European Metrology Network for Energy Gases: current and future measurement challenges of the Energy Gases market

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European Metrology Network for Energy Gases

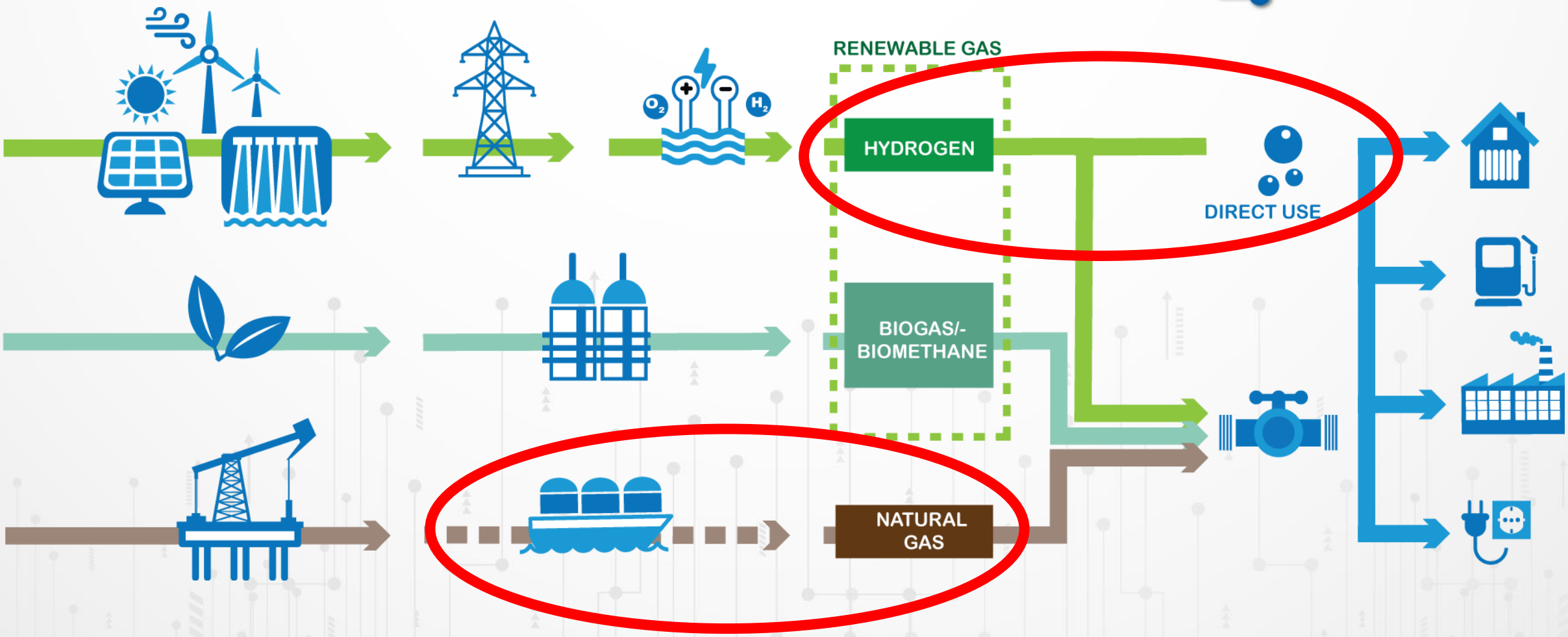
- European knowledge and metrological service center for energy gases
- Under EURAMET: European Association of National Metrology Institutes
- Facilitate energy transition
- Focus on measurement of energy gases: conventional fluids and fluids related to (emerging) renewable/ sustainable energy sources
- Cross-cutting character; Complementarity of measurement services for
  - flow
  - gas composition
  - temperature and humidity
  - pressure
  - density
  - material data
  - Particles
  - material testing

With kind permission of RISE

Who we are

- Chair: Annarita Baldan (VSL, NL)
- Vice-chair: David Learmonth (TÜV NEL, UK)
- Secretary: Marcel Workamp (VSL, NL)
- Steering committee members:
  - Arul Murugan (NPL, UK)
  - Karine Arrhenius (RISE, SE)
  - Henri Foulon (Césame Exadébit, FR)
  - Heinrich Kipphardt (BAM, DE)
  - Jos van der Grinten (PTB, DE)
- 17 members in total
- Official start: February 2019

How can metrology enable the energy transition?



Need for the EMN for Energy Gases

- Challenge:

Reliability and robustness of measurement results to address the energy transition beyond national boundaries and beyond a single technology or discipline

- Solution:

European coordinated effort to interface and collect stakeholder needs and to address these needs in the most efficient way at metrological, standardization, and policy level

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Scope of the EMN for Energy Gases

1. Single point of contact for metrology questions in the Energy Gases field
2. Engage with stakeholders
3. Create and disseminate knowledge
4. Build a sustainable and coordinated infrastructure to underpin regulations and standards
5. Gain international leadership and recognition

EMN Milestones

17/6/2019

Launch EMN for Energy Gases at VSL, NL

22/1/2020

European Energy Gases workshop for stakeholders at NPL, UK

4/2/2020

11th Innovation Summit at European Parliament, Brussels

Strategic Research Agenda (SRA): overview

- Goal:

Identify the key measurement gaps and challenges as experienced by regulators and stakeholders working in the energy gases industry, and prioritising these, with the aim of focusing European research capacity.

- Process
  - Literature review (e.g. outlooks from relevant industry, policy trends, directives, etc.) with input on national level from our 17 members.
  - Workshop with stakeholders (22nd January 2020, NPL)
  - Questionnaire to confirm priority challenges

Priority measurement needs (flow perspective)

- Hydrogen and hydrogen enriched natural gas
  - Flow metering for pure hydrogen grids (from domestic to custody transfer)
    - Research required to ensure performance of flow meters
    - Traceable and independent flow calibration equipment
  - Flow metering of hydrogen enriched natural gas for billing purposes (gas grid)
    - Research required to ensure performance of flow meters for fluctuating blends
    - Also: cost-effective measurement of calorific value, composition and physical properties
  - Flow metering for hydrogen refueling stations
    - Reference standards for validation of dispenser measurements
    - For all forms of transport refueling: heavy duty vehicles, trains, ships, etc.

Priority measurement needs (flow perspective)

- Biomethane
  - Accurate flow measurements for biomethane injected into the gas grid
  - Energy metering of biomethane

- CO_2 from CCUS
  - Traceable flow measurement enabling fiscal metering of CO_2
  - Also: detection of impurities

- LNG
  - Development of metrology infrastructure for flow rates >200 m3/h
  - Composition measurement infrastructure

Completed and ongoing EMPIR projects on Energy Gases

- Flow metering of renewable gases (NEWGASMET)
  - Developing traceable methods for the type testing and verification of flow meters, in compliance with the requirements of the MID.
    - Biogas, biomethane, hydrogen, syngas and mixtures with natural gas
  - To validate calibration methods and uncertainty budgets developed for flow calibration standards.
  - To contribute to the standards revision work of CEN/TC 237 and OIML TC8/SC7.

https://newgasmet.eu/

EMPIR EURAMET
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Completed and ongoing EMPIR projects on Energy Gases

- Metrology for Hydrogen Vehicles (MetroHyVe & MetroHyVe II)
  - Flow metrology for hydrogen vehicles
    - Developing measurement standards
    - Understanding uncertainty sources of hydrogen refueling station metering
    - Understanding calibrations with alternative gases
  - Gas quality
    - Gaseous primary standards
    - Sampling techniques

https://www.metrohyve.eu/

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Completed and ongoing EMPIR projects on Energy Gases

- Metrology for Liquefied Natural Gas (LNG I, II, III)
  - Development of primary standard and calibration facility
  - Understanding surrogate liquid calibrations
  - Also:
    - Gas analysis, sampling
    - Methane number

https://lngmetrology.info/

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Submitted proposals for this year's EMPIR call

- Metrology for Decarbonizing the Gas Grid
  - Develop a metrology infrastructure to support flow metering requirements for hydrogen and hydrogen enriched natural gas in accordance with the EU Measuring Instruments Directive with errors as low as ± 1 % as well as the metering of carbon dioxide in carbon capture and storage processes in Emissions Trading System with accuracy of ± 1.5 - 2.5 %.
  - Also: gas analysis, physical properties, leak detection

- Metrology infrastructure for high-pressure gas and liquified hydrogen flows
  - Develop and investigate methods for the calibration of critical nozzles and master meters as calibration standards for gaseous hydrogen at high pressure (P_{max} = 100 MPa) and flow rates up to 10 kg/min
  - Contributing to amendments and restrictions for the applicability of ISO 9300 for using nozzles with hydrogen
  - To develop a design for test rigs using critical nozzles for flow calibrations at medium pressure

Opportunities for metrology research in the future

- European Partnership on Metrology to accelerate the global lead of Europe in metrology research, has been proposed by EURAMET to the EC
  - First call for research proposal expected in 2021
  - 2021 call topic: the Green Deal!
  - Involvement of industry very much encouraged

- Please feel free to contact us at if you'd like to be involved in metrology research, have suggestions for topics, …
- EnergyGases@euramet.org

Conclusions

- Introduced the EMN Energy Gases and our objectives
- Highlighted current and future challenges in flow metrology
- Overview of existing and ongoing efforts in metrology R&D
  - Glimpse of the future

NORTH SEA FLOW MEASUREMENT WORKSHOP

measuring for the energy transition

ENERGY GASES

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Contact Us

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