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Is Natural Gas to Stay in the EU?

The Role of Gas in the Clean Energy World

Ex-Prime Minister of the Czech Republic
Ex-President of the European Council
Director of International Development & Public Affairs and Member of the Board of Directors Eustream Slovakia

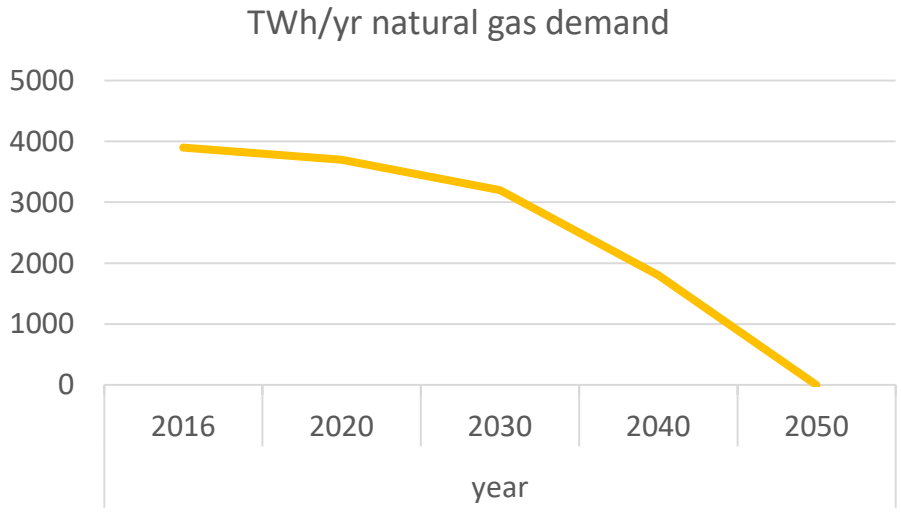
Budapest Energy Summit 2018

Yes, it is. It would be good to stay.

Gas Infrastructure 2050

Some main findings:

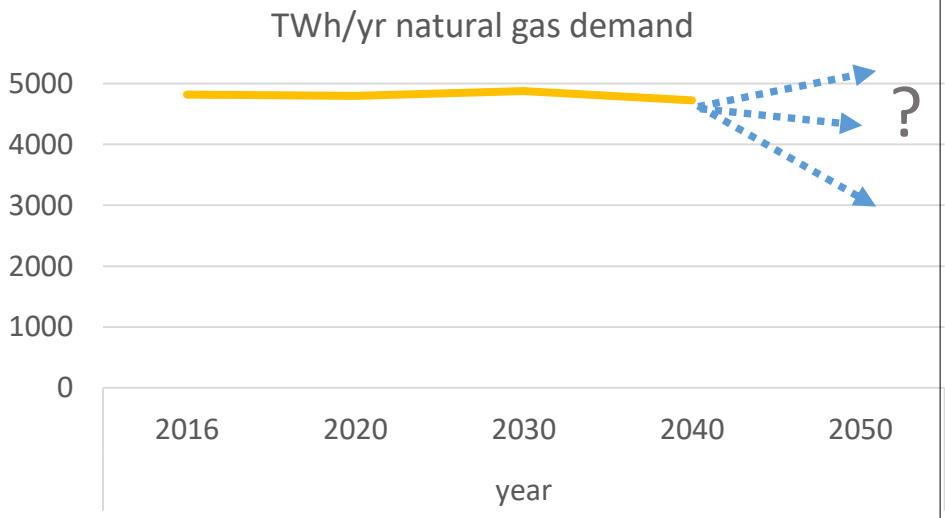
- Lower transported volumes would lead to higher grid tariffs
- Negative impact on gas prices/industrial competitiveness
- Low transmission due to local use of the gas



iea 2017 World Energy Outlook

Natural Gas remain solid due to:

- Replaces coal and nuclear in energy generation
- Provides flexibility for an increasing share of variable renewables
- Able to adapt to rapidly changing production prospects



EU Vision for a Clean Planet for All

November 2018

*"As Europeans, **we want to leave a healthier planet behind for those that follow**. We obviously cannot turn a blind eye to the climate challenge; we must look to the future."*

Jean-Claude Juncker, State of Union address
September 2018

The European Union has been at the forefront of addressing the root causes of climate change and the strengthening a concerted global response in the framework of the Paris Agreement. Our long-term strategy for the reduction of greenhouse gas emissions, as requested by the European Council in March 2018, confirms our lead in global climate action. It **presents a vision to achieve climate neutrality by 2050, through a fair transition encompassing all sectors of the economy**. It underlines the opportunities that this transformation offers to European citizens and its economy, as well as identifies and anticipates challenges along the road.

The strategy outlines a vision of the deep economic and societal transformations required, engaging all sectors of the economy and society, to achieve the transition to a climate-neutral economy. It does not set targets or propose new initiatives to be taken. Instead it seeks to ensure that this transition is socially fair – not leaving Europeans or regions behind – and enhances the competitiveness of EU economy and industry on global markets, securing high quality jobs and sustainable growth in Europe.

Our long-term strategy opens a thorough debate on how the EU should prepare itself towards the 2050 horizon. Reaching a climate neutral economy by 2050 is feasible from technological, economic and social perspective, but it requires deep societal and economic transformations within a generation.

Decarbonising the Energy Sector in EU

The present state of energy supply

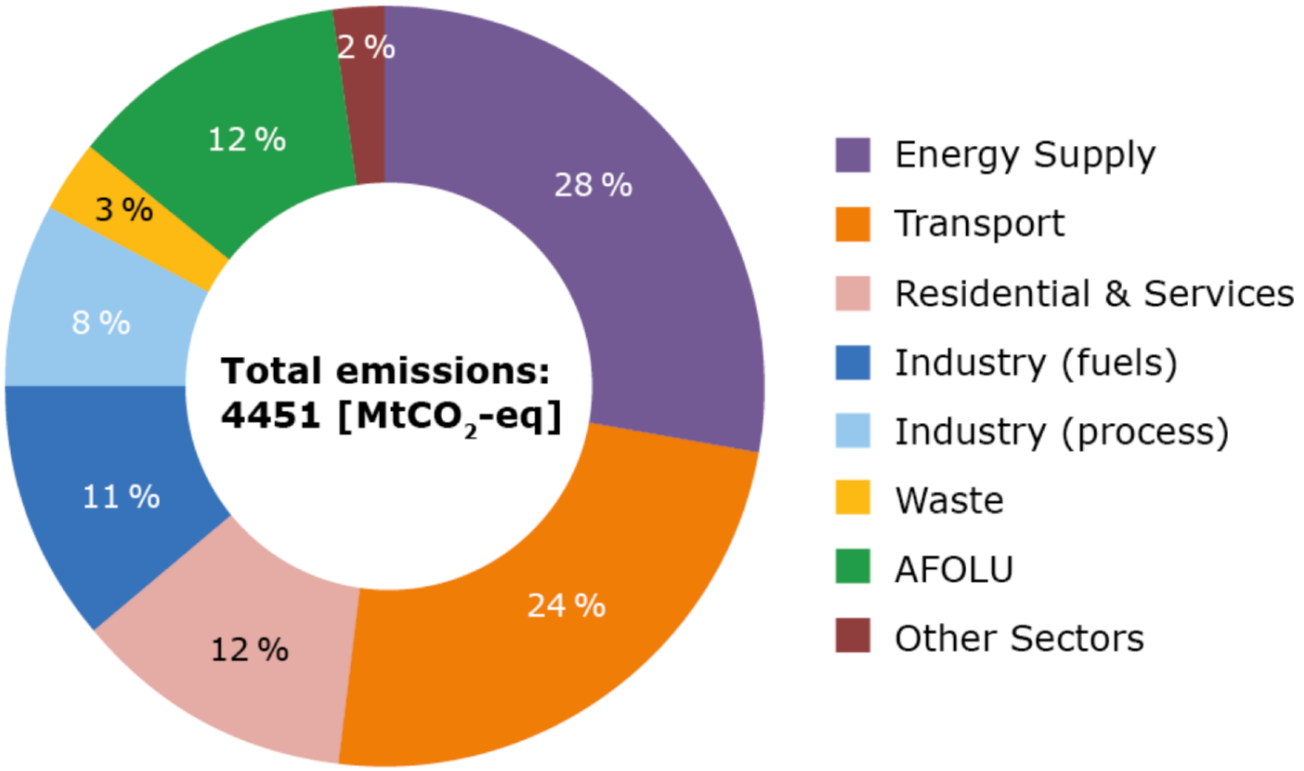


Figure 1: EU-28 greenhouse gas emissions by economic sectors.
Source: based on EEA, Eurostat and own calculations, 2015.

How to Achieve Decarbonising?

There are a number of different routes to producing liquid and gaseous fuels with minimal or even negative GHG emissions over their full life cycle:

- Hydrogen could be produced via low-carbon pathways such as electrolysis from renewable electricity or through alternative production processes (e.g. biomass gasification and carbon dioxide capture and storage (CCS) or thermochemical water splitting) to ensure a minimal or even negative emission impact. If further R&I achieves fast ramping and low capital costs of electrolysis technologies, hydrogen electrolysis could be an important source of flexible electricity demand, thus assisting the integration of large shares of variable renewable electricity sources.
- Methane and liquid fuels consist partially of carbon. However, if they are produced from zero-carbon hydrogen and CO2 captured directly from the air or from biogenic CO2 emissions such as off-gases from industrial fermentations, the net GHG emissions of production and use of these fuels would be close to zero.
- Finally, the conversion of biomass into gas or liquid fuels via the Fischer- Tropsch process or fermentation can be combined with CCS to capture and sequester part of the carbon contained in the feedstock biomass, thus yielding net negative CO2 emissions when accounting for CO2 uptake during biomass growth (IEA, 2011). These negative emissions could be an important contribution to compensating residual GHG emissions that are very difficult to mitigate, e.g. from agriculture or certain industry processes.

EU Environmental Targets vs. SR

- Targets resulting from the EU climate and energy policy by 2020, 2030 and 2050 low-carbon economy

	CO2*	CO2**	Renewables	Energy Efficiency
2020 EU	-20%		+20%	+20%
2020 SR		**+13%**	**+14%**	**+22.4% *****
2030 EU	-40%		+27%	+27%
2030 SR		**-12%**	**+14 to +27%**	**+22.4 to +27.0%**
2050 EU	**-80% to -95%**			
2050 SR		**?**	**?**	**?**

** from 1990 level*
*** Sectors out of the EU ETS*
**** Decreasing the final consumption from 11.6 Mtoe to 9.0 Mtoe*

- This is in line with EU leaders' commitment to reducing emissions by 80-95% by 2050 in the context of similar reductions to be taken by developed countries as a group.
- The Ministry of the Environment of the Slovak Republic is working on the preparation of the **Low-Carbon Strategy for the Development of the Slovak Republic until 2030 with a view to 2050** for selected sectors of economic activities. The low-carbon strategy will include effective and cost-effective measures in the industrial, energy, energy efficiency, transport, agriculture and forestry and waste sectors.

Environmental Targets in the Slovak Republic under Preparation

Switching to low-carbon energy based on the “Value for Money" principle

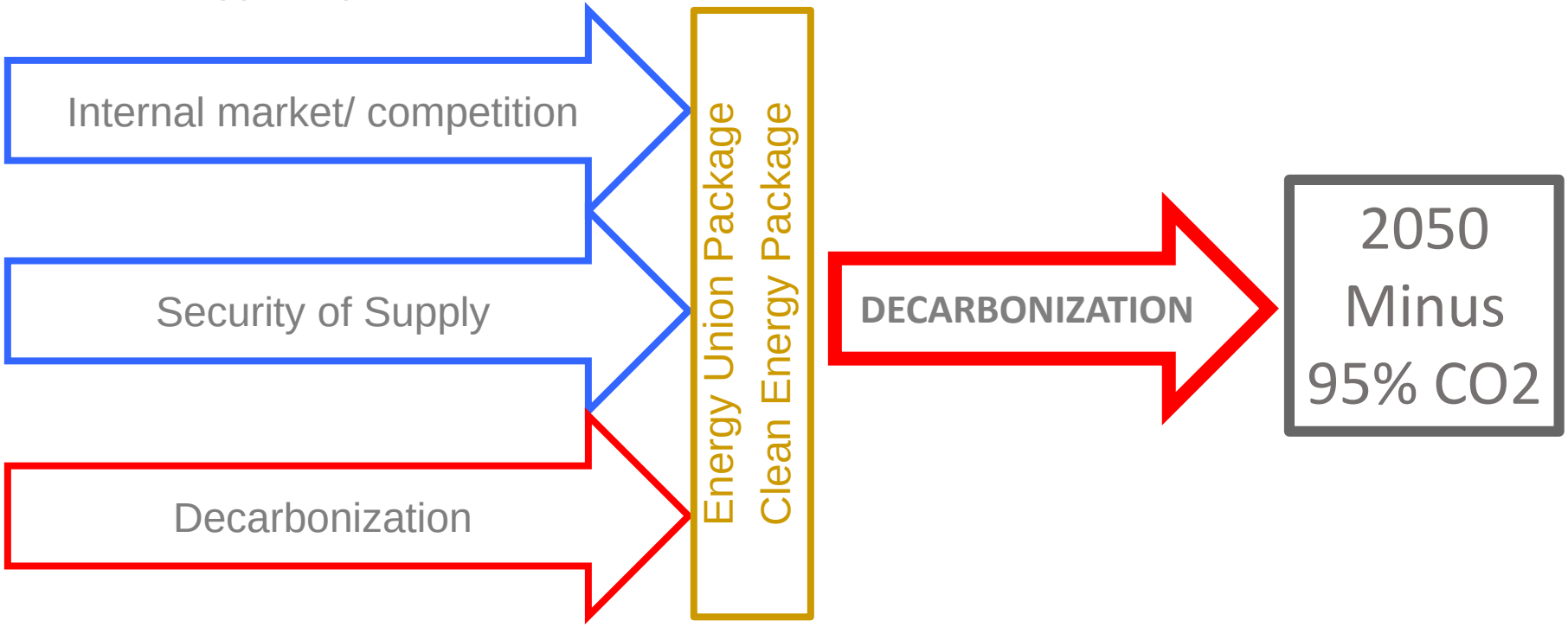
- Green energy requires additional costs => to minimize the impact on the living standard of the Slovak population;
- It is important that the transition is economically efficient (multiple choice based on the “Value for Money" principle)
- There are more valuation criteria:
  - Costs of energy savings (€ / MWh)
  - Costs to increase the share of RES (€ / MWh)
  - **Costs of CO2 savings (€ / tCO2)**

- The main criterion – Costs of CO2 savings - reflects the cost of renewable energy technologies as well as the contribution to the improvement of the environmental climate;

- In accordance with the principle of “Value for Money” the cheapest environmental technologies should replace the most pollutant sources;

Gas in Europe faces challenges

EU energy objectives:



We have to face it:

Short-term steps: Finalize infrastructure (North South corridor, LNG terminals, interconnectors)
Implement properly acquis communaitaire
Depoliticize

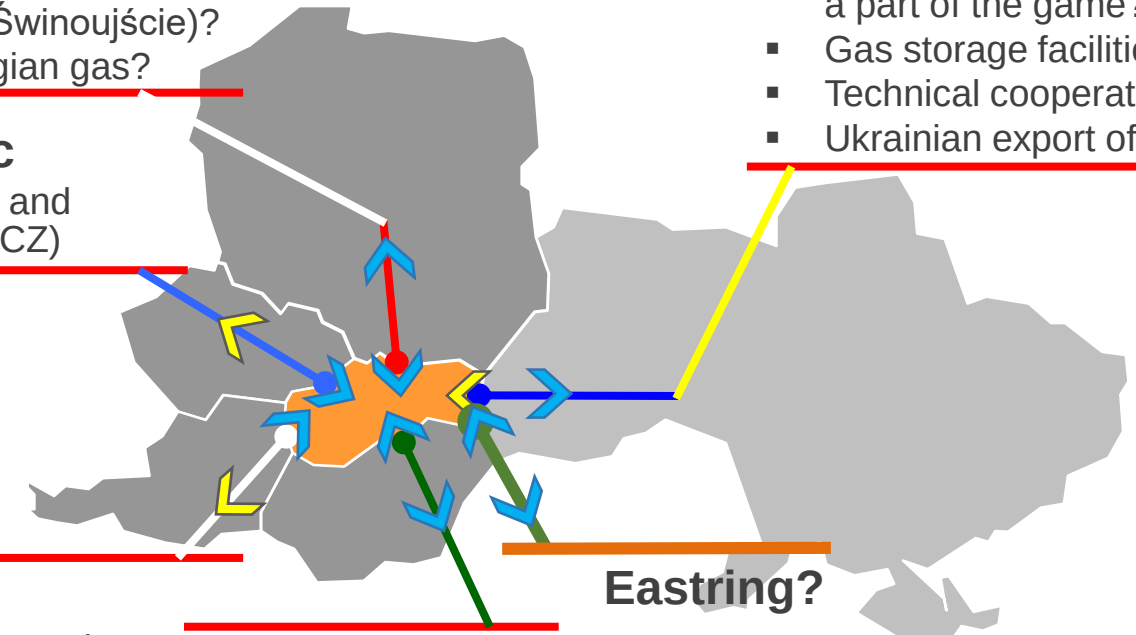
Medium-term steps: Replace natural gas with synthetic gas, biogas, methanisation
Advocate natural gas as a suitable substitute continuously

Results of Eustream Infrastructure Optimization after NSII

Poland
- SK/PL interconnector
- Access to LNG (Świnoujście)?
- Access to Norvegian gas?

Czech Republic
Reverse flow (Yamal and Nord Stream via DE/CZ)

Ukraine
- Reverse flow at SK/UA border
- Some capacity from Russia?
- New conflict in Kerch Strait as a part of the game?
- Gas storage facilities?
- Technical cooperation SK/UA?
- Ukrainian export of gas?



Austria
- Baumgarten Hub
- Reverse flow (WAG and TAG via DE/IT)

Hungary
- SK/HU interconnector
- Access to LNG (Krk)?

Eastring?

Main gas flow directions before Nord Stream

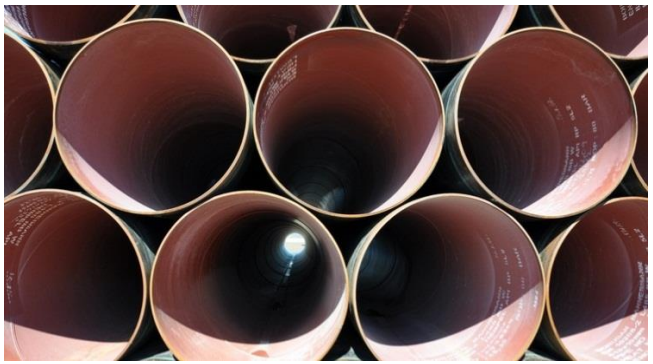
Development driven by Nord Stream

- The new major gas infrastructure projects represent the driving force of existing transmission systems development.
- In order to be competitive with new parallel gas transmission routes, the optimization of existing routes is a must.

Region is vulnerable, North South (Vertical) corridor is needed

Slovak - Polish Interconnector

Last month construction started



Key Facts

CS1 Veľké Kapušany (SK) – Strachocina (PL)

Length: 164 km (106 km at SK side)

Diameter: DN 1,000 mm

Compression power : 32 MW (16 MW at SK side)

Flow: Bi-directional

Technical capacity: 4.7 bcm (to SK), 5.7 bcm (to PL)

Total CAPEX: EUR 437.1 mil.* (current estimate EUR 138.1 mil. at SK side)

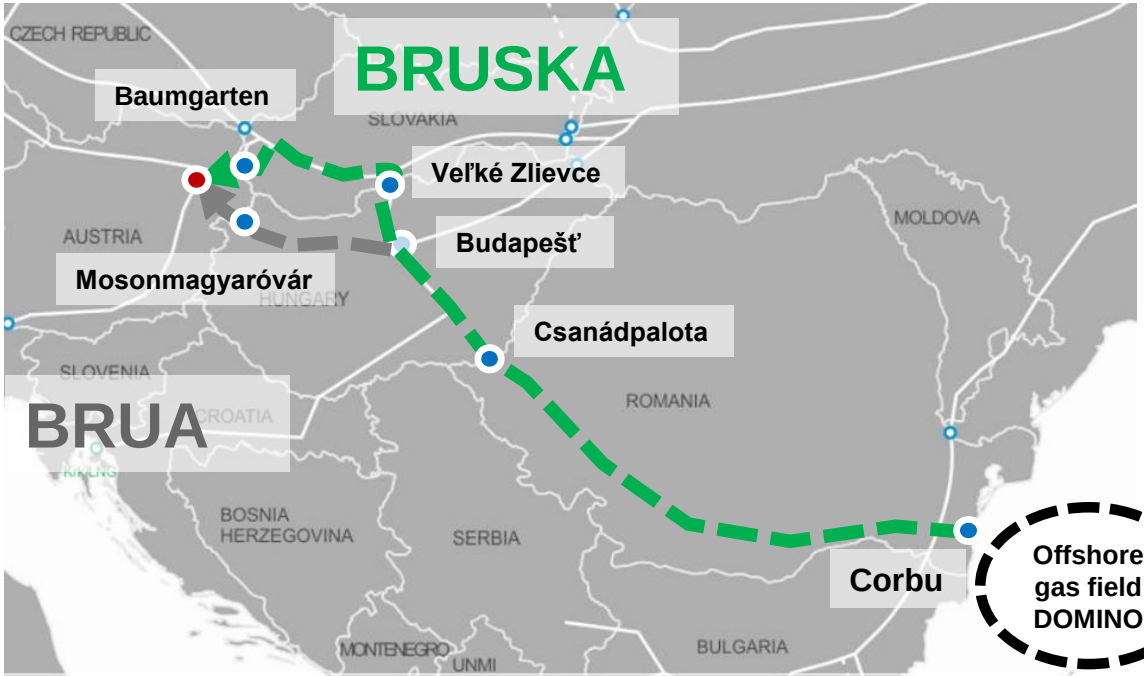
Approved grant: (CEF fund) of EUR 2.3m for studies and EUR 55.2m for construction works

EIB funding: 70 mEUR

- *Official CAPEX from CEF grant application. CAPEX at PL side covers also required upgrades and adjustments of the existing system*

BRU(SK)A

Pipeline Project Represents New Capacity Booking from the Black Sea



BRU(SK)A

Capacity: 4.4 bcm/y
Length: 550 km (RO section)
Diameter: DN800
Mode: one-directional flow
COD: 2022

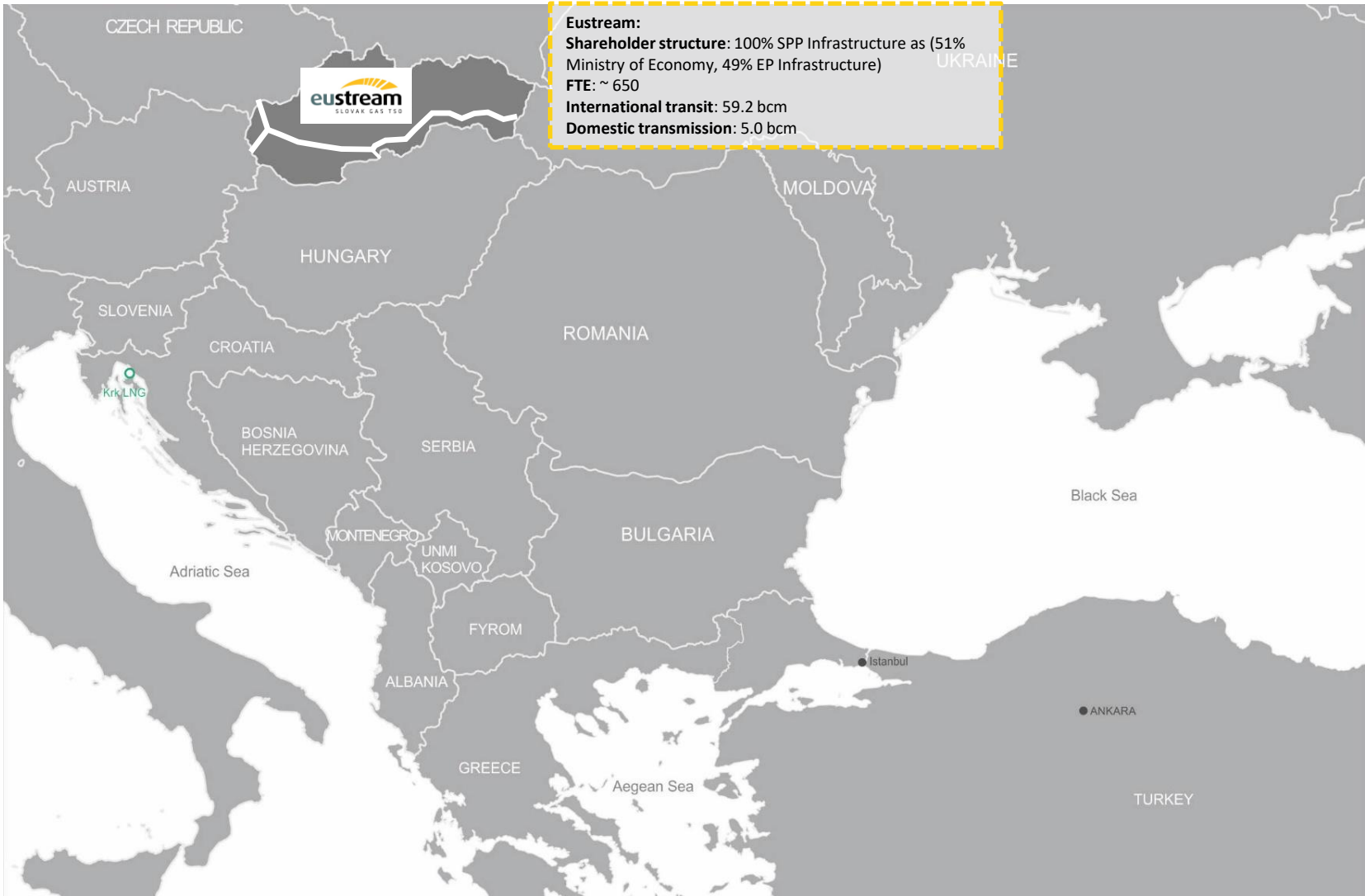
DOMINO Gas Field

Located: continental shelf of the Black Sea
Discovered: 2012
Developed: Petrom and ExxonMobil
COD: 2020
Proven Reserves: ca. 41 – 83 bcm

- BRU(SK)A was formed from the BRUA pipeline project where problems with Open Season procedure have occurred (HU section at the Mosonmagyaróvár) in late 2017 due to missing infrastructure in HU section;
- HU NRA did not approve the incremental process at Mosonmagyaróvár in April 2018;
- BRU(SK)A will connect Eastern and Central Europe to the gas fields in the Black Sea;
- Transgaz received 178 mEUR from the EU towards the cost of the BRU(SK)A project (RO section);
- In October 2018 Eustream have obtained binding demand for transmission capacity in direction HU>SK via Veľké Zlievce (entry), total demand has exceeded capacity of 4.29 bcm/y for 7 years starting from GY 2022/23;

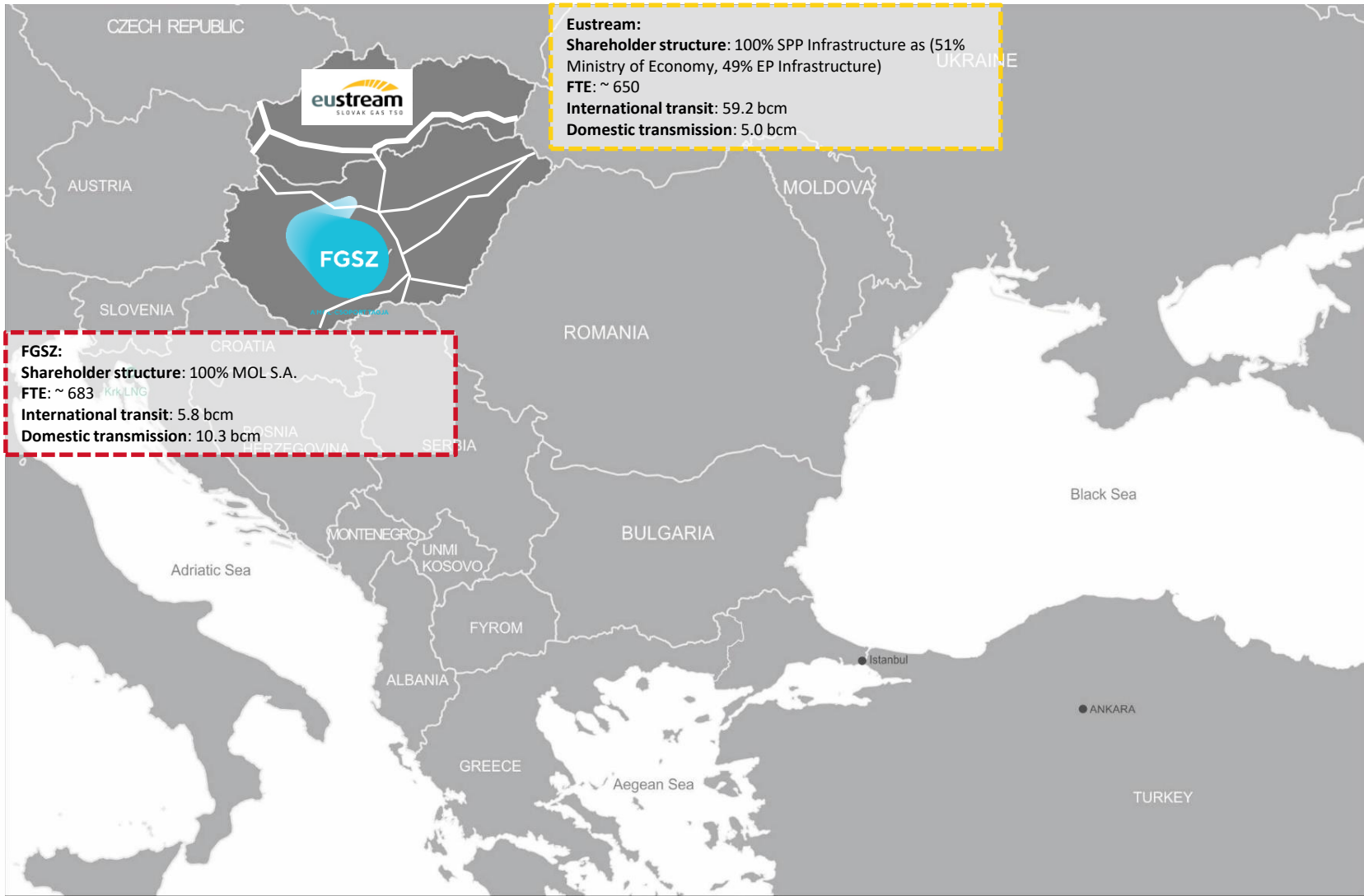
Eastring Project - Promoters

EUSTREAM



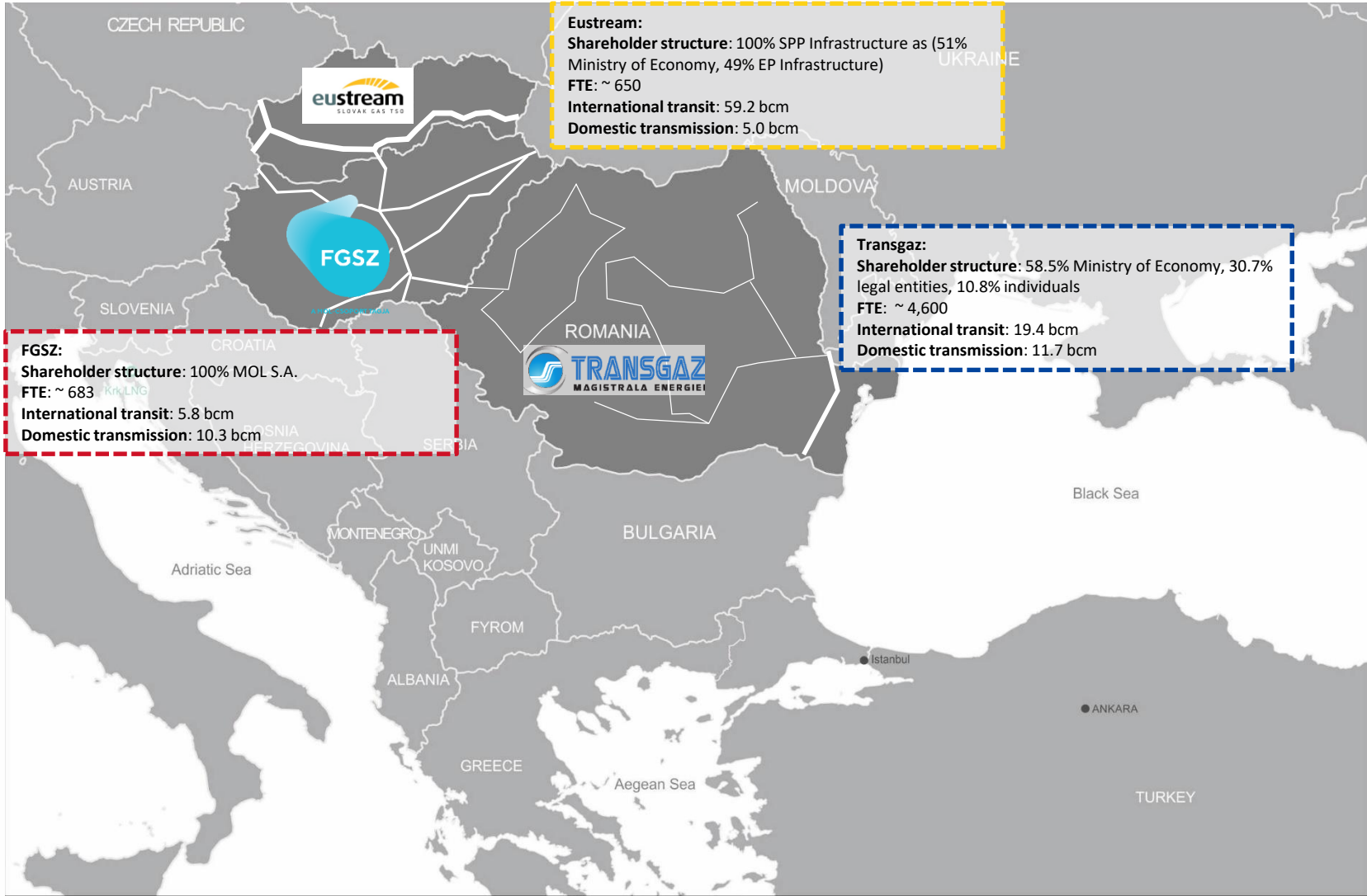
Eastring Project - Promoters

EUSTREAM & FGSZ



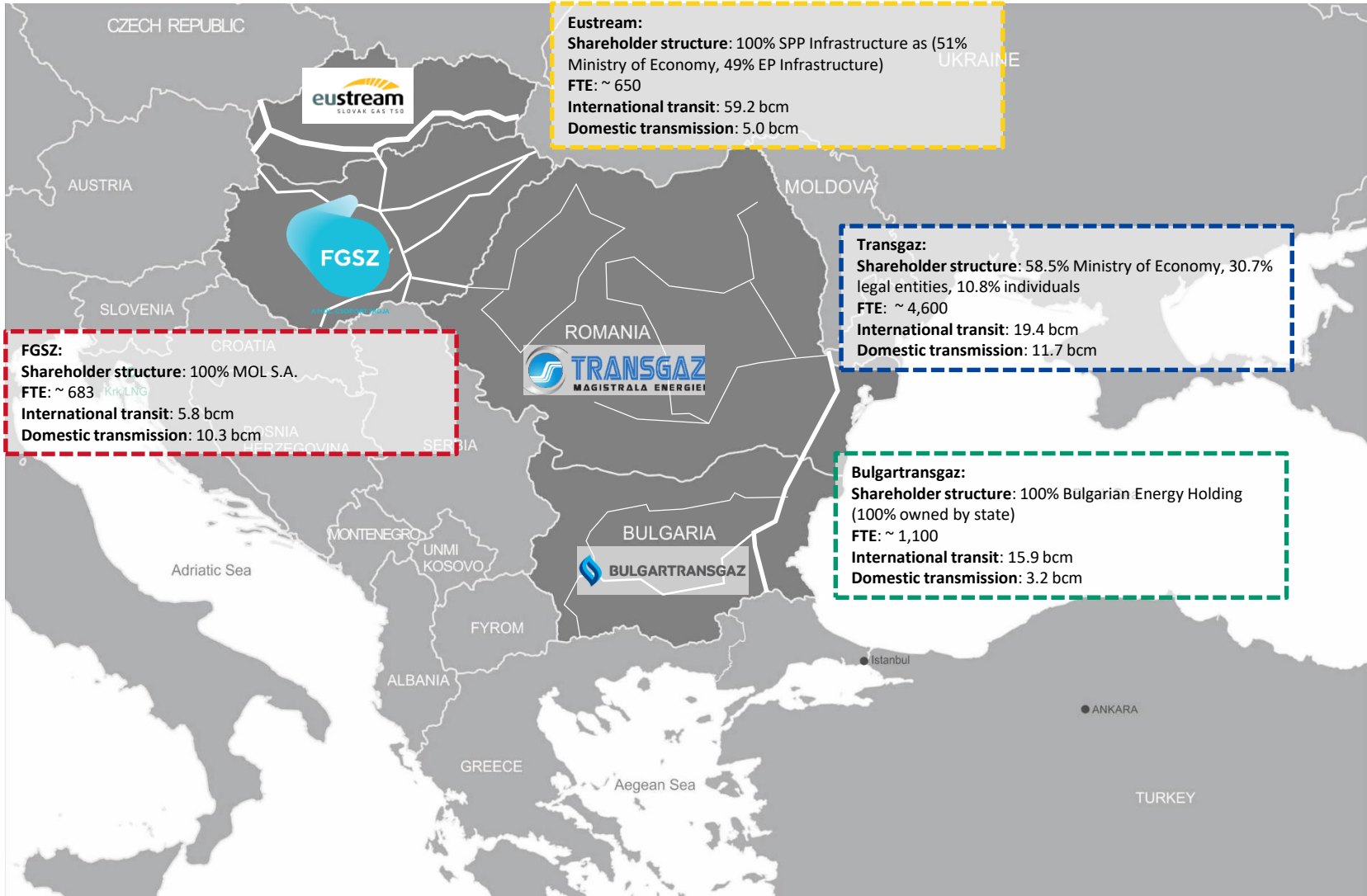
Eastring Project - Promoters

EUSTREAM & FGSZ & TRANSGAZ



Eastring Project - Promoters

EUSTREAM & FGSZ & TRANSGAZ & BULGARTRANSGAZ



Eustream:
Shareholder structure: 100% SPP Infrastructure as (51% Ministry of Economy, 49% EP Infrastructure)
FTE: ~ 650
International transit: 59.2 bcm
Domestic transmission: 5.0 bcm

Transgaz:
Shareholder structure: 58.5% Ministry of Economy, 30.7% legal entities, 10.8% individuals
FTE: ~ 4,600
International transit: 19.4 bcm
Domestic transmission: 11.7 bcm

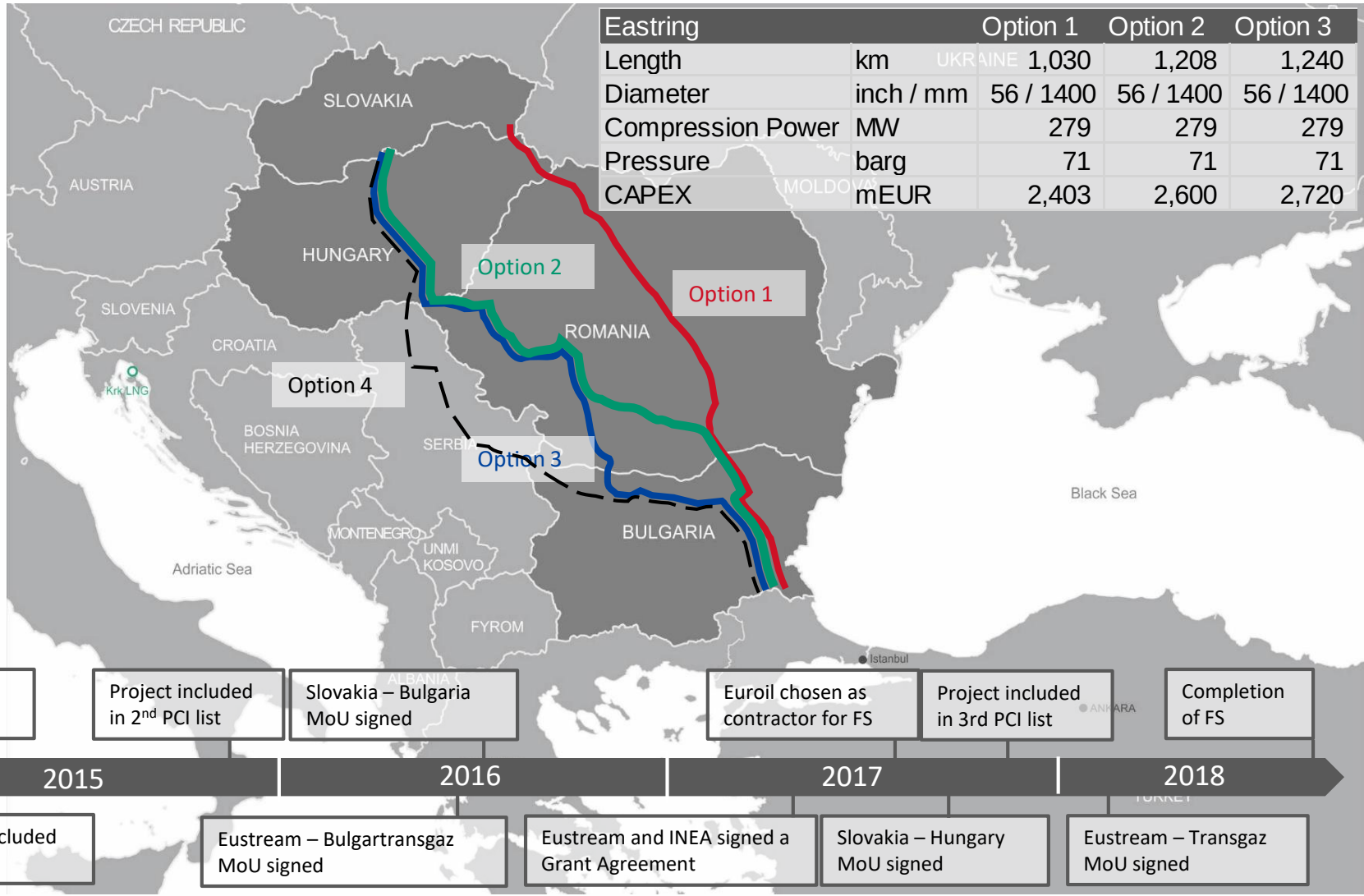
FGSZ:
Shareholder structure: 100% MOL S.A.
FTE: ~ 683
International transit: 5.8 bcm
Domestic transmission: 10.3 bcm

Bulgartransgaz:
Shareholder structure: 100% Bulgarian Energy Holding (100% owned by state)
FTE: ~ 1,100
International transit: 15.9 bcm
Domestic transmission: 3.2 bcm

Eastring

ROUTING AND TIMELINE – RECENT FEASIBILITY STUDY

Eastring		Option 1	Option 2	Option 3
Length	km	1,030	1,208	1,240
Diameter	inch / mm	56 / 1400	56 / 1400	56 / 1400
Compression Power	MW	279	279	279
Pressure	barg	71	71	71
CAPEX	mEUR	2,403	2,600	2,720



2014
- Introduction of Eastring project

2015
- Project included in 2nd PCI list
- Project included in TYNDP

2016
- Slovakia – Bulgaria MoU signed
- Eustream – Bulgartransgaz MoU signed

2017
- Euroil chosen as contractor for FS
- Eustream and INEA signed a Grant Agreement
- Project included in 3rd PCI list
- Slovakia – Hungary MoU signed

2018
- Completion of FS
- Eustream – Transgaz MoU signed

Thank you for your attention