

# Hungarian Hydrogen Technology Association

Hungarian Hydrogen Mobility,  
status 2022 december



**HUNGARIAN HYDROGEN**  
TECHNOLOGY ASSOCIATION



# Introduction of Hungarian Hydrogen Technology Association

- **Hungarian Hydrogen Technology Association** from 2021 Q4  
predecessor: Hydrogen **Platform** from 2020 Q2 → „Hydrogen **White Paper**”  
foundation study to a national H<sub>2</sub> strategy
- June 2021: **Hungarian Hydrogen Strategy** adopted by Government decision No. 1372/2021.
- Umbrella organization for the domestic hydrogen sector
- Coordinates the Green (H<sub>2</sub>) Truck Programme
- Consultancy for implementation of the national H<sub>2</sub> Strategy
- 80+ corporate members:  
from SMEs to larges nat./multinat. companies  
+ universities, background institutions  
All relevant Hungarian players joined.
- Wide international relations / cooperation  
Hydrogen Europe, Global Hydrogen Industrial Alliance

Some of our members:





# Main activities

Consultancy for the ministries (Energy, Transport): regulation, H2 IPCEI advisory, etc.

- Support the implementation of national Strategy
- Green (H<sub>2</sub>) Truck Project
  - First phase: fulfilled (2022.Q2) foundation study of hydrogen based freight transport in Hungary (HDV-FCEV vehicles portfolio and hydrogen refuelling station's and their permitting); studying best practices, technology transfer (espec. from Germany, Switzerland);
  - Second phase: ongoing (2022.Q3-) preparation of hydrogen based freight transport project(s), preparation of public tendering H2 refueling stations, involvement of key stakeholders
- Professional discussions with financial institutions, V4 and Hydrogen Associations in the EU, scientific and research organizations, certification bodies, relevant industry players
- Workshops, conferences:
  - 2022.06: V4+ Hydrogen in mobility (Zalazone), 1st temporary filling station
  - 2022.10: Hydrogen Dialogue (Nürnberg) Budapest-Nürnberg by H2 car to show long distance travel
  - 2022.10. Hydrogen Week (Brussels)
- Other studies and activities on key areas: electric energy regulation, cost analysis of H<sub>2</sub> production based on PV, development options of grid balancing; possible industry development, job creation by hydrogen technologies; hydrogen education issues





# Hungarian Hydrogen Strategy

VISION OF THE HYDROGEN STRATEGY			
<p>We are developing potent competencies with regard to the key elements of the hydrogen value chain, which, supplemented through targeted RDI and economic development activities, will serve to promote the shift towards a carbon-free society and to maintain the competitiveness of the Hungarian economy.</p>			
PRIORITY OBJECTIVES - 2030			
<p><b>Production of large volumes low-carbon and decentralized carbon-free hydrogen</b></p> <p>Establishing the conditions necessary to produce low-carbon and carbon-free hydrogen that is in compliance with user requirements and is competitively priced.</p> <ul style="list-style-type: none"> <li>• 20 thousand tons / year low-carbon hydrogen +</li> <li>• 16 thousand tons / year green* and other carbon-free hydrogen</li> <li>• 240 MW electrolyser capacity**</li> </ul>	<p><b>Decarbonisation of industrial consumption, partly with hydrogen</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>• 20 thousand tons / year low-carbon hydrogen +</li> <li>• 4 thousand tons / year green* and other carbon-free hydrogen</li> <li>• avoiding the emission of 95 thousand tons of CO<sub>2</sub></li> </ul>	<p><b>Green transport</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>• 10 thousand tons / year green* and other carbon-free hydrogen</li> <li>• 20 hydrogen refuelling stations / 40 refuelling points</li> <li>• 4.8 thousand HFC vehicle</li> <li>• avoiding the emission of 130 thousand tons of CO<sub>2</sub></li> </ul>	<p><b>Electricity and (natural) gas support infrastructure</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>• 60 MW average cut-off capacity</li> <li>• min. 2% per year volume blending ratio in the natural gas system (where appropriate)</li> </ul>

+ 3 supporting „horizontal” objectives:

**Taking advantage of industrial and economic development opportunities**

**Horizontal conditionality: establishing a stimulating operational environment**

**RDI and education to promote the success of hydrogen during the transition**



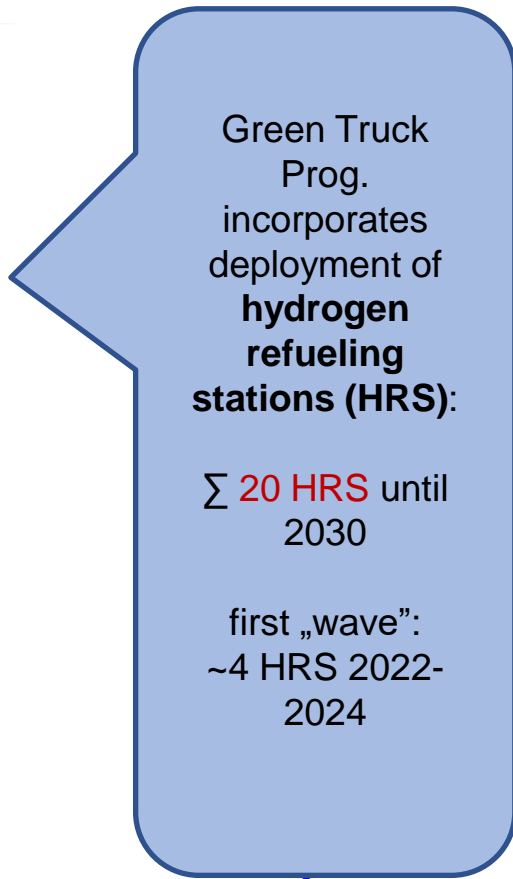
\* “Green” hydrogen is “renewable hydrogen”, extracted from water via renewable electricity.



# Six sub-programs of the Hungarian Hydrogen Strategy

Prioritised projects, which are meant to implement the primary goals of the Strategy and which should be launched as soon as possible, are as follows (with the estimated subsidy requirements in parentheses):

- 1) **Green Truck Programme** for making freight traffic more green (HUF 35-40 bn)
- 2) **Green Bus Programme Plus** for making public services, concerning transportation at the local level, more green (HUF 10-20 bn)
- 3) **Establishment of hydrogen valleys in Hungary** to promote the establishment of interconnected networks of the hydrogen value chains within the given geographical regions (HUF 10-15 bn)
- 4) **Hydrogen Highway Project** for creating a foundation for carbon-free hydrogen production, transportation and energy storage (HUF 20-30 bn)
- 5) **Blue Hydrogen Project** for reducing the carbon footprint of industrial hydrogen usage (HUF 20 bn)
- 6) **Research, development and innovation** in service of the establishment of a hydrogen economy (HUF 10 bn)



Green Truck Prog. incorporates deployment of **hydrogen refueling stations (HRS)**:

Σ **20 HRS** until 2030

first „wave”:  
~4 HRS 2022-2024





## Hungarian projects (1)

- Launch pilot projects by installing a **Hydrogen Refuelling Station (HRS)** – HH Association, HUMDA
- **H-garbage truck** for communal services, electrolyzer production – Kontakt Elektro.
- **Hydrogen-powered trains** on the northern shore of Lake Balaton instead of overhead line construction - MÁV
- Development of fuel cell boat and **inland navigation shipping** at Lake Balaton – MAHART, Kontakt Elektro
- Development of hydrogen technology **R+D+I infrastructure**, establishment of the National Hydrogen Laboratory – TTK
- Hydrogen Compressor Production - Ganzair
- Hydrogen drone development –Ventus Vtech





## Hungarian projects (2)

- **Green Truck Program - 2<sup>nd</sup> phase** – Hungarian Hydrogen Technology Association
- Development of **Hydrogen electrolyzers** – Kontakt Elektro
- Testing **Hydrogen fuelled trucks** – Waberers, HELL Energy
- **Hydrogen fuel tank/container** development – Széchenyi University, Neumann University
- Development of **Hydrogen fuel cells** – **AVL Hungary Kft.**
- Hydrogen powered **drone** development - Ventus-V Tech Kft
- **Electrolysis system** development - Siemens Energy, Thyssen Krupp
- Hydrogen powered **bus** development – Goldy Mobility, Kravtex, ITK, Ikarus
- Development **agricultural** applications, H2 tractors, spraying drone – MATE, Genevation



**TEN-T road corridors and probable locations for the first round of HRS installation (~2022-2024) in Hungary**

**Urban nodes (under TEN-T)** will play also important role, deploying the hydrogen refuelling infrastructure until 2030

Closest Hungarian „urban nodes” to the Slovakian border (according to the proposal of the new TEN-T regulation:

- Budapest
- Győr
- Miskolc
- Nyíregyháza

**TEN-T core network**  
**TEN-T comprehensive**





## Hungarian Hydrogen Strategy (2021)

- Oil refinery
- Fertilizer plant
- Steel works
- Chemical / petrochemical
- Cement plant
- + Nuclear Power Plant – „yellow”  
**hydrogen** production

RePowerEU Plan explicitly mentions nuclear based H<sub>2</sub> production

Memorandum of Understanding to establish a hydrogen ecosystem in the Paks region, based on nuclear and renewable energy

Hungary plans to establish two new hydrogen valleys by 2030.

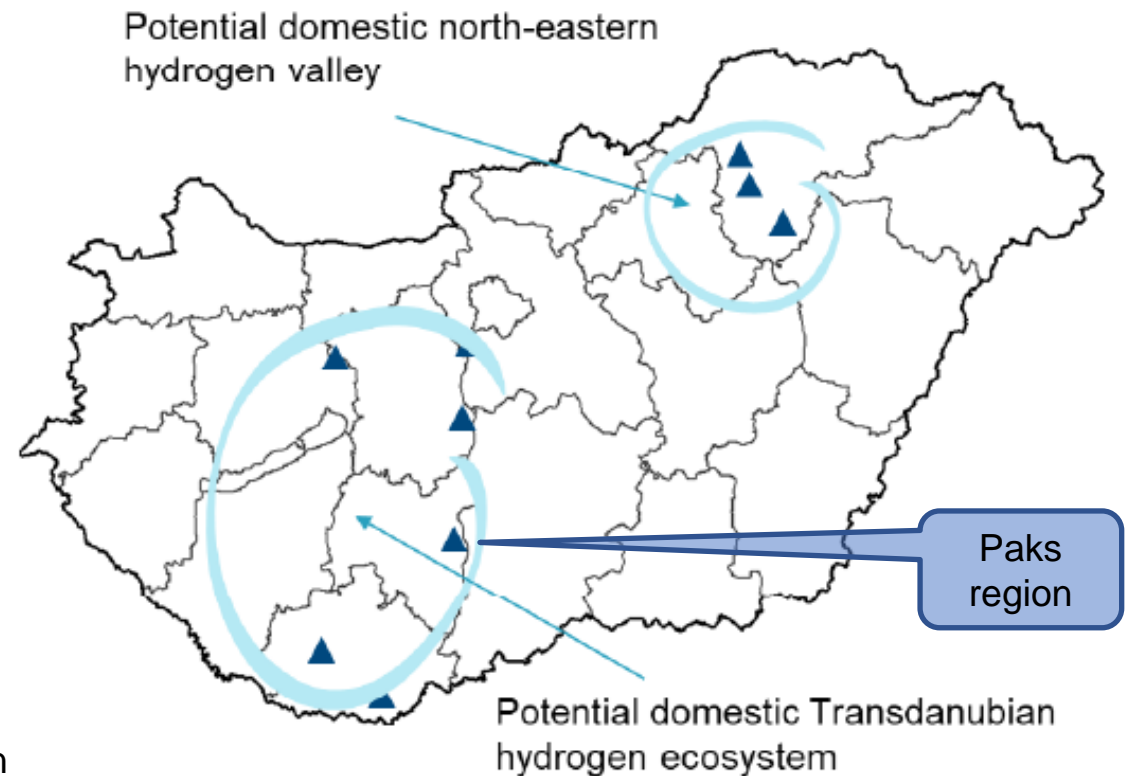



Figure 3: Potential hydrogen valleys of Hungary

## Ongoing projects, main developments

- 2021 first **HRS** opened in Budapest (at present in test operation)
  - First two Toyota Mirai gained Hungarian „green” plate-ID
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- 2021- winners of first large scale H<sub>2</sub> demo projects published – financed **by the Energy Innovation Fund** (EU ETS CO<sub>2</sub>-incomes); project examples:
    - Akvamarin Project – under construction (~2 MW electrolyser capacity)
    - further 4 project are in the planning phase: PV + electrolysers projects; Power-to-Gas bio-methane + hydrogen production; H<sub>2</sub> for seasonal energy storage projects
  - other planned developments (selected):
    - 10 MW electrolyser (green) H<sub>2</sub> project in MOL refinery (announced in May 2022, start of operation 2023.Q3/Q4)
    - automotive test bench for Fuel Cell vehicles (realization phase)
    - pilot project initialization (refit trucks, HFC bus, HFC train, boat & ferry)

Thank you for your attention!

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