



V4 Conference „Hydrogen – present and future in mobility”

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MINISTRY FOR
TECHNOLOGY AND INDUSTRY

Policy Deep Dive: How Are Hungary Supporting The Growing Green Hydrogen Market?

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Target system for the National Hydrogen Strategy

VISION: 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.

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 electrolysis capacity

Decarbonization 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 refueling stations / 40 refueling 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 utilizing 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)

Taking advantage of industrial and economic development opportunities

Enhancing the activities at the intersection of industrial trends and Hungary’s domestic strengths in order to promote competitiveness and stimulate domestic penetration.

Horizontal conditionality: establishing a stimulating operational environment

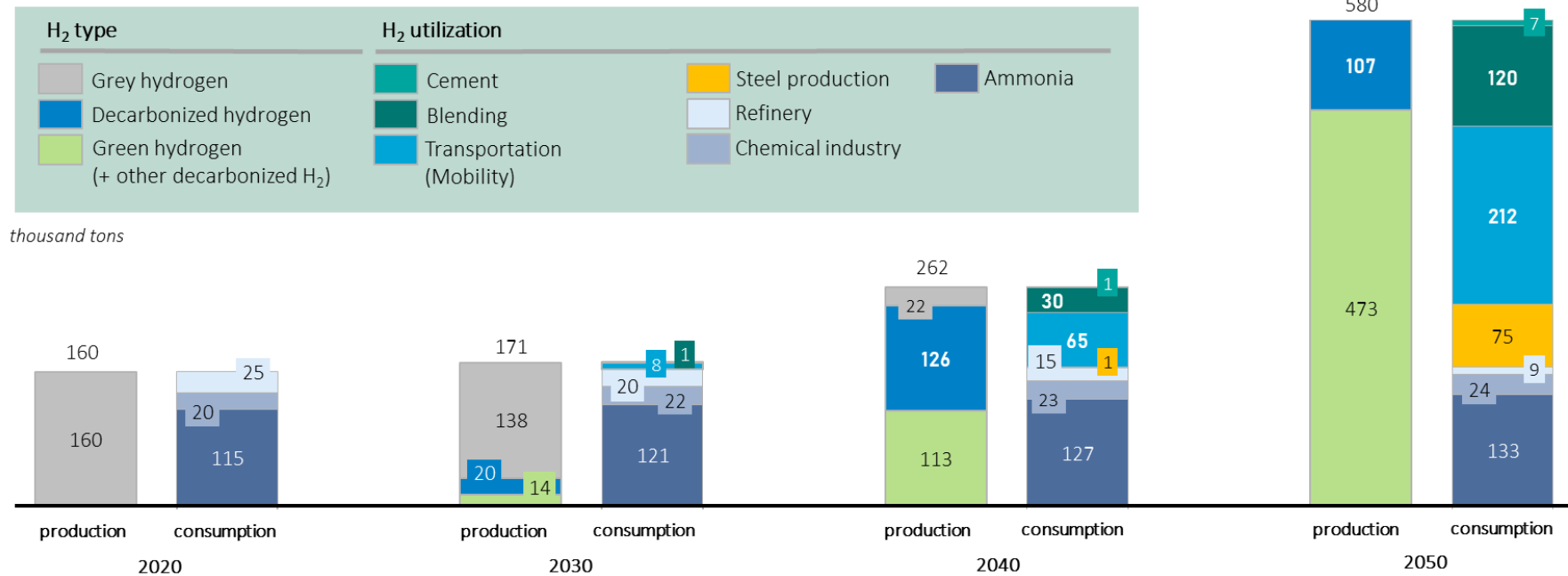
Establishment of comprehensive regulatory and operational frameworks + promoting partnership and international cooperation.

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

It is essential for the implementation of strategic objectives to establish a system of scientific, technological and horizontal competencies that can serve as a foundation for the domestic use and development of new technologies and for demonstrating the legitimacy of such technologies on the domestic market.

By 2050, hydrogen production will be gradually decarbonized and new demands will be emerged in Hungary

Expected development of domestic hydrogen production and consumption



- Domestic hydrogen production is currently fossil-based („grey hydrogen”), which is consumed exclusively in industry (refineries, ammonia production, other chemical industry).
- By 2030, the first industrial pilot plans will be operational, producing mainly low-carbon (especially „blue”) hydrogen through the combination of steam methane reforming (SMR) and carbon capture and storage (CCS).
- At least 240 MW of electrolysis capacity will also be established by 2030.
- New hydrogen-consuming segments will also be emerging in 2020s: transportation and natural gas replacement (or blending). These sectors will typically use carbon-free hydrogen
- There will be a surge in carbon-free hydrogen and transport use. Industrial „grey hydrogen” is replaced by low-carbon (mainly blue) hydrogen by 2040.
- By 2050, there will be a significant new demand for hydrogen (e.g. steel and cement industry), which will typically be supplied with green and other kind of decarbonized hydrogen.

The aim of the strategy is to expand demand and demand-driven supply in parallel, in harmony with each other. Maintaining a balance between demand and supply is critical.

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



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- Conditions to produce low-carbon and carbon-free hydrogen
- In compliance with user requirements
- Competitively priced

- ✓ around 40 thousand tons/year green & low-carbon hydrogen



Decarbonization of industrial consumption, partly with hydrogen



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- Carbon-free hydrogen usage on the longer term
- Low-carbon hydrogen to move industrial processes towards being “more green”

✓ around 30 thousand tons/year low-carbon and green hydrogen

avoiding the emission of 95 thousand tons of CO₂



- Transition to clean modes of transportation (from oil to clean alternatives)
- By 2030 hydrogen may become a realistic alternative primarily in heavy-duty vehicle traffic

- ✓ 4.8 thousand HFC vehicles
- ✓ at least 20 hydrogen refueling stations (40 refueling points)

avoiding the emission of 130 thousand tons of CO₂



Electricity and (natural) gas support infrastructure



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- Creating sector integration ability (primarily seasonal energy storage) by intersectoral synergy
- Establishing an infrastructure that enables the transition to carbon neutrality

- ✓ usage of hydrogen in balancing services
- ✓ making parts of the natural gas pipeline & storage infrastructure capable for hydrogen





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Looking forward

Until 2030 two focal points for hydrogen: hard-to-abate industries and mobility



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Building up hydrogen powered transport



- Establishing coherence between hydrogen production, filling station design and vehicle commissioning
- In connection with this, it is necessary to develop the concept of the hydrogen filling network and the business model required for the operation of hydrogen-powered buses. The design of the hydrogen refueling infrastructure system must be in line with the Alternative Fuels Infrastructure Regulation (AFIR), which is expected to be adopted by the end of the year
- Installation of hydrogen-powered buses (and possibly waste vehicles) in cities and installation of filling stations to meet demand
- Establishment of the base for domestic hydrogen-powered vehicle production (in addition to system integration capacity, additional value-added capacity would be needed)

Industrial decarbonization with hydrogen



- Carbon-free and low-carbon hydrogen can already be used in petrochemical and chemical industries (especially ammonia production), which already use significant volumes, gradually replacing carbon-intensive "gray" hydrogen
- In the longer term, hydrogen will also appear in new industries that are difficult to decarbonise by other methods, such as steel, glass, cement and bricks
- To support industrial decarbonisation, the industrial introduction of carbon-free hydrogen will be scheduled, including:
 - Identification of current and potential industrial hydrogen users,
 - The applicability of the relevant technologies in Hungarian conditions (technical feasibility and economic considerations),
 - Forecasting energy consumption and hydrogen consumption in the industries concerned
 - Possible solutions to meet the hydrogen demand of the industries concerned (comparison of own production and sourcing)
 - Schedule for the introduction of carbon-free hydrogen

In building up the hydrogen ecosystem, maintaining a balance between supply and demand is crucial. This needs new legal, financial, technological, human and consultation framework

I N T E R V E N T I O N S

Modification of the current legal and regulatory environment

- **Legal certainty needs to be created** for investors and a clear message needs to be sent to industry on the areas in which hydrogen should be introduced
- **The legal obstacles restricting the development of the hydrogen economy will be removed, and a supportive legal framework will be created**
 - In the short term, the focus is on regulating transport use
 - Given that several relevant draft EU legislations are under negotiation, the legal framework may be fine-tuned once they have been adopted
- **An appropriate certification scheme is needed** and a **guarantee of origin** institution needs to be set up for both renewable and low carbon hydrogen

Comprehensive development of an incentive system

- We want to promote the spread of hydrogen through various support programs aimed at the production and use of hydrogen before cost-effective competitiveness is established
- **The aim is to set up a system that allows for differentiated support for the combined recovery of supply and demand, taking into account the type of hydrogen, in line with state aid policy**

Strengthening international cooperation

- **Identify concrete opportunities for international cooperation and accelerate cooperation**
 - **Attracting investors in hydrogen technology to Hungary**
 - Exploring and utilizing new opportunities for clean hydrogen cooperation with countries and regions with better hydrogen production potential than at home (primarily local ones)

Education, training, R&D programs

- **Concepts for establishing educational and research background and infrastructure**
- Identification of RDI research areas
- Development of basic curricula
- The early emergence of hydrogen as a topic in educational programs



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**Thank you
for your attention!**