Navigating the road to zero-emissions

14 September 2022 08:00 - 09:00 CEST



Agenda

- Introduction Harmen Dekker, CEO of European Biogas Association
- Navigating the road to zero in Europe Eric Bippus and Ashley Remillard, Hexagon Agility
- Cryoshelter technology Dr. Rebernik, Cryoshelter
- Panel discussion led by Harmen
 Dekker
- Audience participation and discussion
- Closing / Wrap up





There is No Time To Waste!

Are we doing enough?

- 3000 companies worldwide have committed to emissions reduction through the Science based target initiative
- Regulation such as the EU Taxonomy; REPower EU and the US Inflation Reduction Act are defining global economic activities
- Investor activism and rising consumer interest
- The **global pandemic** and the Russia-Ukraine war have propelled energy independence and (local) sustainable energy security to the top of political agendas in the western world
- Yet we need to do more! To make a fast and lasting impact we need to embrace all solutions available.



Decarbonizing the transportation sector with urgency is required to reach global climate targets in 2025 and 2030

Transportation is responsible for almost 20% of global CO2 emissions Is politics turning a blind eye in the EU? Tailpipe approach is not concerned where electricity comes from

In an avg year there are 300,000 trucks sold in the EU. In 2020 96% were diesel

Which solutions can be offered in the HDV segment to be able "to do more and faster for our environment"

It is physically impossible to change the full EU fleet in 2050 to BEV and/or H2



Presenters



Eric Bippus SVP Global Sales & Marketing Hexagon Agility

SVP of Global Sales & Marketing at Hexagon Agility since 2016. He has previous industry experience from 25 years in global heavy duty transport sector working for Remy International and Prestolite Electric Inc.



Ashley Remillard VP Legal & Gov't Affairs Hexagon Agility

VP Legal of Hexagon Agility since 2019. She has experience in both litigating and counseling clients in a wide array of areas. Prior to joining Hexagon, she was partner at Nossaman LLP for 11 years.,



Dr. Rebernik CEO Cryoshelter GmbH

Dr. Matthias Rebernik is the CEO of Cryoshelter GmbH. He founded the company in 2008, and in 2006 his PhD thesis was part of the LH2-tank project for the BMW Hydrogen 7.



Our vision Clean air everywhere

Our purpose Driving Energy Transformation

Our values
Integrity & Drive

Hexagon at a glance

1700 employees

23 international locations

EUR 354 million revenue (2021)

6 decades track record

Mitsui & co majority shareholder since 2015



Hexagon offers a complete portfolio of energy agnostic clean fuel solutions



Over 70,000+ commercial vehicles on the road using one of our clean energy solutions

KAGON

European CO2 intensive transport modes



9 Source: Frontier based on https://www.eea.europa.eu/data-and-_maps/indicators/transport-emissionsof-greenhouse-gases/transport- emissions-of-greenhouse-gases-11 Road Transport constitutes more than 70% of all CO2 emissions for all modes of transport

- it is estimated that road transport is responsible for up to 30% of small particulate matter (PM) emissions in European cities
- •The World Health Organization (WHO) has cited PM as the main cause of air-pollutionrelated deaths and illnesses

Source: European Commission fr-future-road-transport



European heavy-duty transport projected to grow by 55% by 2050





There is a solution – biomethane in HD Transport

What is biomethane?

Methane

 CH_4 (methane) content of more than 90 vol.-%

Manure

bioCNG



Certified for use in vehicles

Landfill waste Agricultural waste Wastewater sludge

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Especially for medium- and heavy- duty trucks There is no difference in vehicle, engine and fuel storage between CNG and





Methane is more than 25-30 times as potent as carbon dioxide at trapping heat in the atmosphere

> **Biomethane is** methane produced from biowaste certified for use in vehicles



Solving two major emission problems through methane capture

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bioLNG displacing diesel



Biomethane has significant well-to-wheel CO_{2-eq} emission savings compared to fossil fuels



Depending on biomass source biomethane has an 80-200% reduction in CO_{2-eq} emissions on a well-to-wheel basis

Biomethane usage **reduces global warming by capturing methane** otherwise emitted to the atmosphere

BEV and FCEV only achieve GHG emission savings compared to ICE-Diesel, if they use energy from renewable sources



Biomethane retains solid EU regulatory support in heavy duty vehicle segment

REPowerEU

• "Fit-for-55"

EU Taxonomy



No restrictions on use of natural gas in heavy-duty vehicle segment



REPowerEU – Biomethane

Three function approach

- Demand side through energy conservation
- Supply side through diversification from Russian fossil fuels
- Acceleration of clean energy transition through rollout of renewables and by reducing fossil fuel consumption



REPowerEU is intended "to support the achievement of the EU target of 35 billion cubicmetres biomethane **production and use** by 2030 and to create the preconditions for a further ramp-up of its potential towards 2050."



Fit for 55: CO₂ Emission Regulation

Aimed at achieving EU's goal of net-zero carbon emissions by **2050**

Reduction's target of 100% for passenger cars and light commercial vehicles by 2035

Reduction's target of **55%** for passenger cars by 2030 and **50%** for vans by 2030 Does not apply to medium or heavy duty segment

Adopted by EU Parliament in June 2022 plenary



Fit for 55: Renewable Energy Directive (RED) III

Categorizes biomethane as "advanced biofuel"; will continue to facilitate investment in Bio LNG

Increases current target for renewable energy sources of 32% to at least **40%** by 2030

Proposes greenhouse gas intensity reduction target for transport of **13%** -- doubling of target over prior methodology EU's renewables target considered "game-changer" in terms of driving investment

Plenary vote expected September 2022



Fit for 55: Advanced Fuel Infrastructure Directive

Requires one refueling station every 400 km on TEN-T Core Network for LNG/bio-LNG and one refueling station at least every 150km for CNG/bioCNG

Retains mandatory targets for LNG/Bio-LNG through 2025; removes targets for CNG/bioCNG

Rationale: Further action on CNG/bioCNG infrastructure unnecessary; maintains LNG/bio-LNG target for heavy duty needs Build out of natural gas infrastructure for LNG/bioLNG to continue

Council General Approach adopted in June 2022 retains concepts from EU Commission proposal



Natural gas infrastructure in Europe well developed to support LNG/BioLNG in heavy duty sector

17%

Estimated content of biomethane in today's European natural gas used for transport sector 581 IG/bioLNG fuel stations in c

Public LNG/bioLNG fuel stations in operation in Europe today vs. 190 in 2019 (+~200% in 2Y)

100% Biomethane Stations

Available today in Sweden, United Kingdom and the Netherlands



Heavy Duty Fleet Emission Regulation

Adopted August 2019

- Two binding reduction targets for OEMs:
 - 15% in 2025
 - 30% in 2030
- Tailpipe based approach
- Includes mechanism to incentivize adoption of zeroand low-emission vehicles in technology-neutral way
- Penalties for exceedances of targets

Current fleet regulations treat these fuels the same! EU-regulations (EU2019-1242) do not credit the CO2-savings to the manufacturers' fleet-emission targets.

Next steps

- Commission report/proposal expected Nov 2022
- FuelEU Maritime might open door to life cycle approach
- Committee review expected 2023
- Actively promoting different, unique program for heavy duty sector



The next 24 months are crucial

- Fleets in record number are already deploying natural gas vehicles utilizing methane sourced from renewables
- All industry players need to engage in regulatory process to shape Heavy Duty Emission Regulation and promote well-to-wheel (versus tailpipe) analysis
- As an industry, we need to educate and shape natural gas targets, with emphasis on biomethane



Decarbonization of HD transport must begin now

No one-size-fits-all clean energy solution for HD transport – now or in the future Path to decarbonization can be accelerated immediately by targeting the high emitting long-haul heavyduty transport segment The biomethane solutions leverage technology, infrastructure and an energy source that is readily available today



Highest emissions in HD Transport - 4x2 Sleeper

		Regulation EU2019 / 1242 in effect since Aug. 2019							
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Vehicle Type		4x2 Rigids		4x2 Tractors		6x2 Rigids		6x2 Tractors	
Cab-Type		а-ко Day-Cab	4-LH Sleeper	Day-Cab	Sleeper	Day-Cab	Sleeper	Day-Cab	Sleeper
CO2 fleet emissions	[%]	5%	2%	1%	68%	4%	10%	0%	10%



Avg HD Long-haul Sleeper 116,000km p/yr

Data from based on ACEA data for 2019/2020 – first time period of CO2-fleet emission assessment.

OEMs conclude that for the HD truck segment the most likely longterm solution will be a multi-fuel strategy





Clean energy solutions for today's European transport sector vary greatly in readiness and suitability for HD long haul





Compact European truck design favors LNG/Bio-LNG due to space limitations



European trucks

- Compact designs to meet regulatory restrictions and provide optimal manoeuvrability on narrow roads
- Limited space to package fuel systems favors LNG/Bio-LNG





North American trucks

- Spacious and custom-made designs well suited for American roads
- Ample space to package CNG/RNG fuel systems





Hexagon Group Portfolio – Filling the final missing piece to energy storage



Cryoshelter Cryogenic Tank Systems for Clean Trucks







Located in Austria/ Europe



Cryoshelter

Cryoshelter was "born automotive"







BioLNG - Liquefied Biomethane Gas





Unique Selling Proposition

















Thinner insulation shell adds up to 30% more

Better insulation performance











Illustrative graphs and figures. Actual figures vary with tank size, stored amount of fuel, fuel quality, ambient conditions, etc. / Values for typical long-haul 4x2 tractor application

Cryoshelter





Values for typical long-haul 4x2 tractor application



Values for typical long-haul 4x2 tractor application



- ✓ Designed from scratch for automotive production processes → enables automotive quality at competitive cost
- $\checkmark\,$ Modular design: choose your tank size / manifold position / hold time
- ✓ High-Precision Fuel Content Gauge
- ✓ Electronic pressure management maximizes performance
- $\checkmark\,$ Electronic coupling of multiple tanks
- $\checkmark\,$ Easy access to manifold components for cost-efficient maintenance
- ✓ Manufactured in Europe



The European Natural Gas (NG) market is growing fast with supportive prospects for decarbonization - the NG market is expected to see high growth in the years ahead





Summary: Biomethane able to immediately impact emissions and is best suited energy solution to support HD Transport well beyond 2040

Biomethane full potential analysis

Highest carbon abatement potential	200% 80%	CO _{2-eq} emissions savings of biomethane from manure compared to trucks with fossil diesel Emission savings of biomethane from agriculture
Biomethane available NOW	95% 581	Biomethane content of gas used in Sweden and California today with many 100% stations in UK, NED LNG filling stations available today with another 3,500 CNG stations
Biomethane is relevant well into the future	2040 and beyond	Biomethane remains competitive vs. Diesel and BEV and FCEV well beyond 2040
Mature CNG/LNG technology	15+	Global OEMs with mature offering in CNG/LNG, incl. Scania, Iveco, Volvo, Freightliner, and more

Clean air everywhere

