VSL

National Metrology Institute

European Metrology Cooperation at the forefront of decarbonising energy gases

Annarita Baldan

24th Meeting of the Directors of NMIs and Member State Representatives

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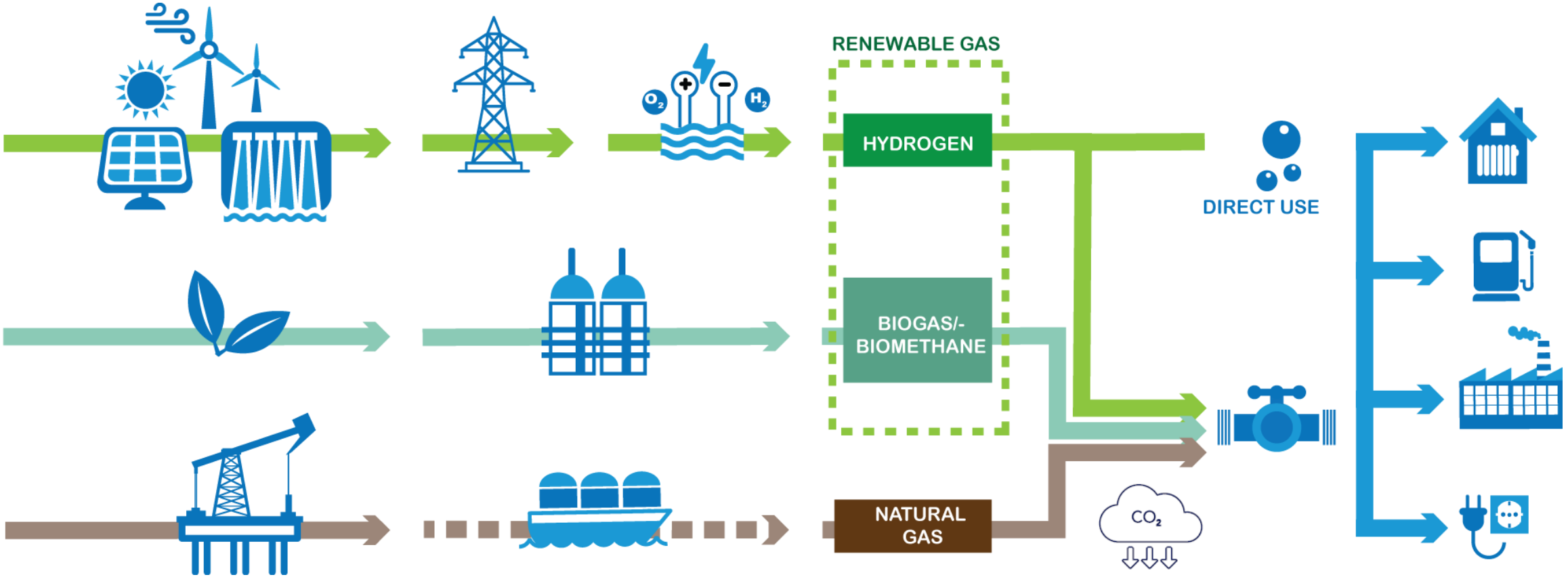
HYDROGEN PROJECTS

Port of Rotterdam



Need for a robust and reliable measurement infrastructure !

EMN for Energy Gases

Focus on accurate measurements for quality, regulation, trade, safety, interoperability AND Innovation

- **Engage** with stakeholders
- **Act** as European metrology knowledge center
- **Facilitate** energy transition by coordinating measurement research based on stakeholder needs
- **Boost** access to metrological services and calibration facilities

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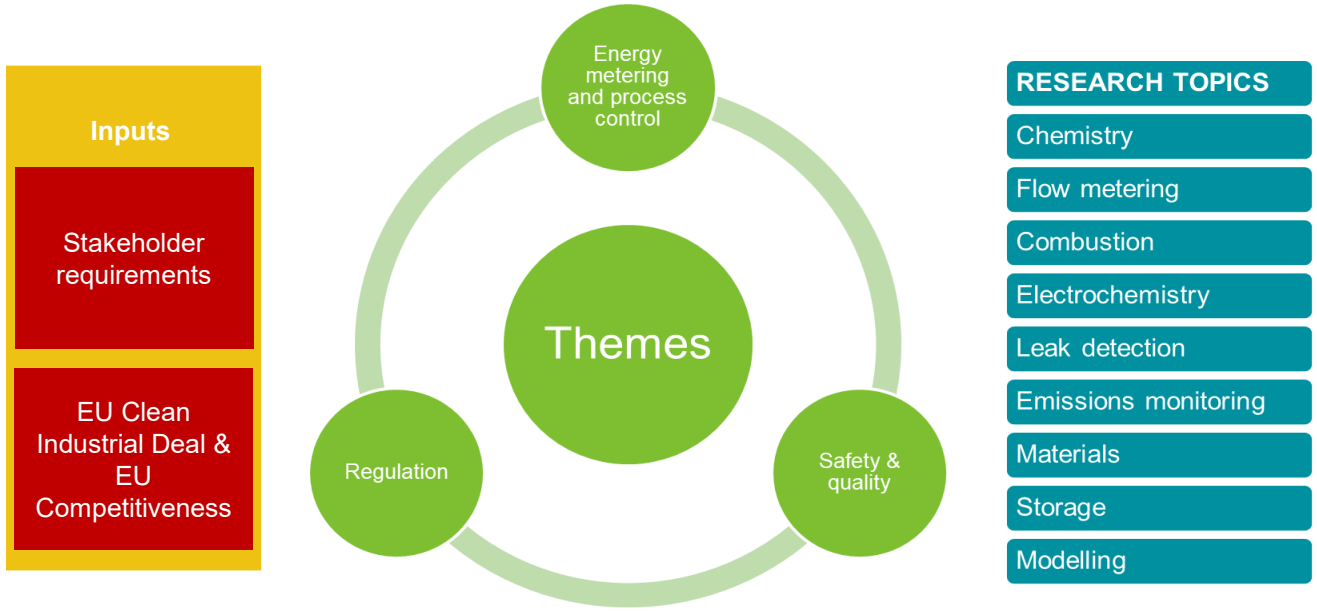
ENERGY GASES

EMN Strategic Research Agenda

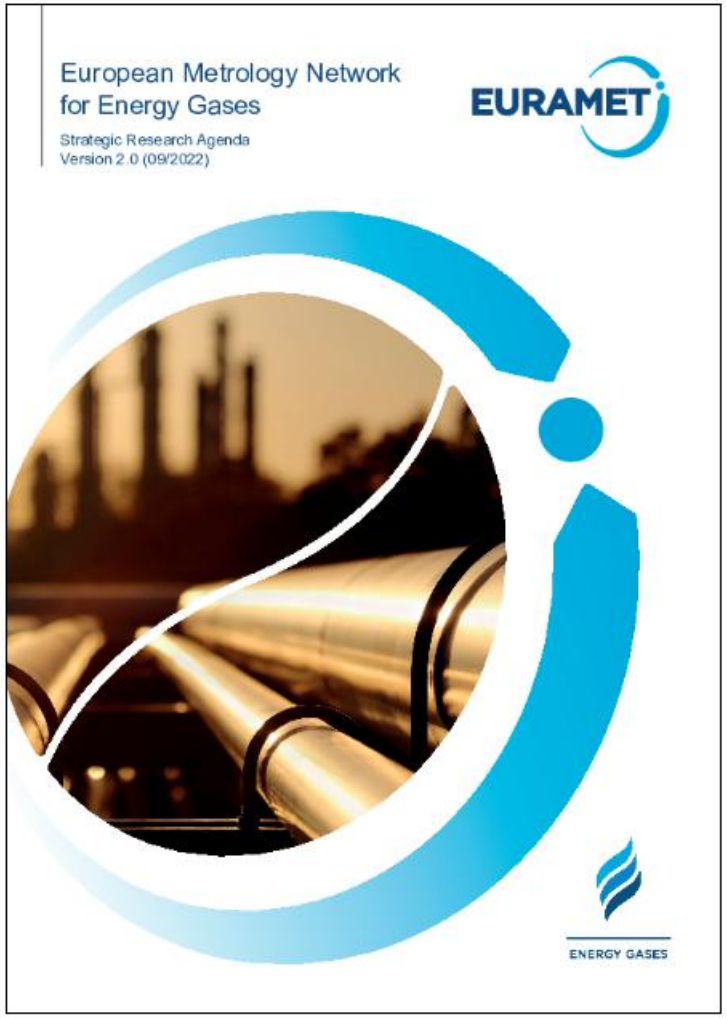


Focus application areas

- Decarbonising natural gas
- Decarbonising industry
- Energy transport and storage
- Cleaner fuel for mobility

Objectives

- Collaborate with industry and other research parties
- Facilitate new projects in Research & Innovation



Available publicly:
https://www.euramet.org/european-metrology-networks/energy-gases/strategy/strategic-research-agenda

EU Metrological Research in Energy Gases since 2010

NATURAL GAS	LIQUIFIED GASES	BIOGAS /BIOMETHANE	HYDROGEN	OTHER ENERGY CARRIERS	CCUS AND DECARBONISATION
1.GAS 2.MultiFlowMet	1.LNG I 2.LNG II 3.LNG III **4.CryoMet**	1.BIOGAS 2.BIOMETHANE 3.Si-S/Biogas 4.BiometCAP	1.Hydrogen 2.MetroHyVe 1 3.MetroHyVe 2 4.MetHyTrucks **5.MetroHyVe 3** 6.NewGasMet 7.MetHyInfra 8.MefHySto 9.Met4H2 10.H2FlowTrace	1.MaritimeMET **2.MetNH3Energy**	1.Decarb 2.MetCCUS **3.SmartGasNet**

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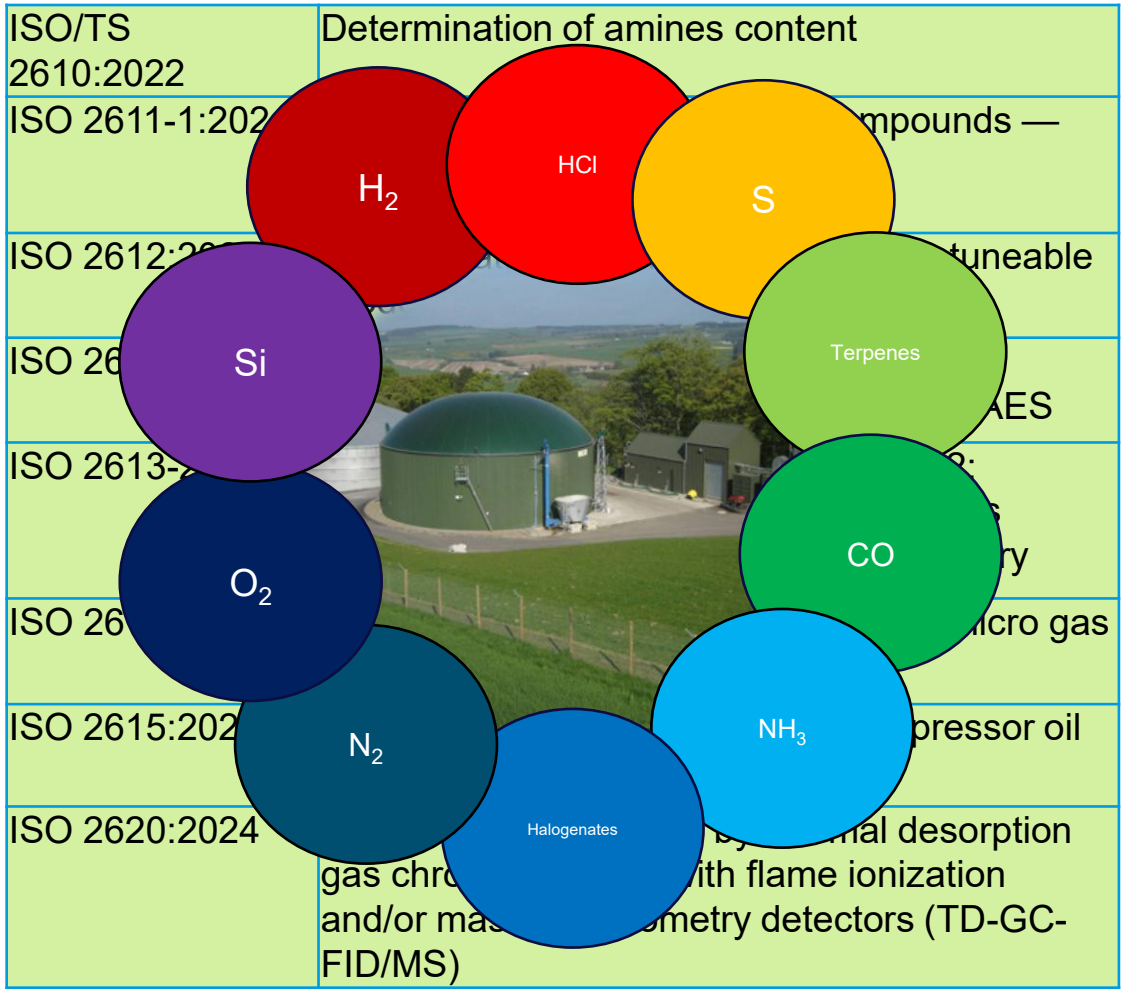
Quality assessment of Biogas and Biomethane

- Driver: EN 16723 specifications for biomethane quality
- Metrological research aimed at developing measurement methods and standards specific for the **quality assessment of biomethane/biogas**

- Impact :
  - Outputs taken up by **ISO/TC193 Natural Gas - SC1/WG25 Biomethane**
  - Eight standards published (ISO 2611 to ISO 2620) and two in draft phase covering analytical methods for biomethane conformity assessment

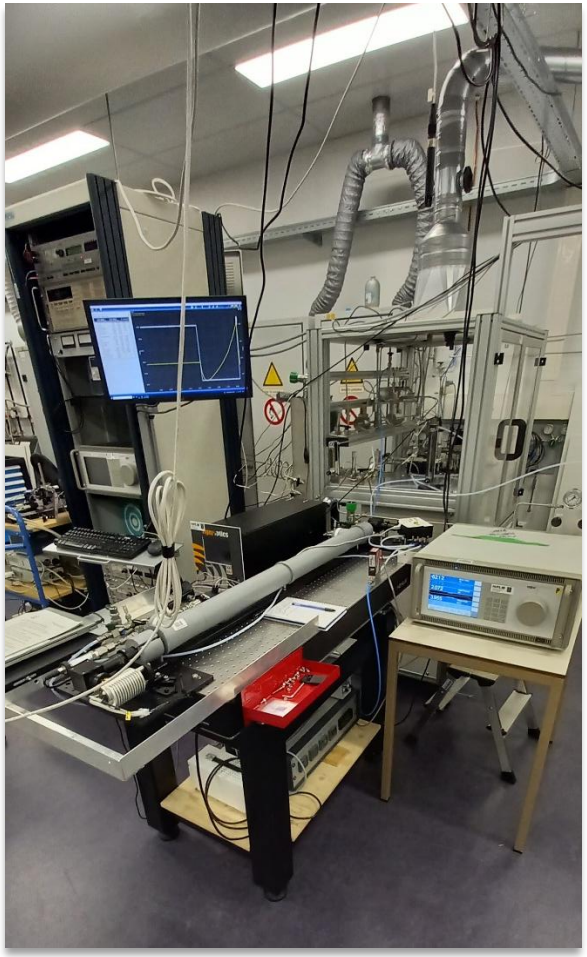


Humidity in Hydrogen

- Metrology infrastructure exists for humidity in **air** at all scales
- But, for humidity in other gases and pressures replicating industrial conditions, has only recently been established.
- Demonstrated equivalence between water vapour primary gas standards in the range for water vapor amount fraction 0.5 $\mu mol.mol^{-1} < x_w < 50\ \mu mol.mol^{-1}$ and at a pressure of 30 bar

Impact :

  - Quality assurance for the whole hydrogen value chain

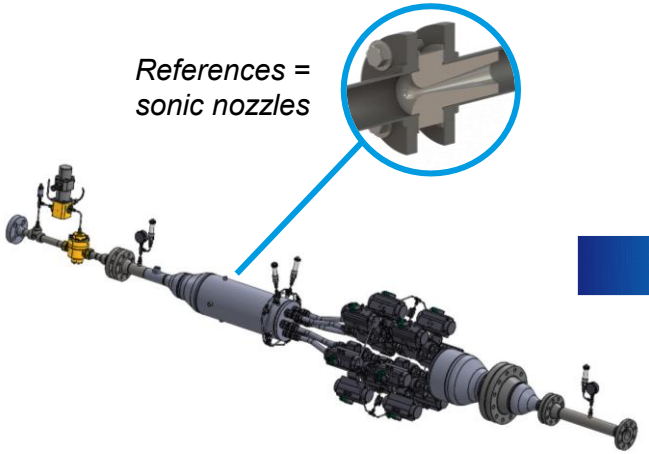


With kind permission of Air Liquide

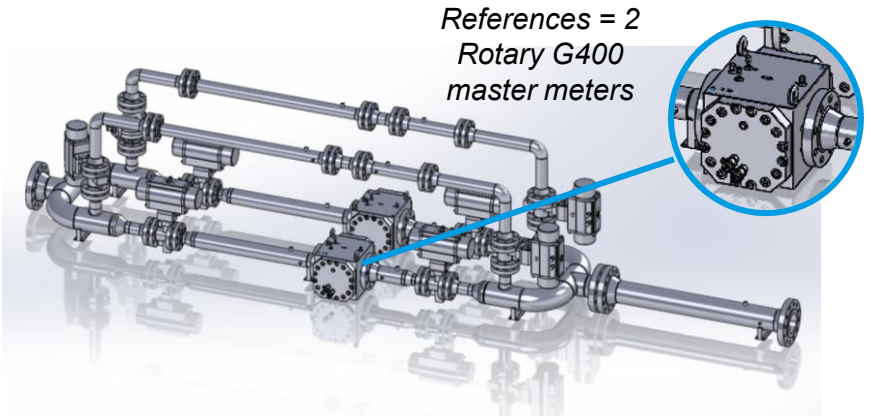
Hydrogen gas flow traceability transfer standard for the gas grid

- Scaling-up: from small-scale to large-scale transfer standards

New PVTt facility –
CESAME(LNE-LADG)
for H_2, HENG, Air
for calibration of sonic nozzles



Small-Scale Transfer Skid with sonic nozzles



Large-Scale Transfer Skid with master meters

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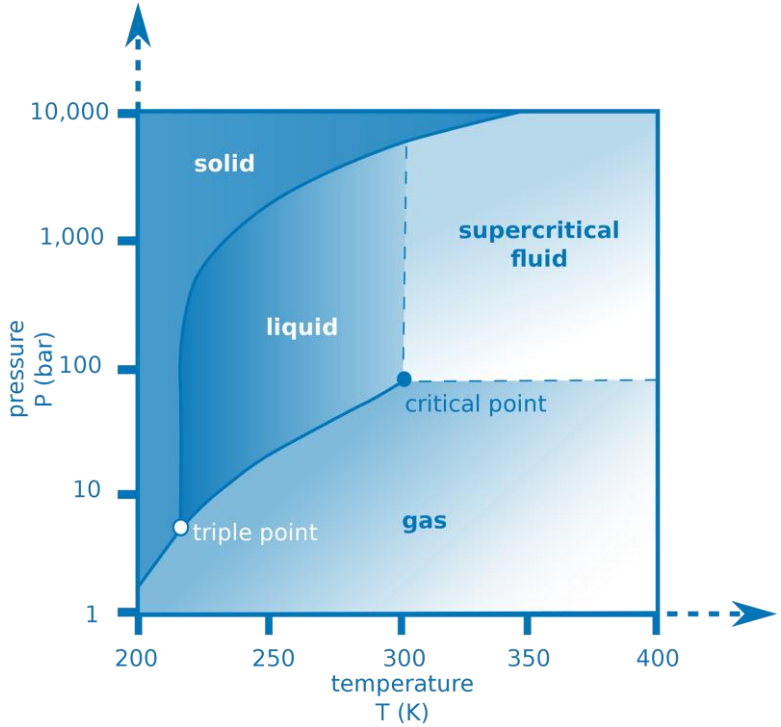
Metrology for CCUS

- Focus on the physical and chemical characterisation of CO_2 in gas phase
  - Primary reference materials for impurities in CO_2
  - Material compatibility for CO_2
- Measurement and quantification of CO_2 emissions from CCS infrastructure
  - Leaks → fugitive emissions
  - Facility scale → diffuse and fugitive emissions



Courtesy of Ara Abdulrahman

Conclusions

- EMN for Energy Gases to promptly address the needs of society and industry in the energy gases sector
- Joint efforts of European NMIs to create a robust measurement infrastructure in support of decarbonisation
- Successful collaboration with industry and standardisation to ensure prompt uptake of the metrological research outputs

Thank you

Acknowledgments

METROLOGY for BIOGAS
MefHySto Metrology for Advanced Hydrogen Storage Solutions
H2FLOWTRACE
METROLOGY PARTNERSHIP
EURAMET
METROLOGY FOR BIOMETHANE
MET4H2
PROMETH2O
METROLOGY for HYDROGEN VEHICLES

The end