Slovak Hydrogen Backbone – repurposing of the Slovak transmission pipelines to H_2

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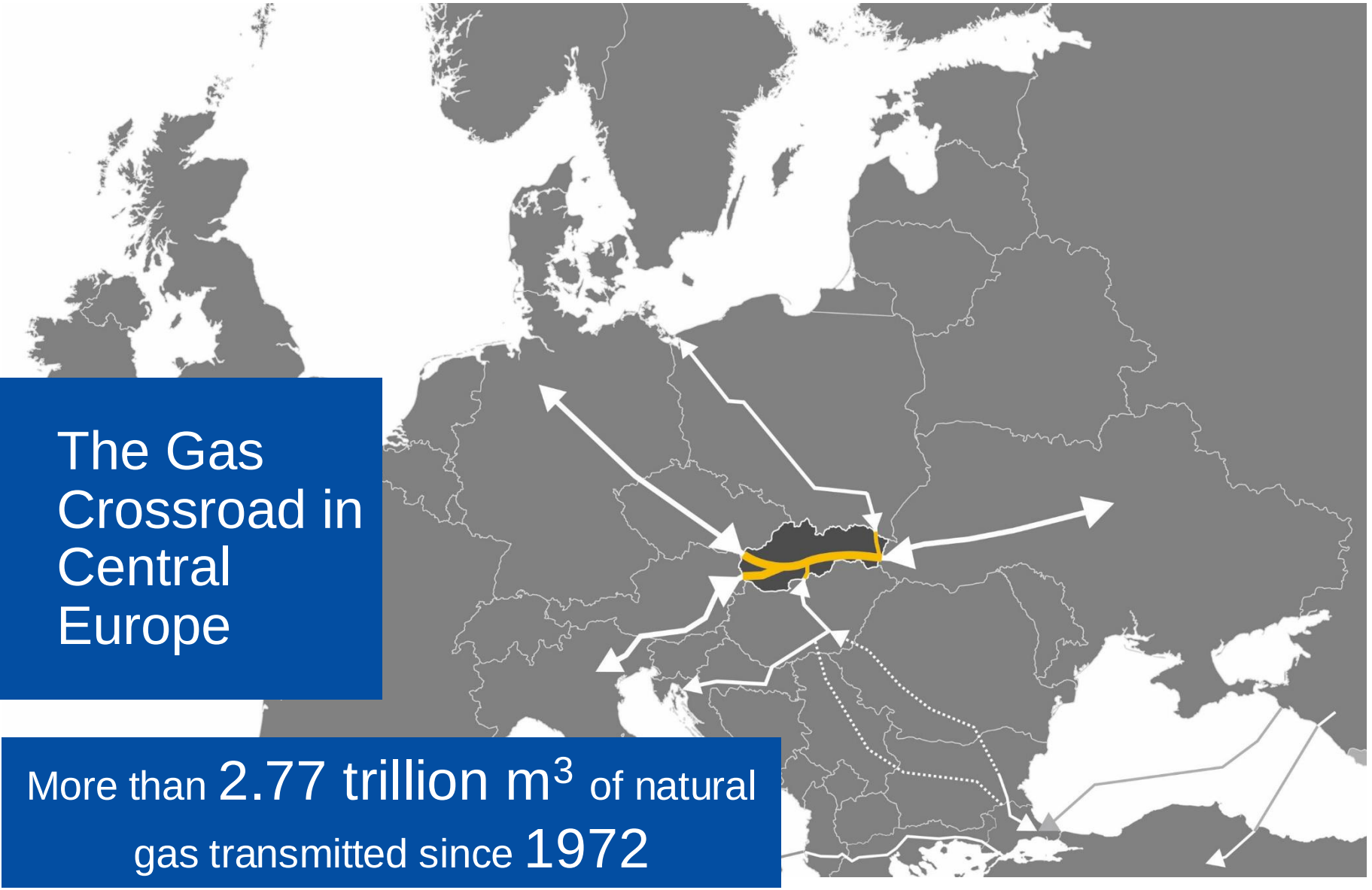
Czech Hydrogen Backbone Dialogue, Prague, November 5th, 2024

EUSTREAM – Facts & Figures



The Gas Crossroad in Central Europe

More than 2.77 trillion m^3 of natural gas transmitted since 1972

- MTC 76.7 bcm/y
  entry point Veľké Kapušany
- MTC 45.6 bcm/y
  entry point Lanžhot
- 2 376 km pipelines
  DN 1200 and 1400 mm
- 4 compressor stations
  installed power 422 MW
- MOP 7.35 MPag

The role of clean molecules in decarbonisation

Renewable and low-carbon gases have a crucial role to play in decarbonising the EU economy.

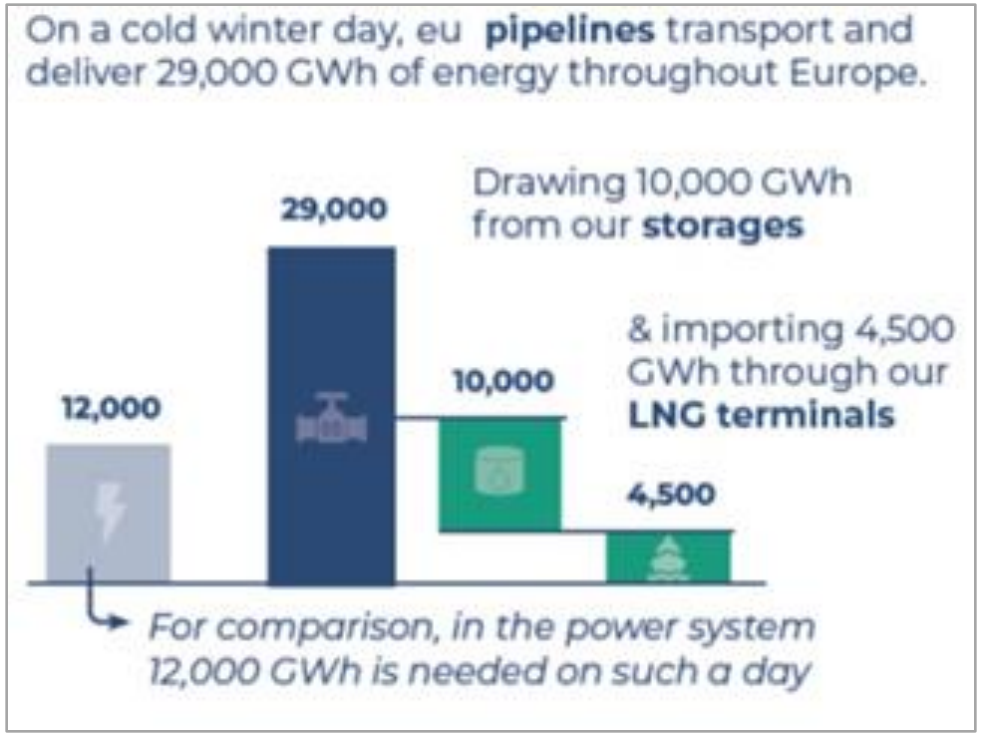
Clean molecules (biogases, hydrogen, and synthetic gases) can support in areas

- where direct electrification is not possible or practical
- provide solutions in key ‘hard to abate’ areas of the economy
- as well as facilitating the development of circular economies and the integration of energy sectors.

Unique advantage of molecules

- Gas can be stored in huge volumes
- Gas has big energy density
- Infrastructure exists/can be repurposed

The REPowerEU Strategy of 2022 set out the aim of producing 10 million tonnes and importing 10 million tonnes by 2030. By 2050, renewable hydrogen is to cover around 10% of the EU’s energy needs



Source: GIE

The role of gas infrastructure

Marcogaz key findings are:

- Up to 10 vol.-% H2, transformation costs below 1% of CAPEX for a new-build infrastructure.
- Up to 30 vol.-% H2, transformation costs below 15% of CAPEX for new-build infrastructure.
- Total costs for retrofitting the existing transmission infrastructure for 100 vol.-% H2 are below 30% of CAPEX for new-build infrastructure.

Clean infrastructure can be delivered more timely and less costly

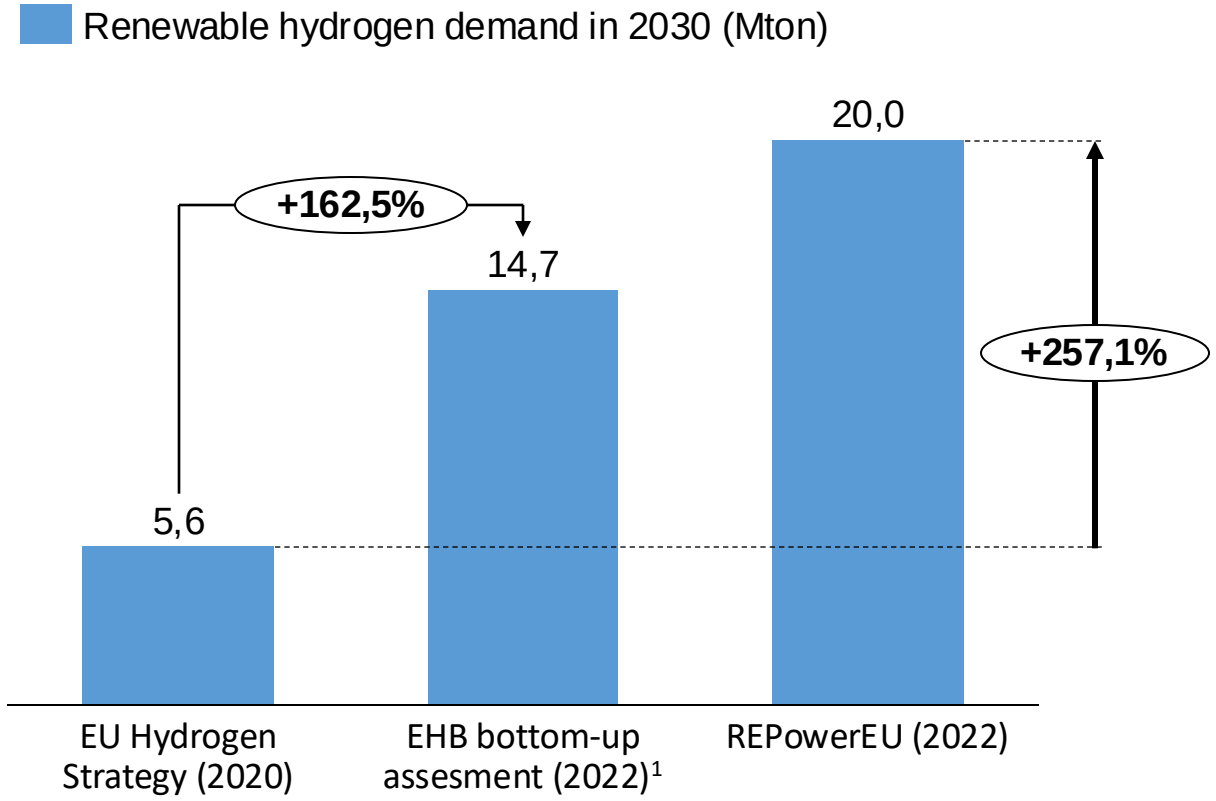
Comparison pipelines vs cables

Name	Cable (BritNed)	Pipeline (BBL)
Capacity	1 GW	20 GW
Construction costs	EUR 600M	EUR 500M
Distance	260 km	230 km

Source: Hydrogen Europe Study

Hydrogen in EU legal framework

Hydrogen will play a key role in in 2030



1: EHB bottom-up assessment 2: Gas For Climate Pan EU Study

EU strategy has 20 key actions, namely:

- Develop an investment agenda to stimulate the roll out of production and use of hydrogen, and build a concrete pipeline of projects.
- Support strategic investments in clean hydrogen in the context of the Commission's recovery plan
- Start the planning of hydrogen infrastructure, including in the Trans-European Networks for Energy and Transport and the Ten-Year Network Development Plans
- **Design enabling market rules to the deployment of hydrogen**

Five H_2 supply corridors for Europe

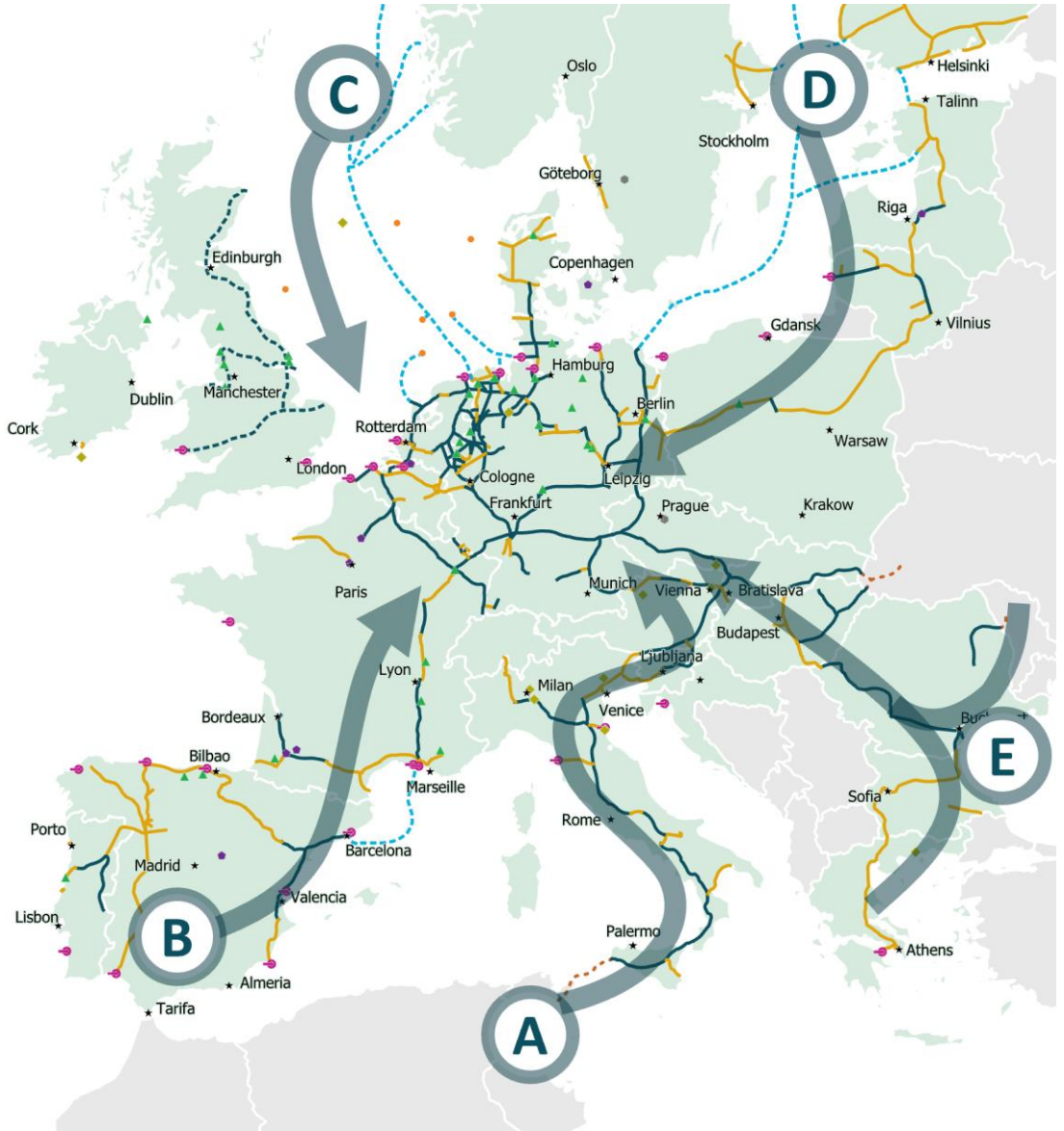
To deliver the 2030 hydrogen demand targets set by the RePowerEU plan, **five large-scale pipeline corridors are envisaged**.

<u>The five hydrogen supply corridors are:</u>

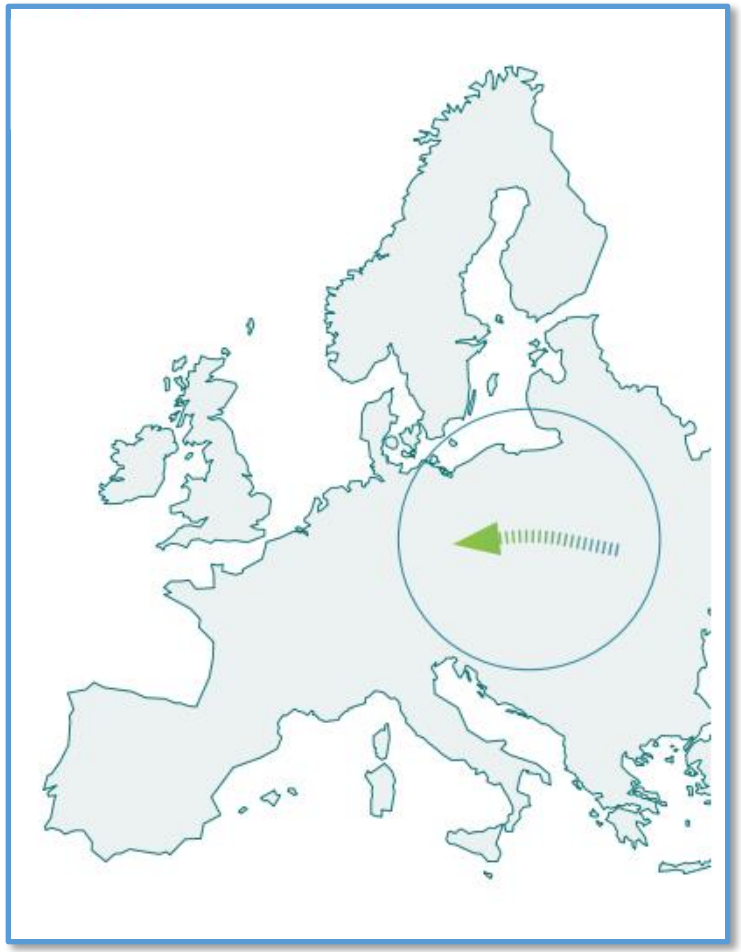
- Corridor A: **North Africa & Southern Europe**
- Corridor B: **Southwest Europe & North Africa**
- Corridor C: **North Sea**
- Corridor D: **Nordic and Baltic regions**
- Corridor E: **East and South-East Europe**

These five corridors **span across both domestic and import supply markets**, consistent with the **three import corridors** identified by the RePowerEU plan:

- **Mediterranean** (Corridors A and B)
- **North Sea** (Corridor C)
- **Ukraine** (Corridor E)



Eastern H2 Corridor
European Clean Hydrogen Alliance documents

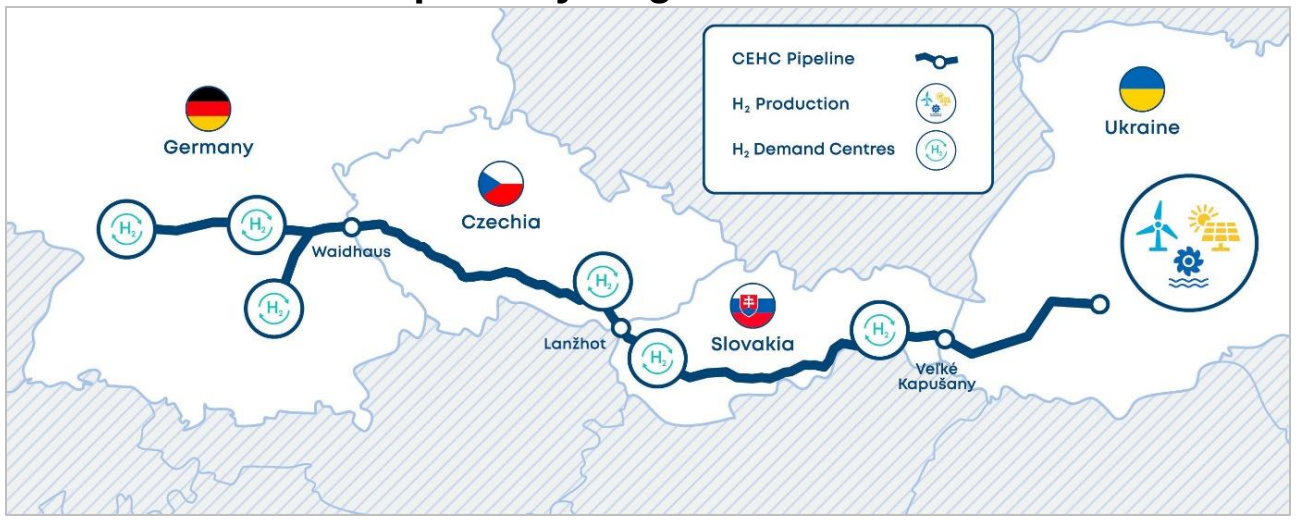


Eastern H2 corridor

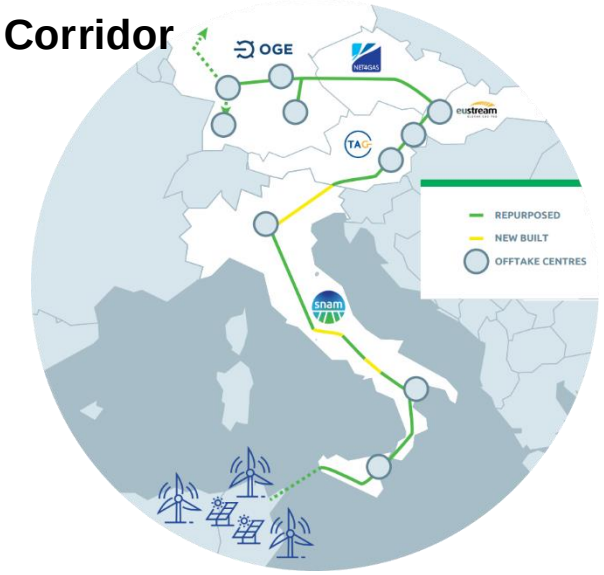
- Major driver for the development of the Eastern corridor is to utilise the potential of renewable hydrogen production in Ukraine
- Ukraine is a very promising future major supplier of renewable hydrogen with excellent conditions for large-scale, green hydrogen production development
- Repurposing existing pipelines in countries along the route allows for fast and efficient development of needed infrastructure
- Hydrogen storages along the route will be used to secure and structure (seasonal) demand of hydrogen consumers
- The corridor can connect high hydrogen supply potential in Ukraine with off takers in Central Europe and southern Germany by 2030

EUSTREAM membership in H_2 initiatives

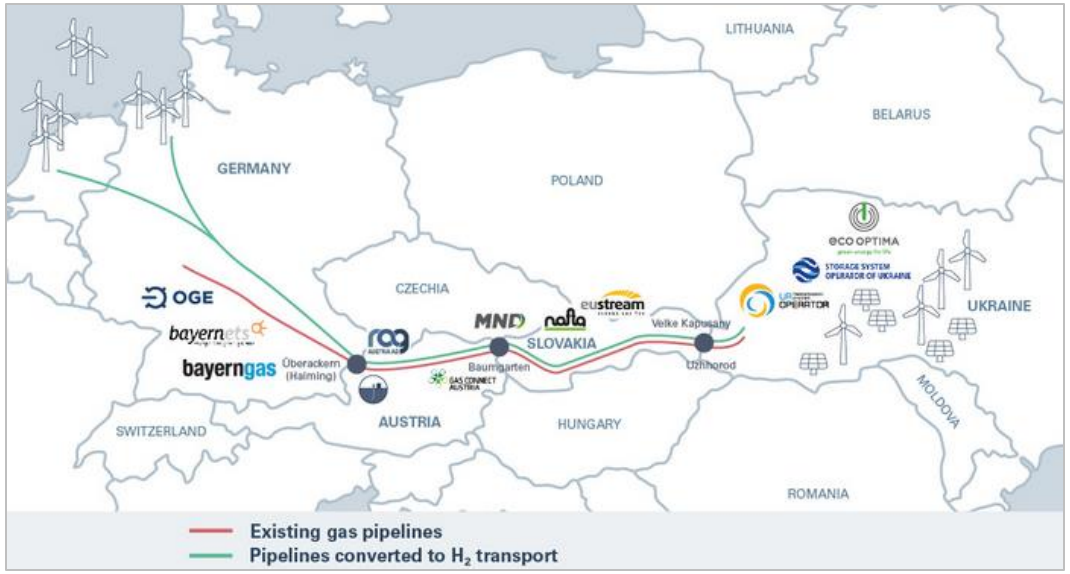
CEHC - Central European Hydrogen Corridor



SunsHyne Corridor



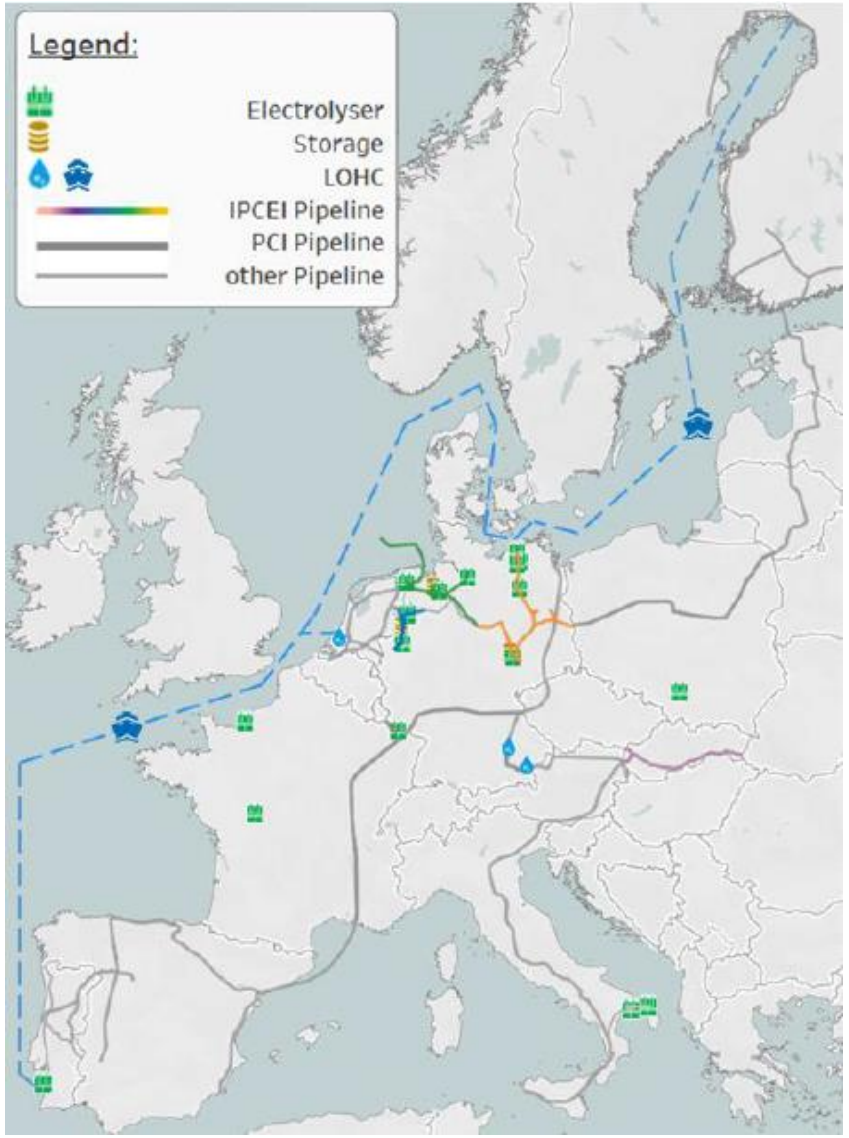
H2EU+Store



SEEHyC - South-East European Hydrogen Corridor

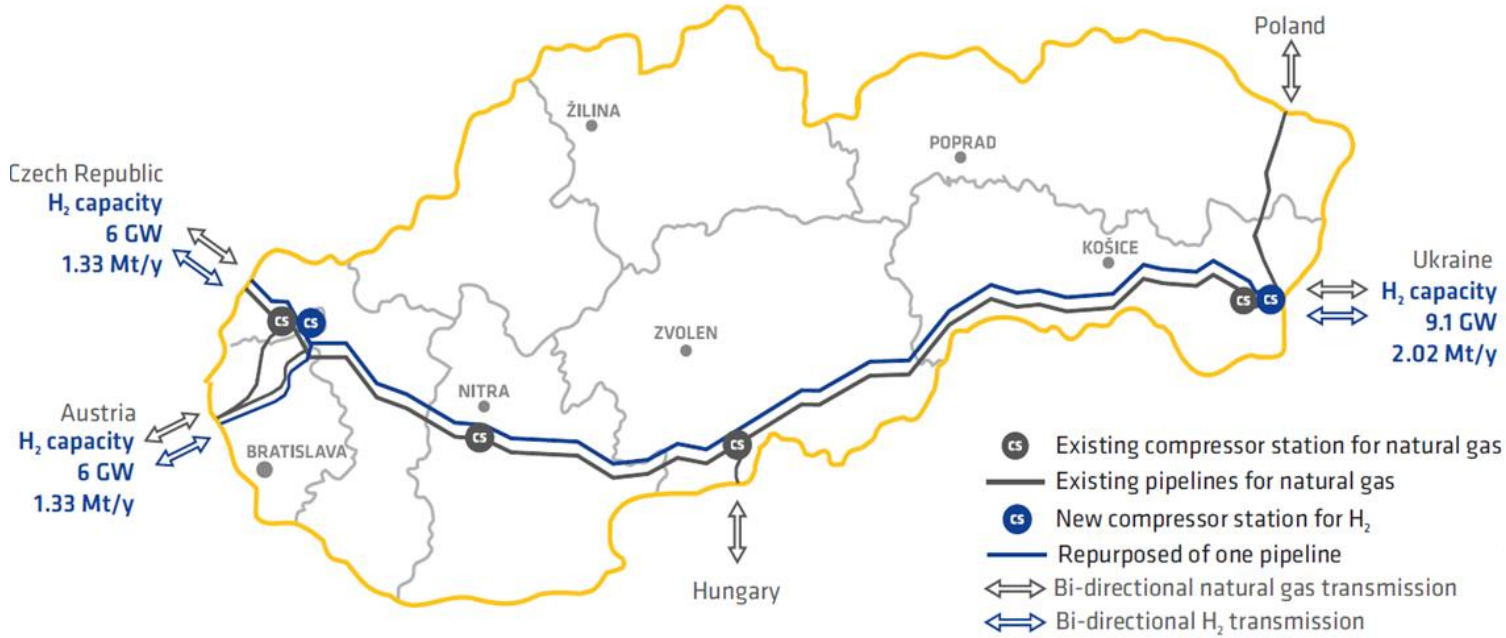
IPCEI – Important Projects of Common European Interest

- 15th February 2024, the European Commission approved the H2 Infrastructure - Transmission Repurpose (H2I-TR) project, it was assigned the IPCEI status within the 3rd wave of "Hy2Infra„.
- 33 projects from 7 EU member states: France, Germany, Italy, the Netherlands, Poland, Portugal and Slovakia.
- H2I-TR project was renamed to Slovak Hydrogen Backbone (SHB) project. The scope is identical.
- In October 2024, Eustream applied for European co-financing for the firt phase of the Slovak Hydrogen Backbone project (SHB).
- The IPCEI Hy2Infra projects include a total about around 2,700 kilometers of new and repurposed hydrogen transmission and distribution pipelines.
- Eventually by 2030, IPCEI and outside IPCEI projects will jointly contribute to a pipeline network to cover around 35% of the proposed European Hydrogen Backbone.



Projects and Clusters overview Hy2Infra

Slovak Hydrogen Backbone (SHB)

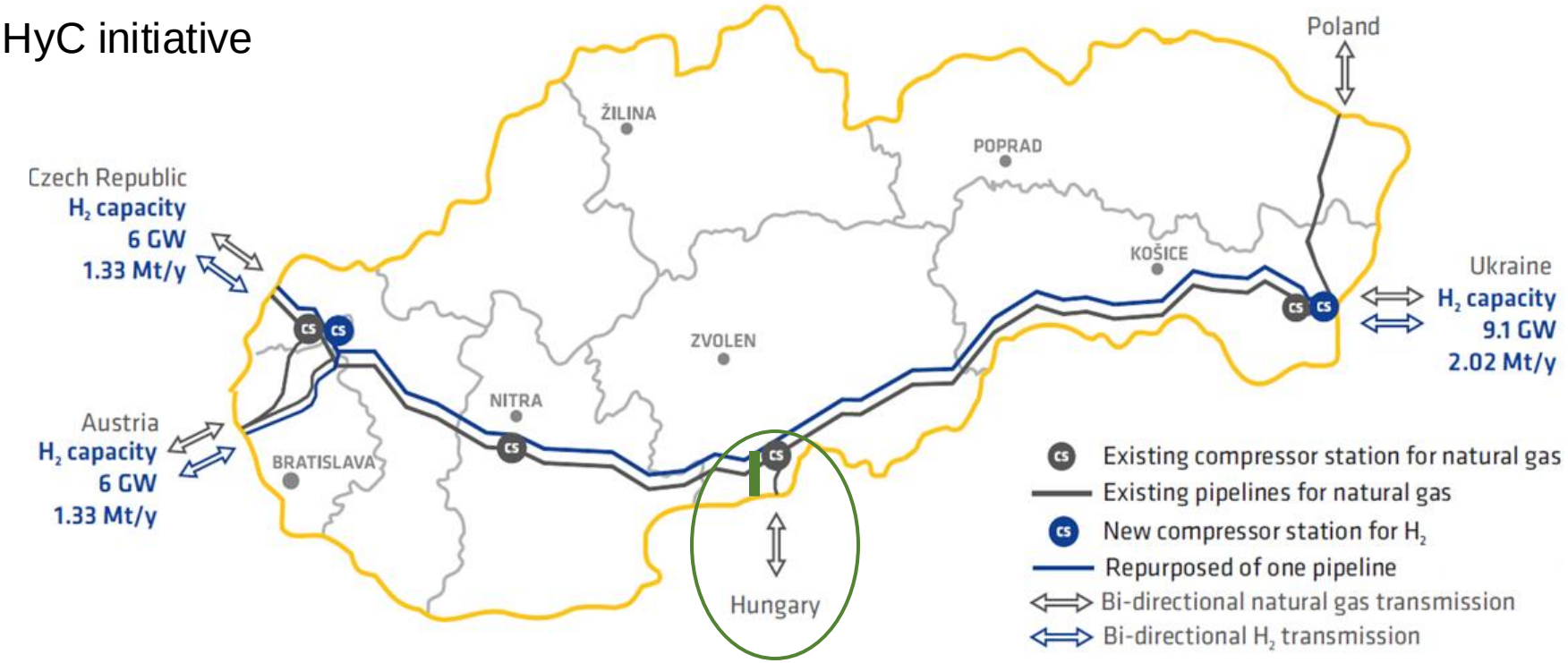


Technical parameters:

- Repurposed pipeline length: 500 km
  - Pipeline DN1200: 415 km
  - Pipeline DN 900: 85 km
- MOP: 4.7 MPag (according to ASME B31.12)
- New H2-ready Metering station at UA-SK border
- Two new H2-ready Compressor stations (60 MW each)
- Transmission capacity:
  - Ukrainian border: 9.1 GW (218.4 GWh/d, 2.02 mil. t/year)
  - Czech/Austria borders: 6.0 GW (144.0 GWh/d, 1.33 mil. t/year)
- Expected commercial operation: 2032

SK–HU H2 Corridor

- Part of SEEHyC initiative



Technical parameters:

- H2-ready interconnector between Slovakia and Hungary
- No Compressor and Metering station in Slovakian part
- New built pipeline
  - Diameter: DN 800
  - Length: 19 km
- Transmission capacity: 4.2 GW (100GWh/d)
- Expected commercial operation: 2030

Estimation of H_2 demand in Slovakia until 2050

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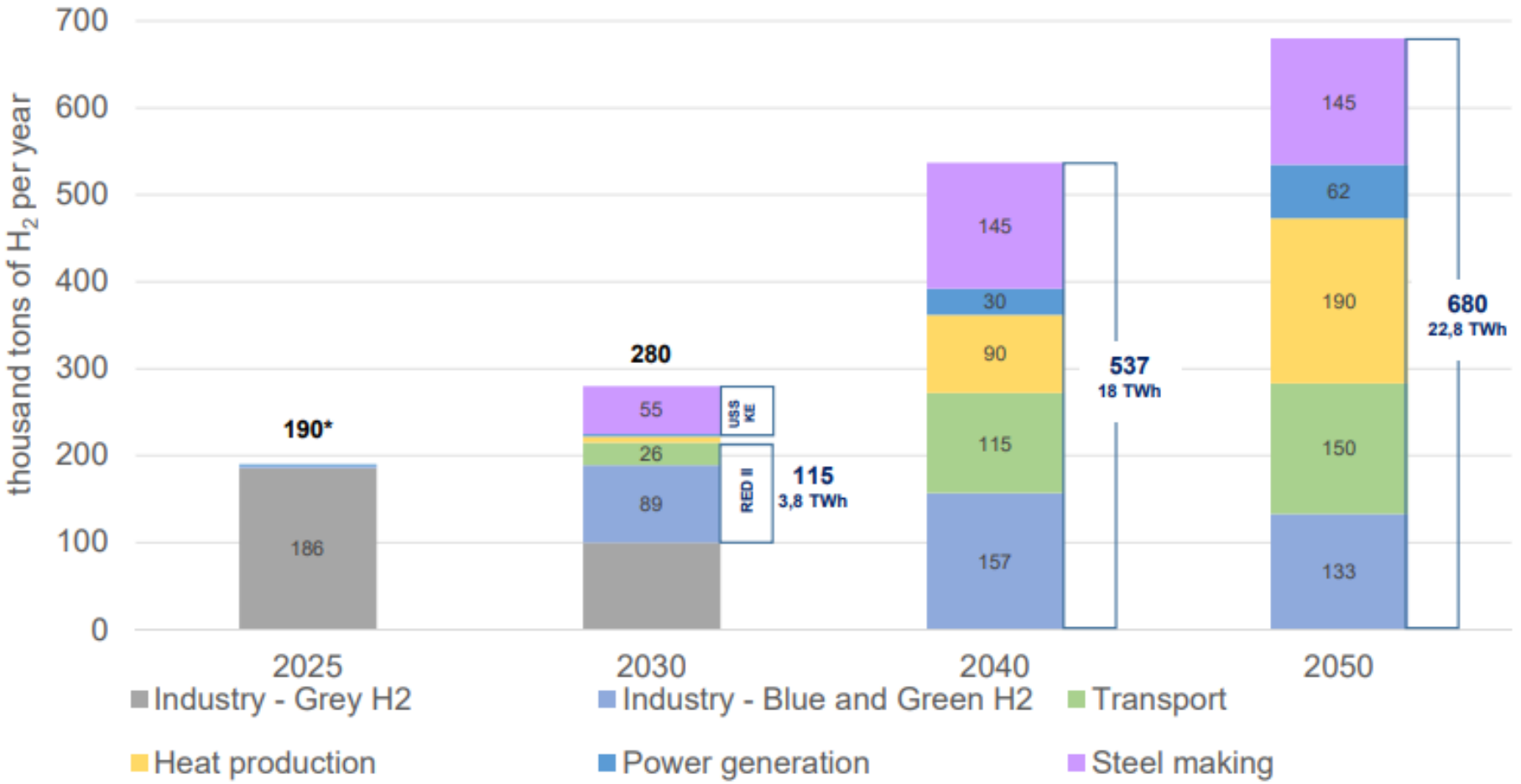
according to the RED II

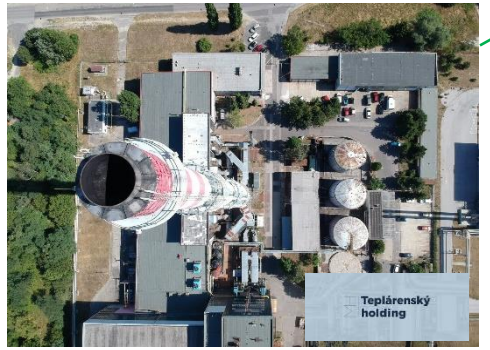


*Action plan to the H2 Strategy of Slovakia
** Source: Slovak National Hydrogen Association

Potential main end-users in Slovakia

1. Cement plants Danucem Slovensko, a.s.

2. Car factory Volkswagen Slovakia, a.s.



3. Heating plant
MH Teplárenský holding, a.s.

4. Rafinery Slovnaft, a.s.

5. Fertilizer plant Duslo, a.s.

6. Steel producer U.S. Steel Košice, s.r.o & EASTGATE H_2 Valley

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Thank you for your attention