Abstract

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DIMETHYL ETHER AS ALTERNATE FUEL

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A great deal of enthusiasm is currently noticeable for synthetically derived fuels from the fossil sources. Notable among such fuels are the diesel, gasoline and jet fuel for which fairly well developed commercial manufacturing processes are in place. A more recent addition to this family of *sulfur-free, near-zero aromatics* synthetic fuels is dimethyl ether (DME), which is considered an excellent substitute for conventional diesel and liquefied petroleum gas (LPG). Asian countries particularly China, India, Japan and Korea with their highest expected energy consumption rates are showing great interest in DME as these countries are large consumers of diesel, LPG and LNG (liquefied natural gas). Several Japanese companies have joined hands together to commercialize DME production and consumption on economic scales comparable with LNG and diesel. Elsewhere in the developed world (US and Western Europe), DME has invoked interest not only as an environmentally benign fuel but also as downstream outlet for over-capacity methanol industry after the expected MTBE ban.

Our report reviews and appraises the technological and economic aspects of DME manufacture and its prospective use as an alternative fuel. The report evaluates the following options for DME production.

- Production of DME from Methanol via “Methanol Dehydration Technology” (termed as *two-step or indirect* methodology for DME manufacture starting from syngas, which is also in current use).
- Production of DME from Natural Gas via “Single-Step DME Synthesis” (an emerging *single-step or direct* methodology).

DME has several physical properties similar to those of LPG; DME has also been found to possess cleaner burning characteristics as compared to conventional petroleum-derived diesel. For that reason, DME is envisaged as a clean alternate fuel of future for electricity generation, domestic heating and automotive power. DME can be produced from a gas mixture of hydrogen and carbon monoxide (generally termed as synthesis gas) which is synthesized from natural gas, coal or biomass.

The report further examines and compares the economic viability of the following pathways for transportation of the remote, stranded energy to the industrialized markets.

- Conversion of remote gas to methanol – transportation of methanol to developed countries – and its subsequent conversion to DME per requirement in those areas.
- Conversion of remote gas to DME directly – transportation of DME to developed countries.

In addition, the report also presents comparative economics of DME with GTL, LNG, conventional diesel and methanol.

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