



Press Information

Feature: DME – the route to a sustainable city?

In 50 years' time, the population of the world's large cities will be greater than the present-day entire population of the world. Keeping these growing mega-cities supplied in an ecologically sustainable way is one of the crucial problems facing urban and regional planners today. In the hunt for efficient alternatives to fossil fuels, Volvo Trucks' latest green solution, biofuel DME, plays an important role.

Forward-planning researchers are scarcely renowned for their unanimity on any issue, but on one point they are all in firm agreement: the world is moving towards the mega-city. Even today, there are more people living in large urban environments than in rural areas, and in another 25 years no less than 70 percent of the world's population will be living in mega-cities. Within that space of time, it is estimated that the world's total building density will have doubled.

This swift urbanisation means the world's urban and regional planners are facing gigantic challenges. Not least on the issues of the environment and climate since fast-growing cities impose considerable burdens on both.

The UN's aim of limiting global warming to two degrees has been adopted as the norm in this context. The EU has promised to reduce emissions of greenhouse gases by 20 percent before 2020 – increasing that figure to 30 percent if other countries also toughen their eco-targets. The same trend can be seen elsewhere in the world.

The question of how today's metropolitan centres can continue to grow bearing in mind these increasingly tough targets is answered by the experts with two words: increased density. After having grown laterally for decades, tomorrow's major cities will now start growing inwards, towards the centre.

“With a denser population structure, people have access to a wider variety of services and facilities within a shorter range. This in turn reduces travel requirements and increases the use of sustainable transport methods such as walking and cycling,” says Sverker Hanson, civic engineer and transportation planner at international consultancy Sweco. He continues:



“The same advantages of increased population density can be seen with regard to logistics. There is already a trend towards a greater number of distribution terminals in and around major cities. With more densely populated cities, in the future it may be possible to have one large reloading terminal per district, with electrically powered distribution trucks providing just-in-time delivery services to households and companies.

Other trends are the coordination of long-haul and distribution transportation and the creation of public transport for goods.

However, increased population density and increasingly well thought-out – and environmentally optimised – urban centres will not solve the other major problem facing the planners: how tomorrow’s mega-cities will be kept supplied. The mathematics is simple: more people means a growing need for consumer goods and food – and a radical increase in the need for transport in to the cities.

“We are moving towards a situation where many of our reserves of fossil fuel, such as oil and natural gas, are beginning to dry up. This together with increased demand for energy will lead to rising energy prices. Linked to the climate issue, this means that the key for tomorrow’s transport will be energy efficiency,” says Lars Mårtensson, environmental affairs director at Volvo Trucks.

He feels that tomorrow’s transport infrastructure must be based on increased synchronisation of all existing transport methods. Ships, railways and trucks will all need to work side by side.

“The future is with a wide variety of transport methods. What we need to work on is improving the synergies between them. This is an area in which we have considerable potential for improvement,” explains Lars Mårtensson.

In the area of road transport, there is already a clear trend towards increasingly large and heavy trucks for the longer routes. And it is these energy-intensive transports that are in focus in Volvo Trucks’ most recent strategic environmental drive.

In a unique development project together with the EU, the Swedish Energy Agency, Danish chemicals specialist Haldor Topsoe, fuel giants Total and Preem and biofuel producer Chemrec, among others, there is a project under way to develop an entirely new type of biofuel: dimethyl ether or DME.

DME is a gas that is transformed into a liquid under low pressure, which means it is relatively straightforward to handle. It is used today for a variety of purposes, among others as a propellant in spray-cans, as a fuel in cigarette lighters and as a base chemical in the production of plastics.



DME can be produced both from natural gas and from a variety of biomass sources, in which case it is known as Bio-DME.

As a fuel in a diesel engine, DME provides as high an efficiency rating as a traditional diesel engine, but a lower noise level. The combustion process produces no soot, so a far simpler method of after-treating the exhaust gases can be used. What is more, the engine can produce higher torque when starting off, thus improving driveability.

All told, this makes Bio-DME an ideal fuel for diesel engines.

Volvos' project involves the development of DME fuel from black liquor, a by-product of the forestry industry. Alongside the Chemrec plant in Piteå in northern Sweden, construction has started on a facility for extracting DME from black liquor obtained from the nearby pulp plant. The cooking chemicals produced by gasification of the black liquor are then sent back to the pulp plant, thus creating a closed circuit characterised by unparalleled energy-efficiency.

“From production of the fuel to its use in the engine, DME is the most efficient biofuel in existence. Each hectare of land produces five times the transport range with DME compared with biodiesel,” says Per Salomonsson, DME project manager at Volvo Technology.

With a massive 95 percent lower climate impact than conventional diesel oil, DME is particularly suitable for transports that consume a lot of fuel – exactly the type of heavy long-haul assignment that will supply tomorrow's growing mega-cities.

However, there is nothing to prevent DME, if it becomes successful, from also being used for other purposes.

“Since DME can be produced from all types of biomass, it may become viable even for countries without any significant forestry industry. For instance, it could be used for other purposes than just as a vehicle fuel. In China, for example, DME is used as an additive in liquefied petroleum gas for household purposes,” explains Per Salomonsson.

Within the framework of the project, which started in September last year and will stretch over a total of four years, 14 test trucks will be built for use in field tests throughout Sweden, starting in summer 2010.

“From the holistic viewpoint, DME is one of the most promising second-generation biofuels. The Bio-DME project creates exciting new possibilities for testing DME in realistic conditions among our regular customers,” says Lars Mårtensson, environmental affairs director at Volvo Trucks.



Facts DME

DME (di-methyl-ether) is a gas that transforms into a liquid under low pressure. It can be handled more or less like liquefied petroleum gas (LPG). Today DME is primarily used as a propellant in spray-cans.

DME can be produced from natural gas and also from various forms of biomass. According to EU estimates, by 2030 Bio-DME has the potential for replacing more than 50% of the diesel oil currently used for heavy road transport.

When Bio-DME is made from biomass via black liquor in a pulp plant, the result is 95 percent lower carbon dioxide emissions compared with fossil diesel. At the same time, it is five times more efficient than biodiesel in terms of the transport kilometres obtained from each hectare of land used for cultivation of the raw material.

Together with the EU, the Swedish Energy Agency, Danish chemicals specialist Haldor Topsoe, Total, Preem and biofuel producer Chemrec, among others, Volvo Trucks is involved in a project to examine the potential of Bio-DME as a future vehicle fuel.

The hub of the project is Chemrec's gasification plant in Piteå. This will take in black liquor from a nearby pulp plant, extract DME from the black liquor and then return some of the cooking chemicals to the pulp plant. The energy content of the black liquor, which today is used for heating and other purposes, will be replaced by other biomass sources in the form of logging industry waste that is not used in paper production. This biomass consists of forestry residue such as branches, at present not a resource that is fully exploited in the forest.

At present 14 test trucks are being built and from summer 2010 they will be field-tested in regular day-to-day operations by customers throughout Sweden. Preem will build fuel stations so the trucks can be used under entirely normal operating conditions.

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