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Active Sequestration of Carbon Dioxide

Canada has the potential to become the world leader in the carbon-neutral production of DME (dimethyl ether). DME is an ultra-clean burning, environmentally benign alternative fuel that is a substitute for diesel and natural gas and a substitute and blendstock for propane. Easy to handle and transport, DME can be used for transportation, power generation, and heating and cooking.

Most jurisdictions in the world that produce DME use fossil fuel reactants such as natural gas and coal as feedstocks. Carbon-neutral DME can be produced from biomass, as it is in Sweden in the BioDME project, or from renewable energy (hydro, wind, geothermal, etc.), water, and waste carbon dioxide (captured from flue gas emissions of fossil fuel processing plants, such as natural gas processing plants, fossil fuel-based electricity generators, and potentially from tar sands upgrading processes, etc.).

Western Canada has an abundance of feedstocks for producing carbon-neutral DME, including near-pure streams of carbon dioxide that are presently being emitted into the atmosphere. This contributes to global warming and wastes the carbon dioxide, a valuable resource. The **Passive Sequestration** of carbon dioxide into geological formations or oil fields perpetuates the wasting of this resource. It is also expensive, both in terms of energy and dollars—and experimental. Further, if these **Passive Sequestration** experiments fail, the consequences could be most unfortunate.

Active Sequestration—the recycling of carbon dioxide for the production of commercial products—represents an immediate solution to the carbon dioxide emissions problem that looms over key sectors of the Canadian economy. The natural gas industry, for example, is fully apprised of the limits of **Passive Sequestration** in western Canada and knows that if alternative solutions do not emerge, efforts to increase production will be compromised. The production of DME with renewables and waste carbon dioxide would be highly beneficial to the natural gas industry. Further, because DME is a superb energy carrier, its adoption would buttress the renewables sector by making it possible to efficiently transmit large amounts of energy from remote wind farms or hydroelectric power generation facilities, for example, to load centres—without large-scale expansion of the grid and other infrastructure. The economic benefits of the **Active**

Sequestration of carbon dioxide in western Canada would have profound environmental and economic benefits for the whole country.

Creation of a domestic market for DME is essential if its potential is to be realized in Canada. The Government of Canada must accelerate the development of this market by mandating that propane used in the country be blended with DME. Such a policy would be comparable to the very successful programs in Canada and the United States mandating the blending of gasoline with ethanol.

Mandating the blending of propane with DME is the most expeditious route to establishing a Canadian market for DME because no modifications to equipment for home cooking and heating or to distribution networks are required for blends containing up to 20% DME. Extensive and decades-long research into all aspects of DME's use, handling and delivery when blended with propane have demonstrated such blends to be a safe and reliable way to utilize it. Further, blending results in an insignificant price increase for consumers.

China is by far the largest producer of DME in the world today, with over 20 large-scale producers. Production in China has grown exponentially in recent years, with capacity in 2010 estimated at 6 million tons, and in 2020 at 20 million tons. More than 90% of the DME produced in China is blended with propane and used for heating and cooking. Government support in China for the blending of propane with DME has resulted in a broad production base and put China in a position to start using DME as a transportation fuel, its ultimate application that greatly increases energy security, enhances air quality, and reduces GHG emissions.

In 2007 Canada produced about 11.4 million cubic metres of propane, about 4.9 million cubic metres of which was consumed in the country. Blend ratios of propane to DME could range from 80-20% down to 95-5%. Blending 4.9 million cubic metres of propane with DME at a 90-10% ratio would require 0.5 million cubic meters of DME per year, the production of one world-scale DME plant.

References

1. [International Dimethyl Ether Association](#)
2. [BioDME Project](#)
3. [Statistics Canada, Energy Statistics Handbook, Second quarter 2008](#)