

DME-JFE

Our sacred Earth. Our Earth, however, is now undergoing _____ change. And what can we do for the future of the human kind. An entirely new fuel has now _____. That fuel is DME – dimethyl ether. Through the wonders of science, DME has been synthesized using natural gas, coal, and coal (..): all natural products found on Earth. It is the next generation fuel, easy to distribute and gentle on the environment. Environment, energy security, economy: with these three E's DME is opening a whole new era of energy.

Society's prosperity continues thanks to the _____ we use as fuels. As these fuels influence the Earth's environments, numerous problems has begun to arise. DME, however is clean energy synthesized from carbon monoxide and hydrogen. Because it has no direct structural combination of carbons no ____ is emitted. Another feature is that emission of sulphur oxides, carbon monoxide, and nitrogen oxides are very low. Furthermore, DME decomposes after several dozen of hours after release to the atmosphere. This means there is no damage to the ozone layer.

Japan imports almost one hundred percent of its energy. Now we can reach an edge where we need to consider secure energy supplies. DME can be produced from a variety of sources including natural gas and coal, _____, biomass, and industrial wastes, which is of immense value in our recycling-oriented society. Building the appropriate infrastructure to complement any change in fuel type results in _____. Handling DME, however, is quite easy. It is similar to propane gas and easily _____ when cooled to minus 25 degrees Celsius at normal pressure or compressed to atmospheric pressure of six at normal temperature. Since DME can use the existing propane gas infrastructure, transport and storage costs are greatly reduced.

Let's now look at some uses of DME. With more than ten thousand tons used annually in Japan as _____, it is widely found in everyday homes. And, in future, as DME is distributed in large volumes at low cost, it is expected

to find a _____ of other uses. DME shows great promise both as an industrial and home use fuel. This experiment on a household _____ shows that with its bright blue flame DME is quite suitable for combustion. A DME bus is currently in use at JFI Steel Corporations', East Japan Works. It uses a commercial _____. The engine itself has not been modified. The only modifications have been in the replacement of the including the fuel tank. Diesel engines which use Diesel oil offer good _____. But particulate matters such as soot as well as nitrogen oxides in the exhausts is a serious problem. In general, as nitrogen oxide emissions decrease, particulate matter emissions increase. As DME is neatly very low in particulate emission, nitrogen oxide emission can be easily reduced, in essence achieving a revolution in clean exhaust. It has been confirmed that output performance is superior to Diesel oil vehicles. Sound levels have also proven to be less than Diesel oil vehicles. Currently, DME buses and trucks with a support of national and local organizations, are undergoing a variety of testing. The goal is to realize ideal _____.

The world's largest one thousand kilowatts class Diesel power generation facility using DME as fuel is currently under development at GMB Engineering Corporation, Sudumi Engineering and Manufacturing Center. This project with Daihatsu Diesel Manufacturing Company Limited and Ibotani International Corporation working jointly with the support of Agency of Natural Resources and Energy will bring about a major revolution in Diesel power generation. The _____ is to achieve a power generation efficiency that is superior to Diesel oil and nitrogen oxide emission less than one tenth that of Diesel oil. Using DME as fuel will give rise to distributed power generation and cogeneration systems that have a _____ on the environment. DME has also proven to be a viable fuel at large scale thermo-power generating facilities using gas turbines. With its emission-free clean and superior performance it shows great promise energy for power generation. The development of fuel cells

continues. Because DME can be easily reformed at low temperatures, it has been gaining attention as _____ . It can also be used in fuel cells. While used in automobile fuel cells, DME is expected to realize the diversity of uses for next generation energy.

JFE is aiming to commercialize DME. As such it is conducting active research and development for methods of DME direct synthesis. This is the DME _____ in Shiranuka, Hokkaido. Built and designed by JFE in 2003 with a support of the Agency of Natural Resources and Energy. It produces one hundred tons of DME daily. The plant consists of the synthesis gas production section, the DME synthesis section and the DME separation/purification section. Let's look at the synthesis gas production section. Natural gas reacts with oxygen in auto-thermal reformer thus synthesizing hydrogen and carbon monoxide. These are then sent to DME synthesis reactor. The DME synthesis section. The _____ of the DME synthesis reactor is filled with a new high performance catalyst developed in house by JFE, which is in the form of a _____. This DME direct synthesis process has the benefit of reduced costs. DME is synthesized when the carbon monoxide and hydrogen rise through this slurry as _____. The new catalyst provide both the high conversion rate and high selectivity. The slurry phase reactor, while maximizing catalyst performance also keeps the _____ at a constant temperature. The DME separation/purification section. Here any unreacted gas and the by-products: carbon dioxide, methanol, and water are separated out. The result is pure DME. At present, nationwide support is under way to expand the _____ of DME, to verify the _____ , to establish product specifications and to demonstrate the _____ to use existing LPG infrastructure. Furthermore, the DME Promotion Center has been established to promote the use of new energy, DME. JFE along with its partners is aiming for rapid DME commercialization.

DME – dimethyl ether – a new, clean, 21st century fuel that addresses both the environmental and energy problems. JFE is opening a new era for the environment and energy.