

Gas TSO of Ukraine LLC

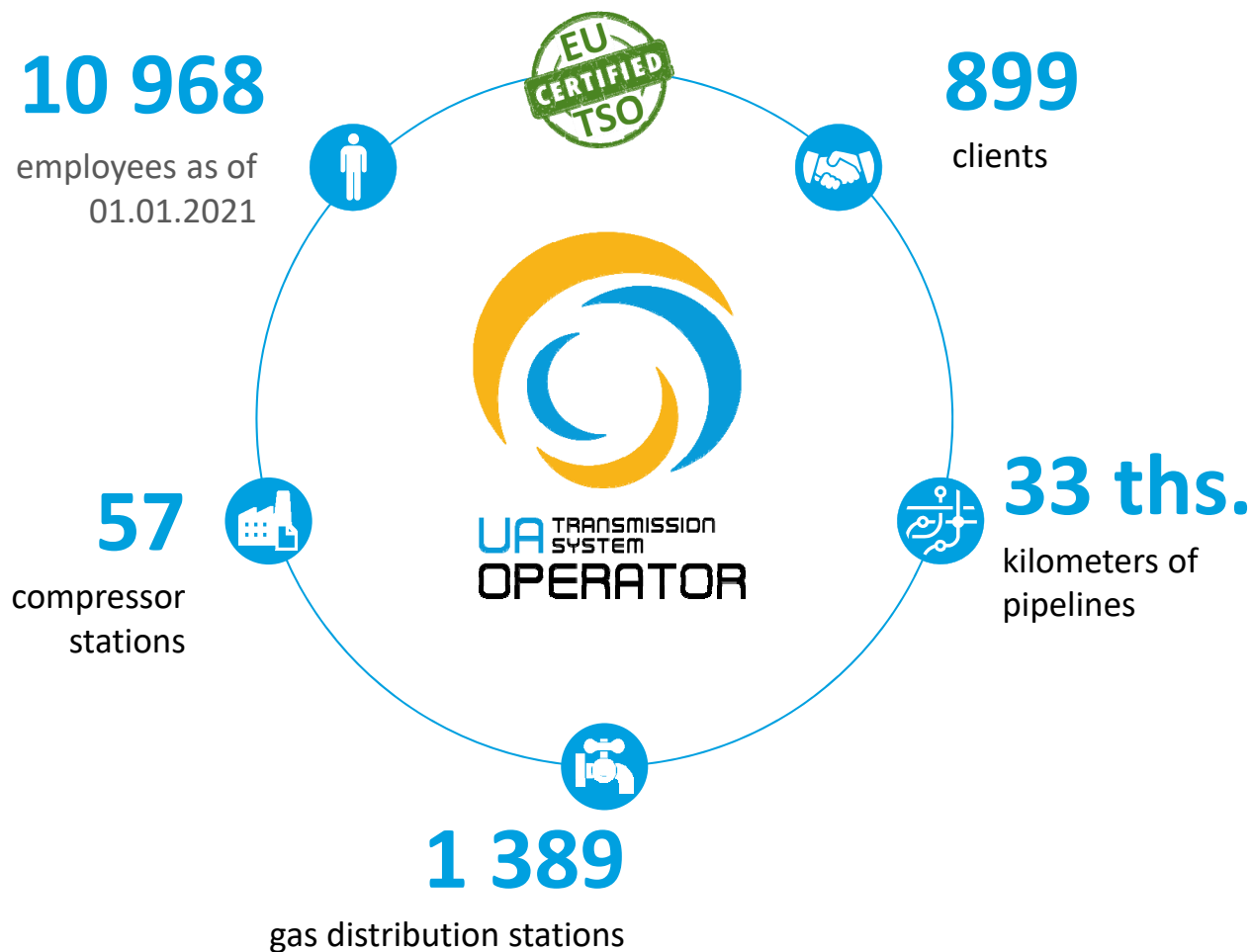
Transformation towards EU Green Deal

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22.09.2021



The new Gas TSO of Ukraine

From the 1st of January 2020



Member of Gas Infrastructure Europe



Observer at ENTSOG



Member of The European Gas Research Group



Member of Technical Association of the European Gas Industry



Member of European Clean Hydrogen Alliance



Member of Energy Association "Ukrainian hydrogen council"



Member of Bioenergy Association of Ukraine



Admission to be a part of European Hydrogen Backbone

Value for our Clients

Reliable provision of gas transmission services in a **transparent, non-discriminatory and sustainable way at fair price**

Support of development of **non-discriminatory, competitive, transparent and liquid** natural gas market aimed at ensuring **fair gas pricing for consumers** in Ukraine



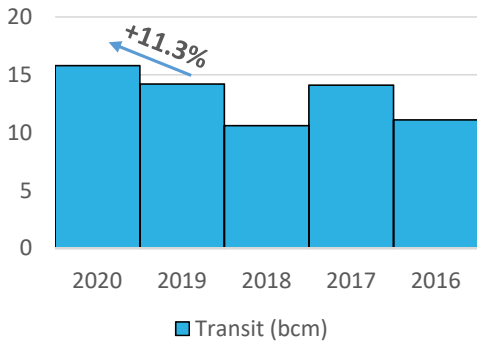
Sufficient and diversified capacity for gas transmission to Ukrainian and European consumers to ensure energy **security and uninterrupted supply in any circumstances**

Independence, fairness and transparency of the operator ensuring customer and market trust

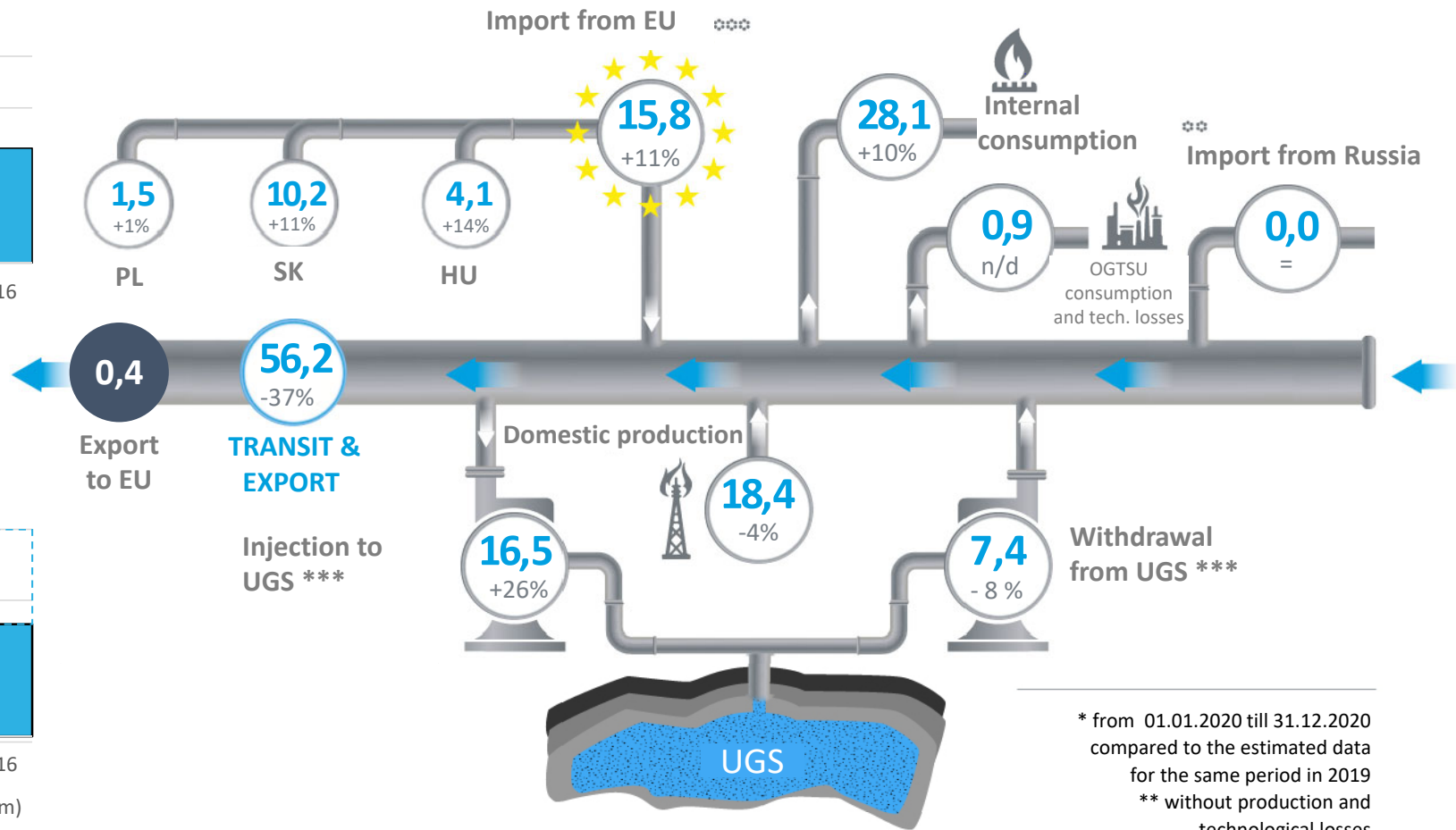
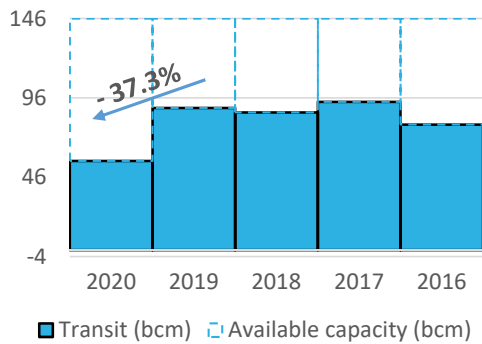
High standards and requirements to **ecology, climate and social corporate policy**

Transmission volumes via OGTSU in 2020

Historical data of import

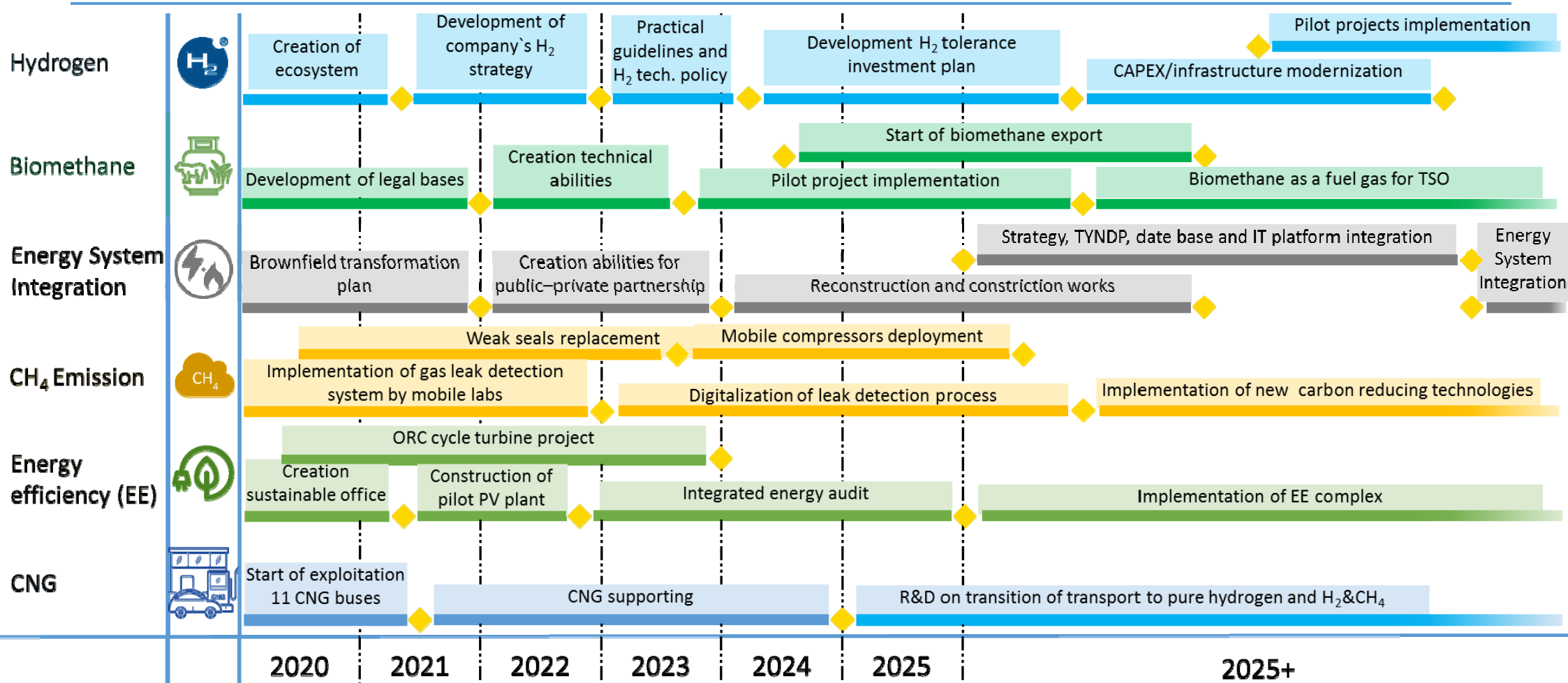


Historical data of transit







* from 01.01.2020 till 31.12.2020 compared to the estimated data for the same period in 2019
 ** without production and technological losses
 *** including virtual reverse flow

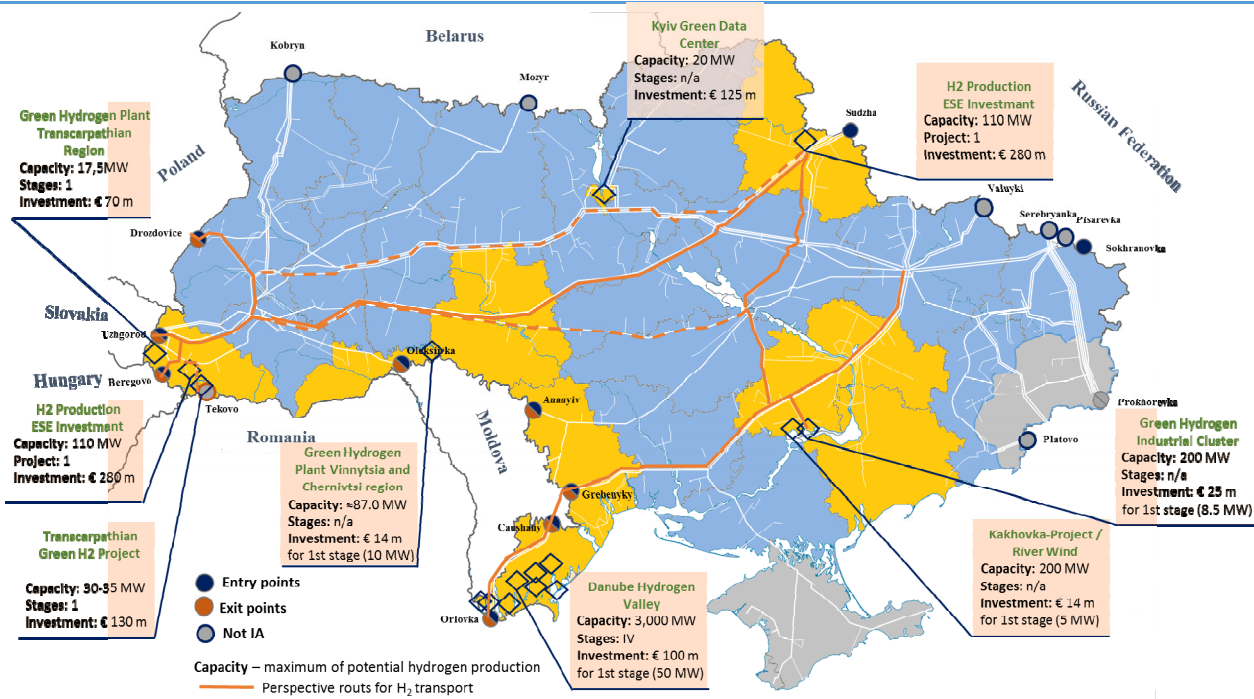
Decarbonization roadmap



UA Gas TSO Hydrogen new horizons:

Background	2020 - 2021	<ul style="list-style-type: none"> Support of development of UA High-level H2 strategy and Market Assessment; Agreement on technical assistance form the EU to H2 readiness of GTS; Roadmap, action plan and ToR developing. 	
Research & Development	2022 - 2025	<ul style="list-style-type: none"> Assessment of technical, economic and legal feasibility of the H2 readiness of existing gas transmission infrastructure; Construction of Hydrogen technology cluster; Lab testing of different types of pipes and equipment; Operation and testing of H2 technology cluster; Hydrogen investments masterplan. 	
Pilot projects	2025 - 2030	<ul style="list-style-type: none"> Integration of pilot projects to the gas grid; Consolidation of operating experience and scaling approaches; Repurposing the existing transmission pipelines/facilities to creation dedicated transmission system for hydrogen (hydrogen blend and pure); Developing renewable and low-carbon hydrogen Ukraine - EU value chain Support of Ukrainian industry transition to H2 supply projects 	
Scaling	2030 - 2035 +	<ul style="list-style-type: none"> Targeted investments in new dedicated hydrogen pipelines and compressor stations. Developing renewable and low-carbon hydrogen Ukraine - EU value chain Integration to European Hydrogen Backbone infrastructure Domestic industry hydrogen supply (ammonia, steel) Development of necessary infrastructure (fuel stations) for H2 transport 	

H2 production and transportation opportunities in Ukraine



UA Gas TSO Hydrogen agenda

H₂ Readiness

The purpose of the assessment is to determine the impact of the H₂&CH₄ mixture on the materials of pipelines, measuring possibilities of meteorological equipment, safety, other equipment and facilities, and effective operation of the UA GTS.

UA Hydrogen strategy

OGTSU joined and support developing “High Level Hydrogen Strategy for Ukraine” to contribute in achieving Ukrainian energy, ecological, economic and geopolitical goals.

H₂ Equipment Tolerance

OGTSU have started cooperation with manufacturers of gas turbines on hydrogen tolerance for example: Zorya –Mashproekt (UA) and Siemens (DE). It's planned to develop a technical policy of H₂ Tolerance

UA H₂ market environment development

OGTSU joined to the project “Assessment of Potential for a Low-Carbon Hydrogen Economy in the EBRD Region: Demand, Supply and Regulatory Analysis” to support creation H₂ supply chains and portfolio of pilot projects

Hydrogen Technology Cluster

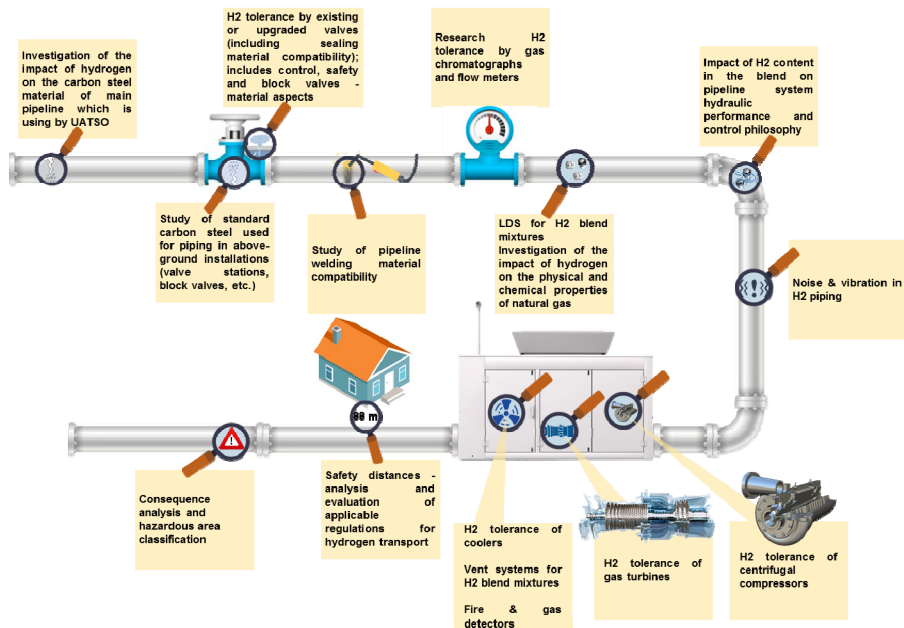
OGTSU plans to implement a pilot project for the production testing volumes of hydrogen and synthetic methane on industrial site using low carbon electricity and carbon capture.

Integration to the EU ecosystem

OGTSU became a member of the EC Clean Hydrogen Alliance, Marcogaz, GERG, GIE, UABIO, Ukrainian H₂ Council; We are in contact with European Hydrogen Backbone, neighboring TSOs and H₂ projects developers



H₂ R&D project



- Summary of the Project**

OGTSU considers in its strategy a special focus on the decarbonization of the gas transmission system's infrastructure and the economy of Ukraine as a whole. In planning its development, the company pays additional attention to the technological, regulatory, and economic aspects of implementing innovative solutions to ensure clean development according to the EU "Green Course" and the transition to the transportation of renewable gases by main pipelines, especially hydrogen. To this end, the gas OGTSU plans to implement a research program with the involvement of leading institutions of Ukraine and the EU in the following areas in 2021-2022. This R&D will provide a systematic approach to determining the potential of the GTS of Ukraine's existing infrastructure for the transportation of a mixture of natural gas and hydrogen.

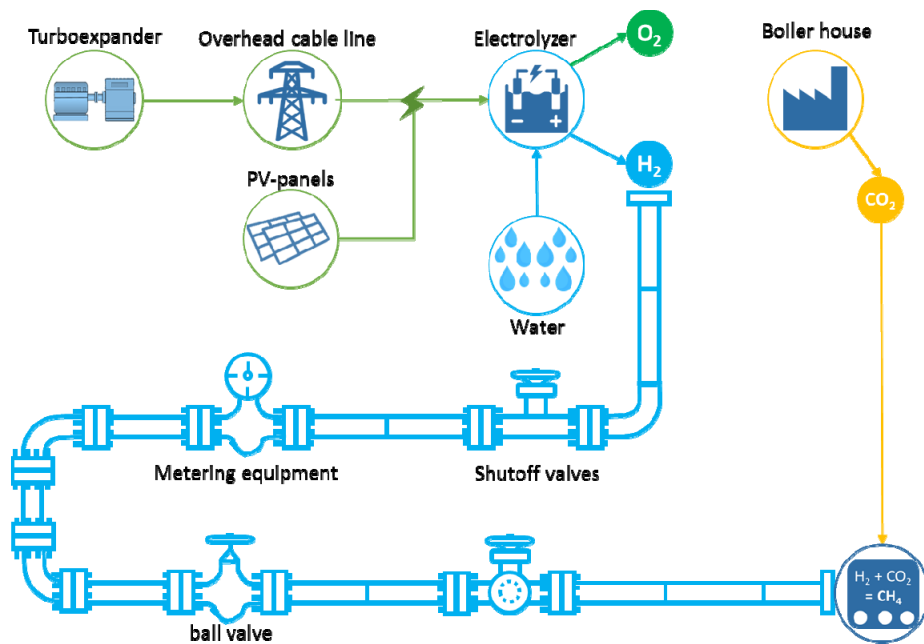
The purpose of the R&D is to determine the impact of a mixture of natural gas with hydrogen on the materials of main gas pipelines and equipment of the gas transmission system, measuring possibilities of meteorological equipment, safety, and effective operation of the UA GTS and one equipment and facilities.
- Implementation period**

2021-2022
- Current status**

Pre-feasibility study
- Which partners we need**

Technical partners, which have experience in implementation of similar projects.
 Research organization
 International financial institutions to sponsorship the project.

Pilot project – Hydrogen technologies cluster



• Summary of the Project

Gas TSO of Ukraine LLC plans to implement a pilot project for the production of testing volumes of hydrogen and synthetic methane on industrial site using electricity obtained on the installed at gas distribution station "GRS-7 Dnipro" existed turboexpander and rooftop PV power station. Volume of CO₂ need for this project for SynCH₄ production will be obtained by capturing emissions from the boiler house, which is located on this industrial site. The option of capturing CO₂ from the air is also being considered.

Hydrogen tech cluster creates opportunity for testing different types of pipes, valves, seals, measuring equipment for compatibility with hydrogen (marked blue at the chart).

Brownfield transformation project involves installation of the Electrolyzer and Methanation unit and CO₂ capture unit, construction of additional pipeline system and new water treatment system, reconstruction of electricity supply system on existing industrial site at city Dnipro.

The project will lay the foundations for attracting modern clean technologies to Ukraine, GAS TSO infrastructure retrofitting, acquiring new skills and knowledges, stuff retraining.

• Implementation period

2021-2024

• Current status

Pre-feasibility study

Currently OGTSU together with company **KHIMOD (French green tech company)** developed a technical model of the project .

Unlocking potential of biomethan in Ukraine



- Biomethane together with hydrogen is one of the two main types of renewable gaseous fuel.
- At the beginning of 2021, there are 53 plants in Ukraine that produce energy from biogas and operate at a "green" tariff. The total electric capacity of these plants is 103.4 MW.
- The potential for biomethane production in Ukraine is 7.8 billion cubic meters. meters per year, according to industry associations.
- The total gross production of biogas in 2019 is estimated at about 100 million nm³ / year, and only 34% of the energy potential of this biogas is converted into useful electricity (156 GWh) and heat (128 TJ).
- The draft Law of Ukraine "On Amendments to the Law of Ukraine" On Alternative Fuels "for the Development of Biomethane Production" was registered and approved in first readings, which should create the fundamental principles of the biomethane market.

Thank you for attention!

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