Use of renewable DME in transport

A simple, clean-burning molecule with multiple applications

Defossilisation options for the transport sector, particularly heavy-duty and non-road transport, are currently limited. rDME is a renewable fuel that can be used in internal combustion engines on the road today, and can provide a long-term defossilisation option for transport sector applications which are hard to electrify. It is clean-burning, increasingly available, and can reduce GHG emissions.

The transport sector defossilisation challenge

The transport sector **plays a vital role in economic and social development**, and enables more connected global communities. Transport sector activity has increased dramatically in recent years and continues to rise.[1]

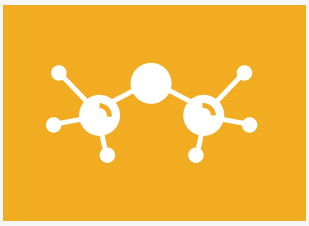
The transport sector emits annually around 8 Gtonnes of CO_2, equivalent to **25% of global energy-related CO_2 emissions**. Over 70% of these emissions are due to the road transport sector.[2]

As activity increases, the environmental impact of the transport sector is also increasing: from the year 2000 to 2019 GHG emissions from the transport sector increased by an average of 1.9% per year.[3] **Pressure from policymakers and consumers is driving change.**

Whilst some transport modes can be electrified, many forms of transport will continue to require a chemical energy source. **Renewable DME can be used in the existing vehicle fleet with little modification.**

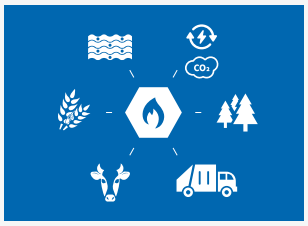
[1] OECD International Transport Forum and World Bank statistics
[2] IEA, World Energy Outlook, (2019) ; IPCC AR5 Report (2014)
[3] International Energy Agency (IEA), Transport (2020), Available from: https://www.iea.org/topics/transport

Renewable DME could provide a solution for transport sector defossilisation



A simple product

Dimethyl-ether is a single molecule. Gaseous at room temperature and pressure, it is transported as a liquid in pressurised cylinders and tanks like LPG.



Renewable

Produced from **a wide range** of renewable feedstocks.

Numerous applications

rDME can be used in the transport sector, for cooking, as well as domestic and industrial heating.

Safe, clean & green

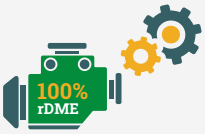
rDME can reduce GHG emissions by up to 85% compared to diesel and heating oil. Its use also significantly improves air quality.

Use of renewable DME in the transport sector

LPG Powered Vehicles

Vehicles currently using LPG can use **a blend of 20% rDME in LPG.**

Diesel Powered Vehicles



Diesel engines in the fleet today **can be modified to run on up to 100% rDME.**

Diesel engines will continue to be required for heavy-duty applications, and **can be modified to run on up to 100% DME.**

Diesel engines used in off-road and heavy machinery applications **can be modified to run on up to 100% DME.**

Use of DME significantly **reduces SOx, NOx and soot emissions** compared to diesel.

rDME can be supplied using existing infrastructure

Handling and distribution

- DME is **chemically similar to Autogas** (LPG used in vehicles), and is a gas at room temperature and pressure.

- Like Autogas it is **easily transported as a liquid** in pressurised cylinders and tanks.

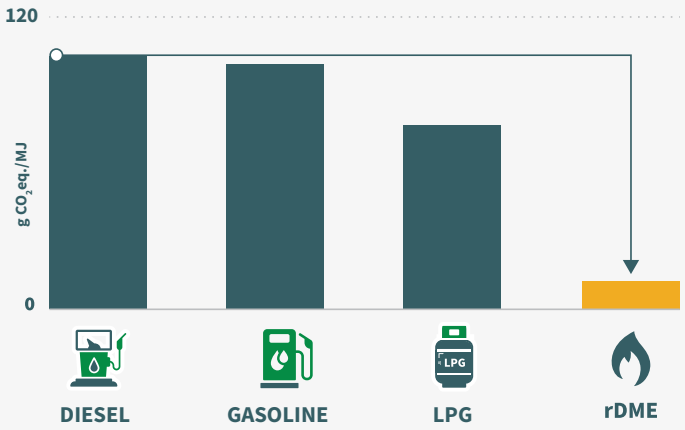
Vehicle refuelling

- Vehicle refuelling can be carried out using a typical **Autogas dispenser** with few modifications.
- Refuelling is **quick and convenient.**

Sustainability

Carbon Intensity

- **Up to 85% GHG emission reduction** compared to diesel
- Can be **produced from multiple renewable feedstocks** including waste streams and residues, with a low GHG footprint



saving could be higher if manure or in-process carbon capture are used

Air Quality

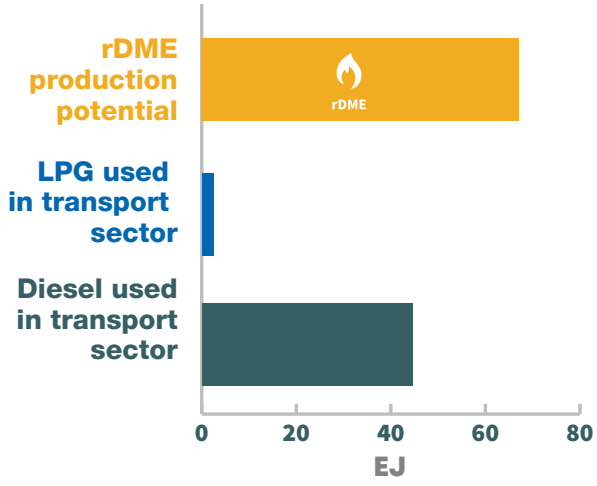
"Diesel, Gasoline, LPG and rDME: Prussi, M., Yugo, M., De Prada, L., Padella, M., Edwards, R. and Lonza, L., JEC Well-to-Tank report v5, EUR 30269 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-19926-7 (online), doi:10.2760/959137 (online), JRC119036."

How can renewable DME use in transport be scaled up?

- **Support scale-up** in the production of rDME
- **Ensure that fuel standards** and specifications allow the use of rDME in transport sector applications
- **Include rDME in market-based** support mechanisms for the use of renewable fuels in transport
- **Support the development** of new heavy-duty engine technology which can use 100% DME
- **Support the dissemination** of information on the potential use of rDME in the transport sector

Large production potential

The global rDME production potential exceeds existing diesel and LPG use in road transport.[4]



[4] Feedstock data: IRENA (2014) Converted to DME production based on 0.02 Mtonnes DME / PJ feedstock
Current diesel fuel consumption in transport from IEA (2020) Date does not include kerosene used in aviation, or fuel oil used in maritime transport ; Current LPG consumption in transport : WLPGA (2020)

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