

If you're in a hole, stop digging

A case study on Hungary's plans to revisit shale gas and on the environmental, social and health impacts of fracking



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Introduction

In July 2022, Hungary declared an energy emergency, which was introduced, according to the official statement, 'in response to supply disruptions and skyrocketing energy prices in Europe'. With the emergency announcement, Hungary put a seven-point energy action plan in place; among its key measures, the plan announced a ramp up of domestic fossil gas production from 1.5 to 2 billion cubic meters (bcm). A key part of the plan was to develop an unconventional fossil gas ('shale gas') field, Nyékpusztza (215 kilometres southeast of Budapest), in Békés county (the Corvinus project). The project was labelled a 'high-priority investment', which means that it could be approved through a quicker and less rigorous process. Gas production from this site started in January 2023.

Shale gas is extracted from impermeable shale through an environmentally damaging and highly polluting process called hydraulic fracturing (also known as fracking). This technology, which is banned in some EU countries, can contaminate

For more information

Mátyás Molnár

Energy Programme Officer

Friends of the Earth – Hungary

matyas.molnar@bankwatch.org

Learn more: [bankwatch.org](https://www.bankwatch.org)



water sources and endanger people's health. Emissions released through the extraction and subsequent use of shale gas are a significant contributor to global warming.

This case study documents the Hungarian government's plans concerning shale gas fracking and reviews the risks of fracking to fully understand its negative impacts on the environment, society and public health. Finally, it provides recommendations for Hungary's decision makers. The case study is based on information prepared by the non-governmental organisation Friends of the Earth Hungary (MTVSZ) during 2022 and 2023 and on the most recent official documents and public statements.

Overview of fossil gas in Hungary

In 2020, Hungary's primary fossil gas consumption was around 10.6 billion cubic meters (bcm), of which 8 bcm (76 per cent) was imported, 1.6 bcm (15 per cent) produced domestically, and 1 bcm (9 per cent) provided from the gas stock stored in the previous year.¹

In 2019, nearly 75 per cent of Hungary's households (3.3 million households) were heated by fossil fuels, of which approximately 2.5 million households used only gas.

Ninety-five per cent of Hungary's annual gas consumption depends on fossil gas imports from Russia, as domestic production has been in decline in the last decades. Although in 1990 the annual domestic production was 4.1 bcm, in 2005 it was only 3 bcm, and currently this figure has been halved from 1990.² In 2021, Hungary signed a new 15-year deal with Russia under which it will receive 4.5 bcm of fossil gas annually, thus cementing its dependence on Russian imports.³

Russian fossil gas used to arrive in Hungary via Ukraine, but this changed with the construction of the Balkan Stream pipeline, which was intended to circumvent Ukraine; now, Russian imports come mainly via Serbia. In recent years, with EU support, Hungary has started to consciously wean itself off its dependency on Russia by building interconnectors to give it access to the networks of neighbouring countries. There are already connections to Romania, Croatia, Austria and Slovakia, and an interconnector with Slovenia is being planned. This interconnector would link Hungary with the TransMed pipeline that delivers gas from Algeria to Slovenia via Italy. In addition, for diversification purposes, Hungary has also contracted significant regasification capacity at the Croatian LNG terminal on the island of Krk, with a total of 6.75 bcm booked regasification capacity for the next seven years.⁴

¹ Hungarian Energy and Public Utility Regulatory Authority, [Monthly data](#), *Hungarian Energy and Public Utility Regulatory Authority*, accessed 25 January 2023.

² FGSZ Ltd., [Statistical data](#), *FGSZ Ltd.*, accessed 26 January 2023.

Hungarian Central Statistical Office, [Dissemination database](#), *Hungarian Central Statistical Office*, accessed 26 January 2023.

Mandiner, ['Magyarország, a majdnem-gáznagyhatalom'](#), *Mandiner*, 17 May 2022.

Portfolio, ['Még mindig több százezer magyar háztartás fűt fával, vagy szénnel'](#), *Portfolio*, 27 January 2020.

³ Reuters, ['Hungary finalises deferred payments deal with Gazprom -minister'](#), *Reuters*, 12 October 2022.

⁴ Telex, ['Orosz energiafüggőség: Moszkva nem hisz a könnyeknek'](#), *Telex*, 2 May 2022.

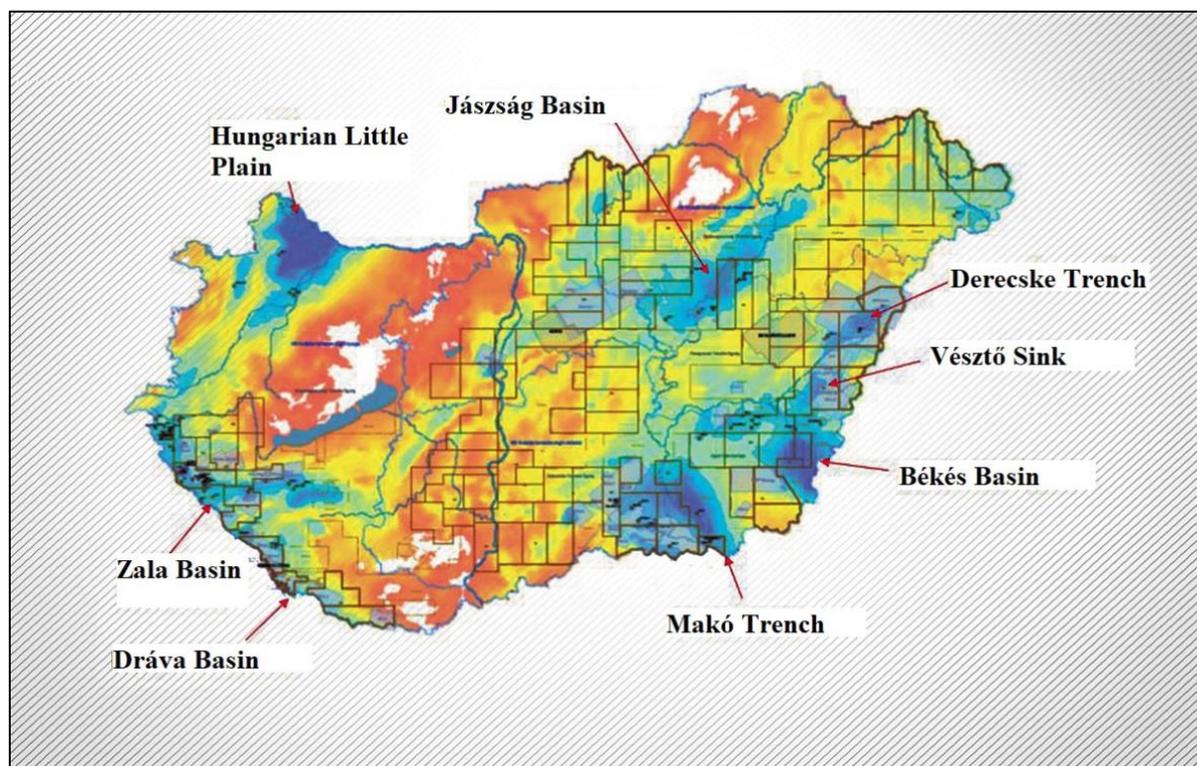
Növekedés, ['Honnan jön a földgáz Európába?'](#), *Növekedés*, 11 May 2022.

Műszaki Magazin, ['Üzembe állt a horvátországi Krk LNG terminál'](#), *Műszaki Magazin*, accessed 31 January 2023.

FGSZ, [Statistical data](#), *FGSZ*, accessed 31 January 2023.

In terms of domestic production, Hungary has several unconventional fossil gas exploration sites from which gas can only be extracted by fracking. These areas have already been the subject of preliminary research and have been identified as potential gas fields to increase domestic production. Among those considered, the most promising are the Makó trench and the Békés basin, where shale gas is typically found at depths of 3,500 to 5,000 metres.⁵

Figure 1: Map of Hungary's potential gas assets



Source: VGF⁶

Hungary's seven-point energy action plan

To address the energy emergency declared in July 2022, the Hungarian government has put forward a package of energy-related measures, one of which is to increase domestic fossil gas production from 1.5 to at least 2 bcm annually.⁷

Portfolio, '[Orbán Viktor elárult pár dolgot a 15 éves magyar-orosz gázszerződésről és a horvát LNG-tervekről](#)', *Portfolio*, 21 December 2021.

⁵ Napi.hu, '[Földgáz rengeteg van Magyarországon, ami csökkentené a függőséget, de nem lépett a MOL](#)', *Napi.hu*, 4 May 2022.

Gábor Dobai, '[A Makói-árok](#)', *VGF szaklap*, June 2015.

⁶ Gábor Dobai, '[A Makói-árok](#)', *VGF szaklap*, June 2015.

⁷ Telex, '[Olyan súlyos az energiaválság, hogy a kormány a szent tehénnek tartott rezsisökkentéshez is hozzányúlt](#)', *Telex*, 13 July 2022.

Origo, '[Hétpontos energia-veszélyhelyzeti tervet hirdetett a kormány](#)', *Origo*, 13 July 2022.

Telex, '[Megjelent a kormányhatározat az energia-veszélyhelyzetről, de a rezsisökkentésről nem derül ki belőle semmi](#)', *Telex*, 15 July 2022.

The government proposal was heavily criticised both by the opposition and non-governmental organisations.⁸ MTVSZ considers this plan short-sighted, as it will lock Hungary into fossil fuels; it furthermore does not contain any investments in renewables or energy efficiency that could shield consumers from high energy costs.⁹

In October, the Ministry of Technology and Industry communicated that it will simplify regulations and encourage investments through its existing mining royalty scheme to increase domestic gas production and reduce energy dependence. However, the new legislative proposal only addresses geothermal energy; shale gas extraction is not included.¹⁰

The Corvinus project

The Corvinus project is a joint venture involving Hungary's MVM Group (a government-owned energy company) and Horizont General LLC, a subsidiary of the US-based Aspect Holdings LLC, each with 50 per cent shares.¹¹ The aim of the Corvinus project is to produce fossil gas reserves and condensate (light oil) through further exploration and development in the Nyékpusztza area of Sarkadkeresztúr in Békés County, at a depth of 3,700 to 4,500 metres in an unconventional gas field. The developers intend to develop several wells, including the associated gas infrastructure.

Until August last year, the government was publicly discussing plans for shale gas extraction in the Makó region of Hungary. However, Békés was selected over Makó, likely because the costs of extraction are lower. According to the Hungarian government, from a technical and geological point of view, both the drilling and the subsequent production tests in Békés were found to be promising.

The government says it wants to attract local entrepreneurs to the mining industry, which will create new jobs and boost the local economy, and local municipalities in the area will also receive significant local business rates from the sale of the mineral wealth. On the basis of this promise, local authorities in the area expect the project to provide a significant economic boost.¹²

By Government Decree no 308/2022, the project was declared a priority investment, which allows fast-track permitting and quicker implementation.¹³ The Corvinus project is scheduled for the next five years, during

⁸ Daily News Hungary, '[Green opposition calls for parliamentary decree against shale gas production in Hungary](#)', *Daily News Hungary*, 22 August 2022.

⁹ Alexa Botár, '[Hungary risks billions in EU funds if it goes ahead with investments in coal](#)', *Euractiv*, 25 October 2022.

¹⁰ Agrotrend, '[Gyorsított engedélyezéssel télen már termelhet az első kút a békési gázmezőn](#)', *Agrotrend*, 18 August 2022.

Üzletem, '[Kiemelt beruházás lett a Corvinus projekt, télen megkezdődhet a földgáztermelés](#)', *Üzletem*, 17 August 2022.

Origo, '[Új földgázmezőt kutat az MVM Magyarországon](#)', *Origo*, 12 August 2022.

Telex, '[Bízunk benne, ha az alvó gázmező most felébred, akkor itt beindul az élet](#)', *Origo*, 18 August 2022.

Magyar Hang, '[Már januárban megkezdődhet a békési „nem hagyományos” földgáz kitermelése](#)', *Magyar Hang*, 11 August 2022.

¹¹ MVM CEEnergy, '[MVM explores unconventional natural gas field](#)', *MVM CEEnergy*, 22 August 2022.

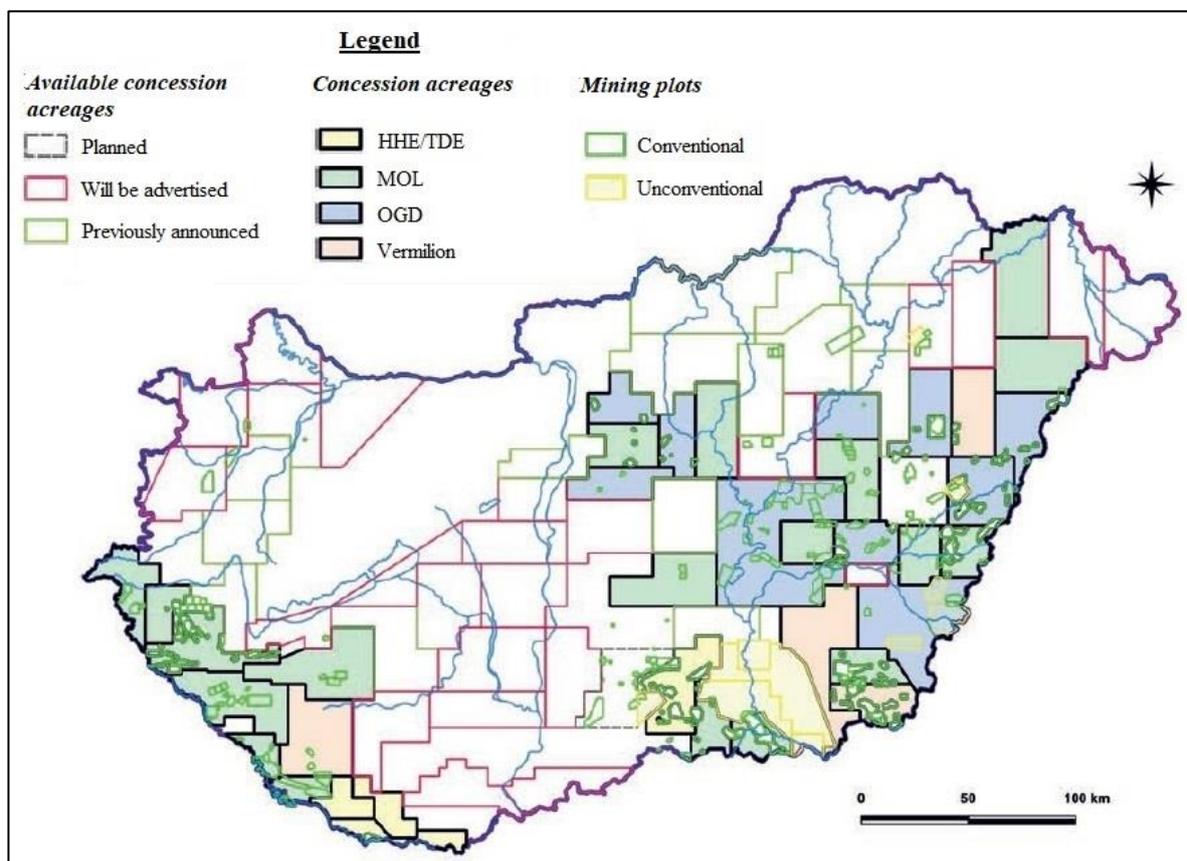
¹² 24.hu, '[Békési gázmező: Orbán Viktor komoly feladatot bízott a főispánra](#)', *24.hu*, 12 August 2022.

¹³ Government Decree No 308/2022 (VIII. 11.)

Magyar Közlöny, '[No 135 of 2022](#)', *Magyar Közlöny*, 11 August 2022.

which the works will affect the following settlements: Dévaványa, Ecsegfalva, Kertészsziget, Körösladány, Méhkerék, Okány, Sarkad, Sarkadkeresztúr, Szeghalom and Vésztő.

Figure 2: Hydrocarbon research areas in Hungary (August 2020)



Source: *Földtani Közlöny*¹⁴

As the government has declared the project to be in the public interest, it is exempt from the regularly applicable monument, environmental and local building regulations. Therefore, for the drilling of wells, laying of pipelines and other related surface facilities on properties located outside these municipalities:

- a) an architectural and engineering design opinion is not required,
- b) no urban development planning opinion procedure is required, and
- c) (c) no urban design notification procedure is required.¹⁵

At the end of December 2022, the Authority for the Supervision of Regulated Activities (the Mining Supervisory Authority) authorised the construction of the second phase of the hydrocarbon wells planned

¹⁴ V. Lamberkovich et al.: 'A jó, a rossz és a csúf? - avagy a szénhidrogén-kutatás dicső múltja. (még) létező jelene és bizonytalan jövője a Pannon-medencében', *Földtani Közlöny*, 2020 (150/4).

¹⁵ Magyar Közlöny, 'No 135 of 2022', *Magyar Közlöny*, 11 August 2022.

24.hu, 'Békési gázmező: Orbán Viktor komoly feladatot bízott a főispánra'.

Government Office of Békés County, [Home page](#), accessed 31 January 2023.

to be brought into production in Sarkad and Mémkerék, as well as in several other municipalities. It also authorised a 60-day trial operation of the planned hydrocarbon wells.¹⁶

Although the project area is close to Romania and the gas fields extend to Romania, no transboundary environmental impact assessment was carried out for the project.

Environmental, social and economic risks of shale gas extraction

Shale gas, which consists largely of methane, is considered an unconventional form of fossil gas as it is more challenging to extract due to its low permeability in shale gas reservoirs. It is difficult to extract because it is found deep underground in shale rock, which is friable and impermeable. It is extracted by a process called hydraulic fracturing (fracking), in combination with horizontal drilling. This process involves drilling vertically and horizontally deep into the ground (generally 1,500 to 1,600 metres, but in the Hungarian case it is much deeper – 3,000 to 6,000 metres), and then the shale rock is fractured at high pressure with a mixture of water, granular material (e.g. sand) and chemical additives, forcing the gas into the extraction well.¹⁷

Fracking has been banned in some EU countries (Bulgaria, France, Germany, Ireland, the Netherlands and Scotland) because of its harmful environmental, social and economic risks.

The most important risks associated with hydraulic fracking in Hungary are water related, but there are also other negative impacts associated with this technology. Some important risks include: 1) huge freshwater consumption; 2) freshwater contamination due to chemical mixing; 3) groundwater contamination with hydraulic fracturing fluids and impacts on drinking water resources; 4) produced water and wastewater handling; 5) impacts on biodiversity and the Natura 2000 network; 6) soil contamination and land use; 7) air pollution; 8) greenhouse gas emissions; 9) seismic concerns; 10) social risks; and 11) economic risks.¹⁸

1. Huge freshwater consumption

Fracturing operations require vast quantities of water, the main component of nearly all hydraulic fracturing fluids (90 to 97 per cent of the total fluid volume injected into the well). Water used is typically freshwater taken from available groundwater and surface water sources located near the extraction site. A layer fracturing operation requires about 15 million litres of water and can be performed up to 10 times for a single shale gas well. The amount of water used in a single shale gas well would be enough to meet the water needs

¹⁶ Magyar Narancs, '[Erőltetett menet a békési gázmezőn: kiadták az engedélyt a kutak építésére](#)', *Magyar Narancs*, 29 December 2022.

24.hu, '[Bámulatos tempóban zajlik a békési gázmező kiaknázásának engedélyeztetése](#)', *24.hu*, 29 December 2022.

¹⁷ Friends of the Earth, '[Shale gas - unconventional and unwanted: the case against shale gas](#)', *Friends of the Earth*, 2012.

¹⁸ Daily News Hungary, '[Green opposition calls for parliamentary decree against shale gas production in Hungary](#)', *Daily News Hungary*, 22 August 2022.

European Commission, '[Shale Gas for-Europe-Main Environmental and Social Considerations](#)', *European Commission*, 2012.

Matthias Altmann et al., '[Hungarian shale gas-impacts on the environment and human health](#)', *Ludwig-Bölkow-Systemtechnik GmbH*, 20 December 2012.

European Commission, '[Overview of the current status and development of shale gas and shale oil in Europe](#)', *European Commission*, September 2016.

Nádor et al., '[Study of Some Potential Environmental Impacts of Hydraulic Fracturing Related to Unconventional Hydrocarbons in Hungary](#)', in *book: Shale gas: Ecology, Politics, Economy*, May 2016.

BBC, '[What is fracking and why is it controversial?](#)', *BBC*, 26 October 2022.

of 10,000 European residents for one year. In Békés, an area at risk of drought in the summer (which can be addressed by maintaining an adequate groundwater level), water withdrawals for fracturing could possibly have a significant negative impact on the environment and local community's needs.

2. Freshwater contamination due to chemical mixing

Hydraulic fracturing fluids are created by mixing water with proppant and various additives (e.g. a single chemical or a mixture of chemicals). A large number of different chemicals might be used in this process (e.g. benzene and formaldehyde, which are highly carcinogenic). Several studies have documented spills of hydraulic fracturing fluids or additives. Spills during the chemical mixing stage of the hydraulic fracturing cycle have reached surface water resources and have the potential to reach groundwater resources.

3. Groundwater contamination with hydraulic fracturing fluids and impacts on drinking water resources

Shale gas production wells and newly created fracture networks can allow hydraulic fracturing fluids to reach groundwater and thus impact underground drinking water resources. The underground injection of the fracturing fluid, which consists of a mixture of freshwater and chemicals, risks contaminating groundwater sources through particular mechanical integrity failures of the well and the associated travel of fracturing fluids through the newly created fractures. In an area as dry as Békés County, this could be considered a significant impact on the drinking water resources and a risk for irrigated crop production.

4. Produced water and wastewater handling

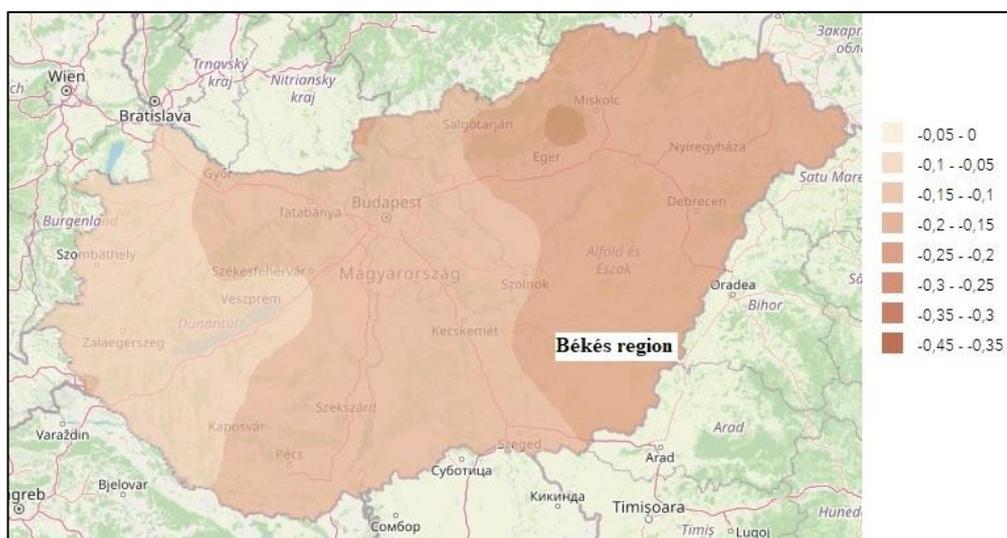
Produced water is a term that refers to any water that returns to the surface through the production well as a by-product of gas production. Produced water can contain salts, metals, naturally occurring organic compounds (e.g. benzene, toluene), oil and grease, radioactive materials and hydraulic fracturing chemicals. The large volumes of water used in hydraulic fracturing need to be collected and handled at the well site after their return to surface. Produced water spills have been documented. Spills have reached groundwater and surface water resources in some cases.

Hydraulic fracturing wastewater refers to the disposal management of the produced water. Wastewater disposal can have impacts on the groundwater and surface water resources. In particular, if inadequately treated, wastewater can compromise the quality of the entire water source for human consumption (making water unsafe to drink for people and animals, or to use for irrigation).

5. Impacts on biodiversity and the Natura 2000 network

Extraction in the Békés region is taking place close to the Körös-Maros National Park (Figure 4). The area is important due to its wetlands, and it is a part of the Natura 2000 network. Due to the climate crisis, in the last few decades this area has been impacted by decreasing precipitation and increasing temperatures (see Figure 3 for the region's projected increase in dryness), leading to droughts in summer months, which are the most critical for livestock grazing (Figure 3).

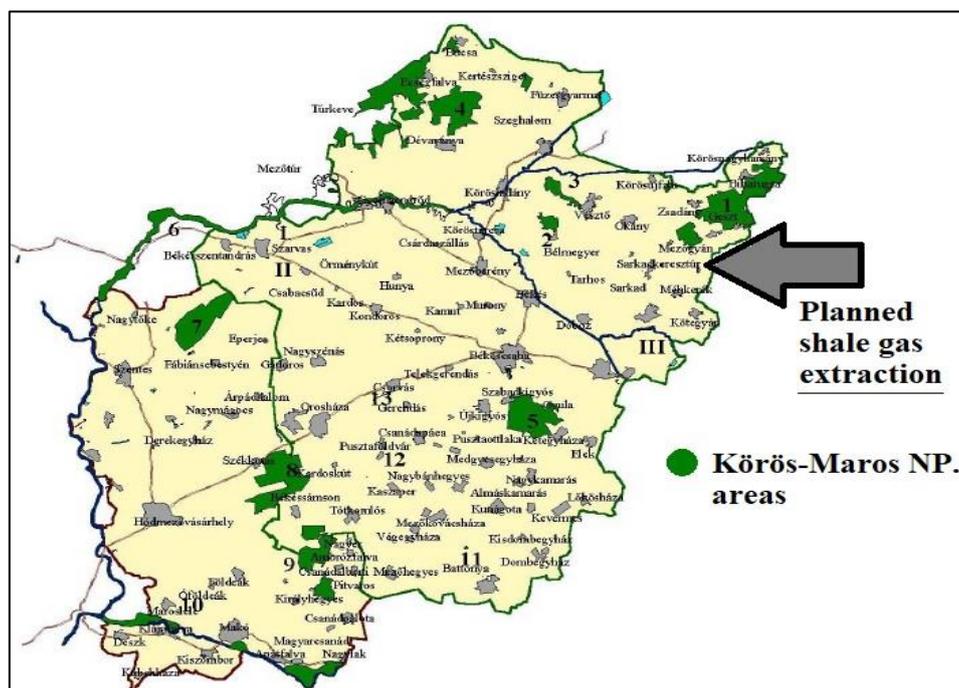
Figure 3: Expected change of aridity index in Hungary, 2021-2050



Source: National Adaptation Geo-information System (NAGiS)¹⁹

There is a high risk that a lack of water for extraction would upset the balance of this fragile ecosystem and make it even more vulnerable to the negative impacts of global warming.

Figure 4: Areas of the Körös-Maros National Park and the site of the planned shale gas extraction



Source: Körös-Maros National Park²⁰

¹⁹ National Adaptation Geo-information System, [Map portal](#), National Adaptation Geo-information System, accessed 27 January 2023.

²⁰ Körös-Maros National Park, [Power Point presentation](#), Körös-Maros National Park, accessed 27 January 2023.

6. Soil contamination and land use

Because the fracking liquid can leak into the soil, it also poses a contamination risk, and a resulting risk to crop production. In addition, fracking requires large expanses of land. The wells are depleted of shale gas after an average of 1 to 1.5 years, so new wells need to be drilled to continue extraction. It is necessary to have more than one well per square kilometre, which can result in up to 10 wells per site, which multiplies the negative impacts from drilling to agriculture.

7. Air pollution

According to industry data, fracking liquids may also contain chemicals officially classified as carcinogenic, mutagenic, anti-reproductive, neurotoxic, allergenic, endocrine disruptors, as well as toxic compounds such as benzene, toluene, ethylbenzene and xylene.²¹

In the United States, air pollution from fracking has already been clearly demonstrated, including 'elevated levels' of benzene and other potentially toxic petroleum-based hydrocarbons such as ethylbenzene, toluene and xylene, which can cause eye irritation, headaches, sore throats, breathing difficulties and increased risk of cancer.

The main sources of air pollution from fracking are:

- emissions from flaring at drill heads
- leaks from compressor stations, where gases are compressed and prepared for transport through the pipeline
- evaporation of cracking chemicals (either from before, during or after injection, and or from wastewater)
- naturally occurring hazardous substances found underground; the evaporation or vaporisation of naturally occurring chemical substances.²²

8. Greenhouse gas emissions

Fossil gas is composed almost entirely of methane (approximately 80 to 95 per cent). Methane in the term of 20 years is over 80 times a more potent greenhouse gas than carbon dioxide due to its higher capacity to absorb heat in comparison to carbon dioxide. When looking at the shorter time frame, methane released into the atmosphere accelerates global warming much faster than carbon dioxide. This is especially problematic now, when there is limited time to significantly reduce emissions to prevent the worst consequences of the climate crisis.

²¹ Friends of the Earth, '[Shale gas - unconventional and unwanted: the case against shale gas](#)'.

²² Ibid.

Several studies²³ have established that 3.6 to 7.9 per cent of a shale gas well's total gas production is lost through fugitive methane emissions. According to the research, the negative impacts of shale gas are more than twice as large as those from coal extraction over a 20-year period.

9. Seismic concerns

Previous research has shown that shale gas fracking causes micro-earthquakes. Artificial cracks caused at a depth can reduce the structural strength of a given geological layer and cause it to slip, resulting in earth movements, which means that buildings, houses and other infrastructure in these extraction areas are at risk.²⁴

10. Social risk

As shale gas wells are depleted within a short period of time, they can only provide jobs (e.g. security guard, driver, etc.) for the local population for the time the wells are in operation. These jobs do not require specific skills, so the value of a temporary worker is not really increased in the labour market by training. As the wells are depleted, so do the social benefits of the wells also decrease.²⁵

11. Economic risk

The Corvinus project and similar developments could lock Hungary into the current energy system, and additional fossil gas investments may follow. This can be considered a diversion of financial resources away from the necessary investments in energy transition through sustainable renewables, community-owned energy infrastructure ('energy communities'), modern heating systems, energy efficiency measures and renovation of the building stock.²⁶

Conclusions

While most EU countries have responded to the global energy crisis by implementing measures to rapidly decrease gas demand, the Hungarian government has responded with short-sighted and harmful measures. Measures from the seven-point energy action plan support fossil fuel projects and investments. New contracts for gas imports (e.g. to receive liquified 'natural' gas from Croatia, or the 15-year-long contract signed with Russia in 2021) or to increase domestic production through fracking, such as the Corvinus project that started operation in January 2023, are short-sighted due to their effects on the environment, climate and the state budget. Significant risks for the local area are associated with the Corvinus project,

²³ Friends of the Earth, '[Shale gas - unconventional and unwanted: the case against shale gas](#)'.

²⁴ Ibid.

²⁵ Friends of the Earth Hungary, '[A természetvédők szerint egy új palagáz-láz végleg tönkretenné az Alföld vízkincseit](#)', *Friends of the Earth Hungary*, 12 July 2022.

Telex, '[Bízunk benne, ha az alvó gázmező most felébred, akkor itt beindul az élet](#)', *Telex*, 18 August 2022.

²⁶ Mining and Geological Survey of Hungary, '[New invitations tender mining concessions](#)', *Mining and Geological Survey of Hungary*, 5 July 2018.

Friends of the Earth Hungary, '[Lassú és költséges út a semmibe: palagáz-fejlesztések Európában](#)', *Friends of the Earth Hungary*, 2013.

Friends of the Earth Hungary, '[Nem hagyományos és nem megalapozott](#)', *Friends of the Earth Hungary*, 2013.

Friends of the Earth Hungary, '[Palagáz összefoglaló](#)', *Friends of the Earth Hungary*, accessed 27 January 2023.

Alexa Botár, '[Power Point presentation - hun](#)', *Friends of the Earth Hungary*, accessed 27 January 2023.

including the pollution of freshwater resources and soil, or the exacerbation of existing problems with access to groundwater in dry periods of the year. The Hungarian government failed to carry out proper environmental and social impact assessments with appropriate public participation and the involvement of all stakeholders, including affected municipalities and communities, independent experts and national and local non-governmental organisations. Although there is a likely risk that the project may have a cross-border impact on Romania, due to its proximity to Romania and because the gas field extends into Romania, no transboundary environmental impact assessment procedure was carried out. Romania was not informed, nor was it involved as an affected party in the cross-border impact assessment.

Although Hungary has made commitments to reduce its gas demand by 2030 through national strategic documents, its short-term emergency plan could end up becoming a long-term plan that may soon lead to lock-in and dependency on fossil fuels. Decreasing domestic production from conventional fossil gas deposits will leave Hungary reliant on imports and thus vulnerable to different geopolitical stresses. Current attempts to increase domestic production by tapping shale gas could end up disastrous, as described in this briefing. Instead, Hungary must accelerate the energy transition that has been circumvented with the 'emergency plan'. Now, it is important to reduce gas demand in the country and ultimately plan for a gas phase-out.

Recommendations

- The Corvinus project must be stopped because of likely adverse negative impacts on the environment, including on water, biodiversity and local communities, associated with this type of fossil fuels extraction. Hungary must not undertake any shale gas projects due to these high risks / negative impacts.
- Hungary must halt new gas licensing and production – especially shale gas extraction or any fossil fuels extraction – that affects the Natura 2000 network, a nature reserve or other environmentally or socially valuable/vulnerable areas (e.g. lowland areas highly vulnerable to water scarcity or climate change).
- For any new gas projects, the Hungarian government should carry out proper environmental and social impact assessments with appropriate public participation and the involvement of all stakeholders, including affected municipalities and communities, independent experts, and national and local non-governmental organisations. For any projects where there is a risk that the project may have a cross-border impact, the affected country must be informed in advance so that a transboundary environmental impact assessment can be carried out in advance.
- Fossil fuels projects must not be considered priority investments, and should not be exempt from procedures in accordance with the international and EU environment acquis, among others, the Aarhus convention and the Environmental Impact Assessment (EIA), Habitats, Birds and Water Framework Directives. Among other conditions, they should not have adverse effects on public health or affected communities.
- The Hungarian government needs to accelerate the energy transition and gradually reduce its overall dependence on fossil fuels (both those that are imported and those that are produced domestically).

- The Hungarian government should set a clear gas phase-out timeline with well-defined milestones based on independent and authoritative experts' calculations. Political interests should not override the scientific approach.



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