

# Renewable and low carbon fuels for the off-grid energy sector

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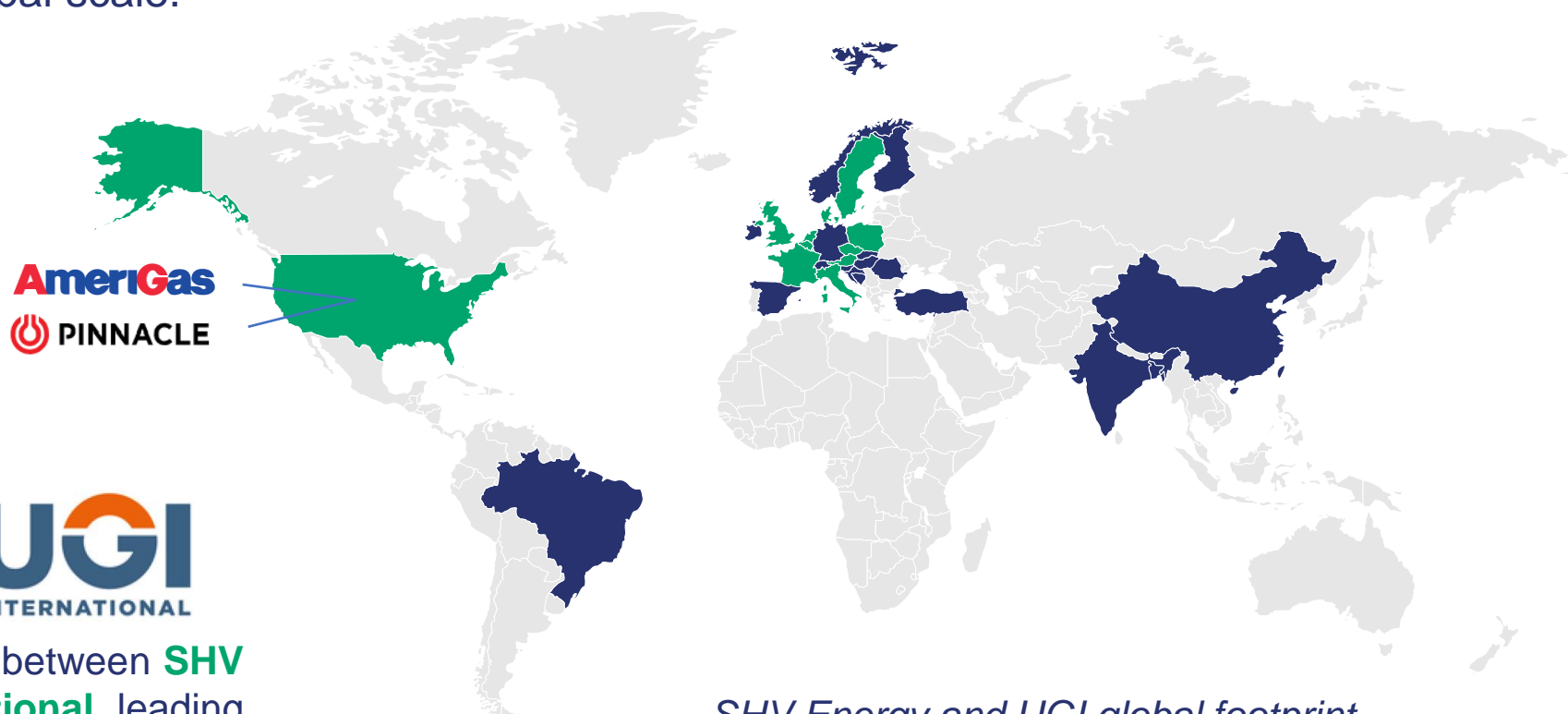






# Dimeta: accelerating the energy transition in off-grid areas

We are advancing the production and use of renewable and recycled carbon Dimethyl Ether (“**rDME**”), a low-carbon **sustainable liquid gas**, to support the de-fossilization of the LPG Industry at global scale.



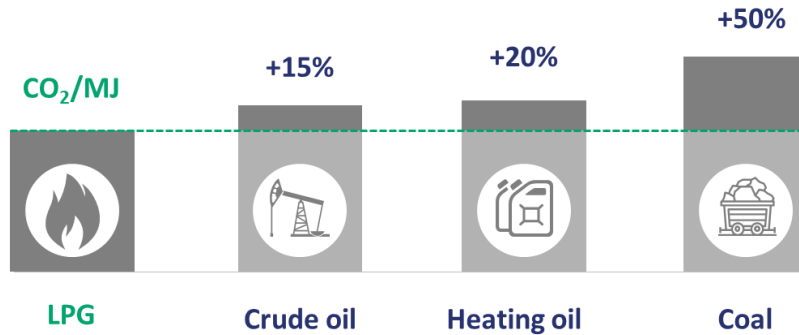
**Dimeta** is a joint-venture between **SHV Energy** and **UGI International**, leading global distributors of off-grid energy.

*SHV Energy and UGI global footprint*



# LPG: Energy for off-grid areas

**LPG (propane)** is a **liquid gas** that allows the off-grid areas to have access to a **clean** and **affordable** form of energy.

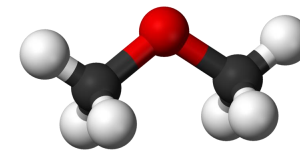


 **>200M** tons/year LPG used globally for energy

 **+ 25%** over past 10 years

Renewable LPG is already available, but in limited quantities.  
**rDME can accelerate and scale-up the use of renewable fuel in off-grid areas**





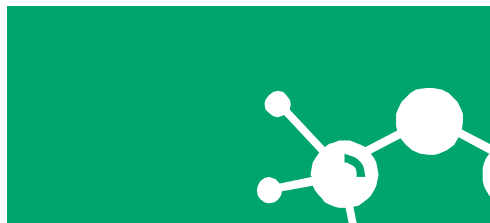
## rDME: energy ready to use

### Easy to handle



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

### A simple product



Dimethyl-ether is a **molecule** ( $\text{CH}_3\text{OCH}_3$ ) that can be produced from a **wide range of local renewable feedstocks**.

### Safe, clean and green



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

### Versatile Fuel



DME has been used for **over 50 years in the chemicals sector** as an aerosol propellant. It can be used as a fuel, providing today a viable alternative to off-grid users.





- rDME can be used as a **clean fuel for many applications**: heating, cooking, industrial applications, but also transportation
- Blends up to **20% rDME** could represent a drop-in solution, displacing volumes of fossil LPG.
- Appliances and equipment can, with small changes, also use **100% rDME**: HDVs and Industry are the most promising sectors.
- DME is also an **Hydrogen Carrier**, easily reformable at low temperatures, making it a future solution for H2 applications



# rDME is strongly supported by the LPG industry, and increasingly recognised in policy

## Press Release

**SHV Energy and UGI Receive European Union Approval to Create Joint Venture to Advance the Production and Use of Renewable Dimethyl Ether**

December 22, 2021

[Download PDF](#)

Suburban Propane Announces  
the Commercial Launch of  
Propane+rDME, a  
Revolutionary Low-Carbon Fuel



NEWS PROVIDED BY  
Suburban Propane Partners, L.P. →  
Apr 27, 2022, 15:44 ET



Fuels

**California approves Oberon's fuel-grade DME for use as fuel in the state**

February 27, 2015



## Green Car Congress

Energy, technologies, issues and policies for sustainable mobility

California reduces tax on dimethyl ether (DME) fuel to be consistent with other alternative fuels; enabling retail sales

29 September 2020



The Strategic Role of  
**Off-Grid  
Renewable  
Gases**



**Renewable Energy Directive EU**

**Calor partners with Adelan to support next generation construction vehicles**



ICS 83 83.060

**ISO 1817:2022**

Rubber, vulcanized or thermoplastic — Determination of the effect of liquids

CEN

**CEN/TC 286 - LIQUEFIED PETROLEUM GAS EQUIPMENT AND ACCESSORIES**

[ABSTRACT](#) [SLOVENIAN](#)



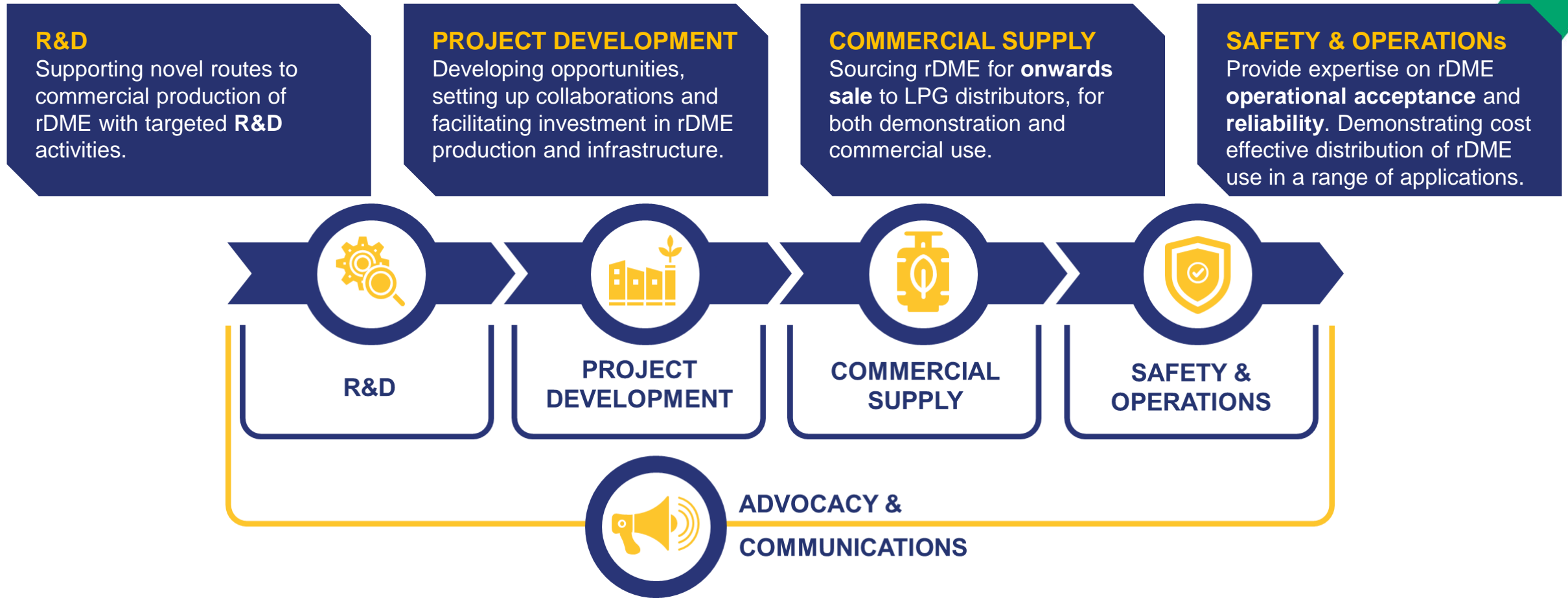
CEN

**EN 549:2019 (MAIN)**

Rubber materials for seals and diaphragms for gas appliances and gas equipment

 **Dimeta**

# Dimeta works across the whole value chain...



## ADVOCACY & COMMUNICATIONS

Promoting the use of rDME as a solution in the energy transition, in both **blended** and **pure** form. Supporting the development of **regulations and standards** for safe and efficient use.





# Targeting 300,000 tons/year of rDME by 2027



**In order to reach this goal, Dimeta is:**

Identifying partners and establishing the right collaboration framework for developing production plants

Supporting partners from pre-feasibility to project development activities

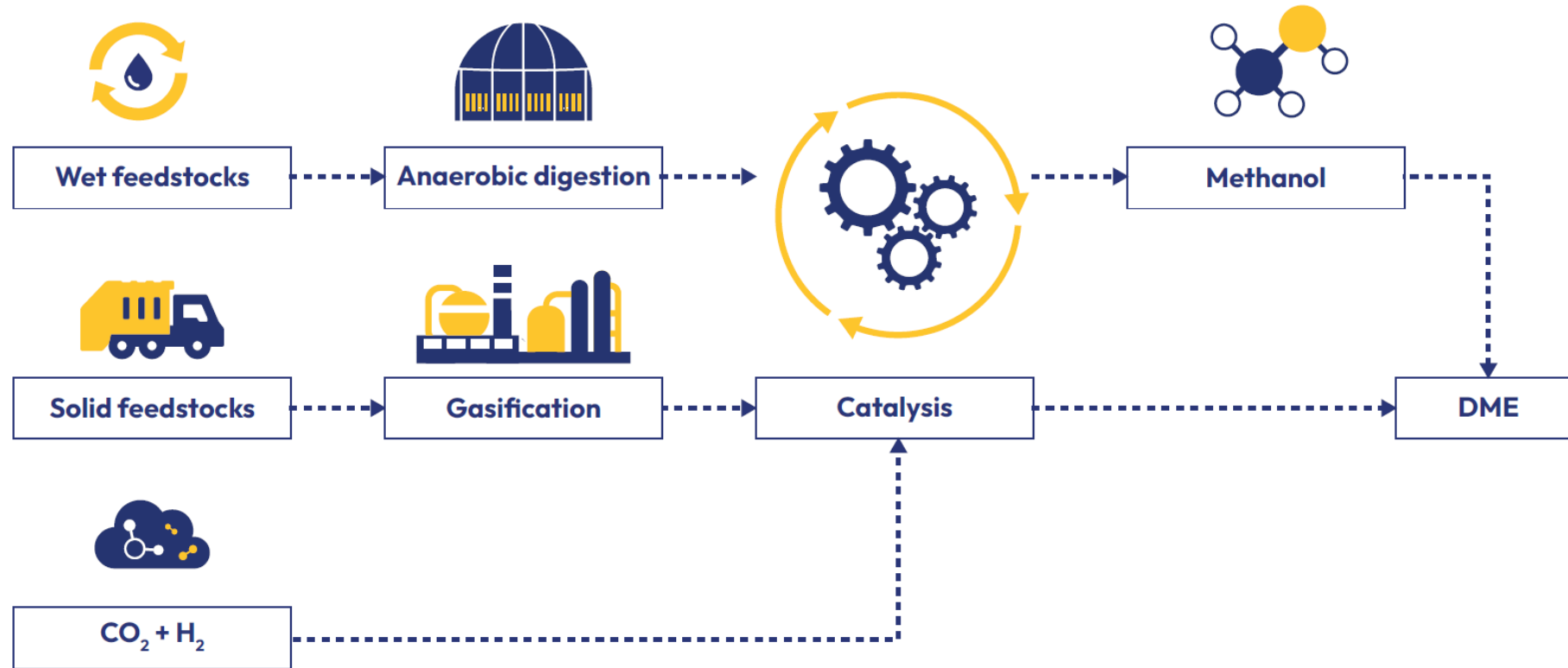
Partnering in investments

Providing a long-term stable offtake contract for the total production, backed by international LPG distribution companies

**Supporting plants through all stages of development, in order to secure rDME offtake**



# We are investigating all routes to produce rDME

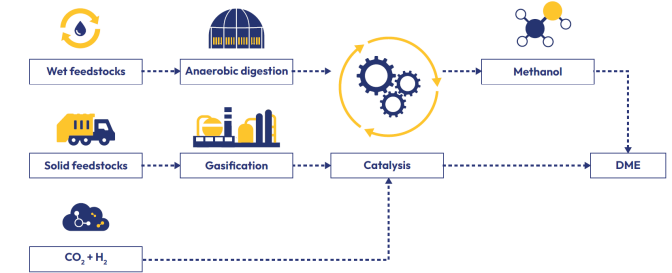


With first commercial plants expected to use gasification

# We are investigating all routes to produce rDME

## Gasification of waste and biomass to make rDME:

- Syngas purity requirements similar to other catalytic processes
- Conventional DME synthesis proceeds via methanol ; more novel processes can go directly from syngas to DME in a single reactor
- High efficiency conversion of syngas to DME
- With a high specificity for DME as a product
- No further upgrading requirements, only purification to meet fuel DME specification (ISO 16861 / ASTM D7901)





# Our first Plant:

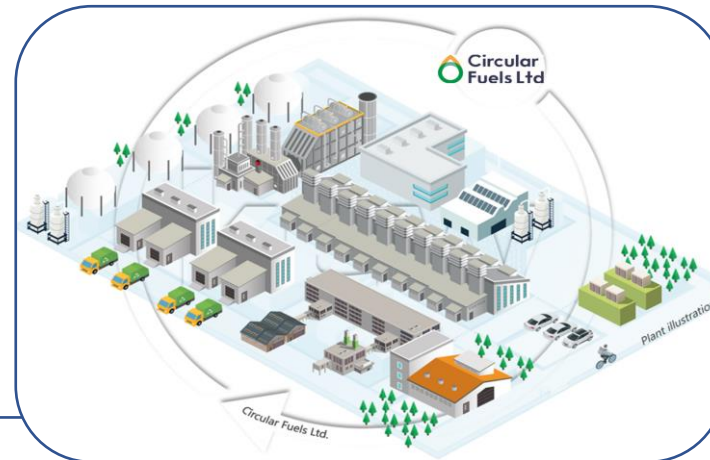


**Circular Fuels Ltd (CFL)** is the first partnership established by Dimeta to scale up the supply of rDME. CFL is a Joint Venture between **Dimeta** and **KEW Technology**. It is a specialised **project development** company, which develops construction-ready waste-to-rDME plants using KEW's proprietary technology.



## Single – module demonstrator

- Birmingham, UK
- 5 t/day production capacity
- Syngas production since 2019, rDME production from Q1 2023



## First commercial scale plant

- 50kt/year production capacity
- 220kt/year non-recyclable waste feedstock
- Site secured: Teesside, UK
- International EPC engaged, detailed engineering complete, target start-up 2024



## Subsequent plants

- Europe and USA
- Under development
- Potential for pipeline investment opportunity



Also working together with:



In October 2022 we have entered into a **collaboration with Enerkem**, the first company in the world to produce renewable methanol and ethanol from non-recyclable, non-compostable municipal solid waste at full commercial scale.

- Exploring the development of rDME plants
- North America, Europe as targets
- Large scale rDME >150.000 ton/year
- Use of non-recyclable waste
- Strong focus on maximising CO<sub>2</sub> recycling





# Some lessons learnt after 9 months of navigation...



## Fair winds...

- Investors and Technology players are looking at rDME
- The LPG Industry has a genuine interest for rDME
- We now have a strong strategy to scale-up supply
- Collaboration can make the journey easier!



## ...and things to watch out for...

- Time : development, construction, global supply chains
- Inflation – the uninvited guest!
- Regulatory framework is in development, a lot of work!



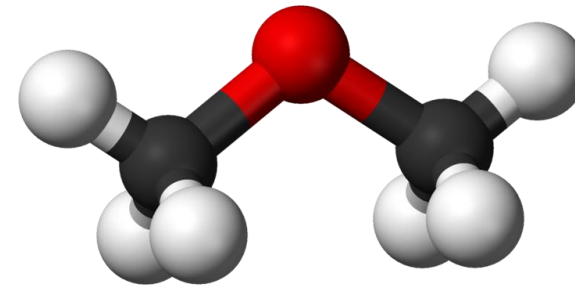
# Collaboration is key!

We are actively looking for collaborations on:

rDME supply  
opportunities

R&D and  
innovative  
technologies for  
rDME production

Financing and  
investments of  
rDME  
infrastructures



Integration of  
rDME into the  
LPG value chain

Sustainable  
feedstock

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