**Using Biodiesel in Urban Transit Buses Could Reduce Harmful Emissions**

Mineta National Transit Research Consortium's free research report provides insight

**San Jose, Calif., October 28, 2014** – Do transit buses operating on biodiesel emit more or less particulate matter and gases than those using conventional diesel? The Mineta National Transit Research Consortium (MNTRC) has released its latest peer-reviewed study based on laboratory and field experiments. Among other test results, *Combustion Chemistry of Biodiesel for Use in Urban Transport Buses: Experiment and Modeling* found that using biodiesel could effectively reduce the mass of particulate matter released in both hot and cold idle modes. Reduction in amount of particulate matter, number of elements, and elemental carbon was observed, and the reduction is considered beneficial to promoting the clean air and human health. Principal co-investigators were Ashok Kumar, PhD, and Dong-Shik Kim PhD working with the research team of Hamid Omidvarborna and Sudheer Kumar Kuppili. The free report can be downloaded from http://transweb.sjsu.edu/project/1146.html

Biodiesel has many advantages over regular diesel even in a very low blend percentage. The benefits include low emissions of particulate matter, combustion elements (mainly sulfur), elemental carbon, and carbon monoxide. Comparing types of elements from field and laboratory experiments showed what types of elements are emitted only from the fuels.

Dr. Kumar said, "Physical properties of biodiesel blends are very important during engine combustion. Higher viscosity causes reduced fuel leakage during injection, which drives an advance in injection timing and an increase of mass injection rate. Density of the fuels affects the start of injection, injection pressure, fuel spray characteristics, etc. When the fuel temperature changes and enters an engine with different temperatures (hot or cold), fuel acts differently and the emissions are different."

In sum, it is recommended that governments consider using blends of biodiesel in urban and commercial vehicles to enhance the quality of air and to promote healthy living.

**Among the report's findings:**

- Combustion temperature and pressure of biodiesel blends are linearly correlated with the portion of oxygen in biodiesel fuels. This information can be used to make proper blends of biodiesel with regular diesel.
- The high oxygen content of biodiesel improves the oxidation of soot precursors and limits soot mass growth, resulting in less particulate matter formation.
- The results also confirmed that better combustion, with less emission of elements, occurred in hot idle mode (i.e., when engines were fully warmed) rather than in cold idle mode (i.e., at morning start-up).
- The results indicated that the use of biodiesel could effectively reduce elemental carbon, which is considered more hazardous than organic carbon.
- Source apportionments of detected elements are done by using laboratory experiments as well as field experiments.
- The neural network method along with the kinetic models is implemented to help us better understand the particulate matter formation mechanisms and come up with more efficient and effective operating conditions to reduce PM emissions.
- Higher flash point of biodiesel, suggests that it is safer than other fuels, and storage process is easier.

Chapters cover five different parts including introduction, literature review, methodology, results and discussion, and finally conclusion and future works. The 92-page report includes 20 figures and 16 tables.

**Download the full report**

The full report is available for free, no-registration; download at http://transweb.sjsu.edu/project/1146.html.

**Tweet this:** #Mineta free research report finds ideal blend of #diesel & #biodiesel for less emission in #transit buses. http://ow.ly/Df4ui

**ABOUT THE PRINCIPAL INVESTIGATORS**

**Ashok Kumar, PhD,** is a professor and chairman of Civil Engineering at The University of Toledo, Toledo, Ohio. Previously, he was an atmospheric physicist at Syncrude Canada Ltd., where he developed, planned, and conducted studies related to the dispersion of emissions of a tar sands plant. He received his bachelor of science in engineering, with honors, from Aligarh University in India (1970), his master of applied science from University of Ottawa, Canada (1972), and his PhD from the University of Waterloo, Canada (1978). He is registered as a Professional Engineer in the Province of Alberta, Canada and is a diplomat of the American Academy of Environmental Engineers. He is an honorary member of Air and Waste Management Association (A&WMA).

**Dong-Shik Kim, PhD**, is associate professor of chemical and environmental engineering at University of Toledo. Since joining the faculty, he has worked on several research projects supported by several funding agencies including NSF, NASA, USDA, Air Force, Ohio Board of Regents, and Korea Institute of Science and Technology. His research has focused on biomaterials development and biomass energy. Dr. Kim earned his bachelor of science and master of science in chemical engineering at Seoul National University, Korea, and his doctorate in chemical engineering at the University of Michigan, Ann Arbor. Dr. Kim is a member of American Institute of Chemical Engineers, American Chemical Society, and American Society of Engineering Education.

Bios of other research team members – Hamid Omidvarborna and Sudheer Kumar Kuppili – are included in the report.

**ABOUT THE MINETA NATIONAL TRANSIT RESEARCH CONSORTIUM**

The Mineta National Transit Research Consortium (MNTRC) is composed of nine university transportation centers led by the Mineta Transportation Institute at San Jose State University. The Consortium was organized in January 2012 after winning a competition sponsored by the US Department of Transportation (DOT) to create consortia tasked with "Delivering Solutions that Improve Public Transportation." Member universities include Bowling Green State University, Grand Valley State University, Howard University, Penn State University, Rutgers University, San Jose State University, University of Detroit Mercy, University of Nevada Las Vegas, and University of Toledo. Visit transweb.sjsu.edu/mntrc

**ABOUT THE MINETA TRANSPORTATION INSTITUTE**

The Mineta Transportation Institute (MTI) conducts research, education, and information transfer programs regarding surface transportation policy and management issues, especially related to transit. Congress established MTI in 1991 as part of the Intermodal Surface Transportation Efficiency Act. MTI won national re-designation competitions in 2002, 2006 and 2012. The

Institute is funded through the US Secretary of Transportation's Research and Technology Office, US Department of Homeland Security's Transportation Security Administration, the California Department of Transportation's Division of Research, Innovation and Systems Development, and public and private grants. In 2006 the US Department of Homeland Security selected MTI as a National Transportation Security Center of Excellence. The internationally respected members of the MTI Board of Trustees represent all major surface transportation modes. MTI, the lead institute for the nine-university Mineta National Transit Research Consortium, is affiliated with San Jose (CA) State University's College of Business. Visit transweb.sjsu.edu

###

Contact: Donna Maurillo
MTI Communications Director
831-234-4009 (mobile)
donna.maurillo (at) sjsu.edu