

Hydrogen Research

Proposal

MOF as carrier H2Gases*

* MOF = metal-organic-framework

Valentina Olabi, Research Specialist, GPCA

Rudy Sadi, MD(A) - MdR, Almajdouie

1. *Industry meets Academia*
2. *Storage H2G challenge*
3. *Impact on Society/economy/intern. cooperation*

- ✓ Is the topic relevant?
- ✓ What does it mean to industry and participants engaged?
- ✓ Interest for participation in research program?

Hydrogen

H₂



Typical data – Diesel vs H2G

Hydrogen typical:

- 350-700 bar, gaseous hydrogen (GH₂)
- Densities up to 36 kg/m³; ($\text{bar}/T_a = 0.0815 \text{ kg/m}^3$)
- Personal cars 5-8 kg/tank
- Wt of tank combined is about 100kg (8% wt.ratio)

Trucking current data ALM:

- Storage capacity is 30.6 kg (350 bar).
- 380 kg tank wt (pay load)
- Reach **300 (H2G) vs 1000-1200km (diesel)**

=> Increasing H2G wt ratio (energy density)

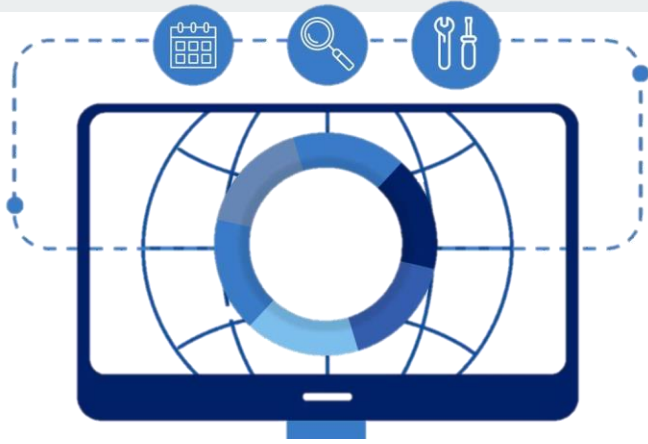
Hydrogen costing:

- 33.3 kWh/kg
 - Production \$1- \$3.3/kg
 - Distribution (\$0.5 p/kg)
 - Infrastructure (\$1/kg)
- } **\$2.5 – 5 p/kg**

Diesel:

- 12.6 kWh/kg
- \$1.65 p/ltr (0.75 kg/ltr)
- **\$2.20 p/kg**

Model



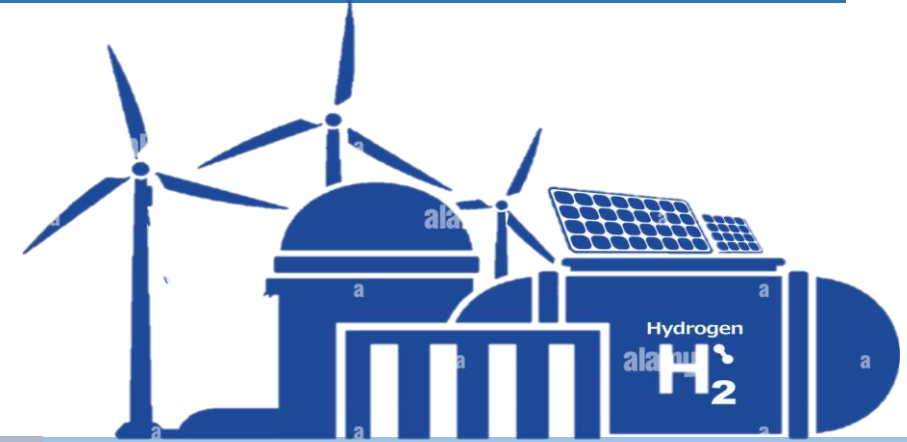
Develop a mathematical model for **MOF** materials for hydrogen storage.

Desired Outcome



Model simulating sorption/desorption processes, leading to increased specific wt. (energy density)

Real-life Integration



Results can then be conveyed to industry specialists to determine feasibility in practical applications and next steps.

Combining Expertise in Innovation and Energy



World leaders in large-scale energy production, hydrogen developments and petrochemical infrastructure.

Renowned for academic leadership in renewable energy and technological innovation.

Strategic Role of Rotterdam Port



1. *Rotterdam port is Europe's largest energy port, positioning itself as a key hub for hydrogen imports.*
2. *Trade routes showing great potential to establish a direct hydrogen supply chain from the GCC, enhancing Europe's energy security.*



Accelerating Hydrogen Technology Advancements

- Joint research can optimize hydrogen production, storage and transport technologies.
- Fuses academic research with industrial-scale applications for global hydrogen solutions.

Mutual Benefit for Sustainability Goals

- Expand clean energy exports and reduce reliance on fossil fuels (GCC).
- Advance transition to a hydrogen economy with reliable imports (NED).

Access to Funding and Resources

- Shared access to research grants, funding, and infrastructure.
- Collaboration could attract further European and Gulf funding for hydrogen projects.



This will strengthen international leadership by developing scalable hydrogen solutions for global markets.

Q & A ?

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Thank you

Hydrogen

H₂