



REKK POLICY BRIEF



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FUTURE OF NATURAL GAS IN THE DANUBE REGION

NATIONAL ENERGY AND CLIMATE PLANS IN THE DANUBE REGION

- Import dependency in the Danube Region (DR) is very high on average (76%) and above 80% in 10 out of the 14 DR countries.
- The share of gas consumption in DR is similar to the EU28 (~24%) while coal is much higher 26% compared to 14%
- There is a common strategy to replace existing coal fuel units with more efficient gas or RES, however, the goals are not ambitious
- Gas will have a prominent role in the building sector since there is no competing decarbonised alternative outlined in policies
- Countries with gas production show signs of last minute panic: the producing countries in DR encourage accelerated resource development while it is still possible, before natural gas gets fully outdated by the decarbonization agenda
- There is contradiction between plans to reduce gas consumption (AT, CZ, DE, HU, HR) while committing significant resources (EUR 9.5 billion) to gas infrastructure mostly linked to the Russian diversification strategy.

This policy brief is part of a series based on the study National Energy and Climate Plans of the Danube Region commissioned by the Ministry of Foreign Affairs and Trade of Hungary in 2020. Other policy briefs cover the <u>electricity (2021/04)</u>, <u>heating and cooling (2021/06)</u> and <u>transport sectors (2021/07)</u>. The Danube Region is an EU regional cooperation strategy covering 14 countries that lie in the reservoir of the Danube, compri-

The Danube Region is an EU regional cooperation strategy covering 14 countries that lie in the reservoir of the Danube, comprising EU Member States (AT, BG, CZ, parts of DE, HR, HU, RO, SK and SI) and Energy Community contracting parties (BA, MD, ME, RS, parts of UA). Non-EU countries have not finalised their NECPs by the time of the research, so other stategic documents were reviewed.

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BACKGROUND

In 2020 EU Member States published their national energy and climate plans (NECPs) outlining measures and milestones to meet the common EU decarbonization target. The NECPs are already outdated since the December 2020 EUCO agreement raised the ambition from 40% to at least 55% on the way to 2050 carbon neutrality. While there is no doubt that efforts need to be upgraded accordingly, any decarbonization strategy will impact the future of natural gas either as a bridge to the solution or an impediment to the elimination of fossil fuels.

This short paper aims to summarize how individual NECP targets and related measures will impact the natural gas sector in the Danube Region (DR).

First, the paper provides a broad overview of the current state of play in DR natural gas markets by consumption volumes, share of natural gas in the energy mix, and import dependency. Second, it will assess measures that are expected to enable decarbonisation, though in certain countries the natural gas market plans are not necessarily synchronized with the decarbonisation agenda. Third, it will summarize the gas infrastructure related investment plans and provides policy recommendations.

GAS CONSUMPTION OVERVIEW

The share of gas in the total primary energy supply (TPES)¹ of the DR is 23%, nearly identical to the EU28 (24%). What stands out across the DR is the high share of solid fossil fuels underpinning energy needs, especially coal and lignite. The DR share of coal is 26% compared to the EU's 14%. On the other hand, the 27% share of oil and petroleum products in the Danube Region is slightly lower than the EU28 (32%).



FIGURE 1. GAS CONSUMPTION AND SHARE OF IMPORTS, DR, 2018

Source: REKK calculations based on Eurostat. Circle size and caption indicate gas market size in bcm/year in 2018.

AT: Austria, BG: Bulgaria, HR: Croatia, CZ: Czechia, DE: Germany , HU: Hungary, RO: Romania, SK: Slovakia, SI: Slovenia, BA: Bosnia and Herzegovina, MD: Moldova, ME: Montenegro, RS: Serbia, UA: Ukraine FIGURE 2. STRUCTURE OF GAS CONSUMPTION BY SECTORS, DR, 2018



DR gas markets are heterogeneous, ranging from large, to middle size mature, and negligible. Out of the total DR gas consumption in 2018 (~170 bcm/yr), Germany and Ukraine made up ~90 bcm/yr and ~30 bcm/yr respectively; Romania, Hungary, Austria Czechia ~ 10 bcm/yr; Slovakia, Bulgaria and Croatia ~5 bcm/yr; and Bosnia & Herzegovina, North Macedonia, Moldova, Serbia, Slovenia less than 2 bcm/yr. Montenegro consumes zero (Figure 1).

The share of DR gas production in the gas supply mix is identical to that of the EU (24%), and import dependency is on average 76% - above 80% in 10 out of the 14 countries, and close to 100% in Bosnia and Herzegovina, Bulgaria, Czechia, Moldova, Slovenia, and Slovakia.

On a regional average, the sectoral distribution of gas consumption in the DR is slightly lower than the EU in power generation (26% compared to 30%) and slightly higher than the EU in the share of household and services (41% versus EU28: 38%) and industrial consumption (24% compared 21%). At the country level there is a wide variance within this average (Figure 2).

IMPACT OF DECARBONISATION MEASURES ON GAS CONSUMPTION

The following subsections assess DR national plans for future gas consumption and its role in decarbonisation across electricity and heat generation, industry, and the building sector (households and services).

DECARBONISATION OF ELECTRICITY AND HEAT GENERATION

The decarbonisation agenda impacts the role of natural gas in electricity and heat generation in two ways:

- in the short run the phase out of coal fired units provides a temporary window of opportunity for increased gas consumption
- in the long run the full phase out of natural gas as a fossil fuel will reduce the lifetime of CCGTs and gas fired CHPs

1 Total energy supply is one of the most important aggregates of energy balance and represents the quantity of energy necessary to satisfy inland consumption (inland fuel deliveries) of a country. (Eurostat) Solid fossil fuels play a significant role in the electricity and heat generation of some DR countries (BG, CZ, DE, BA, ME, RS), with coal representing a high share (42%) in the power and heat generation mix of the Danube Region. Natural gas plays an important role in five countries, but with lower shares of 20-30%.

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Most non-EU countries and less ambitious Member States (Bulgaria, Czechia, Romania, Slovenia, and Croatia) do not set coal phase out dates in their NECPs . Others like Austria will accelerate the phaseout to reach full decarbonisation of the power sector by 2040. Hungary and Germany will phase out coal by 2025 and 2038 respectively, partly switching to gas.

It is not possible to compile a full, reliable dataset from EU and non-EU strategic planning documents for natural gas investment plans. Several DR countries plan to build new CHPs to replace existing solid fossil fuel units (along with RES), which can be broadly categorized into three groups:

- the majority plan to switch to gas CHPs as part of the phaseout of less efficient solid or liquid fossilbased units;
- others will replace part of the retiring CHPs with RES;
- A few (Austria and Hungary) will transition from fossil fuels (natural gas) to renewables in the district heating sector.

According to NECPs, the decarbonisation agenda does not have a tremendous impact on the gas consumption in the electricity and heat sectors up until 2030. Retired coal units will be replaced with gas fired units in Bulgaria and Romania, but coal will remain an important part of the mix still in 2040.

DECARBONISATION OF INDUSTRY

The industrial fuel mix in the Danube Region is very similar to that of the EU. Gas has a substantial share (31%) with potential for a larger share switching from coal.

FIGURE 3. CHANGE IN GAS CONSUMPTION IN THE DANUBE REGION, 2020-2030 (BCM/YR)



Source: National strategy documents. The changes refer to the difference between 2020 WEM and 2030 WAM projections

Within DR long-term national energy strategies there is little reference to the impact of proposed measures on the industry segment. Some countries refer to goals without any specific measures, especially those with the largest potential to reduce energy intensity (e.g. Ukraine, Moldova).

Industrial gas consumption is less impacted by measures and volume shifts to date because decarbonisation plans require major improvements in technological development over a longer time horizon. The contribution of natural gas in coming decades will depend on the pace of industrial process innovation and the availability of low-cost zero carbon electricity and hydrogen, as well as the price evolution of carbon capture, storage, and use.

DECARBONISATION OF HOUSEHOLD AND SERVICES

In smaller gas markets of the Balkans the residential sector is limited by incomplete distribution networks leaving biomass or electricity as the default household heating fuels (Bosnia and Herzegovina, Bulgaria, North Macedonia, Serbia). Strategic documents mostly identify the need to extend the gas distribution network to provide efficient and clean heating alternatives household consumers, but only North Macedonia has concrete plans and measures with development underway.

Another category of DR countries with well-developed gas distribution systems and considerable household gas heating typically aim to cut emissions and improve energy security through energy efficiency measures. Hungary is among them, with plans to reduce household gas consumption by 2 bcm/yr to 2030 and switch from gas to RES in the district heating sector. It is the only country with plans to decommission parts of the gas DSO system (those under 10% utilization rate). Other countries outlining energy efficiency measures to reduce natural gas demand in the residential sector are Austria, Croatia, Germany, Romania, and Ukraine.

Some EU countries plan to gradually phase out old fossil furnaces in households with a deadline for the ban of new installations (e.g. in Austria, Bulgaria and Slovenia). Outside of Austria which explicitly bans new gas connections, though with some exemptions, old, fossil-based furnaces can be replaced with new efficient gas-based units. In general, household **gas heating will remain substantial in the long term** (beyond 2030) despite broad support for RES installations. **According to national strategic documents, measures supporting decarbonized household heating as an alternative to gas are technically available but not financially preferable.** On the other hand, building renovations should reduce significant volumes of natural gas consumption.

SUMMARY OF DR GAS CONSUMPTION TO 2030 BASED ON NATIONAL STRATEGIC DOCUMENTS

First, NECP 2030 gas consumption projections are compared to 2020 WEM (With Existing Measures ~ business as usual) and 2030 WAM (With Additional Measures ~ the effect of policies).

TABLE 1. DANUBE REGION GAS PRODUCTION, BCM/YEAR (2018-2030)

| Production (bcm/year) | ΑΤ | BG | CZ | DE | HR | HU | RO | SI | SK | BA | MD | ME | RS | UA | DR |
|---|------------|--------------|------|-------|----------------|----------------|--------------|----|------|----|----|----|-------|----------------|----|
| 2018 | 1.34 | 0.14* | 0.25 | 5.83* | 0.9* | 1.7 | 10 | 0 | 0.14 | 0 | 0 | 0 | 0.3 | 22 | 43 |
| 2030 | no data | 0.29 | 0.25 | 2.71 | 1.45 | 2.4*** | 12.26 | 0 | 0.1 | 0 | 0 | 0 | 0.2** | 30 | 50 |
| Plans to incentivise domestic production | | Black Sea | | | conce ssion | conce ssion | Black Sea | | | | | | | regul ation | |

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*2020 data, **2023 data, ***2040 data. Source: NECPs and national strategy documents

Based on the country-level documents, total gas consumption of the Danube Region is expected to fall by 3% in the period of 2020-2030 (~6 bcm/yr). The change in DR gas consumption is shown in Figure 3.

According to the projections, gas consumption in Ukraine, Serbia, Romania, Bulgaria, Montenegro, Bosnia and Herzegovina and Slovenia (6.9 bcm/yr) will grow while nearly twice as much will be reduced (12.4 bcm/yr) in mature markets of Germany, Hungary, Czechia and Austria. This small net difference does not require significant pipeline investments with the exception of Montenegro, though it does not plan to use enough gas in the long term to justify national or neighbouring (Albania and Croatia) gas transmission network investment.

FIGURE 3. CHANGE IN GAS CONSUMPTION IN THE DANUBE REGION, 2020-2030 (BCM/YR)



This map serves for illustration purposes. Not all projects listed in national strategies are depicted. Bold lines indicate the large trunkline transmission projects for external suppliers. Arrows represent capacity extension or reverse flow for existing lines. Intra-regional cross border projects are depicted only when explicitly listed by both countries. Source: National strategy documents.

INFRASTRUCTURE INVESTMENTS

This section summarizes how the expected changes in gas import dependency, gas infrastructure investments and regional cooperation outlined in national strategic documents will shape the future role of gas in the DR.

DOMESTIC GAS PRODUCTION

A clear trend has emerged in those countries with gas production or proven reserves to accelerating development of these resources. On a regional level, gas production is expected to grow by 7 bcm/year, mostly driven by Ukraine.

Hungary and Croatia have established concession schemes and Ukraine is eliminating regulatory obstacles that have prevented upstream investment in the past while Romania and Bulgaria outline plans to develop new offshore gas fields in the Black Sea.

INTERCONNECTORS, GAS STORAGE AND LNG PLANS

Even though DR gas consumption and production is projected be flat over the next ten years, the number of DR gas projects listed as 'planned to be implemented by 2030' remains high.

The projects only partly reflect the political efforts towards import diversification in the DR since the 2009 crisis, aiming to increase the resilience of the system to supply shocks and develop competitive wholesale markets with more suppliers. A large part of the proposed new projects are directly connected to the Russian route diversification strategy that completely redirects flows from Ukraine to Turkey (via Turk Stream1-2) and Germany (Nord Stream 1-2)

| | Entry 2019 | Entry ENTSOG FID | NECP | Growth according to NECP | NECP | |
|-----------------|------------|---------------------|-------|--------------------------------|-------------|--|
| | GWh/d | GWh/d | GWh/d | % | Million EUR | |
| AT | 2126 | 0 | 167 | 8% | 100 | |
| BG | 1405 | 1222 | 626 | 45% | 1941 | |
| CZ | 1807 | 2238 | 2593 | 143% | 805 | |
| DE ¹ | 7413 | 4287 | 4442 | 60% | 6900 | |
| HR | 132 | 272 | 1587 | 1202% | 1382 | |
| HU | 811 | 151 | 1900 | 234% | 277 | |
| RO | 1174 | 42 | 672 | 57% | 2343 | |
| SI | 149 | 0 | 165 | 111% | 0 | |
| SK | 3490 | 1505 | 1851 | 53% | 529 | |
| BA | 18 | 0 | 154 | 857% | 101 | |
| ME ² | 94 | 42 | 42 | 45% | 0 | |
| MD ³ | 0 | 0 | 17 | | 0 | |
| RS⁴ | 142 | 415 | 759 | 535% | 164 | |
| UA | 9335 | 29 | 376 | 4% | 190 | |
| TOTAL | 28094 | 10203 | 15348 | | 14732 | |

TABLE 2: GROWTH OF ENTRY CAPACITIES IN THE DANUBE REGION, GWH/DAY AND % COMPARED TO 2018

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1 Cost from DE NECP; 2 Cost at HR; 3 Cost at RO; 4 cost without Balkan Stream RS section.

Below are categorical summaries of project types prioritized in NECPs:

- New LNG terminals: A top priority in NECPs, one is under construction in Croatia and two are planned in Germany
- Storage: There are huge gas storage capacities in the region already and still further development is mentioned in some countries, usually as capacity extensions of existing facilities.
- Cross border pipeline projects: NECPs usually refer to the ENTSOG TYNDP (ten-year network development plan) projects with cross-border relevance, especially Projects of Common Interest (PCI) (Figure 4).
- Some NECPs refer to internal projects addressing national bottlenecks without cross-border effects prioritized for market integration (e.g. Germany).
- Several projects found in national strategies are not part of the ENTSOG TYNDP and instead are part of Russian diversification projects. The DR is particularly impacted by Russia's large offshore transmission infrastructure investments: Nord Stream 1-2 entering Germany (NS 2 94% ready) and Turk Stream 1-2 to Turkey. Existing routes like the Transbalkan have been altered (since 2020 no UA-MD-RO-BG-TR transmission) and will again be reshaped when Nord Stream 2 and Balkan Stream are commissioned. From the North, the onshore projects that connect these Russian projects are already part of the national TYNDP in Germany and related investments in Czechia and Slovakia are partly implemented or highly advanced. From the

South, Balkan Stream entering Bulgaria and reaching Hungary via Serbia, is also under construction (Update: since January 2021 Balkan Stream supplies Serbia and Bosnia and Herzegovina from the South)., enabling flows from the south in Hungary up to Slovakia (see Figure 4).

TAP (Trans Adriatic Pipeline) is the iconic project of the EU Southern priority corridor commissioned in 2020 to carry Azeri gas to Greece and Italy. Connection projects from this new source (e.g. Southern Interconnector for Bosnia and Herzegovina or gasification of Montenegro via Albania) are far less developed or prioritized than those from Russia.

There is a clear **regional divide** between in terms of future plans for existing natural gas transmission networks.

EU countries tend to elaborate testing and development of their system for **blending of hydrogen** but cost estimates are not specified. This is not the case for non-EU countries, which **mostly prioritize DSO system development** with the aim of gasification for household heating.

Table 2 summarizes the capacity extension of the planned infrastructure projects based on REKK calculations.

Since NECPs do not provide data on the projects but refer to them as part of the ENTSOG TYNDP, the latter data sources are used. The first column shows the existing capacities of total entry points to a national system, and the second shows additional capacities labelled by ENTSOG TYNDP 2018 as projects with a final investment decision (FID). It is assumed that the projects with an FID will be implemented.

The next column shows the capacity increment according to NECP project priorities. If the NECPs projects are implemented, Croatia would increase its entry capacity by more than 1000%. In absolute terms, the largest capacity extension is in Germany despite an expected decline in gas consumption. The highest investment figure is therefore EUR 6.9 billion in Germany, accounting for almost half of the total DR investment costs **estimated to be EUR 14.7 billion.** The majority is across EU Member States (97%) increasing gas entry capacities by 76%.

NECPs show a clear contradiction between plans to reduce gas consumption (AT, CZ, DE, HU, HR) while still investing EUR 9.5 billion into gas infrastructure. Most of this investment and capacity is linked to the Russian diversification strategy.

Upon further examination, many countries do not commit to the investments, with the exception of Germany. Projects

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are kept on the list to stay consistent with previous PCI and ENTSOG documents. The NECPs often add that project implementation depends on "market interest". If simple algorithm is applied to filter the projects so that only those supported by national strategies are added to the list, this reduces investment costs to EUR 11.7 billion.

POLICY RECOMMENDATIONS

A review of DR national strategic documents reveals that decarbonization plans do not provide many details as to the role of natural gas despite it being a fossil fuel itself. There is no clear vision of how to decarbonize any of the sectors with significant shares of natural gas (power production, industry or household), and to contrary it seems that natural gas is still considered a bridging fuel on the way to a climate neutral future. It is also clear that production of declining domestic resources will be rapidly maximized, perhaps an indication that there is some understanding in energy politics that these resources will become obsolete over time.

It is therefore recommended to avoid leaving this part of Europe behind in the fossil fuel age based on outdated visions of "gas as a bridging fuel" sending the wrong incentives to potential investors. Messages should be clear:

- No subsidies provided to fossil fuels and those in operation should be phased out.
- A clear signal should be sent to project promoters not to invest into assets that will be unprofitable after 10-15 years.
- Because natural gas is still a very important and cheap heating fuel for DR, a tailor-made plan is needed to provide decarbonized alternative heating at affordable prices for low-income consumers.
- Energy efficiency and building renovation plans must be supported through training and education of skilled workers and by setting up reliable and independent advisory service transparently.
- Introducing natural gas to new markets should not be supported. Coal, biomass and other fuels should be switched to direct electrification and renewable solutions. Gas can be a bridging fuel where the infrastructure already exists, mostly in the power sector, but in new markets renewable solutions should be the way forward.



Borbála Takácsné Tóth has worked with REKK since its creation in 2004. In 2001 she received an M.A. in International Relations and European Studies at the Central European University in Budapest. Borbala was educated as an economist and received her degree from the Budapest University of Economic Sciences in 1998. She spent 5 years as a civil servant in

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