

Country Paper:
**Cross-border energy cooperation in Central
Europe**
The case of Hungary

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The [REKK Foundation for Regional Policy Co-operation in Energy and Infrastructure](#) is a Budapest based think tank. The goal of the REKK Foundation is to contribute to the formation of sustainable energy systems in Central Europe, both from a business and environmental perspective. Its mission statement is to provide a platform for open-ended, European-wide dialogue between government and business actors, infrastructure operators, energy producers and traders, regulators and consumers, professional journalists and other interested private entities. The Foundation develops policy briefs and issue papers with forward-looking proposals concerning challenges posed by energy and infrastructure systems and organize regional forums allowing stakeholders to become familiar with the latest technological and regulatory developments within the industry.

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Introduction

Much has been decided regarding the cross-border energy cooperation of Hungary recently. MAVIR, the electricity TSO, has just signed a loan agreement with the European Investment Bank with a credit line of EUR 100 million¹ to finance the *expansion of the transmission network between Hungary and Slovakia*. In the meanwhile, the *second round of bidding for the capacity at the planned Croatian floating LNG terminal is ongoing*, and the Hungarian party actively makes steps to ensure the success of the negotiation. The historical moment of finding new natural gas sources in the region – i.e. *the Romanian off-shore gas reserves – resulted in partnership agreements* on building the missing infrastructure elements required to export gas to Hungary and on the delivery of Romanian natural gas to Hungary.

Great importance is placed on regional cooperation because of two reasons. The first reason is the RES targets set by the European Commission and the more effective regional solutions for the challenges related to this energy transition. The second reason of cross-border cooperation is the high cost of ensuring gas supply security and source diversification at national level only.

The aim of this country paper is to present how Hungary is involved in cross-border energy cooperation. Furthermore, we identify the lessons learned during recent cooperation activities and we propose further regional priorities to consider.

Institutional cooperation

Hungary has already been active in the European energy markets before joining the European Union in 2004. Since Hungary became a Member State of the European Union, the country has adopted the second and third Energy Packages and participates completely in the internal gas and electricity markets. The Hungarian Government is an active member of the EU-level cross-border meetings (i.e. EnMin meetings etc) and the discussions on legislative packages; furthermore, it takes part in numerous regional initiatives.

Besides the government, the Hungarian Energy and Public Utility Regulatory Authority (HEA), and the Transmission System Operators participate in several international organizations.

The cross-border cooperation of the Hungarian Energy Regulator

HEA, the Hungarian Energy Regulator is an active member in more than 60 working groups of the Agency for the Cooperation of Energy Regulators (ACER), the Council of European Energy

¹ MAVIR is part of MVM Group. The signature of the loan agreement was announced on 4th October.

Regulators (CEER) and Energy Regulators Regional Association (ERRA). HEA also gives expert opinion on the International Energy Agency's country report, due in every five years.

The cross-border activities of ERRA

ERRA, the Energy Regulators Regional Association was established in 2001 in Hungary and its Secretariat operates in Budapest. It is a voluntary organization comprising of independent energy regulatory bodies primarily from Europe, Asia, Africa, Middle East, South and North America. The aim of the institution is to increase exchange of information and experience among its members and to expand access to energy regulatory experience around the world². In order to achieve these goals ERRA organizes regulatory training courses, workshops and virtual meetings and regularly publish database of electricity and gas tariffs. Currently ERRA has 41 energy regulatory bodies as active members.

Government level regional initiatives

The scope of the paper is the regional energy cooperation of Hungary; for that reason we are not dealing with the numerous EU-level government cooperation activities here. However, we discuss the CESEC cooperation in detail, which works as one of the four High Level Groups of the European Commission in energy.

Cooperation under the Central and South Eastern Europe Gas Connectivity (CESEC) was launched by Governments of the participating countries in 2015 February to ensure gas source diversification and security of supply Central and South Eastern Europe³. To achieve the objective that all the countries have access to at least three gas supply sources, a limited number of CESEC priority projects were identified with the help of REKK modelling.

Within the CESEC cooperation, important progress has been achieved so far in the implementation process of the priority projects and also in the fields of high-level political commitment, regulatory deliverables and mobilization of EU financial support. From Hungarian point of view, the most important CESEC projects are the phased Romanian system reinforcement and the LNG evacuation system in Croatia towards Hungary.

In order to expand the successful progress to fields other than gas, CESEC's scope of cooperation was expanded further to include electricity, energy efficiency and renewable energies. It also incorporates a list of priority projects to build an interconnected regional electricity market, as well as specific actions to boost renewables and investment in energy efficiency in a region with vast growth potential in these areas.

² Source: ERRA

³ CESEC was set up by Austria, Bulgaria, Croatia, Greece, Hungary, Italy, Romania, Slovakia and Slovenia. They were joined later by eight Energy Community contracting parties: Ukraine, the Republic of Moldova, Serbia, the Former Yugoslav Republic of Macedonia, Albania, Bosnia and Herzegovina, Kosovo, and Montenegro.

Examples of electricity priority projects include: the enhancement of the transmission capacity between Bulgaria, Romania and Greece; the enhancement of the transmission capacity along the East-West corridor from Italy to Romania via the Balkans; electricity connections between Hungary and Serbia; and infrastructures supporting the integration of the Ukraine and Moldova power systems into the European electricity market. With regards to renewables in CESEC countries, an assessment of the renewable energy potential in the region by 2030 and 2050 will be carried out and best practices and financing tools for the development of renewable energies will be promoted. On energy efficiency, the focus will be on financing and the use of financial instruments to mobilise private financing as well as on ways to support the development of projects.

Cooperation of energy think tanks and governments within the Visegrad Group

In July 2018, the V4 Energy Think Tank Platform (V4ETTP) has been established by the governments of the Visegrad Group⁴. The V4ETTP is a platform – permanent network – of think tanks facilitating energy-related and policy-oriented research and analysis with a regional focus, building on its member institutions' expertise in energy studies. V4ETTP aims at engaging in structured cooperation with the V4 governments' representatives covering energy, energy diplomacy and climate, and for sake of the openness to the Central European region, also whenever justified and agreed by the members, involving representatives from third countries represented on think-tanks' and governments' levels.

Internal energy market

Cross border integration of electricity market

Capacity calculation and allocation

Based on the requirements of Regulation No. 1228/2003/EC and the accompanying guidelines, a market-based, transparent, non-discriminatory, cross-border transmission capacity allocation process should be coordinated at regional level. From 2016 on long-term and day-ahead explicit capacity allocation tasks are carried out by JAO S.A., which was founded in 2015 by the merger of previous allocation offices in CEE and CWE region (CAO and CAS1) and is owned by the system operators from the CEE and CWE region (including MAVIR).

ACER defined new capacity calculation regions in 2016 November⁵, based on which Hungary is a member of the new Core region, which is composed of the former Central and Western European (CWE) and Central and Eastern European (CEE) regions, complemented by Romania and Croatia. This means that Hungarian borders with Austria, Slovakia, Romania, Croatia and the future

⁴ The members of the Visegrad Group – also known as the "Visegrad Four" or simply "V4" – are the Czech Republic, Hungary, Poland and Slovakia.

⁵ https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2006-2016%20on%20CCR.pdf

Hungarian-Slovenian border belong to this region. As Serbia also adopted the CACM Regulation, Hungary becomes a member of the South-Eastern European (SEE) region along the Hungarian-Serbian border.

In order to meet the EU's target model for the day-ahead capacity allocation, MAVIR and HUPX⁶ Zrt. are also members of the NWE-CEE Flow-Based Market Coupling project. The project was extended with the Romanian parties; therefore, the following parts of the Hungarian border are currently affected: the Austrian, Slovakian, Romanian and Slovenian borders (when the interconnection with the Slovenian electricity line is completed).

In the framework of another regional cooperation Austrian-Hungarian and Slovak-Hungarian intra-day cross-border capacity allocation was organized on the auction platform operated by the Czech Transmission System Operator (CEPS).

Day-ahead market integration

On the Slovak-Hungarian and Hungarian-Romanian border, the Czech-Slovakian-Hungarian-Romanian market coupling has been successfully operating allowing for efficient day-ahead implicit allocations since the end of 2014. The members of this project have expressed their willingness to join the Multi-Regional Coupling (MRC) covering a large part of the European market. The aim of the effort is to integrate the immediate coupling of the four markets at the German-Czech, Austrian-Czech and Austrian-Hungarian borders, using the current capacity calculation methodology.

In April 2016 non-EU member states of the South East Europe region (the Western Balkan 6⁷ - WB6), signed a cooperation agreement on the development of the regional electricity market, primarily on day-ahead market coupling and cross-border balancing regulatory cooperation. MAVIR as a TSO sharing borders with the SEE region monitored the progress of this program throughout 2016 and joined the Western Balkan 6 initiative in March 2017⁸.

Beyond this initiative, Hungarian and Serbian Power Exchanges and TSOs together with EPEX Spot signed a memorandum of understanding in February 2018 with the aim of the merger of Hungarian and Serbian Power Exchange in order to create a regional power exchange⁹.

Intra-day market integration

In 2016, MAVIR and HUPX joined to the Cross-Border Intraday Market Project (XBID), which aims to enable continuous cross-zonal trading and increase the overall efficiency of Intraday trading on the single cross-zonal Intraday market across Europe. The participation in the project

⁶ HUPX is the Hungarian Power Exchange.

⁷ The WB6 countries are Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro and Serbia.

⁸ Source: MAVIR

⁹ Source: MAVIR

helps MAVIR to get acquainted with the scope, status, and technical solutions of the XBID project to help prepare future integration and implementation.

In August 2017 Transmission System Operators and Nominated Electricity Market Operators representing Austria, the Czech Republic, Germany, Hungary, Romania and Croatia established a Local Implementation Project to realize the coupling of intraday electricity markets based on the XBID technical solution. The parties endeavour to start operation as soon as possible after the successful go-live of the first wave Local Implementation Projects¹⁰.

Integration of balancing markets

Concerning balancing market integration MAVIR participates in e-GCC project since April 2013 together with Czech and Slovak system operators. The purpose of this regional imbalance netting project is to nullify the simultaneous, counter-directional balance of the regulatory constraints of the participants in order to reduce the amount of the secondary reserve and to increase the unused reserve amount available on average.

In order to implement Guideline on Electricity Balancing (2017/2195) various implementation projects were set up in Europe. MAVIR takes part in the different projects as an observer (TERRE, MARI) and as a first step of implementation joined to the PICASSO (Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation) project in January 2018, which is the implementation project for the establishment of the European aFRR-Platform¹¹.

Cross border integration of gas market

Nowadays there is a consensus that the EU internal gas market (IGM) is functioning well: market liquidity has been improving, competition at the wholesale level is intense and wholesale prices are converging. However, in Central and South-East Europe market inefficiencies are still observable due to missing infrastructure, source dependency and distortive tariffs at certain borders.

There are several (in some cases competitive) regional projects in order to improve integration of gas markets and source diversification of this region. Hungarian parties take an active role in the international cooperative efforts. From Hungary's perspective, the realization of the concept concerning the North-South Gas Corridor would be particularly beneficial, with special respect to the access to LNG sources. Hungarian parties participate actively in the Croatian LNG project: there are continuous negotiations with Hungarian participation, and FGSZ¹² also takes a share in the preparation of the open season procedure. As part of the North-South Gas Corridor the Polish LNG terminal has been commissioned in 2015, and interconnectivity through the planned Polish-Slovakian Interconnector could provide access to this source as well, especially as a capacity

¹⁰ Source: MAVIR

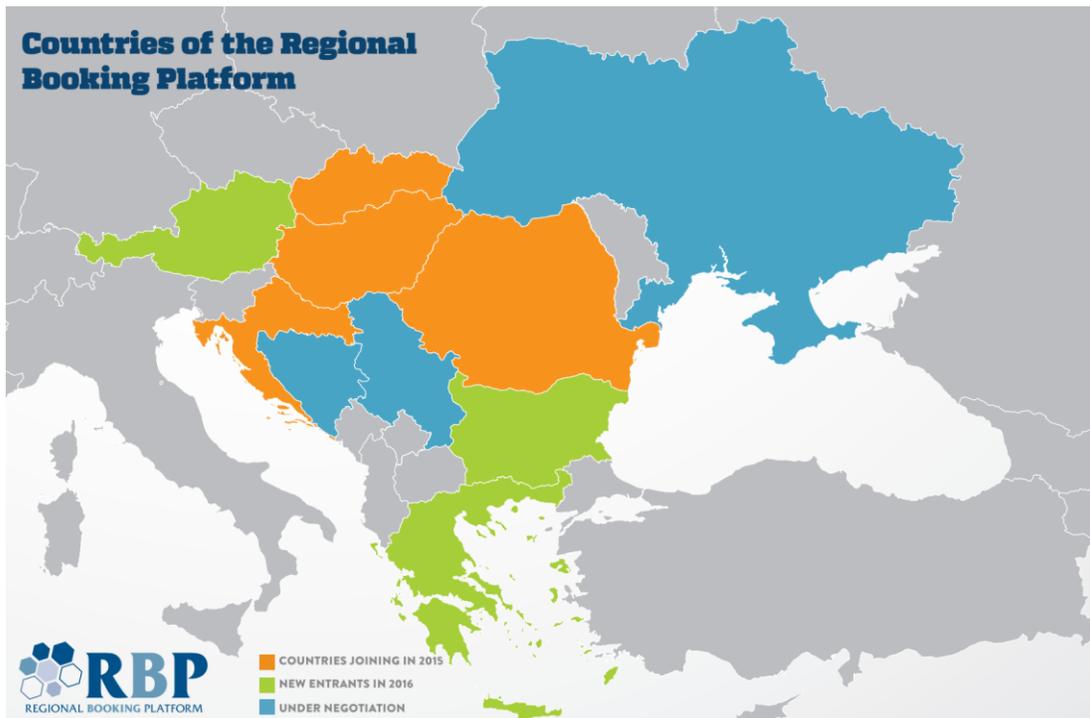
¹¹ Source: MAVIR

¹² FGSZ is the owner and operator of the Hungarian high-pressure natural gas pipeline system.

increase to 7.5 bcm/ year of the LNG terminal is envisaged. The third possible way to deliver LNG into our region is through the Italian Corridor via a future Slovenian-Hungarian interconnector. Hungary could also benefit from the exploitation of the natural gas fields in the Black Sea, from this point of view the BRUA project has significant importance. This interconnector makes possible to deliver gas from the Black Sea fields to Hungary. The first phase of the project has already been under construction, which would allow Hungary to import 1.75 bcm/year gas from Romania by 2020. Timing and elements to be realized from the projects of the Trans Adriatic Pipeline (TAP) or the Turkish Stream through a South Corridor also cannot be regarded to be ignorable in view of Hungary’s long-term energy and supply safety. FGSZ is open to give the opportunity of delivering gas from South through its system in case of all possible projects (from the direction of Serbia or in case of Eastwing).

In 2015 FGSZ launched the first international capacity trading service in the region under the name of Regional Booking Platform (RBP). This platform supports the integration of the neighbouring gas markets, as its use guarantees the synchronization of the capacities of the respective entry and exit sides over the borders in question. All the auctions held in the frame of RBP are in line with the network codes. RBP is used by several gas suppliers in the region (see Figure 1)¹³.

1. Figure: The countries participating in the Regional Booking Platform (RBP)

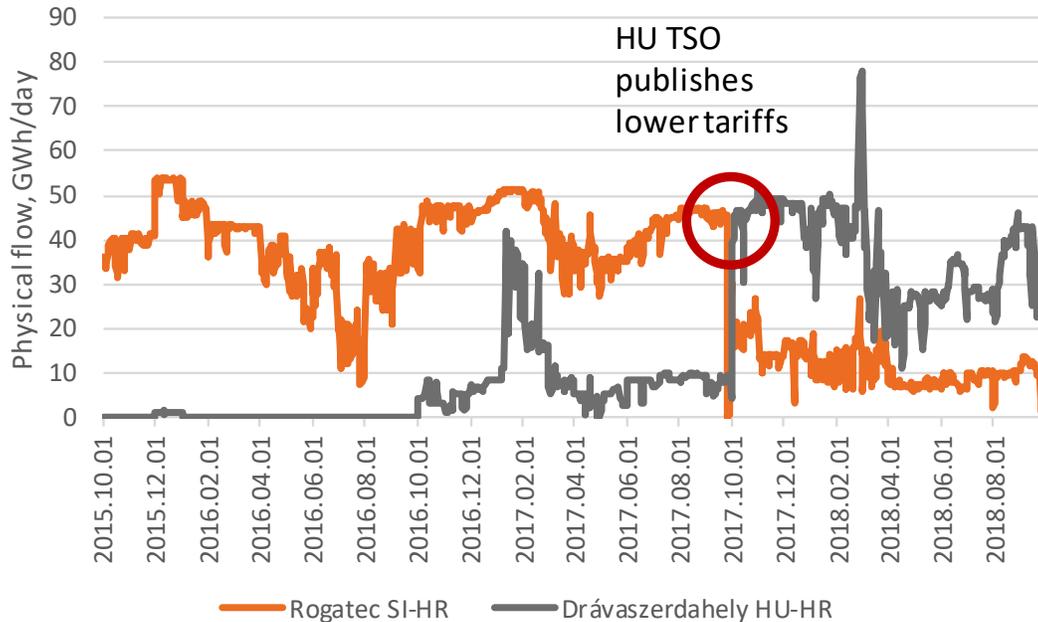


Source: RBP

¹³ Source: FGSZ Annual Report 2016

In line with the instructions of tariff network code, Hungary reconsidered tariffs on gas market in 2017, which had a significant effect on the regional flows. Figure 2 demonstrates this phenomenon: due to lower tariffs deliveries from Hungary to Croatia have increased significantly and in parallel flows from Slovenia to Croatia remarkably decreased.

2. Figure: The effect of reconsidered gas tariffs



Source: REKK

Infrastructure development in gas markets

Coordinated infrastructure development plans

EU Gas Regulation (EC) 715/2009 requires European TSOs to publish Gas Regional Investment Plans (GRIPs) on a biennial basis, which serve as a link between TYNDP and national plans. The third editions of the GRIPs, developed jointly with TYNDP 2017, provide specific regional views of supply, demand, and capacity developments in the different regions for the upcoming decade (2017–2026). Hungary belongs to three regions concerning GRIPs: Central Eastern Europe, Southern Corridor and North-South Corridor.

PCI projects

Table 1 summarizes the Hungarian gas projects from the Gas Regional Investment Plans published in 2017. It is also shown whether these projects are included in different PCI (Projects of Common Interest) lists.

1. Table: Hungarian gas projects in GRIP and PCI lists

PROJECT NAME	EXPECTED COMMISSIONING YEAR BASED ON CEE GRIP	1 ST PCI LIST	2 ND PCI LIST	3 RD PCI LIST
Enhancement of Transmission Capacity of Slovak–Hungarian interconnector	2017	No	No	Yes
Development of Transmission Capacity at Slovak–Hungarian interconnector	2017	No	No	Yes
Romanian–Hungarian reverse flow Hungarian section 1st stage	2020	Yes	Yes	Yes
Slovenian–Hungarian interconnector	2020	Yes	Yes	Yes
Hungarian section of Tesla project	2020	No	Yes	No
HU–UA reverse flow	2020	No	No	No
Eastring – Hungary	2021	No	Yes	Yes
Vecsés – Városföld gas transit pipeline	2021	No	No	Yes
Városföld – Ercsi – Győr	2022	Yes	Yes	Yes
Ercsi – Százhalombatta	2022	Yes	Yes	Yes
Városföld CS	2022	Yes	Yes	Yes
Romanian–Hungarian reverse flow Hungarian section 2nd stage	2022	No	Yes	Yes
Romanian–Hungarian reverse flow Hungarian section 3rd stage		No	No	Yes
Hajdúszoboszló CS	Unknown	No	No	No

Source: CEE GRIP 2017 and PCI lists

The above gas infrastructure projects are serving both regional and Hungarian interests but are in different stage of realization and priority level. The first two projects – related to upgrade of the SK-HU interconnector – are delayed because of ownership structure changes. This transaction is expected to happen by the end of 2018 thus the forecasts for realization of these projects are optimistic.

No doubt the first priority is the BRUA project. While the 1stage is the absolute priority, the 2nd and 3rd stages of the project are also of great importance.

The Slovenian-Hungarian interconnector is one of the substantial missing infrastructure elements which would further reduce the source dependency of the region in the long run. The internal pipeline investments listed in Table 1 play significant role in making possible further gas imports to Hungary.

The Hungarian section of the TESLA project is not on the priority list any more. The Eastring is an alternative for the BRUA project and therefore cautious positive approach is expressed.

As mentioned and emphasized many times¹⁴, the future of the Ukrainian transit and the more fundamental integration between Ukraine and its EU neighbours serve the benefit of all regional countries. Despite not included in the PCI list, the firm reverse flow of the Hungarian-Ukrainian interconnector might be completed as part of the first stage of BRUA and will be built anyway¹⁵.

Infrastructure development in electricity markets

Coordinated infrastructure development plans

ENTSO-E publishes the TYNDP in every even year, which acts as a basis to derive the Projects of Common Interest (PCI) list. TYNDP defines four Trans-European Networks for Energy (TEN-E) electricity priority corridors, among which Hungary belongs to the North-South Interconnections (NSI) East Region, where the main goal is to manage the north-west to south-east power flows. TYNDP 2018 outlines future capacity needs of the Regions given the expected structural changes of the future power system. The long-term 2040 capacity needs are particularly analysed in the Regional Investment Plans which were published at the end of 2017 by the six regional groups responsible for grid planning and other system development tasks. Hungary belongs to two groups: Continental Central East and Continental South East. These Regional Investment Plans identifies future transmission capacity needs in addition to the expected grid in 2020. Concerning Hungary, a necessary capacity increase between Hungary and Romania is identified beyond 2030.

PCI projects

Table 2 summarizes Hungarian electricity projects from the TYNDP 2018 and indicates that all projects are part of all PCI lists except of the Hungarian-Romanian interconnector which is only under consideration.

¹⁴ See REKK Policy Brief 2018/05: Regional vision on challenges and opportunities for Ukraine gas market integration for details.

¹⁵ Source: Challenges and opportunities of EU-Ukraine gas market integration - How the neighbours can contribute? REKK Energy Policy Forum, 30-31 May 2018

2. Table: Hungarian electricity projects in TYNDP 2018 and PCI lists

PROJECT NAME	EXPECTED COMMISSIONING YEAR	STATUS	1 ST PCI LIST	2 ND PCI LIST	3 RD PCI LIST
Interconnection Hungary – Slovakia between Gabčíkovo (SK) and Gönyű (HU) and Veľký Ďur (SK)	2020	in permitting	Yes	Yes	Yes
Interconnection Hungary – Slovakia between Sajóvánka (HU) and Rimavská Sobota (SK)	2020	in permitting	Yes	Yes	Yes
400 kv OHL between Hungary and Romania	>2030	under consideration	-	-	-
Slovenia-Hungary/Croatia interconnection	2018	in permitting	Yes	Yes	Yes

Source: TYNDP 2018 and PCI lists

Substantial portion of the Hungarian electricity demand is fulfilled by import, the ratio of electricity purchased from abroad is around 30% on a yearly base. Additionally, the spot price at HUPX is above the Northern stock exchange prices. These circumstances make the capacity expansion at the Hungarian-Slovakian transmission lines priority investment for Hungary. As mentioned in the introduction, this project has just got green light for EIB financing.

The interconnection between Slovenia and Hungary is on the agenda of bilateral meetings regularly, the Hungarian party being the more active advocate of the project. However, the planned two-system 2 x 400 kV transmission line would also increase the reliability of the Slovenian electric power system and would facilitate Slovenia's access to Eastern European electricity markets¹⁶. Recent negotiations show favourable results about launching the project.

Both the SK-HU and the SI-HU interconnections will enable greater market integration in the region.

¹⁶ Source: ELES

Synchronization of systems

Electricity markets of Central-Eastern Europe could be significantly affected by the extensions of the ENTSO-E system to the East mainly by the synchronous connection of Ukrainian power systems to Continental Europe system. As Ukraine and the Republic of Moldova will synchronously connect through Romania, Hungary, Slovakia and Poland, this could impose needs for regional transmission grid development, in order to maintain the security and reliability of the future European interconnected transmission systems operation. Although the “Agreement on the conditions of the future interconnection of the power system of Ukraine (/the Republic of Moldova) with the power system of Continental Europe” was signed in June/July 2017, there is still a long way to go – if it will be proved to be feasible – before synchronous interconnection.

Support from EU funds

Hungarian project promoters got CEF support three times, for the preparation of environmental permit and engineering documentation for the Hungarian part of RO-HU-AT gas corridor, and for the preparation of HU-SK interconnector. The overall CEF support for Hungary has been 2.49 million €.

3. Table: The Hungarian projects which got CEF support

PROJECT	WHICH PHASE	IMPLE- MENTATION SCHEDULE	MAX. EU CONTRI- BUTION	PERCENTAGE OF EU SUPPORT	BENEFI- CIARIES
RO-HU-AT Corridor	Preparation of EIA and obtainment of the environmental permits for the Hungarian part	May 2017 to December 2018	€922,500	50%	FGSZ
RO-HU-AT Corridor	Preparation of the Basic Engineering Documentation for the Hungarian part	August 2016 to July 2017	€1,377,000	50%	FGSZ
HU-SK inter-connector	Preparation of Gönyű (HU) – National Border (HU) 400 kV interconnection line	August 2014 to September 2017	€188,959	50%	MAVIR

Source: European Commission, Connecting Europe Facility

There are additional CEF supports for projects in which Hungary also participates, however the beneficiaries of these projects are project promoters from the neighbouring countries. Croatian LNG project got CEF support also for studies (4.9 million € and 0.747 million €) and for the

construction (101.4 million €). Plinovodi got 750.000 € CEF support for studies concerning Slovenia-Hungary interconnector. The Slovakian eurostream got 2 million € for preparing the feasibility study of Eastring project.

4. Table: The Hungarian projects which got EEPR support

PROJECT	PROJECT TYPE	EEPR SUPPORT	FUNDING RATE	SUPPORT PERIOD
Hungary - Croatia	gas interconnection	€20 m	16.56%	2009 July – 2011 February
Hungary - reverse flow	gas interconnection	€8.0785 m	49.68%	2010 June – 2012 May
Romania - Hungary	gas interconnection	€16.5 m	50%	2009 July – 2010 December
Slovakia - Hungary	gas interconnection	€30 m	47.7%	2010 March – 2015 January
Austria - Hungary	electricity interconnection	€12.989 m	50%	2009 July – 2011 December

Source: European Commission, European Energy Programme for Recovery

Security of supply

Regional cooperation in gas

The previous Security of Gas Supply Regulation (994/2010) required Competent authorities to prepare a risk assessment of how they meet the supply and infrastructure standards (taking into account both national and regional circumstances), a preventive action plan to mitigate supply risks and an emergency plan to mitigate a serious gas supply disruption. Neighbouring Member States were asked to consult each other to ensure that national plans do not have a negative impact on other countries connected to the same gas supply routes. National plans were to be updated every two years and submitted to the Commission. Member States had the possibility to develop joint plans at a regional level but were not obliged. In 2016 Hungary submitted the third actualized version of the required documents which were agreed by the neighbouring countries, but regional plans were not prepared. In contrary the new Security of Gas Supply Regulation (2017/1938) requires EU countries to cooperate with each other in regional groups to carry out common Risk Assessments and to develop and agree on joint preventive and emergency measures (to be reflected in their national Preventive Action Plans and Emergency Plans). Based on this Regulation Hungary belongs to a South East region: Southern Gas Corridor – Caspian group together with Bulgaria, Greece, Croatia, Italy, Malta, Austria, Romania, Slovenia, Slovakia. Hungary also belongs to the Ukraine Eastern group together with the countries which buy Russian gas through Ukraine. According to the Implementation Roadmap member states shall publish the national and common

Risk Assessments by 2018 October, and they also expected to exchange draft Preventive Action Plans and Emergency Plans and proposals for cooperation by the same deadline.

Concerning solidarity, the Regulation requires the Member States to make bilateral legal, technical and financial arrangements by December 2018 in which they should conclude under which conditions Hungarian storages would help to serve protected consumers in the neighbouring countries (gas volumes, price, way of transport). Hungarian Energy Regulator is preparing for these bilateral negotiation processes not only with EU member neighbours, but also with Serbia.

The abovementioned new regulation also requires that in the event of a regional emergency the TSOs shall cooperate and exchange information using the ReCo (Regional Cooperation) System for gas established by ENTSO-G. Europe is split into three regions, from which Hungarian TSO belongs to ReCo Team East. Cooperation between parties worked several times, for example during the cold spell in February 2017, the members of ReCo Teams East and North-West met to plan and exchange information. In December 2017, the ReCo Team East held two virtual meetings due to the incident at the Baumgarten hub in Austria, causing disruption of the gas flows from Slovakia to Austria, and from Austria to Hungary, Italy, Slovenia and Croatia.¹⁷

Regional cooperation in electricity

Based on a multilateral agreement signed in December 2015, all TSOs in ENTSO-E are required to join a Regional Security Cooperation Initiative (RSC).

3. Figure: Regional Network Security Cooperation Initiatives



Source: ENTSO-E vision package

The Regional Security Coordinators are companies owned by the TSOs. They perform services for the TSOs, such as providing coordinated operational safety assessments, short- and medium-term

¹⁷ Source: ENTSO-G

system compliance projections, coordinated capacity calculation, coordinated outage planning and common network models.¹⁸ Due to the complexity of these tasks and the emerging IT difficulties, the initial deadline of joining to an RSC was first extended until the end of 2018 then until the end of 2019. There are several Regional Cooperative Initiatives in Europe (see Figure 3), among which MAVIR intends to join the TSC projects, but their request has not been confirmed yet.

Research, innovation and competitiveness

Regional Horizon 2020 energy projects

Table 5 shows the main characteristics of those Horizon 2020 energy research projects in which Hungarian institutions, companies and research entities are participating.

5. Table: Horizon 2020 energy research projects in which Hungarian partner is involved

PROJECT NAME	TOTAL BUDGET (EUR)	EU CONTRIBUTION (EUR)
FutureFlow - Designing eTrading Solutions for Electricity Balancing and Redispatching in Europe	12 985 242,50	12 985 233,50
CHPM2030 - Combined Heat, Power and Metal extraction from ultra-deep ore bodies	4 235 567,50	4 235 567,50
GreenPlay - Game to promote energy efficiency actions	1 705 500	1 705 500
BIOSURF - BIOMethane as SUstainable and Renewable Fuel	1 872 912,13	1 872 912,13
CEPPI 2 - Coordinated energy-related PPIs actions for cities (CEPPI)	1 294 808	1 294 808
COMBI - Calculating and Operationalising the Multiple Benefits of Energy Efficiency Improvements in Europe	996 548,75	996 548,75
C-Track 50 - Putting regions on track for carbon neutrality by 2050	1 983 823,75	1 983 823,75
FLEXITRANSTORE - An Integrated Platform for Increased FLEXibility in smart TRANSMission grids with STORAge Entities and large penetration of Renewable Energy Sources	21 699 181,25	17 008 101,88

¹⁸ ENTSO-E RSC factsheet

AMPERE - Automated photovoltaic cell and Module industrial Production to regain and secure European Renewable Energy market	26 557 003,75	14 952 065,14
ENABLE.EU - Enabling the Energy Union through understanding the drivers of individual and collective energy choices in Europe	3 337 416,25	3 337 416,25
PLANHEAT - Integrated tool for empowering public authorities in the development of sustainable plans for low carbon heating and cooling	2 999 400	2 998 962,50
SET-Nav - Navigating the Roadmap for Clean, Secure and Efficient Energy Innovation	3 999 411,25	3 999 411,25
ENERGISE - European Network for Research, Good Practice and Innovation for Sustainable Energy	3 720 453,75	3 176 513,75
4REFINERY - Scenarios for integration of bio-liquids in existing REFINERY processes	5 965 473,71	5 965 473,71
EN SGplusRegSys - A European joint programming initiative to develop integrated, regional, smart energy systems enabling regions and local communities to realize their high sustainable energy ambitions	37 622 856	12 415 542,48

Source: H2020

Majority of these research projects have wide geographic coverage. The analysis of these project shows that the Hungarian partners are usually participating in projects which involve partners beyond the region, from all over Europe. Therefore, the research activities ensure the possibility to spread the latest innovative knowledge all over the continent. Analysing the projects by topic we see that they are dealing with very different areas; however, research related to smart network and developing software for increasing energy efficiency and smart network optimization are the most common ones.

Lessons learned

The regional cross-border activities of Hungary in the energy sector are not without antecedents. **Since the 2009 gas crises, Hungary has been very active in strengthening its network interconnections within the region**, both in electricity and gas sector. The Slovakian-Hungarian gas interconnector has been built and several cross-border gas pipelines were upgraded to bidirectional. In the wholesale electricity market, Hungary is participating in the Czech-Slovakian-Hungarian-Romanian day-ahead market coupling since 2014 and in the regional imbalance netting since 2013.

The successful cross-border activities of the early 2010' are currently being followed by recent regional initiatives:

- MAVIR, the electricity TSO, has just signed a loan agreement with the European Investment Bank to finance the *expansion of the transmission network between Hungary and Slovakia*;
- the *second round of bidding for the capacity at the planned Croatian floating LNG terminal is ongoing*, and the Hungarian party actively makes steps to ensure the success of the negotiations; and
- the historical moment of finding new natural gas sources in the region – i.e. *the Romanian off-shore gas reserves – resulted in partnership agreements* on building the missing infrastructure elements required to export gas to Hungary and on the delivery of Romanian natural gas to Hungary.

Intensive top-down, horizontal and bottom-up regional cooperation is realized by the strong institutional actors: the HEA, whose experts are working in more than 60 working groups of CEER, ACER and ERRA, the Hungarian Government, who is committed to such regional initiatives like the CESEC and the Transmission System Operators, who are managing the upcoming challenges of next level market integration in both gas and electricity successfully.

Electricity sector

Evaluating **the main gains in electricity cooperation**, the core goal of the Hungarian party is to make the land locked position better. The **market coupling, in which Hungary is participating, is very successful**. Besides, the Hungarian Power Exchange became a really liquid one, and attracts many regional sellers and traders from the Balkan region, too. Still, because of its geographical situation and net import position, Hungary is continually looking for further options of regional cooperation. To implement these further options, typically there is need for the active support from the other party, but Hungary is usually facing dependence on a less motivated party. The members of the Czech-Slovakian-Hungarian-Romanian market coupling project for example have expressed their *willingness to join the Multi-Regional Coupling (MRC)* covering a large part of the European market but are waiting for approval from the German and Austrian parties. Similarly, the *Slovenian-Hungarian transmission interconnections* would be favourable for Hungary, but the support from the other interested parties is required.

Beside to these regional electricity initiatives, the planned *merger of Hungarian and Serbian Power Exchange* to create a regional power exchange is a great opportunity. This integration might be favourable for Hungary, but has many risks, too.

Gas sector

The common interest to reduce import gas dependency led to the **successful realization of many gas infrastructure investments in the CEE region**. The Polish LNG terminal, the SK-HU interconnector and the bidirectional upgrades of existing interconnectors enhanced the supply

source diversification position of the region. The priority for **future regional cooperation is the better utilization of the North-South Gas Corridor.**

The great challenge, however, is that those projects, which would ensure further decrease of import gas dependency for a given member state, are usually conflating ones to other countries' priority projects. As the interests of the affected parties regarding **regional gas investment are sometimes clashing within the region, profound solutions should be applied, i.e. CBCA method should be used or different ownership structures with cross-border tariff-setting.**

No doubt that the most important regional project for Hungary is the future of the Romanian off-shore gas reserves, and the actors are waiting for the FID.

Regional conclusions

The paper is not discussing the phenomenon which are not present in the region, but their effect is realized within this region. Given that these external processes could not be influenced by the CEE countries alone, there is a need for regional cooperation to negotiate with actors not from the region. The best example for this is the German loop-flow case, but further Europe-wide issues are affecting the region without owing the measures to handle them.

Regarding those infrastructure projects which are characterised with clashing interests of different countries within the region, fair risk mitigation process should be applied.

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