achieve 100 percent compliance with the program for an entire calendar year.

In 2007, the program cut air pollution from ships at the Port by an estimated 678 tons of nitrogen oxides, 453 tons of sulfur oxides and 60 tons of diesel particulate matter. In addition, the program reduced greenhouse gases by more than 24,000 metric tons of carbon dioxide equivalent.

In 2008 compliance reached 93 percent, and in 2009 the Port of Long Beach expanded the program to offer additional incentives for ships that slow down within 40 nautical miles of the harbor to further reduce air pollution. As the Green Flag Incentive Program evolves, it will continue to make a significant difference in reducing air pollution by going above and beyond current laws and regulations.

Transportation Efficiency Innovations

Transportation Initiative — Stonyfield Farm, Londonderry, N.H.

Stonyfield Farm is a leading maker of organic yogurt and is committed to social and environmental responsibility. In addition to supporting family farms and donating 10 percent of its profits to programs that protect and restore the earth, Stonyfield offsets the carbon dioxide (CO2) emissions generated from its facility energy use. Stonyfield has experienced healthy growth over the past several years while also implementing a corporate plan to decrease emissions from their transportation and logistics operations.

The company's growth highlighted several issues in the area of transportation and logistics that needed to be addressed. For example, double-digit growth had increased Stonyfield's output of transportation-related greenhouse gases (GHGs), but the company did not have an accurate way to measure these impacts because multiple formats were available for measuring GHG emissions, leading to inconsistent reporting.

The company implemented several key strategies to reduce and measure greenhouse gas (GHG) emissions from product distribution. These include purchasing more fuel efficient vehicles, implementing the use of electronic freight invoicing, and measuring GHG via the SmartWay FLEET Performance Model. Stonyfield increased minimum order requirements to reduce the frequency of deliveries to a single location and expanded local fleet usage to deliver 25 percent of the product volume. They also ensure maintenance of adequate inventory of products to ensure orders are filled in a single shipment, reducing redundant deliveries.

These strategies have reduced absolute CO2 emissions by 37 percent in one year, while increasing the tons of product shipped. Stonyfield continues to show their leadership in environmental responsibility through their smart transportation choices.

Thomas W. Zosel Outstanding Individual Achievement

Dr. William Malm — National Park Service

While some call him Dr. Visibility in the United States, Dr. William Malm of the National Park Service is more formally recognized as the leading scientist behind the visibility protection provisions of the Clean Air Act. His science-driven policies are a testament to his dedication to the environment and his perseverance in bringing science to the issue of air quality.

Since making some of the first visibility and air quality measurements in the National Park Service system at the Grand Canyon in 1972, he has designed and built instrumentation to measure the effects of atmospheric aerosols on the scenic qualities of landscape features, as well as their optical and chemical properties. By linking visibility impairment to specific sources, Dr. Malm's studies have lead to requirements for pollution reduction at major power plants in the Southwest. Through his formulation of radiation transfer algorithms, his pioneering of visibility perception studies, and his leadership in collaborative efforts, Dr. Malm has also played an integral role in improving air quality by significantly reducing sulfur emissions.

In addition to his technical achievements, Dr. Malm serves as the intellectual leader responsible for the Interagency Monitoring of PROtected Visual Environments (IMPROVE) Network. From the establishment of the IMPROVE monitoring network, to the development of the IMPROVE equation (which is the basis for EPA regional haze regulations), to the very metrics used to characterize visibility, he has applied sound science to protecting our nation's most treasured vistas.

Dr. Malm has demonstrated leadership, outstanding achievement, and lasting commitment to promoting clean air and helping to achieve better air quality for 30 years. The steadily improving visibility we enjoy in many parts of the U.S. is largely due to the research and advocacy of Dr. William Malm.