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## V4 – ENERGY SECURITY AND REGIONAL MARKETS

# CHALLENGES AHEAD

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## 1. V4 – energy security and regional market. Challenges ahead

Security of energy supply is one of the three main objectives of the EU energy policy, on a par with competitiveness and environmental protection. However, prominence of the energy security as a policy area rose with the 2009 gas crisis and the 2014 conflict in Eastern Ukraine, prompting the EU to adopt Energy Security Strategy. According to the strategy, EU countries should strengthen their ability to face possible supply disruption and improve coordination of their respective emergency and solidarity mechanisms. They should further reduce their dependency on particular fuels, energy suppliers and import routes and increase domestic energy production, while taking demand moderating measures.

All these goals have been long on the policy agenda of the V4 countries. After the exposure to gas crisis in 2009, considerable improvements in terms of route diversification have been made. However, there are new challenges, mainly stemming from geopolitical situation and possible new gas infrastructure that could disrupt the ongoing integration into a bigger regional gas market. V4 power sector has been long viewed as relatively unproblematic compared to gas sector but new and very serious challenges are arising with adoption of ambitious environmental policies and growing RES volumes.

This paper, provides a brief overview of the main challenges and areas we view as problematic or particularly important. It is a subjective selection, covering only power and gas sector issues. To make the paper concise and relevant, we chose not to touch upon other important energy security related issues linked to oil, coal or nuclear fuel. Also, to put the discussion below into a context, we provide some key statistics for gas and power sector in V4 countries but we do this in the annex to save some space and maintain the focus.

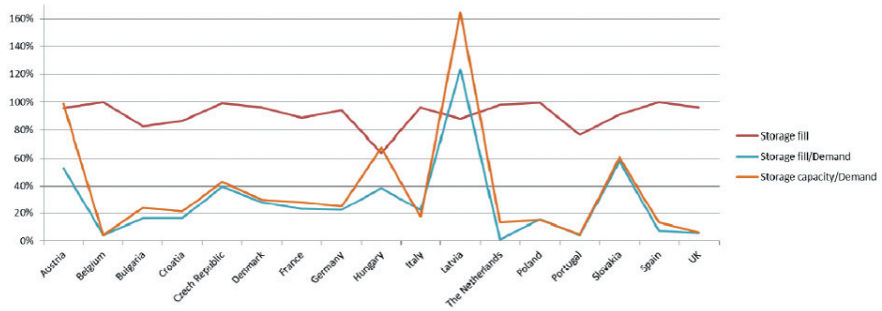
The second part of the paper contains recommendations that would help policy-makers address the current challenges and strengthen the energy security in the Visegrad region and the EU as a whole.

## 2. How vulnerable are V4 countries from the energy security point of view?

Compared to few years ago, V4 countries' energy security has improved, especially in gas. In the aftermath of the 2009 gas crisis, gas infrastructure has been boosted up and several bi-directional cross-border pipelines have come online. Poland has implemented virtual and later physical reverse flow[1] on the Yamal pipeline, enabling the country to be supplied from Western liquid hubs. Gaz-System, the Polish TSO is currently engaged in implementing the interconnection with Lithuania, Slovakia and Czech Republic and has built more than 1200 km of new pipelines, connecting the soon-to-be operational LNG terminal in Swinoujscie with central parts of Poland and further on to the South. The Gazelle pipeline connecting Czech Republic with the Opal and Nord Stream I was opened in 2013 and satisfies today substantial part of the Czech domestic gas consumption. Slovakia has enabled physical reverse flow on the Czech-Slovak border, boosted the Austrian-Slovak interconnector capacity and put in operation a new interconnection with Hungary and Ukraine. Hungary became able to cover its gas import needs from Austria and Slovakia, as an alternative to imports from the Russia-Ukraine direction. In 2011 Hungary completed interconnection with Croatia and Romania and is in process of planning an interconnector to Slovenia. The existing UGS capacities in Hungary and Slovakia are satisfactory (or at present even seem abundant) and can cover relatively large part of the respective domestic consumption. Poland's UGS capacities are low but number of installations is being upgraded. Moreover, relatively large share of the required gas can be produced domestically and the missing volumes can in the near future be partially remedied by the imports from the Swinoujscie LNG terminal.

[1] 5 bcm on firm basis, 2.7 bcm on interruptible

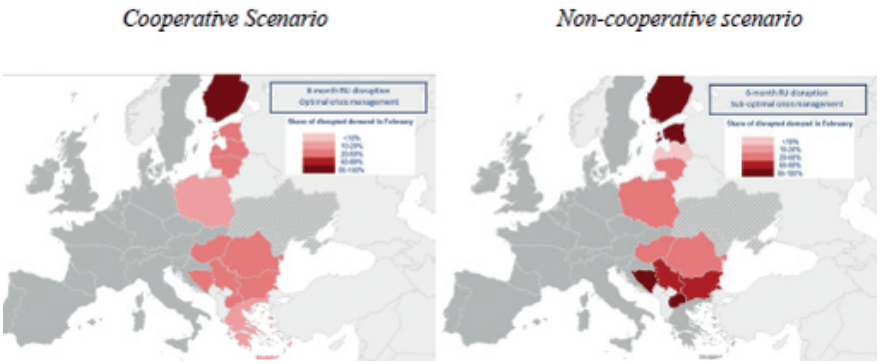
Figure 1: Storage levels (%) per MS, storage fill as share of domestic demand (%) and storage capacity as share of domestic demand (%), October 2014




Source: European Commission

These developments are reflected in the Commission's 2014 security of supply stress tests according to which, V4 countries would be affected by the Russian cuts in gas supplies to a lesser extent than, for example the South-East countries. Hungary and Poland would face shortfalls of 30%, respectively 20% if no cooperation. Under a cooperative scenario (where everybody would share the supply cuts burden), supply shortfalls in Slovakia and the Czech Republic would be below 10%.[2] Considering the overall declining gas demand in the EU[3] , V4 countries are in a better energy security position than in the past, prompting some experts to speak of "quiet gas revolution" in Central and Eastern Europe (CEE)[4].

Figure 2: Maps of likely supply interruptions before further national measures in February at the end of 6-month Russian gas supply disruption in cooperative and non-cooperative scenarios




Source: European Commission, ENTSO-G

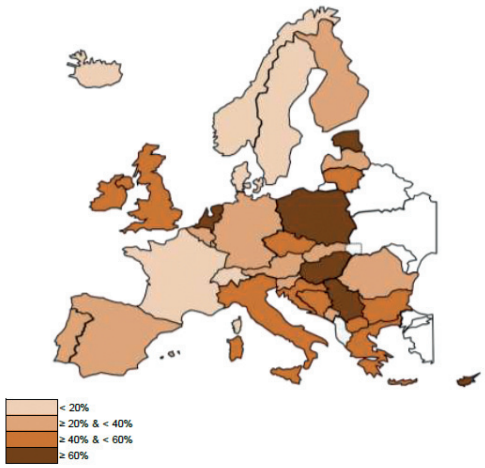
However, all these gas security improvements happened within the existing geo-political framework, when majority of gas supplies were realised in the traditional East-West direction, either through Ukraine or Belarus. With the Nord Stream I completion the situation have changed and the existing transit infrastructure - mainly the Brotherhood pipeline - is facing decreasing utilisation rates and revenues. Germany is increasingly taking over the role of a transit country.[5]

The developments in the power sector are more mixed compared to the gas sector. The positive side is that three out of the four V4 countries (exception is Poland) have implemented a very successful day-ahead electricity market coupling project since 2012, with Romania joining in 2014. The success of market coupling makes it imperative for V4 to further improve cooperation and to avoid policy interventions that could undermine regional electricity market integration.

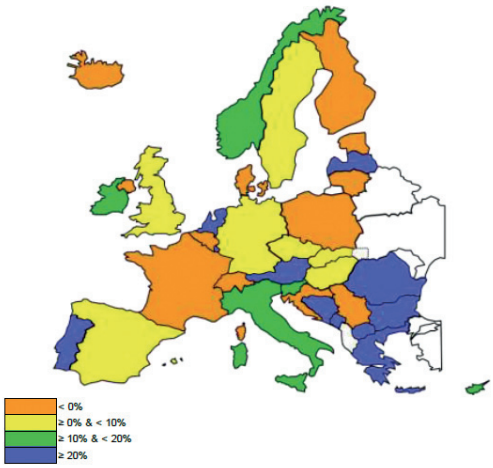
[2]https://ec.europa.eu/energy/sites/ener/files/documents/2014_stresstests_com_en.pdf
[3]Decline by 20% from 2010 to 2014, according to ENTSO-G Winter Supply Outlook.
[4]http://www.energypost.eu/quiet-revolution-central-eastern-european-gas-market/
[5]http://www.icis.com/resources/news/2014/01/16/9744466/analysis-russian-natural-gas-transit-volumes-via-germany-shoot-up-in-2013/

The negative development is a combined challenge for conventional generation in the region by different factors, most prominently declining demand, the fast penetration of heavily subsidised RES-E (especially in Germany) without related changes in transmission pricing, the collapse of European $CO_2$ prices and high relative gas prices in the region. The first three of the above have led to declining wholesale electricity prices that question the viability of the majority of existing conventional power plants. Coal production and coal based resources are facing a mounting pressure (especially if an ambitious international $CO_2$ reduction accord is stroke in Paris this year) in Poland and the Czech Republic. Nuclear energy might face the same fate if certain political attitudes prevail. The lost competitiveness of gas based electricity generation is apparent in Hungary and the related risk of losing highly efficient gas based generation assets through closures is serious. We see this happen all over the EU but the Hungarian example where several gas fired power plants are standing idle tells a clear and sorry story. At the same time, as these old conventional powers plants are being pushed out from the merit order by RES, no new conventional power plants are being built because the future rate of return is too unpredictable. Taken all those factors together, we are entering a situation in which we might have a serious lack of generation capacity that is stable enough and can efficiently back-up the growing volume of intermittent RES.[6] Situation is dramatic especially in Poland that has already experienced power crisis in August 2015 and faces serious risk of capacity shortages till 2017. Inadequate generation capacity is certainly a serious energy security risk. And the situation might deteriorate further after the final decommissioning of German NPPs in 2022.

Figures 3.1 and 3.2: Fossil fuels installed capacity as part of NGC in 2020 | Remaining Capacity in 2020




*F. 3.2.2.6 - Fossil fuels installed capacity as a part of NGC per country in 2020;*




*F 4.1.8 – Remaining Capacity minus Adequacy Reference Margin as a part of Reliably Available Capacity per country, Scenario B, January 2020, 7 p.m.*

Source: Scenario outlook and adequacy forecast 2014-2030, ENTSO-E

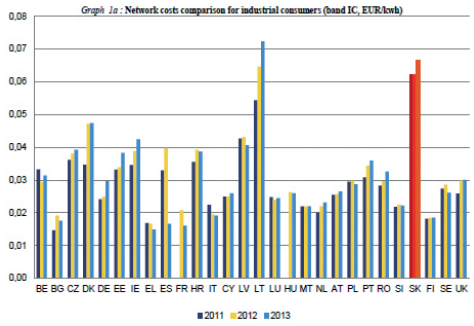
The difference in RES-E penetration dynamics is significant in the V4. For some of the group RES support negatively impacts the public budgets and end-consumer prices. Annual costs of the feed-in-tariff system in the Czech Republic in 2012 was ca. 1,3 bln EUR[7], today it is at almost 2 bln EUR (45 mld CZK).[8] Costs of Poland's green certificates system in 2012 was around 765 million EUR[9]. In Slovakia, where feed-in-tariffs are financed through a special network tariff added on top of the wholesale price, the end-user prices have increased dramatically. Commission claims that Slovakia currently has one of the highest network tariffs in the EU, negatively affecting the competitiveness of the Slovak industry.[10] Slovak Regulator has rejected these claims, arguing in a recent study that the RES implied costs elsewhere are comparable with Slovak ones and are as high as in any other EU country.[11] This conclusion only supports the idea that the current

[6]https://www.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202014/140602_SOAF%202014-2030.pdf
[7]http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/Tab4/C14-SDE-44-03_Status%20Review%20on%20RES%20Support%20Schemes_15-Jan-2015.pdf
[8]http://www.eru.cz/documents/10540/462940/Pro-Energy_2014-03-17.pdf/c9278e3a-6fc2-4636-a10c-c68792e6b83b
[9]http://www.sejm.gov.pl/Sejm7.nsf/InterpelacjaTresc.xsp?key=2F9088F9

RES support system is unsustainable and needs a revision, especially in the Czech Republic and Slovakia where a support system similar to German one is applied. CEE's competitiveness and growth prospects can and should not be affected by unreasonably high end-user energy prices. Today, the end-user power prices for industry in V4 countries are certainly not among the lowest in the EU.[12]

In several of its recent reports on the internal energy market, the Commission acknowledges that various forms of subsidies have the potential to distort the market (this is also the reason why introduction of different capacity mechanisms are looked at with suspicion). RES are far from the only sources in the CEE region receiving support, coal and nuclear is subsidised too. In nearly all V4 countries we see also governments "subsidising" retail prices. It is obvious that this price capping might discourage new suppliers to enter the market and help to preserve the market position of traditional suppliers. Limited competition might negatively affect the choice for end-consumers. Protection of vulnerable consumers is necessary but should be targeted in order to avoid negative effects on the entire sector. Gradual de-regulation of the retail prices should, therefore, be considered by the V4 governments. Poland, which regulates also the wholesale gas prices should as fast as possible comply with the recent ECJ ruling and open up its gas market to competition.

Figure 4: Network costs comparison for industrial consumers



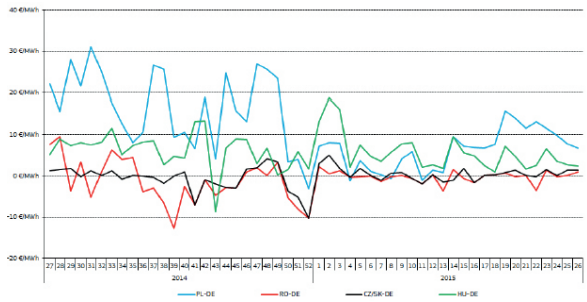

Source: Country Report Slovakia – 2015, European Commission

Last but not least, we want to highlight the correlation between the energy vulnerability, insufficient power market development and the development of the power grid and inter-connectors. Obviously, all V4 countries have during the last few years made serious investments into the development of the transmission and distributions grids. Level of technical losses have decreased and TSO have been able to meet peak loads with sufficient. However, the stability of the grid and the trading patterns are negatively affected by the loop flows caused by the growing volume of intermittent power generated by off-shore wind farms in Germany and insufficient grid connection capacity between northern and southern part of the country. In 2012, average unplanned flows from Poland to Slovakia reached 233 MW, unplanned flow from Czech Republic reached 159 MW and unplanned flow from Slovakia to Hungary reached 121 MW, according to CEPS, the Czech TSO. All V4 countries are affected but the security implications are particularly important for the Slovak-Hungarian profile through which Hungary covers majority of its imports. Considerable unplanned flows (as transit flows) reduce the trading possibilities on this profile and increase the risk of overloading. V4 countries have repeatedly called on Germany to address the problem[13] and it is much welcomed that ACER in its recent Opinion[14] recognises the problem and encourages introduction of a coordinated capacity allocation procedure at the German-Austrian border, effectively splitting this single bidding zone into two. Despite considerable German opposition, the German NRA committed to work towards the split before winter 2018/2019.[15]

[10]http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_slovakia_en.pdf
[11]http://www.urso.gov.sk/sites/default/files/Vykupne-ceny-OZE-v-EU-2014.pdf
[12]http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Half-yearly_electricity_and_gas_prices,_second_half_of_year,_2012%E2%80%9314_(EUR_per_kWh)_YB15.png
[13]http://www.sepsas.sk/seps/en_TlacSpravy.asp?kod=125&Aktualita=622
[14]http://www.acer.europa.eu/Media/News/Pages/ACER-Opinion-No-09-2015.aspx
[15]https://www.cleanenergywire.org/news/europes-largest-electricity-market-set-split

Even if solving the loop flows problem might free up some cross-border capacity for trading it is certainly not enough and V4 will need to continue reinforcing its interconnectors. From the security and further V4 market development point of view, completion of a new Slovak-Hungarian interconnector merits particular attention. Insufficient connection between Slovakia and Hungary is clearly visible when looking at the convergence of electricity prices between the countries, despite the existence of common day-ahead market. The price convergence between Slovakia, Czech Republic, and Hungary increased from 11% to 82% after market coupling in September 2012 but in 2014 the spread was still constant at around 5 EUR/MWh (see graph below). Finalisation of the Slovak-Hungarian interconnector would most probably even out the price difference.

Figure 5: Regional weekly baseload price premiums or discounts to the German market (2015 Q1)




Source: Quarterly report on European electricity markets 2015 Q2, European Commission

## 3. What can we do to improve the situation of V4 countries, what are the challenges ahead of us?

Above, we have partially touched upon selected challenges standing ahead of V4 countries. In this chapter we elaborate a bit more on these challenges and provide some high-level recommendations.

### A) Gas infrastructure

In the previous chapter we have stated that all V4 countries have since 2009 considerably improved their energy security. Each Visegrad country is today fulfilling the N-1 rule and is connected to each other and to western European markets. Clear push behind this development has been the North-South Gas Corridor concept and the additional EU money that helped to materialise it. We believe that the V4 countries should continue the work they have started and worked towards the implementation of the Action Plan for North-South Energy Interconnections.[16] According to the CEE GRIP, a Central European TSO cooperation platform, there are 88 gas investments projects planned for implementation in the CEE region in the upcoming decade, including 24 projects with the FID already taken and 64 projects which are on an earlier stage of development.[17] In this context, we believe that Poland should as soon as possible finalize the work on upgrading their internal gas system and put the LNG terminal in Swinoujscie in commercial operation during the next year. The PL-CZ (the Stork pipeline) and PL-SK interconnectors should be finalized and Poland should also proceed with the finalisation of the Gas Interconnector Poland-Lithuania (GIPL) for which the EU Commission has allocated more than 300 mil EUR financial support. When finished in 2019, not only will the pipeline put an end to the isolation of the Baltic States, it will also connect CEE countries to the floating LNG terminal in Klaipeda. Croatia should as soon as possible evaluate the results of the binding offers submitted within the recently terminated Open Season and proceed with further work at the Krk LNG terminal. Combined, these three LNG terminals could offer up to 15 bcm/y. Higher liquidity that will be acquired through better north-south connection and connections to western European liquid markets is likely to lead lower wholesale gas prices and improved competitiveness of CEEs key industries. The liquidity could be further improved by better integrating the region's UGS market. It is in particular Poland that needs to increase its UGS capacity, the rest of V4 is relatively well off. V4 countries should also to the largest possible extent coordinate their national positions on the implementation of network codes.

[16] https://ec.europa.eu/energy/sites/ener/files/documents/2011_north_south_east_action_plan_0.pdf
[17] http://www.entsog.eu/public/uploads/files/publications/GRIPs/2014/GRIP_003_140519_CEE_2014-2023_main_low.pdf

Arguably the biggest game-changer project last year was the refurbishment of the unused Vojany-Uzhorod pipeline, enabling physical reverse flows (up to 14,6 bcm/y) via Slovakia to Ukraine. The project has certainly improved the security situation of Ukraine. Further options to enable virtual reverse flow at the Brotherhood pipeline should be carefully analysed.

In July 2015 fifteen EU and Energy Community countries agreed to implement a small set of key projects to improve gas market integration and gas supply security for Central and South East Europe. The V4 should support the implementation of the CESEC agreement and thus unlock South East Europe to LNG. At the same time, a viable business model is to be found for the Brotherhood pipeline, a key infrastructure for regional gas supply security, in the framework of the Eastring pipeline project[18] or alternative proposals.

V4 countries should take a joint position on the Nord Stream II project that, once implemented, seems to undermine recent gas market diversification policies of the V4 countries. Poland and Slovakia whose gas transit could be reduced considerably are naturally against such project. The Czech Republic who already today benefits from gas supplies from Nord Stream I and whose gas transit is fully in private hands might have a slightly different position. However, it is obvious that the project, if implemented, would have not only economic but also serious political implications. First of all, it improves energy security of Germany at the expense of economic and energy security interests of Central European countries, thus creating additional tensions within the EU. The project has a potential to undermine the unity of European policy towards Russia. Allowing few individual European companies to go ahead with such important project while the rest of Europe is applying the sanction regime would not send the right signal towards Russia. Moreover, helping Russia to terminate the transit through Ukraine would seriously limit limits EU's room of manoeuvre to moderate Russia's policy towards Ukraine.

Secondly, it seems that the EU does not need this additional capacity to improve its overall gas supply security. The gas demand in Europe is falling and with the continuing fall of wholesale electricity prices and CO prices there is nothing suggesting that the production of power from gas will take off any time soon because the spark spread will stay negative. The example of Hungary is quite illustrative in this context. In addition, spending another 10 bln EUR on new route while already having substantial free capacity available is hardly economically justifiable. The Slovak part of the Brotherhood pipeline with a technical capacity of around 90 bcm/y is currently (2014) transporting only around 46,5 bcm/y and could, therefore, with this significant spear capacity[19] easily accommodate sudden surge in demand. Also the Nord Stream I has additional free capacity. Out of the total technical capacity of 55 bcm/y, in 2012 only 11,3 bcm/y and in 2003, around 23,5 bcm/y of gas was transported through Nord Stream I.[20] For this reason, when the Commission is assessing the grounds for granting the Nord Stream II the Article 36 exemption[21], it should very carefully consider how this new project enhances competition and security of supply in the EU. In our view, the Nord Stream II project is an alternative distributing network for Russian gas rather than additional energy security hedge for the EU. It merely diverts Ukraine and helps to consolidate the Gazprom market share in Europe. The fact that Gazprom, despite having a valid transit agreement with the Slovak TSO well until 2028 (and will therefore be required to fully honour its "ship or pay" obligations until the contract expiration) goes for a new route, indicates the political significance of the Nord Stream II for Russia. For Ukraine's Naftogaz, which does not have any such long-term shipping contract with Gazprom, the Nord Stream II completion and re-routing would mean annual loss of around 2 bln EUR and subsequent degradation of its gas network.

[18] http://www.eastring.eu/
[19] https://ec.europa.eu/energy/sites/ener/files/documents/quarterly_report_on_european_gas_markets_q2_2015.pdf
[20] http://www.clingendaelenergy.com/files.cfm?event=files.download&ui=9C1DEEC1-5254-00CF-FD03186604989704
[21] Article 36 of the EU gas directive (2009/73/EC) enables new infrastructure projects to be exempted from certain provisions of the directive, in particular, the unbundling and TPA rules.

A sufficient framework for gas supply security policy harmonization within the V4 is joint gas supply security planning under the soon-renewed EU gas supply security regulation. This cooperation should in particular develop a joint V4 approach to preserve the viability of the Brotherhood pipeline system providing West-East gas trading opportunities to the V4 and a coordinated approach to utilize abundant gas storage capacities in the region, with an outlook to Ukraine.

**B) Power generation and energy mix**

In the previous chapter, we have described the challenges related to the CEE energy mix and, implicitly, to the preservation of adequate level of generation capacity. It seems that in order to survive and/or continue to provide ancillary services in the future, some types of generation sources will need to be supported by one way or another. The situation seems to be particularly worrying in Hungary where around 15% of the Hungarian gross electricity consumption is covered by gas. With continuing negative spark spread, these plants are standing almost idle and future prospects are dire. In Poland, the coal plants might face similar fate. In the Czech Republic and Slovakia, utilities have called on the Governments to provide support to the construction of new nuclear power plants, preferably through introducing guaranteed price for which the generated power will be purchased in future. In other words, it seems that each V4 country is heading towards establishment of some kind of capacity remuneration mechanisms (CRM), aimed at helping some generation sources to survive. Such a development, especially if uncoordinated, might distort competition and easily undermine recent success in regional electricity market integration.[22] In the V4 context, only Poland is so far discussing the issue explicitly.[23] To minimise the potential damage, Commission's recent report is calling on the member states to assess generation adequacy in a harmonised way and create a framework for providing capacity across borders, in wider regional context.[24] To this end, a public consultation was launched and is expected to run until end of 2015. V4 countries should formulate common positions and rules and eventually implement a common V4 capacity market. Even if such scheme would infringe on the member states prerogative to decide over their own energy mix, possible savings and synergies are too huge[25] to be ignored completely. Poland, whose existing generation capacities are stretched and who had to curb supplies this summer due to maintenance work on a large plant in Belchatow[26], would benefit from a joint scheme where capacity is offered across borders.

Similar approach could be applied to the future RES support design. Introduction of a common RES support scheme in V4 could bring interesting benefits. A recent study outlining first set of proposal on such joint RES support scheme[27] could be taken into account when analysing the feasibility of the idea. As a first step towards its implementation, V4 countries could establish a coordination mechanism within which relevant data could be exchanged.

Last but not least, as in principle all V4 countries are pro-nuclear and nuclear power represents important domestic sources in the Czech Republic, Slovakia and Hungary, the lobbying activities on the EU level aiming to safeguard the position of the nuclear power in the European energy mix should continue. In this context, nuclear V4 countries should make sure that the recently amended 2009/71/EURATOM directive is transposed (by August 2017) in a way it balances the requirement of stronger peer review mechanism and continuous smooth functioning of the units.

[22]https://ec.europa.eu/energy/sites/ener/files/documents/com_2013_public_intervention_en.pdf
[23]http://www.linklaters.com/pdfs/mkt/london/6883_LIN_Capacity_Markets_Global_Web_Spreads_Final_1.pdf
[24]http://ec.europa.eu/energy/sites/ener/files/documents/com_2013_public_intervention_swd01_en.pdf
[25]https://www.diw.de/documents/dokumentenarchiv/17/diw_01.c.508432.de/umpfenbach.pdf
[26]http://www.bloomberg.com/news/articles/2015-08-12/poland-resumes-electricity-supply-curbs-as-industry-lament-grows
[27]http://www.ecofys.com/files/files/ecofys-bbh-tu-wien-2014-res-cooperation-joint-support-schemes.pdf

### C) Electricity infrastructure and cross-border trade

As mentioned above, serious investments have been made into the distribution and transmission grids over the last ten years and technical losses, for example, have decreased considerably. However, with increasing distributed generation and RES volumes, DSOs will need to invest additional funds into reinforcement of the grid, according to a recent EU study as much as 20 – 50 bln EUR annually by 2030.[28] On top of this, DSOs will face increased costs stemming from the smart meters installations. Allegedly, this might be offset by the annual savings in order of 60 – 100 bln EUR[29] on the EU level as a result of better demand management. In any case, closer coordination and discussion on appropriate new regulatory models for DSOs between the V4 regulators would be beneficial.

Cross-border capacities between the Czech Republic and Slovakia are satisfactory and trading can be conducted basically without any limitations. The capacity at the Slovak-Hungarian border is nominally also satisfactory (2 x 400 kV lines) but due to recently increasing import volumes and transit further down to Balkans, the connections needs to be reinforced. There are two projects on the PCI list that should be implemented as soon as possible, especially the Gőny  and Gabčikovo 400 kV line. Nominally, the available Polish-Slovak cross-border capacities are sufficient (2 x 400 kV lines). However these are limited by the loop flows and export from Slovakia to Poland is very limited because of technical restrictions.[30] Given the large wholesale price difference between the countries (see Figure 5) physical flows in SK-PL direction should normally be bigger. In any way , V4 countries should continue implementing the infrastructure projects agreed upon in the Action Plan.[31] At the same time, they should continue exerting pressure on Germany to implement splitting of the single German-Austrian bidding zone and to adopt a work plan with more ambitious deadlines than winter 2018/2019.

Arguably, coupling of CZ-SK-HU-RO electricity markets on the basis of the Single Price Market Coupling for day-ahead market with implicit allocation of cross-border capacities is one of the biggest successes of energy cooperation between the involved countries. Coupling has enabled a much easier power trading and increased the traded volumes within the region. However, Poland has so far not joined the project and as a result, capacities on the cross-border profiles CZ – PL and SK – PL are still allocated through explicit auctions. Such arrangement does not allow to trade volumes with maximum efficiency. Poland should, therefore, reconsider joining the 4M Market Coupling at (hopefully) not too distant point in time. Poland has repeatedly said it would join the initiative once flow-based allocation mechanism would be applied within the 4M MC. Few weeks ago, CEE countries have approved a road map to implement flow-based electricity market coupling in the region (by Q3 2018)[32] and nothing is now formally hindering Poland from joining. Moreover, Poland has last year signed a MoU with neighbouring TSOs, power exchanges, regulators and ACER on the implementation of day-ahead congestion management target model.[33] The impact of existing coupling of Polish market with North-Western European Market via the SwePol Link is rather limited and Poland would, arguably, gain more from jointing the rest of V4. First, however, the gate closure time problem[34] needs to be solved in a satisfactory way for both parties.

[28]https://ec.europa.eu/energy/sites/ener/files/documents/201406_report_renewables_integration_europe.pdf
[29]Ibid
[30]https://www.diw.de/documents/publikationen/73/diw_01.c.463023.de/dp1378.pdf
[31]https://ec.europa.eu/energy/sites/ener/files/documents/2011_north_south_east_action_plan_0.pdf
[32]http://www.icis.com/resources/news/2015/10/26/9936332/road-map-for-cee-flow-based-market-coupling-agreed/
[33]http://www.acer.europa.eu/electricity/regional_initiatives/cross_regional_roadmaps/documents/memorandum-of-understanding-cee.pdf
[34]http://www.icis.com/resources/news/2013/07/16/9688189/cee-traders-against-time-change-for-electricity-market-coupling/

Figure 6: Metered (physical) cross-border electricity flows in Slovak transmission grid in 2014 (GWh)


Source: SEPS Annual report 2014

The V4 countries should also work together on finding the right model for intra-day market coupling. Short-term markets, notably intraday and balancing markets, need to be at the core of the new electricity market design, according to Commission's recent report.[35] Setting up such cross-border intraday trading would also pave the way for establishment of a joint V4 cross-border capacity market.

## Conclusions

CEE faces number of challenges both in the power and gas sectors. In our view, the security situation of the gas sector has improved considerably after the 2009 gas crisis. Through implementing series of important infrastructure projects, interconnection between the V4 countries and with the liquid Western gas market is better than in the past. Some experts even speak about "quiet gas revolution" in CEE. These earlier fragmented markets are slowly integrating into one bigger regional market and the technical harmonisation processes led by ENTSO-G are pushing this process forward and as is continuing implementation of the North-South Gas Corridor projects. We believe, however, that this positive development could be disrupted by substantial modification of the traditional transit routes, especially through the Nord Stream II implementation.

Situation in the CEE power sector is a reflection of broader EU trends, stemming mainly from the policies promoting de-carbonisation of the energy sector. For Poland and Hungary, that in larger extent rely on coal, respectively gas, the transformation of the energy mix is likely to be more difficult than for Slovakia and the Czech Republic.[36] Problem of high power end-user prices needs to be address so as to preserve the competitiveness of the V4 industry. In this context, V4 governments should refrain from action that undermine competition at the energy market and, therefore, aim at abolishing regulation of the retail prices. Low wholesale prices are a problem too but it is not solvable at V4 level only. Would the energy market conditions further deteriorate (energy-only market would collapse totally) and introduction of national capacity mechanisms becomes unavoidable, we argue for strong V4 coordination of these mechanisms and if possible, establishment of a common capacity market. This process could be helped by the development of common intra-day market that could build in the success of the day-ahead markets. Least but not least, V4 countries should continue investing in the development of the distribution and transmission grids. In this context, finalisation of the Slovak-Hungarian interconnections is of particular importance.

[35]http://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v11.pdf
[36]Although it should be noted that the Czech Government recently took the decisi0n to expand the area for exploitation of lignite, while the final decision on whether to build further NPP units in Dukovany or Temelin have not been taken. [36]http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Half-yearly_electricity_and_gas_prices,_second_half_of_year,_2012%E2%80%9314_(EUR_per_kWh)_YB15.png

## ANNEX - KEY V4 POWER AND GAS MARKET DATA AND STATISTICS

V4 countries share some common features. All are, for example, have level of energy intensity which is way above the EU average. All four are relatively important gas transit countries, with Slovakia being the most important one. Gas plays a significant role in the energy mix, especially in Hungary and Slovakia. Czech Republic, Hungary and Slovakia operate nuclear power plants and nuclear energy is in general viewed positively. Poland might join the club if it eventually decides to build its nuclear units. Poland and Czech republic have substantial coal and lignite deposits, Hungary and Poland's gas production is non-negligible. Gas market concentration is rather high in all V4 countries and in Slovakia and Czech Republic power generation market is rather concentrated. Below we provide in a table format main energy related V4 data.

Power market 1

| Country | Installed capacity (GW), 2013 | Power generated (TWh), 2013 | Power consumed (TWh) 2013 | Import/export balance (TWh) 2013 | RES as % of electricity generation, 2013 | Nuclear as % of electricity generation, 2013 |
|---|---|---|---|---|---|---|
| Czech Rep | 21.1 | 87.1 | 70.17 | + 16.9 | 10.21 | 36 |
| Hungary | 9.1 | 30.3 | 39.03 | - 11.88 | 6.6 | 43 |
| Poland | 38.4 | 162.5 | 157.9 | + 4.5 | 12 | - |
| Slovakia | 8.5 | 28.5 | 28.6 | - 1.1 | 20.8 | 55 |

Source: Eurostat, regulatory authorities, other

Power market 2

| Country | Market share of largest el. producer (%), 2013 | End-user prices – Indst (EUR/kWh) 2014 | End-user prices - HH (EUR/kWh) 2014[37] | Regulated HH prices | Switching rates HH, 2013 (%) | TSO unbundling model |
|---|---|---|---|---|---|---|
| Czech Rep | 58.2 (ČEZ) | 0.082 | 0.127 | No | n.a. | OU |
| Hungary | 51.9 (MVM) | 0.090 | 0.115 | Yes | n.a. | OU |
| Poland | 39.3 (PGE) | 0.083 | 0.141 | Yes | 0.86 | OU |
| Slovakia | 83.8 (SE), | 0.117 | 0.152 | Yes | 3.5 | OU |

Source: Eurostat, regulatory authorities, other

[38]This figure excludes transit through the Yamal pipeline in PL, where annually over 30 bcm is transported.

Gas market 1

| Country | Consumption (bcm), 2013 | Domestic production (bcm), 2013 | Import (bcm) 2013 | Imports from RU (bcm), 2013 and as % of total consumption | Share of gas in gross energy consum (%), 2013 | Gross heat generation from gas (%), 2013 |
|---|---|---|---|---|---|---|
| Czech Rep | 8.4 | 0.3 | 11.0 | 7.2 (86%) | 16 | 34.6 |
| Hungary | 8.6 | 1.9 | 5.9 | 5.9 (69%) | 35 | 39.8 |
| Poland | 16.7 | 4.2 | 11.4 | 9.6 (57%) | 13 | 27.8 |
| Slovakia | 5.4 | 0.1 | 5.4 | 5.3 (98%) | 26 | 19.3 |

Source: BP, Eurostat, regulatory authorities, other

Gas market 2

| Country | End-user prices – Indst (EUR/kWh) 2014 | End-user prices - HH (EUR/kWh) 2014 | Number of suppliers 2013 | Market share of the dominant supplier (%) | Total transited volumes (bcm), 2013 | UGS capacity (bcm), 2013 |
|---|---|---|---|---|---|---|
| Czech Rep | 0.030 | 0,056 | 29 | 64 | 35.1 | 3.5 |
| Hungary | 0.039 | 0,035 | 30 | 54 | 16 | 6.3 |
| Poland | 0.036 | 0,050 | 22 | 95 | 16.5 bcm | 2.4 |
| Slovakia | 0.038 | 0,052 | 8 | 63.2 | 58.5 | 3.1 |

Source: BP, Eurostat, regulatory authorities, other

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