



SEPTEMBER 12, 2015: THE LATEST DIMETHYL ETHER INSIGHT FROM CHEMBIOWER

The Sleepers Awake

After years of silence, the U.S. Department of Energy is now supporting the development of dimethyl ether (DME). The Ford Motor Company trumped this announcement, disclosing a consortium of commercial and academic organization would develop a DME automobile. Moreover, in an interview with the Financial Times, the New York City Sanitation Commissioner portrayed a future where recycled methane and carbon dioxide could be used to make dimethyl ether and power over 6,000 sanitation vehicles.

Three global thought leaders conclude that DME will reduce dependency on Middle East fossil fuels. A message to OPEC, as Yamamoto said: "I fear all we have done is to awaken a sleeping giant and fill him with a terrible resolve."

The DOE Accelerates Alternative Fuels in Heavy-Duty Vehicles

[From US DOE 11-Sep-15] The U.S. Department of Energy today announced \$11 million in available funding to support development and demonstration of innovative alternative technologies for medium- and heavy-duty vehicles, designed to help reduce U.S. reliance on gasoline, diesel and oil imports. The funding opportunity includes two areas of interest:

- Medium- and Heavy-Duty Vehicle Power Train Electrification focuses on research, development, and demonstration of electric-drive power train technologies for medium- and heavy-duty vehicles that significantly reduce fuel consumption.
- Heavy-Duty Vehicle Dual Fuel Fleet Demonstration seeks to demonstrate the performance and reliability of commercially-available dual fuel heavy-duty vehicles equipped with engines capable of operation using a mixture of diesel fuel and gaseous fuels—natural gas, propane- or natural gas-derived fuels such as dimethyl ether (DME) - and the associated emissions control systems.

Data collected from these activities will be analyzed by Energy Department National Laboratories and used to identify technology barriers and inform future efforts. The Office of Energy Efficiency and Renewable Energy accelerates development and deployment of energy efficiency and renewable energy technologies and market-based solutions that strengthen U.S. energy security, environmental quality, and economic vitality. The Vehicle Technologies Office funds research and development for energy efficient and environmentally friendly vehicle technologies.

Ford Leads Diesel Project That Could Run on Converted CO₂

[From Ford 11-Sep-2015] Ford Motor Company is leading a €3.5 million research project to investigate the use of alternative fuels that could offer customers the power and performance of modern internal combustion engines with environmental benefits comparable to an electric vehicle.

The German government is co-funding the three-year project that will test the first-ever cars to run on dimethyl ether (DME), commonly used as a non-toxic propellant in aerosol spray gas.

The ether, which will power cars based on the Ford Mondeo, offers the potential for extremely low particulate emissions and enhanced fuel efficiency. DME can be generated from fossil natural gas or bio-gas or through a sophisticated process called power-to-liquid that uses renewable sources such as solar or wind power together with CO₂ captured from the air.

This promising technology is being investigated in a parallel project together with RWTH Aachen University researching the viability of different DME generation methods, looking at conversion efficiency, estimated fuel prices and infrastructure aspects.

“The CO₂ produced by a car powered by DME from renewable sources could be comparable to the amount generated by a marathon runner covering the same distance – but with performance similar to a diesel powered vehicle,” said Werner Willems, Ford of Europe. “This is a project that could help place vehicles with a significantly reduced carbon dioxide and particulate emissions on the market at **affordable costs**.”

It is estimated that DME from renewable energy sources could offer well-to-wheel emissions of about 3 g/km CO₂. Like liquefied petroleum gas, DME must be stored in a slightly pressurized tank. The DME-powered engines are expected to benefit from almost soot-free combustion; higher thermal efficiency and excellent cold start properties.

“DME is safe, burns cleaner than conventional diesel, and most importantly is versatile. The energy generated from solar, wind and other renewable sources can be stored within the fuel itself, and this enables DME to be used across a range of applications” said Andreas Schamel, Ford’s director Global Power train Research & Advanced Engineering.

New York City Commissioner on DME for the Sanitation Fleet

{From the FT, 10-Sep-15} Today, New York City’s Department of Sanitation has more than 9,700 uniformed and civilian employees, handles more than 3.2m tons of refuse each year and recycles more than 600,000 tons of waste material. Ms. Kathryn Garcia is commissioner of the world’s largest sanitation department.

Managing such large numbers demands military-style precision: “There are clear chains of command and protocols for who goes on which truck and when,” she says. Kathryn Garcia’s cavernous office doubles as a boardroom and leaves plenty of space for reminders of her job.

On one wall is a panoramic photograph of Fresh Kills, the former Staten Island landfill being turned into a park. In front of her desk are two chairs from Materials for the Arts, a reuse centre that helps companies and individuals donate unneeded furniture and supplies to non-profits and public schools.

While thinking about landfills and recycling, Ms Garcia also wants to make the department’s just over 6,000 vehicles greener, and on her desk lays a possible answer. “We’re constantly trying to figure out how to be the cleanest fleet.

We have very aggressive particulate filters, but what about the future?” she asks, pointing to a model of a dimethyl ether (DME) molecule, a clean gas whose sources include renewable materials such as organic waste and agricultural products. “This little molecule is very clean, but acts like a liquid fuel so it’s easier to pump,” Ms Garcia explains. The department has yet to harness it for its fleet, but “this is to remind me that we need to figure it out”.

Our Position is Diesel Power is at the Fork in the Road

The continued use of conventional diesel fuel presents many challenges. Diesel fuel degrades the environment through the emission of greenhouse gases and particulate matter, while fostering dependence on volatile Middle East oil reserves. Diesel has a shelf life, can gel in cold weather, can get water logged and separates over time. Diesel fuel is poisonous, pollutes water and soil if leaked, requires layers of anti-pollution devices and uses 2 to 8 liters of purified, fresh water for every liter of diesel produced. Today, the compression engine is great power source with a problematic fuel.

Dimethyl Ether – Keep the Engine, Change the Fuel

The challenge is to find a fuel for compression engines that is environmentally friendly, stores easily and transported simply. DME can be readily synthesized from abundant natural gas and biomass feedstock using a number of well-established chemical processes. DME is benign, evaporates after a spill, burns smoke free with no sulfur and reduced nitrous oxide and generates 1 to 2 liters of water for each liter of fuel produced. Unlike compressed natural gas (CNG) or liquid natural gas (LNG), most importantly, DME is used in compression engines, which substantially impacts the potential applications of this fuel over LNG. CNG, Ethanol or Methanol. Finally, the path is clear for clean diesel power across the globe.