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COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the short term resilience of the European gas system

Preparedness for a possible disruption of supplies from the East during the fall and winter of 2014/2015

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1. INTRODUCTION

On 28 May 2014 the Commission adopted its European Energy Security Strategy providing a comprehensive plan to strengthen our security of energy supply.[1] Against the background of the situation in Ukraine and the possible related risk of a disruption in gas supplies to the EU, the Strategy encompassed measures to be taken immediately in order to increase the EU's resilience to a major gas disruption in the upcoming winter. As part of those immediate measures, the European Council endorsed on 27 June 2014 the Commission's proposal to launch a so-called stress test exercise with the purpose of assessing the resilience of the European gas system to cope with a severe disruption of gas supply to the EU this winter.[2]

At the beginning of July the Commission requested Member States, Energy Community Contracting Parties and Georgia[3], as well as Switzerland and Turkey to model the impact of various possible disruption scenarios on gas deliveries in their countries this winter and to describe measures in place to address supply shortages. The Commission also requested Norway to inform of its ability to respond to such a disruption by increasing its gas supply. The Commission proposed three "focus groups" to specifically cover the regions where the impact of the disruptions was likely to be most prominent. These were the South East region of the EU (Bulgaria, Croatia, Greece, Hungary and Romania), the Baltic States and Finland and the Energy Community Contracting Parties. National authorities have worked hard over summer to collect the data and carry out assessments within short deadlines and presented their national reports[4] to the Commission in August and September 2014. The European Network of Transmission System Operators for gas ('ENTSOG') has equally modelled the impact of supply disruptions on the EU-wide gas system and several industry associations, the International Energy Agency[5], the G7 and other key partner countries have provided contributions as well.

Methodology and scenarios of "stress tests"

The scenarios proposed by the Commission to all participants in this exercise covered the disruption of the Ukrainian gas transit route as well as all Russian gas flows to Europe for periods of one month and six months (September to February), supposing average winter conditions in each case. In addition, a 2-week February "cold spell" sub-scenario was also developed by ENTSOG to cover the effect of peak demand on an already strained supply

[1] Communication from the Commission to the European Parliament and the Council, 'European Energy Security Strategy', COM/2014/0330 final.
http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0330&from=EN

[2] European Council Conclusions of 27 June 2014, EUCO 79/14
http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/ec/143478.pdf

[3] The Contracting Parties are the Republic of Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Republic of Moldova, the Republic of Montenegro, the Republic of Serbia, Ukraine and The United Nations Interim Administration Mission in Kosovo pursuant to the United Nations Security Council Resolution 1244. The Republic of Georgia is an Accession Candidate to the Energy Community.

[4] National reports were replaced by a joint report for the three Baltics States and Finland.

[5] The IEA has provided a comprehensive analysis of the LNG market.

system. These proposals were based on past experience and the need to put to the test our energy systems under very demanding conditions, i.e. the disruption of all the flows from Europe's main external supplier of natural gas.

The effects of the Ukraine transit or the full Russian supply disruption scenarios on the South-East European countries, being supplied largely via Ukraine, is very similar and the Baltic Member States and Finland are unaffected by the modelled Ukraine transit disruption. Therefore the Commission refers throughout the report mostly to the effects of the 6-month Russian gas disruption scenario under normal winter conditions and a cold spell.

This exercise has already been very valuable insofar as this is the first time that such a complete picture was provided on the possible impacts on and readiness of the European gas sector as regards a possible serious gas supply disruption from the East.

In the present Communication, the Commission reports on the main findings of this stress test exercise and formulates a number of specific recommendations. In parallel to this Communication, the Commission services have prepared staff working documents which contain the reports of the three "focus groups", a report on the cooperation with G7 and other partner countries as well as a report on the review of the Security of Gas Supply Regulation[6]. In addition, the Commission is also adopting its Recommendation for the application of internal market rules for the Energy Community.

2. RESULTS OF THE STRESS TESTS

2.1 Situation of transit flows

In parallel to the stress test exercise and starting already in the spring of this year the European Commission has made considerable efforts to broker a compromise solution between Ukraine and Russia in their dispute over gas payments and debts with the aim of ensuring sufficient deliveries of gas to Ukraine and stable transit to the EU and other Energy Community Contracting Parties. Over the year a number of meetings have been held between the European Commission, Ukrainian and Russian authorities, including at ministerial level. At the last trilateral ministerial meeting on 26 September in Berlin the Parties came closer on key points of a compromise proposal tabled by the Commission. This "winter package" is currently under consultation in Moscow and Kiev and a next trilateral meeting is foreseen ahead of the October European Council. An agreement would secure gas deliveries to Ukraine throughout the winter.

Overall the stability of Russian gas supplies to the EU and transmission through Ukraine depends on many factors, of which only some are in the EU's control. Hence, it is prudent to

[6] Regulation (EU) No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC, OJ 2010 L 295/1.

consider all possible scenarios including major disruptions of gas supply. In this regard, the projections detailed below should not be seen as a prognosis but merely as a possible scenario and a basis for contingency measures.

In September and October 2014, flows of Russian gas to the EU were at times lower than expected which, in the view of the Commission, is worrying. Notably, during September reductions in Gazprom deliveries to a number of EU companies have been reported, albeit these reductions have not had an adverse impact on supply security in the EU or its neighbouring countries. Physical reverse flow from Slovakia to Ukraine was stable. Reverse flows from Poland to Ukraine were temporarily interrupted for two days but resumed quickly. Furthermore, deliveries from Hungary to Ukraine were indefinitely interrupted on 25 September due to larger volumes of gas entering Hungary en route to the storage facilities. The Commission is closely monitoring the situation with the cooperation of the Gas Coordination Group.

2.2 Europe's supply situation in case of a disruption

At the request of the Commission, ENTSOG has modelled various supply disruption scenarios. The model shows that in the different six month disruption scenarios the EU and the Energy Community Contracting Parties without Ukraine would, after reshuffling the supply mix, altogether still be missing between five and nine billion cubic meters (bcm) of gas[7]. It also shows – assuming maximized use of infrastructure and normal market conditions[8] – that when such six-month disruptions occur Russian volumes are replaced particularly through the import of additional volumes of LNG.[9,10] Although ENTSOG has not modelled the price effects of the supply disruptions, the need to replace volumes will be accompanied by price increases triggering the import of significant additional volumes of LNG. It is those price signals, to the extent allowed by the interconnection capacities or direct access to LNG import facilities that move gas to markets where it is most needed for the purposes of e.g. heating, electricity production. The higher prices will also trigger intense storage withdrawals and voluntary demand reduction.

The modelling exercise also shows which countries would be most affected by the gas disruptions.

[7] This is roughly equal to 1-2% of annual EU consumption.

[8] It should be noted that these premises are in reality unfortunately not always fulfilled.

[9] LNG in the supply mix would increase in the most extreme scenario by 130% from 24 bcm to 56 bcm.

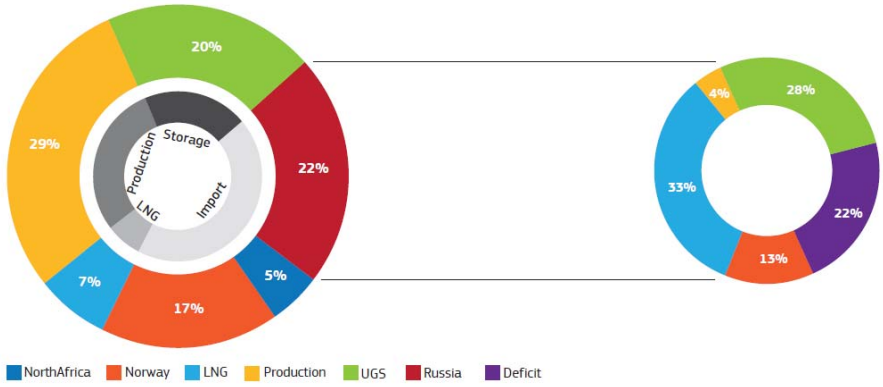
[10] Importantly, according to the ENTSOG analysis, increasing the capacity of the OPAL pipeline (which is one of the extensions of the Nord Stream pipeline, running from Greifswald in northern Germany to Brandov on the German-Czech border) to 100% from its current 50% will not have an effect of reducing the missing gas volumes in the Eastern Member States due to existing infrastructure constraints towards the east. The effect of increasing the capacity to 100% will be limited to replacing LNG volumes in Western Europe.

Table 1 – Missing gas volumes per affected country over 6-months period in Russian supply cut and cold spell scenario (total shortfall in mcm and largest relative monthly shortfall in %)

6-month Russian disruption with 2-week February cold spell	BG	EE	FI	EL	HR	HU	IT	LT	LU	LV	PL	RO	SE	SI	BiH	fYRoM	SRB
Total shortfall BEFORE national measures (mcm)	670	204	2255	109	41	2170	26	693	8	39	890	1361	13	21	139	126	631
Largest relative monthly shortfall in %	100%	73%	100%	18%	12%	35%	<0,1%	59%	5%	15%	28%	31%	6%	17%	100%	100%	64%

Source: ENTSOG

Figure 1 – Replacement of Russian gas in the 6-month Russian supply disruption scenario



Source: ENTSOG

ENTSOG has modelled both a "non-cooperative" and a "cooperative" scenario for the purpose of this exercise.[11] The main differentiating feature between the two is that the "cooperative" scenarios of ENTSOG presuppose the crucial element of **equal (relative) burden sharing** by which solidarity between Member States is applied to such an extent that shortfalls in gas are spread equally between neighbouring Member States. By contrast, in the "non-cooperative" scenario Member States would reduce or stop gas exports between each other and to Energy Community Contracting Parties when their domestic demand can no longer be fully satisfied. The "cooperative" scenario assumes that Ukraine and Moldova[12] are continuously supplied with gas from Member States via at least Slovakia at full capacity while the "non-cooperative" scenario assumes exports at 50% of Slovak reverse flow capacity.

[11] In its report to the Commission ENTSOG refers to these two scenarios as "optimal" and "sub-optimal".

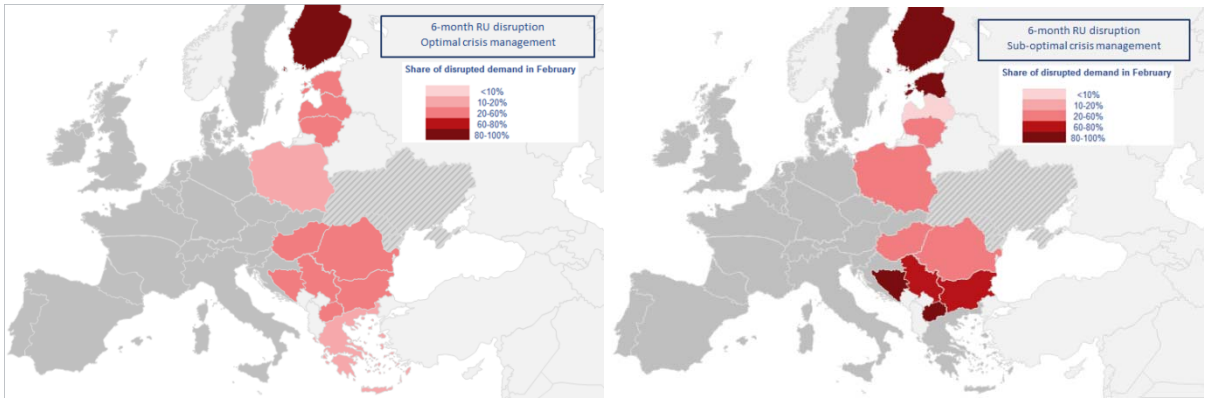
[12] In the case of Moldova, ENTSOG's assumption of deliveries notwithstanding, commercial and regulatory (licencing) issues prevent the Iasi-Ungheni interconnector from Romania to Moldova from operating even though it has been officially opened and is technically functioning. Therefore, unless the issue is resolved and subject to a disruption happening there will be a 100% shortage of gas in Moldova.

In the absence of cooperation between Member States and of additional national measures, serious supply shortfalls of 40% or significantly more[13] could materialise, at least towards the end of the 6-month disruption period, for Bulgaria, Romania, Serbia, the former Yugoslav Republic of Macedonia and Bosnia and Herzegovina (in both Ukraine transit and full Russian supply disruption scenarios). Shortfalls of similar magnitude would apply for Lithuania, Estonia and Finland in the scenario of a total halt of Russian supplies to the EU. Hungary and Poland[14] would also be substantially affected, albeit to a lesser degree, by shortfalls of 30% and 20% respectively. The headline effects of the disruption can be seen in Figure 2.

In the cooperative scenario the effects of the disruption are significantly dampened in those Member States and Energy Community Contracting Parties most affected and most particularly Bulgaria, Estonia, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia and Serbia. At the same time Greece and Latvia would likely also experience some non-negligible shortfall[15]. Based on their existing gas supply infrastructure and gas sourcing Member States shaded in grey on the maps would, according to the simulation, not be directly affected.

Figure 2 – Maps of likely supply interruptions – before further national measures – in February at the end of the 6-month Russian gas supply disruption scenario in cooperative and non-cooperative scenarios under average winter conditions[16]

Cooperative Scenario *Non-cooperative scenario*



Source: ENTSOG

13 Up to 100%

14 Poland is only affected in the total Russian supply disruption scenario.

15 The position of those two Member States is affected by the "cooperative scenario" because both are surrounded by Member States with a very high exposure to a supply disruption but themselves have infrastructure – storage in Latvia and LNG regasification terminal in Greece – which provides them a buffer. In allowing such infrastructure to be shared their supply-demand balance changes.

16 Both maps illustrate the effects in February of a 6-month Russian supply disruption. Any national measures relating to e.g. demand response, obligatory switching, etc. take this likely deficit as a starting point. Consequently Member States appearing to be without options from a pure gas network infrastructure point of view – as is the case in Finland –, may have recourse to other specific national measures such as the elaborate system of obligatory switching in place for gas-fired power generation and heating units.

Effects of a continued supply disruption on Ukraine

Ukraine is in a rather unique situation among the Contracting Parties of the Energy Community. It developed transmission and storage capacities, albeit in need of modernization, give Ukraine tools to address the challenge of a supply disruption in a more differentiated way than other Contracting Parties. Ukraine normally consumes about 50bcm/year, of which about 20 bcm are domestically produced and most of the rest imported from Russia. However, gas supplies from Russia for consumption in Ukraine have been halted since 16 June 2014.

The stress test assessment of Ukraine indicates that domestic production and storages can cover 50%-70% of demand if demand response measures are applied. Imports from the EU would help to partially cover the shortage of gas in the optimistic scenario foreseen by Ukraine[17]. An important step in this direction was the Slovakia-Ukraine reverse flow, which became operational in early September and which can ship up to 27 mcm of gas per day, two-thirds of which on a firm basis.

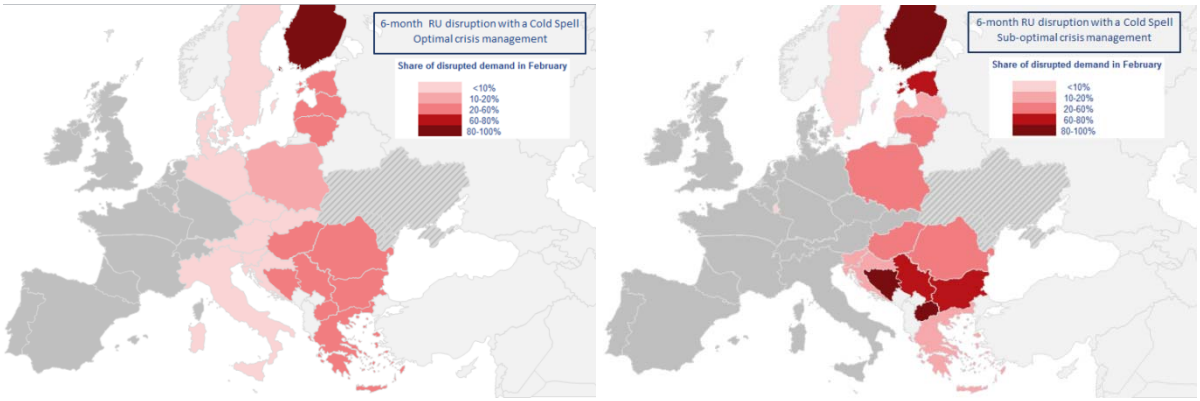
A hypothetical 2-week cold spell towards the end of the 6-month disruption would certainly aggravate the security of supply situation. As can be seen in Figure 3, according to the ENTSOG model, here too a cooperative scenario would allow shortfalls in the most affected countries to decrease from the dramatic level that would result from an uncooperative scenario. In the cooperative scenario other Central Eastern and Western European Member States such as Austria, Czech Republic, (northern) Germany[18], Italy and Slovakia would however also be affected as a result of gas flowing to countries where the shortfalls are higher. Such shortfalls would, on the basis of the model, be of a level below 10%. This is normally a level within which price-induced (natural) demand reduction would take place without the need for additional measures.

[17] Such a scenario foresees in particular full capacity reverse flow from Slovakia, Hungary and Poland as well as reductions in district heating and industrial consumption.

[18] The so-called NetConnect Germany market area.

Figure 3 – Maps of likely supply interruptions – before further national measures – in February at the end of the 6-month Russian gas supply disruption scenario in cooperative and non-cooperative scenarios during a cold spell

Cooperative Scenario *Non-cooperative scenario*

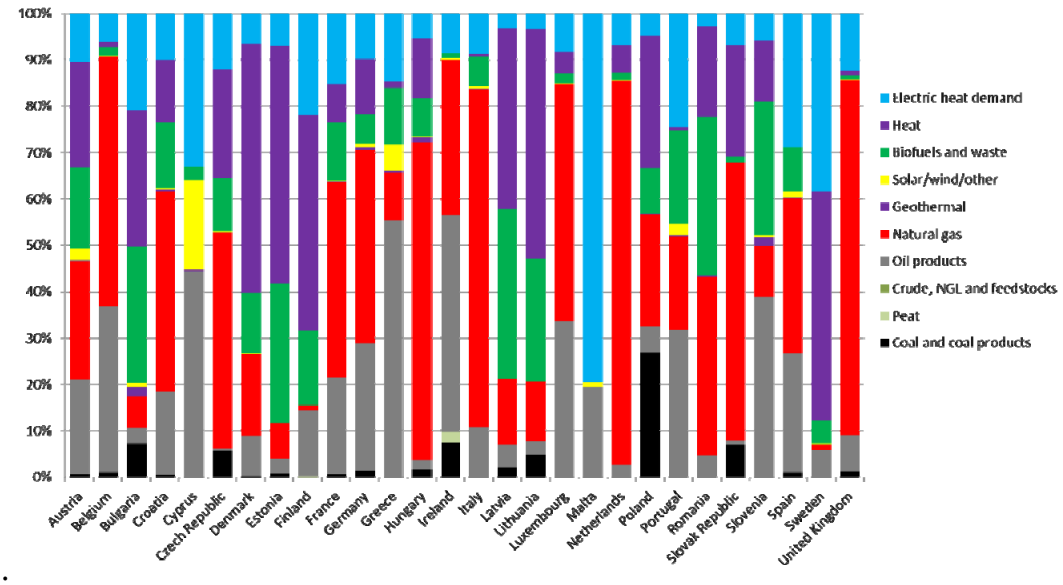


Source: ENTSOG

Exposure of the heating sector to gas a disruption

Around half of the EU's primary energy consumption is used for space and water heating in the residential and tertiary sectors and for process heat in industry. Space and water heating in buildings is particularly gas-intensive in Hungary, Italy, the Netherlands and the United Kingdom as shown in Figure 4 below.

Figure 4 – Member State distribution of end-use heat demand for space heating and hot water preparation in residential and service sectors, by fuel type and energy carrier.



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Source: Stratego EU28 Heat Market Assessment for year 2010

Most of the space and water heating (88%) in the EU is performed by individual boilers for self-consumption while the share of district heating is 12%. This average however covers large differences as in the Northern, Baltic, Central and Eastern European Member States district heat supplies between 14% and 56% of the heat[19] serving between 10% to nearly half of domestic consumers.[20] On average, 44% of district heating runs on gas with a share of up to 80% in the countries where district heating is well-established such as Latvia, Lithuania, Slovakia, Bulgaria and Hungary. Consequently, in the Baltics and Finland, gas consumption in district heating and in combined heat and power plants typically represents around 50% of total gas consumption.

Gas-fired district-heating plants (unless they have fuel-switching capabilities) and distributed heating customers are generally regarded as protected customers[21] and are the last ones in line to be affected by any possible supply cut. In addition, many Member States have imposed fuel switching obligations to heating plants although the share varies greatly from essentially 100% in Finland to below 20% in Romania and Bulgaria.

2.3 Assessment of the measures proposed in the national reports

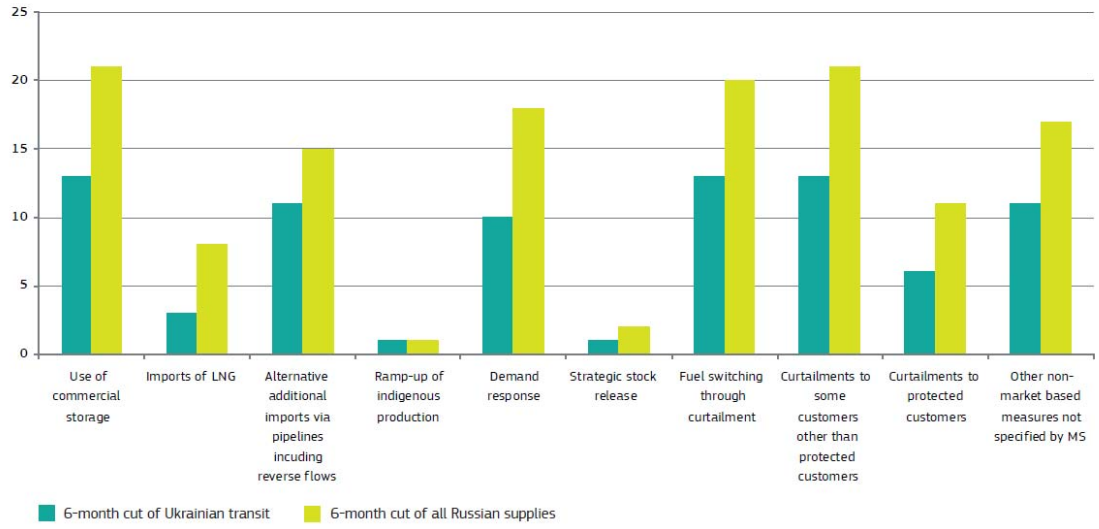
As shown in the ENTSOG scenarios, Member States would be impacted very differently by possible supply cuts of Russian gas, depending on both their geographic location and gas sourcing options. Those varying degrees of impact are also reflected in the measures which Member States and Energy Community Contracting Parties have listed in their stress test reports to the Commission. While some of the most vulnerable countries may have to resort to radical measures (such as supply curtailments or strategic stock releases) rather quickly during the modelled period, other Member States allow their gas sector operate on the basis of market fundamentals. It is important to note that a calm, market-based management of the supply crisis in Member States less affected will have an overall beneficial effect for the whole EU and the Energy Community in resolving the shortfalls.

[19] In Sweden, Denmark and Slovakia this percentage for example is, 56%, 53% and 54%, respectively, in Finland is 47%. In Romania, Bulgaria, Slovenia and Austria this share is between 14% and 19%.

[20] In Sweden, Denmark, Finland, Latvia, Lithuania, Poland and Slovakia more than 40% of domestic consumers have their home heated by district heating. District heating supplies heat for 10% to 40% of consumers in Germany, Austria, Hungary, Slovenia, Bulgaria, Croatia, Romania and the Czech Republic.

[21] The Security of Gas Supply Regulation established a category of so-called protected customers which includes households and, when the Member States so decides, essential social services and SMEs, within a certain limit, and district heating installations that cannot switch fuels and that deliver heat to other protected customers.

Figure 5 – Overview of the count of different measures envisaged by Member States in their reports supposing a 6-month cut of Ukrainian transit and of all Russian supplies respectively.



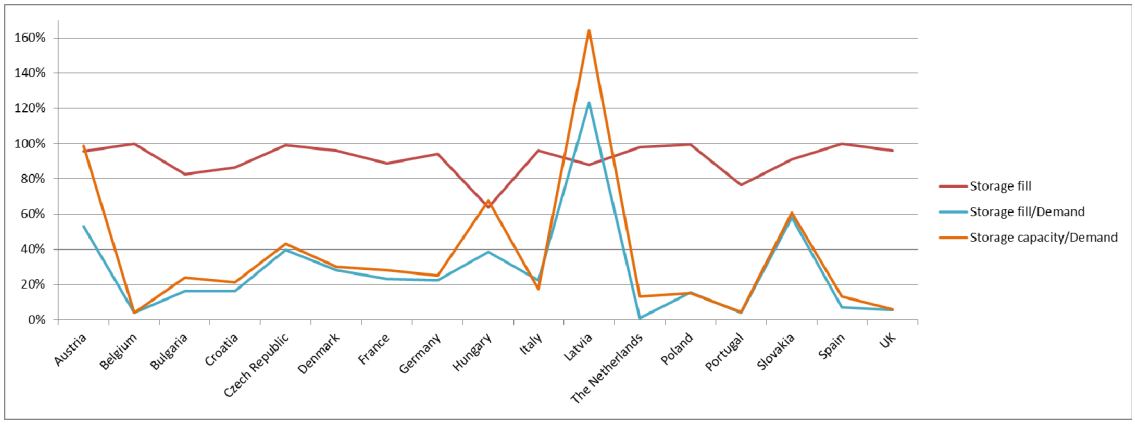
Source: National Stress Test Reports

2.3.1 Storage

Storage, where available, is a key tool to balance the supply-demand situation in all Member States and Energy Community Contracting Parties[22]. As of early October, storage filling levels in the EU were very high at around 90%. Only two Member States (Hungary and Portugal) had storage levels under 80% but, due to its large storage capacities, Hungary already has an above average storage fill-to-demand ratio.

[22] Nota bene, storage use has generally been considered in a national context.

Figure 6 – Storage levels (%) per Member State, storage fill as share of domestic demand (%) and storage capacity as share of domestic demand (%), October 2014[23]



Source: GSE IGSA transparency platform and Eurogas; Commission analysis

Nevertheless, according to the figures provided in the national reports and the ENTSOG analysis, a long-lasting crisis or simply a cold winter could empty the storages quickly and thereby necessitate resorting to other security of supply measures in order to ensure the supply of customers.

In assessing the various national plans on the use of storages, a number of important observations are to be made. First, there is little to no room to physically increase storage capacity in the short term. Secondly, where countries rely on a short term increase in withdrawal rates – unless measures are taken subsequently to avoid emptying storages too rapidly –, these countries have to face the repercussions later in case the disruption endures, including that withdrawal rates at low storage levels decrease substantially.

Filling storages beyond usual filling levels and ensuring that the withdrawal pace has regard to the possibility of an enduring winter period can prove to be important preparatory measures in the Member States most exposed in the case of a crisis. Storage can be used to secure supplies in more and less market-based ways. Several Member States have implemented preventive measures to ensure security of supply in the form of supply-related storage obligations (e.g. Bulgaria, Denmark, France, Italy, Poland, Portugal, Slovakia and Spain) and strategic storage (e.g. Hungary). Furthermore, some national plans, such as that of Hungary, foresee measures that make it more attractive to fill storages by reducing the transmission tariffs, which can account for a significant portion of the storage costs. Special care should be taken that the perfectly legitimate activity of facilitating the filling of storages – using often imported gas – does not come at the (explicit) expense of cross-border transactions aimed at delivering gas out of the country.

[23] By now essentially only Gazprom Export and Romanian storage system operators are not reporting storage levels to the Gas Storage Europe AGSI transparency site.

2.3.2 Replacing missing volumes by ramping up domestic production or buying more gas from another source

An obvious way to replace missing gas volumes from one source is to import from another source or increase domestic production.

In general there is little to no scope for increased domestic EU gas production to have a significant effect in the short term, in particular due to technical constraints in the systems.

As regards imports, the scope for additional deliveries through pipelines from North Africa is currently limited and Norwegian production is close to capacity. LNG is clearly the import source with the biggest potential as LNG terminals in the EU have sufficient capacity to allow new LNG volumes to be shipped in.[24] From a commodity perspective, the global spot LNG market is large enough to provide additional volumes and so is the shipping sector. In addition, recent drops in Asian LNG prices have made LNG a more economic alternative for the EU. Nevertheless, given that in times of disruptions and scarcity the price of LNG will rise, acquiring spot cargoes may be expensive[25]. Moreover, it may require at least one week for a shipment to arrive in the crisis area.

2.3.3 Using the Demand Side

Reducing the need for gas will mitigate the impacts of a disruption. As a general observation, a large majority of the national reports – particularly in the most affected regions – have not assessed the effect of possible demand reduction (from industrial customers or potentially gas-fired power generation) resulting from price increases in case of a supply disruption. Demand with high price elasticity – estimated in the range of 10% – is likely to leave the market first by shutting off units on economic grounds or switching, in case that is economic, to alternative fuels (biomass or oil). Market-based, incentive-driven measures relating to the demand side have only been laid out in very few national stress test reports and there is no experience of implementation in the most affected countries.

The ultimate demand-side tool in the hands of authorities – which all of them are ready to make use of also in the light of the provisions of the Security of Gas Supply Regulation – is curtailment according to a set sequence of user groups. Such plans usually start with the most flexible industrial users and end with the protected customers, mainly households. As regards such demand side curtailment, the Commission notes that many plans do not quantify or specify the exact effects of foreseen curtailment measures on individual customer groups,

[24] Altogether EU regasification capacity stands at around 200 bcm/year but most of it is concentrated on the Mediterranean and Atlantic coast. Consequently interconnection constraints limit many individual LNG terminals' ability to supply every region of disruption.

[25] The IEA estimates that prices may rise by up to 100%.

resulting in some lack of clarity as to the precise extent of possible consequences of a disruption for various customer groups.[26]

2.3.4 Fuel switching

District heating systems in many affected Member States run predominantly on gas. In addition, the share of gas-fired power generation was at or above 25% in 2012 for Croatia, Greece, Hungary, Latvia and Lithuania.[27] An increase in gas prices may result in some temporary fuel-switching driven by economic considerations in a crisis situation. In addition, the national plans of all countries faced with a likely supply cut foresee the possibility to force fuel switching. Under such measures, users that have dual fuel capabilities are generally required to switch. Member States have reported obligations for the on-site stocking of alternative fuels (such as biomass or oil) for a given – relatively short – number of days[28]. In general, no serious logistics or supply-related problems were expected by Member States as regards arranging for fuel-switching within the national compulsory supply periods. Nevertheless long periods of disruptions and corresponding switching durations remain untested. Where needed, use strategic oil stocks can be used to fuel power plants and central heating units in line with the legislation[29].

The Commission notes that in some Energy Community countries, difficulties may arise due to a lack of oil and coal stocks dedicated to heating. For example in Serbia, or in Bosnia and Herzegovina, although one third of district heating plants are capable of switching from gas to oil, the oil stocks would run out quickly. Also in the case of Moldova, a switch from gas to coal for the production of electricity might not be fully possible when storage of coal is not ensured in due time.

Several national reports mention the possibility of a switch from gas consumption, in particular for heating purposes, to electricity consumption, including using renewables (locally grown sustainable biomass, heat pumps, etc.) and availing of the thermal storage possibilities in district heating systems. Whilst electricity may be an effective measure to alleviate gas shortages to a considerable extent, careful consideration must be given to e.g. the role of gas-fired power generation facilities in the provision of system reserves and balancing

[26] It is worth pointing to a specific plan of Ukraine which, in order to reduce domestic demand, envisages the introduction of a new law requiring consumption to be cut by 20-30%, mostly by reducing demand of district heating, households and chemical industry and by introducing measures in the public sector. Although such cuts are enforceable, the impacts on consumers are difficult to predict.

[27] Gas use for power generation has decreased over the past years however due to low or negative profit margins compared particularly to coal-based electricity production.

[28] Typically the stocking obligations are around 5 to 15 days. Finland is a notable exception with fuel stocking obligations of up to 5 months.

[29] Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products

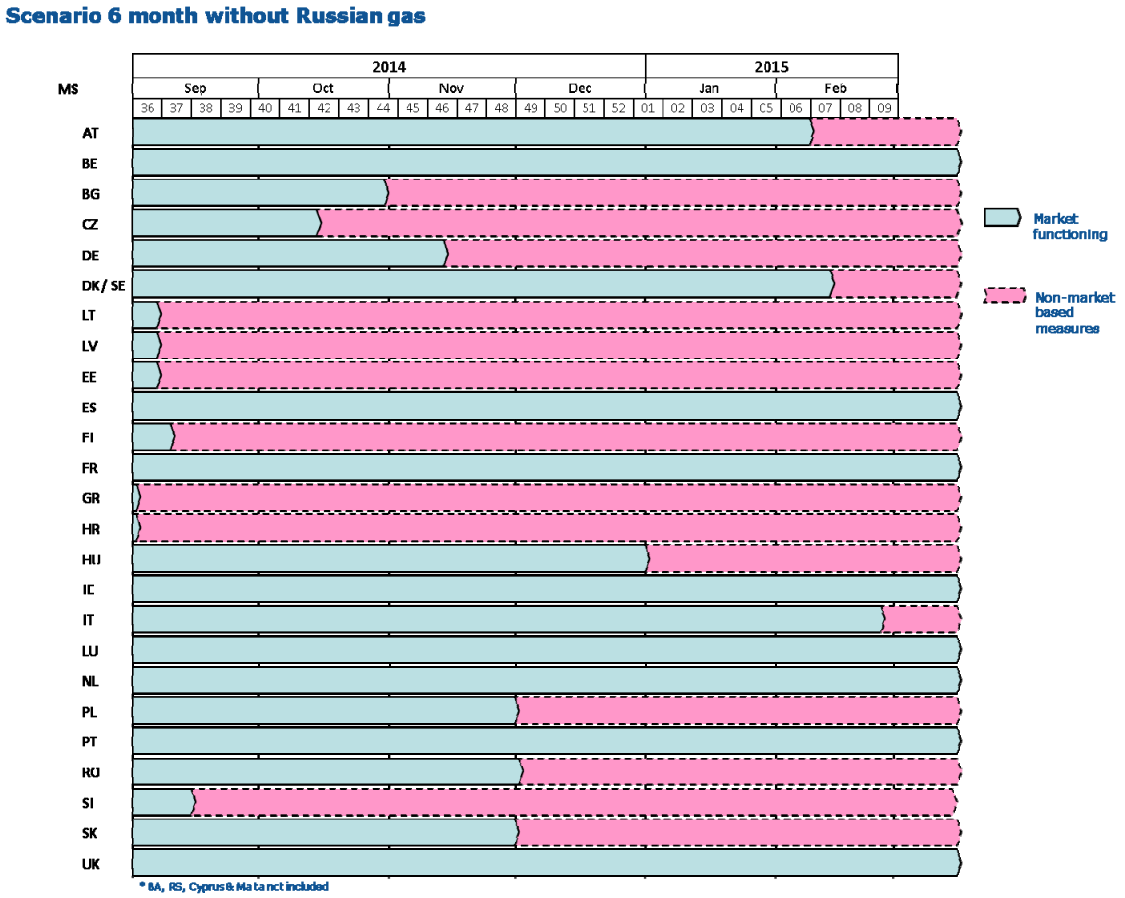
and the limits of the network to cope with extraordinarily high demand sustained in time.[30] The discussions between the Baltic States and Finland, as well as between other countries such as Greece and Bulgaria, point towards cooperation and some joint consideration of the interplay between the two sectors. Overall, however, the national reports and the assessment done by the European Network of Transmission System Operators for Electricity (ENTSO-E), on the basis of best-available data, do not provide the necessary full view of the spill-over effects of a gas disruption on the power sector.

2.3.4 Timing of non-market-based measures

Figure 7 below shows a Commission analysis of the potential timing of the introduction of non-market-based measures throughout the 6-month full Russian supply disruption period. Some of the differences – beyond differences in levels of exposure – are likely also due to policy-level decisions in Member States regarding the approach to a supply crisis. Some, such as Czech Republic and Germany which, on the basis of the ENTSOG "cooperative scenario" calculations, are likely to be affected to a smaller degree only during a cold spell, are indicating the introduction of non-market-based measures at a very early stage in a pre-emptive manner to ensure supply to protected customers. Other differences are shown by the early move to non-market-based measures by e.g. Greece and Croatia compared to an apparent emphasis for market-based measures on the part of e.g. Bulgaria, Hungary and Romania as long as possible. Furthermore, cross-reading these national analyses with the ENTSOG maps of the areas and levels of affectation in a supply crisis, it may be observed that, under the cooperative scenario, the introduction of non-market-based measures can be significantly delayed. This suggests scope for improving the overall situation on the basis of closer coordination.

[30] E.g. it is unclear to what extent in some states in the Balkan region an extensive switch to electricity in conjunction with the effects of floods of spring 2014 and the decrease in supply of gas to thermal power plants will cause serious electricity supply deficits. These concerns have not been examined in detail in the national reports.

Figure 7 – Chart of temporal introduction of national measures



Source: National Reports, Commission analysis

3. CONCLUSIONS

3.1 Assessment of Member State measures

A prolonged supply disruption of the Ukraine transmission route and *a fortiori* of all Russian gas supplies to the EU will have a substantial impact in the EU, with the Eastern EU Member States and the Energy Community countries being affected most.

The national reports reveal two main weaknesses in the EU's short term security of supply situation. First, several infrastructure projects launched with the explicit purpose of increasing security of supply after the 2009 supply crisis have – due to a variety of issues ranging from a lack of political support to unsatisfactory project management and lack of cross-border cooperation – not yet been (fully) commissioned.[31] Second, many of the national security of

[31] These include in particular the Greek-Bulgarian, Romanian-Bulgarian, Bulgarian-Serbian, Moldavian-Romanian and Hungarian-Slovakian interconnectors as well as the Romanian reverse flow project. Furthermore,

supply strategies are either unilateral in nature, insufficiently coordinated and/or insufficiently cooperative. Overall this leads to a sub-optimal level of efficiency in dealing with security of gas supply in the Union as will be further detailed below.

The ENTSOG analysis shows that cooperation based on optimized infrastructure use and relative burden-sharing ensures the supply of protected customers in Member States and Energy Community Contracting Parties as well as significant exports to Ukraine.[32] Nevertheless, in addition to the optimization of domestic and cross-border gas flows, Member States in the Baltic States, Finland, as well as in Central and South-Eastern Europe and Energy Community Contracting Parties will need to employ a broad array of additional measures to ensure that "unserved" or missing gas to non-protected customers is kept to the minimum. As sourcing of additional gas from possible national production, external sources or storage has already been taken into account in the ENTSOG model, the most likely next measure – in addition to other types of demand-side measures – is price-induced or compulsory fuel switching. A good example is Finland, which at first sight may be the most vulnerable Member State with up to 100% unserved or missing gas during the modelled disruption scenario of a 6-month Russian supply cut. However, firstly the share of protected customers being supplied by gas is minimal. Furthermore, due to its obligatory switching mechanism and high alternative fuel stock obligation it would – with well-executed logistics – in all likelihood be able to replace all the gas volumes without the need to curtail demand. The most affected Baltic, Central and South East European Member States and Energy Community Contracting Parties[33] are however very likely to have to undertake curtailment of non-protected customers, particularly towards the end of the modelled period.
All national reports present measures to address a possible supply disruption. The sequencing of those measures is important and it is crucial that the market functions as long as possible. Where the market works, price signals will attract new deliveries of gas – mainly LNG – to the EU and within the EU to those countries where scarcity is highest provided that the necessary infrastructure exists. Price signals will promote the commercial use of storage as a tool to ensure the demand-supply balance and incentivize demand reduction and fuel switching driven by economic considerations. Member States should not prevent gas to flow across borders. A price increase is not a supply crisis and not a justification for intervening in the market under the pretext of security of supply.

This however does not release vulnerable Member States from the obligation to design and sequence well the measures they would resort to in preparing for and responding to an

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some interconnectors are not yet able to physically pump gas bi-directionally and therefore limit the overall flexibility of the system.

[32] Supply shortfalls will in all likelihood not be large enough to reach protected customers. In the "non-cooperation" scenario protected customers are particularly endangered in Bosnia and Herzegovina and the former Yugoslav Republic of Macedonia and curtailment of non-protected customers is likely to be markedly higher in other affected countries as well.

[33] Estonia, Lithuania, Latvia, Poland, Hungary, Romania Bulgaria, Greece, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia and Serbia.

emergency. Vulnerable countries too should exploit market based measures first and in full, but where they are no longer sufficient, non-market based measures may have to be resorted to when an emergency is declared. Where non-market based measures have to be applied, it is very important that the least distortive and most proportionate measures are applied before the more intrusive ones and that this is done taking duly into account the effect of the measure across borders.

3.2 Need for increased cooperation and coordination

As mentioned, in general, the national reports are more oriented towards *national approaches* rather than looking at the regional dimension when conceiving security of supply strategies. Thus many Member States have made assumptions in their national reports about the lack of certainty of deliveries from certain borders prompting them to have recourse equally to assumptions about no exports which weaken security of supply on a broader regional and EU-wide scale. Cooperation is therefore key as, for instance, in the Baltic region the position of the Inčukalns storage is so crucial that, if it cannot rely on it, Estonia would run out of gas to even supply its protected customers within five days.

The lack of coordination is reflected in a number of discrepancies in the measures indicated by different, often neighbouring, Member States. Such discrepancies include either the inclusion in several plans of the same external suppliers increased capacities or the different assumptions of flows across shared interconnectors. This is clearly a harbinger of inefficient outcomes, particularly in a crisis situation with tight markets, and can lead to a false feeling of security. While it is clear that some coordination has taken place before the stress test exercise and has been further reinforced by new discussions, the comparative analysis of the reports shows that there is still scope and a need for closer cross-border coordination to ensure – as a basic objective – realistic assumptions as regards the expected gas flows across the interconnection points.

In the light of the above, it is evident that cross-border cooperation must go beyond the mere cross-border consistency check of national measures and be extended to include the *identification of cross-border synergies* and agreeing on how to implement solidarity measures. Such an approach would fundamentally result in efficiency gains, not only in economic terms but also in terms of ensuring very short term security of gas supply.

There are examples of such cooperation between Member States and the Commission welcomes those as an effective first step to improve security of supply on a regional level. An example is the envisaged agreement between Estonia and Lithuania on the basis of which the protected customers of both countries will be served ahead of the non-protected customers in either country. Another example can be found in the Hungarian-Croatian Intergovernmental Agreement on security of supply, which, though it still needs to be implemented, reflects a constructive approach towards cooperation. Furthermore, cooperation can also manifest itself in the common use of infrastructures, for example storages, or in the increased power

generation in a certain Member States to allow other Member States to use the thus freed-up gas for the supply of protected customers. An interesting example in that regard is the developing cooperation between Greece and Bulgaria which foresees an exchange of gas and electricity to stabilize both systems in the case of a severe shortfall.

An enhanced cooperative approach will require agreements amongst the concerned parties on the organizational, commercial and regulatory terms and conditions of cooperation in case of a crisis. In order to build trust, clear rules need to be agreed beforehand at European or regional level. It is possible that enhanced cross-border cooperation may not be fully achieved in all aspects by the coming winter. Nevertheless, given the heightened current risk, neighbouring Member States and countries should start this process, or strengthen initiatives underway, immediately in order to come to an understanding on the most fundamental information as well as individual and joint actions during a possible crisis situation. Such arrangements, including measures that can be implemented in case of need during next winter, could be facilitated by the European Commission in order to conclude an agreement in a relatively short period of time.

Forms of cooperation need to kick in in order to alleviate the gas shortfall in a Member State by ensuring and enabling deliveries across the border, even if those deliveries would cause some sacrifices in the "donor" country as well. In applying such a principle, the coordinative role and security of supply responsibility of the TSOs need to be fully harnessed, with the support of national energy regulators, so as to allow them to provide flows to the neighbouring country even though they may not have ensured full system functioning in their area of responsibility. This could also be an opportunity to improve security of supply in the long-term through regional partnerships.

The Commission highlights in this context the special role of Member States through the territory of which gas is flowing towards markets further "downstream". As regards delivering supplies to Central and South Eastern Europe Germany, Czech Republic, Austria, Slovakia, Hungary and Slovenia all have particularly important infrastructure in place which needs to be used in an optimized manner already as a basis for a functioning internal market. In addition, in a specific security of supply situation it must also be ensured that these countries continue to allow gas to move to markets where shortages are significant.

It is clear however that this type of cooperation cannot just be a one-way street. It should allow for an appropriate allocation of costs of the measures necessary to cope with a crisis in the short but also in the medium and long term. The concept that consumers in a country bear the costs of the security of supply measures and should, consequently, enjoy higher levels of protection has often constituted a barrier for the development of cooperative schemes. Solidarity measures are not grants or gifts but operational emergency response measures to which the beneficiary will ultimately have to contribute. Solidarity that incentivizes free-rider behaviour is not solidarity. In any event it would be inappropriate to regard solidarity exclusively in a pure short term business context.

Enhanced cooperation will not only deliver short term tangible benefits for those Member States most exposed to the risk of emergencies in the upcoming winter. It is in the common interest of all that the introduction of the most far-reaching and radical measures – such as demand curtailments, trade restrictions or the release of strategic stocks – is delayed and reduced to the minimum, as these measures can undermine the internal energy market on a long-lasting basis. That, in turn, may damage the confidence of investors (e.g. in commercial storage) and reduce the attractiveness of the EU market for external supplies from existing and new sources. Approaches based on isolation and suspicions go against the solidarity that is needed to create a true Energy Union. This however will also require that the vulnerable Member States do the utmost to avoid an emergency situation by undertaking steps discussed further in Chapter 4.

4. RECOMMENDATIONS

Overall the EU energy policy seeks to complete the internal energy market, increase energy efficiency, reduce greenhouse gas emissions, diversify external supply sources and exploit indigenous sources; all of which improve the EU's security of supply. The present report focusses however on the specific recommendations that will ensure that the EU is better prepared for and in a position to respond to a concrete risk of supply disruptions from the East in the coming winter.

4.1 Urgent recommendations for the upcoming winter

The Commission has grouped the short-term recommendations along three themes of i) making the market work ; ii) defining clearly when the market stops working and when emergency measures are needed; and iii) coordinating and cooperating both in emergency planning and possible interventions.

i) Making the market work in the short term

1. Maximize capacity on interconnectors and remove or resist restrictions to cross-border trade

Capacity on interconnectors should be maximized and it should be ensured that this maximal capacity is made available to the market, e.g. by applying effective congestion management procedures[34] and capacity allocation mechanisms[35] without delay. In particular, export restrictions can have a detrimental effect in case of a gas crisis. As evidenced by the analysis carried out by ENTSOG, export restrictions can severely aggravate the damage of a gas crisis

[34] Pursuant to Commission Decision 2012/490/EU on amending Annex I to Regulation (EC) No 715/2009

[35] Pursuant to Commission Regulation (EU) No 984/2013. Valuable early implementations notwithstanding, this Regulation is to be implemented by 1 November 2015.

in the most affected Member States and would increase the number of countries which would face serious supply disruptions. The Commission recalls in this context Article 11(5) of the Security of Gas Supply Regulation, according to which "*no measures [should be] introduced which unduly restrict the flow of gas within the internal market"* or which *"are likely to endanger seriously the gas supply situation in another Member State."*

The Commission encourages the swift implementation of third party access rules to infrastructures (including storage) even in those cases where derogations to the Third Energy Package have been granted, such as for example in Latvia and Estonia.

2. Optimize the use of storage

Transparency on storage levels has greatly increased over the past years and the Gas Storage Europe (GSE) platform is a commendable initiative providing up-to-date information on nearly all EU storages. A last ditch effort should be made by Romania (Romgaz) to publish its storage level data[36], including on the GSE platform.

National regulators have tools at their disposal to provide economic incentives to market players – e.g. through lowering transmission tariffs for injecting gas in storage – to stimulate increased injections. This has worked effectively lately in Hungary which has led to solid growth in storage levels over the past weeks, even though storage levels in Hungary remain somewhat below EU average.[37]

Withdrawal patterns in storages are driven by economics and not necessarily by a security of supply strategy, particularly if the supply obligations are not properly enforced. Economic incentives may be given to dissuade market players from having too fast a recourse to storage when other gas sources such as LNG could be tapped as well. Such incentives, as already used by the Danish TSO, could be in the form of ultimately socialized *payments to owners of gas in storage to keep their gas in storage* instead of withdrawing it.

As a last resort and in duly justified circumstances, in case such economic incentives remain ineffective, introducing disincentivizing withdrawal tariffs for storages or even outright withdrawal caps/limitations for various timeframes throughout the winter may be considered. This should have the aim of ensuring a more prudent emptying of storages especially during periods when markets across the EU are less tight. However, it must be clear that any such tariffs or caps need to be proportionate in view of security of supply risks and should not aggravate the security of supply situation in neighbouring countries.

3. Ensure that infrastructure projects are implemented on time

[36] In line with Article 19.4 of the Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks.

[37] At the same time the additional storage injection coming from increased Russian gas imports through Ukraine has brought with it the suspension of exports to Ukraine which is a lamentable consequence.

The Commission welcomes the forthcoming commissioning of the Klaipeda LNG terminal in Lithuania. The existence of such infrastructure enabling supply diversification is vital both in order to diversify supply but also to ensure a more flexible gas network. Therefore it must be ensured that the commissioning of projects scheduled for completion in the coming months is done without delay. Specifically as regards the coming winter, these include the Slovak-Hungarian interconnector (1 January 2015), the Świnoujście LNG terminal in Poland (1 February 2015). Member States should inform the Commission well in advance, specifying the reasons, if delays may be encountered with a view to jointly identifying possible immediate actions that would allow for the elimination or at least minimization of the delay.

ii) Defining clearly when the market stops working and when emergency measures are needed

4. Implement the supply standard obligation laid down in the Security of Gas Supply Regulation

Gas suppliers should be encouraged to prepare responsibly for various supply situations that could occur next winter. Ensuring security of supply is about preparing well for a possible disruption – this is a shared responsibility between public authorities and the industry. The Security of Gas Supply Regulation contains a supply standard that should be honoured, implemented and applied in practice. The European Commission will facilitate the full implementation of all provisions of this Regulation. However, it is for the national competent authorities to enforce the supply standard obligation and to monitor whether suppliers have secured sufficient supplies and flexibility options to supply their customers next winter under various scenarios.

If this is not the case, the national competent authorities should recommend or impose, depending on the tools they have at their disposal under national legislation, to procure additional gas or flexibility options on a commercial basis. As pointed out above, the possibility of additional pipeline gas to the EU is limited and some Member States have limited access to alternative pipeline sources other than Russian. Therefore LNG is the key alternative to increase supplies in case of serious shortfalls. However, in view of commercial and operational considerations, procuring LNG spot cargoes expediently during a crisis can be both expensive and require some time. Therefore additional volumes of gas in storage or contracting some form of "LNG insurance", e.g. in the form of LNG purchase options, can greatly reduce corporate exposure by hedging both price and operational risk.

Consideration may also be given to ways in which LNG purchases by market players can be executed in times of severe supply disruptions in a manner that – while staying true to market principle – does not further significantly deteriorate the economic situation in a given country. Such clearly circumscribed, dedicated cooperative agreements could be envisaged with other major LNG importers such as Japan.

5. For countries which have an increased supply standard, put in place measures to temporarily reduce it in case of regional or Union emergency

The Security of Gas Supply Regulation establishes an obligation on Member States to ensure the supply of protected customers under a series of demanding circumstances. However, it also obliges Member States to identify how any increased supply standard or additional obligation imposed on natural gas undertakings beyond those demanding circumstances may be temporarily reduced, in a spirit of solidarity, in the case of a Union or regional emergency. Any such temporary reduction could free up certain amounts of gas, which otherwise would not necessarily be used, thereby increasing liquidity in the market and possibly alleviating gas shortages in other regions. The analysis of the Preventive Action Plans and Emergency plans[38] shows that some Member States have already put in place detailed provisions for the application of such a reduction. The Commission will work with those that have not to agree on the appropriate measures.

6. Maximize fuel switching potential and ensure operational implementation

Fuel switching capabilities are a key element in preventing and overcoming supply disruptions. While Finland for instance is completely dependent on Russian gas and cannot be supplied with gas from any other source, it has put in place measures to ensure a very broad obligation as regards fuel switching providing a sustainable alternative. The national reports have shown that the fuel switching potential is very different between Member States and the Energy Community Contracting Parties. Given that Member States already plan[39] to switch approximately 10% of their heating needs to renewables, these plans should be advanced using the European Social and Investment Fund, and benefitting from the experience already gained. National competent authorities should ensure that all administrative and operational measures are in place that would facilitate large-scale fuel-switching to take place, particularly in district heating systems, including the testing of facilities to ensure they can effectively switch fuel. Given that this currently concerns largely oil, it is crucial to ensure that the logistical aspects of such a (possibly sustained) switch en masse are planned for ahead, including the possible use of strategic oil stocks under certain circumstances. The same goes for switching to biomass.

In industry, Combined Heat and Power (CHP) units can also be switched off and their production replaced by the heat-only boilers that most industrial CHP plants have as back-up capacity, provided that the electricity produced from CHP can be replaced with electricity from the grid, and that such replacement is financially interesting.

7. Implement short-term energy efficiency and demand moderation measures

[38] According to the Security of Gas Supply Regulation, Member States must establish a Preventive Action Plan, to remove or mitigate the risks identified, and an Emergency Plan with the measures to remove or mitigate the impact of a gas disruption.

[39] C.f. National renewable energy action plans

Achieving an appreciable level of demand reduction by encouraging users to decrease room temperatures or assisting them in undertaking other energy-saving measures can be effective to reduce a supply gap. Public campaigns to that effect have proven effective to absorb, at least in part, sudden supply shortages in the electricity sector following the Fukushima accident in Japan and the explosion of the Vasilikos power plant in Cyprus. Readily-available measures which can be implemented quickly and bear low upfront investment costs include e.g. draught proofing, fitting radiator reflector panels and pipe lagging. These measures can be implemented through various means, including energy provider obligations under the EU Energy Efficiency Directive. In industry, energy demand can be optimised in the short term through the introduction of energy audits and the implementation of energy management schemes.

8. Specify the role of the TSO in emergency situations and ensure that this role is well-understood by the TSO

It should be considered whether it may be necessary to vest the TSO with additional responsibilities, under the supervision of the national regulatory authorities, so as to allow it to go beyond the mere network-centric monitoring of the supply-demand balance and undertake broader preventive or reactive actions to ensure operational security of supply. These actions could possibly involve the TSO carrying out purchases of gas under specific, clearly defined circumstances as well as contracting transportation to its market area and possibly contracting storage capacities. Such a system exists for example in the Netherlands where the TSO is mandated to have gas in storage and release it in case the temperature drops below a certain level.

TSOs having such roles on a national level must coordinate effectively across borders. It must moreover be absolutely ensured that the role of the TSO is precisely circumscribed and explicitly limited to well defined circumstances of market failure. The public service function which would in this case be imposed on the TSO should not breach the fundamental market design feature of the EU internal energy market that TSOs should not be an active participant in the commodity trading or supply market.

iii) Coordinating and cooperating both in emergency planning and possible interventions

9. Need to further develop regional cooperation on security of gas supply

In principle all countries should closely coordinate and cooperate with their peers across the border either to establish interconnections or to ensure that those interconnections can be efficiently used for the benefit of both sides. In certain cases – for instance as regards Greece and Bulgaria – such cooperation should be even broader in view of addressing the possible specific security of supply risk of respective shortages of gas and electricity that could be alleviated by an agreement. Furthermore, regional cooperation may also focus on ensuring

supplies to protected customers such is envisioned between Lithuania and Estonia. Regional cooperation may also relate to the use of storages in the case of emergency.

Consideration may also be given to ways in which LNG purchases by market players can be executed in times of severe supply disruptions in a manner that – while staying true to market principles – does not further significantly deteriorate the economic situation in a given country. Such clearly circumscribed, dedicated cooperative agreements could be developed within the EU but could also be envisaged with other major LNG importers, such as Japan.

10. Need for more transparency

TSOs and national regulatory authorities but also Member States should strive for the highest level of transparency in their actions vis-á-vis each other, stakeholders and the general public. In an interconnected network and in the process of completing the internal market, actions by one Member State or country (or its market players) have repercussions on other markets. In a situation of heightened tensions such as the one we are experiencing currently, all actions may be interpreted in a political light. It is therefore crucial that such actions are explained to allay concerns and build trust.

11. Commission's continued monitoring role and the use of the Gas Coordination Group

The Gas Coordination Group was created in 2004[40] although it was substantially reinforced by the Security of Gas Supply Regulation. In the past years it has become a valuable platform for the exchange of information and discussions on security of gas supply. This, in turn, has contributed to increased transparency and the building of trust among all its members.

The Commission intends to closely monitor the security of supply situation in close cooperation with national competent authorities. It will continue to convene regular Gas Coordination Group meetings to exchange with Member States and stakeholders on the matter and will also use emergency meetings of the Gas Coordination Group to share information and discuss measures taken in the case of possible or actual supply disruptions. The Commission will also coordinate action and ensure that emergency is declared and non-market based measures are implemented in accordance with the Security of Gas Supply Regulation.

Furthermore, as the analysis of the effects of the gas disruption on the electricity sector has been so far inconclusive, the Gas Coordination Group should, with the assistance of ENTSOG and ENTSO-E, follow-up on this matter to determine likely spill-over effects.

12. Cooperation with non-EU countries

The European Commission invited key international energy partners to provide contributions to this Report, particularly any observations or suggestions with respect to the potential flexibility for additional supplies of gas. These partners included the non-EU members of the

[40] Pursuant to Directive 2004/67

G7 as well as Norway, Switzerland, Turkey and the International Energy Agency (IEA). The Commission further invites these key external energy partners, including those with LNG export capacities and potential as well as those importing LNG, to continue the cooperation that has started with this Report, also in the context of the G7 and the IEA.

4.2 Medium term measures (by end 2015)

13. Commission's Recommendation on application of internal energy market rules between the EU Member States and the Energy Community Contracting Parties

Closer cooperation of authorities and consistent application of the EU internal market legislation on the borders between the Contracting Parties and the EU Member States are elements that could improve the security of supply deficits in the Contracting Parties and the EU Member States. Positive examples include the solutions found around the reverse flow from Slovakia to Ukraine. Consistent application of the Third Package internal market legislation is a fundament on which cross-border cooperation can further be developed.

In order to facilitate such cooperation with a formal act, the Commission will issue a Recommendation to the EU Member States to cooperate with the Contracting Parties in application of the Third Package and on questions of security of supply. The Commission stresses however that in the absence of functioning gas markets and lack the of implementation of the Third Package on the side of the Contracting Parties, the recommendations of the EU will not replace the necessary negotiations to take place between the EU Member States and the Contracting Parties in the region on how to use common infrastructure and on which terms it can be used in case of a crisis.

14. Speed up the commissioning and implementing of key Projects of common Interests or Projects of Energy Community Interest

All necessary measures should be taken to speed up and, where applicable, avoid further delays in implementing key infrastructure projects which are deemed to be of crucial importance from a security of supply point of view[41]. These include for instance the Romanian-Bulgarian interconnector, the Greek-Bulgarian, Bulgarian-Serbian interconnector and the Romanian-Moldovan interconnector which the Commission selected on the basis of clear and proximate commissioning dates. These projects should be taken forward swiftly and completed by end 2015. The Commission will follow up such projects and also stands ready to facilitate any outstanding negotiations between parties with a view to push forward all these project towards an expedited completion.

15. Re-evaluation of physical reverse flow exemptions

[41] See projects specifically enumerated in the Commission's European Energy Security Strategy Communication, page 23 and 24

Physical reverse flows allow Member States to be truly connected flexibly with each other. Often such investments are relatively minor but have a significant impact on the security of supply of an entire region, as demonstrated by the investment of in reverse flow on the Yamal-pipeline on the German-Polish border and more recently on the Slovak-Ukrainian border. Member States should work together to reassess whether the circumstances under which exemptions were requested for a physical reverse flow project have not changed particularly in light of the heightened security of supply situation as well as the fact that many Member States have lately significantly benefited from the additional trading and supply options such new trajectories offer. This is particularly the case for the reverse flow capability of some major trunk gas pipelines running today only from the East to the West (Obergailbach, Waidhaus and the BBL interconnector between Netherlands and the UK) as well as for the interconnector between Austria and Hungary.

16. Fuel switching through district heating and cogeneration in the residential/tertiary and industry sectors

District heating networks provides technological flexibility, as they can be run on many and multiple supply sources. Networks built on natural gas can be switched to alternative sources, such as biomass, waste heat, cogeneration, solar and geothermal, heat pumps, municipal waste, etc. The transitions can be implemented in 1-2 years, depending on the specific size and capacity requirements.

Where district heating systems already exist but do not connect all buildings in the area, the expansion of those systems, replacing gas supply to individual gas boilers, can be a cost-effective way to switch to local renewable and other low carbon sources.

Switching industrial Combined Heat and Power (CHP) plants and medium-size CHP in the tertiary sector (hospitals, shopping malls, office complexes) to renewable or low carbon supply sources can be implemented in 1-2 years' time, depending on the specific size and capacity requirements.

Industries with large heat requirements (e.g. pulp and paper) that are auto-producers, based on gas-fired CHP or/and heat-only boilers, could also invest in flexibility to store heat or switch between heating based on gas and heating based on electricity. This would be profitable if it would be flexible enough to benefit from low prices in times of excess (renewable) electricity production.

17. Heat demand reduction in industry and energy transformation

Industry and the energy transformation sector (generation, distribution) have large potential for energy efficiency measures that reduce demand at low cost with short (less than 2 years) pay-back time, for example by better process-monitoring and control, preventative maintenance. Identifying the short-term low or zero cost energy efficiency improvement potentials requires speeding up the implementation of energy audits or energy management systems under the Energy Efficiency Directive in the energy intensive industries.

5. NEXT STEPS

Experience with the application of the Security of Gas Supply Regulation indicates clear improvements in the EU security of supply situation since 2009 but also further margins for strengthening the EU's regulatory framework. As stated in its European Energy Security Strategy of 28 May 2014, the Commission will review existing mechanisms to safeguard security of energy supply and propose their reinforcement, where necessary.

In parallel the Commission intends to (continue to) work together with specific (groups of) Member States in order to develop solutions to issues that were identified as potential risk factors in the course of this stress test exercise.

Consequently the Commission intends to pursue the above recommendations via two separate work streams. Firstly, it intends to set up – together with ACER and ENTSOs – permanent monitoring of the implementation of the short-term recommendations and provide – where necessary – assistance in facilitating or driving forwards projects and discussions. Furthermore, it will continue working with Member States, the European Parliament and stakeholders to define the key objectives of security of electricity and gas supply for the EU in the years to come.