Gas TSO of Ukraine LLC
Transformation towards EU Green Deal

Pawel Stanczak
22.09.2021
The new Gas TSO of Ukraine

From the 1st of January 2020

- 10,968 employees as of 01.01.2021
- 899 clients
- 57 compressor stations
- 33,000 kilometers of pipelines
- 1,389 gas distribution stations

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

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

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

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**

<table>
<thead>
<tr>
<th>Year</th>
<th>Transit (bcm)</th>
<th>+11.3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Import from EU**

- **PL**: 1.5 bcm (+1%)
- **SK**: 10.2 bcm (+11%)
- **HU**: 4.1 bcm (+14%)
- **Total**: 15.8 bcm (+11%)

**Import from Russia**

- **Total**: 28.1 bcm (+10%)
- **OGTSU consumption and tech. losses**: 0.9 n/d
- **Withdrawal from UGS**: 0.0 =

**Export to EU**

- **Total**: 0.4 bcm

**Transit & EXPORT**

- **Injection to UGS**: 16.5 bcm (+26%)
- **Domestic production**: 18.4 bcm (-4%)
- **Withdrawal from UGS**: 7.4 bcm (-8%)

**Note:**

* 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

Hydrogen

- Creation of ecosystem
- Development of company’s H₂ strategy
- Practical guidelines and H₂ tech. policy
- Development H₂ tolerance investment plan
- CAPEX/infrastructure modernization
- Pilot projects implementation

Biomethane

- Development of legal bases
- Creation technical abilities
- Start of biomethane export
- Pilot project implementation
- Biomethane as a fuel gas for TSO

Energy System Integration

- Brownfield transformation plan
- Creation abilities for public-private partnership
- Reconstruction and construction works
- Strategy, TYNDP, date base and IT platform integration
- Energy System Integration

CH₄ Emission

- Implementation of gas leak detection system by mobile labs
- Digitalization of leak detection process
- Implementation of new carbon reducing technologies

Energy efficiency (EE)

- ORC cycle turbine project
- Creation sustainable office
- Construction of pilot PV plant
- Integrated energy audit
- Implementation of EE complex

CNG

- Start of exploitation 11 CNG buses
- CNG supporting
- R&D on transition of transport to pure hydrogen and H₂&CH₄

Year: 2020 2021 2022 2023 2024 2025 2025+
### UA Gas TSO Hydrogen new horizons:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Background</strong></td>
<td>2020 - 2021</td>
<td>• Support of development of UA High-level H2 strategy and Market Assessment;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Agreement on technical assistance form the EU to H2 readiness of GTS;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Roadmap, action plan and ToR developing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assessment of technical, economic and legal feasibility of the H2 readiness of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>existing gas transmission infrastructure;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Construction of Hydrogen technology cluster;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lab testing of different types of pipes and equipment;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Operation and testing of H2 technology cluster;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hydrogen investments masterplan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integration of pilot projects to the gas grid;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consolidation of operating experience and scaling approaches;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repurposing the existing transmission pipelines/facilities to creation dedicated transmission system for hydrogen (hydrogen blend and pure);</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Developing renewable and low-carbon hydrogen Ukraine - EU value chain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Support of Ukrainian industry transition to H2 supply projects</td>
</tr>
<tr>
<td><strong>Pilot projects</strong></td>
<td>2025 - 2030</td>
<td>• Targeted investments in new dedicated hydrogen pipelines and compressor stations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Developing renewable and low-carbon hydrogen Ukraine - EU value chain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integration to European Hydrogen Backbone infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Domestic industry hydrogen supply (ammonia, steel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Development of necessary infrastructure (fuel stations) for H2 transport</td>
</tr>
<tr>
<td><strong>Scaling</strong></td>
<td>2030 - 2035</td>
<td></td>
</tr>
</tbody>
</table>

![Graphical representation](image)
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.

**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.

**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.

**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.

**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.

**Integration to the EU ecosystem**
OGTSU became a member of the EC Clean Hydrogen Alliance, Marogas, GERG, GIE, UABIO, Ukrainian H₂ Council; We are in contact with European Hydrogen Backbone, neighboring TSOs and H₂ projects developers.
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 CO\textsubscript{2} need for this project for SynCH\textsubscript{4} production will be obtained by capturing emissions from the boiler house, which is located on this industrial site. The option of capturing CO\textsubscript{2} 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 CO\textsubscript{2} 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 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!