European Hydrogen Backbone

Press Release – 5 April 2022

European Hydrogen Backbone grows to meet REPowerEU's 2030 hydrogen targets and develops 28,000 km in 2030 and 53,000 km in 2040, now covering 28 European countries

- Accelerated EHB network vision by 2030 in response to European Commission's REPowerEU communication and call to greater action on climate protection and European energy system resilience.
- European Hydrogen Backbone (EHB) network grows by more than 110% since initial launch one and a half years ago expanded members present vision for approximately 53,000 km hydrogen pipeline infrastructure in 28 European countries by 2040.
- The Backbone is expected to be made up of ~60%-40% repurposed natural gas versus new pipelines in 2040.
- Digital, interactive vision maps published as part of new EHB website later in April

Today, the European Hydrogen Backbone (EHB) initiative presents a promising solution to accelerate hydrogen adoption for greater energy security and meet renewable targets

In the wake of the Russian invasion of Ukraine, the onus is on European countries to achieve greater energy independence. This has led to a greater push to accelerate and scale up the adoption of decarbonised energy sources as highlighted in the REPowerEU statement, a plan to phase out Europe's dependence on fossil fuels from Russia well before 2030 and to increase the resilience of the EU-wide energy system. Amongst other measures, REPowerEU introduces an update of its vision for a dedicated hydrogen transport ambition to reach an additional 15 million tonnes (Mt) of renewable hydrogen on top of the 5.6 Mt foreseen under Fit for 55, going beyond the targets of the EU's hydrogen strategy.¹ Achieving these targets will require a rapid acceleration of the development of an integrated gas and hydrogen infrastructure across Europe. In light of these events, the EHB has accelerated its programme from 2035 to 2030 with the aim to meet the REPowerEU targets. The group proposes a hydrogen network of ~53,000 km by 2040, with further growth expected after 2040. The network, reflecting the vision of [31] European energy, hydrogen storage facilities, and port infrastructure operators,² covers 28 European countries and creates a diverse set of hydrogen import opportunities. The vision launched today follows the EHB reports published in July 2020 and April 2021, which sparked an uptick in interest across

² Note: since the announcement of the EHB initiative's work programme in January 2022, 2 additional TSOs, Transgaz Romania and FluxSwiss (Switzerland) have joined the initiative.



¹ European Commission (2022) – REPowerEU : Joint European Action for more affordable, secure, and sustainable energy (COM(2022) 109 final). Source: <u>https://energy.ec.europa.eu/repowereu-joint-european-action-more-affordable-secure-and-sustainable-energy en</u>

Europe. Since the initial launch one and a half years ago, the EHB's 2040 vision network has expanded to 18 new countries and has grown by 110%.

Accelerated vision to meet climate ambitions and increase European energy system resilience

In view of tighter national and European climate ambitions and following quotes from the EC's REPowerEU communication to accelerate hydrogen, that can replace 25-50 bcm per year of imported Russian gas by 2030 and political developments have pushed EHB to accelerate its work programme, bringing the 2035 scenarios to 2030. The updated hydrogen infrastructure network maps presented today build on the EHB initiative's prior body of work. The accelerated EHB vision shows that **by 2030**, **five pan-European hydrogen supply and import corridors** with almost 28,000 km of initial pipelines **could emerge**, connecting industrial clusters, ports, and hydrogen valleys to regions of abundant demand – and laying the foundation for future large-scale hydrogen supply. The EHB's vision is an adequate vehicle through which the EC's 2030 **ambition to promote development of a 20.6 Mt renewable and low-carbon European hydrogen market** could be realised.

Cost-effective onshore and offshore pipeline transport of hydrogen

The ~53,000 km envisaged backbone **by 2040** requires an estimated total investment of €80-143 billion based on using ~60% of repurposed natural gas pipelines and ~40% new pipeline stretches, including subsea pipelines. This investment cost estimate, which is relatively limited in the context of overall investments needed in the European energy transition, includes subsea pipelines and interconnectors linking continental demand centres to offshore energy production hubs. Transporting hydrogen over 1,000 km along the proposed onshore backbone would **on average cost €0.11-0.21 per kg of hydrogen**, **making the EHB the most cost-effective option** for large-scale, long-distance hydrogen transport. In case hydrogen is transported exclusively via subsea pipelines, the cost would be €0.17-0.32 per kg of hydrogen per 1,000 km transported.

Stable regulatory framework required

The hydrogen infrastructure maps for 2030 and 2040 published today reflect the vision of 31 European gas TSOs, based on their analysis of how infrastructure could evolve to meet decarbonisation targets. It is important to stress that the hydrogen transport routes and timelines in the maps are not set in stone. The final backbone design and timeline depend on market conditions for hydrogen and natural gas and the creation of a stable regulatory framework.

"With EHB, the participating infrastructure companies took a European perspective for upscaling hydrogen from the start. Going beyond just regional clusters and anticipating a Europe-wide hydrogen transportation infrastructure based on the existing gas infrastructure early on creates confidence for future market participants, access to various competitive supply sources and security of demand for project developers. The current geopolitical situation underlines how valuable Europe's gas infrastructure is. It is a real asset in the transformation" says Daniel Muthmann, Chairman of the EHB initiative.

An open initiative

The EHB aims to accelerate Europe's decarbonisation journey by defining the critical role of hydrogen



infrastructure – based on existing and new pipelines – in enabling the development of a competitive, liquid, pan-European renewable and low-carbon hydrogen market. By 2040 this could include a majority 60% repurposed pipelines and 40% new. **The initiative seeks to foster market competition, security of supply, and cross-border collaboration** between European countries and their neighbours.

The EHB initiative is looking forward to continuing to discuss its vision with stakeholders including policy makers, companies, and initiatives along the hydrogen value chain. An up-to-date and interactive version of the latest vision maps will be published alongside the EHB's flagship website later in April.

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AB Amber Grid (Lithuania) is the operator of Lithuania's natural gas transmission system and is in charge of transmission of natural gas (transportation of natural gas through high pressure pipelines) to system users, and operation, maintenance and development of natural gas transmission system. Amber Grid started its operations on 1 August 2013, when the fixed-term natural gas transmission licence (issued to AB Amber Grid by the National Control Commission for Prices and Energy) came into effect. On 10 April 2015, Amber Grid was issued with an open-ended gas transmission business license and was designated as the Transmission System Operator. For more information, visit: https://www.ambergrid.lt/en/.

Bulgartransgaz (Bulgaria) is a combined operator performing licensed activities of natural gas transmission and storage. The company operates 3 276 km high pressure gas pipelines and Chiren Underground Gas Storage facility. The company's gas transmission system has interconnections with all neighboring countries – Greece, North Macedonia, Romania, Serbia and Turkey. Bulgartransgaz is continuously developing its infrastructure both for transmission and storage. The ongoing projects for expansion of Chiren UGS, raising cross-border transmission capacities and developing the national transmission network are of utmost importance for the realisation of the Balkan Gas Hub concept. In line with the European and National goals for decarbonization and climate neutrality, Bulgartransgaz is currently developing several projects in the field of hydrogen. For more information, visit: https://bulgartransgaz.bg/en

Conexus Baltic Grid (Latvia) is a unified natural gas transmission and storage system operator in Latvia. Company manages one of the most modern natural gas storage facilities in the Europe – Inčukalns underground gas storage, which is an important strategic object in the whole region.

Creos (Luxembourg) owns and operates electricity (high, medium and low voltage) and natural gas (high, medium and low pressure) networks in Luxembourg. Its mission is to viably ensure energy transportation and distribution via electricity and natural gas grids at transparent rates in the Grand Duchy of Luxembourg. This role is executed equally with respect to all suppliers and by respecting the company's public service and environment protection obligations. Aside from developing and operating its infrastructure, Creos is also committed to bringing markets closer together through more intensive cooperation at the regional level.

Elering (Estonia) is an autonomous and independent integrated electricity and gas system operator whose primary task is to ensure the security of supply of energy to Estonian consumers. For this purpose, the company manages, administers and develops domestic and cross-border energy infrastructure. With its activities, Elering ensures the conditions for the functioning of the energy market and for the development of the economy.

Enagás (**Spain**) is a European Transmission System Operator with 50 years' experience in the development, operation and maintenance of energy infrastructures, operating in eight countries. The company has more than 12,000 kilometres of gas pipelines, three strategic storage facilities and nine regasification terminals. In Spain, it is the main natural gas transporter and the Technical Manager of the Gas System. The company has committed to be carbon neutral by 2040 and to developing projects promoting renewable gases – hydrogen and biomethane – sustainable mobility and energy efficiency, among other areas. For more information, go to <u>www.enagas.es</u>

Energinet (**Denmark**) was founded in 2004 as an independent public enterprise owned by the Danish Ministry of Climate, Energy and Utilities. Energinet owns, operate and develop the transmission systems for both electricity and natural gas in Denmark. Energinet's aim is to enable a cost-effective transition of the energy system to 100 % renewable energy while maintaining the high level of security of supply. For more information, go to <u>www.energinet.dk</u>

Eustream (Slovakia) EUSTREAM's transmission system in Slovakia represents an important east-west



and north-south energy connection. A robust system of 4 to 5 parallel pipelines is connected to the primary transmission routes in Ukraine, Hungary, Austria and Czech Republic (a new gas interconnector with Poland will be commissioned soon).

Today, Slovakia is mainly a transit country for natural gas. In the future, a similar role is foreseen for large amounts of green hydrogen. EUSTREAM's system lies between the anticipated hydrogen productions centers in the CEE, including Ukraine, and the consumption in Germany and other Western European countries. Its unique geographical position and developed infrastructure makes it well positioned to become an important hydrogen entry gate for European markets

FGSZ Ltd. (Hungary) is the owner and operator of the Hungarian high-pressure natural gas pipeline system servicing gas distribution companies, power plants and large industrial consumers. The company operates interconnectors with Austria, Slovakia, Ukraine, Romania, Serbia and Croatia, while planning to extend its network towards Slovenia as well. The company is committed to further enhancing its regional connections as well as the security of supply of the Hungarian national gas market, while also investigating the use of hydrogen in natural gas pipelines and reducing its GHG emissions, in line with our currently updated strategic vision. For more information, visit https://fgsz.hu/

FluxSwiss (Switzerland), based in Lugano, is a transmission system operator in the Swiss Transitgas pipeline system, marketing approximately 90% of the technical pipeline capacity for border-to-border gas flows, between Germany, France and Italy. We combine our expertise with close customer interaction to provide high-level services for their supplies into Italy or Northwest Europe. As a Fluxys group company it is our mission to contribute to a sustainable energy future and our passionate teams secure reliable and affordable energy flows into the market.

Fluxys (Belgium) is a Euronext listed subsidiary of gas infrastructure group Fluxys headquartered in Belgium. With 900 employees the company operates 4,000 kilometres of pipeline, a liquefied natural gas terminal totalling a yearly regasification capacity of 9 billion cubic meters and an underground storage facility. As a purpose-led company Fluxys Belgium together with its stakeholders contributes to a better society by shaping a bright energy future. Building on the unique assets of gas infrastructure and its commercial and technical expertise, Fluxys Belgium is committed to transport hydrogen, biomethane or any other carbon-neutral energy carrier as well as carbon dioxide and to accommodate the capture, usage and storage of the latter.

Gas Connect Austria GmbH (Austria) is a natural gas transmission system and distribution system operator, based in Vienna. With 280 employees, Gas Connect Austria operates a modern and powerful high-pressure network centred on the Baumgarten hub, with connections to Germany, Hungary, Slovakia and Slovenia, as well as to storage and production facilities. As a logistics services provider with a strong customer focus, the company is constantly developing its products and services in line with market requirements. Gas Connect Austria is intensively engaged with the issues of the energy transition at national and European level and is actively working on solutions for decarbonising the grids.

Gasgrid Finland Oy (Finland) is a Finnish state-owned company and transmission system operator with system responsibility. We offer our customers safe, reliable and cost-efficient transmission of gases. We actively develop our transmission platform, services and the gas market in a customer-oriented manner to promote the carbon-neutral energy and raw material system of the future. Find out more: <u>www.gasgrid.fi/</u>

Gassco (Norway) is the independent system operator (ISO) for the integrated system for transporting gas from the Norwegian continental shelf to other European countries. This gas transport system consists of 9000 km of subsea pipelines, 3 gas processing plants in Norway, offshore platforms and receiving terminals in the UK, France, Belgium and Germany. Gassco's operatorship confers overall responsibility for running the infrastructure on behalf of the owners to ensure safe and efficiently gas transport to millions of people. Gassco is also the architect for developing new gas infrastructure on the Norwegian continental shelf.



Gas Networks Ireland (Ireland) operates and maintains Ireland's €2.7bn, 14,500km national gas network. The modern network powers 30% of Ireland's primary energy needs, 40% of the country's heating and 50% of the nation's electricity – more than 85% at peak times. A vital national energy asset, over 705,000 Irish homes and businesses rely on the gas network to provide safe, reliable and affordable energy to meet their heating, cooking, transport and power needs, while the whole country relies on its flexibility and responsiveness to meet electricity demand. By gradually replacing natural gas with renewable, carbon neutral and ultimately zero carbon gases, such as biomethane and hydrogen, Gas Network Ireland is on a journey to delivering a net-zero carbon gas network.

Gasunie (**The Netherlands**) is a European energy infrastructure company. The company provides the transport of natural gas and green gas via its subsidiaries Gasunie Transport Services B.V. (GTS) in the Netherlands and Gasunie Deutschland in Germany. The company also offers other services in the energy infrastructure field, including hydrogen, heat, CCS, gas storage and LNG. Gasunie commits itself to accelerating the energy transition and to the realisation of a climate neutral energy supply. For more information, go to <u>www.gasunie.nl</u>.

GAZ-SYSTEM (**Poland**) is a key player in the natural gas market in Poland as a company of strategic importance to the national economy and energy security. The Company is responsible, inter alia, for the management of the transmission network (11 056 km long) and for the transport of natural gas throughout the country (18.1 bcm without UGS in 2020) together with the LNG terminal in Swinoujscie in order to supply the fuel to distribution networks and to final customers. For more information, please visit the website https://en.gaz-system.pl

GRTgaz (**France**) is the gas transmission system operator which owns and operates more than 35,000 km of buried pipes and 26 compression stations. GRTgaz is committed to ensuring security of supply to consumers, connecting territories and communities with great care for the environment. GRTgaz delivers innovative and accessible solutions to accelerate and secure a successful energy transition by connecting the energies of tomorrow, driving the growth of renewables and new uses for gas while fostering synergy between electricity and gas systems. For more information, go to <u>www.grtgaz.com</u>

Hellenic Gas Transmission System Operator (DESFA) S.A. (Greece) is responsible for the operation, management, use and development of the Hellenic National Natural Gas System. Being a reliable partner in the framework of the ongoing international energy projects in Southeastern Europe and beyond, DESFA is committed to support the fulfilment of the European energy and climate objectives, contributing to the implementation of the Greek National Energy & Climate Plan and the Greek Hydrogen Strategy, accelerating its energy transition towards a decarbonized economy. For additional information, please visit www.desfa.gr

National Grid Gas Transmission (United Kingdom) and operates the gas National Transmission System in Great Britain, with day-to-day responsibility for balancing supply and demand. Our network comprises approximately 7,630 kilometres of high-pressure pipe, 23 compressor stations and 618 above-ground installations. Today, natural gas keeps 85 per cent of the UK's 28 million homes warm and comfortable, generates electricity and fuels industrial and manufacturing processes. We aim to serve customers well and efficiently, supporting the communities in which we operate and making possible the energy systems of the future. For more information, please visit https://www.nationalgrid.com/uk/gas-transmission/.

NET4GAS, s.r.o. (Czech Republic) is the gas transmission system operator in the Czech Republic. Through its network of almost 4,000 km of pipelines, NET4GAS transports more than 50 billion m³ of m³ of natural gas per year. As a Central European gas transmission system operator, NET4GAS plays an active role in connecting and integrating European energy markets to the benefit of Czech and other European customers. At the same time, the company participates in shaping the European energy market in the context of the transition to a low carbon economy. For more information, visit www.net4gas.cz/en.



Nordion Energi (Sweden), is specialized in gas infrastructure with the aim to drive the energy transition and becoming the first gas grid in Europe with 100% green gas. We operate the gas grid in Sweden, which extends from Dragör in Denmark to Stenungsund in Sweden and transports energy to distributors and customers with direct links. The gas grid supplies 33 municipal areas and several combined heat and power plants and is also used in more than 34,000 households and in the transport sector. For more information, go to <u>www.swedegas.com</u>

OGE (**Germany**), headquartered in Essen, operates the largest German gas transmission system spanning 12,000 kilometres. Two thirds of natural gas consumed in Germany flow through OGE's pipeline system, comprising about 100 compressor units and about 1100 exit points. With its OGE 2030+ strategy implemented in 2018 the company defined a new purpose, namely, to enable energy supply today and in the future energy mix. While dedicated to providing efficient and reliable transport services for natural gas, the main focus in business development today is to become a leading provider of infrastructure in a decarbonised energy system in Germany and Europe, re-purposing natural gas infrastructure for transporting pure hydrogen, securing international import routes for hydrogen and investigating the transport of CO2 are key areas of activity today. For more information, go to <u>www.oge.net/en</u>.

ONTRAS Gastransport GmbH (Germany) is a national gas transmission system operator in the European gas transport system based in Leipzig. ONTRAS operates Germany's second-largest gas transmission system, with approximately 7,700 km of pipelines and about 450 interconnection points. ONTRAS links the interests of transport customers, traders, regional network operators and producers of renewable and decarbonised gases. Since 2013, theyhave been transporting green hydrogen from two power-to-gas plants, as an admixture in their network. In the Bad Lauchstädt Energy Park real laboratory, they will be converting 20 kilometers of natural gas pipeline to pure hydrogen by 2024. And with their three IPCEI projects, they are driving forward the development of a hydrogen economy in Eastern Germany.

Plinacro (**Croatia**) is a natural gas transmission system operator in Croatia. By performing gas transmission as its main activity, Plinacro guarantees safe, reliable and high-quality supply of natural gas from the entry point into the gas transmission system to off-take measuring-reduction stations of gas distributers and direct and eligible customers. Plinacro is in charge of supervision, maintenance, development and construction of the entire gas transmission system, and of other activities necessary for the technical functioning of the system. Today Plinacro operates 2549 km of high-pressure gas pipelines, 1579 km of which is 50-bar, 952 km is 75-bar system and 18 km is 100-bar system, 6 entry measuring stations, 1 entry-exit measuring station at the connection with the Okoli underground gas storage, 1 entry measuring station from LNG terminal, 156 exit measuring reduction stations and a state-of-the-art National Dispatching Centre, a centre of remote supervision and managing the entire gas transmission system. For more information, visit: <u>https://www.plinacro.hr/</u>.

Plinovodi d.o.o. (**Slovenia**) is the gas transmission system operator in Slovenia. The main operational goal and activity of the company is provision of long-term, reliable, high quality, price competitive and environmentally acceptable transmission of gas. The gas transmission system consists of almost 1,2 thousand km of pipelines. It connects most of the large industry and urban centres with distribution systems in Slovenia. By constantly developing the system and introducing sustainable solutions and technologies, company Plinovodi d.o.o. enables users to access different sources of gas through various transmission routes. For more information, goto <u>http://www.plinovodi.si/en/</u>

REN (**Portugal**) SGPS comprehends a group of companies holding the energy concessions in Portugal including REN Eletrica, the Portuguese Electricity TSO, REN Gasodutos, the Portuguese Gas TSO, also in charge of the renewable and low carbon gases, REN Armazenagem, the SSO for the Carriço UGS (salt caverns), REN Atlantico, operating the LNG Terminal at Sines and REN Portgas, the DSO operating a gas distribution concession in the north of Portugal. Main Facts & Figures about REN available at



https://www.ren.pt/en-GB/quem_somos/facts_and_figures

Snam (Italy) is one of the world's leading energy infrastructure operators and ranks among Italy's largest listed companies, by market capitalization. Through its international footprint, Snam operates in Albania (AGSCo), Austria (TAG, GCA), France (Teréga), Greece (DESFA), Italy, UAE (ADNOC Gas Pipelines) and UK (Interconnector UK) and has started activities in China and India. Snam is also one of the leading shareholders in TAP (Trans Adriatic Pipeline). The Group has the largest natural gas transportation network (over 41,000 km including international assets) and storage capacity (approx. 20 bcm including international assets) and storage capacity (approx. 20 bcm including international assets) among its European peers and is also a leading player in regasification, through the LNG terminal in Panigaglia (GNL Italia) and its stakes in the Livorno (OLT) and Rovigo (Adriatic LNG) terminals in Italy and in the Revithoussa (DESFA) terminal in Greece. Snam also invests in energy transition businesses: biomethane (Snam4Environment), energy efficiency (Renovit), sustainable mobility (Snam4Mobility) and hydrogen. The company also operates in forestation (Arbolia) and is committed to achieving carbon neutrality (Scope 1 and Scope 2 CO2 eq emissions) by 2040.. For more information, please visit https://www.snam.it/en.

Trans Austria Gasleitung GmbH (Austria) is a transmission system operator in Austria. Its pipeline system connects Baumgarten in Austria with Tarvisio in Italy over a distance of 380 km and has an annual transport capacity to Italy of 30 billion cubic meters of natural gas. The TAG pipeline network consists of around 1,140 km of high-pressure natural gas pipelines from the Slovakian-Austrian to the Austrian-Italian border. Along the route in Austria, the natural gas pipeline also supplies natural gas for consumption. TAG also transports natural gas to Slovenia via the SOL pipeline. For more information, please visit https://www.taggmbh.at/

Transgaz (Romania) The National Gas Transmission Company TRANSGAZ SA is the technical operator of the Romanian National Gas Transmission System (NTS) and secures the fulfilment of the national strategy for domestic and international gas transmission, gas dispatching and research and design in its core business specific field, under conditions of effectiveness, transparency, safety, non-discriminatory access and competitivity, in compliance with the provisions of the EU and national laws and of the quality, performance, environment and sustainable development standards. Gas transmission is ensured by over 14,200 km of pipelines (of which: 482 km – BRUA phase 1 and 183.5 km – international gas transmission pipelines (Transit III) and gas supply joints with diameters within the range 50 mm – 1,200 mm, at pressures between 6 bar – 63 bar. The company was listed on Bucharest Stock Exchange in 2008 and has private management implemented according to the corporate governance system. With a strategic investment programme for the next 10 years estimated at EUR 3.4 billion, Transgaz has a substantial contribution to the development and upgrading of the gas transmission infrastructure, to its alignment to the current requirements on decarbonization and to the sustainable development of the Romanian energy sector. For further information please access: www.transgaz.ro

Teréga (France) is established in South-West France and has over 75 years of experience in gas transport and storage infrastructure and continues today developing innovative solutions. A true accelerator of the energy transition in France and in Europe, Teréga operates over 5,000 km of pipelines and 2 underground storage reservoirs representing 16% of the French gas transport network and 26% of national storage capacities. Teréga enjoys a strategic position in Europe, thanks to its interconnections with Spain. Teréga aims at accelerating the green revolution enabled by renewable gas, through increasing its involvement in hydrogen and biomethane. For more information, visit <u>www.terega.fr</u>

