

2016 – Year of the Max Q

Maximum dynamic pressure

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Max Q – Maximum Dynamic Pressure



- In aerospace engineering, the maximum dynamic pressure, often referred to as **maximum Q** or **max Q***, is the point at which aerodynamic stress on a vehicle in atmospheric flight is maximized. It is an important factor in the structural and mission design of rockets;
- Max Q is proportional to the density of the atmosphere and square of the rocket's speed;
- Around Max Q the thrust of rocket engines is usually reduced to approximately 60-70% in order for rocket to withstand the structural stress...

Good News First – part Eastring

- Bi-directional pipeline project connecting Slovak-transmission system with Turkish-Bulgarian border:
 - Provides security of supply by diversification of routes and sources;
 - Creates a corridor (which does not exist now) between Europe and Turkey;
 - Offers a valuable advantage in transparent pricing derived from liquid European gas exchanges

➤ Milestones:

Nov-2014: Eastring introduced at CEEC 2014

Jan-2015: Creation of working group for Eastring

Feb-2015: Hydraulic calculations completed

May-2015: Eastring included in TYNDP

***Nov-2015:* Eastring included in the PCI list**

EASTRING – Key Facts

Capacity: 20 bcm/y (first stage) up to 40 bcm/y (optional final stage)

Length: 846– 1,029 km

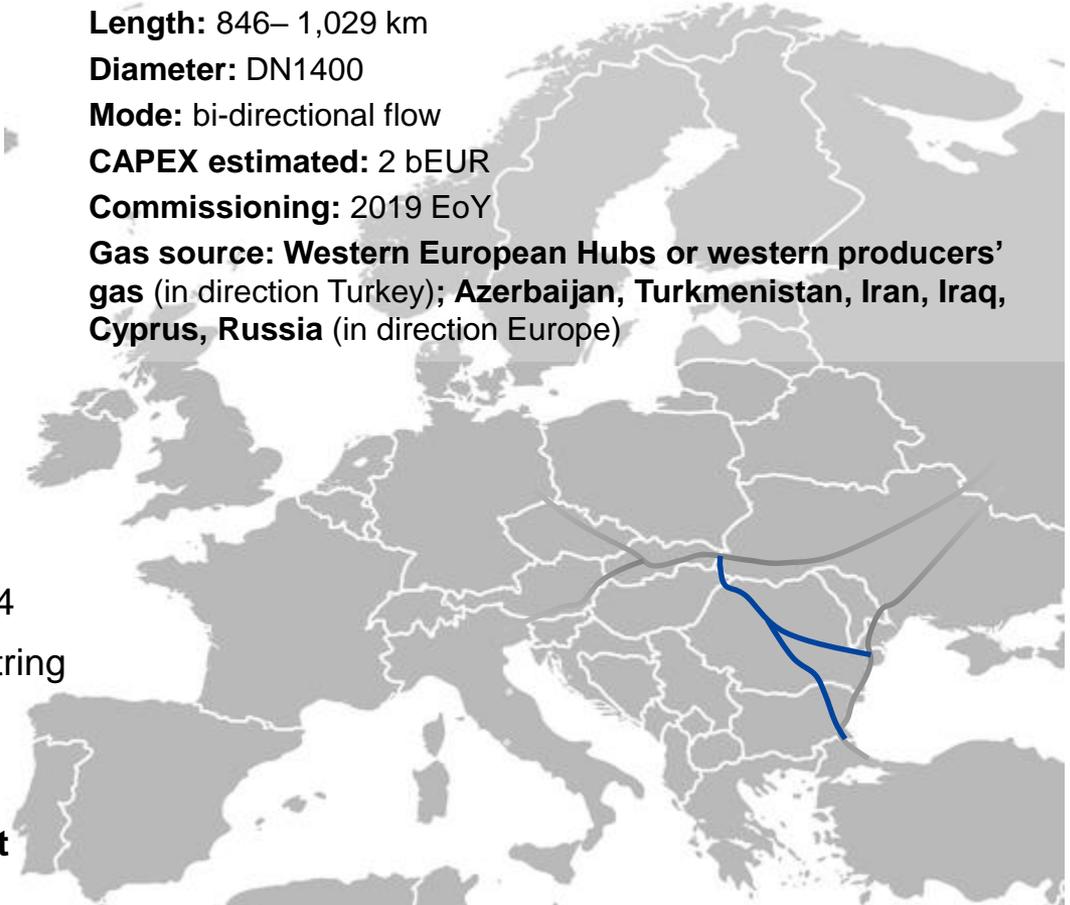
Diameter: DN1400

Mode: bi-directional flow

CAPEX estimated: 2 bEUR

Commissioning: 2019 EoY

Gas source: **Western European Hubs or western producers' gas** (in direction Turkey); **Azerbaijan, Turkmenistan, Iran, Iraq, Cyprus, Russia** (in direction Europe)



Good News First – part Ukraine

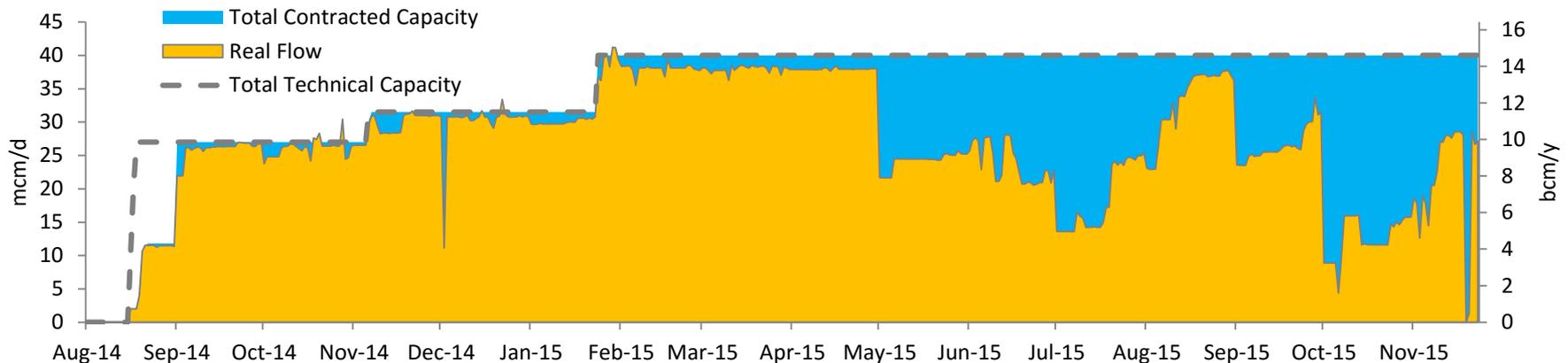
28-Apr-2014: Naftogaz signed a pipeline access deal with Slovakia's Eustream (MoU)

Implementation phase officially introduced

16-Aug-2014: Start of a test operation

01-Sep-2014: Ukraine started to supply gas from the EU via Eustream (Slovakia)

Technical capacity of reverse flow to Ukraine via Eustream has been increased twice since the beginning of the operation in September 2014. Actual technical capacity 40 mcm/d.

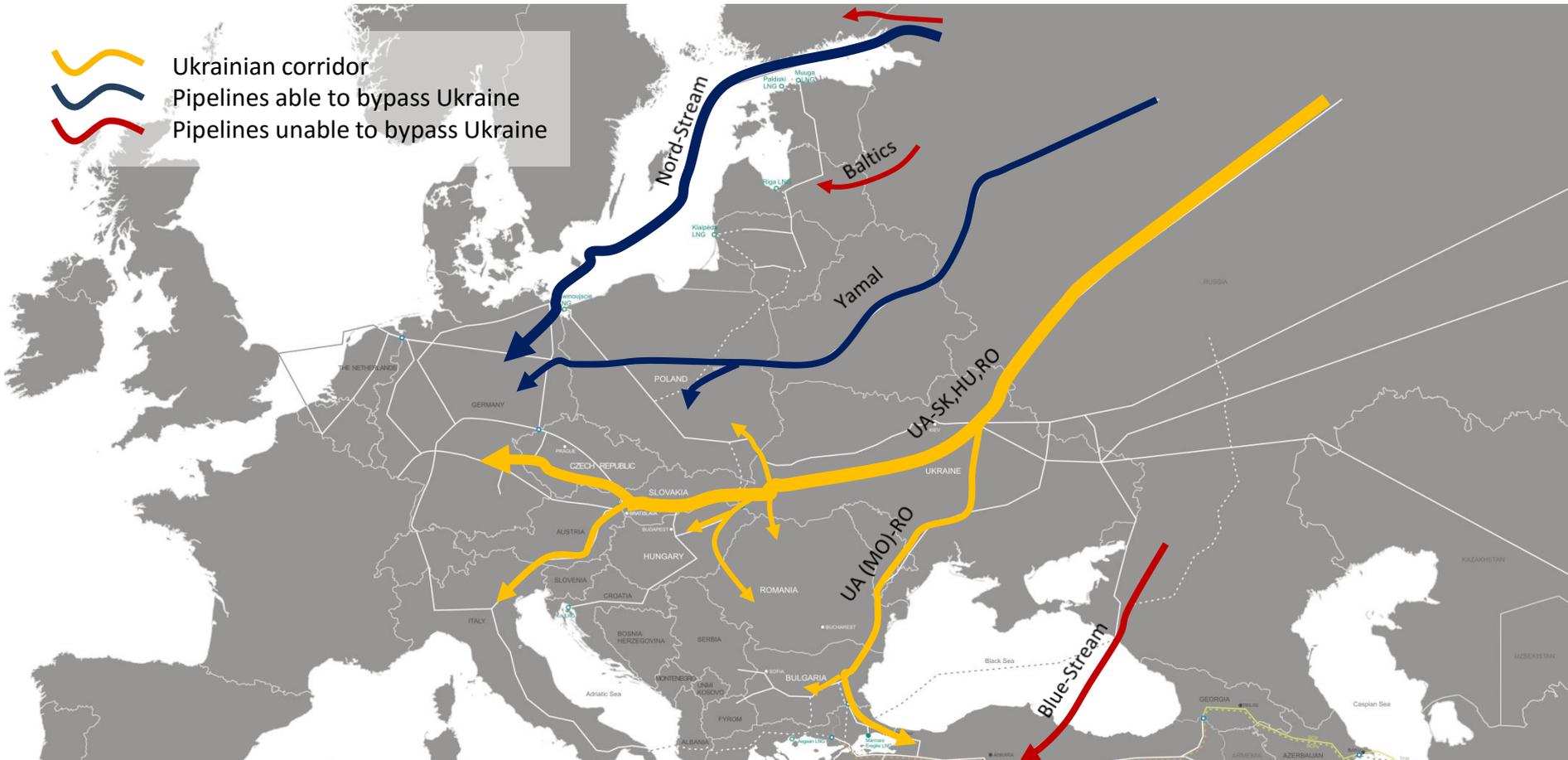


- From the beginning of the test operation Eustream has transmitted 12.7 bcm* of natural gas to Ukraine (as of 22-Nov-2015);
- Ukrainian central corridor proved to be the reliable way for Russian gas to Europe

* Natural gas dedicated for Ukraine has been coming via Czech Net4Gas and Austrian Baumgarten

Bypassing Ukraine – Nord Stream 3,4

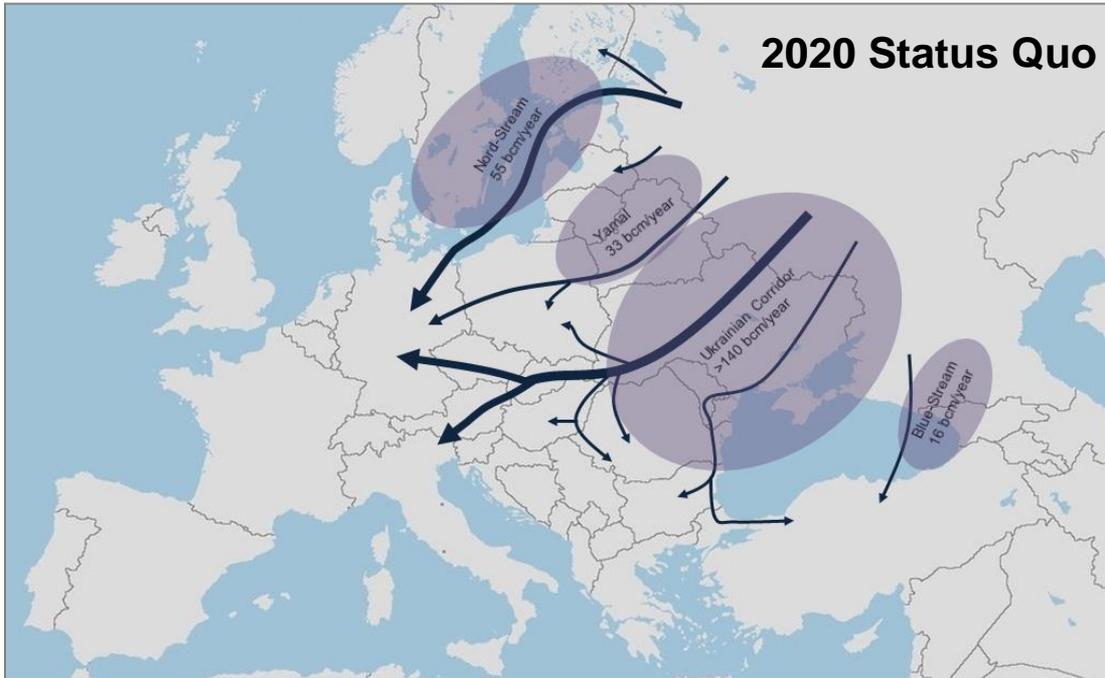
-  Ukrainian corridor
-  Pipelines able to bypass Ukraine
-  Pipelines unable to bypass Ukraine



Pipeline (bcm/y)	Capacity	Transmission in 2014	UA bypass scenario (UA, MO, SK)	UA bypass scenario (UA, MO, SK) with NS II
Ukraine	> 140.0	62.2	0.0	0.0
Nord Stream + Yamal	88.0	62.7	88.0	88.0
Others (Finland, Blue Stream, etc.)	24.2	21.7	17.4	17.4
Nord Stream II	55.0	0.0	0.0	41.2
Undelivered volumes	-	0.0	41.2	0.0
Russian export	-	146.6	146.6	146.6

Impact of Nord Stream 3,4 – Deterioration of Overall EU Security of Supply

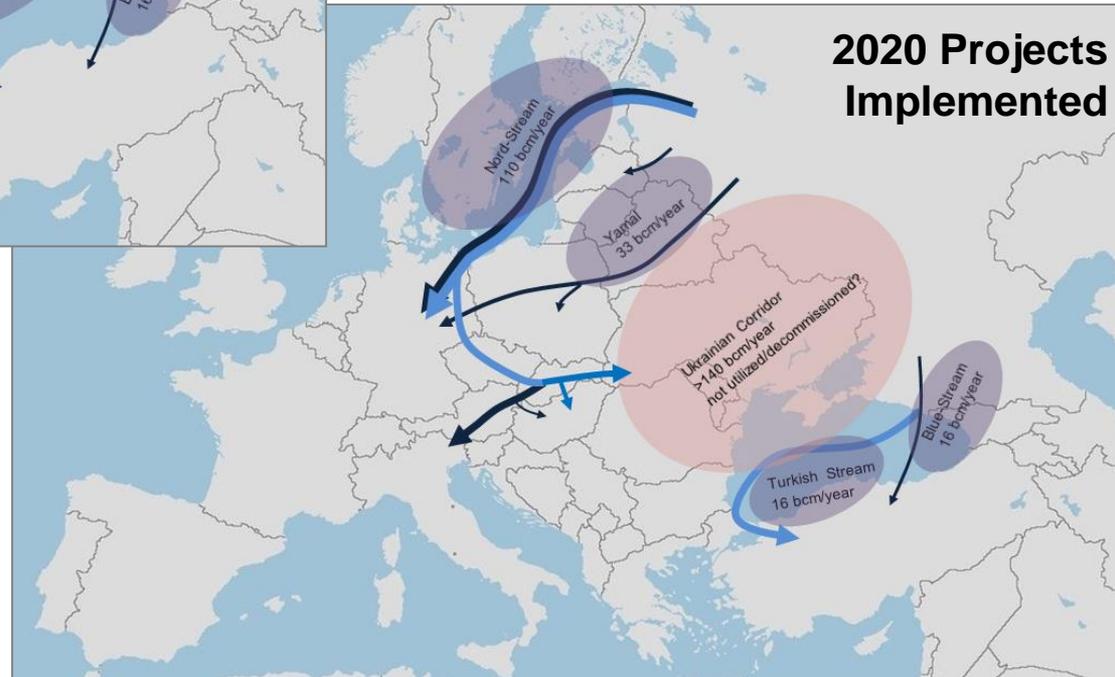
2020 Status Quo



- According to Eurogas predictions, European gas consumption is expected to rise only moderately from 460 bcm in 2014 to 523 bcm in 2020 (according to Eurogas projections).

- Bypass of Ukrainian system shall result in Ukrtransgaz annual loss of up to USD 2 billion, which shall effectively result in Ukrtransgaz's inability to maintain its system. This shall lead to overall deterioration of security of supply of the EU by almost 30% (ca. 140 bcm of piped import capacities) and storage capacity loss in total amount of 31 bcm (25%).

2020 Projects Implemented



Russia – Strong and Clever

- Stated goal of bypassing Ukraine with gas transit;
- Long term strategic thinking (no need for quick wins at any costs);
- Fast track decision making process, single voice;
- Ability to use almost any external environment for its own benefit (low oil price, Syria);
- Masters in PR and propaganda;
- Historically deeply rooted cooperation with Germany

- Difficult relations with their logical trading partner Russia (especially in energy business);
- Exhausted economy due to war and other reasons as well;
- Urgent need for further reforms and need for additional external financial help;
- Probably not the European priority number one any more (at least in media)

Europe – Rich, Weak and Fragmented

- Rich society with weak energy companies due to strategic mistakes and due to low oil & gas prices (easily to be “bought”);
- Short term focus (companies - next quarter, politicians - next elections at best);
- Too many non-correlated interests, no single voice;
- Due to the above mentioned inability to solve more than one problem at a time (Ukraine, Greece, Iran, refugee crisis, Islamic state);
- **But major problem for energy security of Europe is represented by behavior of Germany**

Incredible Visit to Moscow in October 2015

- “My personal opinion is that we must do everything possible to implement the agreements we have reached, and as far as past situations and various interpretations of events are concerned, we should leave them in the past and find new ways to renew cooperation, especially between Germany and Russia.”*
- “Mr Miller and Mr Matthias Warnig will continue to pursue Nord Stream 2 project. This is in our interests; but it is not just in Germany’s interests – it is a very interesting project even beyond Germany’s borders.”*
- “What’s most important as far as legal issues are concerned is that we strive to ensure that all this remains under the competence of the German authorities, if possible. So if we can do this, then opportunities for external meddling will be limited. And we are in a good negotiating position on this matter.”*

2016 – Year of the Maximum Dynamic Pressure

- The fate of Nord Stream 3,4 and of the Ukrainian gas transit (and therefore Ukraine) will be decided in 2016;
- The decision will not be made in Moscow or in Kiev. It will be made in Berlin;
- The pressure will be enormous;
- If the key players in this game will push too hard when approaching Max Q point some structures may start to crack and European project may start falling apart;
- The future of energy security of Ukraine, V4 and EU is too important to be decided only in "Deutschland GmbH".