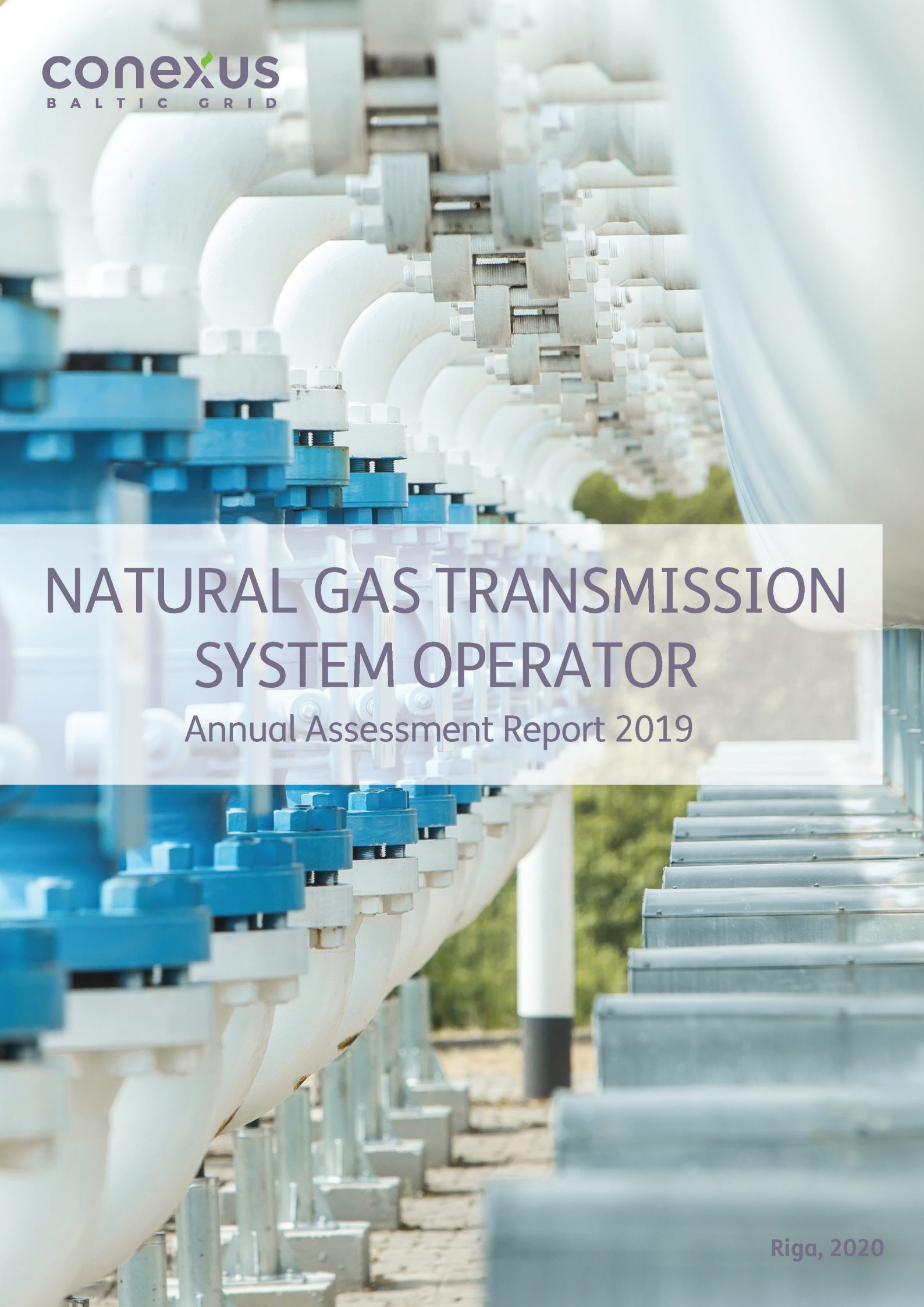


conexus BALTIC GRID

NATURAL GAS TRANSMISSION SYSTEM OPERATOR

Annual Assessment Report 2019

Riga, 2020

Contents

1. GENERAL INFORMATION

According to Part 2 of Section 43.1 of the Energy Law, the natural gas transmission system operator must prepare an annual report on the correspondence between natural gas consumption and its supply, and on the security of the national supply of natural gas ('assessment report'). The 2019 assessment report has been prepared in accordance with the provisions of Regulations No482 of 20 June, 2006, of the Cabinet of Ministers 'Regulations regarding the natural gas transmission system operator annual assessment report'. In accordance with Section 5 of this regulation, the transmission system operator must prepare an assessment report and submit it to the Ministry of Economics and the Public Utilities Commission (PUC) by 1 June every year.

- Joint Stock Company (JSC) 'Conexus Baltic Grid' (hereafter - 'unified operator', 'Conexus' or 'Company') is the unified natural gas transmission and storage system operator in Latvia, managing the only functional underground gas storage facility in the Baltic States, the Inčukalns underground gas storage facility ('Inčukalns UGS' or 'storage facility'), which operates to ensure the stability of regional gas supply and is a major and strategically important facility for the entire region. The active natural gas capacity of the Inčukalns UGS is up to 24 TWh, which enables it to fully cover the demand for natural gas in Latvia and the region. For market participants, this is an opportunity to store natural gas in a strategically advantageous location.

- The modern natural gas transmission system, which is a part of the Company's structure, is 1188 km long and it directly connects the Latvian natural gas market with Lithuania, Estonia and Russia. The transmission system makes it possible for market participants to supply natural gas to their clients in a flexible and secure manner; the system also offers options for international transport, which is the cornerstone of the region's natural gas supply.

- Conexus is an independent and competitive company with high-quality service that provides opportunities for growth for both its clients and employees.

VISION (Who we want to become?)	MISSION (Why we exist?)	VALUES (What is importat to us?)
Become the most trusted energy source in the region.	Promote a sustainable regional energy market by ensuring a reliable operation of natural gas transmission and storage system	Secure system operation Professional und united team Flexibility and openess through competent solutions Sustainable development

The key mid-term (2019–2023) objectives of Conexus are related to the following three areas: market development, infrastructure provision and development of operations. The strategic objectives have been set in line with the Conexus values, the company vision and the Conexus mission – promoting sustainable operation of energy market in the region, ensuring reliable operation of natural gas transmission and storage system.

STRATEGIC OBJECTIVES

1. Development of the regional gas market to achieve a sustainability of Incukalns UGS operations in market conditions
2. Managing safe and accessible infrastructure appropriate for market conditions
3. Implementation of sustainable management of internal and external resources

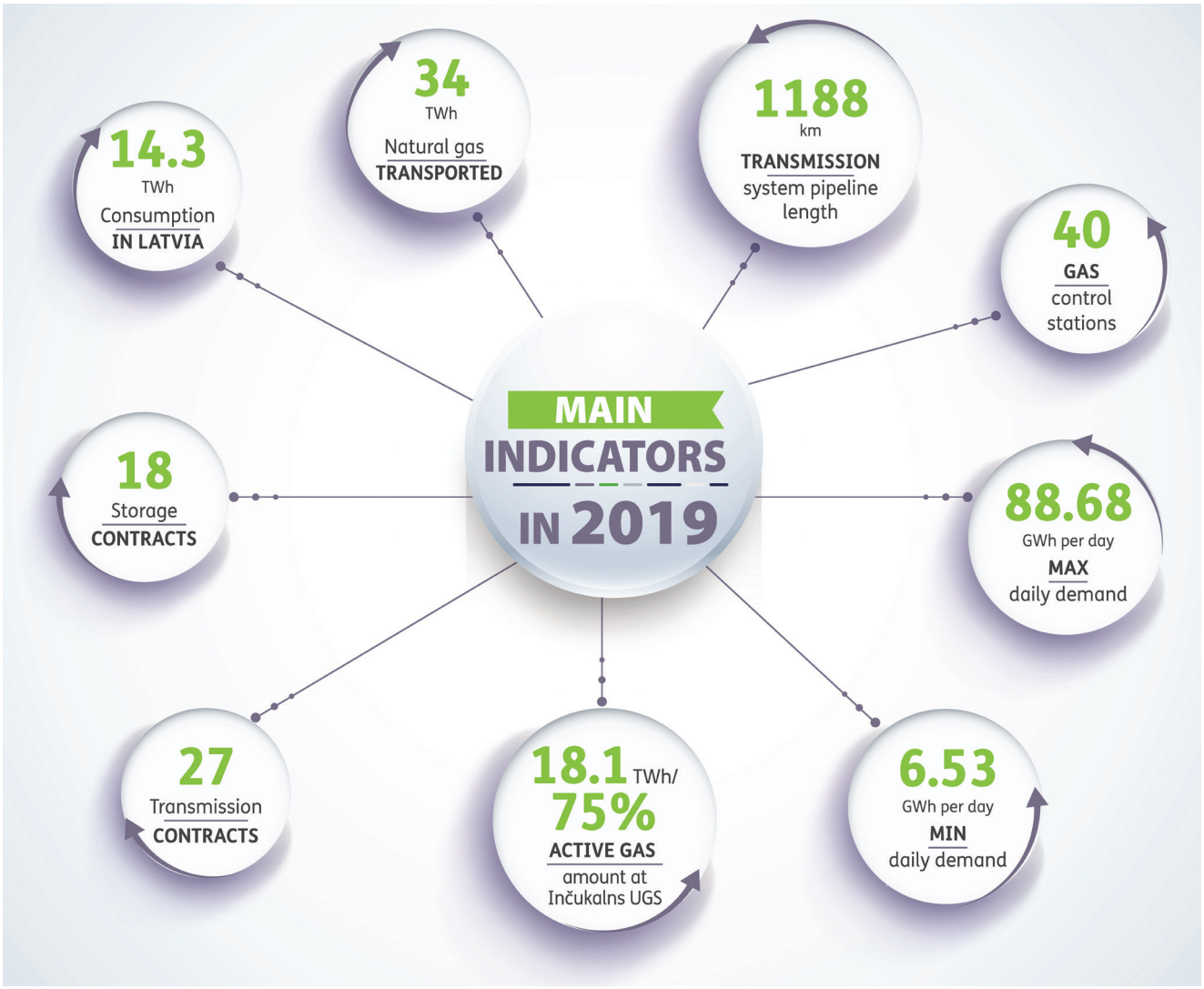
The strategic objectives defined in the Conexus strategic development plan for 2019–2023 are as follows:

- Development of the region's natural gas market to ensure sustainable operation of Inčukalns UGS in the market conditions;
- Providing infrastructure that is safe, accessible and adequate for the market;
- Implementing sustainable management of internal and external resource capacity.

Alongside its strategic objectives, Conexus has defined three development principles that govern all the planned mid-term activities. These development principles complement the strategic objectives and contribute to their implementation:

DIGITALIZATION	CONEXUS – ENERGY COMPANY	TOGETHER WITH OTHER REGIONAL TSOS
Operations of Conexus will be focused on technological advancements, improvement, decentralised management of assets, staff and finances, as well as introduction of effective resource management model.	The vision of Conexus is to become the most reliable source of energy in the region, as a result of which Conexus is planning to introduce services not only to the natural gas users, but also to electricity users.	In the medium term, Conexus intends to promote cooperation with other transmission system operators in the region by coordinating routine cooperation and implementing a periodic comparative analysis system with other TSOs in the region.

2. MAIN INDICATORS IN 2019



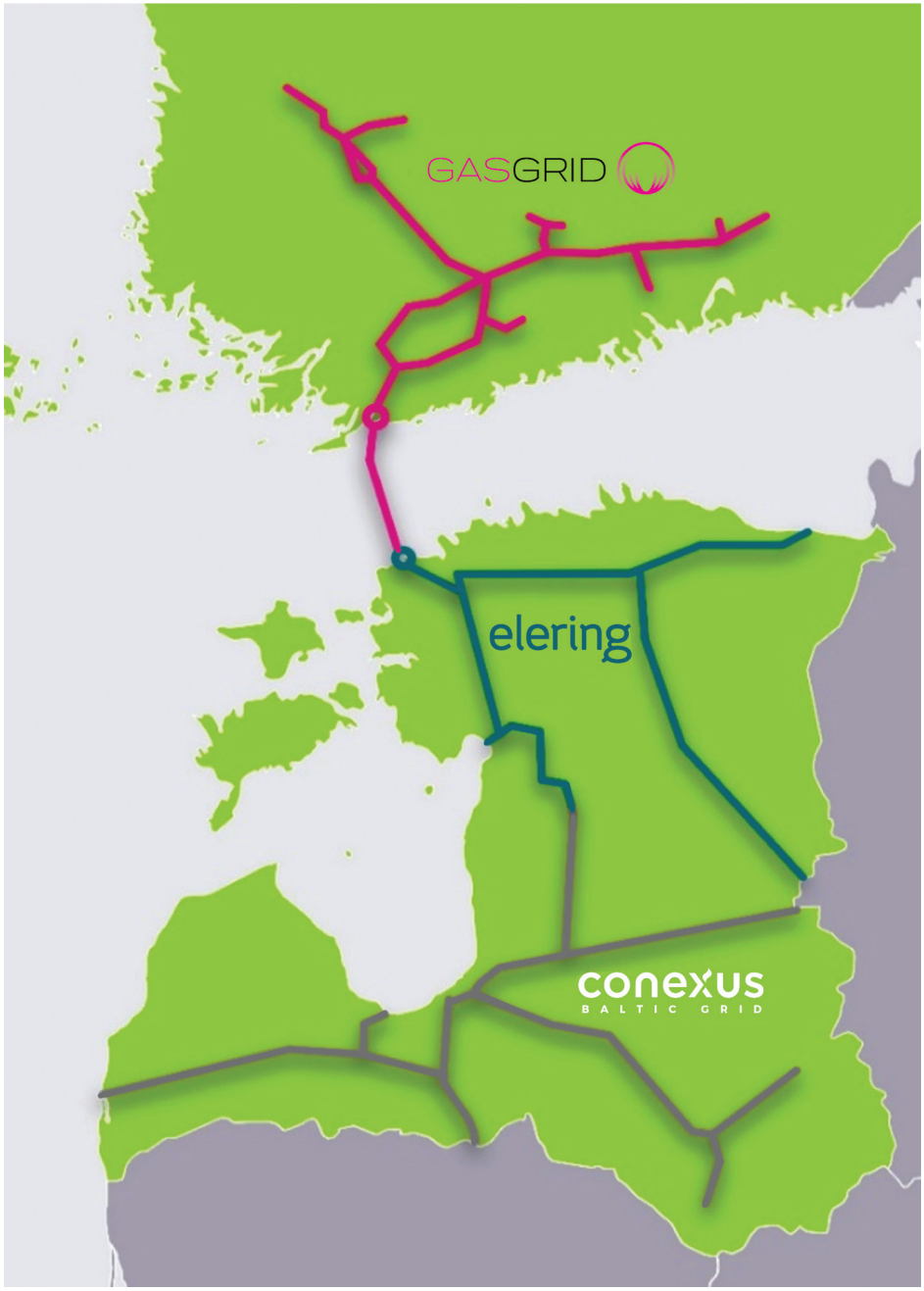
3. KEY EVENTS IN 2019

Regional development, integration of infrastructure, and social responsibility: these were the key features of 2019 for Conexus, a year which was full of new trends and activities, and can be seen as a good foundation for the coming year's challenges.

The unified natural gas market launched on 1 January, 2020, involves transmission system operators of Finland, Latvia, and Estonia. The regional gas market began its operation with the creation of a unified gas transmission entry tariff zone in these countries, with two balancing zones: the common balancing zone for Latvia and Estonia along with the balancing zone for Finland. The Balticconnector interconnection between Estonia and Finland that opened in December created new trading opportunities in the gas markets of Finland and the Baltic States. For Latvia, the pipeline entails more potential for the use of infrastructure, including the Inčukalns UGS, as it is now possible to supply natural gas to the market in Finland.

An agreement among Latvia, Estonia, and Finland has cancelled payments for transporting gas through Estonia, Latvia, and Finland, with unified transmission system entry tariffs. In combination with a common IT platform for system users, the gas market model significantly reduces the administrative burden caused by everyday operations and promotes international competition among suppliers.

In December 2019, the Innovation and Networks Executive Agency of the European Commission (INEA), Conexus, and Lithuania's transmission system operator Amber Grid signed an agreement funding a construction project to increase the throughput of the Latvia–Lithuania interconnection. The preliminary studies and cost/benefit analysis for the project took place in 2018; it revealed that more capacity would be necessary in order to meet the demand of the regional market for natural gas and to guarantee the security of gas supply when the Balticconnector gas interconnection between



Estonia and Finland begins operating and when the gas connection between Poland and Lithuania will be built. The increase in transmission capacity between Lithuania and Latvia will enable better market access to the Inčukalns UGS, the Klaipėda liquefied natural gas terminal, and the gas interconnection between Poland and Lithuania, which is to start operating in 2022.

According to plan, the construction of the project to increase the throughput of the Latvia–Lithuania interconnection will be completed by the end of 2023. The project is included in the list of EU Projects of Common Interest[1], the ten-year European network development plan of the European Network of Transmission System Operators for Gas[2], and the Gas Regional Investment Plan[3].

One of the most significant events in the improvement of Conexus infrastructure was the upgrade and commissioning of Latvia's only transmission gas measuring station, Korneti. The goal of the project was to replace the obsolete metering and quality control equipment, to upgrade the site management system, and to install redundancy equipment. In view of the strategic significance of the Korneti station in ensuring the security of gas supply in the region, because the station is where the gas flows from Russia to the single balancing zone of Latvia and Estonia, it is important to provide accurate, transparent, and traceable gas metering. With this project, Conexus set up one of the most modern cross-border gas metering stations in Europe.

The work on improving the operations at the Inčukalns UGS continue[4], as its gas collection station No 2, rebuilt and equipped with new production equipment and pipelines, was commissioned in September 2019. Because of the increasing capacity of the technological lines and the specific distribution of the wells, the throughput capacity of the gas collection point increased significantly, making it possible for the Inčukalns UGS to be more flexible reacting to changes in market demand during the natural gas withdrawal and injection seasons.

Our social responsibility activities are on the rise, and the Conexus team has received praise for them: having joined the Sustainability Index of the Institute for Corporate Sustainability and Responsibility for the first time in 2019, it was assigned the Silver category. The Sustainability Index is a strategic management tool that makes it possible for companies to determine their performance in five key areas: strategic planning, market relations, working environment, environment, and local community. The criteria were set based on international principles and experience so as to provide an objective understanding of the company's approach to risk and process management. What distinguishes Silver-level companies is that they consistently work to effectively involve the audiences they influence and to implement processes enabling the identification and management of risks and opportunities.

During the reporting period, Conexus took part in a comparative study by the Council of European Energy Regulators, which assessed the operational and cost efficiency of gas transmission system operators[5]; Conexus received a rating of 100%. The main purpose of the study was to observe and assess if the income earned by transmission system operators through regulated services reflects their actual costs; the study makes it possible to estimate the cost efficiency of structurally comparable transmission system operators.

[1]Project of Common Interest No 8.2.1. Enhancement of Latvia — Lithuania interconnection

[2]ENTSOG website. Available at: https://www.entsog.eu/tyndp

[3]ENTSOG website. Available at: https://www.entsog.eu/gas-regional-investment-plans-grips

[4]Project of Common Interest No 8.2.4. Enhancement of Inčukalns Underground Gas Storage

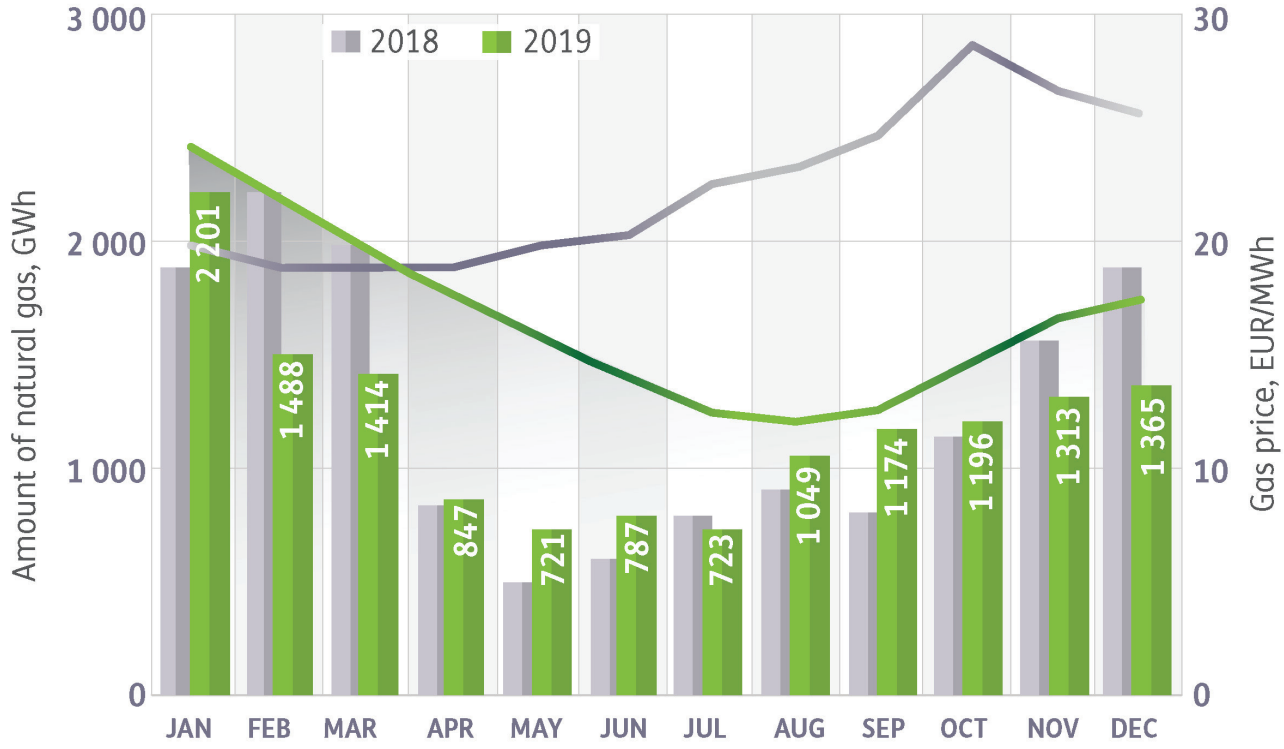
[5]CEER website. Available at: https://www.ceer.eu/documents/104400/-/-/90707d6c-6da8-0da2-bce9-0fbbc55bea8c

4. NATURAL GAS CONSUMPTION IN LATVIA IN 2019

Natural gas accounts for a key share in the generation of heating and electric power in Latvia, which is why demand is closely linked to fluctuations in the ambient temperature and changes in the consumption of natural gas for the generation of electric power.

In 2019, the total consumption of natural gas in Latvia was 14.3 TWh, with a year-on-year drop of 5%. During the 2019 heating season, the ambient temperature was above average in Latvia, resulting in less consumption of natural gas for heating. At the same time the demand of cogeneration plants for natural gas for electricity production increased, prompted by the loss of capacity in hydroelectric plants due to the relatively low amount of precipitation that year and the falling price of natural gas, which hit its lowest point in August 2019[6].

Figure 1. **Amount of natural gas delivered to the Latvian distribution system (GWh) and gas price[6] (EUR/MWh) in 2018 and 2019**



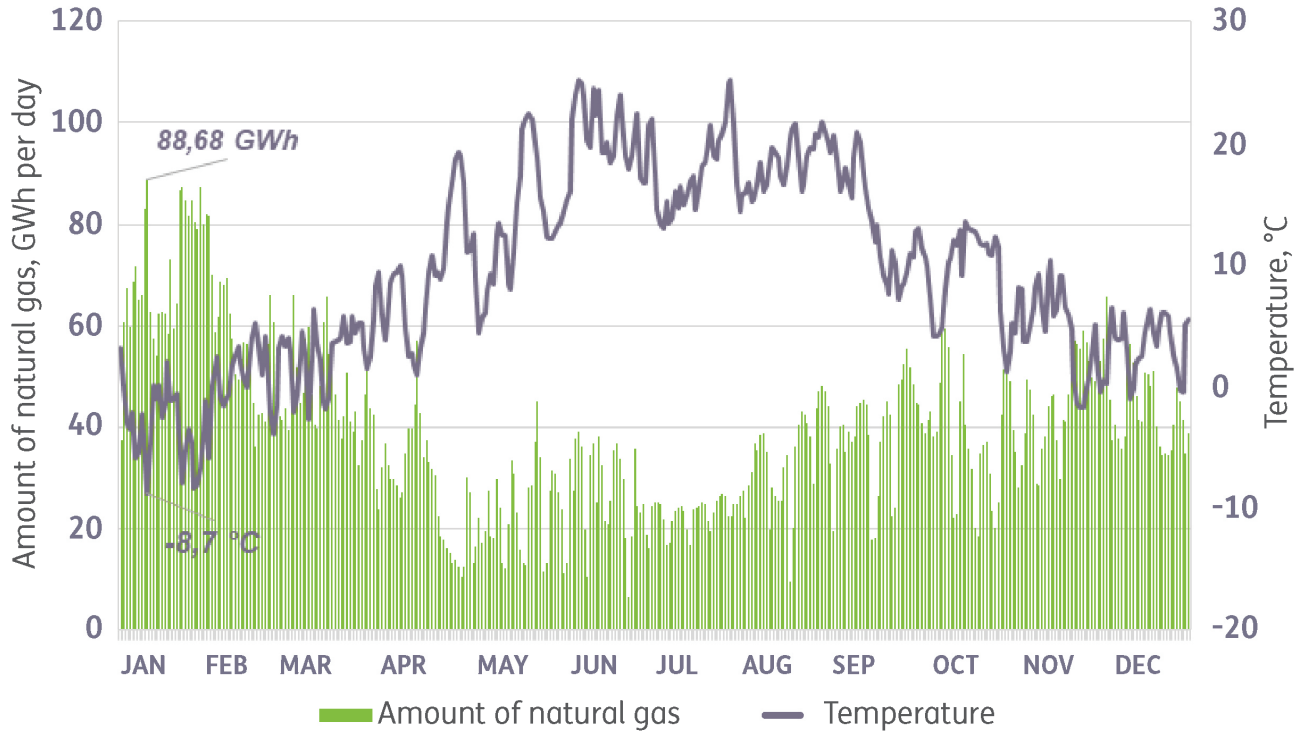
Average monthly temperature and temperature norm in Riga during the heating season of 2019 (°C)[7]

Month	January	February	March	October	November	December
Norm	-4.4	-3.8	0.0	+7.5	+2.3	-2.0
2019	-3.2	+1.6	+3.2	+9.3	+4.9	+3.3

[6]GET Baltic data. Available at: https://www.getbaltic.com/en/market-data/trading-data/

[7]Central Statistical Bureau data. Available at: https://www.csb.gov.lv/lv/statistika

Figure 2. **The volume of natural gas delivered to the Latvian distribution system in 2019 (GWh) and average daily temperature in Riga (°C)[8]**



According to the 2016 study, 'Joint Risk Assessment of the Gas System of Estonia, Finland, Latvia, and Lithuania', by the European Joint Research Centre, the natural gas consumption on a winter day in Latvia can be as high as 136 GWh per day. During the 2019 winter, the maximum consumption, 88.68 GWh per day, was reached on 10 January. This was the day when the lowest daily average temperature, -8.7 °C, was registered in Riga. Compared to 2018, the maximum daily consumption of natural gas fell by 22%, or 25 GWh per day; this is explained by the warm weather in 2019, as the temperatures during the 2019 heating season were above the Latvian norm.

The minimum consumption level was registered in summer, on 23 June, 2019, at 6.53 GWh per day. The minimum daily consumption level in 2019 was comparable to those of the previous years.

Maximum daily consumption level in 2019 in Latvia

Date	Consumption (GWh)	Ambient temperature (oC)
10 January	**88.68**	**-8.7**
21 January	86.71	-3.6
22 January	87.39	-7.9
28 January	87.26	-6.7

[8]Latvian Environment, Geology, and Meteorology Centre data. Available at: https://www.meteo.lv/meteorologija-datu-meklesana/?-nid=461

The past decade has seen a reduction in the consumption of natural gas, caused by the implementation of measures to promote energy efficiency and the use of renewables. However, recent years have shown an increase in the share of natural gas in the overall consumption due to a significant reduction in its price, thus making it more competitive compared to other energy sources.

Figure 3. **Consumption of energy resources in Latvia (2000, 2005, 2010, 2016, 2017, 2018)**[9]

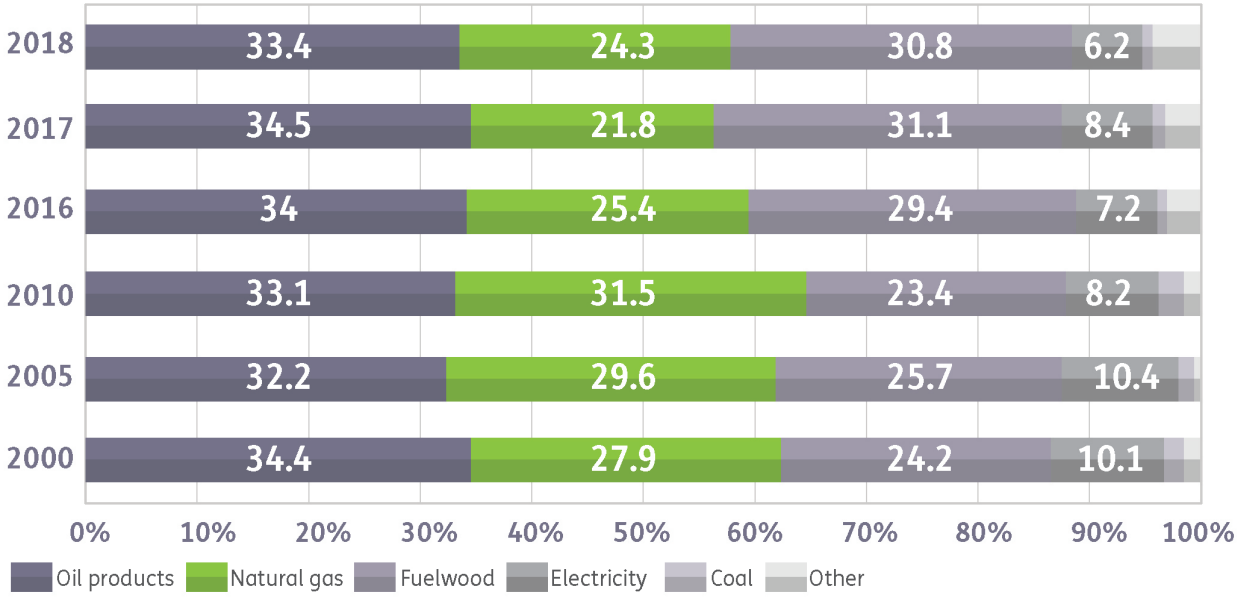
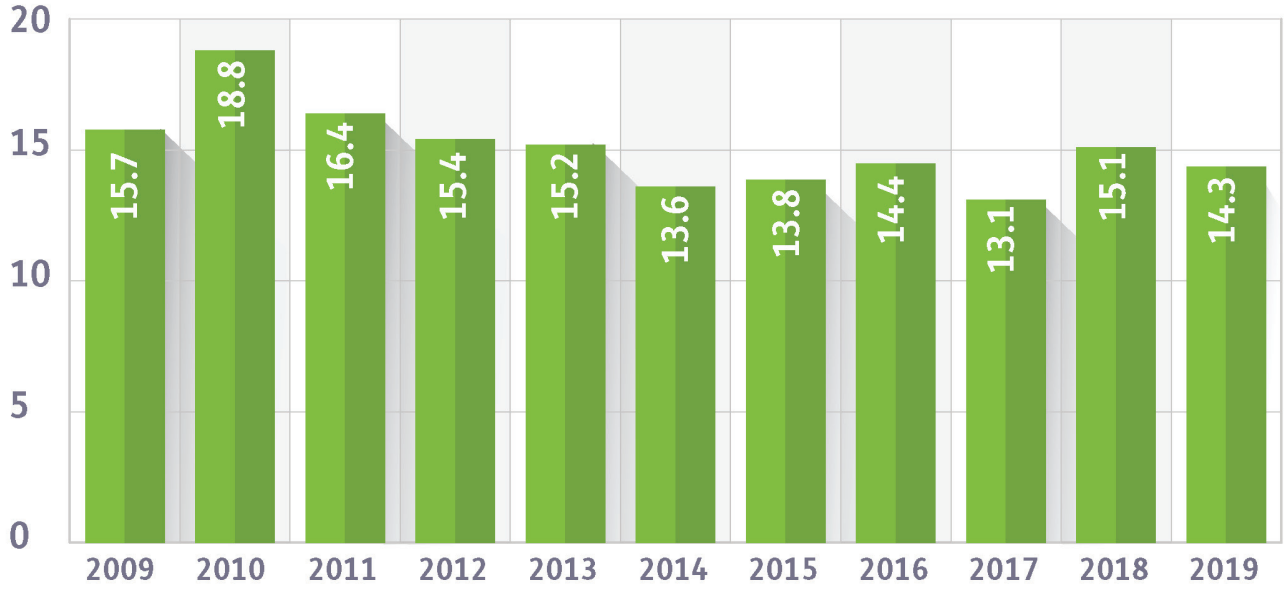


Figure 4. **Amount of natural gas delivered to the natural gas distribution system operator in Latvia (TWh)**



[9]Central Statistical Bureau data. Available at: https://www.csb.gov.lv/lv/statistika

5. 10-YEAR FORECAST FOR NATURAL GAS CONSUMPTION IN LATVIA

In November 2019, the European Network of Transmission System Operators for Gas and Electricity (ENTSOG and ENTSO-E, together referred to as ENTSOs) published a joint TYNDP 2020 Scenario Report[10] describing the possible scenarios for the development of the energy industry in the EU by 2050. The ENTSOs' scenarios will be used for assessing the future needs and projects in the fields of electricity and gas infrastructure. All scenarios head towards a climate-neutral future: reducing greenhouse gas emissions in line with EU targets for 2030 and the United Nations Climate Change Conference 2015 Paris Agreement objective of keeping temperature rise below 1.5°C.

- National Trends is the central policy scenario of this report, designed to reflect the most recent EU member state National Energy and Climate Plans ('NECP'). The Plans were submitted to the European Commission in accordance with the Regulation of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action. NECP 2030 is the main document for defining long-term energy and climate policy, with a vision of sustainable, competitive, safe, and climate-neutral economic development.

According to the Latvian NECP[11] forecast data, the total final consumption of energy will be 11% less in 2030 than in 2018, while the share of electricity and natural gas in the overall final consumption of energy will rise by more than 5%, due to the replacement of oil products with gas in road vehicles. No significant changes are expected in the primary energy type structure, as natural gas and oil products will continue taking up the biggest share in the overall primary consumption of energy resources in Latvia.

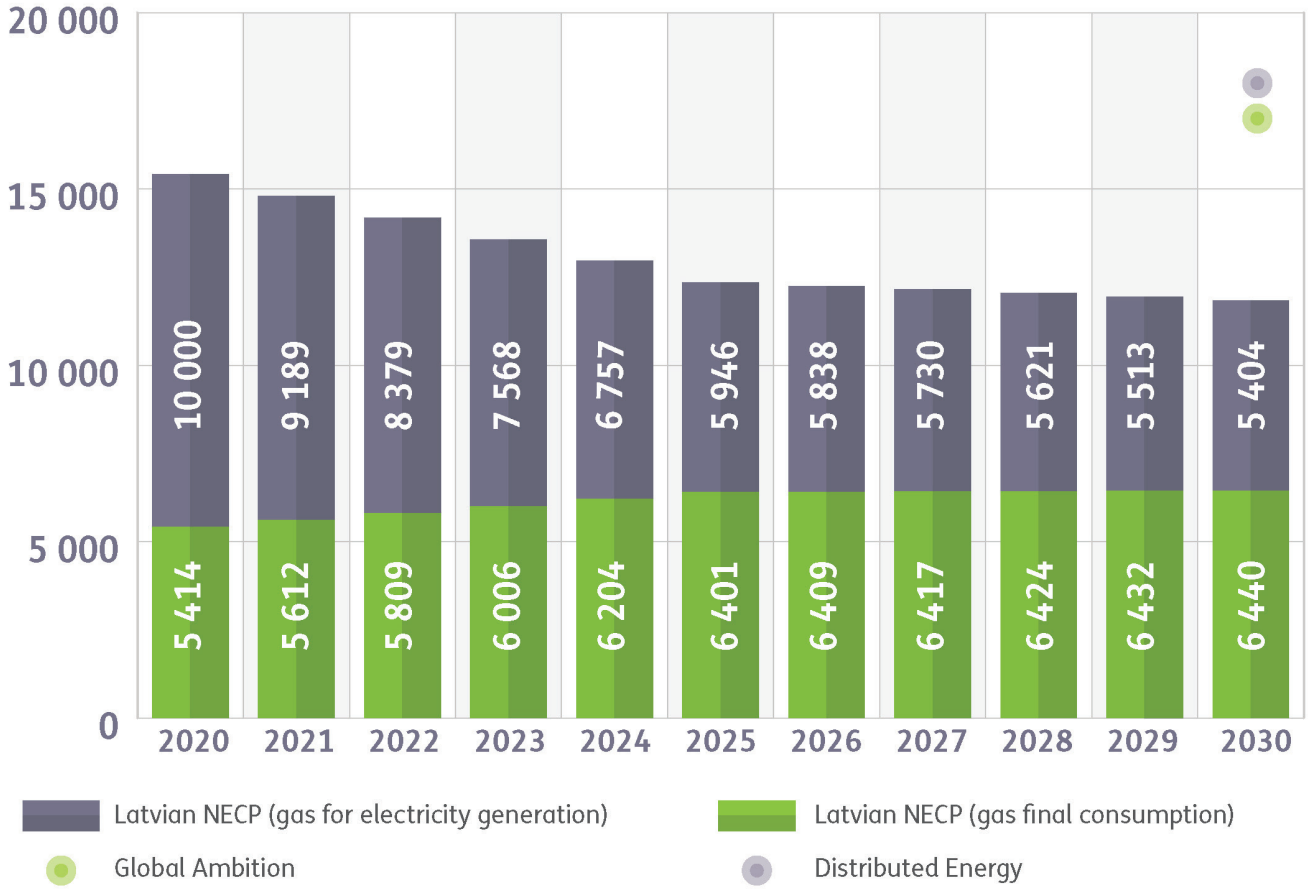
- Global Ambition and Distributed Energy scenarios compliant with the target of the Paris Agreement to reduce the emissions of greenhouse gases, to prevent the global temperature from rising by more than 2°C compared to the average temperature of the pre-industrial age, and keeping temperature rise below 1.5°C.
- Global Ambition scenario looks at a future that is led by economic development in centralised generation. Economies of scale lead to significant cost reductions in emerging technologies such as offshore wind, but also imports of energy from cheaper sources are considered as a viable option. Distributed Energy scenario embraces a de-centralised approach to the energy transition. A key feature of this scenario is the role of the energy consumer, who actively participates in the energy market and helps to drive the system's climate neutrality by investing in small scale solutions and circular approaches.
- The total consumption of gas forecasted for 2030 by the Global Ambition and Distributed Energy scenarios is higher than the one proposed in the National Trends (Latvian NECP 2030) scenario. This is due to the assumption that the energy system reach higher decarbonisation level with more gas, as a result of a faster switch from carbon-intensive fuels, such as coal and oil, to gas, and also higher shares of renewable and decarbonised gases in the gas mix.

Currently, ENTSOs are working on updating the overall scenario model data. The updated scenario data will be published in 2020.

[10]ENTSOG website. Available at: https://www.entsog.eu/tyndp

[11]Website of the Ministry of Economics. Available at: https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

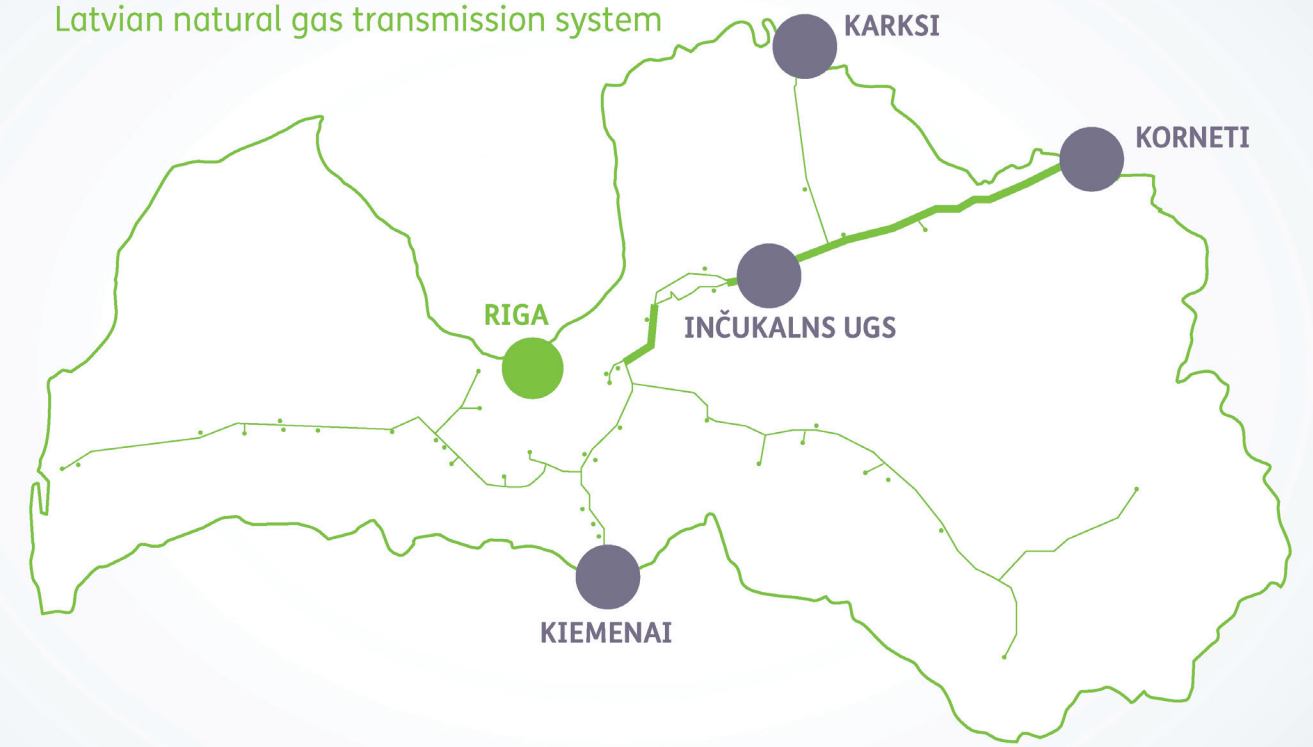
Figure 5. **Gas consumption forecast for 2030, according to the Latvian NECP[12], Global Ambition and Distributed Energy scenarios (GWh)**



[12]The ktoe to GWh conversion factor is 11.63

6. INFORMATION ABOUT THE NATURAL GAS TRANSMISSION SYSTEM IN LATVIA

Conexus is the unified natural gas transmission and storage system operator in Latvia; that enables market participants to use the Latvian natural gas transmission system for trading natural gas. The Company manages gas transmission infrastructure with a total of 1188 km of gas lines throughout Latvia.



The diameters of the gas lines in the transmission network are within a range of 350 mm to 720 mm, with an operating pressure of 28 bar to 45 bar.

40 gas regulation stations are used to transport natural gas to the local natural gas distribution system in Latvia. In order to increase the operational security of the Rīga–Daugavpils and Iecava–Liepāja transmission lines, gas pressure reduction units were set up at the ends of each line respectively.

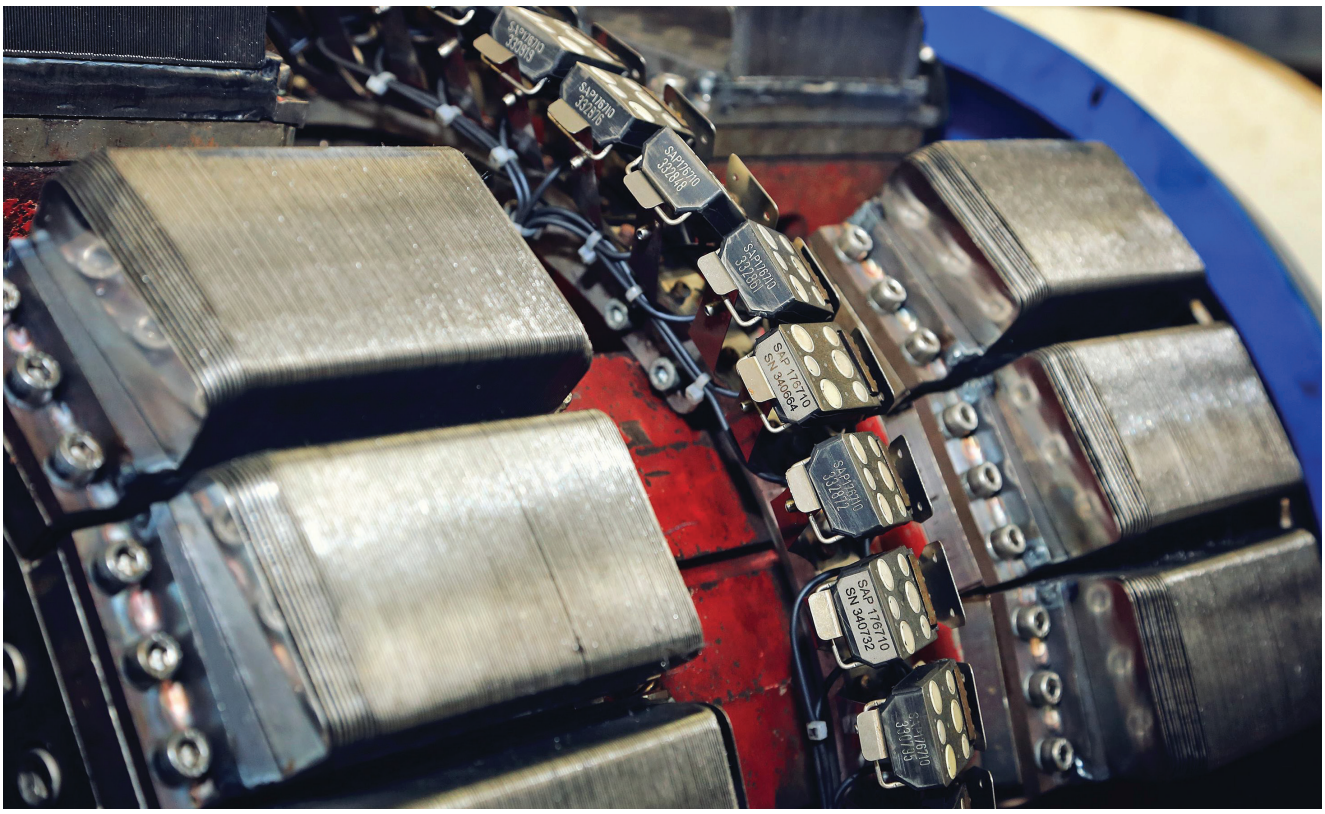
Natural gas transmission system's technical capacity in 2019 (GWh per day)

Entry/exit point	Entry technical capacity	Exit technical capacity
Inčukalns UGS	316[13]	178.5
Kiemenai (LV/LT)	67.6	65.1
Karksi (LV/EE)	34.695[14]	73.08
Korneti (LV/EE)[15]	188.5	105

[13]Technical capacity with the active natural gas amount in Inčukalns UGS exceeding 18 TWh

[14]Technical capacity in 2019, starting from 2 October

[15]The entry/exit point is seasonal in nature



In ensuring the uninterrupted functioning of the system, pipeline in-line inspection and early elimination of defects found during inspection, is a priority. The in-line inspection of pipelines is done to determine the maximum acceptable operating pressures, in order to maintain a higher pressure in the transmission pipelines. The in-line inspection of pipelines is carried out in conjunction with operators in other countries (Russia, Estonia, Lithuania), which makes it possible to assess the technical condition of gas transmission pipelines over their entire length and repair any defects found.

In 2019, three gas transmission pipeline sections underwent in-line inspection:

Riga-Panevežys
84 km

Vireši-Tallinn backup inverted siphon across the river Gauja
200 m

Pskov-Riga
158 km

- An experimental inspection of a short section of the gas transmission pipeline Izborsk — Inčukalns UGS took place in August 2019, using the innovative magnetic tomography method.
- By the end of 2019, in-line inspection were carried out for 96% of the gas transmission main lines and 29% of the gas transmission system branch lines in Latvia. Overall, 88.6% of the entire natural gas transmission system of Latvia was covered by the in-line inspection.
- The elimination of defects revealed takes place through various methods, including local repairs of the gas line, replacement of defective pipes, repair of defective pipes by welding metal sleeves onto them, and renovation to the anti-corrosion protection of the gas lines.
- The Balticconnector interconnection, a bi-direction gas pipeline connecting the natural gas infrastructures of Estonia and the Baltic States with Finland, was officially opened on 11 December, 2019. On 18 and 19 December, 2019, the transmission system operators of Latvia, Estonia, and Finland conducted a joint gas infrastructure operation test on the Balticconnector interconnection between Finland and Estonia, the transmission systems of Latvia and Estonia, and the Inčukalns UGS. In order to test the operation of the gas lines, production equipment, metering devices, and the cooperation between the system operators, natural gas was supplied from the Inčukalns UGS to Estonia and Finland, switching the Inkoo (Finland) compressor to intake mode. The tests were also carried out in the opposite direction, supplying gas via Balticconnector from Finland to Estonia and Latvia. This testing was the first time when Conexus received gas from Estonia via the Vireši–Tallinn. Prior to the testing, the work of the Conexus and Estonian transmission system operator Elering systems was modelled using Optiplan and Simone software.

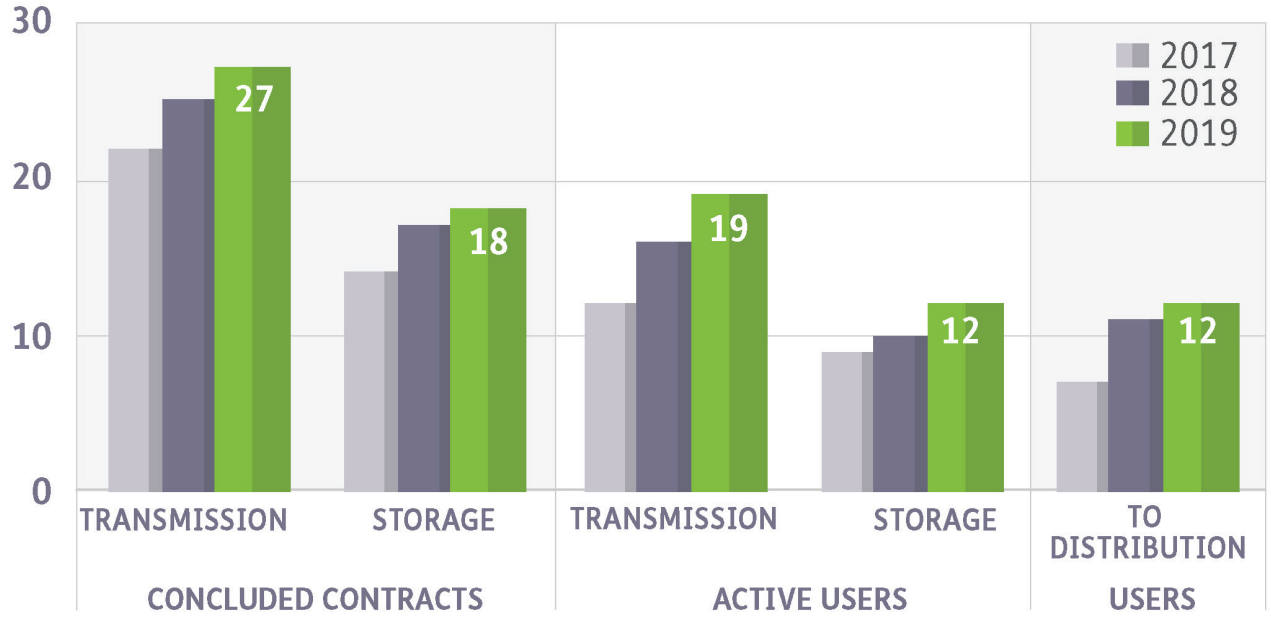
7. SUPPLY AND DEMAND BALANCE - FLOW OF NATURAL GAS

7.1 COMMERCIAL DATA

During the reporting period, the number of service contracts signed with the unified operator increased, with 27 transmission system service contracts and 18 natural gas storage service contracts effective in 2019. In 2019, two contracts for the use of the system were terminated: one system user terminated the contract because of a merger with another system user; the other discontinued its business in Latvia's natural gas transmission system.

Of all the system users that have concluded transmission system service contracts and storage service contracts, 19 are actively used transmission services and 12 - storage services. 12 users supplied natural gas from the natural gas transmission system to the natural gas distribution system.

Figure 6. **Number of natural gas system users and contracts in 2017, 2018, and 2019**

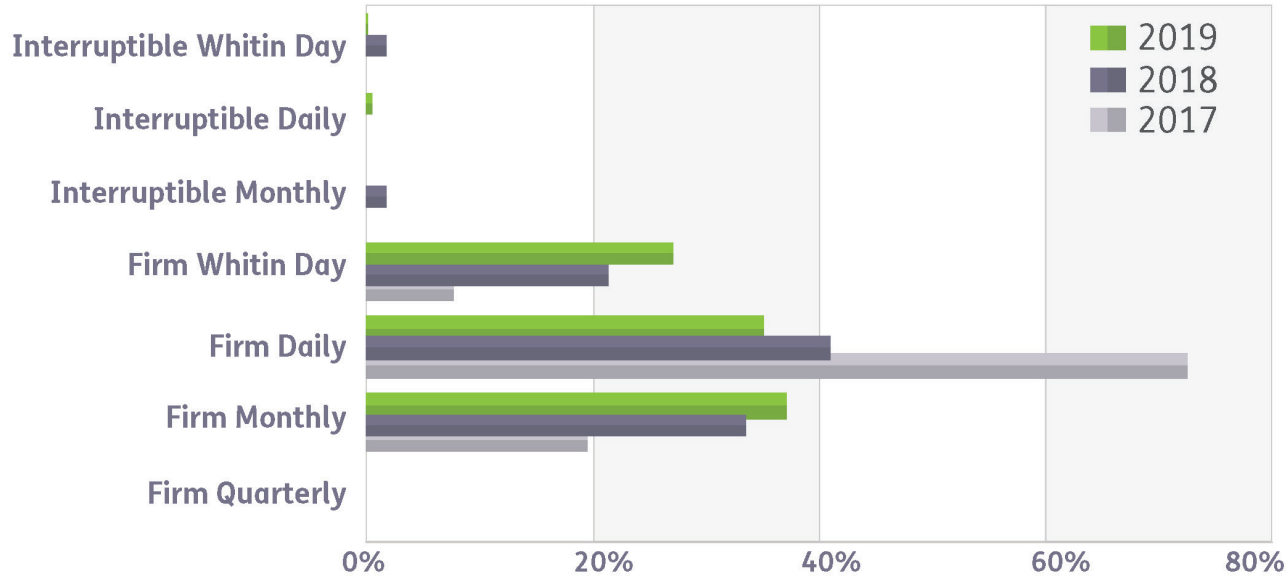


The use of seasonal factors to entry points from neighbouring natural gas transmission systems in accordance with TAR NC[16] has achieved the intended result. In 2019, of all the transmission products purchased, the day ahead product was booked less than in 2018. At the same time, the proportional shares of the monthly product and the within day product have grown, which can be explained by the system users planning their portfolio for a longer period of time and adjusting their portfolio with the within day product.

In 2019, the use of the interruptible capacity product tariffs saw a year-on-year reduction, in spite 2019 being the first year of the full use of capacity over multiple months. This can be explained by the optimisation of the bookable capacity by the operator and the assessment of the probability of an interruption of interruptible capacity in the event of a bottleneck, when the interruptible capacity is disconnected and the service is not provided.

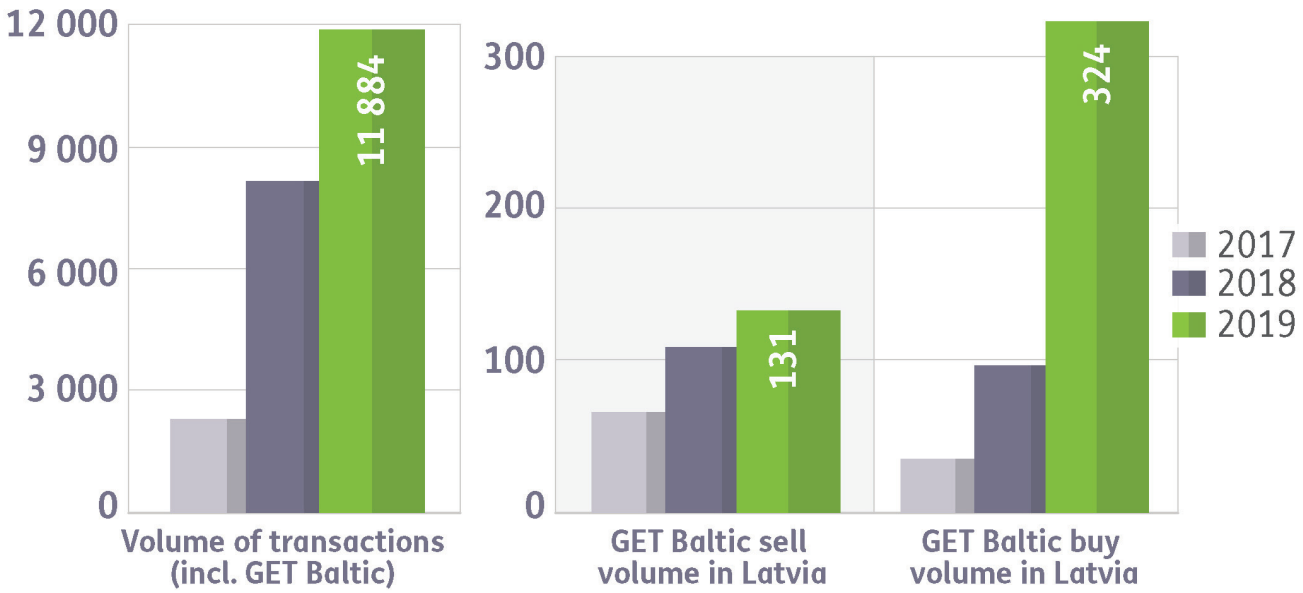
[16]Commission Regulation (EU) 2017/460 of 16 March, 2017, establishing a network code on capacity allocation mechanisms in gas transmission systems

Figure 7. **Booking of capacity in 2017, 2018, and 2019, broken down by product type (%)**



The volume of transactions at a virtual trading point saw a year-on-year increase of 45%, with a total transaction volume of 11.9 TWh. The rise in the volume bought in the Latvian market area on the GET Baltic exchange is noteworthy, as it tripled compared to 2018. The sharp increase can be explained with the gas price slump in 2019 and the ability to keep cheaper gas in the storage facility.

Figure 8. **Volume of transactions in VTP and the GET Baltic exchange[17] in 2017, 2018 and 2019 (GWh)**

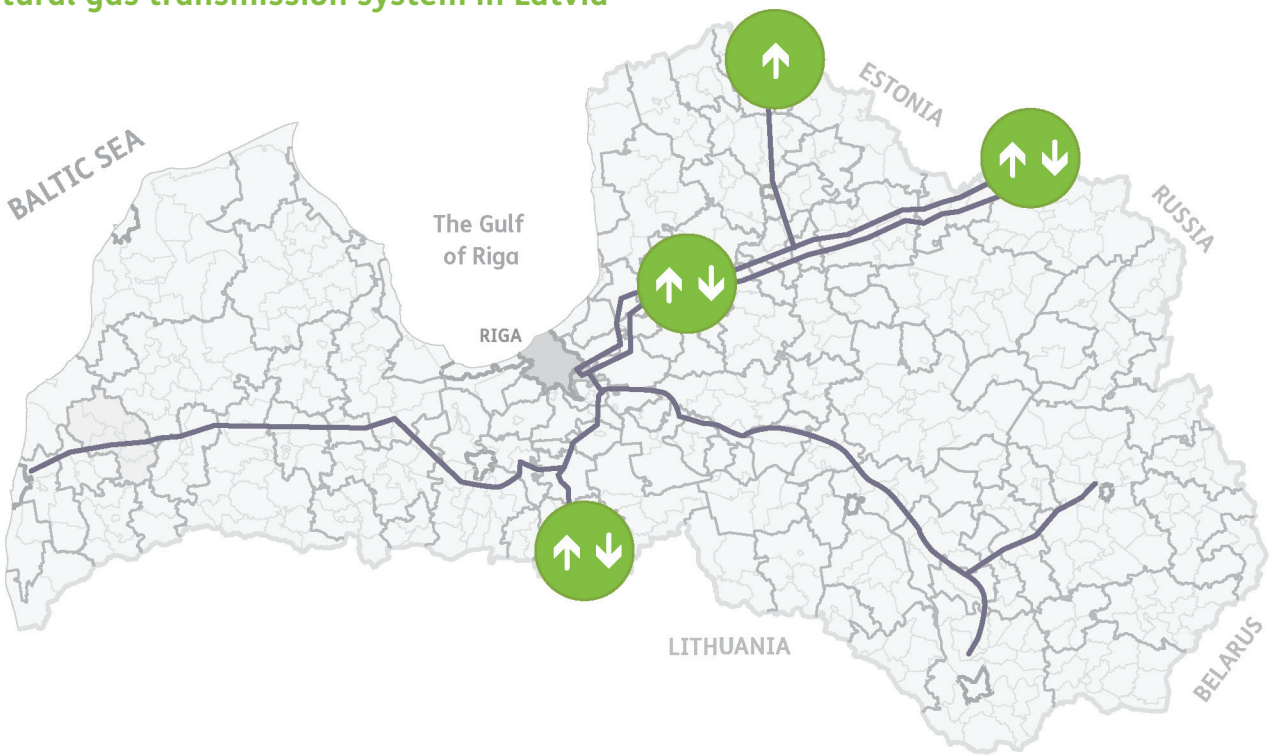


[17]GET Baltic data. Available at: https://www.getbaltic.com/en/charts

7.2. TRANSMISSION SYSTEMS FLOW DATA

The physical entry flows into the Latvian natural gas transmission system originate from Russia (Korneti entry point), Lithuania (Kiemenai entry point) and, during the withdrawal season, Inčukalns UGS (Inčukalns UGS entry point). The physical exit flows from the transmission system provide for the supply of Latvian consumers, Lithuania (Kiemenai exit point), Estonia (Karksi exit point), Russia (Korneti exit point) and to Inčukalns UGS (Inčukalns UGS exit point) during the injection season. Furthermore, the transmission system has an entry at the Karksi point and the storage facility during the injection season and an exit directed to the storage facility during the withdrawal season with virtual counter-flows.

Natural gas transmission system in Latvia



In 2019, the total amount of gas transmitted in the transmission system was 34 037 GWh, which is 13% more than the 2018 amount, 30 151 GWh. The biggest natural gas flows in the Latvian transmission system can be observed in summer, during the injection season. In 2019, the injection of gas began on 1 May: this is significantly earlier than in 2018, increasing the volume of gas transported during the first six months of the year by 40% compared to 2018, reaching the maximum gas storage fill level for the 2019 injection season.

Conexus started its 2018/2019 withdrawal season with the historically lowest level of active gas at the Inčukalns UGS, at 13 507 GWh - which meant that, at high demand, there was a risk of having to limit the withdrawal capacity during the active withdrawal season and of not being able to provide gas in the requested amounts to all system users.

In order to assess the supply risks, Conexus intensified the control system of Inčukalns UGS and Latvia's entire gas supply system in early 2019[18]. The main purpose of the control system is to monitor the fluctuations in gas demand in Latvia and the Baltic region during the withdrawal season, which makes it possible to analyse the reliability of gas supply and appropriately react to any supply risks.

[18]The information is available in Section 13, 'Planned transmission measures in the event of maximum demand'

The lowest ambient temperatures are typically observed at the beginning of the calendar year, causing an increase in the demand for natural gas. February and March have traditionally been the most critical months of the gas withdrawal season because of the drop in the amount of gas kept in the storage facility by the end of the season. In 2019, during the period between 15 February and 26 March, the already high demand for natural gas was raised even further by repairs to the gas transmission pipeline Valday—Pskov in Russia. However, due to warm weather, the actual demand was not high in the Baltics, and the Inčukalns UGS managed to fulfil all its gas supply orders during the withdrawal season.

Figure 9. **Amount of natural gas received by the transmission system in 2017, 2018, and 2019 (GWh)**

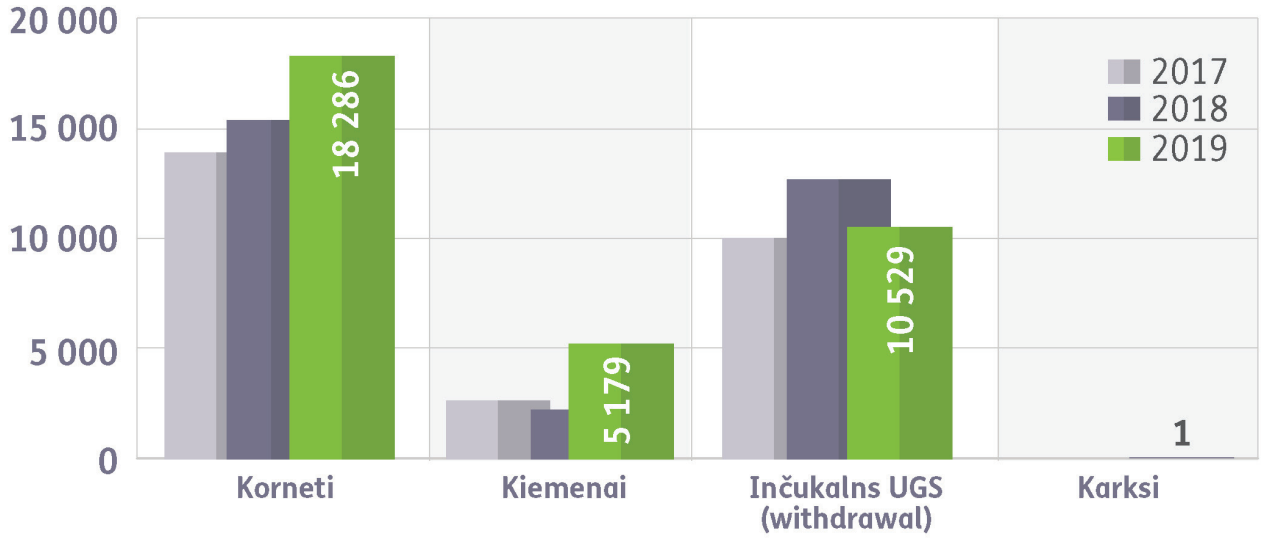
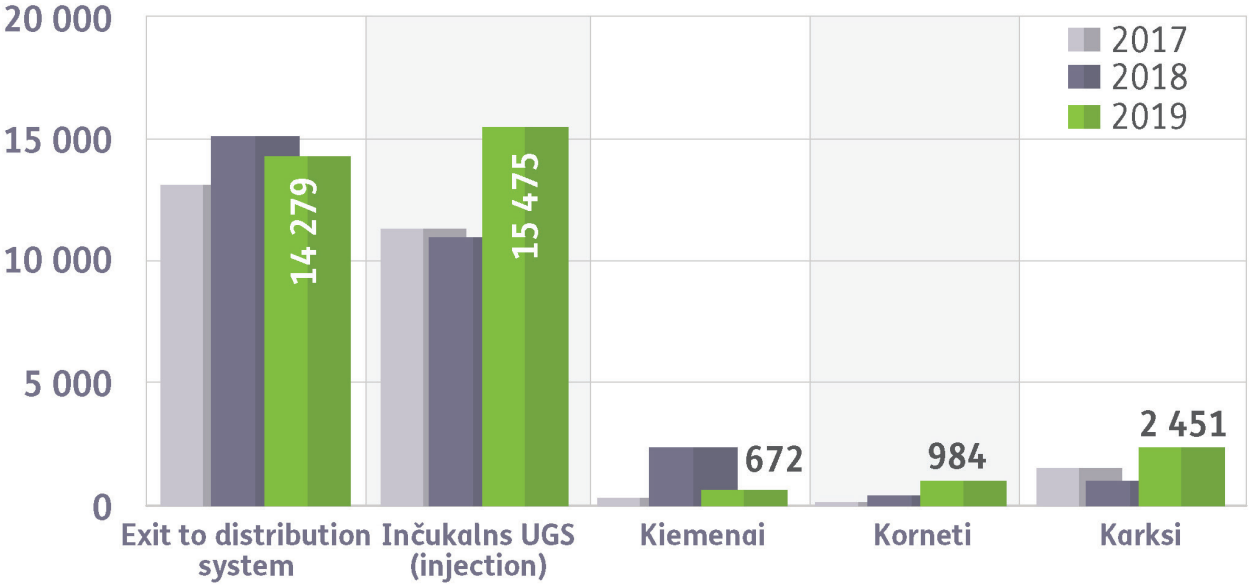


Figure 10. **Amount of natural gas transferred by the transmission system in 2017, 2018 and 2019 (GWh)**



Top daily capacity utilisation indicators, broken down by month, in 2019 (%)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
IUGS	withdrawal	52.1%	78.4%	96.6%	61.3%	55.2%	0.0%	0.0%	0.0%	0.0%	63.9%	49.3%	35.4%
	injection	0.0%	0.0%	0.0%	0.0%	100.0%	76.9%	100.0%	100.0%	100.0%	96.4%	15.5%	0.0%
Karksi	entry	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.8%	52.1%
	exit	25.8%	35.8%	36.3%	100.0%	44.5%	3.5%	70.0%	100.0%	10.7%	25.8%	29.7%	40.0%
Kiemenai	entry	1.9%	3.0%	0.4%	2.0%	13.4%	82.5%	93.5%	100.0%	100.0%	100.0%	80.1%	5.7%
	exit	12.4%	1.6%	30.1%	3.9%	0.0%	0.0%	82.0%	0.0%	0.1%	0.0%	13.2%	21.6%
Korneti	entry	7.9%	32.2%	3.0%	1.8%	100.0%	72.9%	88.1%	100.0%	69.5%	71.3%	20.1%	43.0%
	exit	0.0%	45.0%	99.0%	0.0%	27.7%	0.0%	0.0%	0.0%	0.0%	42.8%	90.5%	0.0%

In 2019, the highest demand for natural gas transmission system capacity was observed during injection at the Inčukalns UGS exit point (in the direction of injection) and at the Korneti and Kiemenai entry points. At the Kiemenai point, the high demand for capacity is associated with the injection into the storage facility as the gas was delivered from Lithuania and is caused by a reduction in the capacity of the Lithuanian transmission system resulting from repairs conducted by the transmission system operator, Amber Grid. The storage facility is at the centre of the natural gas supply system in Latvia; 2019 was no exception, and during the heating season, the entry point of Inčukalns UGS (in the direction of withdrawal) was the busiest transmission point in the country.

8. STORAGE FACILITY UTILISATION AND FLOWS IN 2019

The Inčukalns UGS is a part of the Conexus structure, comprising above-ground production facilities, boreholes, and an underground storage facility. The storage facility consists of naturally-formed Cambrian sedimentary rock in an aquifer. The injection of natural gas into the Inčukalns UGS takes place via a compressor, while the withdrawal of gas is powered by the pressure of the natural gas accumulated in the reservoir layer.

The remaining Inčukalns UGS active natural gas amount at the beginning of the injection season in May 2019 was 2.8 TWh, with 15.4 TWh injected into the storage facility over 2019. The amount of active natural gas in the storage facility after the end of the injection season in mid-October 2019 was 18.1 TWh, which is 75% of the maximum amount of active natural gas stored.

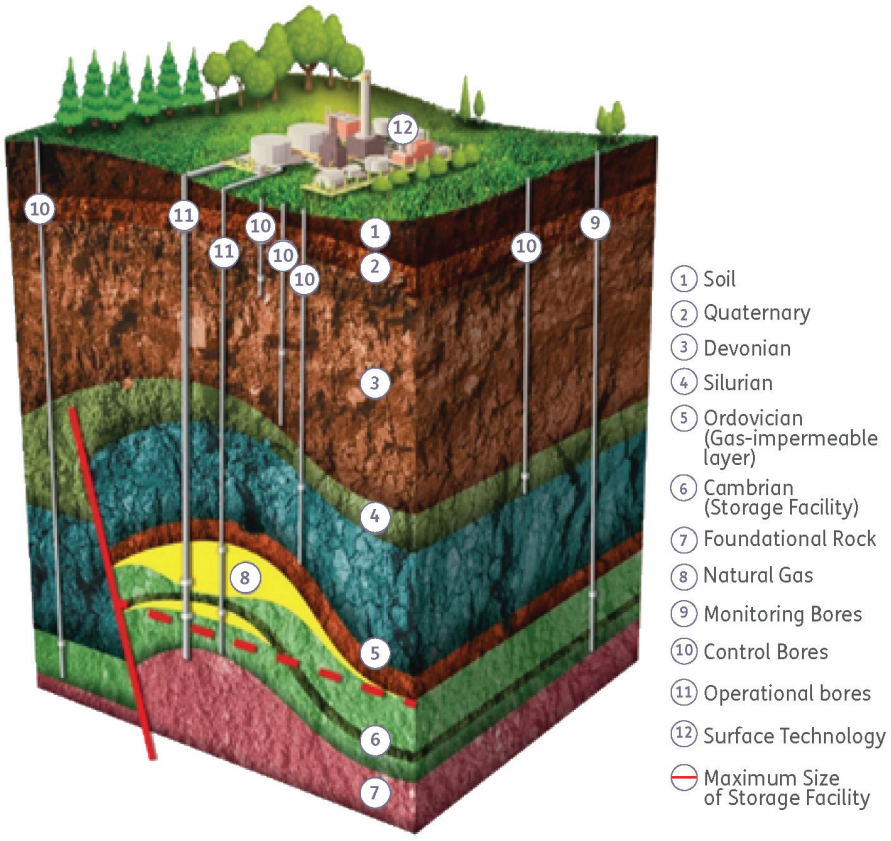
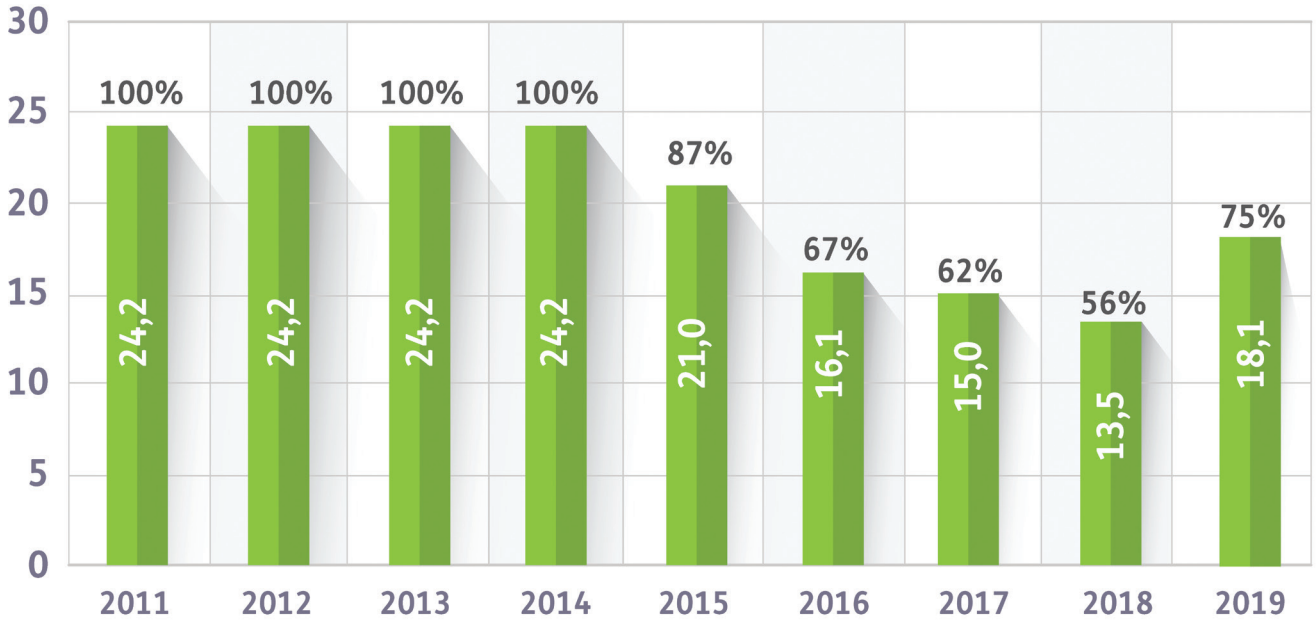
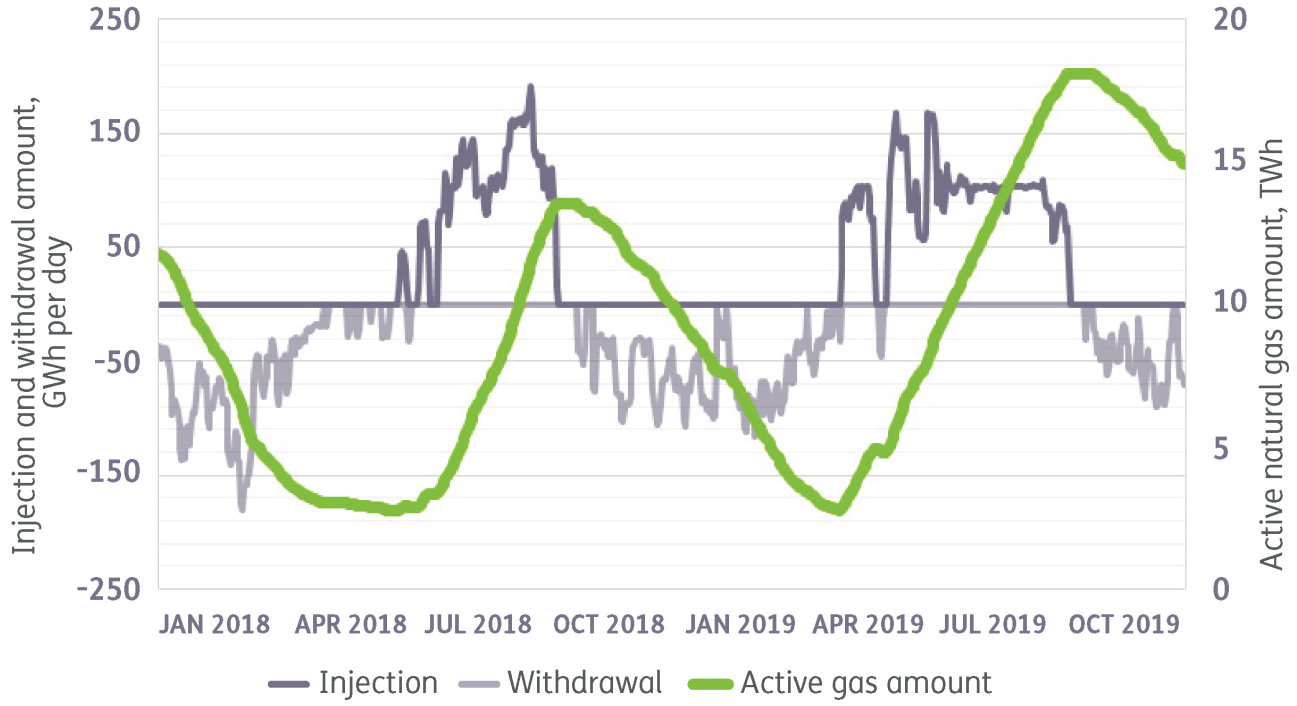


Figure 11. **Amount of active natural gas stored in the Inčukalns UGS at the end of the natural gas injection season (TWh and %)**



The maximum active natural gas storage capacity specified in the engineering design for the Inčukalns UGS is 24.219 TWh, while the technical maximum injection capacity is 178.5 GWh per day. Various technological factors affect the pressure in the reservoir layer and, thus, the amount of natural gas that can be stored; these particularly include the actual fill level of the Inčukalns UGS during the previous storage cycles and the intensity of injection during the storage cycle in question. The fill level of the Inčukalns UGS during its last three full cycles was within 56% to 67% of its design natural gas capacity; at the same time the facility has experienced a major change in the stability of the injection mode caused by short-term business considerations of the system users, resulting in a lower fill level of the storage facility.

Figure 12. **Injection and withdrawal amount (GWh per day) and active natural gas amount (TWh) at the Inčukalns UGS in 2018 and 2019**[19]



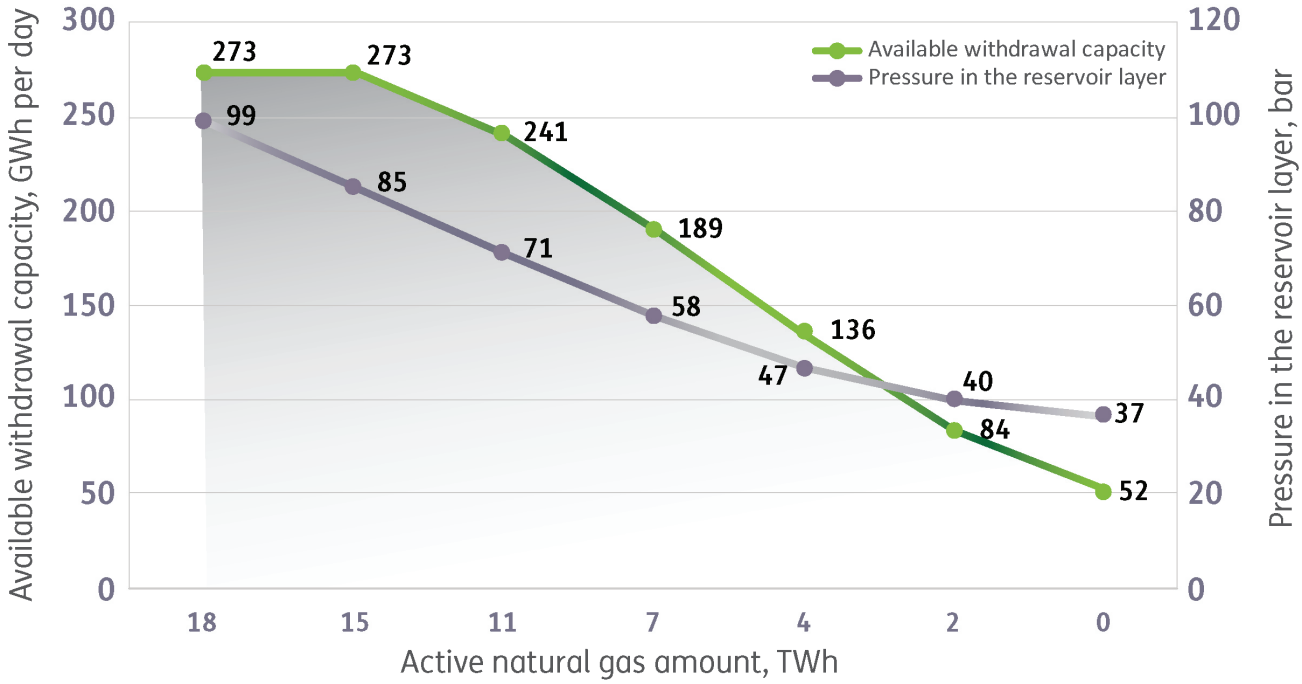
A significant rise in the interest of storing natural gas at the Inčukalns UGS was observed during the 2019/2020 injection season among market participants, fuelled by the low spot[20] price of gas on the market. The injection intensity grew considerably during the first week of July 2019, up to 157–167 GWh per day, which caused a sharp rise in the reservoir layer pressure. In order to restrict the pressure increase in the storage facility and to avoid irreversible damage to the reservoir layer rock while making it possible to use all the Inčukalns UGS storage capacity available during the 2019/2020 cycle, Conexus reduced the exit capacity of the natural gas transmission system at the interconnection with the Inčukalns UGS to 104 GWh per day until the end of the 2019/2020 injection season; following the suggestions of the storage's supervisory organization, Conexus also reduced the total amount of natural gas to be stored to 18.54 TWh. Maintaining the recommended injection intensity, it was possible to achieve the expected active gas amount and reach the layer pressure for the end of injection without exceeding 105 bar (which complies with the engineering design of the Inčukalns UGS) by 13 November, 2019.

[19]GIE data. Available at: https://agsi.gie.eu/#/

[20]Market price on a specific day

In winter, the security and stability of the transmission system depend on the amount of natural gas in the Inčukalns UGS, which makes it possible to provide the required technical entry capacity at the interconnection between the transmission system and the storage facility, in the transmission system as a whole, and in the international supply of natural gas. Withdrawal of natural gas from the storage facility takes place using the pressure difference in the reservoir layer and the transmission gas line, which means that the daily withdrawal capacity depends on the fill level of the storage facility. The maximum withdrawal capacity of the storage facility is 316 GWh per day and is available with an active gas volume of more than 18 TWh. If the fill level of the storage facility is less than that, the natural gas withdrawal capacity drops according to the storage facility's withdrawal capacity curve, which depicts the expected available daily withdrawal capacity of the storage facility (GWh per day, vertical axis) relative to the active amount of natural gas in the storage facility (TWh, horizontal axis).

Figure 13. **Inčukalns UGS withdrawal capacity curve in 2019**



In 2019, fulfilling its duty to provide the capacity to withdraw natural gas from the storage facility in the event of an energy crisis during the 2019/2020 storage facility cycle as established by Cabinet Regulations[21], Conexus arranged an auction for the storage and maintenance of a certain active amount of natural gas at the storage facility for 2019/2020. Seven companies from three countries submitted their bids for the auction, for a total amount of 7527 GWh, with the highest price offered being EUR 10.69 per MWh. Having evaluated the offers, Conexus fully or partially accepted offers for a total amount of up to 2845 GWh.

[21]Cabinet Regulation 312 'Procedure for energy user supply and sale of fuel in the event of an energy crisis or threat to the state' of 19 April, 2011

Gas collection station No 2, rebuilt, upgraded, and provided with new production equipment and systems, was commissioned on 23 November, 2019, at the Inčukalns UGS. The purpose of the reconstruction of the gas collection station was to replace obsolete production equipment, systems, and pipelines, to set up the remote control of the facility, and to increase its capacity. As part of the project, the number of production lines rose from 19 to 27, a utility building to accommodate the production equipment necessary for the collection of gas was built, and gas metering and consumption control units were set up. Thanks to the improvements, the throughput capacity of the gas collection point increased significantly, making it possible for the Inčukalns UGS to be more flexible reacting to changes in market demand during the natural gas withdrawal and injection seasons, which is particularly important due to the opening of the single natural gas market on 1 January, 2020.

At the end of the year, Conexus signed a contract with a new supervisory organization for the Inčukalns UGS. The supervision of the Inčukalns UGS operation involves analysing the operation of the storage facility during the injection season, monitoring the results, assessing the hermetic integrity of the storage facility, calculating and adjusting the permissible operating modes of the storage facility, and providing Conexus with relevant information.

9. TRANSMISSION SYSTEM DEVELOPMENT

9.1 INTERCONNECTION SYSTEM DEVELOPMENT

The gas supply systems in the Eastern Baltic region are not connected to the common natural gas transmission network of the European Union. In order to mitigate the effects of this situation, the Eastern Baltic region is determined to be one of the EU priority corridors, in accordance with Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April, 2013, on guidelines for trans-European energy infrastructure and on repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

According to this regulation, there are fixed European Projects of Common Interest (PCI) that may be carried out following a simplified procedure, with financing from the CEF fund in certain cases.

Figure 14. **Planned natural gas infrastructure projects in the Baltics**[22]

[22]ENTSOG website. Available at: https://www.entsog.eu/maps

The PCI list is revised every two years. Work on preparing the fourth PCI began in 2018, and the European Commission finally published it on 31 October, 2019[23], with the plan to approve it in 2020. Similar to the third PCI list, Conexus intends to include two projects in it: Enhancement of Inčukalns Underground Gas Storage and Enhancement of Latvia — Lithuania interconnection. The following projects were in the third PCI list, which was approved in 2017 and is still in effect:[24]

1. Interconnection Estonia—Finland (Balticconnector)[25]. The Balticconnector interconnection, a bi-direction gas pipeline connecting the natural gas infrastructures of Estonia and Finland, was officially opened on 11 December, 2019. Balticconnector will make it possible to open the Finnish natural gas market while also connecting natural gas network of Finland and the Baltic States, playing a major role in the unified natural gas market, which launched on 1 January, 2020.

The 77 km underwater pipeline section between Inkoo in Finland and Paldiski in Estonia is connected to a 21 km land pipeline in Finland and a 55 km land pipeline in Estonia, thus interconnecting the transmission systems of the two countries. The total transmission capacity of Balticconnector is a maximum of 72 GWh per day.

2. Enhancement of Estonia—Latvia interconnection[26]. Improving this interconnection will make it possible to increase the flow of natural gas and to arrange the supply of natural gas from Estonia to Latvia, which will be important in maintaining the flows of natural gas as part of the unified Baltic natural gas market, and enabling market participants in Estonia and Finland to store natural gas at the Inčukalns UGS. The planned entry and exit capacity of the interconnection (105 GWh per day) will be significantly affected by the Latvia–Lithuania interconnection improvement project, which is slated for completion in late 2023. In Estonia, the improvements are expected to be finished in 2020, in Latvia - no sooner than 2024, due to the deadline of the implementation of the Latvia–Lithuania interconnection project.

3. Enhancement of Inčukalns Underground Gas Storage[27]. The Inčukalns UGS is the only underground natural gas storage facility in the Baltic States, providing a reliable supply of natural gas for the entire region in winter. On 15 May, 2019, INEA and Conexus signed an agreement concerning a PCI. The project involves three main activities: improvements in the above-ground facilities, renovation of the gas boreholes, and improvements in the operation of the gas pumping equipment. The project will result in a considerable reduction in the dependence between the capacity available for withdrawal and the amount of gas stored in the facility, which will significantly improve the security of natural gas supply and the operating efficiency of the storage facility itself, which is particularly important for the circumstances that the unified Baltic and Finnish natural gas market is in. In addition to these activities, the project will also involve environmental protection measures intended to reduce the amounts of CO_2, NOx, and other emissions produced by the facility. The project is to be completed by December 2025.

4. Enhancement of Latvia — Lithuania interconnection[28]. In December 2019, INEA, Conexus, and Lithuania's transmission system operator Amber Grid signed an agreement funding the construction of the 'Improvement of the Latvia-Lithuania interconnection' project intended to increase the capacity of the interconnection between Latvia and Lithuania. The increased capacity will make it possible not only to transport larger amounts of natural gas between Latvia and Lithuania, but also to provide the Latvian transmission system with sufficient capacity necessitated by the creation of the regional natural gas market. The purpose of the project is to rebuild certain facilities of the transmission system and to diagnose and repair pipelines in order to prepare the system for increased operating pressure, which will at the same time increase the throughput of the interconnection in the direction from Latvia to Lithuania to 119.5 GWh per day and in the direction from Lithuania to Latvia to 130.47 GWh per day. The project is to be completed in December 2023.

5. Poland-Lithuania interconnection (GIPL)[29]. This project aims to connect the Polish and Lithuanian natural gas transmission systems, thus connecting the

[23]List IV of European Union Projects of Common Interest. Available at: https://ec.europa.eu/energy/sites/ener/files/c_2019_7772_1_annex.pdf

[24]List III of European Union Projects of Common Interest. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/annex_to_pci_list_final_2017_en.pdf

[25]Project of Common Interest No 8.1.1. Interconnection Estonia — Finland

[26]Project of Common Interest No 8.2.2. Enhancement of Estonia — Latvia interconnection

[27]Project of Common Interest No 8.2.4. Enhancement of Inčukalns Underground Gas Storage

[28]Project of Common Interest No 8.2.1. Enhancement of Latvia — Lithuania interconnection

[29]Project of Common Interest No 8.5. Poland-Lithuania interconnection

Eastern Baltic gas transmission systems to the Central European natural gas transmission network. GIPL will function as an alternative gas supply source for the Eastern Baltic region, improving the security of natural gas supply there and allowing to integrate the region into the EU natural gas transmission network. The expected capacity of the interconnection is 73.9 GWh per day in the direction towards Lithuania and 57.7 GWh per day towards Poland. The project is to be completed in December 2021.

The de-synchronisation of the Baltic electric power grid from the BRELL[30] zone and its synchronisation with the continental European zone will have a significant impact on the natural gas market. Having connected to the new synchronisation area, Latvian producers of electricity will have to provide their own generating capacities, and natural gas to a large extent will have the role of guaranteeing the stability of the electric power supply. The Baltic interconnections NordBalt (Sweden–Lithuania), Estlink (Estonia–Finland), and LitPol (Lithuania–Poland), which have had PCI status, have fundamentally changed the electric power generation market in the Baltic States, leading to more demand for natural gas and options to store it.

Interconnections of the electric power grids with the Nordic region have increased competition in the electric power generation market, requiring greater flexibility from producers, which is something that thermal power plants running on natural gas can deliver. The Nordic electric power market will indirectly but significantly affect the natural gas market in the Baltic countries, resulting in more demand for natural gas flexibility and storage opportunities. Thermal power plants using natural gas as fuel must be able to quickly generate the necessary amount of electricity; this will require sufficient and timely withdrawal of natural gas from the Inčukalns UGS. In the coming 10 years, Inčukalns UGS will play a major role in the Latvian energy supply system, because after the Baltic electric power grid is desynchronised, the Inčukalns UGS will act as an assurance of the electric power supply and energy security in the region.

9.2. NATIONAL SYSTEM DEVELOPMENT

On 18 April, 2019, PUC approved regulations for the natural gas industry, improving the natural gas system connection procedure, 'Natural gas transmission system connection for manufacturers of biomethane, operators of liquefied natural gas system and natural gas users'. The regulations reflect the essence of this regulatory approach, in that natural gas users themselves are allowed to decide on, plan, and set up connections to the natural gas transmission system in locations that are technically and economically viable. Such connection points can make it possible to feed natural gas to or withdraw it from the transmission system which meets the defined parameters[31], for example at gas stations for road vehicles or at industrial sites.

Information about what must be submitted to confirm the preparation of the user's natural gas supply system for its connection to the transmission system has been published on the website of Conexus[32], describing in detail the steps required for setting up the connection as well as other information that can be vital for potential users. Two companies expressed their interest in setting up a direct connection to the transmission system in 2019.

The Company has prepared a map with possible locations for connections with potentially lower costs of connecting to the pipelines of the natural gas transmission system. The Company continues to work on identifying potential connection points; in 2019, the map was expanded to include three additional locations in Dobele, Jelgava, and Aizkraukle Municipalities.

The map of Latvia's natural gas transmission system, including the potential connection points, is enclosed in Annex 1.

[30]An agreement to synchronise the electric power networks was signed by Belarus, Russia, Estonia, Latvia, and Lithuania.

[31]Cabinet Regulation 650 as of 4 October 2016, 'Requirements for injection and transportation of bio-methane and liquefied natural gas in the natural gas transmission and distribution system'

[32]Conexus website. Available at: https://www.conexus.lv/pieslegumi-parvades-sistemai

10. BALTIC UNIFIED NATURAL GAS MARKET

The Regional Gas Market Coordination Group (RGMCG) was established as part of the Baltic Energy Market Integration Plan (BEMIP); on 5 December, 2014, heads of governments from the Baltic States and Finland concluded an agreement for the harmonisation of network codes and the establishment of a unified natural gas market by 2020. Various objectives were set for the members of RGMCG (transmission system operators, public service regulators, and relevant ministries). Transmission system operators were tasked with harmonising transmission system regulations and balancing measures while also creating a unified entry - exit area. The competence of the national regulatory bodies includes the development of a unified tariff zone methodologies and principles for the socialisation of the costs of the regional natural gas infrastructure, as well as the harmonisation of licensing arrangements. The ministries are responsible for security matters regarding the regional supply. The activities of RGMCG are closely monitored by the European Commission Directorate-General for Energy.

On 14 February, 2019, the transmission system operators of Finland, Estonia, and Latvia concluded an agreement for the establishment of an inter transmission system operators compensation mechanism as of 1 January, 2020 ('ITC agreement'), in accordance with the principles set forth in the memorandum signed by the parties on 8 October, 2018.

In addition to the preparation of the ITC agreement, the Latvian and Estonian operators cooperated on the development of a common Estonia–Latvia balancing zone. As part of this work, the Latvian and Estonian operators developed draft Regulations for the Use of Natural Gas Transmission System and draft Regulations for the Natural Gas Balancing of Transmission System, which were subject to public consultation from 8 March to 5 April, 2019[33]. On 31 July, 2019, having compiled and assessed the proposals and having consulted with the regulatory bodies, the Latvian and Estonian operators submitted draft regulations for approval by the regulatory bodies of Estonia and Latvia. The approval procedure for the Regulations was completed on 28 October, 2019; resulting in the Latvian regulatory body's decision to adopt the draft Regulations[34] [35].

Based on the ITC agreement and the approved Regulations, the Latvian and Estonian operators concluded a set of agreements that enabled the common Estonia–Latvia balancing zone to start operating according to the 'one-stop agency' principle on 1 January, 2020, both reducing the administrative burden incurred by market participants regarding capacity booking and settlements of used capacity, imbalance and neutrality. The agreements concluded by the parties also determine the allocation of rights and responsibilities pertaining to the identification, approval, and fulfilment of everyday balancing activities between the operators, as well as which of the operators will lead of the market zone. In accordance with a supplementary agreement signed by the parties, Conexus will lead of the market zone as of 1 January, 2020, and until further notice.

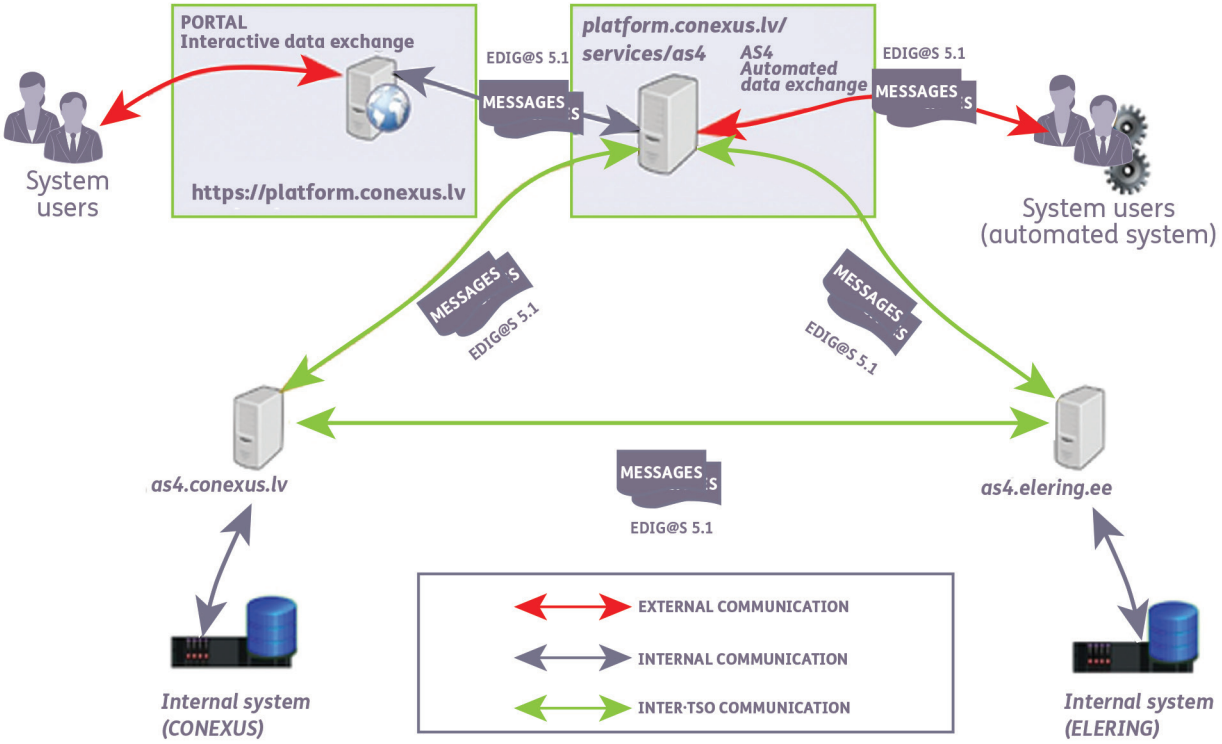
[33]Conexus website. Available at: https://www.conexus.lv/aktualitates/latvijas-un-igaunijas-ieejas-izejas-sistemas-dabasgazes-parvades-sistemas-lietosanas-noteikumu-un-balansesanas-noteikumu-sabiedriska-apspriesana

[34]Available at: https://likumi.lv/ta/id/310339-par-vienotas-dabasgazes-parvades-ieejas-izejas-sistemas-lietosanas-noteikumu-saskanosanu

[35]Available at: https://likumi.lv/ta/id/310338-par-vienotas-dabasgazes-parvades-ieejas-izejas-sistemas-balansesanas-noteikumu-saskanosanu

In early 2019, the development of an IT platform for the common Estonia–Latvia balancing zone began, as commissioned by the Latvian and Estonian operators; it is intended to enable centralised communication between the active gas market participants and operators and the exchange of data between the operators necessary for the operation of the gas market and the fulfilment of the duties of the entity in charge of the market zone. The platform has an interactive web interface to simplify its use, and it supports the direct exchange of data using EDIG@S 5.1 standard messages[36] via AS4 data transmission channels. A diagram showing the exchange of information between the transmission system operators of Estonia and Latvia is given in Figure 15.

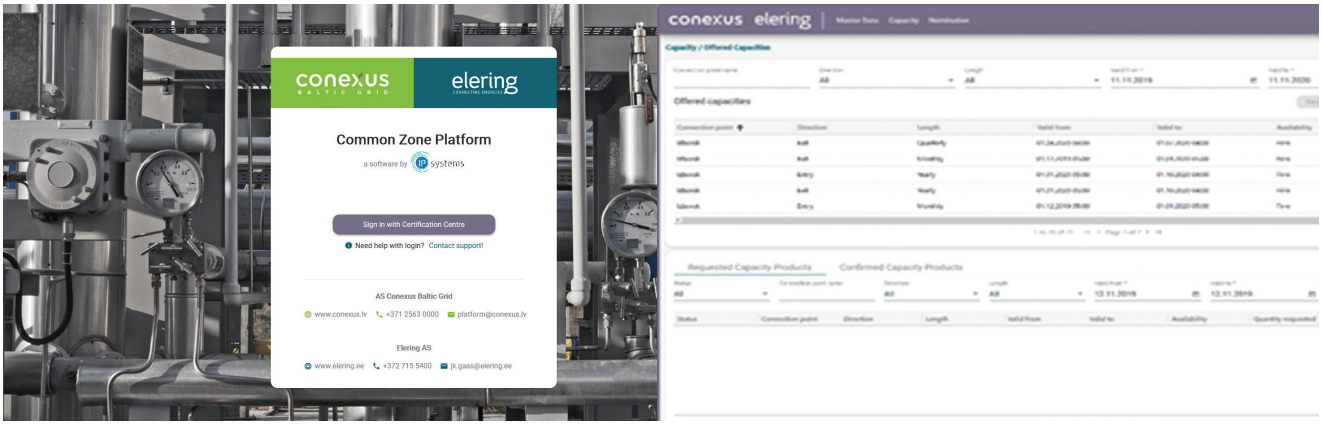
Figure 15. **IT system cooperation between the transmission system operators of Estonia and Latvia**



[36]Available at: https://www.edigas.org/

The Estonian and Latvian operators began gradually transitioning to the new regulations as of 1 November, 2019, when they started concluding new transmission system use and balancing contracts; they launched the booking of capacities for first month and first quarter of 2020 on 1 December, 2019. Overall, in early 2020, a total of 21 contracts for the use of the transmission system and 21 balancing contracts were signed within the common Estonia–Latvia balancing zone; one user utilized its right to delegate its balancing obligations to another system user, in accordance with the Regulations. Of these 21 users, 19 have also concluded contracts for the use of the Inčukalns UGS.

Figure 16. **Main webpage of the common platform and capacity booking section**



11. GREEN GROWTH AND SUSTAINABLE DEVELOPMENT

11.1. EUROPEAN GREEN DEAL AND LATVIAN NECP

In December 2019, the European Commission published a plan for environmental and climate protection: the European Green Deal[37], the purpose of which is to achieve a zero greenhouse gas emission level (climate neutrality) in the European Union by 2050. The European Green Deal is a strategy involving various legislative initiatives that will affect the energy sector through the following activities: increasing the share of renewables, improving energy efficiency, ensuring energy security and availability, setting up an integrated and networked energy market, and promoting innovation and research.

In 2019, the Ministry Of Economics developed a policy planning document, the Latvian National Energy and Climate Plan for 2021–2030[38] ('Latvian NECP'), which sets the goals for Latvia and the activities intended to accomplish them. The plan was submitted to the European Commission in accordance with the Regulation of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action. Latvia's NECP 2030 is the main document for defining the long-term energy and climate policy in Latvia, with a vision of sustainable, competitive, safe, and climate-neutral economic development.

Because gas infrastructure plays a major role in achieving the goals of a climate-neutral economy, supporting reductions in emissions across all sectors of Latvia's economy at the lowest cost possible, Conexus has identified three key areas for further growth:

Gas infrastructure development

Conexus plans to introduce renewable energy resources in the gas system as part of developing gas infrastructure. A study about the production of biogas in Latvia was conducted in 2019, in conjunction with the Latvian Biogas Association. It revealed that the cost of a single unit of bio-methane in Latvia is lower than elsewhere in Europe, implying a potential for local bio-methane producers to sell it to other countries in the region using the Conexus transmission system via Certificates of Origin. An alternative advantage is to setup a corresponding network of gas resupply stations which would allow for bio-methane to be successfully used as a fuel for road vehicles in Latvia.

Long-term, Conexus sees potential in developing Power-to-Methane technology and, furthermore, after conducting a study of its possible impact on the Inčukalns UGS and the transmission systems, and after the gas quality standard is harmonised among the Baltic States, Finland, and Poland, in the possibility of introducing hydrogen into the overall gas system or setting up an alternative infrastructure for hydrogen. In view of the geological features of Latvia, including the ability to set up new underground storage facilities, it is necessary to assess the possibility of harnessing them in the application of carbon capture and storage (CCS) technology. This technology could enable solutions for capturing and storing CO_2 generated by gas power plants and other sources, thus reducing the effective CO_2 emissions. In planning the coordinated development of gas and electric power infrastructure in the context of carbon-neutral energy management and storage, optimal use of the already available infrastructure will be ensured, to avoid redundant investments. In view of gas stability and flexibility and the ability of gas storage facilities to store energy long-term (compared to solutions for storing electric power), the electric power generation and heating sectors will be able to continue benefitting from carbon-neutral gaseous energy sources.

The Inčukalns UGS fulfils a function guaranteeing energy security in Latvia and the Baltics; however, it also provides previously unappreciated economic benefits in the field of electric power generation and transmission. The results of the 2019 Artelys study, 'Value of the gas storage infrastructure for the electricity system', commissioned by Gas

[37]European Commission website. Available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

[38]Website of the Ministry of Economics. Available at: https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

Infrastructure Europe[39], which were presented by the European Commission and the European Association of Gas Market Participants during the 33rd Madrid Forum, show that a more than 10% reduction in the capacity of European storage facilities requires a large amount of investments in the electric power sector; for example, lowering the capacity of European storage facilities by 30% would lead to 55 billion euros required in investments and 8 billion a year in operational costs.

Transport network development

Because the road transport sector (which traditionally uses oil products as its source of energy) is the biggest energy consumer in Latvia, and because of the micro-particle pollution caused by this sector, it is considered to be the biggest source of harmful emissions in the country. Replacing oil products with gas would reduce the amount of such emissions and improve air quality – and as the proportion of 'green gases' in the system grows, the use of gas as a fuel will speed up the progress towards the target of carbon neutrality in the transport sector even further. In order to accomplish this task, Conexus supports the development of a network of compressed and liquified gas (CNG, LNG), bio-CNG, and bio-LNG, as well as hydrogen stations for vehicles. In order to promote the interest of companies in gas-based refuelling stations and in developing the corresponding road vehicles, Conexus has prepared a map[40] with possible locations for connections with the transmission system that would potentially result in lower connection costs.

Energy affordability

At the moment, Latvia is one of Europe's poorest countries in terms of per-capita consumption of energy. Because energy enables even and consistent growth of all sectors of the economy, the competitiveness of the country cannot be built upon consumers without a reliable supply of energy, which would then further aggravate energy poverty. This is why in implementing new technologies, it is necessary to emphasise the national and regional priorities, including their economic, geological, and geopolitical components. Conexus is interested in actively participating in the implementation of international projects and integrating into regional markets. Participating in international activities enables Latvia to be more successful in protecting its national interests through the development of solutions in conjunction with the other states in the region.

11.2. ENVIRONMENTAL AND ENERGY RESOURCE MANAGEMENT

As part of promoting sustainable growth of the Company, Conexus has implemented, certified, and maintains an integrated management system that encompasses environmental management, energy management, occupational health, and safety management systems.

The integrated management system of the Company used to be certified only partially: the Inčukalns UGS facility has been certified according to ISO 14001 (Environmental management) since 2004, and according OHSAS 18001 (Occupational health and safety management), since 2005. Since 2017, the entire Company has been certified as complying with the requirements of the ISO 50001 (Energy management) standard.

In 2019, in order to establish a centralised management system for natural gas transmission and the Inčukalns UGS and to certify the system in accordance with current international standards, the Company underwent a certification audit; it has since implemented an integrated management system that complies with international standards:

- ISO 14001:2015 (Environmental management);
- ISO 50001:2018 (Energy management);
- ISO 45001:2018 (Occupational health and safety management).

The implementation and maintenance of the integrated management system has improved the Company's environmental performance, working towards the requirements for reducing pollution, ensuring effective use of energy resources, and increasing the level of employee responsibility in terms of the quality of their work.

[39]European Commission website. Available at: https://ec.europa.eu/info/sites/info/files/energy_climate_change_environment/events/presentations/02.b.03_mf33_background_-_gie_-_artelys_study_capacity_value_of_gas_storage.pdf

[40]Conexus website. Available at: https://www.conexus.lv/pieslegumi-parvades-sistemai

11.3. REDUCTION OF METHANE EMISSIONS INTO THE ATMOSPHERE

Well-organised management and reduction of methane emissions is one of top priorities for the European gas industry. Reducing methane emissions results in a financial benefit and raises the overall level of safety in the industry. However, reducing methane emissions is more and more seen as a proactive, short-term measure against climate change and as a tool that increases the environmental value of gas.

Conexus continuously implements technically and economically viable measures to reduce the amount of methane emissions in the environment:

- reducing gas pressure in the line to the minimum possible level before any work involving the release of gas into the atmosphere;
- using special equipment and methods for making repairs and upgrades that make it possible to carry out work without draining gas from the pipeline;
- when draining gas from multiple sections of gas lines in the transmission system, use the gas present in the neighbouring sections to fill the drained sections with gas after repairs or renovation;
- when blowing gas through the flowlines and connecting pipelines of the storage system, direct the gas into the transmission system;
- partially reducing gas pressure in the pipelines and facilities of the storage system with the gas transferred to the transmission system;
- in order to prevent possible emissions of natural gas in the event of breakdowns in the transmission and storage systems, the Company regularly renovates cathode protection stations, anode earthing, boreholes, and gas collection stations; connects flowlines and compressor stations; and conducts gas pipeline diagnostics and scheduled pipeline insulation repairs;
- using highly sensitive leak detectors and conducting immediate repairs of any leaks found.

Preventive activities to reduce the amount of methane released into the environment are carried out at the same time, including:

- the deployment of new production equipment in the gas transmission and storage systems, reducing the amount of methane emissions both as a result of the operation of this new equipment and during its inspections;
- the possibility of using compressed air (instead of natural gas) to operate the starters of the compressor unit 2 equipment within the gas storage system, or replacing pneumatic starters with electrical ones, has been reconsidered;
- in the gas transmission, the possibility of burning natural gas when draining gas from sections of pipelines within the transmission system has been reconsidered.

12. SYSTEM SECURITY

12.1. PHYSICAL FLOW SECURITY

Conventional N-1 calculation

The functional capability of the natural gas system in the event of failure of one of its facilities has been assessed in accordance with the supply security regulation[41], which is guided by the N-1 principle, i.e. operating failure in a region's single largest natural gas infrastructure. The N-1 calculation is theoretical in nature, describing the technical capacity of a natural gas infrastructure to meet the total demand for natural gas within a certain area, assuming that on a day with the highest demand in the last 20 years, the biggest interconnection in the natural gas supply infrastructure becomes unavailable.

N-1 makes it possible to assess the level of protection for natural gas consumers, i.e. the level of security of the natural gas infrastructure in the area in question, expressed as a percentage that takes into account the characteristic values of various natural gas system parameters. The N-1 calculation formula and the explanations for the elements calculated are provided in Annex 2, while the results of N-1 calculations at different fill levels of the Inčukalns UGS are provided in the table. For a full calculation of the N-1 values, see Annex 3.

N-1 calculation results based on the Inčukalns UGS fill level

Inčukalns UGS fill level	N-1 value[42]
30%	170.2%
100%	193.21%

The N-1 value is directly proportional to the fill level of the Inčukalns UGS. In accordance with the supply security regulation, the value exceeds the minimum specified in it in both scenarios. The estimates show that the security level for natural gas supply in Latvia is high, though N-1 does not offer a complete picture of the overall natural gas supply security in Latvia. The projected capacity values for the system used in the N-1 calculation do not reflect the availability of natural gas at the corresponding infrastructure entry points, only assessing the technical capabilities of the natural gas transmission system instead.

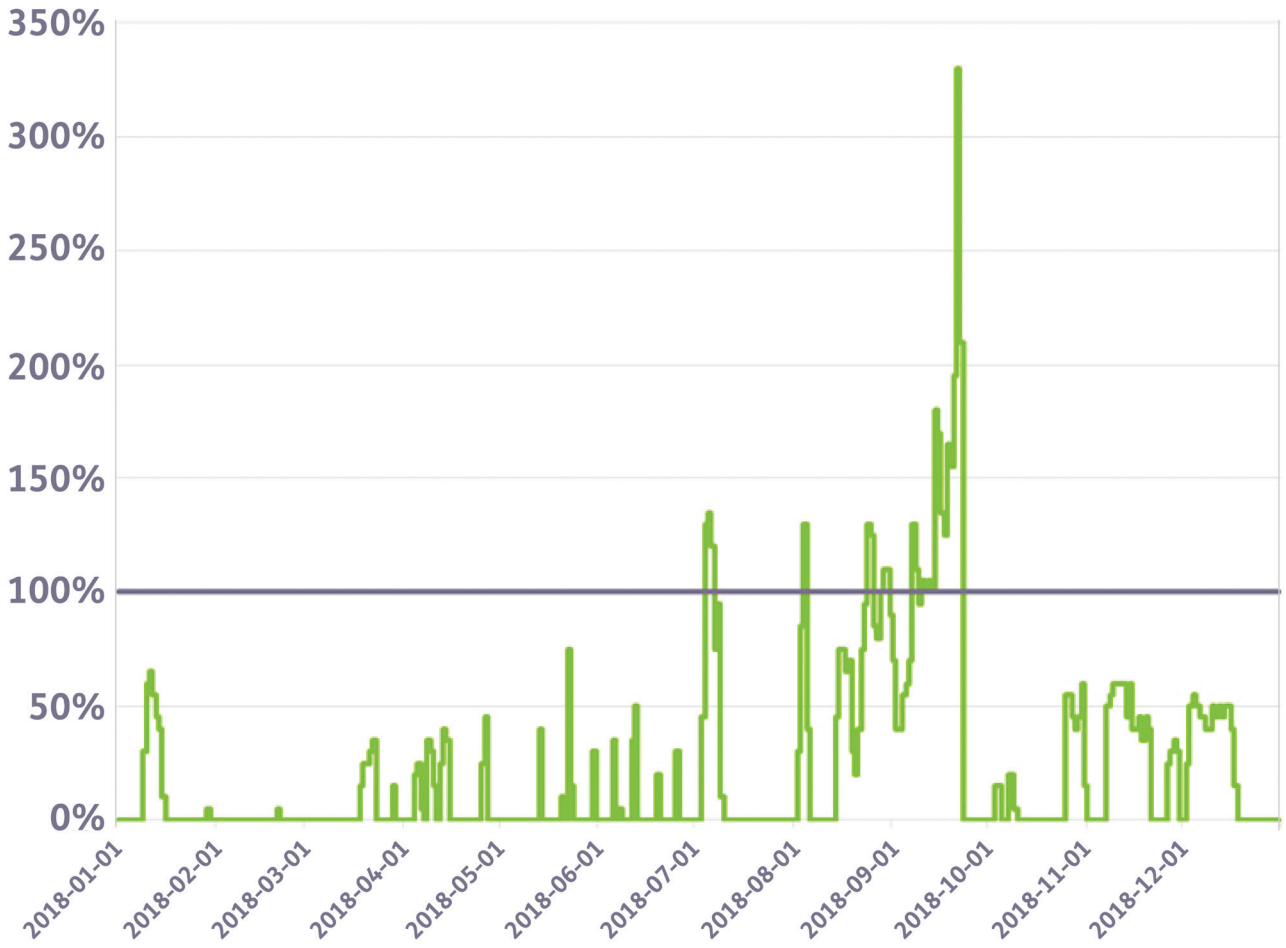
The N-1 estimate does not account for the seasonal nature of the natural gas system: in Latvia's case, gas is injected in the Inčukalns UGS in summer, and in winter the gas is withdrawn from that facility to supply it to the Baltic region. It must also be pointed out that in summer, when the natural gas is injected into the Inčukalns UGS, the Latvian natural gas transmission system continuously works at a higher load than in winter, when the natural gas is withdrawn from the Inčukalns UGS. The fill level of the Inčukalns UGS directly affects the operational capacity of the natural gas transmission system, because it determines the amount of natural gas available for withdrawal on any single day, and indirectly influences the pressure level in the natural gas transmission system. Thus, it is necessary to assess the security of natural gas supply, taking into account the seasonal nature of the natural gas supply system in Latvia, and the higher impact that the summer N-1 value has on the security of the supply in winter than the winter N-1 value.

[41]Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October, 2017, concerning measures to safeguard the security of gas supply

[42]According to the requirements of the supply security regulation, N – 1 ≥ 100 %

If the actual ability to receive natural gas was considered in the N-1 calculation, the N-1 value would only comply with the requirements of the supply security regulation during certain time periods. Because the calculation and publication of the natural gas transmission system technical capacity values in accordance with the CAM NC requirements[43] began only on 1 May, 2017, the N-1 calculations provided in the figure below begin on that date. The increase in N-1 observed in November is associated with the reduction in the technical entry capacity at Korneti before the beginning of the repairs in Russia's transmission system and with the special features of the N-1 calculations.

Figure 17. **Daily N-1 value, taking into account the actual availability of infrastructure and natural gas**



[43]Commission Regulation (EU) 2017/459 of 16 March, 2017, establishing a network code on capacity allocation mechanisms in gas transmission systems

ENTSOG TYNDP 2017 single largest infrastructure disruption method

In its 10-year network development plan (TYNDP 2017), ENTSOG included a new N-1 calculation method, the Single Largest Infrastructure Disruptions method (SLID). The method models a situation involving the entry capacity of the transmission system, the internal demand in the country, and infrastructure disruptions, whereby one of the major gas supply infrastructure facilities is unavailable or not operational.

In Latvia, the Inčukalns UGS is traditionally considered to be the biggest natural gas infrastructure facility. However, the operation of the Inčukalns UGS depends on the fill level of the storage facility. Because in summer, the storage facility is mostly filled through the Korneti entry point, it must be assumed to be the largest element of the natural gas system infrastructure. It must also be taken into consideration that over the last 20 years, no disruptions that would jeopardise the security of the infrastructure have taken place at the Inčukalns UGS. The technical capacity of the Latvian natural gas transmission system at its entry points is shown in Figure 18.

The total design capacity of the Inčukalns UGS is 24 219 GWh; during the natural gas injection season (between 1 June and 15 October, 2018), it is possible to inject 17 954.5 GWh through the Korneti entry point, which makes up 74.13% of the maximum capacity of the facility, while a total of 8 538.8 GWh can be injected through the Kiemenai entry point, i.e. 35.26% of the maximum capacity of the Inčukalns UGS.

Based on the SLID method included in ENTSOG TYNDP 2017, and the above explanation, the Korneti entry point is assumed to be the largest element of the natural gas supply infrastructure. The technical capacity of the Latvian natural gas transmission system at its entry points, calculated according to simulations, is shown in Figure 19.

Figure 18. **Technical capacity of the Latvian natural gas transmission system at its entry points, GWh per day**

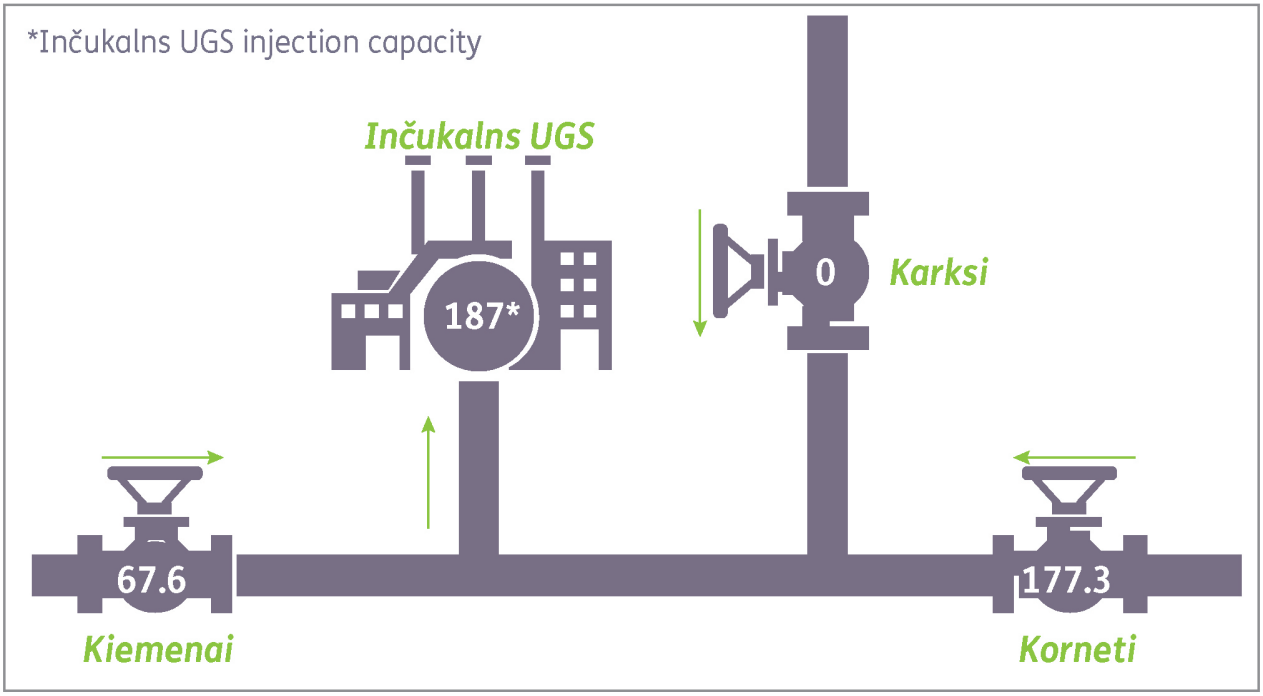
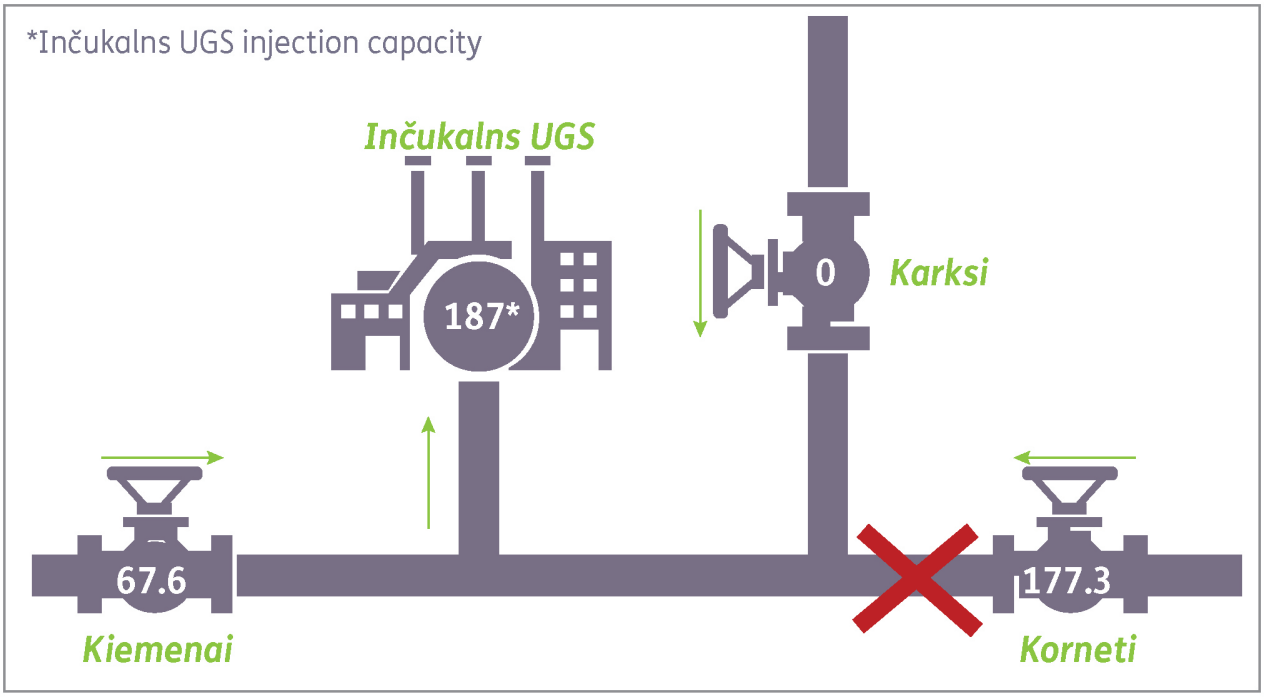


Figure 19. **Technical capacity of the Latvian natural gas transmission system at its entry points, calculated according to simulations, GWh per day**



The SLID calculations assume that the supply of natural gas is disrupted at the Korneti entry point, meaning that the only source of natural gas supply remaining is Kiemenai, which can inject 8 538.8 GWh into the Inčukalns UGS (35.26% of the maximum capacity) during the injection season. In order to ensure a stable gas supply in the winter season in Latvia and to ensure continuity in the operating modes of the storage facility, the natural gas amount accumulated in the Inčukalns UGS at the beginning of the heating season must be at least 7 400 GWh.

During the 2017/2018 winter season, the total consumption of natural gas in Latvia was 10 799.5 GWh (of which 8 930.6 GWh was received from the Inčukalns UGS, while the remaining 1 868.8 GWh came from other sources), which is 23.6% more than what can technically be injected in the Inčukalns UGS according to the SLID estimate. Furthermore, according to the 2016 study, 'Joint Risk Assessment of the Gas System of Estonia, Finland, Latvia and Lithuania', by the European Joint Research Centre, the total amount of active natural gas at the beginning of the winter season must be at least 8 261.816 GWh, assuming high demand.

If in the summer no natural gas is supplied to the Inčukalns UGS via the Korneti point (from Russia), then in order to ensure the supply of natural gas during the heating season in Latvia at least 7 400 GWh must be supplied to the Inčukalns UGS via the Kiemenai entry point throughout the injection season and there must be an option to supply natural gas from Lithuania in winter.

In accordance with Section 3 (f) of Article 8 of Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July, 2009, on conditions for access to the natural gas transmission networks and on repealing Regulation (EC) No 1775/2005 (Text with EEA relevance), ENTSOG must prepare annual summer and winter supply outlooks; such summer-season documents shall be named the Summer Review and Summer Supply Outlook[44].

[44]ENTSOG website. Available at: https://www.entsog.eu/outlooks-reviews

According to the 2020 ENTSOG Summer Outlook:

- Of all the EU member states, Latvia is the only one that will not achieve the natural gas injection target of 90% of the active natural gas in the storage facility. The reasons for this are the entry capacities of the current interconnections and the fact that the natural gas intended for the NW part of Russia will not be injected into the Inčukalns UGS moving forward.
- Due to the pipelines in the NW of Russia have undergone a renovation, the pipeline natural gas supply capacity is now sufficient there, and Russia no longer uses Inčukalns UGS to supply its consumers.
- In a situation where the Inčukalns UGS is not used to inject natural gas from Russia, the maximum fill level of the storage facility as of 30 September cannot be more than 55% (14 TWh).
- The capacity of the interconnection between Latvia and Lithuania to fill the storage facility is insufficient at the moment.

12.2. SYSTEM CYBERSECURITY

Having assessed the Company's significance in the national economy, the Ministry of Economics assigned it the status of an essential service provider in accordance with Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July, 2016, concerning measures for a high common level of security of network and information systems across the Union. This status involves closer cooperation with the Information Technology Security Incident Response Institution and meeting additional organisational and technical requirements.

Furthermore, in 2019, in order to ensure the confidentiality and integrity of communication with system operators and users, and in accordance with Commission Regulation (EU) 2015/703 of 30 April, 2015, establishing a network code on interoperability and data exchange rules, the Company developed a new platform for transmission system users in conjunction with the Estonian transmission system operator Elering, thus improving the security of the submission of information. At the same time, the Company expanded the use of the EDIG@S data exchange protocol in accordance with the ENTSOG and ENTSO-E data exchange standards, e.g. using standard EDIG@S messages more widely in exchanging business data with the Estonian transmission system operator Elering.

12.3. SYSTEM PHYSICAL SECURITY

Active efforts to improve the physical security of the Company's infrastructure facilities began in 2019. In order to enable Conexus to resist today's physical security threats, and to ensure a professional approach and the implementation of the latest security solutions, an independent third-party audit of the current physical security systems and solutions (including fire safety, video surveillance, access control, and security alarm systems, and the physical security services used) took place during the reporting period. The upgrade of the security systems is slated to start in 2020.

At the same time, the Company was working on updating the civil defence plans for its infrastructure facilities defining appropriate procedures in the event of emergencies and threats of emergency. In accordance with the plans, Conexus employees are instructed in the matters of civil defence and regularly undergo training intended to test their actions in the event of an emergency and to verify the adequacy of the civil defence plans. The State Fire and Rescue Service approved the current version of the Inčukalns UGS civil defence plan in July of 2019. The development of a single civil defence plan for the entire transmission system, to replace the plans used at its individual facilities, will continue into 2020.

In 2019, Conexus prepared an Inčukalns UGS security report assessing the risk of industrial emergencies at this hazardous site and developing and implementing measures to minimise this risk and to ensure the safety of employees, residents of neighbouring areas, and the general public in the event of an industrial emergency, protecting them against its harmful effects without losing the quality of the environment. The security report has been submitted for review by the State Environmental Monitoring Bureau.

13. PLANNED TRANSMISSION MEASURES IN THE EVENT OF MAXIMUM DEMAND

The 2016 Latvian plan of preventive action and plan of action in the event of a natural gas emergency is currently in effect; the Ministry of Economics developed it in conjunction with PUC and AS Latvijas Gāze, in accordance with the 28 October, 2015, review by the European Commission and Regulation (EU) No 994/2010 of the European Parliament and of the Council of 20 October, 2010, concerning measures to safeguard the security of the gas supply and repealing Council Directive 2004/67/EC. Nevertheless, the measures specified in the 2016 plan of emergency action cannot be introduced because of the changes on the natural gas market in Latvia that have taken place since the approval of the plan, as AS Latvijas Gāze no longer fulfils the functions of a transmission system operator, distribution system operator, and storage facility operator.

The supply security regulation[45] took effect on 1 November, 2017, introducing the duty for the competent bodies of member states to develop new plans of preventive action, which must include measures to minimise and eliminate any natural gas supply disruption risks identified during risk assessments and new plans of emergency action that must specify the course of action if a disruption in the supply of natural gas does occur. In Latvia, the competent authority is the Ministry of Economics. After the plans are drafted, they must be submitted for review by the European Commission, which may issue an opinion recommending that the plans be revised.

Compared to past regulations governing the security of natural gas supply, the supply security regulation bolsters regional cooperation among EU member states, setting up groups of member states that share natural gas supply risks and requiring that the plans of preventive and emergency action contain sections on regional and international measures. The supply security regulation also introduces a solidarity mechanism, according to which if a member state experiences natural gas supply disruptions that are so significant that the state cannot supply its users protected by solidarity (defined in Section 6 of Article 2 of the regulation — usually households, though member states can choose to specify in their own way; providers of various essential utility services and central heating facilities are also considered users protected by solidarity), then the state is entitled to ask its immediate neighbours for aid in supplying natural gas; such neighbours are required to provide such aid, even if they would be required to restrict the supply of natural gas to their own users that are not consumers protected as part of solidarity, and even if those neighbours begin to experience an energy crisis themselves. The countries that use the solidarity mechanism must remunerate the countries supporting them accordingly.

The security of gas supply regulation defines three levels of energy crisis:

- An early warning where there is concrete, serious and reliable information that an event which is likely to result in significant deterioration of the gas supply situation may occur and is likely to lead to the alert or the emergency level being triggered; the early warning level may be activated by an early warning mechanism.
- An alert where a disruption of gas supply or exceptionally high gas demand which results in significant deterioration of the gas supply situation occurs, but the market is still able to manage that disruption or demand without the need to resort to non-market-based measures.
- An emergency where there is exceptionally high gas demand, significant disruption of gas supply or other significant deterioration of the gas supply situation and all relevant market-based measures have been implemented, but the gas supply is insufficient to meet the remaining gas demand so that non-market-based measures have to be additionally introduced with a view, in particular, to safeguarding gas supplies to protected customers

The actual maximum demand is achieved only at the levels of alert and emergency. At the early warning level, there are only reasonable suspicions that it may occur.

At the level of alert, any disruptions are remedied by natural gas traders. The natural gas transmission system operator mostly operates in normal mode (business as usual), although there is a possibility of physical congestion when the capacity of a certain part of the natural gas transmission system must be restricted, because demand exceeds the technical capacity that the system operator can safely provide.

In 2019, Conexus continued its work in conjunction with the Ministry of Economics, developing a new Plan of Preventive Action and a Plan of Emergency Action which comply with the requirements of the security of gas supply

[45]Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October, 2017, concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 (Text with EEA relevance)

regulation. In 2019, Latvia, Estonia, and Lithuania jointly developed the regional dimension section of The Plan of Emergency Action.

The Company proposed that it be included in The Plan of Emergency Action as the crisis manager during the early warning and alert stages, mainly functioning as the body for exchanging information and monitoring the situation with natural gas supply, collecting information concerning the management of the energy crisis (which the Company could obtain through its own means and which could be provided to the Company by the natural gas distribution system operator, natural gas traders, and major natural gas consumers), and providing it to the Ministry of Economics.

During the reporting period, Conexus created and implemented a supervision system used to monitor the Inčukalns UGS and the entire gas supply system in Latvia. The main task of the supervision system is to follow the fluctuations in demand for natural gas in Latvia and the Baltic region during the withdrawal season, with the goal of assessing the capability of the natural gas system to fulfil the orders and demand of system users in a timely manner. The supervision system also includes Conexus experts' analysis of the demand trends for the subsequent two weeks, taking into account fluctuations in ambient temperature, the withdrawal capacity of the Inčukalns UGS, and orders by natural gas system users.

Figure 20. **Natural gas consumption and withdrawal forecast for Latvia**

		11.03.	12.03.	13.03.	14.03.	15.03.	16.03.	17.03.	18.03.	19.03.	20.03.	21.03.	22.03.	23.03.	24.03.
Diennakts vidējā temperatūra Average daily temperature	°C	-1	-3	1	4	4	4	4	3	1	3	4	4	3	3
Izņemšanas apjomu prognoze no krātuves Withdrawal forecast from storage	MWh/d	88 803	97 097	87 098	69 703	68 664	86 613	87 212	90 389	96 793	91 354	90 067	93 873	97 301	98 428
t.sk. Latvijas dabasgāzes patēriņa prognoze incl. Forecast of Latvian gas consumption	MWh/d	60 235	64 352	52 001	42 394	43 767	43 081	43 767	46 168	53 716	47 198	43 424	43 767	44 110	44 110
Kopējā Inčukalna PGK izņemšanai pieejamā tehniskā jauda / Technical available withdrawal capacity of Inčukalns UGS	MWh/d	127 410	124 788	124 264	122 691	121 642	120 594	118 496	116 818	115 350	113 253	111 156	108 010	106 961	104 864
Dabasgāzes pieprasījuma koeficients Natural Gas Demand coefficient		70%	78%	70%	57%	56%	72%	74%	77%	84%	81%	81%	87%	91%	94%

In the event of an emergency, the State Energy Crisis Centre would be in charge of managing the crisis. Conexus is one of the Centre's members, in accordance with Section 8.13 of Cabinet Regulation 40 'By-laws of the State Energy Crisis Centre' of 29 January, 2002. The duties of the Company change in the event of a state of emergency, because disruptions in the supply of natural gas are sufficient enough that it is necessary to introduce measures outside the market: for example, consumption restrictions and the use of natural gas reserves.

The natural gas transmission system operator also has special duties in building up and storing natural gas reserves, related to energy crises. In accordance with Section 34^4 of Cabinet Regulation 312, 'Procedure for energy user supply and sale of fuel in the event of an energy crisis or threat to the state', of 19 April, 2011, the transmission system operator must provide and make sure that the Inčukalns UGS contains a reserve amount of natural gas equivalent to the standard gas delivery amount determined in accordance with Article 6 of the security of gas supply regulation. This reserve of natural gas is intended to supply the system's users with natural gas. It is created before the occurrence of a crisis and is continuously stored in the Inčukalns UGS, to be used during a crisis, if the Cabinet of Ministers decides to do so. After the state of emergency is declared, the natural gas distribution system operator is required to connect the natural gas distribution system operator to this reserve, in order to enable its further delivery to consumers of natural gas.

In accordance with Section 12^1 of Cabinet Regulation 312, 'Procedure for energy user supply and sale of fuel in the event of an energy crisis or threat to the state', of 19 April, 2011, the Company must ensure that during every withdrawal season at the Inčukalns UGS it must contain an amount of active natural gas that is no less than 3160 GWh (300 million m^3 of natural gas), intended to maintain the 24-hour withdrawal capacity of the Inčukalns UGS in the event of an energy crisis and to prevent the loss of natural gas supply in Latvia.

In 2019, Conexus participated in the Coherent Resilience 2019 natural gas supply security exercise organised by the NATO Energy Security Centre of Excellence and the European Commission Joint Research Centre; its participants played through scenarios associated with disruptions in the supply of natural gas. Participants in the exercise identified the risks and the actions of the parties involved that must be introduced in the documents governing natural gas supply security in the Baltic region, including The Plan of Emergency Action and The Plan of Preventive Action.

14. CONCLUSIONS

- The unified market for natural gas, operated by Finnish, Latvian and Estonian transmission system operators, has been successfully established. High activity of system users and considerable interest from Estonian and Finnish users in using Inčukalns UGS.
- It is necessary to begin the development of a Gas Market Law that must include the following:
  - Matters pertaining to the integration of the gas market of the Baltic States.
  - Clear regulations for the wholesale and retail markets of gas, in order to prevent wholesale transactions from being taxed multiple times before the natural gas is delivered to the end user on the retail market.
  - Production of bio-methane, bio-gas, and other alternative gaseous sources of chemical energy and their use within the unified market of the Baltic States and Finland.
- The Inčukalns UGS is the main element of the natural gas supply security system in Latvia and in the Baltics; it clearly demonstrated its ability to meet the demand for natural gas during the 2019 heating season and the high demand for the storage facility's capacity among market participants during the 2019 injection season. It is necessary to further develop the storage market model:
  - Introduce a market-based and cost-neutral, for the unified operator, solution able to ensure the sustainable operation of Inčukalns UGS and sufficient withdrawal capacity at Inčukalns UGS in the event of high demand. This shall replace the current solution (specified in Section 12^1 of the Regulation 312 of the Cabinet of Ministers , 'Procedure for energy user supply and sale of fuel in the event of an energy crisis or threat to the state', 19 April, 2011) by March 2022.
  - To evaluate the role of the storage facility in guaranteeing the generating capacity for electric power, based on the high correlation between the demand for electricity and natural gas, the planned 2025 conclusion of the Project of Common Interest cluster 4.8, 'Integration and synchronisation of the Baltic States' electricity system with the European networks', and the natural limitations of alternative sources of generating capacity (e.g. a low level of water reserves at hydropower plants).
- Working to develop the Latvian economy in a sustainable, competitive, secure, and climate-neutral manner, there is a need for further research into the decarbonisation of the gas network, developing new technologies for the production of gas by using renewables (e.g. biomethane and power-to-methane technology), as well as alternative uses for natural gas, with the biggest potential presented by using it to replace oil products in road transport.
- The application of seasonal factors to the entry points connected to the natural gas transmission systems of the neighbouring states achieves the intended effect in that the traders pay more attention to supply planning, resulting in the booking of capacity products for longer periods than merely the day ahead, as well as improvements in the overall foreseeability of Conexus' operations and the planning of supply security measures.
- The opening of the natural gas market continues positively affecting market liquidity, with an increase in the number of natural gas traders and the volume of VTP transactions, including transactions in the Latvian price zone of the GET Baltic exchange.
- It is necessary to prepare a new assessment of regional supply security risks that takes into account the Finnish market and the Balticconnector interconnection between Estonia and Finland that was put into operation on 1 January, 2020.
- The mid-term strategy of Conexus must be updated to include the goals of the Latvian NECP for 2021–2030 and the European Green Deal.

Riga, 12 May 2020

(Digital signature *)

Zane Kotāne
Chairperson of the Board

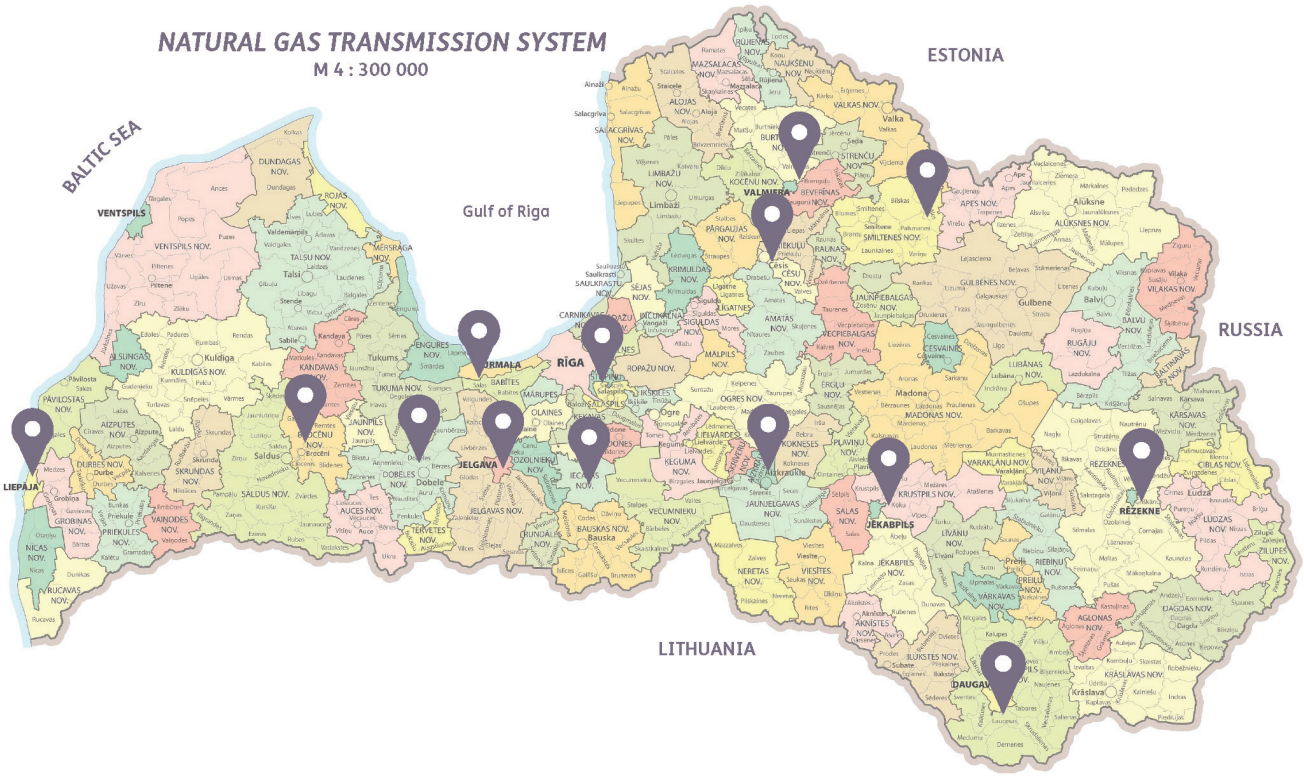
(Digital signature *)

Mārtiņš Gode
Member of the Board

* This document is signed with a security digital signature.

Annex 1

Map of the natural gas transmission system of Latvia, including the connection points



Annex 2

N-1 calculation formula

$$N\text{-}1\ [\%] = \frac{EPm + Pm + Sm + LNGm - Im}{Dmax} \times 100, N\text{-}1 \geq 100\%$$

Where:

EP_m — technical capacity of entry points (GWh/d), other than production, LNG and storage facilities covered by P_m, LNG_m and S^m, means the sum of the technical capacity of all border entry points capable of supplying gas to the calculated area;

P_m — maximal technical production capability (GWh/d) means the sum of the maximal technical daily production capability of all gas production facilities which can be delivered to the entry points in the calculated area;

S_m — maximal technical storage deliverability (GWh/d) means the sum of the maximal technical daily withdrawal capacity of all storage facilities which can be delivered to the entry points of the calculated area, taking into account their respective physical characteristics;

LNG_m — maximal technical LNG facility capacity (GWh/d) means the sum of the maximal technical daily send-out capacities at all LNG facilities in the calculated area, taking into account critical elements like offloading, ancillary services, temporary storage and re-gasification of LNG as well as technical send-out capacity to the system;

I_m — means the technical capacity of the single largest gas infrastructure (GWh/d) with the highest capacity to supply the calculated area. When several gas infrastructures are connected to a common upstream or downstream gas infrastructure and cannot be separately operated, they shall be considered as one single gas infrastructure;

D_{max} — means the total daily gas demand (GWh/d) of the calculated area during a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years.

Annex 3 (N-1 calculation)

N-1 estimated data at the 30% fill level of the Inčukalns UGS

Indicator	Value (GWh/d)
EP_m Pipeline interconnections — Entry capacity: ● from Russia, 188.5* GWh per day ● from Lithuania, 67.6 GWh per day	256.1
P_m	0
S_m	158 **
LNG_m	0
I_m	188.5 *
D_{max}	132.55

Notes
* Maximum technical capacity of the Korneti entry point. In winter, only 20–30 GWh can be obtained from Russia per day; the unavailability of the pipeline during the repairs was not taken into account.
** Indicator value at the 30% fill level of the Inčukalns UGS, in accordance with the updated storage facility curve.

$$N\text{-}1=\frac{256,1+0+158+0-188,5}{132,55}\times 100=170,2\%$$

N-1 estimated data at the 100% fill level of the Inčukalns UGS

Indicator	Value (GWh/d)
EP_m Pipeline interconnections — Entry capacity: ● from Russia, 188.5 GWh per day ● from Lithuania, 67.6 GWh per day	256.1
P_m	0
S_m	315 *
LNG_m	0
I_m	315 *
D_{max}	132.55

Notes
* Indicator value at the 100% fill level of the Inčukalns UGS.

$$N\text{-}1=\frac{256,1+0+315+0-315}{132,55}\times 100=193,21\%$$