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Advancing Clean Energy for a Sustainable Economy

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Dimethyl Ether (DME)

What is DME?

DME stands for Dimethyl Ether. It is a clean burning, energy efficient, renewable fuel and an alternative choice to diesel. DME is an organic compound and a colorless, odorless gas.

DME is a simple ether, an isomer of ethanol and an aerosol propellant. As a propellant, it has been used in a variety of spray cans. Many Americans have probably used it already in this capacity. Its application as a fuel for trucks, however, has led many to call it the “fuel of the future”.

How is it made?

DME can be produced from many sources like biomass, waste products, agricultural products, natural gas and coal.The most popular way of producing DME is by methanol dehydration.

For decades, DME has been manufactured in places like China, Japan, Egypt, Korea and Brazil. With China being the number one producer of DME. DME is currently not commercially available in most parts of the United States.

What are the benefits of using DME?

DME is a non-toxic and non-carcinogenic product. DME is also environmentally friendly. During a fuel spill, DME evaporates into the air, unlike diesel, because it is stored at pressure. Also, DME is not a GreenHouse Gas (GHG) whereas natural gas (CH4) is said to be between 22 and 80x worse than CO2 as a GHG.

Though DME is mostly discussed as a fuel for transportation, it is safe for the home as well. It is used for domestic cooking and heating and in fact, is the propellant for asthma inhalers.

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How does it compare to other fuel types?

Studies conducted by Pennsylvania State University, Volvo and Oak Ridge National laboratory show that DME (CH_3OCH_3) has compression-ignition properties that make it an ideal alternative to diesel (much like spark-ignition propane—C_3H_8—is for gasoline). Like propane DME does not require an expensive diesel particulate filter nor does it require expensive infrastructure.

DME has a high diesel thermal efficiency, quiet combustion, and a low emission of nitrogen oxide (NOx). NOx is primary emission of concern in the formation of ground level ozone, a contributor to air quality related health concerns. It is also a greenhouse gas. Additionally DME provides fuel economy benefits. It has a 30% higher fuel economy than gasoline in passenger cars. DME has a lower heating value of 68,930 BTU/gallon compared to the diesel's heating value of 128,450 BTU/gallon. Even with its benefits, it would still take 1.8 gal of DME to go the same distance as 1 gal of diesel.

DME offers great promise as a clean burning alternative to conventional fuel. For fleets considering alternative fuel options, DME can be stored as a liquid under moderate pressure, so tank costs are less than similar CNG and LNG options. This 'fuel of the future', however, is not currently available in North Carolina though there are research interests and potential pilot projects.

We're looking forward to its arrival. Stay tuned!

Where can I learn more?

- Volvo: http://www.volvotrucks.com/TRUCKS/NA/EN-US/PRODUCTS/ALTERNATIVEFUELS/CNG/Pages/DME.aspx
- International DME Association: http://www.aboutdme.org/index.asp?sid=48
- U.S. Department of Energy: http://www.afdc.energy.gov/fuels/emerging_dme.html
- Volvo Explains DME https://www.youtube.com/watch?v=k8NF9psjg-Y
- Oberon Fuels: http://www.oberonfuels.com/technology/dme-basics-2/
- Ohio University http://www.ohio.edu/people/lees1/DME.html
- Biomass Energy Data Book: http://cta.ornl.gov/bedb/appendix_a/Lower_and_Higher_Heating_Values_of_Gas_Liquid_and_Solid_Fuels.pdf

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