SEEGAS: REGIONAL TRANSMISSION ROUTES

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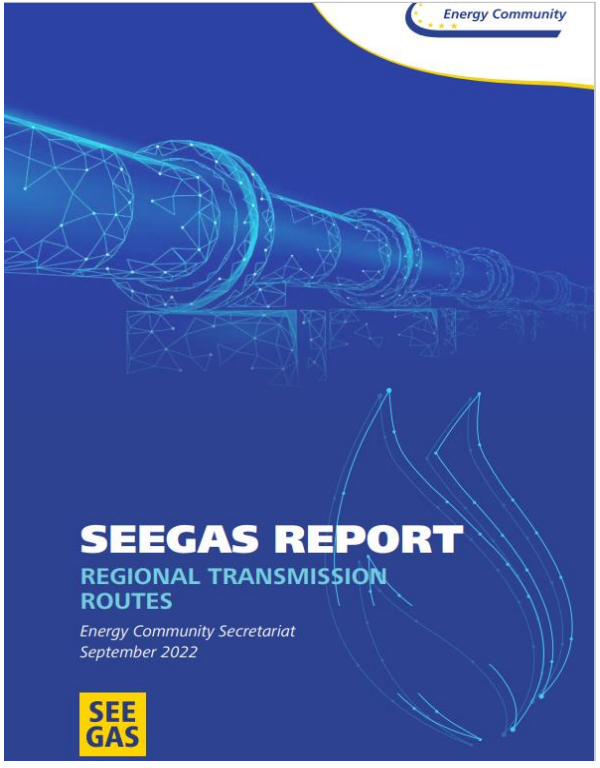
The upcoming SEEGAS infrastructure study

1. The SEEGAS study
2. Findings
3. Supply corridors
4. Changes since last presentation
5. Recommendations

1. The SEEGAS study

- Provides comprehensive information on transmission and gas importing infrastructure in central, southern and eastern Europe
- Information was offered first-hand by transmission system operators and LNG terminal operators
- Identifies alternative supply routes that would allow the region to wean itself off Russian gas
- Publishes latest transmission tariffs for relevant infrastructure
- Flags up bottlenecks caused by physical congestions as well as regulatory obstacles
- Invites market participants to provide feedback on best practices that would need to be implemented



2. Findings

1. Although nearly all surveyed countries benefit from access to at least three sources of supply, **less than 20%** of the technically available capacity was used over this summer. The lowest usage rate is in Romania and Bulgaria, the highest in Poland.

2. The existing LNG regasification capacity across the region is **21bcm/year** but could rise to **65bcm/year** if Turkey's four onshore and offshore terminals are included. This could be further expanded to **110bcm/year** before end of decade if all regional projects materialise.

3. The **cheapest route** to source natural gas imported as LNG into Ukraine is the **Polish-Ukrainian corridor** (assuming a direct Poland-Ukraine route). The **most expensive** transmission route is the **Trans-Balkan pipeline** if assuming a company would try to use the entire stretch of the corridor starting at the Greek Revithousa LNG terminal and ending in Ukraine.

4. The **Southern Gas Corridor** is of great importance to the region, providing **real diversification**, particularly if expanded in the future and linking up with a planned offshore terminal in **Albania**.

5. Despite abundant transmission and import capacity, **the region remains poorly connected because of numerous regulatory bottlenecks**, including lack of interconnection agreements, delays in implementing congestion management mechanisms or failure to implement the use-it-or-lose-it principle (UIOLI).

3.1 Supply corridors: Croatia – Hungary - Ukraine

Krk terminal utilisation rate - ~ 84% (01.04.2022 – 30.06.2022)

Cost to ship regasified LNG from Krk to Ukraine €3.51/MWh (based on 2021/22 tariffs and exclusive of 20% VAT in Ukraine)

Development plans:

- Expansion of Krk Terminal from 2.9bcm/year to 3.5bcm/year
- Expanding the Bosilijevo – Kozarac pipeline to central Croatia and the Lućko-Zabok-Rogatec pipeline to Slovenia will require the development of bigger regasification capacity at the LNG terminal of at least 700,000 m3/h
- Guaranteeing firm capacity of 8mcm/day at the Bereg interconnection point with Ukraine and possibly expanding it with more compression in Hungary

3.1.1 Traders' feedback

- **Experience dealing with regional gas TSOs**: Generally positive
- **Experience booking capacity on RBP**: Good, standard procedure although there have been reports of heavy-handed approach and insufficient communication from the Hungarian regulatory authority MEKH following a decision to limit bids on the Austria-Hungary border that can be submitted by a network user at borders. This was highlighted by traders because of the measure's impact on west-to-east flow.
- **Tapping new sources of gas supplies**: A challenge
- **Tariffs**: The level is in general fine, however, cross-border trade with physical delivery via multiple markets limits access and competition. This has led to swap deals. In Hungary, the commodity charge was due to increase steeply from the Gas Year 2022/23, which will impact the overall transmission cost
- **What is needed?** The expansion of the KRK LNG terminal
- **Impediments to market integration:** Tariffs can pile up due to multiple border crossings and regulatory risks
- **What can be done to streamline operations?** Limit reporting requirements which are very burdensome, with new obligations being added regularly since Russia's war in Ukraine started

3.2 Supply corridors: Poland - Ukraine

Świnoujście terminal utilisation rate - ~ 82% (01.04.2022 – 30.06.2022)

In a scenario where firm capacity is considered, the cost to ship regasified LNG to Ukraine would cost €2.03/MWh (capacity plus commodity fee) In a scenario where interruptible capacity is considered, the cost to ship regasified LNG to Ukraine would be €2.005/MWh (capacity plus commodity fee (based on 2021/22 tariffs and exclusive of 20% VAT in Ukraine)

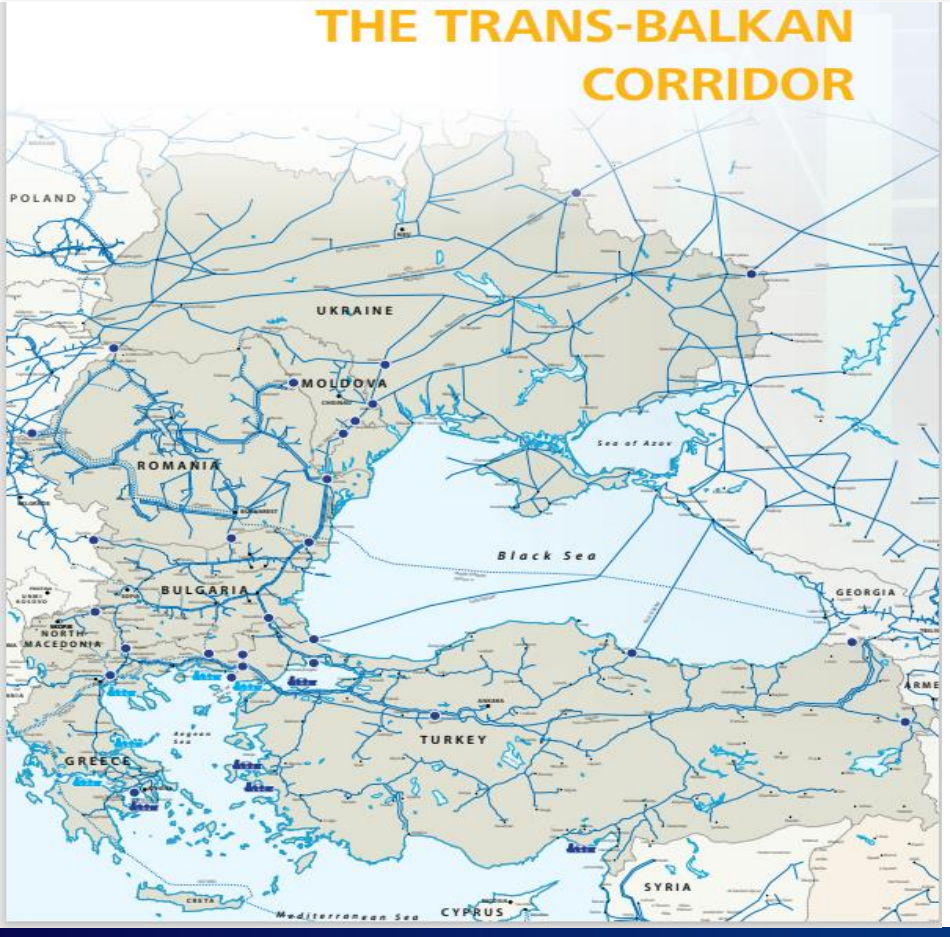
Development plans:

- Expansion of Świnoujście terminal from 6.2bcm/year in 2022 to 8.3bcm/year in 2024.
- Potential for two new FSRUs at Gdańsk with a total regasification capacity of 12.2bcm/year by 2027.
- Incremental firm capacity with Ukraine and the Czech Republic

3.2.1 Traders' feedback

- **Experience dealing with regional gas TSOs**: Generally positive
- **Experience booking capacity on RBP**: The Polish LNG terminal is fully booked and there are storage obligations, which have foreclosed the market since the requirements were introduced in 2017. Specifically on Poland – Ukraine IP the border capacity is booked on an unbundled basis.
- **Tapping new sources of gas supplies**: A challenge
- **Tariffs**: As Slovakia could be used as a route, traders noted that the entire tariff methodology in the country is imperfect. The commodity charge is linked to the short-term price index as if the gas transmission system operator eustream was buying its entire fuel gas in short-term products and the charge applies both to entry and exit regardless of whether these result in any physical flow or not.
- **Impediments to market integration:** Regulatory risks
- **What is needed?** The expansion of the KRK LNG terminal
- **What can be done to streamline operations?** Increase transmission capacity in southern Poland to help decongest border with Ukraine and establish firm exit border capacity
- **Other remarks:** Unstable regulatory environments

3.3 Supply corridors: The Trans-Balkan route



Greek Revithousa terminal utilisation rate - ~ 40% (01.04.2022 – 30.06.2022)

The cost to ship gas from the Greek terminal Revithousa up to the northernmost Grebenyky delivery point on the Moldovan – Ukrainian border could cost as much as €3.85/MWh. Without the Moldovan leg this would be €3.24/MWh (based on 2021/22 tariffs and exclusive of 20% VAT in Ukraine)

Development plans:

- Expansion of Greek LNG regas capacity from the current 8.25 to 30bcm/year by 2027 if four new FSRUs added.
- Expansion of Turkish LNG regas capacity from 44bcm/year currently to 51bcm/year once Gulf of Saros FSRU complete.
- Expansion of domestic Greek transmission capacity
- Commissioning of new North Macedonia – Greece interconnector by 2025
- Building a 63km pipeline looping which would increase the total technical capacity of the Negru Vodă 1/Kardam and Negru Vodă 2,3/Kardam on the Bulgaria-Romania border into a single virtual point to up to 25mcm/day from the current 15mcm/day.

3.3.1 Traders' feedback

- **Experience dealing with regional gas TSOs**: Generally positive with the exception of Romania and Turkey

- **Experience booking capacity on RBP**:
  - No available capacity on the North Macedonia – Bulgaria and Bulgaria -Turkey (Strandzha 1) borders
  - Very limited capacity offered on the Romania-Bulgaria and on Romania-Ukraine border via the Trans-Balkan route
  - No firm capacity offered from Romanian VTP to Ukraine
  - No capacity offered on the Romania-Ukraine border (Tekovo-Mediesu Aurit IP)

- **Tapping new sources of gas supplies**: A challenge.
  - Very limited liquidity on local exchanges.
  - No access to alternative sources of gas in North Macedonia and limited diversity of supplies in Moldova

- **Tariffs**: Very expensive particularly in North Macedonia, Romania and Moldova

- **Impediments to market integration:**
  - Lack of interconnection agreements between EU and Energy Community countries
  - Heavily regulated markets such as Turkey and Romania. Very unstable political and regulatory environments.
  - Gazprom monopoly in North Macedonia and Moldova
  - Proximity of TBP to war zone in Ukraine.

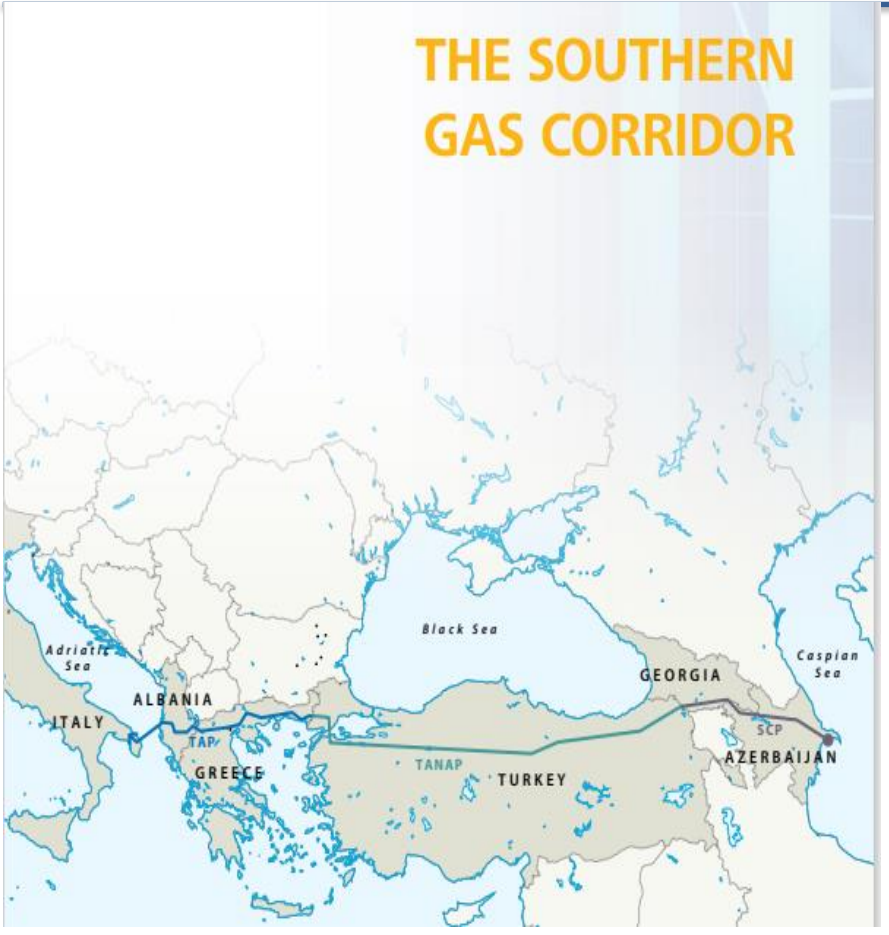
3.3.2 Traders' feedback (continued)

- **What is needed?**
  - Expansion of LNG importing capacity in Greece and Turkey
  - Apply EU rules at borders between EU and Energy Community countries
  - Release more capacity to the market particularly at Bulgaria – Romania, Romania-Ukraine borders
  - Merge Isaccea 1,2,3 and Negru Voda 1,2,3 into VIPs

- **What can be done to streamline operations?** I
  - Sign interconnection agreements and apply EU network codes
  - Streamline licensing procedures in Greece and Romania
  - Establish capacity booking mechanism in North Macedonia
  - Reduce tariffs in Romania and Moldova
  - Operate in a transparent environment in Turkey
  - Clarify issues related to gas release programme in Bulgaria
  - Introduce backhaul in Moldova

- **Other remarks:**
  - The region has a very unstable political environment
  - Minimise reporting requirements – Romania has one of the most intrusive regimes in Europe
  - Moldova must establish a balancing market and fully unbundle transmission system operator

3.4 Supply corridors: The Southern Gas Corridor



TAP's utilisation rate stood at 89% during survey period 01.04.2022 – 30.06.2022

Transmission costs high, with TANAP's alone reported at $6.70/MWh (but not confirmed by operator)
Although 10bcm/year have been booked on TAP on a long-term basis, the pipeline has flexibility to offer around 4mcm/day in peak hours on a spot basis (this amounts to 1.5bcm/year)

Development plans:

- During a public consultation which ended in March 2022, TAP signalled the possibility of expanding the transmission capacity of the pipeline, quoting four thresholds: 40.5mscm/day, 42.9mscm/day, 50.4msc /day, 60.2mscm/day.
- There are plans to connect an upcoming FSRU in Albania to the corridor and add two exit points at Relievi Roskovec, Albania and Kuçovë, Albania with combined technical capacities of 1.3mcm/day

3.4.1 Traders' feedback

- **Experience dealing with regional gas TSOs**: Positive TAP, no answers for TANAP

- **Experience booking capacity on RBP**: not applicable

- **Tapping new sources of gas supplies**: Capacity allocation mechanisms in place and the capacity products currently on offer are such that companies buying Shah Deniz II (SDII) (Caspian) gas via the TAP pipeline and with contractual delivery in Italy are financially incentivised to do so only on the Italian hub PSV and discouraged from diverting their supply to Greece and/or Bulgaria.

- **Tariffs**: Expensive.
  - The cost to exit the Italian Snam transmission system is charged even if no molecules have actually entered the Italian gas system
  - The cost of TAP commercial reverse flow is charged even if deliveries at an earlier eastward delivery point save TAP the cost of fuel gas

- **Impediments to market integration:** Lack of additional exit capacity from Turkey. Inflexible capacity booking mechanism

3.4.1 Traders' feedback

- **What is needed?** A new mechanism should be established to give shippers who have booked capacity at one exit point in TAP the opportunity to move the use of that capacity to an alternative point by participating in auctions for shorter term capacity products (than the duration of the capacity product initially procured) taking place later in the year. In case of successful outcome of the auction, the shipper moving capacity from West to East would do this at no additional cost, unless the auction clears with a premium, in which case the premium would be payable. The shipper moving instead capacity from East to West would pay the difference between the initial cost and the clearing price of the auction.

- **What can be done to streamline operations?**
  - The seller of SDII gas to move the default TAP exit point in their (TPA exempted) bookings to different exit points at no or limited additional costs
  - SDII buyers to ask the SDII seller to move the agreed default delivery point in their SDII contracts without Azerbaijan Gas Supply Company (AGSC) incurring any or limited additional costs
  - New TAP shippers to buy capacity with an optionality value which would be, most likely, reflected in increased demand for TAP incremental capacity
  - Eliminate any unnecessary market segmentation effect generated by the cost to transport gas from Italy to Greece and Bulgaria, while leaving TAP the necessary revenue to recover its financing cost and generate its regulated allowed returns

- **Other remarks: N/A**

4.1 Changes since last presentation – new capacity

- Commissioning of Strachocina – Veľké Kapušany IP (Poland-Slovakia) end of August 2022.
  - Exit from PL: up to 4.7 bcm/year
  - Entry to PL: up to 5.7 bcm/year

- Start of commercial operations of 10bcm/year Baltic Pipeline (Norway-Denmark-Poland) on 1 October

- Start of commercial operations of 3bcm/year Interconnector Greece-Bulgaria on 1 October

- Increase in exit capacity on Romanian-Hungarian Csanadpalota from 4.8mcm/day to 7mcm/day from 1 October

- Launch of backhaul operations on Moldova-Ukraine Grebenyky border from 26 September 2022. Available capacity 3.9mcm/day.

4.2 Changes since last presentation - supplies

- Bulgargaz issued three tenders for the purchase of LNG for November and December for the full year 2023 and for the period 2024-2034 to be delivered into either the Greek Revithoussa terminal or Turkish LNG terminals.
  - It requested 142mcm for November and 190mcm for December.
  - Bulgargaz will also seek 1.5bcm for 2023 and 1bcm/year in the 2024-2034 period.

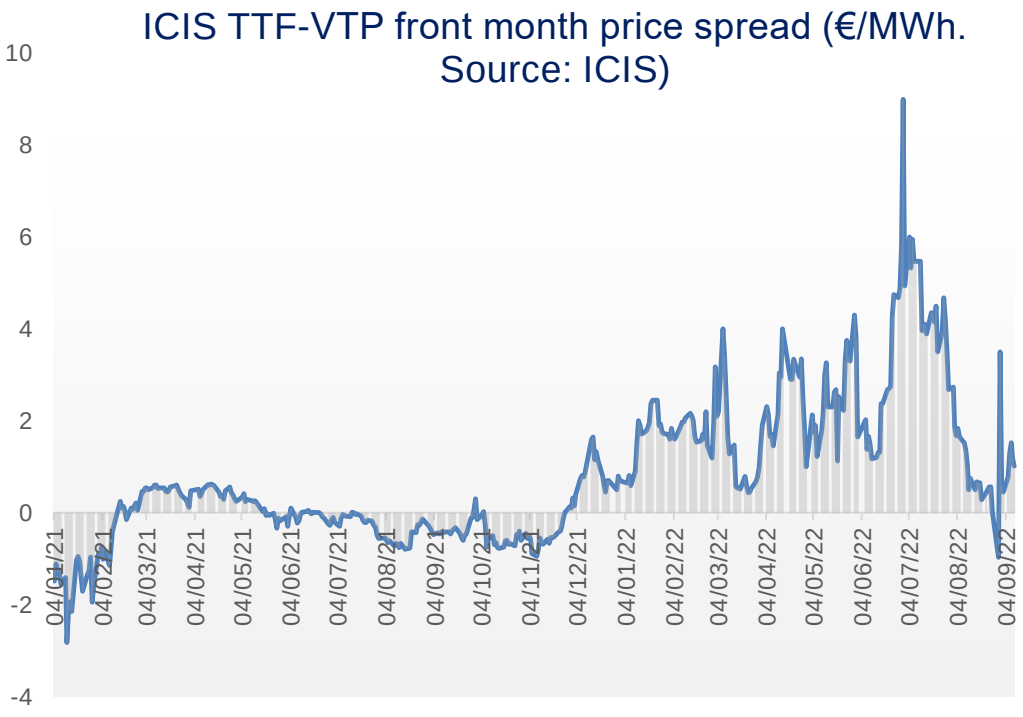
- Greek gas company DEPA agreed at the end of September an option to buy up to ten LNG cargoes this winter from French energy company TotalEnergies.
  - DEPA will be able to buy two LNG cargoes per month from November 2022 to March 2023 under the deal, but will also have the option not to take the cargoes in return for paying a cancellation fee.

- Hungarian gas imports from Russia increased from September following an agreement with Gazprom to supply up to 5.8 mcm/d (2bcm/year) of on top of pre-existing contracted volumes of 4.5bcm/year.

4.3 Changes since last presentation – regulation, politics

- Romania introduced a 98% tax on gas and electricity traders' net profit and a 100% retroactive tax on electricity export revenues.
- Croatia plans to ban exports of local produced gas during winter
- Regional countries push for EU-wide introduction of wholesale gas price caps
- Gazprom reduces gas supplies to Moldova by 30% from 1 October, delivering only 5.7mcm/day, compared to estimated October demand of 8.06mcm/day.
- Concerns over Ukraine energy ministry's proposal to ban commercial electricity exports to Moldova

4.4 Changes since last presentation – Ukrainian gas transit



- The region's premium over the TTF is now close to €3.00/MWh amid a historic reversal of gas flows from West to East
- The premium started to increase following the reduction in the Ukrainian gas transit at the end of May.
- The premium is also the result of underused infrastructure because of regulatory bottlenecks

5. Recommendations

1. Immediate application of EU network codes at border points between EU/Energy Community states

2. Signing of interconnection agreements between North Macedonia – Bulgaria; Bulgaria-Turkey; Turkey-Greece, Romania-Ukraine

3. TSOs should offer firm, rather than interruptible capacity wherever possible

4. TSOs should align on issues such as methane content

5. Turkish gas TSO BOTAS should start offering LNG terminal regasification and exit capacity with neighbouring Bulgaria/Greece

6. Regulators in Greece and Romania should streamline the licensing and reporting requirements as a matter of urgency

7. Romania remains a major concern because of its highly unpredictable regulatory environment. It should consider making significant improvements in that regard.

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