



Technology Collaboration Programme  
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## Newsletter IEA Bioenergy Task 37: 03/2023

### Wrap-up of 2022: Road and maritime transport

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#### **Baleària considers gas to be the cleanest technology**

The Spanish shipping company Baleària considers gas technology to be a viable and cleanest bet that currently exists, in a context where the debate on energy dependence and consumption models, with the horizon of decarbonization 2050, has come to the top of the list of urgencies of the countries. Baleària has developed projects linked to gas since 2013. Since October of last year, the company has reduced its consumption in the face of escalating prices that threatened the company's viability. "The decision was made out of responsibility; if we are not viable, in no case can we be sustainable", highlights Cervera. As a commitment to the future, the shipping company has nine ships with dual engines prepared to consume 100% biomethane and up to 25% green hydrogen mixtures, renewable gases that are neutral in CO2 emissions, in which Baleària is involved in several projects.

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#### **Biofuels and ammonia, are analysed in a set of new reports released by EMSA**

The reports, prepared by the European Maritime Safety Agency (EMSA) to support the European Commission in the ongoing work on the "Fit for 55" package, in particular availability, sustainability, cost implications, and safety. As a 'drop-in' fuel which could replace conventional fossil fuels without substantial engine modification, biofuels can offer an immediate alternative for the existing fleet. The report finds that many of the existing

maritime regulations can be transferred from fossil fuels to biofuels, and the safety risks are broadly similar. While the current use of biofuels in marine-engine applications is very limited (99.91% of marine fuel use was of carbon-based conventional fuels in 2020) there is significant potential for biofuels to capture a larger share of the total maritime fuel consumption. Projections for 2030 forecast between 6.3 to 8.0 exajoules (EJ) of available biomass volume in the EU and increasing to 6.7-14.7 EJ by 2050 (for comparison purposes, the international maritime transport sector represented about 12.0 EJ in 2021<sup>2</sup>). However, the research notes that the future availability of sustainable biofuels may be in question, given the size of any potential demand from the maritime sector.

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### **Bio-LNG's role in shipping's decarbonization**

Conducted by the Maritime Energy and Sustainable Development Centre of Excellence (MESD CoE) at Nanyang Technological University, Singapore (NTU Singapore), the study explored questions around fuel availability, cost, lifecycle emissions and logistics, providing an overview of the applicability of Bio-LNG as marine fuel. It also investigated the feasibility of LNG and Bio-LNG as a realistic pathway for the shipping industry to achieve greenhouse gas emission reduction targets in a sustainable manner. Bio-LNG can be blended with fossil LNG in relatively small amounts to reach the 2030 International Maritime Organization (IMO) targets and the biofuel proportion in the mix can be increased to meet 2050 targets. The findings suggest that pure Bio-LNG could cover up to 3% of the total energy demand for shipping fuels in 2030 and 13% in 2050. If it is considered as a drop-in fuel blended with fossil LNG, Bio-LNG could cover up to 16% and 63% of the total energy demand in 2030 and 2050, respectively, assuming a 20% blending ratio. In the long term, shipowners who have invested in the LNG pathway will need to shift to renewable synthetic LNG (e-LNG). The report also forecasts that the average cost for delivered Bio-LNG will fall by 30% by 2050 compared to today's values, mainly driven by the reduced cost of producing biomethane in large-scale anaerobic digestion plants. This makes Bio-LNG one of the cheapest sustainable alternative marine fuels, compared to biomethanol and electro-fuels, including e-ammonia and e-methanol.

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### **Attero, Nordsol and Titan join forces to produce Bio-LNG for maritime transport**

Attero, Nordsol, and Titan, three companies from very different sectors, have joined forces to achieve a decentralized production of Bio-LNG designated for use in the maritime industry. The three partners met at the site for the plant – located at the facility of waste processor Attero in Wilp, the Netherlands – where the final investment decision was made and where building can now begin. The FirstBio2Shipping project is set to deliver the first Bio-LNG early 2024. The plant will produce around 2,400 ton/year of Bio-LNG (or liquefied biomethane). Attero will process domestic biowaste into 6 million Nm<sup>3</sup> of biogas per year. Nordsol and Attero will jointly produce 2,400 tons/year high-purity Bio-LNG and 5,000 tons/year liquid bio-CO<sub>2</sub> from this biogas using Nordsol's patented iLNG technology. Clean fuel supplier Titan, the exclusive long-term off-taker, will supply the Bio-LNG to the maritime industry where it will cost-effectively substitute fossil fuels. Last year, The European Union awarded the project with €4,3M in funding.

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### **The role of bio-LNG in the decarbonization of maritime transport**

Decarbonization of shipping will require the use of multiple low and zero carbon fuels. When evaluating different options, it is essential to properly consider each pathway, not

just the destination. It is critical that decision making be guided by accurate information that evaluates each alternative fuel pathway on a comparative and full life cycle (Well-to-Wake) basis. A new study commissioned by SEA-LNG confirms that bio-LBG can make a major contribution to the decarbonization of maritime transport. As it can be mass-produced quickly to meet demand and is cheaper than most other alternative fuels, it should enable the sector to meet its greenhouse gas emission reduction targets. Results suggest that pure bio-LBG could meet up to 3% of total energy demand for marine transportation fuels in 2030 and 13% in 2050.

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### **HAVI and HAM bet on biomethane hand in hand with Scania**

HAVI, together with its collaborator HAM and hand in hand with Scania, promote the use and consumption of biomethane in their trucks, in a clear commitment to the decarbonization and development of this green energy, obtained from biogas. The use of biomethane represents a reduction in CO<sub>2</sub> emissions of 90% vs. the use of equivalent diesel trucks and 75% vs. trucks that already use natural gas (CNG-LNG), which represents a substantial reduction in greenhouse gas emissions, which will contribute to meeting environmental objectives. Since transport is responsible for 85% of the total CO<sub>2</sub> emitted per ton distributed, in 2016 HAVI began to incorporate gas trucks into its distribution fleet, at its distribution center in Barcelona and with the collaboration of HAM for the supply of the gaseous fuel. Also for Scania, manufacturer of HAVI's gas trucks, the decarbonization of transport is the central axis of its strategy. One of the technologies with the greatest decarbonisation potential that the Swedish manufacturer has within its range are trucks that can run on biomethane. Biomethane trucks are a key part of Scania's Science Based Target, with which it commits to reducing CO<sub>2</sub> emissions from its products by 20% between 2015 and 2025.

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### **California fleets fueled with RNG achieve carbon-negativity**

Natural Gas Vehicles for America (NGVAmerica) and Coalition for Renewable Natural Gas (RNG Coalition) today announced that California fleets fueled with bio-CNG achieved carbon-negativity last calendar year for the second straight year. Ninety-eight percent of all on-road fuel used in natural gas vehicles in California in 2021 was renewable natural gas (RNG). According to data from the California Air Resources Board the annual average carbon intensity score of bio-CNG in that mix was -44.4 gCO<sub>2</sub>e/MJ.

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### **Class 8 natural gas truck retail sales gained 18% through August**

US and Canadian Class 8 natural gas truck retail sales for the first eight months of year outpaced the same period in 2021 by 18%, as published in the quarterly report, Alternative Fuels Quarterly, just released by ACT Research. Although retail sales of NG Class 8 trucks are up, fueling infrastructure continues to contract. Sales of natural gas/renewable gas-powered vehicles, as reported by the six major truck OEMs, who account for approximately 60% of the heavy-duty (HD) NG/RNG market were mixed in the June to August time period, with June dropping 33%, July surging 204% compared to last July, and August up 20% versus a year ago. Regarding fueling, there were 822 public CNG/RNG stations open in the US in mid-September 2022, the vast majority of which can accommodate a heavy-duty (HD) vehicle. However, it is to mentioned that there are also 4,572 private filling stations in the US.

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### **In India, Toyota starts selling natural gas cars**

While its future in Europe is uncertain due to the phasing of ignition engines in 2035, CNG cars continue to develop in other parts of the world. In India, where the use of gas for mobility is accelerating, Toyota has just launched its first CNG models.

The Toyota Glanza sedan comes in CNG form on two trim levels. The same goes for the Toyota Urban Cruiser Hyryder, an SUV now available with a factory-fitted CNG kit.

On the technical side, the configuration varies significantly from one model to another. Equipped with a 1.2-liter 57 kW engine, the Toyota Glanza CNG claims an average consumption of 3.26 kg/100 km. The more powerful Hyryder Cruiser combines a 1.5 l engine with a 5 speed transmission. Less economical, it announces an average of 3.83 kg/100 km. In both cases, the capacity of the tanks is not specified.

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### **Weichai Group launches natural gas engine with a thermal efficiency of 54.16%**

Weichai released the world's first commercial natural gas engine with base engine's thermal efficiency of 54.16%. TÜV Sud, an authoritative international testing institution, awarded certificates to the representatives of Weichai's development team. In 2012, Weichai successfully developed China's first large-power in-cylinder high-pressure direct injection compressed combustion natural gas engine. Since 2018, the R&D team of Weichai has achieved huge leaps in the base engine's thermal efficiency of natural gas engines, exceeding at the industry level of 42% to 45% and 50% in 2020 and 2021 respectively, In November 2022, the thermal efficiency of a natural gas engine was successfully improved to 54.16%, meeting the Euro VI emission standards.

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### **World's first liquefied natural gas tractor by CNH industrial**

New Holland Agriculture, one of its global agricultural brands, presented the T7 Methane Power LNG (Liquefied Natural Gas) pre-production prototype tractor in Phoenix, AZ. New Holland is the alternative fuels leader in agriculture – having developed the first commercialized Compressed Natural Gas (CNG) tractor – the T6 Methane Power. The new T7 prototype furthers the Brand's position, driving greater value for their customers. It more than doubles the autonomy compared to a CNG design. In comparison to the T6 Methane Power CNG, this is a fourfold increase in fuel capacity. It delivers the same power and torque as the equivalent diesel tractor while delivering autonomy without the need for any extra tanks. It's also quieter – a significant reduction in drive-by noise levels makes it perfect for tasks near livestock or in urban areas.

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### **Achieving climate neutrality with biogas**

Heavy lorries that transport large loads over long distances account for only 25% of Europe's fleet – yet they account for 75% of CO<sub>2</sub> emissions. That's why it is so important to take swift action in this area. And this is precisely where trucks with CNG and LNG drive systems come into play. CNG and LNG trucks run on biogas to reduce CO<sub>2</sub> emissions – something that will not be feasible with other alternatives in the foreseeable future. In the midst of a global fuel and energy crisis, [carbon neutrality in road](#) traffic simply cannot be achieved with "just" one technology – it will take all of them. With an addition of 55% biogas by 2030, 75% by 2040 and 100% by 2050, which would then mean a total of 15 billion cubic meters of biomethane. This timetable – or the [biogas roadmap](#) as a counterpart to an existing electric roadmap, so to speak – comes at exactly the right time: the [European Commission](#) will shortly present its proposal to revise the CO<sub>2</sub> Regulation for

heavy-duty vehicles, which includes new targets for 2035/2040 and takes into account renewable fuels, including biogas and bio-LNG in addition to synthetic fuels, e-fuels and hydrogen. With an addition of 55% biogas by 2030, 75% by 2040 and 100% by 2050, which would then mean a total of 15 billion cubic meters of biogas. This timetable – or the [biogas roadmap](#) comes at exactly the right time: the European Commission will shortly present its proposal to revise the CO<sub>2</sub> Regulation for heavy-duty vehicles, which includes new targets for 2035/2040 and takes into account renewable fuels, including biogas and bio-LNG in addition to synthetic fuels, e-fuels and hydrogen.

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### **Bio-LNG can support Europe's journey towards sustainable mobility by 2050**

According to the European Environmental Agency, transport is responsible for 27% of Europe's total GHG emissions and is a major contributor to climate change. The European Commission has recently set a target to increase the share of renewable energy in transport to at least 14% by 2030, including a minimum share of 3.5% of advanced biofuels. One of the options for the fast decarbonization of the transport sector is to use Bio-LNG, produced from organic residues and resulting from the purification of biogas. This renewable fuel is readily available for use at scale and with infrastructure in place. The paper authored by Floris Goedhart "Sustainable mobility in Europe: Potential market share for Bio-LNG in the heavy-duty transport and maritime sectors in 2050" also illustrates that the share of Bio-LNG in heavy-duty vehicles and maritime transport in 2050 are equally promising. His research shows that by 2050 the Bio-LNG production could amount to 46 – 405 TWh, representing between 1.7% (lowest scenario) and 18.7% (highest scenario) of European transport energy consumption. The market share of Bio-LNG could be at least 57% in the heavy-duty vehicles sector or 17% in the maritime sector.

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