

Hungarian hydrogen ecosystem



Zoltán Butsi, general secretary



Introduction of the Hungarian Hydrogen Technology Association



Hydrogen
Europe™

member

→ **106 members** ←



HUNGARIAN HYDROGEN
TECHNOLOGY ASSOCIATION



member

Main activities:

- Supporting the Hydrogen Strategy of the Hungarian government
- Green truck program coordination
- Studies
- International relations
- Generation of projects & innovation chains
- H2 regulation - formulating proposals
- Education - training of H2 specialists



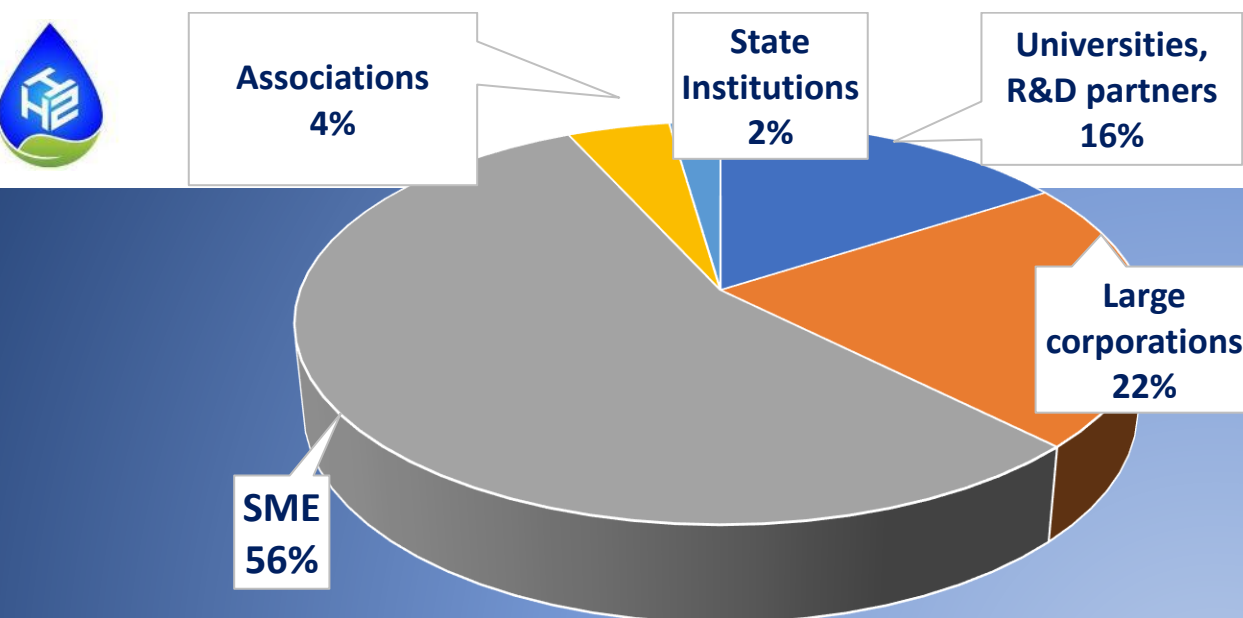


Our members





Introduction of Hungarian Hydrogen Technology Association



Hungarian hydrogen strategy

Government decree: 1372/2021.

2021

„White Book”

Foundation of H2 strategy

2020

Platform

predecessor organization

The relevant
Hungarian
members joined

2022

Association
established

Umbrella organization
(engine) of hydrogen sector

106 members: SME-s, companies,
Universities, Organizations

Members, i.e:



Energiatudományi
Kutatóközpont





Hungarian Hydrogen Strategy

★ Update is underway!

PRIORITY OBJECTIVES - 2030

Production of large volumes low-carbon and decentralized carbon-free hydrogen

Establishing the conditions necessary to produce low-carbon and carbon-free hydrogen that is in compliance with user requirements and is competitively priced.

- 20 thousand tons / year low-carbon hydrogen +
- 16 thousand tons / year green* and other carbon-free hydrogen
- 240 MW electrolyser capacity**

Decarbonisation of industrial consumption, partly with hydrogen

At first, predominantly low-carbon hydrogen will be used to make the industrial processes and product use “more green”, with a shift to carbon-free hydrogen usage on the longer term.

- 20 thousand tons / year low-carbon hydrogen +
- 4 thousand tons / year green* and other carbon-free hydrogen
- avoiding the emission of 95 thousand tons of CO₂

Green transport

Accelerating the transition to clean modes of transportation by a gradual transition from gas oil usage to clean alternatives. Within this framework, on the 2030 timeline, hydrogen may become a realistic alternative primarily in heavy-duty vehicle traffic.

- 10 thousand tons / year green* and other carbon-free hydrogen
- 20 hydrogen refuelling stations / 40 refuelling points
- 4.8 thousand HFC vehicle
- avoiding the emission of 130 thousand tons of CO₂

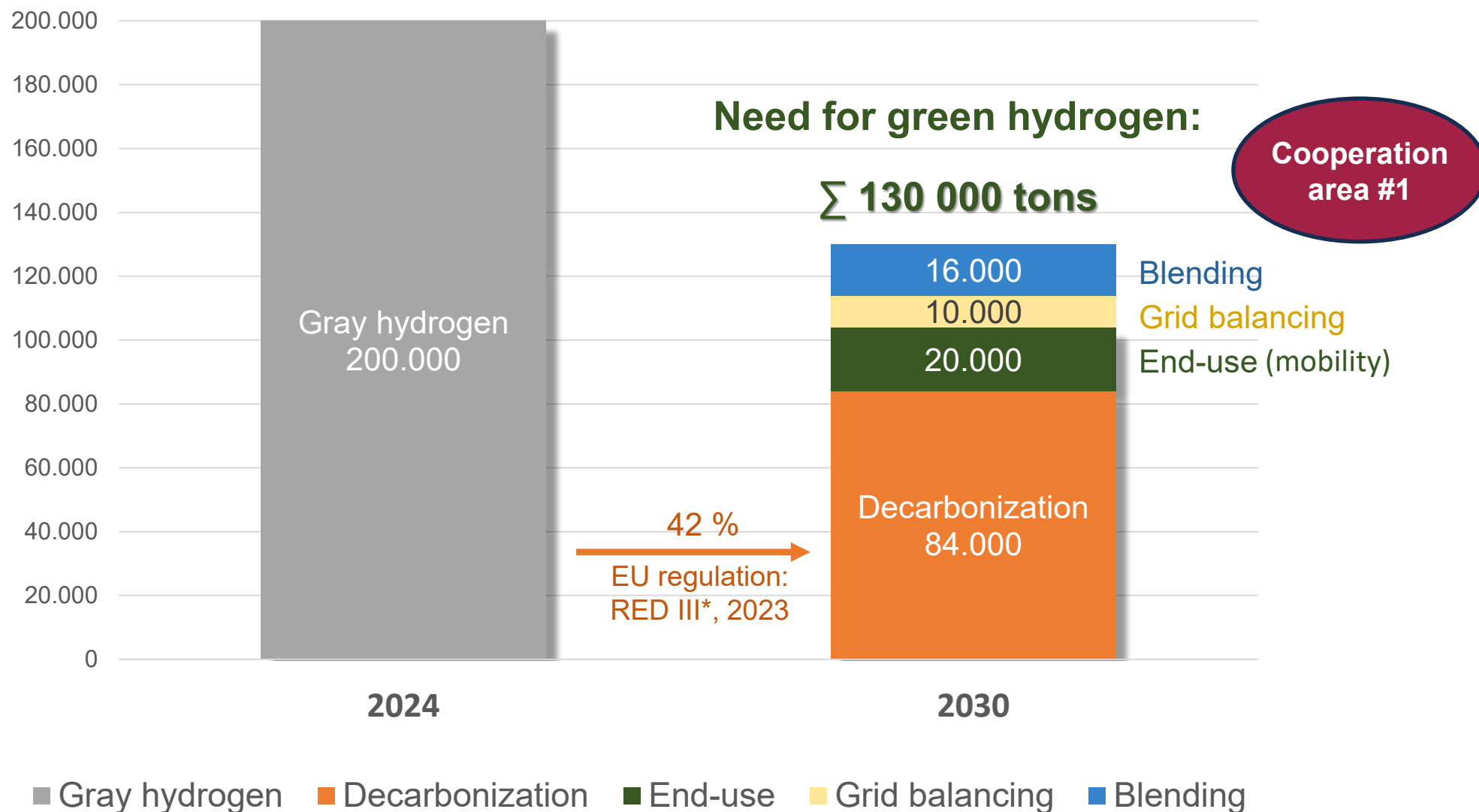
Electricity and (natural) gas support infrastructure

Building sector integration ability - primarily seasonal energy storage ability - by utilising intersectoral synergy, establishing infrastructure that will enable the transition to carbon neutrality, and reconstructing existing infrastructure.

- 60 MW average cut-off capacity
- min. 2% per year volume blending ratio in the natural gas system (where appropriate)



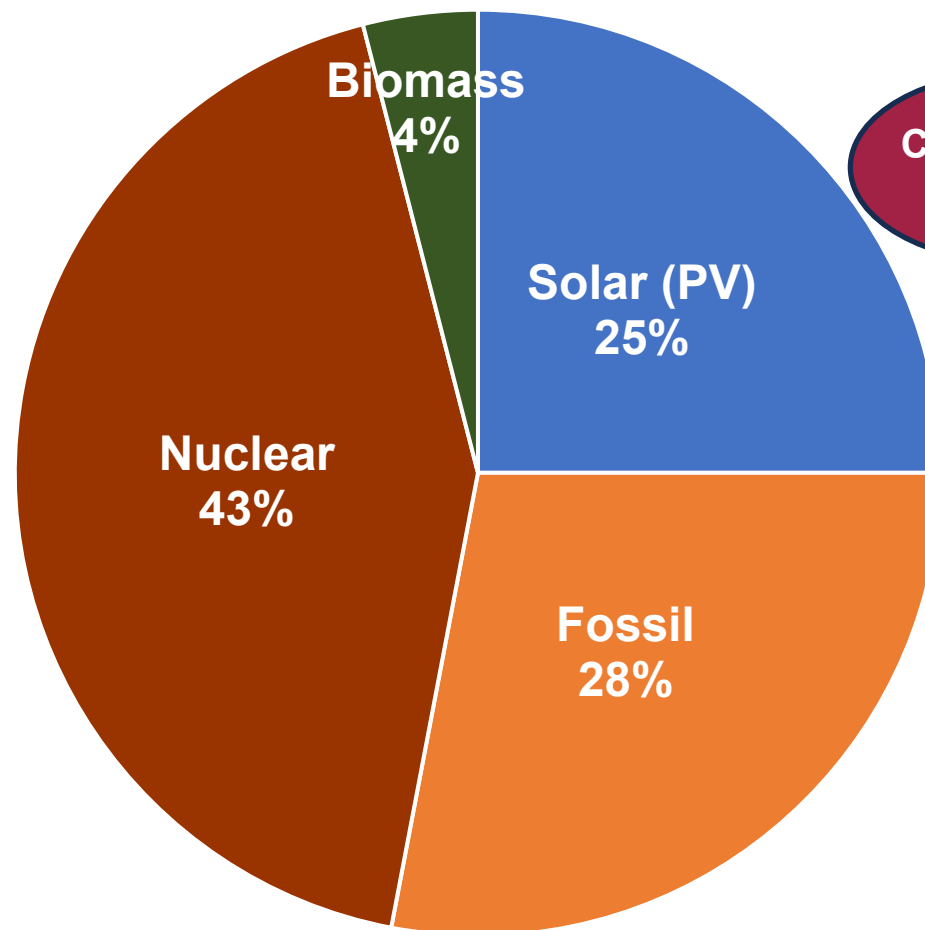
EU regulation >> pressure and drive for green H2 production / import





The Hungarian Energy Mix

% in the energy mix



Cooperation
area #2

Need for grid balancing

■ Solar (PV) ■ Fossil ■ Nuclear ■ Biomass



Hungary has a good potential in hydrogen economy

- **Opportunities for investment:**

- Skilled workforce
- Lower salaries/wages
- Good FDI potential
- New industrial developments: battery, H₂, solar
- Education
- Developed car & supply industry

Actualities of the Hungarian hydrogen industry - projects

Green hydrogen production has started! 2024 is a breakthrough year:

- **MOL: Green hydrogen plant– Százhalombatta**

Development of 10 MW electrolyser system, 1600 tons/year, 100 MW scalable



- **MVM Akvamarin project – Kardoskút**

Development of a 2.5 MW electrolyser system with a total capacity of 68 tons/year and the related hydrogen gas preparation technology



- **Bükkábrány – Energy Park**

Power to Gas Technology Testing

Construction of 1 MW controllable PEM electrolyser

Output: Green hydrogen, 60 tons/year

Peak output: 22 MWp



- **SZTE Science Park:**

40 tons/year, 1 MW

Synthetic fuel

production in

different ways including

Fischer Tropsch (CO₂)

based solution



Actualities of the Hungarian hydrogen industry - projects



H2 powered generators

1 kW
6 kW
15 kW



Fuel cell powered boat



H2 garbage truck development



H2 bus test in national public transport company (MÁV Group)



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Hydrogen developments underway in Hungary

- Hydrogen aggregators and development of hydrogen-powered garbage trucks at Kontakt-Elektro Kft



- Hydrogen-powered truck testing – Waberers, HELL Energy
- Hydrogen-powered train, tender preparation - MÁV
- Hydrogen-powered bus testing - VOLÁN
- H2 Drones: Ventus-V Tech Kft., Budapest, Central Geo Kft. Szolnok, MouldTech Systems Pécs

Budapest Airport - in the center of H2 aviation!

Cooperation
area #3

Budapest Airport is part of a joint hydrogen project by **AIRBUS** and **Vinci Airports**.

Innovative aviation
**hydrogen treatment
and refueling**
project

Demonstration of
ground operations of
hydrogen-powered
aircraft
3 EU airports.



GOLIAT
(Ground Operations
of Liquid hydrogen
Aircraft) project
10,8 million euro

Airbus,
Rotterdam
The Hague Airport,
Vinci Airports,
Stuttgart Airport,
Budapest Airport



MÁV Group: Successful H2 bus tests in 2024 & H2 railway plans



Planned
procurement



Manufacturer

Toyota-Caetano
H2. City Gold



Solaris

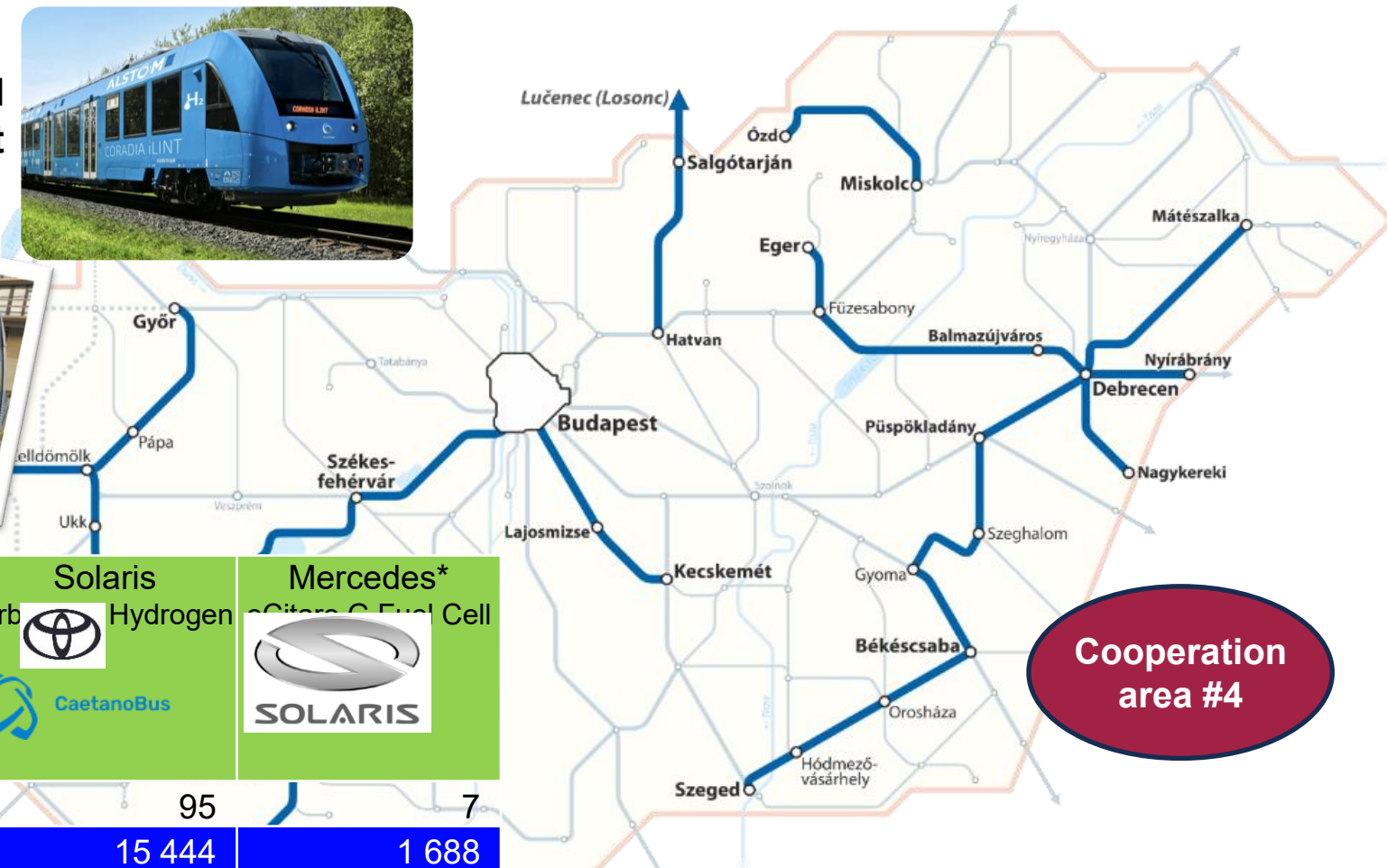


Mercedes*
eCitaro G Fuel Cell



Bus in operation (days)	200	95	7
Total distance traveled (km)	54 108	15 444	1 688
Average distance traveled per day (km)	256	160	241
Average refueling time (minute)	22 (350 bar)	37 (200 bar)	17 (350 bar)
Total amount of hydrogen used (kg)	3 297	1 282	95
Average consumption (kg/100km)	6,09	8,38	5,61

*The eCitaro G Fuel Cell is an articulated electric bus with hydrogen fuel cell range extender
It was also charged with 979 kWh of electricity, with a consumption of 0.58 kWh/km.



Cooperation
area #4

Refueling stations planned:

- Debrecen
- Szeged-Rendező
- Hatvan
- Székesfehérvár



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Hungarian H2 actualities – H2 pipelines

SEEHyC Hungary

Factsheet

- 4 Entry & 4 Exit point (7.7 TWh/y) demand in Hungary based on 2023 non-binding H2 survey
- Connecting large industrial customers and potential producers in Hungary to the regional corridor
- Region was underrepresented in the PCI-2023 list, SEEHyC project to be submitted in the next PCI round

FGSZ Ltd.

FGSZ

A MOL-CSOPORT TAGJA

Budapest

SEEHyC, South- East European Hydrogen Corridor





Main tasks / objectives

Hydrogen valley

- Min. 500 t/year production
- Critical volume of mobility
- Min. 1 refueling station
- Cross-border projects

Green ammonia

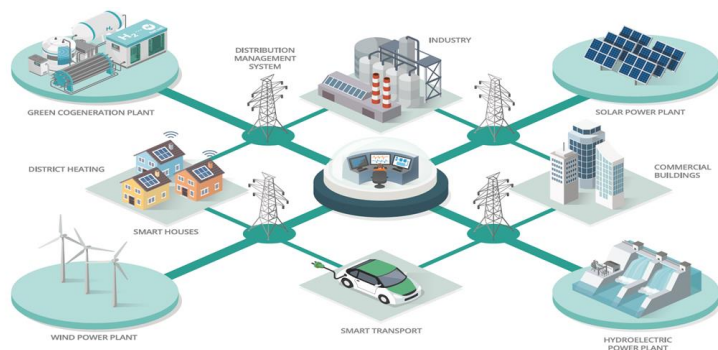
- Analysis of necessary steps
- Import or production
- Agricultural support

Grid balancing

- Minimum peak shaving
- Dominant: PV, nuclear
- Storage: liquid hydrogen

Regulation

- RED 3 implementation
- RFNBO reg. change (V4)
- Low carbon Hydrogen
- Regional Hydrogen Bank



Education and R&D

HYDROGEN TECHNICIAN TRAINING

Organized by our Association & Dunagáz



Professional qualification:

Skilled builder, operator and maintainer of hydrogen systems

Main features:

Profession Group: Mechanical Engineering, Level 2,
Min: 112 hours, Max: 140 hours,
Ratio of theoretical & practical training: 50-50%

Moduls: 3

PROFESSIONAL ENGINEERING courses



University of Pécs

Faculty of Technology and Informatics:
Fuel cell and hydrogen technology specialist
Started in 2022.

University of Dunaújváros:

Hydrogen technology operating engineer: *From 2024*

István Széchenyi University:

Hydrogen Systems Engineer: *To be started*

University of Miskolc:

Hydrogen supply engineer-specialist: *To be Started*



NATIONAL LABORATORY OF RENEWABLE ENERGIES

with hydrogen focus

Universities: PTE, BME, DE, ME, NJE, PE, SZE, SZTE

Research Centers: HUN-REN Center for Energy Research,
HUN-REN Research Centre for Natural Sciences



H2 vendor development program for SMEs

Free hydrogen technology business development program series for small and medium-sized enterprises.

Developing H2 technology knowledge for SMEs in the field of energy storage, hydrogen production and application, thus opening up the supplier opportunities inherent in the technology for them

Expanding
knowledge

Development
and supplier
opportunity

International
experience
and contacts



SME workshops:

- Gödöllő 12/03/2026
- Kiskunhalas 2026. 03.
- Zalaegerszeg 28/05/2026
- Balatonfüred 26/08/2026
- Miskolc 2026. 11.

• <https://hh2.hu/h2-open-nyitas-a-hidrogentechnologia-fele/>



Hydrogen Open Budapest: 3-5 February 2027



Thank you for your attention!



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