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## Newsletter IEA Bioenergy Task 37: 05/2024

### Biogas for shipping and trains

#### Topics

[River passenger transport: RivesEnReves converts its fleet to RNG](#)

[Métha Valo 92: RNG boats to transport digestate](#)

[Bio-LNG increasingly used in marine applications](#)

[MSC Euribia saved 43 tons of fuel by using Bio-LNG](#)

[Wasaline's ferry starts operating on biomethane](#)

[DK: 52% of new ship orders sail on green fuels](#)

[Decarbonizing the Shipping Industry](#)

[X-Press Feeders gets set for methanol-powered service in Europe](#)

[Astrid Mærsk arrives in Shanghai for first green methanol bunkering in China](#)

[Alternat and RiverCat: sailing towards a sustainable future with RNG](#)

[The prospects for RNG trains in France](#)

[OptiFuel Systems to Begin testing RNG locomotive prototypes in 2025](#)

#### River passenger transport: RivesEnReves converts its fleet to RNG

Specializing in river cruises and port management along the Marne, RivesEnReves was recently selected by GRDF in its call for projects to decarbonize river and coastal shipping. The company aims to position itself as a partner of choice for conducting feasibility studies on boat retrofitting. Starting with the conversion of its own fleet of 5 river-sea boats. To control its impact on the environment, the company is starting to convert its fleet to BioGNC with the "Seine et Marne", a 150-passenger boat soon to be equipped with two Hydro-Armor electric motors and a 91KW biogas-powered generator. With its dimensions of 5.85 meters wide and 32 meters long, it offers both ideal space for a hybrid engine, and the ability to navigate on the Marne.

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#### Métha Valo 92: RNG boats to transport digestate

The Métha Valo 92 project is about to transform the river transport landscape by using RNG-powered boats between the ports of Gennevilliers and Limay. Behind Métha Valo 92 are two organisations: Sigeif, which has already initiated the installation of several CNG stations in the Paris region, and Syctom, the public household waste treatment service for 82 municipalities in the Ile-de-France region. The project is designed to process up to 50,000 tons of bio-waste per year to biogas, equivalent to almost 12% of the department's total collection volume. This food waste will come from households, institutional catering, and unsold and out-of-date produce from supermarkets and hypermarkets. One part of the gas will be injected into the GRDF network in the form of biomethane, and the other will be used by Paprec for its heating and electricity needs. As for the digestate, a residue from the methanization process, it will be spread in the Eure and Eure-et-Loir regions to fertilize fields, and will be transported to farmland by river. Self-propelled barges, up to 80 meters long and capable of transporting up to 1,000 tons of digestate, are good candidates for this conversion to RNG, although

Paprec has a slight preference for barges with pushers, as they can be replaced more easily during downtime.

[More](#) (in French)

[Top](#)

### **Bio-LNG increasingly used in marine applications**

In a new analysis dedicated to LNG bunkering, SEA-LNG highlights the strong growth of bio-LNG in the maritime sector. According to SEA-LNG, bio-LNG is currently present in almost 70 ports around the world. These include the East Coast of the USA, Rotterdam and Singapore. Data on the growing use of bioLNG as a marine fuel is contained in the latest update of SEA-LNG's online tool. Called "Bunker Navigator", it takes the form of a world map featuring information on the maritime use of renewable liquefied natural gas in each country. The current world fleet of 411 LNG-powered vessels are all capable of using bio-LNG as an alternative fuel without any modification. Additional 526 ships are on order. Nanyang Technological University's Center of Excellence in Marine Energy and Sustainable Development (MESD) published a study in October 2022. It estimates that biomethane production will increase 20-fold by 2050, and that bio-GNL, as a marine fuel, will be sufficiently available to decarbonize 13% of the world's maritime fleet by 2050.

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### **MSC Euribia saved 43 tons of fuel by using Bio-LNG**

The world's first cruise voyage with net zero greenhouse gas (GHG) emissions, achieved by the MSC Euribia, the new ship powered by liquefied natural gas (LNG) from MSC Group, marks a change paradigm for the segment. It demonstrates that net-zero emissions cruise travel is already possible today, significantly ahead of the 2050 target for the industry. The MSC Euribia achieved this milestone using Bio-LNG as fuel through the application of mass balance. Following MSC Euribia's historic net-zero GHG maiden voyage from Saint Nazaire, France, to Copenhagen, Denmark, 3-8 June 2023, including a day in Amsterdam, MSC Cruises can now share key data and the knowledge gathered from the journey. Over four days, MSC Euribia performed 11% better than its digital twin, a virtual ship that replicates optimal energy flow and utilization on board, achieving an overall saving of 43 tons of fuel.

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### **Wasaline's ferry starts operating on biomethane**

Wasaline started operating with certified biogas one day a week from October 13, 2023 in preparation for the EU emissions trading system that will come into force this year. Biogas is more expensive than liquefied natural gas (LNG), the current primary fuel of M/S Aurora Botnia, but the company will cover the extra costs on behalf of its customers. With certified biogas, all Friday departures until Christmas will be climate neutral. Wasaline has already reduced its CO2 emissions by 22 percent this year compared to last year. The use of biogas will further reduce CO2 emissions of Aurora Botnia. With four trips on Fridays, 18 percent of the total weekly departures will be operated with biogas. The biogas is supplied by Nordic energy company Gasum.

[More](#)

[Top](#)

### **DK: 52% of new ship orders sail on green fuels**

In Denmark, Danish Shipping says Danish shipping companies currently have 67 new ships in the order book, which will be delivered from shipyards around the world in the coming years. This increases the number of Danish ships in the order books for the third year in a row. Of these ships, 35, just over 52%, will be sailing on green fuels, including the service operation vessel (SOV), which ESVAGT and Ørsted are expected to receive in 2024. It is the world's first of its kind that can sail on green fuels. The ordered tonnage has increased by 7% compared to the same time last year, and if you look at the ships' tonnage, the green development appears even more clearly. Over 80% of the new tonnage can sail on green fuels.

[More](#)

### **Decarbonizing the Shipping Industry**

The shipping industry contributes approximately 3-4% of global GHG emissions, and tighter regulation from the International Maritime Organization (IMO) on decarbonization targets and customer demand will be two major factors in the growing pressure that marine logistic companies will face. This increasing pressure to stay commercially competitive whilst reducing its environmental impacts has started to drive some major industry participants to adopt new ways to reduce their GHG emissions. Battery technology is unable to provide close to on-par energy density required, and compounded by the relatively expensive costs to purchase, replace, and recharge, electric heavy-duty ships will certainly not be seen any time soon.

While gaseous alternatives such as hydrogen, ammonia, and RNG provide additional fuel options, their associated costs for transportation, storage in pressurized vessels, and overall energy densities remain inferior to a liquid substitute, methanol. Methanol provides a pathway for shipping industry companies to decarbonize. Clarksons, a global leader in maritime and shipping research services, reports that as of June 2023, there are 29 methanol-fuel-capable vessels in operation and 112 on order, along with 3 methanol-ready vessels operating and 128 on order. Bio-methanol (methanol produced from biomass) and e-methanol (methanol synthesized from captured carbon and renewable power sources) are two "green" methanol supply options being explored. There are 2 major technological pathways to bio-methanol production: synthetic gas, produced by gasification of carbonaceous biomass feedstock and steam methane reforming of biogas, predominantly biomethane, produced from anaerobic digesters fed with organic materials.

[More](#)

[Top](#)

### **X-Press Feeders gets set for methanol-powered service in Europe**

In Florida, The Maritime Exclusive reported that Singapore-based X-Press Feeders was on track to launch green shipping corridors in Northern Europe during the third quarter of this year following the inking of a landmark agreement with six ports. The company has already signed a contract with Dutch fuel supplier OCI Global for the supply of green methanol at the port of Rotterdam. X-Press Feeders says that the vessels will save about 270 kilograms of CO<sub>2</sub>e emissions for every TEU carried when compared to a conventionally-fueled ship. The first vessel is preparing to make its maiden voyage from Shanghai's builder Sumec Yangzhou New Dayang Shipbuilding Company to Rotterdam.

[More](#)

### **Astrid Mærsk arrives in Shanghai for first green methanol bunkering in China**

In China, Maersk said its methanol-enabled vessel "Astrid Mærsk" arrived at Yangshan port in Shanghai, for the first green methanol bunkering with simultaneous cargo and bunkering operations in China. This achievement was made possible in partnership with the Shanghai International Port Group (SIPG).

"Astrid Mærsk" sailed from Yokohama, Japan to Shanghai after having its naming ceremony in early April. It is the second of Maersk's 18 large methanol-enabled vessels, scheduled for delivery between 2024 and 2025.

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### **Alternat and RiverCat: sailing towards a sustainable future with RNG**

Awarded a prize in GRDF's latest call for projects to decarbonize river and coastal maritime transport, Alternat and RiverCat are working respectively to promote training, information and exchanges on solidarity initiatives, and to restore river passenger transport to its former glory. To promote environmental education, it was natural for them to start by decarbonizing boats. The two organizations attracted the attention of the jury of GRDF's call for projects because of their joint project to carry out a feasibility study on retrofitting the Bali boat. Retrofitting the Bali is an experimental field test to find out whether it is more interesting to retrofit used boats, or have new ones built, both from an economic point of view, but also in terms of the pollution of each solution. Alternat's boats need a great deal of autonomy to ply the Seine from Juvisy to Conflans-Sainte-Honorine, via Paris and sometimes as far as Normandy. There are currently two 1,000-liter tanks on the Bali. Knowing that the boat consumes around 1l per km, it can sail for 2,000 km.

[More](#) (in French)

[Top](#)

### **The prospects for RNG trains in France**

With 60% of the train network in France electrified, rail transport can be considered a pioneer in energy transition. However, a quarter of the locomotives was still powered by a diesel block in 2018, i.e. around 20% of traffic. 18% of regional passenger transport is still carried out by internal combustion engines and 25% by dual-mode thermal-electric models. This accounts for 63% of greenhouse gas emissions from passenger rail operations. For cost reasons, there are no plans to wire the lines. A study published in December 2023 to reduce emission was carried out jointly by Ademe's Transport and Mobility Department and GRDF's Strategy Department. It opens up prospects for the use of bioGNV to fuel trains in mainland France next to battery electric, hydrogen, B100 and HVO. With regard to freight, there is a national strategy under the leadership of the Ministry of Transport. Some fifteen countries are also interested in NGV for rail transport. Most often with less than 5 locomotives in service or planned, as is the case in Norway, Sweden, Estonia, Latvia, Poland, Peru, Italy, Spain, etc. On the other hand, Argentina plans to operate 400 CNG locomotives (passenger transport), the United States uses 40 (freight and passengers, since 2012), India 50 (passengers, since 2014) and Russia 27 (freight and passengers, since 2015) with 24 more in the pipeline. All these initiatives are detailed in the ADEME/GRDF study.

[More](#) (in French)

### **OptiFuel Systems to Begin testing RNG locomotive prototypes in 2025**

In South Carolina, OptiFuel Systems announced that it will begin testing a prototype 5600-hp Total-Zero RNG Line Haul Locomotive and 2500-hp Total-Zero Powered Tender with 7,500 DGE (diesel gallon equivalent) capacity, in January 2025. The RNG-powered line haul locomotive produces 5100 hp of continuous power from zero emission Cummins RNG engines using OptiFuel's Quick-Power technology with a peak power of 5600 hp with the standard LFP battery pack. Focused on sustainability, OptiFuel's Total-Zero RNG-Electric Line Haul Locomotive will have ZERO well-to-wheel nitrogen oxides (NOx) and particulate matter (PM) criteria emissions and negative carbon intensity while simultaneously improving fuel cost and operating range by 25%.

[More](#)

[Top](#)

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