



Technology Collaboration Programme  
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## Newsletter IEA Bioenergy Task 37: 03/2022

Biomethane for shipping, trucking and trains

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### Well to wake study updates GHG emissions from LNG as marine fuel

The 2nd lifecycle GHG emission study on the use of LNG as a Marine Fuel from Sphera (formerly thinkstep) revisits its 2018/2019 research, using the latest available engine and supply chain data to bring the study fully up to date. This comprehensive report uses the latest primary data to assess all major types of marine engines and global sources of supply with quality data provided by original equipment manufacturers including Caterpillar MaK, Caterpillar Solar Turbines, GE, MAN Energy Solutions, Rolls Royce (MTU), Wärtsilä, and Winterthur Gas & Diesel, as well as from ExxonMobil, Shell, and Total on the supply side. Methane emissions from the supply chains as well as methane released during the onboard combustion process (methane slip) have been included in the analysis. The study confirmed that shipping with LNG reduces the GHG emissions by up to 23%.

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### Finnish Border Guard to test liquefied biogas as maritime fuel for its operations

The Finnish Border Guard is testing bio liquefied natural gas (LNG) as fuel for a coastguard patrol vessel in an effort to lower greenhouse gas (GHG) emissions, thereby lessening the impact on global warming. The 96 meter long vessel Turva is fitted with Wärtsilä dual-fuel engines and has been supported with a Wärtsilä maintenance agreement since its launch in 2014. The Bio LNG fuel is supplied by Gasum, a Finnish state-owned biogas refiner. After close evaluation of specifications provided by Gasum, Wärtsilä said it is confident that bio LNG fuel represents a viable choice for the multi-fuel capability of its engines. Following this evaluation, the Finnish Border Guard opted to proceed with the testing program.

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### **World's first carbon-neutral synthetic LNG bunkering trial**

A container ship bunkered about 20 tons of liquefied synthetic natural gas (synthetic LNG or SNG) in the Elbe port of Brunsbüttel, Germany. This is the first time that synthetic LNG - generated through P2G from 100% renewable energy - has been used in commercial shipping. The ElbBLUE, which sails in the North and Baltic Seas, will be operated under the supervision of engineers from MAN PrimeServ, the aftermarket division of MAN Energy Solutions. The ship's CO2 emissions are expected to be reduced by 56 tons. The bunkering is a joint project of MAN Energy Solutions, the shipowner Elbdeich and the charterer Unifeeder to demonstrate the potential of using climate-neutral fuels in shipping. LIQUIND Marine was responsible for organizing the logistics from the liquefaction plant to the port and executing the LNG bunkering from the truck to the ship's tank. The carbon-neutral fuel is produced at Kiwi's Power-to-Gas facility in Werlte, Germany.

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### **First bio-LNG bunkering trial in Rotterdam**

The CMA CGM Group and Shell have performed a bio-LNG bunkering trial in Rotterdam. Containerships Aurora, a 1,400 twenty-foot equivalent units LNG-powered vessel was bunkered by Shell with a nearly 10% blend of low-carbon bio-LNG while calling at Rotterdam. The vessel received around 483 m<sup>3</sup> of LNG, 44 m<sup>3</sup> of which were bio-LNG. The operation was performed by the barge LNG London at the Rotterdam Short Sea Terminals. It was successfully conducted through a ship-to-ship transfer while the containership Aurora carried out cargo operations simultaneously. Shell's bio-LNG offering, combined with the dual-fuel gas engine technology developed by CMA-CGM, has the potential to further reduce greenhouse gas emissions by at least 67% well-to-wake (the whole value chain) compared to very low sulphur fuel oil. Results from the trial will give the maritime sector a vital demonstration of the scalability and technical compliance of the fuel, said CMA-CGM.

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### **Dutch maritime bio-LNG project receives €4.3m**

Nordsol, Titan and Attero have received €4.3 million in funding for a bio-LNG production plant in the Netherlands that will supply fuel to the maritime industry. Attero will produce 6 million Nm<sup>3</sup> of biogas annually from domestic biowaste for the FirstBio2Shipping project. The biogas is upgraded and liquefied into bio-LNG by Nordsol's iLNG technology. Under the partnership, Attero and Nordsol will produce 2,400 tons per year of high-purity bio-LNG and 5,000 tons per year of liquid bio-CO<sub>2</sub>. Titan, the exclusive long-term offtaker, will supply the bio-LNG to the maritime sector to substitute fossil fuels. The produced bio-LNG will reduce GHG emissions by 92% compared to conventional maritime fuel. The plant is due to be completed in 2023.

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### **Cummins developed new heavy duty power train for gas**

Global power leader Cummins Inc. and Cummins Westport Inc. announced that the ISX12N+Endurant HD N powertrain from its integrated power portfolio is now available for heavy-duty customers, delivering a fully integrated natural gas powertrain. The ultra-low emissions of the ISX12N combined with the Endurant HD N transmission provides the optimal powertrain solution for customers working to lower their carbon footprint. The integration between the engine and transmission results in improved launch performance, improved low-speed maneuverability and smoother shifts when compared to previous natural gas engines and automated manual transmission combinations.

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### **New Holland T6 Methane Power**

The first biomethane tractor from New Holland (T6 Methane Power) , is now in the final testing phase and will enter the European market in the course of 2021. The methane tractor will be delivered to

selected customers in Germany, France, Italy, the United Kingdom and the Benelux countries.

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### **Scania introduces new 13-litre gas engine**

Scania is renowned for its wide range of low-carbon powertrain options, and is now proud to add the all-new 13-litre gas engine that can run on natural gas and on biogas – regardless if the gas is in compressed or liquified form – as well as new tank options. The new gas engine and new tank options facilitate travel operators to switch to biogas without issues with range and while still providing the power needed for any operation. Another upside is that it doesn't take a huge investment. Running on both liquified gas (LBG/LNG) and compressed gas (CBG/CNG), the benefits with the new engine are many: it can use renewable fossil-free fuel locally produced that reduces emissions by up to 90 percent. Air quality in general is positively affected by reduced emissions, and the quieter vehicles benefit drivers, passengers and crew. Moreover, the 13-litre engine offers the power and torque of equivalent diesel engines, meaning it can handle even the toughest challenges. This makes it the most sustainable, yet viable powertrain option on the market for long-distance operators. Furthermore, Scania gas engines require no additives to use the fuel, eliminating dependence on the additive's availability, all while reducing operating costs. The 13-litre gas engine is available as an option on the recently introduced high-floor Scania K-chassis with an increase in load capacity in the front axle by 500 kilos, which enables improved weight distribution and higher passenger and luggage capacity.

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### **European sustainable transport award for Volvo LNG and Bio-LNG trucks**

Volvo Trucks' natural gas and biogas trucks have received the 'European Transport Award for Sustainability 2022' in Munich, Germany. Volvo Trucks won first prize in the 'trucks with gas drive' category with the Volvo FH and Volvo FM with LNG and Bio-LNG drive mainly for its economical consumption. Gas-powered trucks are an important part of Volvo Trucks' strategy on the road to lower CO2 emissions in long-haul transport. According to Volvo's recent press release, their bio-LNG-powered trucks have the same high performance and low fuel consumption as a diesel-powered Volvo truck, but significantly lower CO2 emissions. With natural gas, CO2 emissions drop by 20 percent. However, when running on RNG, emissions can drop by up to 100 percent.

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### **Project to run UK locomotive on biogas, hydrogen receives gov't funding**

UK rail freight provider Freightliner, working in partnership with a consortium of specialist suppliers, has secured government funding to develop a dual-fuel solution for the Class 66 locomotive. The technology, utilising biogas and hydrogen, is one of the 30 winners of the latest round of the First of a Kind competition announced by the UK Transport Secretary. The project will substitute diesel with both hydrogen and biogas on the Class-66 locomotive, one of the industry's most challenging two-stroke locomotives, which hauls over 80% of freight on the UK rail network. The engine will run on a combination of diesel, biogas, and hydrogen. Freightliner operates over 113 Class-66s in the UK. It is the first time after years, when a first successful test was made in Sweden, that a diesel engine of a train will be changed into biogas.

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### **SNCF has been attracted to biogas for the repowering of some of its TER trains.**

GRDF's teams are working on this solution with the consulting firm 2C-Consulting, who have come up with the idea of retrofitting existing trains with a hybrid bioNGV technology. Already under study in the Hauts-de-France region for freight, biogas is also of interest to the SNCF (French national railway company) and the Hauts-de-France region for passenger transport. The stakes are high: by 2035, the operator wants to replace all diesel fuel with alternative fuels.

Hydrogen, batteries, B100. To replace thermal TERs, several complementary solutions are on the table: Hydrogen, batteries, B100. Each with its own advantages and disadvantages.

While batteries and hydrogen remain the most virtuous solutions in a "tank to wheel" approach, the former has the disadvantage of a limited autonomy of about 80 kilometers, while the latter is sometimes disproportionately expensive. Of the 1,000 trains that the SNCF must replace, it is estimated that 300 will be able to run on batteries and about 15 on hydrogen. There are still 600 trains to be replaced with alternative energy. On the RNG part, 300 trains could respond to the solution. GRDF's engine solution is based on a combination of two 420 kW MAN gas engines and a 300 kW battery pack. This would give a total power of 1.2 MW, which is close to the conventional power levels used on diesel trains.

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### **Estonia develops its first LNG-powered locomotive**

Latvian engineering company DiGas will equip a diesel locomotive of Estonian rail freight carrier Operail with a gas turbine. The vehicle will be tested on the Estonian railway network. In late 2020, the LNG-powered locomotive was expected to be introduced into regular service. The project of Operail and DiGas costs a quarter million euros and includes the retrofitting of GE C36-7 diesel locomotive produced by General Electric. To implement the project, DiGas will divide the 17,000-litre fuel tank of the locomotive into two parts. One section will be used for diesel fuel, while another one will be adapted for Liquid Natural Gas (LNG). Also, the Latvian company will install the new LNG storage system including sensors to record and analyse the fuel consumption. Operail intends to reduce the operational costs and emissions. The vehicle of this type usually consumes 30 per cent less fuel, emits 20 per cent less carbon dioxide and 70 per cent less Sulphur dioxide.

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