



HY-ONE

**SCOTLAND'S COMPREHENSIVE
HYDROGEN STORAGE TESTING FACILITY**

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Acknowledgement

Emerging Energy Technologies Fund



Scottish Government
Riaghaltas na h-Alba
gov.scot



Our Team



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Project Marketing Manager

Hydrogen Value Chain



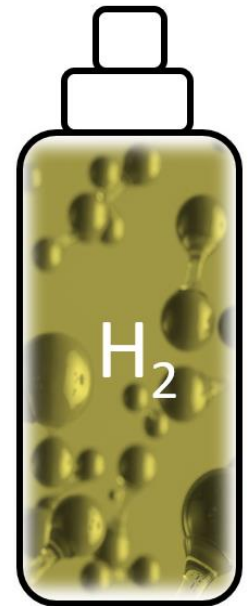
GREEN: Electrolysis/renewable electricity
BLUE: Fossil fuels/CO₂ is captured
GREY: Extracted from natural gas (steam-methane reforming)
PURPLE/PINK: Electrolysis using nuclear power
TURQOISE: Thermal splitting of methane & solid carbon produced
BROWN/BLACK: Coal using gasification
YELLOW: Electrolysis using grid electricity (renewable and fossil fuels)
WHITE: Byproduct of industrial processes/natural form



#7 Affordable and Clean Energy
#9 Industry, Innovation and Infrastructure
#13 Climate Action

Hydrogen Storage Market

Projected to grow from **US\$ 17.25 bn** in 2022 to **US\$ 30.53 bn** by 2030, a compound annual growth rate (CAGR) of 8.5% during 2022-2030.



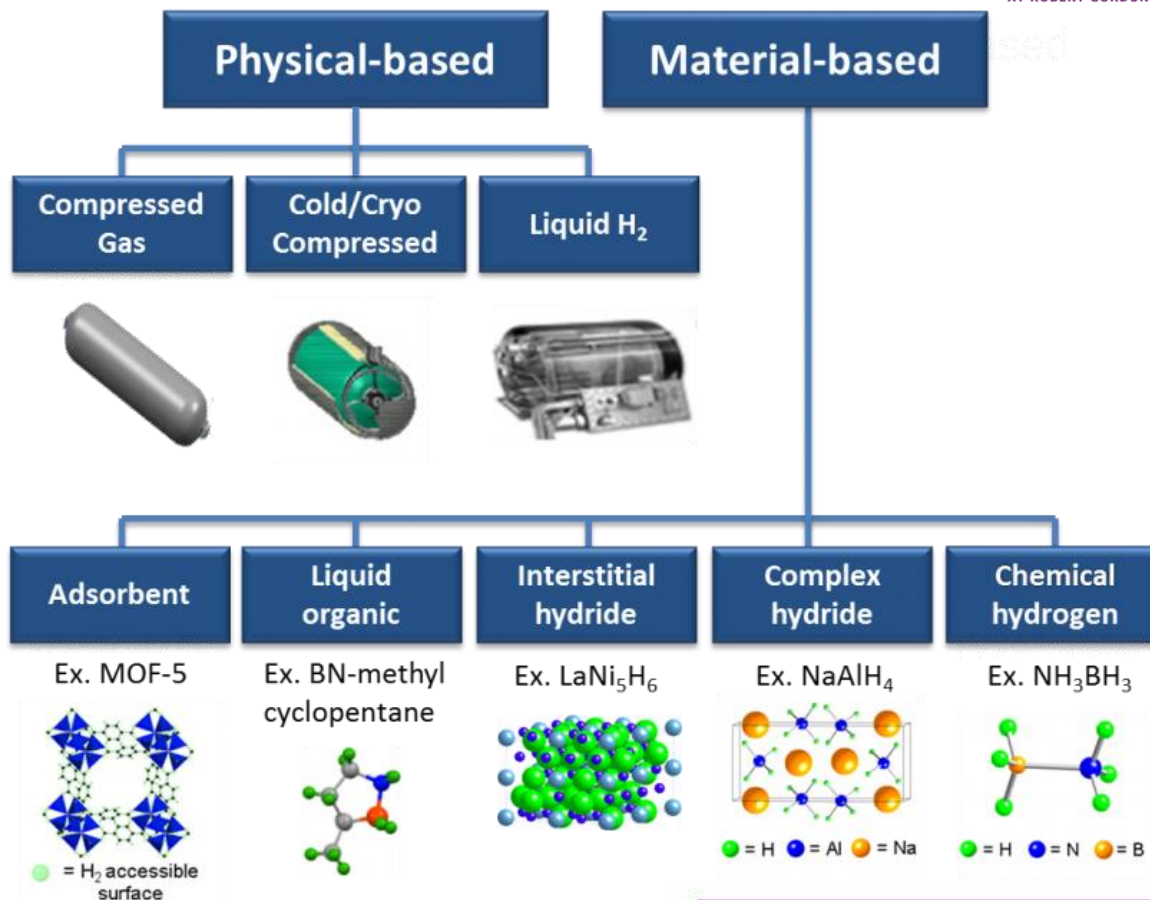
Hydrogen Storage

Testing requirements

- High pressure testing (static, dynamics)
- Underwater/underground testing pool
- Fatigue and endurance testing
- Leakage testing
- Drop weight impact testing (0.3J - 1800J)
- High velocity impact
- Refilling station test station
- Equipment guards

Storage challenges

- Costs
- Safety
- Skilled personnel availability



Our Aim

- Hy-One is a comprehensive one stop **hydrogen storage testing facility**, providing plug and play testing and demonstrations for hydrogen storage systems, prototypes, and accessories for gas hydrogen storage.
- Hy-One will support the **development, demonstration, and implementation** of small- to large-scale compressed hydrogen storage vessels and their accessories to support the increased hydrogen production levels in Scotland and the rest of the UK.
- **Funded by ScotGov:** Emerging Energy Transition Fund (EETF), Hydrogen Innovation Scheme, Stream 2; and Robert Gordon University (Project No. EETF/HIS/APP/007)



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Hydrogen Capability

- Production
- Storage
- Utilisation
- Integration

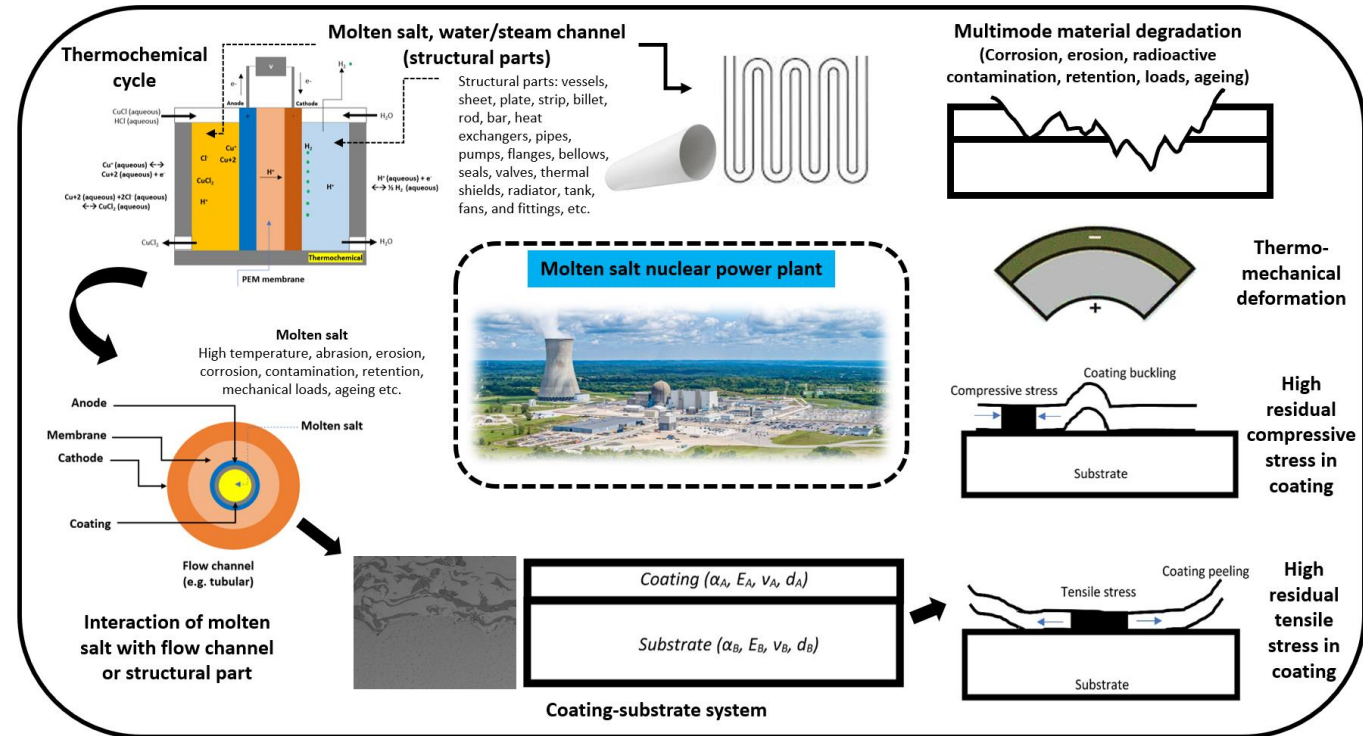
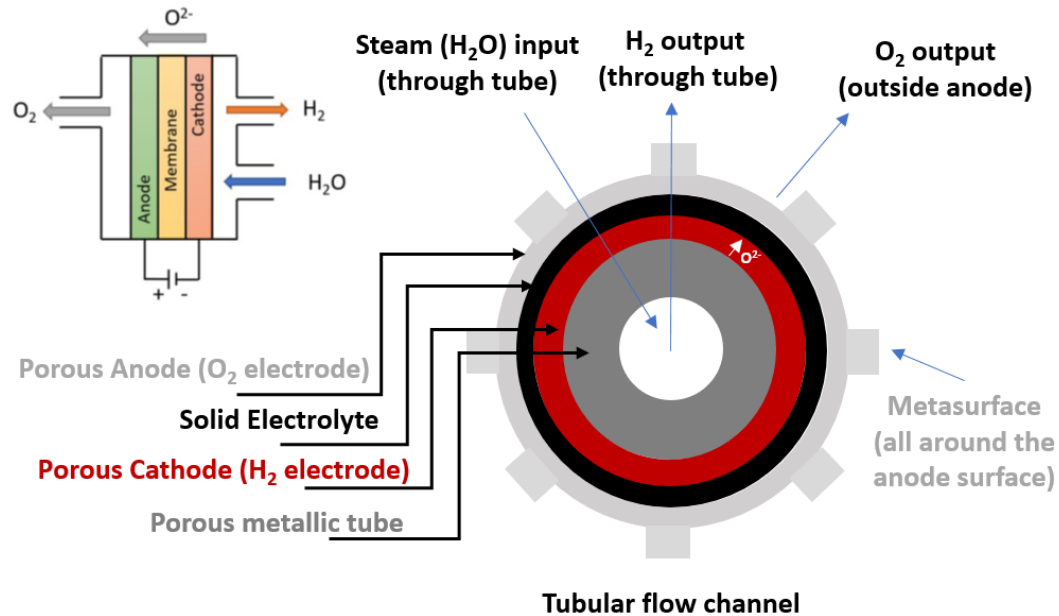


HYDROGEN PRODUCTION

Electrolysis materials
solid oxide electrolysis
Hydrogen from nuclear
Boosting efficiency



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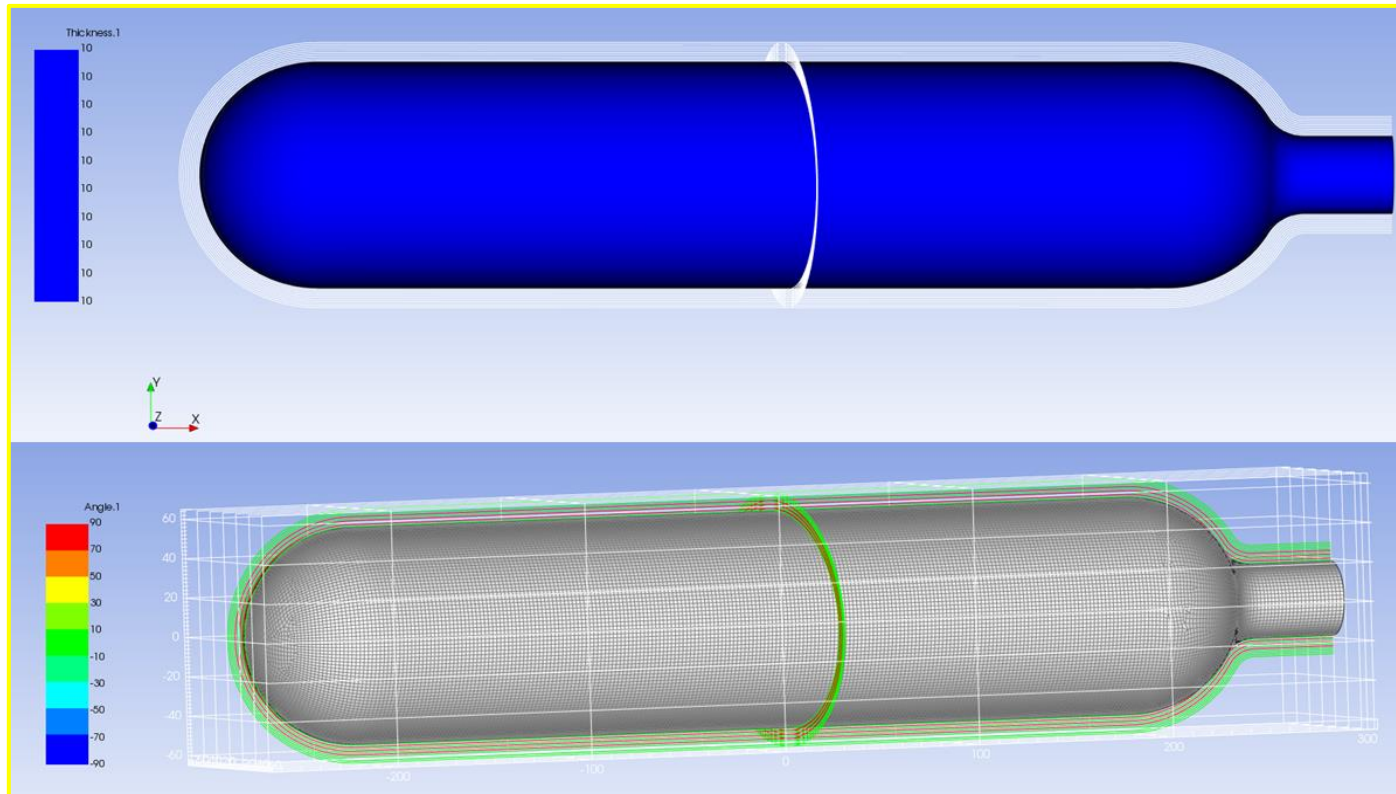


HYDROGEN STORAGE

Storage materials
Vessel prototype development
Composite materials
Vessel and component testing

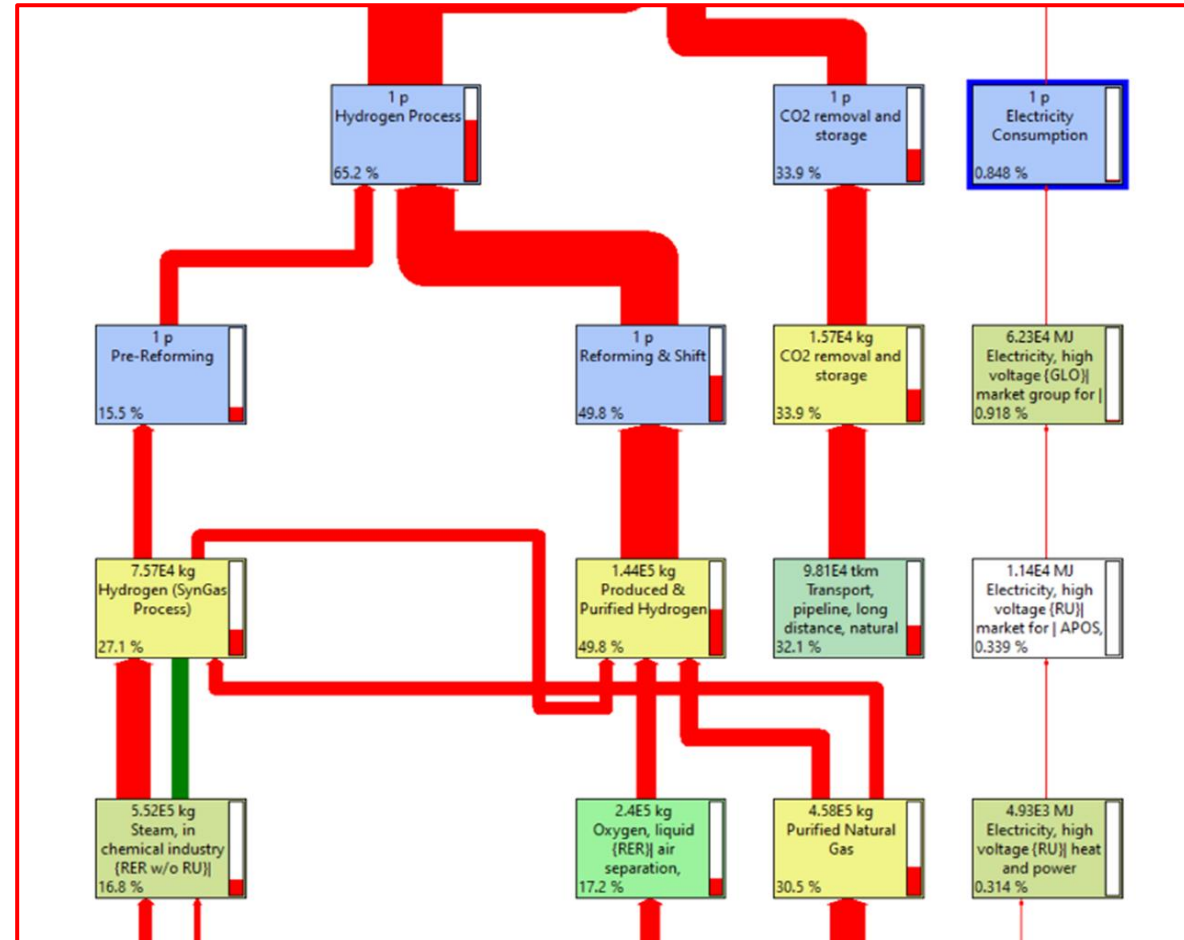


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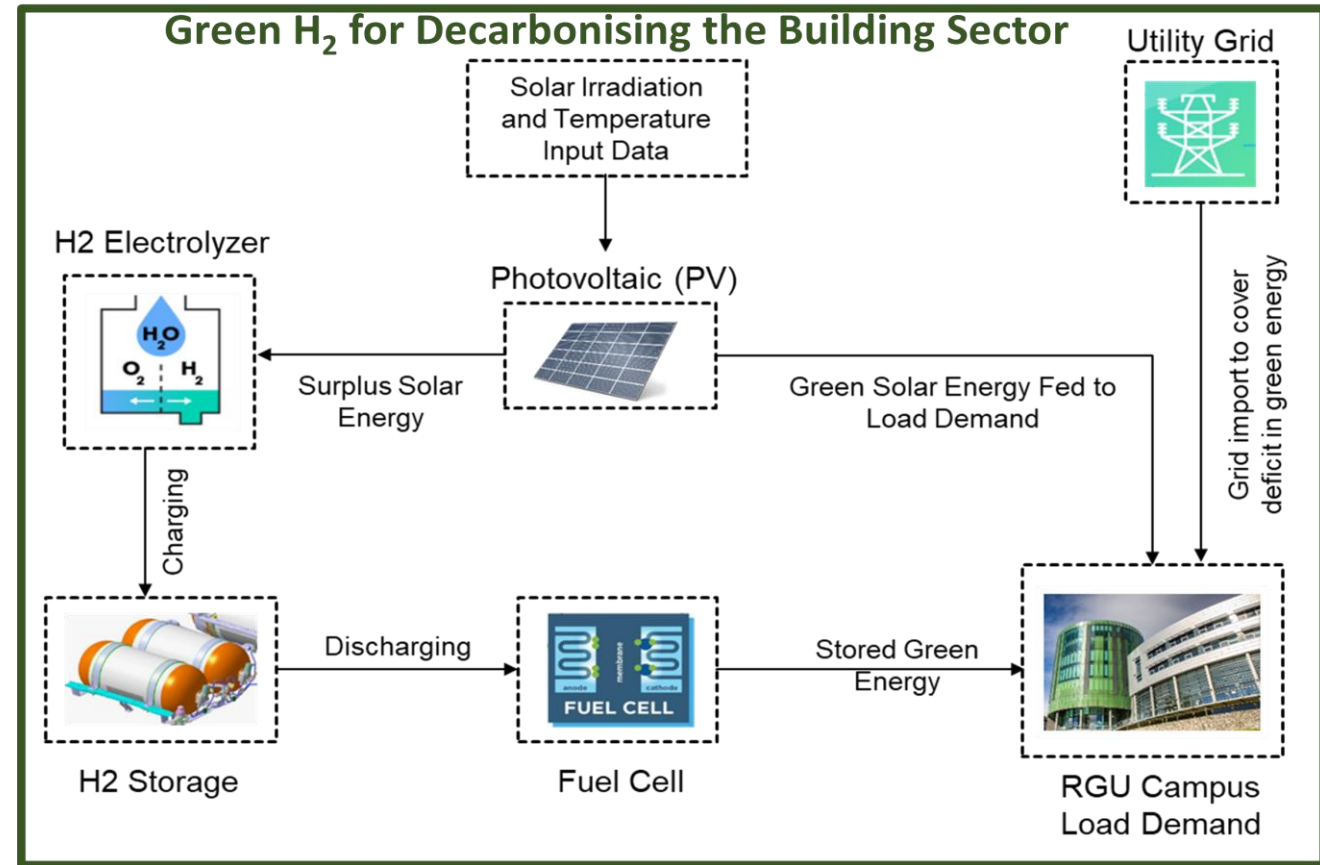
HYDROGEN UTILISATION

Environmental impact analysis of production
Hydrogen policy development

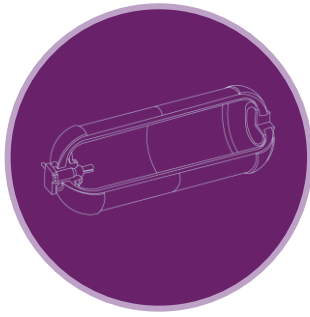


HYDROGEN INTEGRATION

Decarbonising buildings
UPS systems



Our Facility



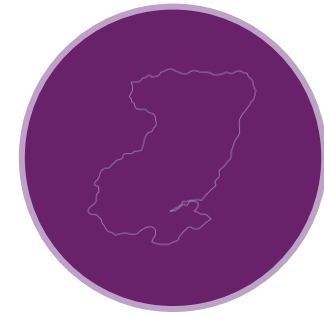
**PROTOTYPE AND
CONCEPT DEVELOPMENT**



**HYDROGEN VESSEL AND
COMPONENT TESTING**

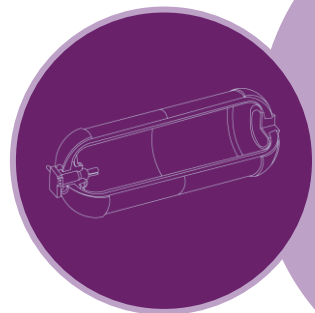


CERTIFICATION

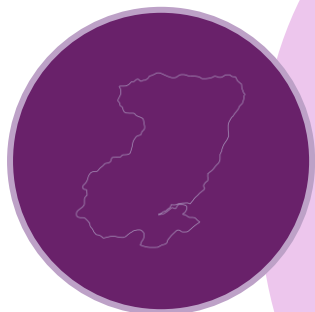


**HYDROGEN CLUSTER
DEVELOPMENT**

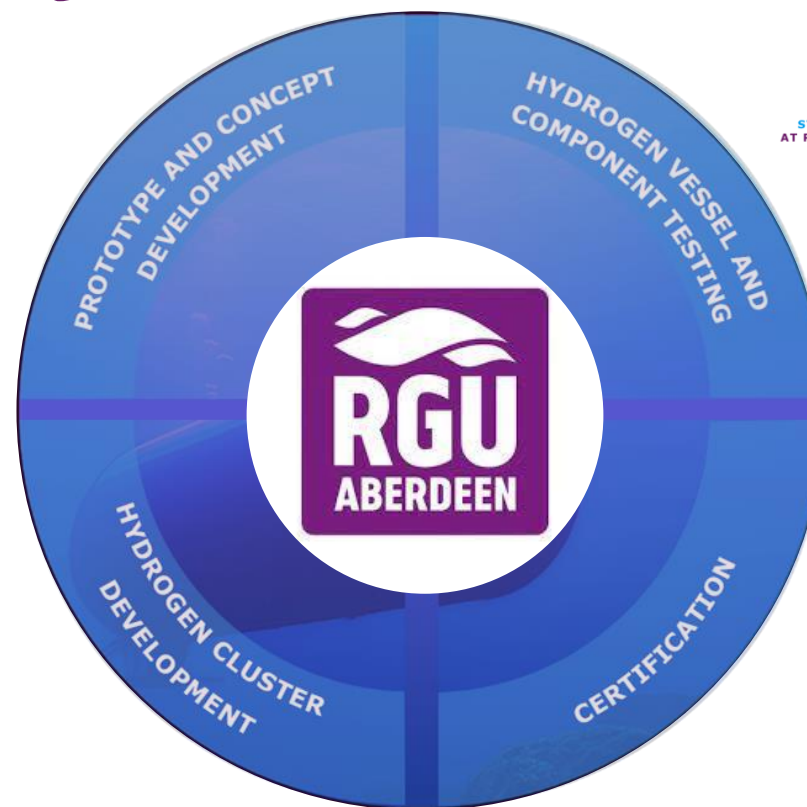
Our Facility



- Hy-One will engage with prototypes and concepts through the different scales of **TRL1 to TRL9**, particularly supporting early-stage concept evaluation.
- Providing advice for businesses in terms of **developing prototypes and concepts** and a **guide to storage vessel developers and manufacturers** on the best practices for testing, improving, and evaluating upcoming and new technologies.



- Hy-One will **facilitate the development of a hydrogen cluster in Scotland**. Support the creation of job opportunities within the sector through technological development and economy expansion.
- Facility and hydrogen cluster will also **provide confidence in the mobility of smaller scale hydrogen storage** as a business and a social behaviour in support of the technological developments.
- Facility will provide **training and development** for the local and regional supply chain within the hydrogen cluster.



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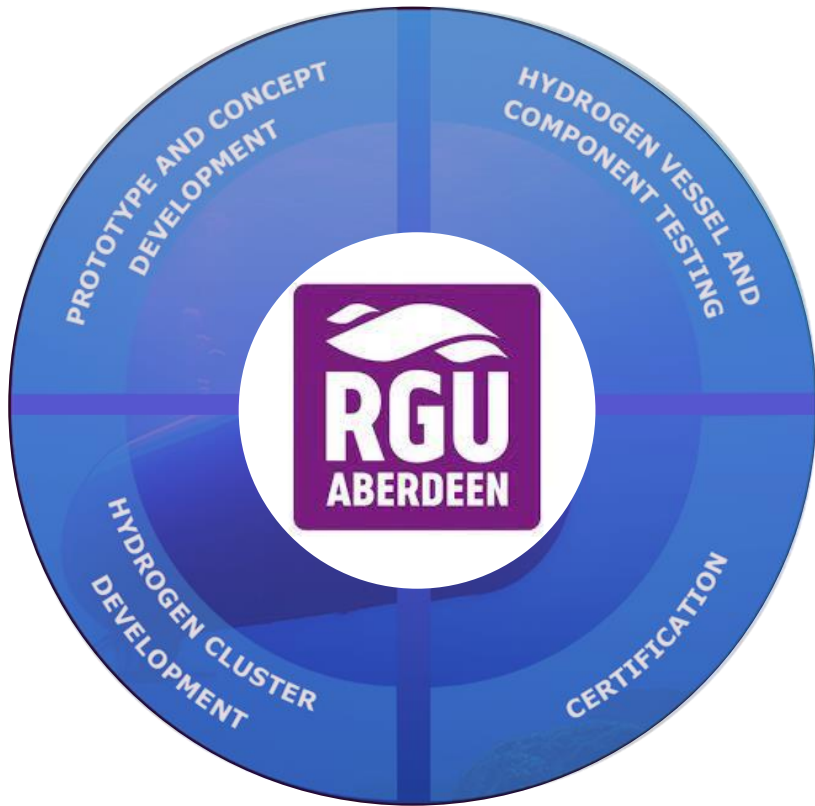
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Our Facility



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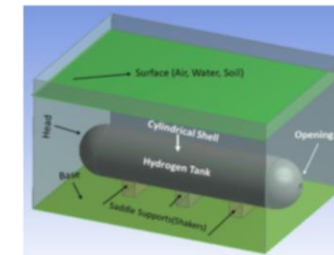
- Hy-One will provide technical reports on current and future **understandings of technology** and influence governmental standards for the development of compressed hydrogen storage vessels.
- **Hydrogen exposure permeation and leakage testing for materials, valves, tanks, links and connections of the storage vessels.**
- Using **sensors, measurement** equipment and data acquisition system
- **Exposure testing** for absorption/desorption quantification
- Above **ground, underground, underwater** and component testing



- Hy-One will also provide comprehensive **certifications and compliance qualifications** aligned with the current national standards, practices and guidelines
- Allowing suitable compressed storage vessels developed in **Scottish hydrogen supply chain** and support further renewable hydrogen production and the integration of hydrogen into our energy systems.



Vessel & Component Testing



CURRENT FACILITIES

Fluids and Structures Lab

- Materials testing (coupons, components, structures)
- ROV Pool
- Multi-phase flow loop



Hydrogen Lab

- Membranes technology
- Gases separation process
- Flow assurance
- Core flooding & gas loops (N_2 , CO_2 , H_2)

Composites Manufacturing Lab

- Polymer processing and
- Composites manufacturing (pipes/cylinder/vessels..)

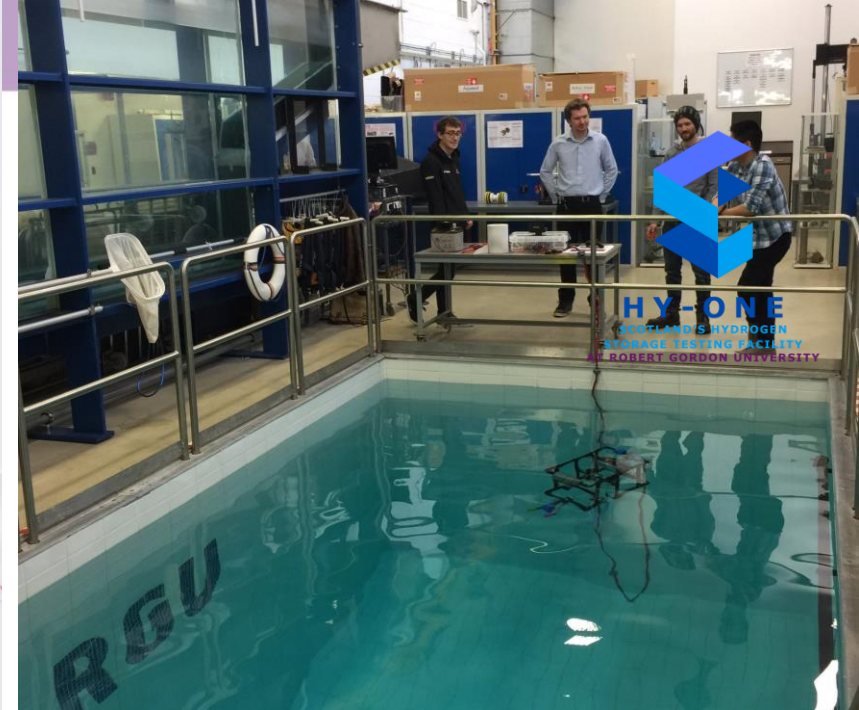
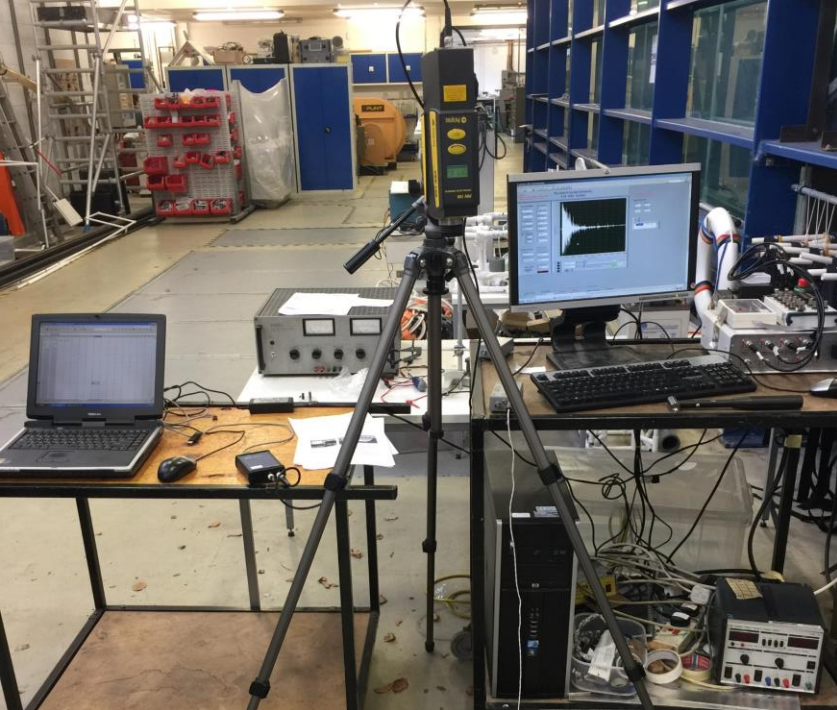
Microsystems Technologies/Microsensors Lab

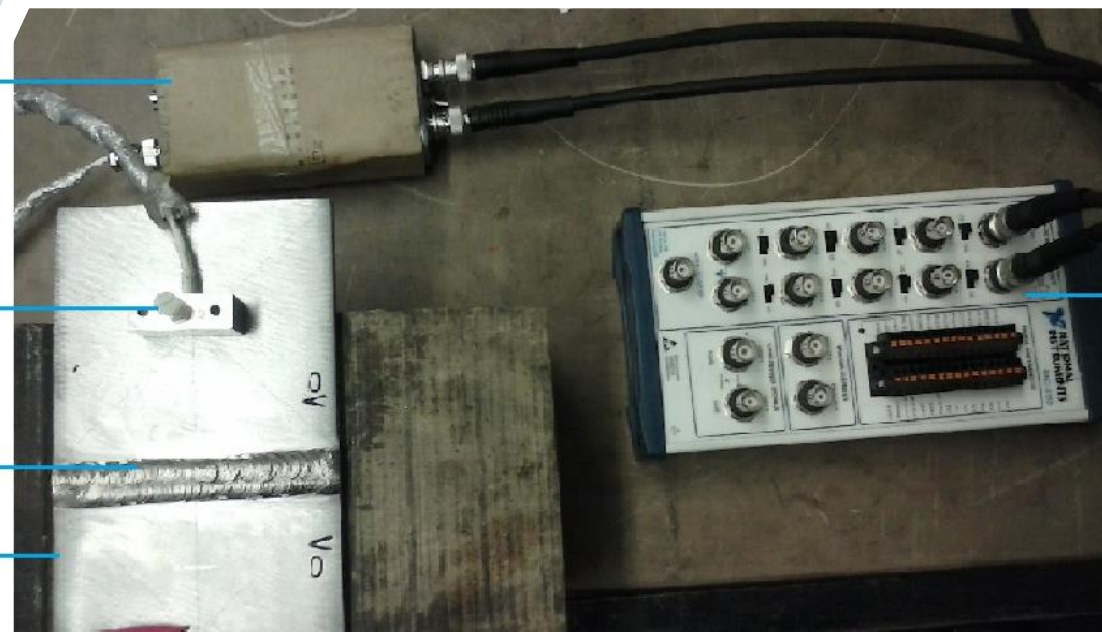
- Synthesis, characterisation
- Sensors, electrodes,
- NEMS/MEMS etc

NEW FACILITIES

- Drop weight impact testing machine
- High velocity impact (puncture test)
- Endurance testing (pressure load, leak, burst)
- Underwater/Underground testing pool (fatigue and endurance testing)
- Pressure testing systems
- High pressure testing bunker
- Refilling test station







and the
g Magnet

Weld

Plate

Data Acquisition Unit

Industry Involvement & Engagement



**PUBLIC ENGAGEMENT
ACTIVITIES/ SKILLS
DEVELOPMENT**



**EQUIPMENT
SUPPLIER
OPPORTUNITIES**



**PROJECT
UPDATES**



**EXTERNAL
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