

Low Carbon Fuels for the Asphalt Industry

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Calor Gas



Part of SHV Energy



UK's Leading LPG Supplier



196,000+ Customers



**Two of Europe's largest
LPG gas storage terminals**



1,000+ LPG Delivery Vehicles



28
Countries

30+
Million
Customers

17+
Thousand
Employees



Decarbonising Off-Grid Industry



All industries must decarbonise to meet UK's 2050 net zero target.



Off-grid industries can be challenging to decarbonise. Electrification not always practical or achievable, especially for heating



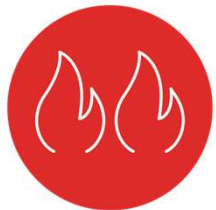
Calor is at the forefront of off-grid decarbonisation, supplying low carbon fuels since 2018



Decarbonising Asphalt Industry



National Highways driving asphalt emissions reduction. Targeting 78% reduction by 2040

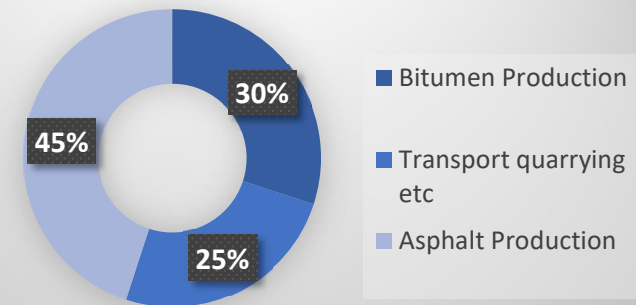


Asphalt burner emissions account for 41% CO₂ emissions in typical road building project



Off-grid asphalt plants fuelled by Kerosene or PFO offer large opportunity to decarbonise

CO₂ Emissions Source
Typical road project



LPG

- ✓ LPG is versatile energy that is already in widespread use wherever mains gas isn't an option.
- ✓ The cleanest of all fossil fuels.
- ✓ Cuts CO₂ emissions by 18% compared to oil
- ✓ Effective, tried-and-tested off-grid power for all aspects of commercial activity
- ✓ Comes in a variety of storage options – from underground and above-ground tanks to cylinders.



BioLPG

Low Carbon option available today.



Manufactured from a blend of waste residues & **sustainable feedstocks**



CO2 savings up to **86%** vs. oil. Certified by Green Gas Certification Scheme.



Chemically identical to LPG meaning no changes to infrastructure or equipment



CALOR

BioLPG

Flexibility through Blends



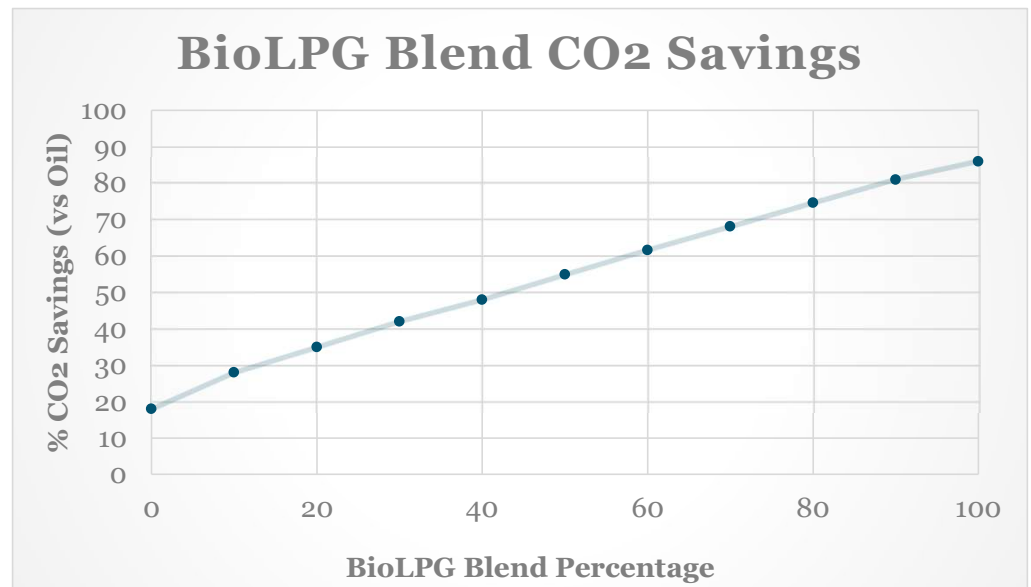
BioLPG can be blended in any ratio with LPG to deliver incremental carbon savings



Typically offered as 20 %, 40% or 100% blends

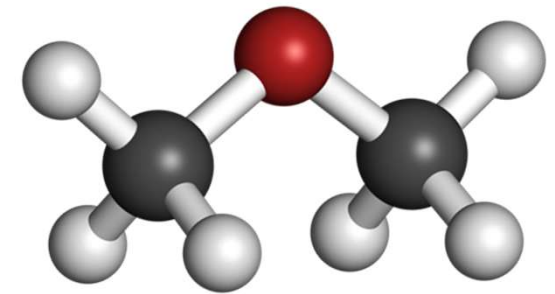


All Carbon savings are verified by Green Gas Certification Scheme



Renewable Dimethyl Ether (rDME)

What is rDME?



01.



A simple product

Dimethyl-ether is a single molecule that can be produced from a wide range of renewable feedstocks.

02.



Easy to handle

DME is chemically similar to propane and butane, and is a gas at room temperature and pressure. Like LPG it is easily transported as a liquid in pressurised cylinders and tanks.

03.



Safe, clean and green

rDME can reduce GHG emissions by up to 85% compared to diesel and heating oil, and emits no harmful particulates.

04.



Versatile Fuel

DME has been used for over 50 years in the chemicals sector as an aerosol propellant. It can also be used in the transport sector, for cooking, as well as domestic and industrial heating.



CALOR

rDME routes to market



100% rDME

- 100% rDME for hard to decarbonise offgrid energy users
- Requires modified infrastructure
- Largest carbon savings



Drop-in Blend

- rDME blended with LPG across entire supply chain
- No change to infrastructure
- Lower carbon savings
- Maximum blend percentage TBD



rDME Field Trials

Operational trials to demonstrate rDME



Commencing in
2025



rDME compatible
tanks, vehicles &
appliances developed



Prioritising key off-
grid industries such
as asphalt &
agriculture



Validation of
technical
modifications for
rDME



rLPG & eLPG

Driving R&D projects to produce on-purpose low carbon propane



>24 research projects globally at various Technology Readiness Levels. Global university & partner collaboration



Potential feedstocks such as ethanol, manure, sewage & other wastes. Prioritising local feedstocks to minimise emissions



Planned to deliver significant volumes of low carbon liquid fuels to decarbonise off-grid energy



Hydrogen

Calor & SHVE Energy are exploring how Hydrogen can de-carbonise off-grid industry



For off-grid industries, hydrogen may offer a route to decarbonisation



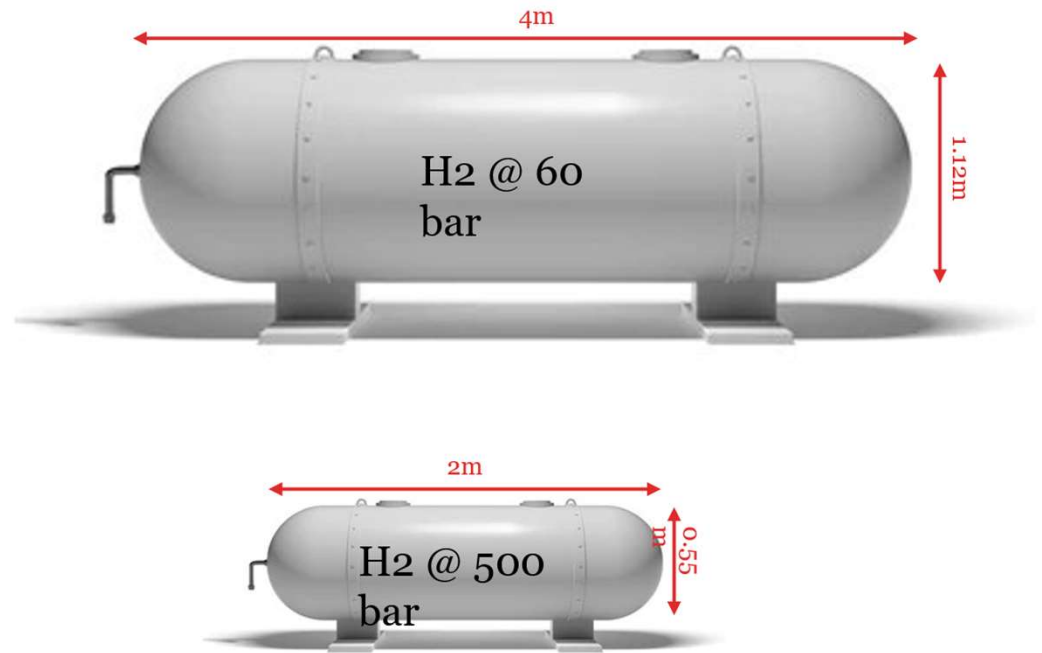
Road transport of H₂ is inefficient, however LPG & DME are excellent H₂ carriers



Calor & SHV Energy investigating routes to efficient supply of low carbon H₂

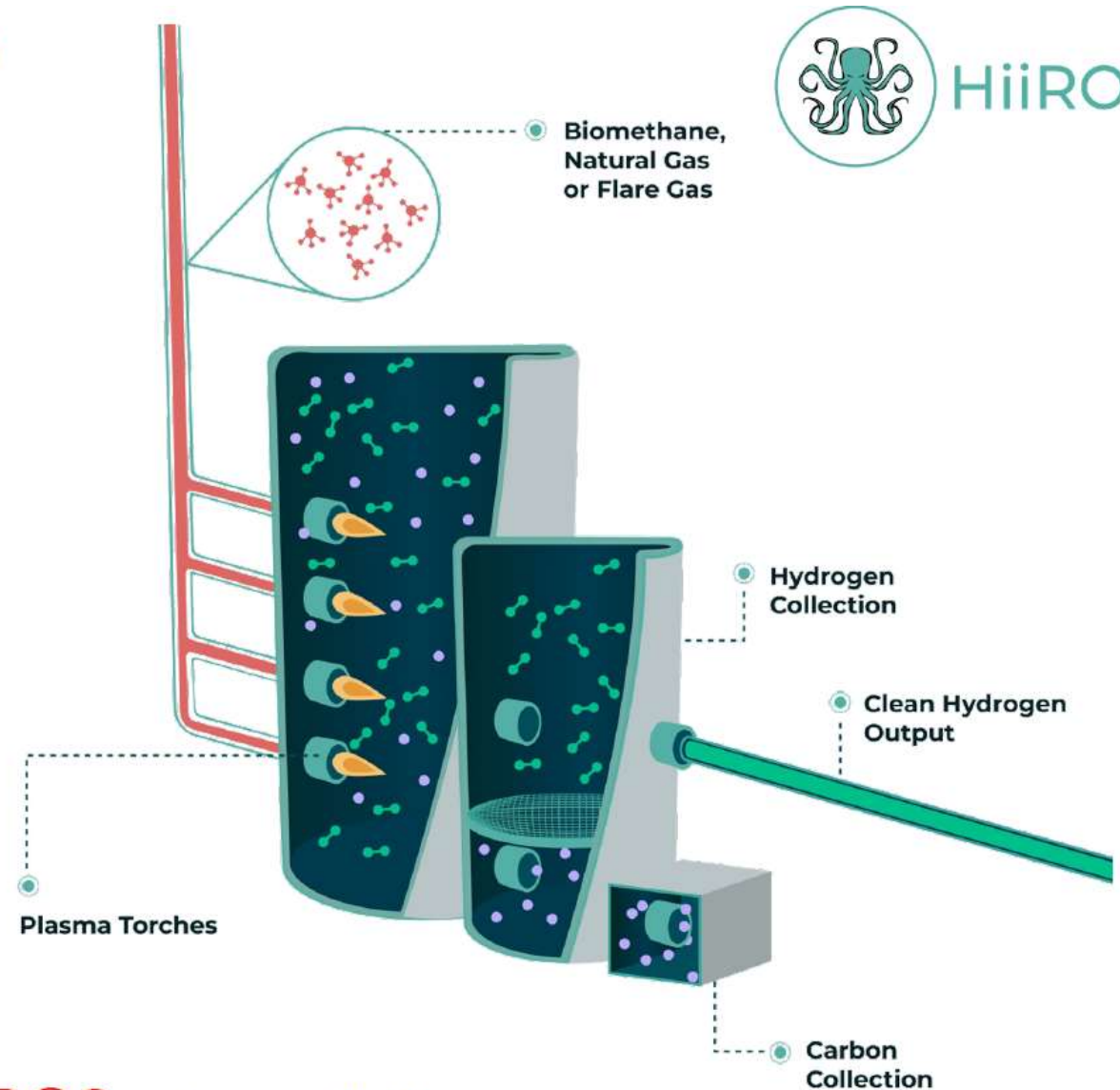


LPG: compact and easily stored compared to H2



Thermal Plasma Electrolysis (TPE) of Hydrocarbons

- Produces Hydrogen and Solid Carbon
- Uses only one fifth the electricity used by water electrolysis
- No direct CO₂ emissions as with Steam Methane Reforming
- Scalable – from small, local production up to full industrial scale



.....can we substitute with LPG?

Image credits- HiiROC

TPE is a proprietary process developed by HiiROC

 FUTURIA FUELS

Summary



Decarbonising off-grid industry is challenging but Calor has solutions



LPG can deliver 18% CO₂ savings compared to oil



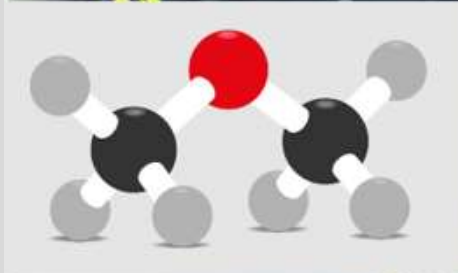
BioLPG is available today and can deliver 86% CO₂ savings



rDME provides alternative decarbonisation pathways
Field trials commence 2025



Calor & SHV Energy investing heavily in other future fuels such as rLPG, eLPG & H₂



Thank you



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