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Accompanying document to the

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

concerning measures to safeguard security of gas supply and repealing Directive 2004/67/EC

IMPACT ASSESSMENT

{COM(2009) 363}
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This report commits only the Commission's services involved in its preparation and does not prejudge the final form of any decision to be taken by the Commission.

Table of contents:

Introduction

The Commission set out in the 2nd Strategic Energy Review an **EU approach to security of energy supply**, including a five-point EU Energy Security and Solidarity Action Plan[1]. The approach and the Action Plan have been solidly endorsed by Council, Parliament and European Council[2], and by stakeholders[3]. This impact assessment concerns one element in the Action Plan - the strengthening of provisions for crisis prevention and response in the gas field and in particular, the revision of **Directive 2004/67** on measures concerning the security of gas supply.

A **concept of security of energy supply**, from a policy perspective, was put forward by the Commission in the 2000 Green Paper "Towards a European strategy for the security of energy supply"[4]: "The European Union's long-term strategy for energy supply security must be geared to ensuring, for the well-being of its citizens and the proper functioning of the economy, the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development".

In the **gas** field, this general definition of the outcome sought could translate into an objective of an acceptable level of risk of involuntary interruption of supplies to consumers. What would an acceptable level be? Gas, unlike electricity, is substitutable by other fuels in several of its main uses, so some risks of disruption of supplies will be acceptable to many consumers. Many industrial consumers with possibilities for fuel switching choose interruptible contracts offered in the market. Thus the 2004 Directive on security of gas

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1 COM(2008)781, "2nd Strategic Energy Review: An EU Energy Security and Solidarity Action Plan"

2 EP Resolution of 2 February 2009 on the 2nd Strategic Energy Review (2008/2239(INI)); Energy Council Conclusions, 19 February 2009 (6692/09); Presidency Conclusions, European Council, 19 March 2009

3 See report of public consultation, annex 4

4 COM/2000/0769

supply protects only household and some other customers who are unlikely to have satisfactory fuel switching possibilities. It establishes security of supply standards in terms of the severe weather conditions and other disruptions during which it should still be possible to supply protected customers from the market, without emergency measures.

The basic idea in the Directive, as in the earlier and subsequent internal gas market Directives, is that the **internal gas market** should be well-functioning and flexible enough, with sufficient infrastructure, to mitigate most gas supply disruptions. At the same time, for disruptions which turn out to be beyond the capacity of the market to mitigate, the 2004 Directive establishes a framework, compatible with the internal market, for emergency measures by public authorities (e.g. imposition of reduction of supplies to customers). This **joint focus** on the **functioning of the market** and **emergency measures if needed** is a fundamental structure in gas security of supply policy in Europe. The 2004 Directive complements the internal energy market Directives, notably by establishing standards for security of supply which are implemented by market participants. It is self-standing as regards the framework which it establishes for emergency actions, although compatibility with the internal market is a prime criterion.

The establishment of robust relations with producer and transit countries is clearly an important part of EU gas security of supply policy. However, **external relations actions** are largely[5] outside the scope of this impact assessment.

In recent years, **much has changed** as regards Europe's security of gas supply. Dependence on imports is increasing and at the same time, supply and transit risks are growing (see Section 2). The Russian-Ukrainian gas crisis in January 2009 (summarised in Section 2) brought an unprecedented disruption of gas supplies to Europe, far greater than any earlier disruptions. 30% of Europe's imports were cut off for two weeks. This is now a **realistic gas supply disruption scenario**. The situation within Europe has also been changing. With the growing importance of long-distance network flows of gas and the development of the internal gas market, gas supply crises are quickly felt across large parts of Europe and by the same token, the **internal gas market** is offering an increasingly powerful means of mitigating gas supply disruptions.

The increasingly important **European dimension** requires an adequate regulatory framework for security of supply at EU level. This should develop and use the potential of the internal gas market to deal with supply disruptions and address today's risks of disruptions. If an integrated liquid EU gas market already existed, it could be expected that most supply disruptions could be mitigated. But this is not yet the case. Infrastructure and market integration developments are still needed (see Section 2). In this context and after examining the implementation of Directive 2004/67, the Commission proposed in November 2008 that the Directive be revised. After the Russian-Ukrainian gas crisis in January 2009, the Council, Parliament and the European Council all called for the revision of the Directive to be accelerated.

The **Member States** are in very different situations as regards reliance on gas in their energy mixes, their main uses of gas and thus substitution possibilities, indigenous production, storage, geographical position in gas networks etc. (See Table 1.) The priority attached to security of gas supply varies among Member States. Very concretely, the risks and impacts of

[5] A monitoring mission to Ukraine and Russia was part of the EU response to the January 2009 gas crisis

gas supply disruptions are different in different Member States, as are their means of mitigating disruptions, although the internal gas market is an increasingly important factor. The **flexibility** allowed to Member States in the 2004 Directive is a reflection of these differences. Nevertheless, given the external and internal developments noted above, the clear message from Council and Parliament is to revise the Directive. This is an EU and internal energy market matter, as is reflected in the areas of importance in the revision of the Directive indicated by the Council and Parliament.

They focused on an EU framework for emergency action as well as the importance of a well-functioning internal gas market. The Energy Council "recognizes the need to improve, as an urgent priority, both national and EU level instruments for ensuring security of gas supply, through the revision of the Directive, with notably a better definition of the major supply disruption indicator and a more effective crisis response mechanism (e.g. through predefined emergency plans at the appropriate levels)"[6]. For the European Council, the revision should include "an appropriate crisis mechanism ensuring the preparedness of all actors, including the energy industry, transparency and prior information through the development of plans for security of supply; solidarity among Member States through the development of regional plans; and improved assessment and coordination through the redefinition of the threshold for deciding actions at Community level"[7]. For the Parliament, key elements in the revision are "mandatory and effective national and EU emergency action plans, which among other things, define a common declaration of an emergency situation, allocation of available supplies and infrastructure capacity among the affected countries, coordinated dispatching, activation of emergency measures in unaffected or less affected states in order to increase the amount of gas available to the affected markets using all means possible, including, among others, interruptible contracts, fuel switching, storage withdrawal, supply flexibilities for example; considers that it is essential to improve the functioning of the market through transparency and increase the availability of gas in the market; calls on the EU and its Member States to develop gas storage with fast-release capacity"[8].

Table 1: Sectoral consumption of natural gas by Member State 2007 (mtoe) and gas as % of primary fuel mix

	Power generation	House-holds	Industry	Services	District heating	Other	Gas as % of primary fuel mix
Austria	29%	18%	37%	7%	2%	7%	21
Belgium	29%	22%	39%	10%	0%	0%	26
Bulgaria	26%	1%	46%	3%	7%	17%	15
Czech Republic	6%	28%	35%	18%	7%	5%	15
Denmark	39%	15%	18%	7%	3%	16%	20
Estonia	12%	6%	36%	6%	39%	1%	13
Finland	55%	1%	27%	1%	8%	9%	10
France	15%	34%	28%	21%	0%	2%	14
Germany	23%	37%	27%	14%	1%	0%	23
Greece	73%	5%	16%	3%	0%	2%	10

6 Council Conclusions, 19 February 2009 (6692/09)

7 Presidency Conclusions, European Council, 19 March 2009

8 Par 67, EP Resolution of 2 February 2009 on the 2nd Strategic Energy Review (2008/2239(INI))

Hungary	32%	30%	15%	16%	4%	3%	40
Ireland	64%	14%	15%	8%	0%	-1%	27
Italy	40%	23%	24%	10%	0%	3%	38
Latvia	46%	8%	21%	10%	15%	1%	29
Lithuania	31%	5%	49%	4%	10%	1%	32
Luxembourg	41%	26%	34%	0%	0%	0%	26
Netherlands	33%	20%	23%	19%	1%	4%	40
Poland	8%	26%	40%	13%	2%	12%	13
Portugal	59%	6%	27%	5%	0%	4%	15
Romania	28%	16%	32%	9%	4%	11%	32
Slovakia	9%	22%	26%	19%	9%	16%	28
Slovenia	10%	9%	74%	1%	5%	0%	12
Spain	44%	12%	30%	9%	0%	5%	22
Sweden	31%	4%	40%	13%	1%	12%	2
United Kingdom	33%	33%	14%	9%	2%	8%	37
EU27	31%	26%	25%	12%	1%	4%	24

Source: Eurostat

Section 1: Procedural issues and consultation of interested parties

Identification: DG TREN, Agenda planning/WP reference: 2009/TREN/042

Organisation and timing of the Impact Assessment: The impact assessment was prepared in house in DG TREN, drawing from consultations and expertise, assessments of the January 2009 gas crisis and relevant studies. DGs COMP, ECFIN, EMPL, ENTR, ENV, JLS, JRC, RELEX, REGIO, as well as SG participated in the Impact Assessment Steering Group which met on 25 May 2009. LS had a separate discussion with DG TREN on 25 May. The Impact Assessment Board discussed the draft impact assessment on 10 June, provided a first opinion on 12 June and a second on 24 June on the resubmitted draft impact assessment of 18 June.

The recommendations of the Board were followed up in the revisions of the draft, notably as follows:

- A definition of "security of gas supply" and the intended scope of the initiative, starting from the concept adopted by the Commission in its 2000 Green Paper; this underlined the joint focus of security of gas supply policy on the functioning of the gas market and emergency measures..
- Strengthening of the section on analyses of the January gas supply disruption, including its economic impacts, drawing from academic research.
- Stronger consideration the first policy option, "No new EU action" (the baseline scenario) including the 3rd internal energy market package and the European Economic Recovery Plan. Inclusion of EERP projects in a calculation of n-1.
- Consideration of the application of n-1 at regional and EU as well as Member State level.
- Further material on assessment of costs of additional investments, notably from Transmission System Operators on reverse flow projects. Comparison with overall gas costs to consumers.

Consultation of stakeholders on the substance of the impact assessment:

- Public consultation on basis of Commission's November 2008 evaluation report[9] on the implementation of the 2004 Directive on measures concerning the security of gas supply, November 2008-March 2009 (report in Annex 4).
- Gas Coordination Group[10] discussions (23 February, 2 April, 13 May), responses of members to questionnaires and issue papers.

External expertise[11]:

- Study on natural gas storage in the EU, Ramboll, October 2008
- Study on Interoperability of LNG Facilities and Interchangeability of Gas and Advice on the Opportunity to Set-up an Action Plan for the Promotion of LNG Chain Investments, MVV Consulting, May 2008
- Studies on the January 2009 gas crisis, notably from the International Energy Agency, the Regional Center for Energy Policy Research at Corvinus University of Budapest, Oxford Institute for Energy Studies, IEA report *The Ukraine-Russia Gas Dispute* (20.01.2009)[12]

Main results of consultations, positions expressed, how taken into account or not:

In the public consultation on the revision of the 2004 Directive, based on the Commission's evaluation report on its implementation, fifteen responses were received from Member States (4), European associations of energy regulators and individual regulators (3), infrastructure operators (1), suppliers (4), traders (1) and users (2). The consensus was that a well-functioning internal gas market provides the best guarantee of security of supply. At the same time, there was general agreement on the need for specific efforts across Europe to mitigate future disruptions. Some Member States noted that only on the basis of shared responsibility for security of supply can solidarity actions be properly developed. Respondents offered detailed views and proposals, as summarized at the end of this section.

Thus, there is a consensus amongst EU institutions that a revision of Directive 2004/67 is necessary, improving the capacity and organisation of the EU, Member States and internal energy market participants to prevent and deal with gas supply crises. The public consultation demonstrated a readiness of the main stakeholders to engage in the development of detailed proposals to achieve an effective revision. The various proposals of the institutions and stakeholders are considered in this impact assessment. The Commission’s minimum standards for consultations have all been met.

Summary of public consultation:

(i) The first question concerned the **definition of security of supply standards** which would put reasonable, equal burden on market participants while respecting the different situations of Member States. The 2004 Directive established security of supply standards in terms of consumers to be protected and extreme weather conditions and supply disruptions during which it should be still possible to supply these customers. However, much **flexibility** was allowed, reflecting the very different

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9 COM(2008)0769; report on public consultation in Annex 4

10 The Gas Coordination Group, established under the 2004 Directive, brings together Member States and the gas industry and consumers through their European associations (Eurogas, OGP, GIE, IFIEC, BEUC, Eurelectric)

11 First two studies at http://ec.europa.eu/energy/gas_electricity/studies/gas_en.htm

12 The IEA Secretariat's note *Overview of the Russia - Ukraine gas dispute of January 2009* (11 March 2009) also provides a useful chronology of the crisis.

situations of Member States (reliance on gas in their energy mixes, uses and substitution possibilities, indigenous production, storage, position in the gas network etc.), with the result that standards across Europe are very heterogeneous, more than seems justifiable[13].

The Commission had raised at the Gas Coordination Group, during the public consultation, the idea of a disruption for which provision should be made - the failure of the largest supply infrastructure or source. This concept, already established in the electricity sector, is known as **"n-1"**. The January gas crisis demonstrated that this is now a realistic disruption scenario. The Commission had also raised the ideas of requiring **bi-directional flows on interconnectors**, and a security of supply **capacity margin**. Respondents to the public consultation tended to accept the idea of adding "n-1" to the disruption events specified in the Directive. However, they made clear that the devil is in the details, with proposals on definitions and comments on the availability of data. There was less support for the bidirectional flows and capacity margin ideas, mainly on cost-benefit grounds.

To accommodate the differing situations of Member States, several respondents put forward the idea that each Member State should do a **risk assessment,** referring to the agreed disruptions (e.g. n-1, weather), and reflecting their individual situations as regards the potential impact of disruptions and available ways of mitigating them. The risk assessments should be peer reviewed by other Member States. If investments or new measures are needed in order to deal with the disruptions, Member States should establish **national action plans** and implement them within a transition period.

Some respondents noted that **disruption scenario analyses at regional and European levels** would make it easier to assess the potential impacts of a crisis and could help in identifying critical investment needs. Coordination with the proposed 10-year Network Development Plans[14] would improve synergy.

(ii) The second question concerned the extension beyond households of **mandatory protection** under the Directive. This could concern power generators, small and medium sized enterprises and other vulnerable customers. Views were split. Some emphasized the importance of security of gas supply for essential service providers (e.g. hospitals). Some noted that gas fired power plants and Combined Heat and Power units without adequate fuel switching possibilities could need protection as residential consumers are likely to switch to electricity in a gas crisis. Other respondents considered that overprotection would diminish the ability of the market to handle shocks and would remove incentives on market participants to increase their own security of supply.

(iii) The third question concerned the actions which should be defined in the Community mechanism, in **EU emergency plans**. There was consensus that the market should be allowed to function as long as possible and emergency measures, solidarity mechanisms and government intervention should come as a last resort. Some argued that governments should guarantee that contractual obligations (e.g. cross-border access to storage) could be fulfilled even in emergency situations. A European crisis

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13 November 2008 evaluation report, op cit.

14 In 3rd internal energy market package

management mechanism should include a mechanism for declaring an emergency at European level. The idea of setting up a network of emergency contact points was proposed by a Member State. Many respondents considered that the Gas Coordination Group should have a stronger role in coordination and information exchange in the event of a crisis. Regulators invited the Commission to ensure that authorities responsible for dealing with emergency response are the same in all Member States.

There was broad agreement that **national emergency plans** should be communicated in advance to the Commission and other Member States, as well as to market participants throughout Europe. Several respondents argued that they should be based on a harmonized European-level scheme.

Cooperation at **regional level** was widely supported. However, views on the scope and field of cooperation varied, with some looking for regional emergency plans and solidarity mechanisms, others focusing on improving regional trading platforms and infrastructures.

(iv) The fourth question concerned the **definition of regions** for security of gas supply purposes. The few stakeholders who responded focused on infrastructural and technical issues, such as existing and planned interconnections, predominant gas flows, location of storage and import facilities. Some added that existing bilateral or multilateral agreements for emergency situations should be taken into account. All saw ERGEG[15]'s Gas Regional Initiatives as a good starting point. Purely administrative groupings should be avoided.

(v) The fifth question addressed the **economic compensation of solidarity**. The few replies suggested that solidarity is seen as a marginal option. Some noted that it should preferably not be used. If it is used, it should be based on pre-agreements between the operators with market-based compensation (concerning for example, reservation of capacity rights or purchase of gas for solidarity reasons).

(vi) The final question concerned how security of gas supply can be strengthened **at lowest cost**. Most respondents considered that a transparent, well-integrated, fully functional, open and competitive market with supply and demand flexibilities is a basic guarantee in preventing and mitigating supply disruptions. Better transparency of data would help better capacity allocation and congestion management. Exposing market participants to the full costs of disruptions may serve as an incentive to provide flexible answers to risks, based on knowledge of willingness to pay. Promotion and transparent operation of commercial storages, diverse supply interconnections, rapid demand reduction through interruptible contracts can also help. Solidarity and government intervention may be applied as a last resort only if the market is unable to cope with the problems arisen. National security of supply measures should be reviewed to ensure that they do not hinder the internal market excessively.

Section 2: Problem definition

What is the issue or problem that may require action? What are the underlying drivers of the problem?

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15 European energy regulators, www.energy-regulators.eu

The fundamental issue is the EU relies heavily on gas and will do so for the foreseeable future. 24% of Europe's primary energy consumption is gas. It is used directly by households and industry and in power and heat generation. As demonstrated in the scenario analyses in Table 2 below, the achievement of the EU's 2020 targets for renewables, efficiency and greenhouse gas emissions reductions should diminish EU demand for gas, the net effect of energy efficiency gains, new energy sources (renewables) and the impacts of a carbon price. However, shrinking domestic production will mean that the EU's dependence on gas imports is unlikely to drop below today's levels in terms of volumes, and may well increase. Imports account for a large (60%) and growing part (71-77% in 2020, depending on scenarios) of Europe's gas consumption.

Security of gas supply is directly important for households, many industries (e.g. chemicals, fertilizers) and for power generation. At the level of the energy system as a whole, gas is expected to play an important role in Europe's transition to a high-efficiency, low-carbon energy system, notably in the period before renewables are competitive. Loss of confidence in the security of gas supply could undermine the contribution of gas to this transition, as well as creating major problems for current users. With insecure gas supplies, the issue of back-up fuels comes to the fore. In power generation for example, in the period before renewables are competitive and the necessary grid developments have been put into place, and before Carbon Capture and Sequestration is commercially available, insecurity of gas supply could mean more investment in coal-fired generation and the lock-in of high CO2 emissions technologies.

Why is security of gas supply in doubt now? Medium-term trends for global gas consumption point to a sustained increase in demand, particularly from developing countries. At the same time, remaining reserves and spare production capacities are becoming increasingly concentrated in a few hands. For the EU in particular, surrounded by several gas producers, today's questions focus more on transit risks and the adequacy of investments in new supplies in producer countries. There are growing doubts[16] about the adequacy of investments in upstream resources, notably in Russia, the EU's main source of gas imports. Uncertainty about future gas demand, notably in the EU, is certainly making it more difficult to plan and undertake investments. The situation as regards transit is worrying, particularly in the case of Ukraine. The January 2009 dispute between Naftogaz (Ukraine) and Gazprom (Russia) could be repeated at any stage, the fundamentals have not changed substantially. In this situation, alongside external action, the EU needs to diminish its **vulnerability to gas supply disruptions**.

Table 2 – **Scenarios for EU-27 in 2020**

This Table shows the results of four scenario analyses: (i) baseline scenario (i.e. without the Energy Policy for Europe[17]), with oil prices at 61$/bbl; (ii) baseline scenario with oil prices at $100/bbl; (iii) a scenario with the Energy Policy for Europe and the moderate oil price; (iv) a scenario with the Energy Policy for Europe and the higher oil price.

EU-27 Mtoe	2005	Baseline projection, oil price 61$/bbl	Baseline projection, oil price $100/bbl	New Energy Policy projection,	New Energy Policy projection,

[16] See reports by the International Energy Agency

[17] 20-20-20 by 2020, as proposed in the January 2007 Strategic Energy Review and followed up in legislation: Reduction in greenhouse gas emissions to 20% below 1990 levels, 30% in the context of a global agreement on climate; 20% contribution of renewables to final energy consumption; reduction in primary energy use to 20% below the baseline projection for 2020. The baseline scenario includes only policies implemented by end-2006

				oil price $61/bbl	oil price $100/bbl
Primary energy demand	**1811**	**1968**	**1903**	**1712**	**1672**
Oil	666	702	648	608	567
Gas	445	505	443	399	345
Solids	320	342	340	216	253
Renewables	123	197	221	270	274
Nuclear[18]	257	221	249	218	233

EU energy production	**896**	**725**	**774**	**733**	**763**
Oil	133	53	53	53	52
Gas	188	115	113	107	100
Solids	196	142	146	108	129
Renewables	122	193	213	247	250
Nuclear	257	221	249	218	233

Net imports	**975**	**1301**	**1184**	**1033**	**962**
Oil	590	707	651	610	569
Gas Mtoe (*bcm*)	257 *(298)*	390 *(452)*	330 *(383)*	291 (337)	245 *(284)*
Solids	127	200	194	108	124

Final electricity demand	**238**	**303**	**302**	**257**	**260**

Sources: Eurostat and analyses based on PRIMES model; see Commission Services Working Paper, "Europe's current and future energy position: demand – resources – investment".

Based on the outline of the situation in the Introduction, there are **two main issues** in the reduction of the EU's **vulnerability** to gas supply disruptions. One is whether flexibility in the internal gas market is developing sufficiently to mitigate gas supply disruptions such as that of January 2009. Are updated standards or some other incentive needed? The second is the effectiveness of emergency arrangements as currently implemented at national, regional and EU levels, their impact on capacity of the internal gas market to mitigate disruptions and on solidarity. Is a better organization needed?

The **January 2009 gas supply disruption** provided an opportunity to examine Europe's resilience and preparedness for supply disruptions[19]:

[18] Assumes nuclear phase-outs decided by Member States as at end-2006

Brief resume of the crisis:
The crisis resulted from an unresolved commercial dispute between Naftogaz (Ukraine) and Gazprom (Russia). Gazprom stopped supplying gas for Ukrainian consumption (111 mcm/day) on 1 January 2009. Gas for transit through Ukraine for European consumption (about 300 mcm/day) continued to be delivered to Ukraine. From 2 January, gas deliveries to several European Member States were affected, notably Poland, Slovakia, Hungary, and above all Bulgaria and Romania. Gas deliveries gradually shrank on the Western Balkan route and at Western Ukraine entry points. During the night of 6-7 January, all supplies through Ukraine to the EU were cut. There were no Russian supplies to Europe from 7 January to 20 January.

In response, the EU, led by the Czech Presidency and the Commission, mediated between the partners at company and government levels. This led to the signing of a monitoring agreement between Ukraine, Russia and the EU on 9 January, which provided for independent monitors from government and industry in all parties to establish clearly what was happening as regards the transit of gas. On 17 January, EU mediation was intensified, with a high level summit between the parties in Moscow. This resulted in an agreement on 18 January between the Russian and Ukrainian Prime Ministers. On 19 January, within the political agreement, Gazprom and Naftogaz signed a new 10-year agreement on the purchase of gas by Ukraine and the transit of gas to the EU via Ukraine. On 20 January, normal gas transit towards the EU resumed.

As regards the **impact** of the supply disruption, on the ground in Europe:
- **Most Member States** were affected, directly or indirectly.
- There were considerable **economic and social impacts** in some Member States. Estimates, related mainly to involuntary restrictions of gas supplies to industry, are 1000m€ in Slovakia, 255m€ in Bulgaria, 70m€ in Hungary[20].
- The impact of the disruption in Member States depended on a range of **domestic factors**, alongside importance of Russian gas in the energy mix. Analyses[21] suggest that Member States on which the supply disruption had a low impact (A, CZ, SLO, RO) had the benefit of some import diversification, some achievements in closer market integration (SLO-A, CZ-D), and relatively plentiful local production and storage. In middle impact Member States (HU, SK), local production and massive storage compensated for a low level of diversification. In high impact countries, notably BG, key problems were inadequate storage and limited domestic production, limited import diversification, dependence on uni-directional single lines, distance from liquid markets (D) and low levels of preparedness for emergencies (e.g. low levels of oil reserves for heating).
- The **internal gas market** responded to the disruption. Almost immediately, flows changed direction on the UK-Belgium Interconnector and were reduced on the UK-Netherlands BBL Interconnector, increasing the supplies available on the Continent. Within a few days, additional spot LNG cargoes arrived in Greece and Turkey, flows increased from Germany to Croatia, from Hungary to Serbia and Bosnia, and Croatia

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19 See separate report on January 2009 gas supply disruption. See also See International Energy Agency analysis, based on information from EU Member States; also Stern, OIES, February 2009; Kovacevic, OIES, March 2009

20 Peter Kaderjak, Regional Center for Energy Policy Research, Corvinus University of Budapest; presentation of 3 April 2009

21 This list from Kaderjak, op cit

increased its production share off-take from the Croatian-Italian gas field in the Adriatic. By ten days or so into the crisis, reverse flows had been organised from the Czech Republic to Slovakia and, on the last day of the crisis, from Greece to Bulgaria.

- It was mainly **inadequacies in gas transport** which constrained flows (capacities, reverse flow capabilities, unusual routes, insufficient integration of gas networks in Central and South Eastern Europe), not lack of gas. The supply shortfall to the EU through the Ukraine amounted to 300 million cubic meters per day (mcm/d), compared to daily consumption of the EU of some 2000 mcm/d. Available storage withdrawal capacities in the EU were around 800 mcm/d. Gas imports from Norway increased.
- The crisis tested the gas **emergency arrangements** in those Member States which used them. Some reconsideration of supplies curtailment procedures is underway[22].
- Slovakia introduced an emergency regulation prohibiting exports from storage facilities in Slovakia. Italy introduced an emergency regulation optimizing use of import pipelines. Such regulations may have **prevented some gas flows** which would have been useful.
- There were no **solidarity actions** between Member State governments.
- Information exchange in the Gas Coordination Group was widely considered useful. However, the **data available** to governments and market participants on gas flows, stocks and available capacities was inadequate, making market decisions and decisions on emergencies more difficult.

The January 2009 gas crisis provided a practical demonstration of the European dimension of today's gas supply disruptions and of the response. By the time Russian supplies via Ukraine reached Europe again, action within Europe had largely compensated for the supply gaps. At the same time, the crisis demonstrated that **investments in infrastructures** across Europe to prevent disruptions becoming crises are still needed (e.g. storage, reverse flows, some new interconnectors) and that further **market integration** would improve security of supply. The question of the compatibility with the internal market of **emergency measures** of Member States has arisen.

To what extent can the undesired effects of the January gas supply disruption be attributed to **poor implementation** of existing regulations, including the Directive on gas security of supply?

In **Member States which were most hit**, the factors were poor diversity of imports, dependence on uni-directional single lines, distance from liquid markets, inadequate storage and limited domestic production, as well as low levels of preparedness for emergencies (e.g. low levels of oil reserves for substitute heating fuel). Several of these countries are operating with energy systems developed in a different context, still relatively poorly geared to benefiting from the developing internal energy market. Investments are needed, as reflected in the list of eligible projects in the European Economic Recovery Plan and expenditures under the Structural Funds. Those **Member States which were able to accommodate** the January supply disruption had the benefit of some import diversification and some achievements in closer market integration.

Good implementation of the 2004 Directive would not have directly affected import diversity nor import infrastructures. It would not have increased domestic production but could have encouraged further investment in commercial storage. It would have ensured better preparedness for emergencies. What are the underlying **drivers** for poor implementation,

[22] HU, according to Kaderjak op.cit.

notably on storage and emergency planning? The lack of clear standards in the 2004 Directive and the consequent practical limitations on enforcement must come into the picture. As regards emergency planning, the January crisis was unprecedented and, for many, unexpected.

The January crisis demonstrated the potential already developed in the **internal gas market** to mitigate quite substantial gas supply disruptions. The crisis has encouraged the identification by Member States and Transmission System Operatorss of necessary infrastructure investments, so future disruptions should be accommodated at least as effectively. Thus, although there is still progress to be made in the development of the internal energy market, the indications from the January crisis were positive.

The introduction of **emergency regulations** by some Member States may have prevented some gas flows which would have been useful. However, this does not seem to have had a major impact this time. Nevertheless, market participants in particular want clarity on what is allowed.

In general, the analyses if the crisis support the two issues identified at the start of this section – Is flexibility in the internal gas market developing sufficiently? Are emergency arrangements effective, what is their impact on the mitigation of disruptions by the internal gas market and on solidarity?

What are the **drivers** of these two issues?

The January crisis suggested that inadequate flexibility on the internal gas market is currently mainly a matter of **inadequate infrastructures**. A number of missing links and inadequate capacities were evident in the January crisis (eg reverse flow on Greece-Bulgaria pipeline). Many were included as eligible projects in the European Economic Recovery Plan, agreed shortly after the January crisis (see Annex 3).

More generally, there is arguably a **risk of underinvestment in infrastructures** which are intended to be available for mitigating disruptions, preventing crises. Individual elements of infrastructure which would not be used much in normal circumstances (e.g. provision for reverse flows on routes normally used one way) are unlikely to be profitable and attract financing unless without their wider benefit to the network being recognized. In Europe's unbundled internal gas market after the **3rd internal energy market package**, it will be for energy regulators to work this out among themselves and with Transmission System Operators. The rolling 10-year Network Development Plans, at Member State, regional and EU levels, agreed in the 3rd internal energy market package, should provide a good vehicle for this. However, the **current situation** is worrying. As demonstrated in the Winter Outlook prepared by Gas Infrastructure Europe[23], a significant part of Europe's gas transmission capacities is totally or nearly totally saturated during the cold winter temperatures. There is no spare capacity to increase gas flow if something happens. Spare capacities, more interconnections and reverse flow capacities must be built in order to have a buffer capacity in transmission and distribution of gas. With the prospect of further gas supply disruptions, urgent action on infrastructures is needed.

[23] See Annex1 or www.gie.eu

There may be a risk of **underinvestment in gas supplies for security of supply**. Costs of gas supply insecurity are visible to suppliers and consumers (e.g. back-up supplies, uncertainty about investments) and incentives to diminish insecurity correspondingly clear. However, in many of the actions to reduce insecurity, benefits are widely shared, which normally encourages free-riding. The classic example is oil prices. If some consumers act (e.g. stocks, demand reduction) to reduce pressure on the supply/demand balance, the resultant price drop is felt by all. Hence international cooperation among consumers on oil stocks. Less research work has been done on gas but the same factors should operate[24]. An example would be power generators making provisions for fuel switching, thereby leaving more gas for others in a crisis.

Under the 2004 Directive, security of supply standards are already in place. They specify severe weather conditions and other disruptions during which it should still be possible to supply protected customers from the market, without emergency measures. For the moment, there does not seem to be a problem about quantities of gas in Europe. However, with growing import dependence, the situation should be kept under review.

The flexibility of the internal gas market to mitigate supply disruptions depends not only on investments in infrastructures and gas but also on its **functioning**. There is currently insufficient physical network integration, inadequate transparency in network utilisation as well as inflexibility in capacity reallocation and congestion management. Technical difficulties in transporting gas over non-standard routes were evident in the January crisis. There is insufficient market integration, price-response mechanisms are inadequate. All of these can undermine a market response to a gas supply disruption. Thus the coming into operation of the **3rd internal energy market package** will enhance the internal gas market's ability to deal with supply interruptions, through measures such as transparency (obligations to publish data on forecast and actual gas flows, amount of gas in storage and available pipeline and storage capacities), harmonisation of access rules through codes as well as clear roles for Transmission System Operators and regulators, the creation of ACER for cooperation of regulators and ENTSOG for cooperation of TSOs and for coordination of investment plans through the 10-year Network Development Plan[25].

The main driver for the issue of the **effectiveness of emergency arrangements** and their impact on the mitigation of disruptions by the internal gas market and on solidarity is the evidence of unilateral and uncoordinated action by some Member States in gas supply emergencies. There are several problems with this. By creating doubt on when emergencies will be declared in parts of the internal gas market, when non-market actions will be introduced, confusion is created around the basic agreement on having the internal gas market mitigate supply disruptions for as long as possible. Once an emergency is declared, clarity is needed on what this implies. Gas market players from several Member States have raised the issue of uncertainty about continued access to storage in neighbouring countries in a crisis, despite commercial contracts, for example. These concerns about getting the functioning of emergency systems right are influenced by the general sense that there could be further severe gas supply disruptions in the future and the reality that as the internal gas market develops, clarity is needed by all participants on when non-market measures might be applied.

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[24] CEPS Policy Brief: "National and EU-level Estimates of External Supply Externalities", Arnold and Hunt, April 2009

[25] Agency for Cooperation of Energy Regulators, European Network of Transmission System Operators - Gas

A driver of both issues – adequacy of investments and organization of emergency arrangements – is the objective of **solidarity** in the EU. In the energy field, reflecting interdependence of Member States, the ideas of responsibility and solidarity have been linked. Thus there may be greater readiness to agree in advance on solidarity measures which would come into play in an emergency when there is trust that all Member States have acted to reduce the risks of an unmanageable gas supply disruption spilling over into other Member States. Several Member States repeated this in the public consultation on the revision of the 2004 Directive.

Who is affected, in what ways, and to what extent?

The ultimate sufferers from inadequate and inefficient gas security of supply arrangements in Europe are **European citizens** (dependent on gas for cooking and heat, directly or via district heating; many dependent on gas-fired electricity generation) and **industry** (e.g. power sector, chemicals, fertilizers). Gas supply disruptions are a serious issue for electricity generation in several Member States, hence the likelihood that a gas crisis can become a much more disruptive energy crisis[26].

Costs of supply disruptions can be considerable, as demonstrated in the January crisis (see earlier in this Section), directly affecting industry (e.g. temporary closure of plant; requirement on power plants to switch fuels, provision of back-up fuels or insurance-type contracts), then households. **Significant economic damage** was felt in the Member States most affected in the January crisis.

Supply disruptions will have impacts on **jobs**. Some 25% of gas consumption in the EU is in industry (fertilizers, other chemicals etc). Interruption of supplies to such continuously running enterprises is a negative factor, potentially putting jobs at risk.

How would the problem evolve, all things being equal?
As noted earlier in this Section, risks of gas supply disruptions to Europe are growing, with growing gas demand from developing countries, doubts about adequacy of investments in new supplies, and uncertain relations between producer and transit countries, notably Russia and Ukraine. Imports are projected to grow for the foreseeable future and the EU is highly dependent on a small number of gas suppliers and routes. Crises comparable to that of January 2009 could easily be repeated, leaving European customers without gas.
If underinvestment and inefficient investment in the capacity of the market to mitigate disruptions continues while risks of disruptions grow, the impact and costs of disruptions will increase. The 3rd internal energy market package and the European Economic Recovery Plan will certainly bring relevant improvements although it will be some time before the integrated liquid internal gas market which could best deal with supply disruptions will be achieved .

Emergency measures and plans of Member States need to be coordinated, lest the untransparent and difficult situation in January 2009 be repeated in the next crisis, undermining the effectiveness of the internal market in mitigating the disruption. More broadly, the development of solidarity between Member States in dealing with emergencies is likely to be held back by any sense of lack of responsibility of other Member States in making the necessary provisions to prevent and mitigate gas supply crises.

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[26] During the January 2009 gas crisis, problems emerged in electricity (Slovakia) and oil products supply (Bulgaria, Moldova and Serbia).

As noted earlier, doubt about security of supply could undermine the contribution expected of gas in the transition to a high-efficiency, low-carbon energy system, notably in the period before renewables are competitive.

Does the EU have the right to act and is EU added-value evident – Treaty base, 'necessity test' (subsidiarity) and fundamental rights limits?

On security of energy supply, its inclusion in the Lisbon Treaty energy article and the endorsement of the 2nd Strategic Energy Review point to an EU role, consistent with the growing reality of the internal energy market.

The 2004 Directive is based on Art 100, EC Treaty, which applies to situations in which "severe difficulties arise in the supply of certain products" [27]. Decisions under this Article are taken by the Council acting on a proposal from the Commission. This is consistent with short-term and emergency situations, not with longer-term, preventive action in the internal energy market. The Commission's original proposal for the 2004 Directive was based on Art 95 which deals with "the approximation of provisions laid down by law, regulation or administrative action in Member States which have as their object the establishment and functioning of the internal market." The justification was that the Directive related to provisions, consistent with the internal market, to be made by Member States to address disruptions which could arise in the market (standards for market participants, publication of planned measures for use in an emergency, transparency etc). This justification for using Art 95 has become stronger as the internal energy market has developed[28]. In addition, the clear purpose of its revision is to achieve advance planning and provisions by Member States and market participants, not to frame ad hoc responses to crises.

The adoption of the 3rd internal energy market package will strengthen the market. In a situation in which national markets are becoming increasingly integrated, it will not be possible to consider security of supply primarily as a national concern. This is already partly the case. Consequently the legal basis of the related EU legislation should arguably no longer be disconnected from the internal market rules of the EU Treaty. Any proposal should – consistently with the legal basis for the internal energy market of which it is arguably an extension – be based on Article 95. This is the legal basis of a similar instrument adopted in 2005 in the field of electricity (Directive 2005/89/EC).

Subsidiarity, proportionality:
No single Member State, acting on its own, can assure a sufficient regulatory framework and investments in the internal market for security of gas supply. Only EU-wide action can do this. No single Member State, acting on its own, can ensure that all Member States have effective provisions in place, consistent with the internal market, to handle gas supply emergencies. Moreover, individual non-coordinated actions by MS are increasingly likely to

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27 Article 100: 1. Without prejudice to any other procedures provided for in this Treaty, the Council, acting by a qualified majority on a proposal from the Commission, may decide upon the measures appropriate to the economic situation, in particular if severe difficulties arise in the supply of certain products. 2. Where a Member State is in difficulties or is seriously threatened with severe difficulties caused by natural disasters or exceptional occurrences beyond its control, the Council, acting by a qualified majority on a proposal from the Commission, may grant, under certain conditions, Community financial assistance to the Member State co concerned. The President of the Council shall inform the European Parliament of the decision taken.

28 The 2005 Directive on security of supply of electricity is based on Art 95.

hamper further development of the internal market, lead to discriminatory treatment and put security of supply in other Member States at risk.

As noted earlier, the **Member States** are in very different situations. The risks and impacts of gas supply disruptions are different in different Member States, as are their means of mitigating disruptions. The flexibility allowed to Member States in the 2004 Directive is a reflection of this. Nevertheless, given the external and internal developments noted above, the clear message from Council and Parliament is to revise the Directive. This is an EU matter.

Section 3: Objectives

What are the general policy objectives?

The general policy objective is to secure an **adequate level of preparedness** in Europe for gas supply disruptions, developing and using the potential of the internal gas market to deal with supply disruptions and address today's risks of disruptions. The weaknesses made evident in the January 2009 gas crisis must be tackled **quickly**, before any further crisis.

Consistency of these objectives with other EU policies:

In the changing global gas market, supply and transit disruptions must be expected. Despite much effort on developing **international cooperation** and partnership, there are continuing questions about matching supply side investments and demand, and political dimensions of supply and transit risks. As set out in the 2nd Strategic Energy Review, internal action to reduce vulnerability to gas supply disruptions supports a strong EU line and action with external partners.

Terrorism and other criminal activities, natural hazards and other causes of accidents are not constrained by borders within or outside[29] the EU. The directive on the identification and designation of European Critical Infrastructures[30] lists the energy sector as one of its priorities. This includes as particular infrastructure assets gas production, storage, transmission by pipelines, as well as LNG terminals. A strengthened regulatory framework on gas security of supply and **EU policy on critical infrastructures** could be mutually supportive.

Inadequate European responses to gas supply disruptions would have impacts on other EU policies, notably **internal energy market** development (undermining of efficient market response, unclear investment signals), **environment and climate** (avoidable switching to fuels with greater greenhouse gas emissions e.g. coal, fuel oil), **economic development** (insecure supplies, involuntary closure of plant, loss of competitiveness and jobs), **poverty alleviation** (relatively great impact of disruptions on vulnerable customers), **external relations** (suppliers not helped by unclear European market rules).

What are the more specific/operational objectives?

Reflecting the two issues identified earlier and the discussion of the drivers of the problems, the specific/operational objectives for the revision of the 2004 Directive are:

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29 The Commission has recently started a dialogue with the Member States about an external dimension of the EU policy on critical infrastructure protection. This strand of work would address the issue of critical infrastructures located in third countries, which if disrupted or destroyed would have an adverse effect on a certain number of Member States or the EU as a whole.

30 Council Directive 2008/114/EC of 8 December 2008

(i) Achievement of sufficient **flexibility** in the internal gas market to mitigate most gas supply disruptions, by establishing the necessary incentives for investments in infrastructures and gas and the well-functioning of the market.

(ii) Effective cooperation in dealing with gas supply **emergencies** in Europe, with pre-defined emergency plans involving all players, at Member State, regional and EU levels, minimizing any undermining of the internal gas market response to the disruption and geared to supply disruptions of the size and scope experienced in January 2009.

On flexibility in the internal energy market to enable it to mitigate most supply disruptions, the main focus today, bearing in mind the January gas crisis, is on infrastructures. As noted in the previous Section, existing incentives for gas supplies seems to be adequate. The 3rd internal energy market package will improve market functioning and the conditions in which investments can be made. A missing element may be a standard relating clearly to infrastructures. This is neither in the current Directive on security of gas supply (which only specifies "a partial disruption of supplies") nor in the 3rd internal energy market package. A **security of supply standard focused on infrastructures** could complement the 3rd internal energy market package. The package has created a new situation in which infrastructure investments will be made in future. With clear roles and cooperation among Transmission System Operators and regulators in Europe, a 10-year Network Development Plan will be developed, at Member State, regional and EU level. A clear security of supply standard for gas infrastructure could support the development of such network development plans.

The Commission put forward for discussion in the Gas Coordination Group the idea of a disruption for which provision should be made - the failure of the largest supply infrastructure or source. This concept, already established in the electricity sector, is known as **"n-1"**. The January gas crisis demonstrated that a disruption scenario of this scope, previously considered unlikely, is now realistic. The Commission also raised the ideas of requiring **bi-directional flows on interconnectors**, and a **security of supply capacity margin**.

The differences between Member States as regards risks and impacts of gas supply disruptions would clearly be a factor to be borne in mind in requiring an infrastructure-based security of supply standard. An approach based on n-1 would allow a response tailored to the specific situation of each Member State, while ensuring the development of a network with the capacity to deal with crises as well as normal circumstances.
Thus, to summarize why a **security of supply standard for infrastructure** may now make sense as a specific/operational objective for the revision of the 2004 Directive, it is because large-scale failures of supply and the need to replace supplies from other infrastructures is now a realistic disruption scenario; gas flows across Europe are increasing and the internal gas market is developing; and the 3rd internal energy market package will provide new means of implementing such a standard.

The **n-1 concept** as a basis for a security of supply standard for infrastructure was accepted by many respondents to the public consultation. However, respondents made clear that the devil is in the details, with proposals on definitions and comments on the availability of data. Compared to the **capacity margin** concept which would be applied to all existing infrastructures, the n-1 concept would enable a focus on missing infrastructures. Many respondents rejected the capacity margin concept, mainly on cost-benefit grounds. The idea

of requiring **bidirectional flows on all interconnectors** could be assessed on its own merits, it would not conflict with the n-1 concept, indeed it could be accommodated within it.

In principle, the n-1 concept could be applied at any level – **Member State, regional or EU**. The choice as to which level would be best would be influenced by very concrete considerations of existing interconnections, existing cross-border arrangements (e.g. access to storage), existing cooperation frameworks. A pragmatic approach is justified. The responses from the public consultation support a pragmatic approach, at least as regards regional cooperation.

It would clearly be necessary also to have **disruption scenario analyses** at EU level, to support analyses and risk assessments at regional and Member State levels. These analyses at EU level should be consistent with and contribute to the planned 10-year **Network Development Plan**, to be developed by ENTSOG. The maps in Annex 2, for example, produced using the Joint Research Centre's MC-Genercis model, give an EU-level view of gas flows. They show gas flows in Europe on a normal day and on the first day of the January 2009 gas crisis. Transmission System Operators in GTE+ are already working on gas disruption scenarios in an EU perspective.

Section 4: Policy options

What are the possible options for meeting the objectives and tackling the problem?

4.1 No new EU action – the baseline scenario

Can achievement of the objectives set out above be expected from the existing EU policy framework and from incentives already in place?

(i) Achievement of sufficient flexibility in the internal gas market to mitigate most gas supply disruptions, by establishing the necessary incentives for investments in infrastructures and gas and the well-functioning of the market.

As noted in Section 2, the January crisis suggested that flexibility in the internal gas market to handle gas supply disruptions is most immediately a matter of **inadequate infrastructures**. In Europe's unbundled internal gas market, when the **3rd internal energy market** provisions are operational, it will be for energy regulators to work out among themselves and with Transmission System Operators the costs and benefits of additional investments, including those to strengthen the capacity of the market to mitigate disruptions. The rolling 10-year Network Development plans, at Member State, regional and EU levels, agreed in the 3rd internal energy market package, should provide a good vehicle for this, when they are developed. Security of supply is one of the factors which TSOs and regulators will consider in their infrastructure development plans.
In general, strengthened cooperation on security of supply should be possible, through the clearer roles, responsibilities and cooperation obligations established in the 3rd internal energy market package, within Member States and at regional and EU levels.

It will take some time before all the elements in the 3rd internal energy market package are operational and before their impacts are felt in an integrated, well-functioning liquid internal gas market.. If the 3rd package is to address imminent gas supply disruption, there will have to be early implementation of its provisions by the relevant players. In response to the January

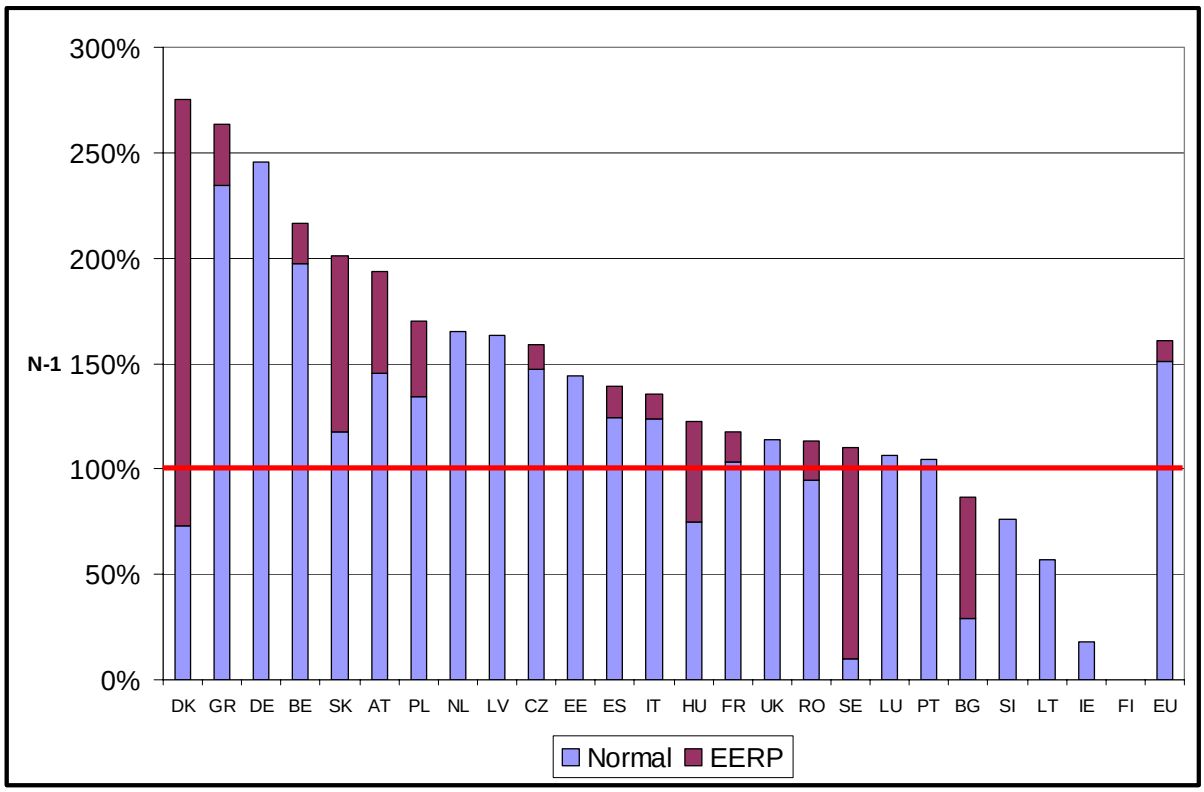
gas crisis, Council encouraged the early formation of ENTSOG and the start of its work on the 10-year Network Development Plan. TSOs in GTE+ have started working on EU-level gas supply disruption scenarios. Thus, even before full implementation of the 3rd internal energy market package, some work towards proper reflection of security of supply in network developments in Europe can be expected.

This is a strong argument for **early agreement on a clear security of supply standard for infrastructure**, providing guidance and support at EU level to enable regulators and Transmission System Operators to address the need for additional investments. The issue of financing investments which are primarily designed to ensure security of supply is not easy and experience, particularly in an unbundled internal energy market environment, still needs to be built up.

Agreement on the disruptions which each Member State should be able to compensate could simplify the lives of regulators and facilitate a fair burden-sharing. Under the 2004 Directive, the definition of such a disruption goes no further than "a partial disruption" of supplies, during a period to be determined by Member States, taking into account national circumstances. This gives no guidance. Incentives for investment in infrastructures to strengthen the capacity of the market to mitigate disruptions are not clear enough at this stage. A significant part of Europe's gas transmission capacities are totally or nearly totally saturated during the cold winter temperatures. There is no spare capacity to increase gas flow should something happen. With the prospect of further gas supply disruptions in the near future, **urgent improvements in infrastructures** are needed.

The **European Economic Recovery Plan** includes a list of eligible gas infrastructure projects, to be started in 2009-2010 (Annex 3), many of which would strengthen the capacity of the market to mitigate disruptions. This will certainly help, as will the continued implementation of the TEN-E programme. The impact of the Recovery Plan projects on the meeting of an n-1 standard (details in Annex 1) can be calculated. The following Table 3 does not include the Recovery Plan projects concerning reverse flow capacities as it is not yet possible to attribute the support.

Table 3: Preliminary calculation of n-1 for Member States:



If all projects in the Recovery Plan are implemented, it would certainly take several Member States nearer to meeting an n-1 standard for security of supply. However, the projects included in the Recovery Plan are eligible projects, construction cannot be guaranteed. The planned revision of **Council Regulation EC N° 736/96** on notification of investment projects in the gas, electricity and petroleum sector will help to establish greater transparency regarding the development of energy infrastructure and better understanding of the reasons for project delays or withdrawals.

The guidelines for the TEN-E programme will be revised in 2010. One of the ideas put forward by the Commission for the public consultation is to tailor the programme more closely to energy security needs. This may involve greater financing.

Against this background of the 3rd internal energy market package and its early implementation, the European Economic Recovery Plan and the TEN-E programme, is there need for a **security of supply standard relating to infrastructure**? What added value would it provide? Firstly, the 3rd internal energy market package does not provide such a standard, only much improved means for reflecting one in decisions on investments and in network development plans. The existing 2004 gas security of supply Directive does not provide one either. The Recovery Plan will at best only partially deal with the problem of inadequate infrastructures. Agreement on a standard would provide **guidance and support at EU level** to enable regulators and Transmission System Operators to tackle, at Member State, regional and EU level, the difficult questions of which additional investments make most sense, how should costs be allocated. In timing terms, it would support early advance work by ENTSOG, ACER, the TSOs and regulators.

Other factors influencing flexibility in the internal gas market to mitigate most gas supply disruptions should also improve somewhat in the next years. On the functioning of the

market, after the 3rd internal energy market package, the Commission proposes to strengthen **gas network transparency** through detailed rules through comitology by a proposal to amend the Annex of the current Gas Regulation 1775/2005. On availability of **substitute fuels**, the recently-agreed revision of the oil stocks Directive, for example, will provide a more clear assurance of supplies.

(ii) Effective cooperation in dealing with gas supply emergencies in Europe, with pre-defined emergency plans involving all players, at Member State and EU levels, minimizing any undermining of the internal gas market response to disruptions.

The January 2009 gas crisis has certainly stimulated greater awareness of the need for effective cooperation on crises, at Member State, regional and EU level and in relations with supplier and transit partners. As noted in the problem definition section, confusion on timing and content of emergency plans of Member States can undermine the effectiveness of the internal energy market in mitigating supply disruptions. The **Gas Coordination Group** has already started working on emergency plans as well as security of supply standards.

Work underway on strengthening **international energy cooperation** could diminish the risk of gas supply disruptions (EU-Russia Energy Dialogue, Energy Charter Treaty, Energy Community, EU-Russia New Agreement etc).

Thus, the baseline scenario may well partially deliver the objectives over the next years, through the 3rd internal energy market package, the European Economic Recovery Plan, the revision of Council Regulation EC N° 736/96 on notification of investment projects in the gas, electricity and petroleum sector, the TEN-E programme, the existing 2004 gas security of supply Directive and cooperation on emergency planning following the January gas crisis. Nevertheless, given that the internal gas market is far from the integrated, liquid, well-functioning market which could best deal with supply disruptions, an EU framework is still needed to ensure that **actions of Member States** for security of gas supply, notably during crises, do not undermine the growing capacity of the market to deal with disruptions and that the **standards for security of supply which market participants should meet** are clear to all. Such standards have not been provided in the 3rd internal energy market package nor in the 2004 gas security of supply Directive. More positively, an EU framework is needed to ensure that the **potential of the internal gas market** to deal with supply disruptions is developed and used. The 2004 Directive does not provide sufficient concrete provisions to do this. The 3rd internal energy market will radically improve the framework for investments in the internal energy market but a clear indication of what is needed for security of supply has not been provided.

4.2 Better enforcement and implementation of the 2004 Directive

(i) Achievement of sufficient flexibility in the internal gas market to mitigate most gas supply disruptions, by establishing the necessary incentives for investments in infrastructures and gas and the well-functioning of the market.

The Commission's evaluation report on the implementation of Directive 2004/67[31] demonstrated heterogeneity of standards among Member States for mitigating gas supply

[31] November 2008 evaluation report on implementation of Directive 2004/67

crises. Member States are required to establish security of supply standards based on certain criteria (customers to be protected, their demand to be met during specified weather conditions and partial disruptions of supplies). In their transposition of the Directive, Member States have adopted heterogeneous security of supply standards and in several cases[32], they have not adopted any standard at all. Eight Member States have extended the scope of the protection beyond households. The national definitions of partial disruption vary from around 10% (in Slovenia) to around 30% (Slovakia) of average gas consumption with durations ranging from 48 hours (Bulgaria) up to 6 months (France). Most Member States use 1-in-20 or 1-in-50 rules for weather but details such as peak duration vary. Thus, even though some flexibility was intended in the 2004 Directive, the result in practice does not seem to follow any pattern. The uneven implementation across the EU is not surprising. With such imprecise standards, strict **enforcement** is impossible.

(ii) Effective cooperation in dealing with gas supply emergencies in Europe, with pre-defined emergency plans involving all players, at Member State and EU levels, minimizing any undermining of the internal gas market response to disruptions.

For effective cooperation between governments on crises which are beyond the capacity of the market to handle, Member States must have real emergency plans, they must be shared in advance and cooperation arrangements must already be in place. The Directive only requires national emergency measures to be defined in advance of any crisis, published and communicated to the Commission. Eighteen Member States have done so. Ten of these have developed their national emergency measures in a systematic way, creating national emergency plans. Others stay at the level of measures. It became clear in the January crisis that those Member States which had emergency plans in place and tested, were better able to mitigate the disruption than other Member States.

The emergency plans are rather different between Member States. For example, there are substantial differences between Member States in the roles and responsibilities for security of gas supply. In some cases it is the Ministry, in others the regulator, in others the Transmission System Operator. The net effect is not conducive to easy cooperation at European level in a crisis. There are few instances of cooperation or solidarity arrangements in place between governments in advance of any crisis.

The Community mechanism set out in the Directive is poorly defined, weak and slow. Member States may indicate to the Commission events beyond their capacity to manage nationally. In such a case, or in a major supply disruption, the Commission convenes the Gas Coordination Group and if necessary, the Commission submits a proposal to the Council concerning further measures. In practice, the Commission has not chosen to use this relatively lengthy, heavy procedure and has preferred to use the Gas Coordination Group set up under the Directive. The information exchanges, discussions of best practice etc. in this group which brings together Member States and the gas industry and consumers representatives through their European associations (Eurogas, OGP GIE, IFIEC, BEUC, Eurelectric), have proven useful and suggest that a process based on review of plans by Member States would be feasible, effective and flexible to adapt to sudden crises if necessary.

[32] Bulgaria, Greece, Ireland, Luxemburg.

As noted earlier, agreement on timing of introduction of emergency action is important, particularly if it allows the use of non-market measures. Confusion on timing can undermine the effectiveness of the internal gas market in mitigating supply disruptions.

In the January 2009 gas crisis, many considered the current degree of transparency in gas flows to be inadequate for decisions by market participants and governments during the crisis. A good understanding of the situation, Europe-wide, in the market and particularly during crises, is needed. The **reporting** required in the 2004 Directive is clearly insufficient for dealing with crises. In addition, implementation is poor, some Member States do not collect the relevant data. Regulators have proposed developing a harmonised minimum level of information to be made available to the market, especially in crisis situations when quick decisions have to be made.

All of these issues constitute weaknesses now, far more than they were in the past, in today's situation in which a gas supply crisis quickly spreads to several Member States and when a crisis such as occurred in January 2009 cannot be excluded.

The Policy Option "Better enforcement and implementation of the 2004 Directive" is not analysed further, essentially because the requirements are so weakly established in the 2004 Directive that stronger enforcement is not possible.

4.3 Voluntary approach by industry (self or co-regulation)

(i) Achievement of sufficient flexibility in the internal gas market to mitigate most gas supply disruptions, by establishing the necessary incentives for investments in infrastructures and gas and the well-functioning of the market.

There is a strong consensus in Europe that a transparent, well- functioning market with supply and demand flexibilities and adequate infrastructures is the best way to mitigate gas supply disruptions. Exposing market participants to the full costs of disruptions will serve as an incentive to provide flexible answers to risks, on both supply and demand sides. Thus voluntary approaches by some stakeholders to some aspects of security of supply inadequately covered by the Directive are underway and could be imagined. For example,

- improvement of the **information and analysis base**: Gas Transmission Europe +[33] is already working on gas supply disruption scenarios at EU level and on investments in reverse flows.
- **coordinated commitments** by infrastructure operators (transmission, storage, LNG, interconnections), supported by regulators, to invest in spare capacity for security of supply purposes could be envisaged. This could be related to the 10-year Network Development Plan which should now be prepared at Member State, regional and EU level by Transmission System Operators.
- **information pooling** to achieve improved transparency on gas stocks and flows. Regulators have already started working on this.
- **commitments by shippers or suppliers** to have back-up contracts or some equivalent insurance or flexibility for a certain proportion of their supplies could be envisaged.

[33] GTE+, the association of gas TSOs in Europe

The issue of what contracts (fixed, flexible or back-up) need to be in place, in a cost-effective security of supply system, is being discussed by the industry[34].

ii) Effective cooperation in dealing with gas supply emergencies in Europe, with pre-defined emergency plans involving all players, at Member State and EU levels, minimizing any undermining of the internal gas market response to disruptions.

A disadvantage of a voluntary approach is that reliance on market forces to deliver security of gas supply has limits. Provisions for emergencies cannot be left to the market. Participation of all participants cannot be guaranteed. Many aspects of security of supply rely on a collective effort. Any work of industry on developing standards would need to be followed through into a binding instrument. On these grounds, the Policy Option "Voluntary approach by industry" will not reach the objectives sought and is not analysed further.

4.4 Revision of the 2004 Directive

(i) Achievement of sufficient flexibility in the internal gas market to mitigate most gas supply disruptions, by establishing the necessary incentives for investments in infrastructures and gas and the well-functioning of the market.

The 2004 Directive established **security of supply standards** in terms of the severe weather conditions and other disruptions during which it should still be possible to supply protected customers from the market, without emergency measures. In principle, these standards should provide clear incentives for investments in infrastructures and gas.

The Directive left **flexibility** for Member States to adapt the prescribed security of supply standards to their own specificities and choose their own measures to enable their standards to be met. This reflected the very different situations of Member States as regards reliance on gas, nature of demand, substitution possibilities, availability of indigenous production, geographic position, geological potential for storage facilities, varying levels of existing interconnections etc. Concretely, as demonstrated in Table 1, the reliance of Member States on gas in their primary energy mixes varies from 2% (Sweden) to 40% (Netherlands, Hungary). Member States differ also in the sectoral distribution of gas use. In Estonia, almost 40% of the gas is used in district heating. In Ireland, 64% is used in power generation. In Slovenia, 74% is used in industry. These figures imply different needs for seasonal flexibility (greater for heating), different short-term peak demand requirements, different possibilities for interruptible contracts and fuel substitution and fundamentally, different degrees of importance attached to security of gas supply. Alongside this, crisis mitigation possibilities differ substantially between Member States. Some Member States are well-supplied in storage, some are well-interconnected, some have flexible demand.

The idea of flexibility in the choice of measures to deal with gas supply disruptions is therefore still valid. The idea of flexibility to set different standards for the type of crisis which should be prevented and mitigated is less valid. Gas supply disruptions now spread easily throughout the internal market, so it is reasonable to require all Member States to make provisions to deal with a **standard set of supply disruption events**. There is little justification for the set of disruption events to be different. The growing reality of the internal market, the prospect of further major gas supply crises, and the consensus that solidarity must

[34] Eg: Private Initiative for Security of Supply, under auspices of German Federal Minister for Economics and Technology.

be underpinned by **responsibility**, all argue for **clear, common security of supply standards, with maximum flexibility in the measures used to meet them**. The supply disruption events in the 2004 Directive need to be precise and they must relate to today's supply disruptions.

In the 2004 Directive, the security of supply standards relate to (i) customers to be protected, (ii) weather conditions during which their demand should be met and (iii) partial disruptions of supplies.

Regarding **customers to be protected**, the 2004 Directive specifies households and allows Member States to extend protection to small and medium-sized enterprises and other customers without fuel switching possibilities. The security of the electricity system can also be a criterion. It is arguable whether the scope of customers to be protected should be fixed as a common standard or left to Member States. The importance of protecting gas supplies to particular customer groups (e.g. gas-fired electricity generation) varies between Member States, which suggests that only a common minimum scope of protected customers (e.g. households) should be fixed. In addition, extension of protection would diminish the ability of the market to handle shocks and would remove incentives on market participants to increase own security of supply (as was pointed out by a number of respondents in the public consultation). Given internal energy market developments and the objective of increasing flexibility in the market, an extension of the scope of protected customers does not seem justified.

Regarding **weather conditions**, for the peak weather standard, the 1-in-20 rule is currently specified but not the peak duration. There is no clear justification for the heterogeneity of durations among Member States which has resulted. Thus duration should be specified (e.g. extremely cold or hot temperatures during a 7-day peak period occurring statistically once every 20 years). Similarly, an extreme winter or summer should be specified (e.g. any period of 60 days of exceptionally high gas demand during the coldest or the hottest weather periods statistically occurring every 20 years).

For partial disruptions of supplies, the concept needs to be updated as well as better specified. The **failure of the largest single infrastructure or supply source** is a realistic scenario today, as was demonstrated by the January 2009 crisis.

The Commission raised for discussion in the Gas Coordination Group the "**n-1" concept** commonly used in electricity network planning and operations. It refers to the failure of the largest single infrastructure (entry point, production field, LNG terminal, storage etc). In principle it could also refer to the largest single supply source. The remaining capacities should be capable of meeting domestic demand for a specified time period (e.g. 60 days).

The idea of using this concept in the EU framework for gas security of supply has been cautiously welcomed by most stakeholders, many offering proposals on the details of its implementation[35]. It could be applied at Member State, regional and at EU level. Its calculation would demonstrate how far from the standard the infrastructure provisions in that Member State, region or the EU are. If n-1 is below 100% (see explanations of calculation in

[35] Some Member States (e.g. France, Spain) already use the n-1 concept already in their planning for security of gas supply. Spain's disruption scenario, for example, encompasses the failure of a major LNG terminal (Barcelona)

Annex 1), it suggests that the Member State, region or EU risks not being able to deal with a gas supply crisis which removes from service the main supply infrastructure The gas situation in the Member State, region or the EU may be such that despite the indicator being below 100%, the risk of an unmanageable supply disruption is low. This could be the case in a Member State with low reliance on gas and strong provisions for fuel switching, for example. The important issue is whether the risk of a supply disruption which the market cannot handle is sufficiently low. This is what is of interest to Member States and market participants in the increasingly integrated internal energy market. Thus, n-1 could be a benchmark, a reference scenario against which each Member State, region or the EU would do a risk assessment for its own situation, and if necessary develop a Preventive Action Plan to diminish the risk of an unmanageable disruption. These risk assessments and the Preventive Action Plans would be shared among Member States. The Commission would organise a **review of risk assessments and Preventive Action Plans**, involving the Gas Coordination Group, with attention not only to the adequacy of the current and planned provisions for security of supply but also for compatibility with other Member States' and regions' risk assessments, coherence of provisions in the internal market, possibilities for cooperation on crisis prevention and mitigation and best practice. The Commission would issue **recommendations** to the relevant Member States or require changes..

N-1 is a relatively flexible concept although **availability of data** is an important consideration. A calculation is shown for illustrative purposes only in Annex 1. This calculation has been kept simple. Security of supply measures, notably on the demand side, are not included in the calculation. They could be brought into the risk assessments. Thus, interruptible contracts and provisions for fuel switching, if not included in the calculation of n-1, could come into the risk assessment as security of supply measures.

N-1 could in principle apply to supplies as well as infrastructure. In that case, the Commission would propose a definition of what would constitute the "same source of supply", reflecting physical and commercial realities.

In practice, reducing the risk of unmanageable gas supply disruptions may depend on neighbouring states so a **regional approach c**ould make sense and indeed be necessary. Given the current state of development of the internal gas market, the choice as to whether to apply n-1 at Member State or regional level should be pragmatic, based on the realities in the regional market and infrastructures. For many Member States, it could make sense in cost-effectiveness terms. The regions would not necessarily coincide with the regions defined in ERGEG[36]'s gas regional initiatives. For a given Member State, the regional approach should include all interconnected and planned-to-be-interconnected neighbouring Member States.

The application of n-1 would also be envisaged at EU level, with use of EU-wide models such as MC-Genercis[37] (see Annex 2). Supply disruption scenario analyses at regional and European levels would support the assessment of potential impacts at Member State level of a disruption and could help in identifying critical investment needs. Coordination with the proposed 10-year Network Development Plans[38] would improve synergy. Risk assessments at Member State level could feed into and be reviewed against the background of analyses of

[36] ERGEG – association of European renergy regulators

[37] MC-Genercis, being developed by the Joint Research Centre, currently enables the impact of a supply disruption in an import pipeline on pipelines and other infrastructure throughout the EU to be modelled

[38] In 3rd internal energy market package

gas supply disruption scenarios at regional and EU level. GTE+, the association of TSOs, has already started working on EU supply disruption scenarios. In the public consultation, there was support for the preparation of a yearly **European winter outlook report**. There is also readiness in the Gas Coordination Group to periodically discuss supply disruption scenarios and levels of preparedness.

An advantage of using n-1 is that attention is focused on infrastructures and possibly supplies which are particularly risky in the EU supply system and internal market. A second is that in the subsequent risk assessment and Preventive Action Plan, Member States would have flexibility to bring into play to the whole range of security of supply measures on both supply and demand sides which are open to them in their particular situations. A third is that a region-level application is reasonable and could be chosen by Member States. These three advantages are far less true of **two other options** for supply and infrastructure standards put by the Commission to the Gas Coordination Group.

The option of a **security of supply margin** to be maintained in all interconnectors and import infrastructures as a percentage (e.g. 5%) of the total interconnector capacity was raised in the Gas Coordination Group. The definition of this margin for security of supply would have to be precise, to distinguish it from other provisions for flexibility. It would normally be bookable only on a short term basis, so as to retain flexibility for use in managing a crisis. In the public consultation, a number of respondents pointed out that this security of supply measure would be expensive. Relative to the n-1 approach, it would be less focused on risky or missing infrastructures and supplies in the EU system. Thus in an EU, regional or Member State perspective, it is likely to be poor in cost-benefit terms.

The option of a requirement for bidirectional **gas flows** at all borders with other Member States was also raised. A variant is that the reverse flows should be at least enough to enable supply of all household consumers, if this supply can be distinguished from supply of other customers. The same arguments of limitation of flexibility and relatively poor focus on particularly risky infrastructures would apply as in the security of supply margin idea. However, in cost-benefit terms, given the relatively low costs of reverse flow provisions, it could make sense. GTE+, the association of TSOs, is well-advanced on a study of reverse flow projects. Provision has been made in the European Economic Recovery Plan for funding a number of such projects.

To conclude, a security of supply standard for infrastructure, based on the n-1 concept, could be defined. It could allow flexibility in its implementation, including the possibility of application at regional level. An EU-level application, with supply disruption scenarios, could support its application at regional and Member State level and facilitate consistency with the rolling 10-year network development plan. Such a standard, and the accompanying risk assessments and preventive action plans, would require a revision of the 2004 Directive.

It is true that most Member States already meet an n-1 standard (see Table 3). The focus in terms of necessary infrastructure developments is on a number of missing elements, not in all Member States. However, agreement on a standard would provide the starting point of a framework of regular risk assessments. In the developing internal energy market, these risk assessments are of mutual interest.

(ii) Effective cooperation in dealing with gas supply emergencies in Europe, with pre-defined emergency plans involving all players, at Member State and EU levels, minimizing any undermining of the internal gas market response to disruptions.

Member States are already obliged under the 2004 Directive to publish security of supply measures. These need not be emergency plans in the sense of a comprehensive, systematic set of measures, with a clear trigger. The January 2009 gas crisis underlines the need for **real emergency plans** to be established in all Member States, well in advance of any crisis. An emergency plan also needs to be defined in advance at **European level** and could also make sense at regional level. Currently, only a procedure is defined at EU level[39]. The idea in the 2004 Directive is that supply crises would be addressed first by the market, then at Member State level if necessary and finally at EU level if necessary. Yet in practice, the EU role is important from the earliest stages, supporting the management of the crisis in the market. In the January gas crisis, the Gas Coordination Group met regularly, exchanging the latest information, and common external action was developed in an EU process led by the Presidency and supported by the Commission. In practice, EU and Member State action should be mutually-supportive, while the market is working and when an emergency has to be declared and non-market measures launched.

To facilitate cooperation at regional and EU level in dealing with emergencies, it would make sense to agree a **common structure and minimum content** for the plans of Member States. The Preventive Action Plans as set out in the previous section, and the risk assessments underpinning them would be fundamental in developing emergency plans. It should be clearly specified when an emergency would be declared[40]. Particularly for emergencies, the roles, powers and responsibilities of market participants and public authorities should be defined, and procedures and measures must be established in advance. There must be an obligation on market participants to cooperate. The identification of a crisis manager could enable rapid cooperation at EU level, inter alia. There should be an obligation to test out emergency plans.

Non-market based instruments can be justified only **for the emergency level** and measures that could impede flows in the internal market should be specifically **authorised by the Commission**.

In general, security of supply policies must be non-discriminatory and compatible with the internal energy market. In the January crisis, several Member States brought into operation regulations concerning imports of gas or alternative fuels[41]. In some instances, the effect was to undermine the functioning of the market and impede some useful gas flows. Such security of supply measures must be proportionate, should disrupt the internal market as little as possible and there should be prior information. Some stakeholders argue that assurances are needed from all Member States that contractual commitments (e.g. to give access to stored

[39] If measures taken in the market and then by Member States are not sufficient to deal with the supply disruption, the Commission convenes the Gas Coordination Group on its own initiative or at the request of a Member State. The Group can assist in the coordination of national measures. The Commission can provide guidance to Member States on further measures to assist Member States particularly affected by the disruption. Finally, the Commission can submit a proposal to the Council regarding further necessary measures.

[40] For example, a) normal operational conditions; b) exceptional disruption, but the market is still able to handle it; c) Emergency – conditions or sudden crisis in the energy market, where the physical safety or security of persons, apparatus or installations or system integrity is threatened.

[41] See OIES, March 09

gas), particularly cross-border commitments, would not be impeded, even in emergency situations.

The **triggering of a European emergency** has been much discussed. In today's internal energy market, it is likely that a major disruption in any Member State will have an impact, direct or indirect, across much of Europe. European action could arguably be triggered when triggered in one or more Member States.

The crisis managers identified in the national emergency plans should work together in a **European network**, with a clear statement of powers, organisation and actions. The day-to-day management of the emergency response should be managed by the European Commission in cooperation with national competent authorities. The Gas Coordination Group should continue in its advisory functions. The composition of the Gas Coordination Group would need to be updated to encompass ACER[42], ENTSO-G[43] and the network of crisis managers.

In the November 2008 evaluation report, the Commission listed for comment a number of actions which could possibly be included in an **EU emergency plan**: a common declaration of an emergency situation, allocation of available supplies and infrastructure capacity among the affected countries, coordinated dispatching, activation of emergency measures in unaffected or less affected states in order to increase the amount of gas available to the affected markets.. At EU level, an EU process could be envisaged to temporarily relax security of supply obligations in all Member States, affected or not, for the purpose of increasing the amount of gas available to the affected markets. Similarly, transmission system operators could be requested to ensure available capacity in their transmission systems. Some of these ideas for EU emergency actions arguably make more sense at regional level.

No such measures were formally taken in the January crisis, as part of an emergency response. The market response brought additional supplies to the affected areas.

Developing further the experience of the January crisis, the deployment of a **monitoring mission** within or outside the European Union could be envisaged.

Where they make sense in terms of practical cooperation, **regional emergency plans** could be established and tested. However, it is likely that most major disruptions at Member State level will be taken up at European level. In practice, it is difficult to define the appropriate regions, several factors enter into play. A pragmatic "immediate neighbourhood" approach, focusing on instances in which a regional approach makes sense (e.g. Baltic Energy Market Interconnection Plan) would make more sense that an artificial layer of cooperation.

In general, transparency and exchange of information between Commission, governments, regulators, TSOs and other market parties, both under normal market operations to monitor the risk of an emergency, and in case of an emergency need to be improved. Regulators are working on a **harmonised minimum level of information** to be made available to the market, especially in crisis situations. However, this improved transparency should be achievable on the basis of the third internal energy market package, once adopted, and the

[42] (future) Agency for the Cooperation of European Regulators
[43] Organisation for the cooperation of European TSOs dealing with gas

planned revision of **Council Regulation EC N° 736/96** on notification of investment projects in the gas, electricity and petroleum sector.

To conclude, the January crisis provided ample demonstration of the need to emergency plans to be established in advance of any crisis, at Member State and EU level and at regional level when this makes sense. Given the likely EU dimension of any disruption and response, there must be an obligation to cooperate. These would require substantial amendments to the 2004 Directive.

Thus, amendments to the 2004 Directive, notably on security of supply standards, related risk assessments, regional cooperation, an EU process to ensure mutual consistency of plans, supported by EU-level analyses, obligations concerning emergency plans, would achieve a framework ensuring better preparedness of the EU for possible gas supply disruptions and more effective response, primarily in the internal gas market.. The various possible amendments have been much discussed by stakeholders in the public consultation and elsewhere. This is the first short-listed Policy Option.

4.5 A Regulation on gas security of supply

(i) Achievement of sufficient flexibility in the internal gas market to mitigate most gas supply disruptions, by establishing the necessary incentives for investments in infrastructures and gas and the well-functioning of the market.
(ii) Effective cooperation in dealing with gas supply emergencies in Europe, with pre-defined emergency plans involving all players, at Member State and EU levels, minimizing any undermining of the internal gas market response to disruptions.

The main issue here is whether a Regulation would be a better and feasible vehicle for the substantial amendments to the 2004 Directive outlined in the Policy Option "Revision of the 2004 Directive".

Timing is one factor. A Regulation could be operational well before a Directive. There is a real risk of repetition of gas supply disruptions such as in January 2009 in the short and medium term, so the sooner a clear EU framework is in place, the better.

Clarity is a second factor. In a Regulation, common standards for security of supply could be **directly applicable** to the market participants, notably the Transmission System Operators and the gas suppliers. The current situation in the Directive of having Member States set standards to be implemented subsequently by market participants, may well be a weakness, having the effect of distancing participants from their responsibilities. As the internal gas market develops, the need for a **level playing field** in terms of obligations on market players for security of supply increases in the competitive part of the market.

As noted earlier, Member States are in very different situations as regards reliance on gas and possibilities of mitigating supply disruptions. The n-1 approach envisaged for an infrastructure standard focuses on weaknesses in infrastructures. Those Member States which are already well provided with infrastructures would have no extra burden in meeting such a standard. The implementation of an n-1 approach could also allow a certain flexibility, with the possibility of regional approaches, for example.

The arguments for direct application are even stronger as regards emergency plans. There must be a clear obligation to cooperate. There must also be clarity on who is doing what,

when, coming up to and during an emergency. A wide range of participants across Europe will be involved. Clear definition of roles and procedures and a clear obligation to cooperate in this **collective** effort is essential. A Regulation could establish this more effectively and quickly than a Directive.

Thus, a "Regulation on gas security of supply" would enable the achievement of the objectives, should be feasible, could offer advantages over a Directive in terms of timing and clear, direct application, and is the second short-listed Policy Option. There has been some support in the public consultation for this option.

Section 5: Analysis of impacts

5.1. Economic impacts

Investment costs
The economic impacts of both short listed Policy Options would be dominated by the investment costs and the resultant benefits of the implementation of **n-1** and subsequent **Preventive Action Plans**. Reverse flow capacities could be included in the calculation of n-1 or in the Preventive Action Plans. Costs could be spread over a number of years.

A very **preliminary calculation** of n-1 for Member States has been done, for illustrative purposes only in this Impact Assessment.

Table 4: Preliminary calculation of n-1 for Member States:
See Annex 1 for explanation of the calculation

Mcm/day	Production withdrawal capacity	Maximal Consumption*	Storage Withdrawal capacity	LNG send-out capacity	Incoming Pipeline Capacity	Single Largest Infrastructure	N-1
AT	12,16	49,41	48,00	0,00	137,52	125,94	145%
BE	0,00	139,20	22,80	24,70	321,61	94,43	197%
BG	0,30	15,60	4,20	0,00	72,00	72,00	**29%**
CY	0,00	0,00	0,00	0,00	0,00	0,00	-
CZ	0,30	67,60	55,01	0,00	185,98	141,94	147%
DE	45,00	400,00	463,32	0,00	579,44	105,96	245%
DK	29,90	25,70	18,80	0,00	0,00	29,90	**73%**
EE	0,00	4,30	0,00	0,00	22,99	16,80	144%
ES	0,00	160,20	10,54	160,90	67,01	39,70	124%
FI	0,00	1,00	0,00	0,00	20,68	20,68	**0%**
FR	2,40	370,00	231,00	42,44	156,28	50,00	103%
GR	0,00	14,00	0,00	13,69	38,36	19,20	235%
HU	9,00	92,50	47,50	0,00	58,04	39,80	**81%**
IE	1,00	20,30	2,60	0,00	30,00	30,00	**18%**
IT	24,00	425,00	295,85	35,00	284,80	114,60	124%
LT	0,00	16,00	0,00	0,00	39,11	30,00	**57%**
LU	0,00	5,98	0,00	0,00	11,30	4,93	107%
LV	0,00	9,00	14,69	0,00	24,64	24,64	163%
MT	0,00	0,00	0,00	0,00	0,00	0,00	-
NL	440,00	235,00	153,02	0,00	95,62	300,00	165%
PL	6,48	59,71	34,20	0,00	147,56	108,00	134%
PT	0,00	19,30	7,00	14,20	13,21	14,20	105%
RO	34,30	75,00	25,80	0,00	113,00	102,00	**95%**

SE	0,00	6,00	0,60	0,00	8,49	8,49	**10%**
SI	0,00	5,80	0,00	0,00	14,53	10,13	**76%**
SK	0,30	29,90	34,87	0,00	301,00	301,00	118%
UK	231,00	536,00	126,57	84,56	241,34	73,70	114%

(1-in-20 winter case)

Sources: IHS, Gas Coordination Group

The major infrastructure – "1" in "n-1" - is the main import pipeline in most Member States. For UK, Netherlands and Denmark, it is the main production facility. For Spain and Portugal, it is the main LNG terminal. In many of the importing countries, storage is important but usually the main import pipeline has a higher capacity than the main storage facility.

Based on this preliminary calculation, nine Member States do not meet the n-1 standard (see also Table 3). These Member States are in a variety of situations, and can bring a variety of security of supply measures to bear and could develop regional cooperation. Sweden, Finland, Denmark, Lithuania and Ireland, for example, are relatively poorly connected to the network. However, Sweden relies very little on gas in its energy mix (2%). Finland's gas users, mainly in industry, have made substantial fuel switching provisions. Denmark, Lithuania and Ireland are focusing on the construction of new interconnectors and other infrastructures. Bulgaria and Hungary are far from meeting the standard, Romania and Slovenia somewhat less so. The impact of these infrastructure inadequacies was evident in the January gas crisis. On the basis of such calculations, and subsequent risk assessments and Preventive Action Plans by Member States, a good idea of necessary infrastructure developments can be developed.

While the detailed risk assessments would still need to be done by Member States, it is clear that many of the necessary infrastructure projects are in the list of eligible projects in the **European Economic Recovery Plan** (Annex 3 for details). N-1 goes above 100% for several Member States if eligible projects are included (see Table 3). The assumption that these projects will all be constructed has been made in the Table. Provisions in the Recovery Plan for reverse flow projects (80m€) have not been allocated in it.

As the total European Economic Recovery Plan support for gas infrastructure projects is 1440m€ over two years, a maximum of 50% of the eligible project costs during that time, then as an order of magnitude, the n-1 standard applied Europe wide, could imply an investment cost of a few b€. However, if the projects are already launched under the European Economic Recovery Plan, the extra investment costs from the application of the n-1 standard Europe-wide would be smaller.

Gas Transmission Europe has prepared a preliminary overview of reverse flow projects which would improve security of supply in Europe. Over forty projects have been identified for a total investment cost of about 1.5b€.

All of these investment costs would normally be reflected in regulated gas transport tariffs, through an allowable rate of return. Thus the costs would normally be spread over all gas consumers. A very rough estimate of what this could mean for households could go as follows: natural gas prices for households in EU-27 including excise taxes were 18.01€/GJ (GCV)[44]; final gas consumption by households and services is some 8,000,000 TJ(GCV)[45];

[44] Eurostat, 2007 prices
[45] Eurostat, 2005 consumption

thus some 144b€ is spent by households and services on final gas consumption each year. Thus, additional costs amounting to as few b€ over several years for investments in infrastructures for security of supply would be relatively small compared to total household gas bills and smaller still compared to total gas bills in Europe. It is evident, however, that this is the roughest of calculations. Gas prices still vary substantially across Europe and between households and industrial customers. Investments are needed more in some Member States than in others. Thus the impact on household customers and industry in some Member States could be significant.

The January gas crisis gave some idea of the benefits of avoided gas supply disruptions at the level of consumers. Estimates, related mainly to involuntary restrictions of gas supplies to industry, are 1000m€ in Slovakia, 255m€ in Bulgaria, 70m€ in Hungary[46]. Thus 1-2b€, which is still small compared to the total paid for gas in Europe, but concentrated in a small number of Member States.

A regional approach to n-1 could in principle be more cost-effective. However, it must be justifiable by market integration in the region and existing infrastructure links.

Impact on the internal market and other economic impacts:

Security of supply has a cost. One way or another, there needs to be some flexibility and redundancy in the system if gas supply disruptions are to be managed. The main benefit of the n-1 standard and related risk assessments and Preventive Action Plans would be in focusing efforts on the remaining weak infrastructures and supplies in Europe, requiring improvements where they are actually needed.

Both Policy Options would build confidence in provisions for security of gas supply across Europe. They would also create the conditions for effective cooperation and solidarity in dealing with emergencies, allowing the internal market to work as long as possible. Thus there would be a **positive interaction with the internal market** through strengthening incentives for investment, assessing investments in a regional and EU process, creating a level playing field in terms of security of supply obligations, and clearly delimiting emergency situations in which non-market instruments could be brought into play. The infrastructure improvements, such as more flexible interconnections, should improve trade possibilities, liquidity and price formation in the internal market as well as security of supply.

A Regulation, through the direct application of standards to market participants, could arguably encourage investment and ensure internal market benefits more directly.

The spillover from gas security of supply into security of electricity supply raises the stakes, given increasing reliance of the European economy on electricity. For example, in late-2008, reserves in the Spanish hydroelectrical system were very low. As evidenced in the Quarterly Report on European Electricity Markets[47], the stored energy that could have been retrieved from the hydro system during a given week in the fourth quarter was some 1,4 TWh lower than the 10-year average. Spain uses 44% of its gas for power generation. About a third of its

[46] Peter Kaderjak, Regional Center for Energy Policy Research, Corvinus University of Budapest; presentation of 3 April 2009

[47] "Quarterly Report on European Electricity Markets", Market Observatory for Energy, Vol 1, Issue 3, Oct-Dec 2008

power generation is gas-fired. Thus a gas supply failure during this time would have been felt throughout the electricity system. The reverse situation in South East Europe during the January 2009 gas crisis (see 5.2 below) was simply fortuitous.

Administrative burden
The administrative costs for businesses of both short-listed Policy Options are marginal. There are no new reporting obligations. This is why the EU Standard Cost Model has not been used in this Impact Assessment.

There could be an increase in administrative costs for public authorities compared to the current situation. These would be related to the calculation of n-1 and development of emergency plans. The administrative costs would be lower for a Regulation which is directly applicable and would require no transposition to national legislation. The costs would be marginal compared to investment and other costs. This is why the EU Standard Cost Model has not been used in this Impact Assessment.

5.2 Social impacts

As regards **jobs**, the substantial use of gas in industry suggests that job losses are possible as a direct result of any lack of confidence in supplies. Some 25% of gas consumption in the EU is in industry (fertilizers, other chemicals etc). Industry has a particularly high share of consumption in Finland (91%), Bulgaria (89%), Slovenia (81%). Interruption of supplies to such enterprises, often continuously running, is a negative factor, undermining competitiveness. Provisions for fuel switching at customer level are normally quite costly. In addition to the cost of set-aside resources, there would often be a CO2 emissions cost related to relatively higher emissions from back-up and substitute fuels (see below).

Some 26% of gas in Europe is used directly by households, others rely on gas-fired district heating. Gas supply crises will have a direct impact on these consumers, often vulnerable. There is a limit to how easily households can resort to electricity for heating or cooling. A gas crisis in Europe will normally put electricity prices up. The January crisis could have been much more difficult for people in South East Europe but for the coincidence that heavy rain facilitated very large hydropower production, averting an electricity crisis[48].

While provisions for security of supply will certainly be felt in the prices paid by customers for gas, a Directive or Regulation enabling a focus on the necessary provisions would minimise the additional costs and limit tariff increases.

5.3 Environmental impacts

The continuation of inefficient gas security of supply arrangements in Europe could have an impact on the environment, climate and sustainable development.

The question of whether Europe should be investing further in infrastructures for fossil fuels, given prospects of depletion, uncertainty about future energy and gas demand and the growing contribution of alternative fuels has been raised. However, as demonstrated by alternative scenario analyses[49], Europe will continue to depend on imports of gas until at least

[48] "The impact of the Russia-Ukraine gas crisis in South Eastern Europe", Kovacevic, OIES, March 2009
[49] See scenarios in 2nd Strategic Energy Review

2020 and on to 2030. Gas has an important role as a transition fuel in the move towards a high-efficiency, low-carbon energy system.

Like any other infrastructure development, new investments in gas infrastructures will have environmental impacts (e.g. biodiversity). The fact that many gas pipelines are underground should help. Planning of additional infrastructures to identify those which would have most impact on security of supply, using the flexibilities offered by the internal energy market, should minimise the total environmental impacts. The minimisation of necessary provisions for back-up fuels should also help, particularly in the period when low-carbon fuels are not sufficiently developed or available.

Section 6: Comparing the options

The impacts of the baseline option and two short-listed Policy Options can be compared as follows:

Policy Option	Effectiveness in achieving objectives	Efficiency	Coherence
No new EU policy	May partially deliver, through the 3rd IEM package, the European Economic Recovery Plan, TEN-E, the existing 2004 gas security of supply Directive and cooperation on emergency planning following the January gas crisis. Nevertheless, an EU framework is still needed to ensure that **actions of Member States** for security of gas supply, notably during crises, do not undermine the growing capacity of the market to deal with disruptions, that the **standards for security of supply which market participants should meet** are clear to all, and that the **potential of the internal gas market** to deal with supply disruptions is	Implementation of 3rd package likely to need support, notably assessments of potential gas supply disruptions at EU level and practical guidance to TSOs and regulators; current security of supply standards in the 2004 Directive too imprecise.	Not relevant

	developed and used.		
Revision of Directive	Yes	Would imply well-focused, limited investment costs; would ensure that the potential of the internal gas market to deal with supply disruptions is developed and used. would imply administrative burden on public authorities as regards calculation of n-1 standard and emergency provisions	Would have a positive effect on the development and functioning of the internal energy market; positive effect on the environment, notably by reducing unplanned recourse to higher-emissions substitute fuels; positive effect on competitiveness and jobs in gas-using industry, and on households.
New Regulation	Yes	Compared to a revision of the Directive, would have the advantage of being operational more quickly; a major gas supply disruption could happen anytime; also a more direct impact on provisions and investments by market participants; would be more effective in achieving clear arrangements for cooperation around emergencies with clear obligation to cooperate; comparable administrative burden on public authorities as regards emergency provisions;	It would constitute a more direct engagement of public authorities and market participants in security of gas supply in an EU perspective, with systems in place earlier. The costs would not be very different from those implied in the revision of the Directive

Both short-listed Policy Options would have similar economic, social and environmental impacts compared to the option of no new EU policy. The major difference between them concerns the speed and effectiveness of their implementation. Arguably the Regulation option is more likely to be effective (clearly attributing responsibilities to market participants, clear

obligation to cooperate around emergencies), fair (a level playing field in terms of security of supply obligations) and could be in place and in effect more quickly.

The importance of getting the necessary improvements in the EU regulatory framework in place quickly needs to be appreciated. Decisions taken now in the energy system (e.g. on coal-fired power generation) will lock in technologies for decades to come. Investment decisions not taken now will lead to energy supply and transport constraints and high prices in due course, when economic growth restarts. As demonstrated in the preliminary calculation of n-1, the projects in the European Economic Recovery Plan are crucial in meeting reasonable security of supply standards. In the current economic and financial climate, clear incentives for investment are of fundamental importance. The Skanled gas pipeline, for example, an eligible project in the Recovery Plan, has been suspended by its promoters. In this context, it is all the more important to have a clear, relevant regulatory framework for security of supply quickly in place.

Section 7: Monitoring and evaluation

A reporting and monitoring system is in place for the internal energy market. This system yields data which is relevant for security of supply purposes. Council Regulation EC 736/96 on notification of investment projects in the gas, electricity and petroleum sectors will be revised. With input from these, monitoring and evaluation mechanisms specifically focused on security of supply can be strengthened.

The role of the Gas Coordination Group could be expanded to include regular monitoring and assessment, drawing inter alia from the envisaged review of risk assessments by Member States.

ANNEX 1: Possible calculation of the n-1 standard

Please note that the proposal for a Regulation includes a more precise calculation of n-1. This simplified calculation is for illustrative purposes only in this Impact Assessment. Nevertheless, the results in terms of the n-1 indicator are unlikely to be very different.

Technical capacity[50] (contracted capacity[51] plus available capacity[52]) of all gas supply infrastructure in the event of disruption of the single largest infrastructure should be greater than demand for deliveries in a 60 days period of high demand, after taking into account interruptible contracts and demonstrated fuel switch possibilities.

The N-1 indicator, calculated as below, should be higher than 100%.

$$N\text{-}1[\%] = \frac{IPm + Pm + Sm + LNGm - Im}{Dmax} * 100,\ N\text{-}1 > 100\%$$

Definitions required for the calculation of the N-1 indicator:

IPm – Maximum technical capacity of import pipelines (mcm/d) to the calculated region. It includes reverse flow possibilities, transit inflow and outflow capacity.

Pm – Maximum production capacity (mcm/d) in calculated area for at least the 60 days period.

Sm – Crisis deliverability (mcm/d) – the sum of maximum rates at which storage facility users in the calculated area can withdraw gas from the storage facility over at least the 60 days period.

LNGm – Maximum LNG facility capacity (mcm/d), taking into account critical elements like maximum ships and storage capacities availability and technical send-out capacity to the system, providing gas over the 60 days period to the calculated area.

Im – Single largest gas infrastructure (mcm/d) suppling the calculated area with gas.

Dmax – Gas demand in mcm/d, related to the lowest temperature in last 20 years

50 Draft Regulation (EC) No …/… of the European Parliament and of the Council on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005 Art.2 (18) "technical capacity" means the maximum firm capacity that the transmission system operator can offer to the network users, taking account of system integrity and the operational requirements of the transmission network;

51 Art.2 (19) "contracted capacity" means capacity that the transmission system operator has allocated to a network user by means of a transportation contract;

52 Art.2 (20) "available capacity" means the part of the technical capacity that is not allocated and is still available to the system at that moment;

Annex 2: MC-GENERCIS model

The Joint Research Centre has developed a model of the European gas network which helps in understanding the distribution of flows in any given situation. Starting from a particular situation in a given region, the model distributes the eventual surplus of gas using the Monte-Carlo approach[53]. A situation is only defined by the following set of variables:

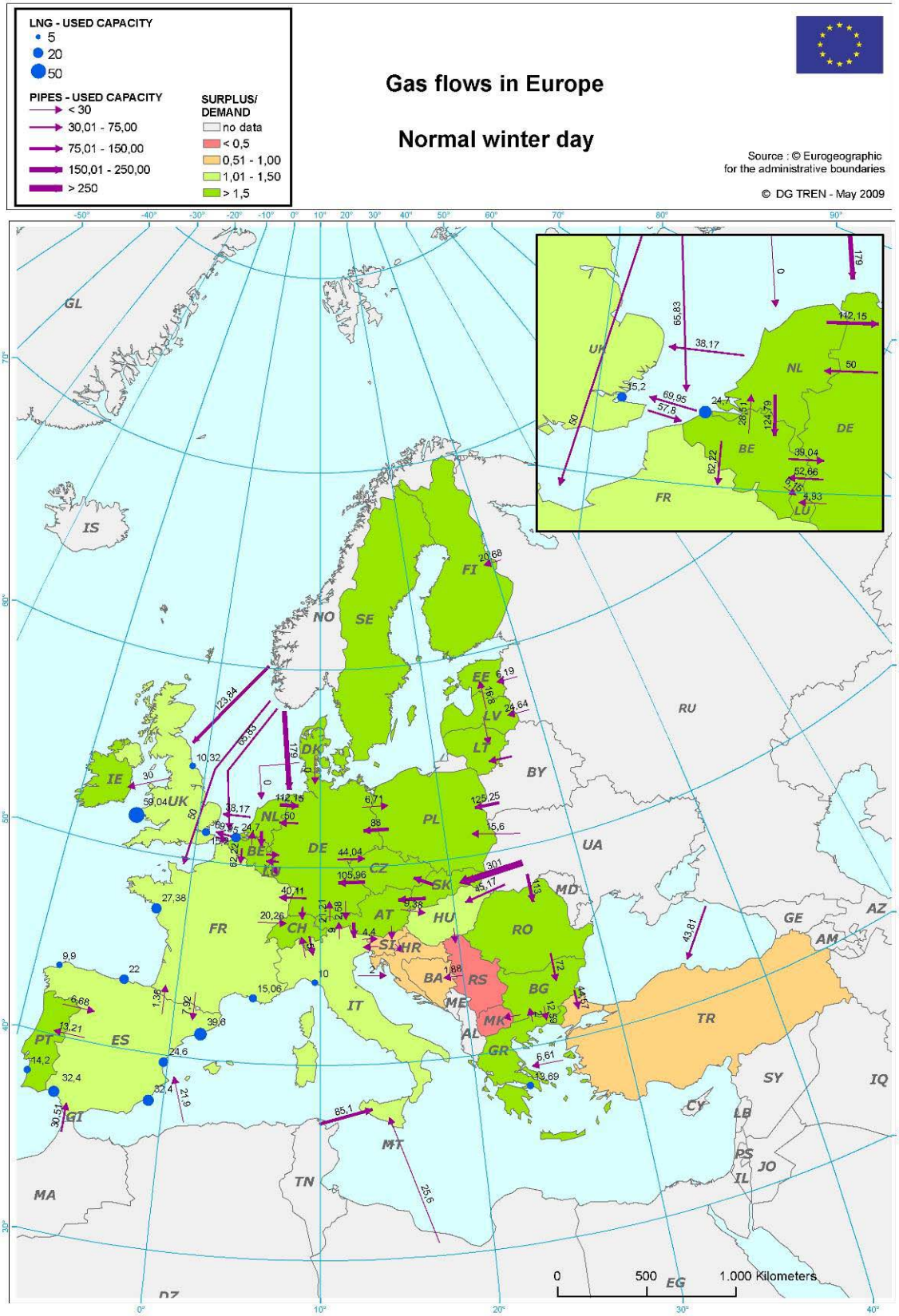
1. Production withdrawal capacity
2. Consumption
3. Storage withdrawal capacity
4. LNG send-out capacity
5. Incoming pipeline capacity, including possible reverse flows.

The model can handle any modification of the set of variables, for example, the January gas crisis or any kind of technical problem affecting the above mentioned capacities. MC-GENERCIS calculates for the gas system of each region the likelihood of disruption, the mean value of imbalances (supply/demand), as well as the pipeline utilisation rate. The following maps compare the situation of the European gas network during a normal winter day with the first day following the outbreak of the January Ukraine-Russian crisis.

Even though MC-GENERCIS is already producing promising results, it still has potential for improvement. The current version is time-independent and the spatial resolution is limited to country level. In addition, the iteration process could be improved to eliminate unrealistic dispatching strategies.

MC-GENERCIS has clear connections to the N-1 approach. Both try to evaluate the vulnerability of the gas system. The N-1 approach looks at the vulnerability of each country in absolute terms, and provides a benchmark; MC-GENERCIS estimates the likelihood of disruption deriving from a concrete situation, in each and every region of the gas network. Taking the recent January crisis as an example, we can compare the average value of imbalance calculated by MC-GENERCIS with the N-1 results, for each Member State. Similarly, we can compare the normal winter day case from GENERCIS to N situation, with the supply-demand balance of the system using the N-1 approach and not taking into account the removal of the single largest infrastructure.

[53] As it is impossible for to predict the behaviour of TSOs in real time during a disruption, the model evaluates the possible set of "dispatching strategies" the system offers, applying a large number of iterations.


LNG - USED CAPACITY
5
20
50
PIPES - USED CAPACITY
< 30
30,01 - 75,00
75,01 - 150,00
150,01 - 250,00
> 250
SURPLUS/ DEMAND
no data
< 0,5
0,51 - 1,00
1,01 - 1,50
> 1,5
Gas flows in Europe
Normal winter day
Source : © Eurogeographic for the administrative boundaries
© DG TREN - May 2009
GL
IS
NO
SE
FI
RU
EE
LV
LT
BY
UA
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CZ
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MD
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MK
AL
GR
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SY
LB
IL
JO
IQ
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AM
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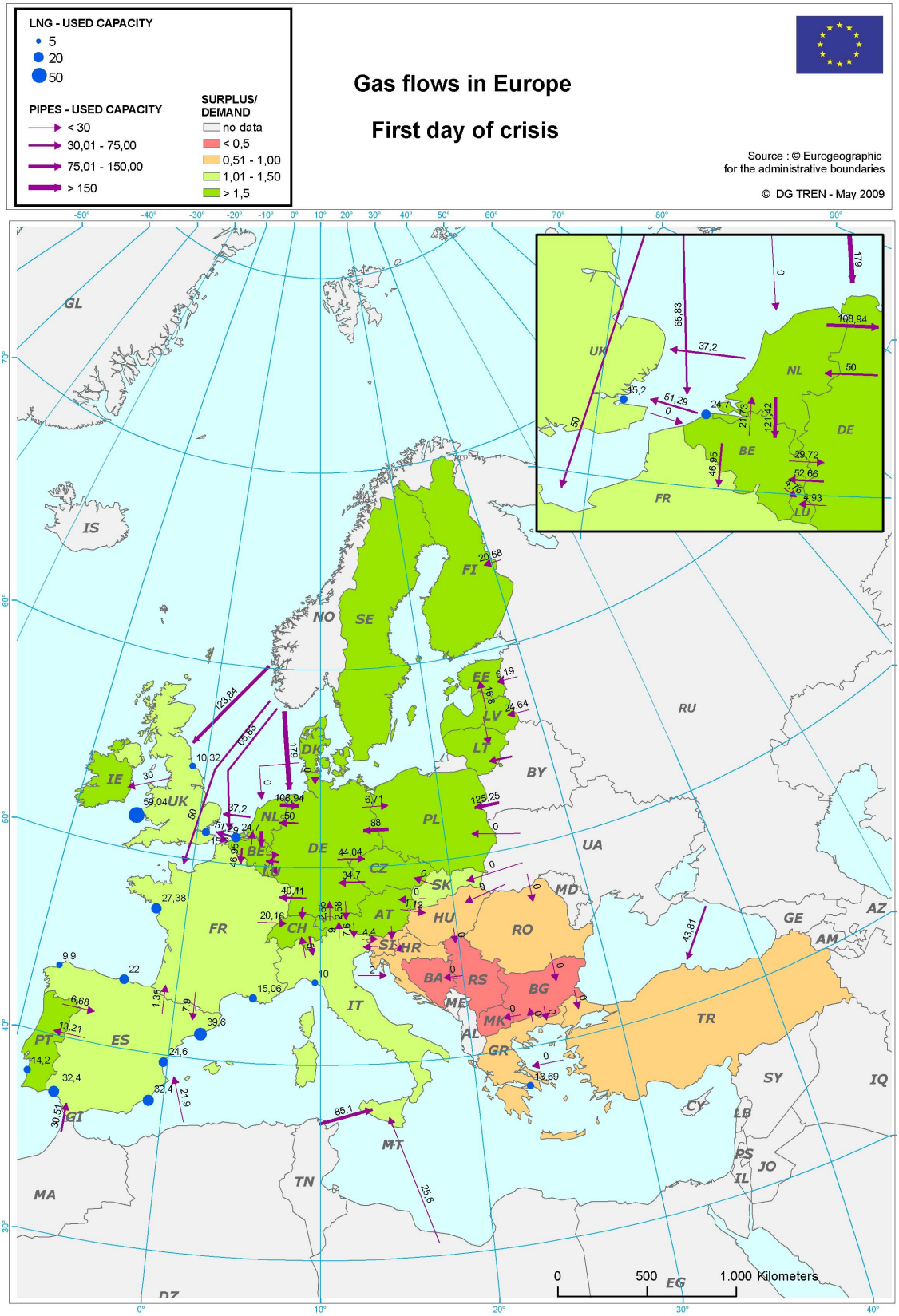
LNG - USED CAPACITY
5
20
50
PIPES - USED CAPACITY
< 30
30,01 - 75,00
75,01 - 150,00
> 150
SURPLUS/ DEMAND
no data
< 0,5
0,51 - 1,00
1,01 - 1,50
> 1,5
Gas flows in Europe
First day of crisis
Source : © Eurogeographic for the administrative boundaries
© DG TREN - May 2009
0
500
1.000 Kilometers

ANNEX 3: Extract from European Economic Recovery Plan - Eligible projects

A. INTERCONNECTORS

1. Gas interconnectors

Project	**Location of projects supported**	**Envisaged Community contribution (€ million)**
Southern Gas Corridor		
Nabucco	Austria, Hungary, Bulgaria, Germany, Romania	200
ITGI – Poseidon	Italy, Greece	100
Baltic interconnection		
Skanled	Poland, Denmark, Sweden	150
LNG network		
Liquefied Natural Gas terminal at Polish coast at port of Świnoujście	Poland	80
Central and South East Europe		
Slovakia-Hungary Interconnector (Velky Krtis – **Vecsés)**	Slovakia, Hungary	30
Gas transmission system in Slovenia between the Austrian Border to Ljubljana (excluding the section Rogatec-Kidričevo)	Slovenia	40
Interconnection Bulgaria-Greece (**Stara Zagora - Dimitrovgrad**-Komotini)	Bulgaria, Greece	45
Romania-Hungary gas interconnector	Romania, Hungary	30
Expansion of Gas Storage Capacity in the Czech hub	Czech Republic	35
Infrastructure and equipment to permit reverse gas flow in the event of short term supply disruption	Austria, Bulgaria, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia	80
Slovakia-Poland interconnection	Slovakia, Poland	20
Hungary-Croatia interconnection	Hungary	20
Bulgaria-Romania interconnection	Bulgaria, Romania	10
Mediterranean		
Reinforcement of FR gas network on the Africa-Spain-France axis	France	200

GALSI (Gazoduc Algérie-Italie) Gas Interconnection Western Axis Larrau Branch	Italy Spain	120 45
North Sea area Germany-Belgium-United Kingdom pipeline France-Belgium connection	 Belgium France, Belgium	 35 200
TOTAL		**1440**

Annex 4: Main findings of the public consultation on the revision of the 2004/67 Directive concerning measures to safeguard security of natural gas supply

General remarks

As a follow-up of the publication of the Second Strategic Energy Review package, a public consultation was open between November 2008 and March 2009, in order to seek views and proposals on the revision of the 2004/67 Directive concerning measures to safeguard security of natural gas supply. The Commission received 22 feedbacks from Member States (5), Regulators (1 individual and 2 umbrella organizations), infrastructure operators (1), one member of the electricity industry (1) and members of the gas industry (12). Apart from the individual companies, the main associations of gas supplier, trader and infrastructure undertakings also expressed their views.

Questions

1. How to define comparable security of supply standards that put equal, reasonable burden on market participants while respecting the differences between Member States?

Seven respondents – two Member States, infrastructure operators, and members of the gas industry emphasized that differences among Member States (in supply diversity, demand side flexibility, storage position, public sector obligations, risks to supply, fuel mix etc.) are significant, therefore an individual approach respecting these differences is needed. At the same time it was considered essential by these respondents that a common and comparable level of security – which is defined by the EU – is reached so shortages or supply disruptions can be managed successfully on European level. Creation of a "toolbox" of security of supply measures was considered, to reach the afore-mentioned level of security.

The comparable security of supply standards and level of preparedness is a precondition to prevent "free-riding" when solidarity actions are implemented. Standards could also reduce ad hoc political intervention in case of a crisis. Those Member States bearing more risks should consequently take additional measures (e.g. demand side responses, greater storage levels etc.) to provide the adequate level of security.

Two Member States and a company suggested that the Commission should organize a workshop on preparedness in cooperation with IEA.

Members of industry, a Member State and a regulator organization [*CEER*] emphasized that Member States should have autonomy in setting these standards. A Member State and a company fully rejected the idea of having EU-wide standards for security of supply.

The following ideas were submitted for the proposals of security of supply standards:

- In case of the **N-1 rule** the general idea was supported but short-term feasibility was questioned – as data is difficult to collect – and a transition time for its introduction was recommended. Other contributions asked for further information and more detailed definition on the application of the rule.

  Member States submitted proposals to this rule such as:

  - not only the infrastructure but availability of gas should be taken into account

- demand side measures (fuel switch, interruptible contracts) and supply flexibility should also be considered

- only the infrastructure supplying the domestic market should be taken into account (excluding transit and stocks to other markets)

- "N-1" should be the only standard, no need for separate bi-directional-flow or security of supply margin standards

While for some respondents "N-1" could constitute a robust and single security of supply standard, others doubt that it should be introduced as an EU-wide standard.

- **Bi-directional flows** were seen as a useful tool for enhancing security of supply. In their case the definition of an exact percentage of bi-directional capacity, the question regarding tariffs, covering of costs (the beneficiary is sometimes different than the investor) and gas quality harmonisation are to be further examined.

- The concept of **security of supply margin** was challenged. It is yet to be decided upon who would cover the costs and how could unused capacity be utilized at locations where it may not be needed under normal market conditions. One way to solve this problem was proposed in the form of using the extra capacity in the form of interruptible contracts. Another proposal was to define the margin on country or on regional but not single entry-point level. Some views supported security of supply margin to be introduced based on its practice in the electricity sector.

One MS proposed new standards:

- **"Expected energy unserved"** - measuring the likelihood of different gas supply shortfalls in one probability/weighted measure. Its drawback however is that it is complicated to calculate and depends on many input assumptions.
- **"Supply/demand margin"** - 3 types:

1. capacity margin measuring the "spare" capacity - domestic production, import infrastructure, storage vs. peak day demand in a cold winter

2. de/rated capacity margin estimating not only the capacity but also the likelihood - applying less than 100% probability to each piece of infrastructure based on models

3. duration-based capacity margin calculating margin over all 180 days in the winter assuming storage withdrawal and no re-fill

- **Standards measuring two or three key risks** that a Member State could face and calculate the likelihood of those events and gas shortfall.
- **Supply diversity indicator** showing the rate of diversity for both source and route in the supply portfolio.

Four members of the gas and electricity industry, infrastructure operators and two Member States recommended conducting risk assessments based on a harmonized methodology for each Member State about national gas markets, fuel switch opportunities, range of protected customers, bottlenecks, congestion points, demand in extreme situations and other vulnerabilities. Such assessments could provide a solid base for emergency response plans.

Scenarios and disruption models – preferably coordinated and developed on regional level – would make it easier to assess the impacts of a crisis and may help in identifying critical points of investment. Coordination with the proposed 10-year Network Development Plans would improve synergy in this aspect.

The possible need for transition periods was mentioned by two members of the industry. A Member State suggested that compliance with the standards on the medium term could be an objective for all European countries.

2. Should the Directive extend mandatory protection beyond households to power generators, small and medium sized enterprises or other vulnerable customers?

Views on the extension of mandatory protection were split. On one hand according to two respondents, the importance of security of essential service providers (e.g. hospitals) was emphasized and it was noted that certain gas fired power plants and CHP units may be considered eligible for protection (residential consumers are likely to switch to electricity in time of a gas crisis, which results in increased demand in power generation). However, obligatory protection of certain customers (e.g. power plants) may prove unnecessary in certain Member States with low share of gas in the fuel mix, representing additional burdens. Market-detrimental effects could be minimized by setting a time limit for the period of protection.

According to the approach of six other respondents, market should face the risks and market participants should look after their own security as alternative means are available even in case of a high level of dependency. Broadening the scope would put supply of households to a risk and "overprotection" would decrease the ability of the market to handle shocks and remove incentives to increase own security of supply.

There were also more flexible responses stating that it should be Member States' privilege to define the range of protected consumers, and that mandatory protection should be extended only to those consumers that have no real alternative to using gas. Consumers with dual-firing capabilities, interruptible contracts or storage capabilities should not be protected.

3. What should be the precise actions defined in the Community mechanism, in the regional and EU emergency plans?

Contributions were clear and unambiguous that in case of an emergency, market mechanisms should be used as long as possible and emergency measures, solidarity mechanisms and government intervention should be a last resort.

Respondents also emphasized that transparency of data is essential for the market to be able to deliver.

Both these topics are covered in the upcoming Third Package, therefore they are not further discussed in the public consultation.

Several respondents highlighted the need for harmonized roles and responsibilities of regulators and market participants. As these are also described in the Third Package, any further legislation is required only for those cases, when these roles and responsibilities are changed or expanded.

Respondents agreed that national emergency plans are needed, to provide mechanisms to manage a supply crisis. These plans should be transparent, regularly updated and communicated in advance to market participants and also to other Member States (peer review). They should preferably be based on a harmonized European-level scheme and planned on regional level so measures of a Member State do not have any unexpected adverse effects on another country.[54] Regional coordination would in itself contribute to a higher level of security of supply.

Regulators invited the Commission to ensure that authorities responsible for defining security of supply schemes are the same in all Member States and adequate methods are developed to harmonize national emergency plans. The idea of setting up a network of emergency contact points was proposed by two Member States.

Cooperation on regional level was supported by both Member States, regulators and the industry. However, views on the scope and field of cooperation varied. The following proposals were put forward:

- regional trading platforms
- regional emergency plans ,
- regional solidarity mechanisms,
- Member States to establish regional emergency response communication networks
- declaring emergency and applying measures should be decided and coordinated on regional or EU level.

The question of emergency levels was also reflected upon. At present, Member States define different levels of emergency with different measures. In many cases one or more "pre-emergency" levels exist that reflect a deviation from normal situation but which can still be managed efficiently and effectively by open market mechanisms. In order to ensure comparability and compatibility, it must be discussed to what extent the levels (concerning their scaling and basic characteristics) should and could be alike on the regional or on a Community level. The different structure of gas markets, consumption patterns and public service obligations of market participants in the Member States require careful examination to see if such compatibility and comparability may still be reached.

The Gas Coordination Group was proposed to receive a more serious role of monitoring and coordination and information exchange in the event of a crisis.

There was no clear view on solidarity mechanisms. IE proposed that each Member State should be required to provide assistance to neighbouring countries to ensure that supply of households is provided.

4. How should the regions for security of gas supply be best defined?

The regional approach was supported by respondents. When defining the regions, technical issues, such as existing and planned interconnections, predominant gas flows, location of storage and import facilities and existing bi- or multilateral agreements for

[54] Regulators [*CEER*] expressed that Member States should have autonomy in defining the measures to to ensure security of supply.

emergency situations should be taken into account. ERGEG's Gas Regional Initiatives could be a good starting point. Purely administrative grouping should be avoided.

5. How can solidarity be economically compensated?

The answers to this question reflect that solidarity is considered a marginal option, which preferably should not be used. However, if it is, then it should be based on pre-agreements between the operators and it should be compensated by market terms (extra tariffs etc.). Reservation of capacity rights or purchase of gas for solidarity reasons is to be compensated also in non-emergency situations. In order to enhance solidarity through market-based measures, regulators consider it should be guaranteed on governmental level that contractual obligations are fulfilled also in emergency situations.

Possible solidarity measures should be known to market participants and conditions must be examined how the extra costs of a solidarity action would be covered.

6. How can security of gas supply be strengthened at lowest cost?

It is of common understanding among the respondents that a transparent, well-integrated, fully functional, open and competitive market with supply and demand flexibilities is a first step and a basic guarantee to prevent and mitigate supply disruptions. (Existing legislation and the proposals of the Third Package should be correctly implemented.) In case of a failure, market mechanisms should be the first set of tools to be used. Solidarity and government intervention may be applied as a last resort only if the market is unable to cope with the problems arisen. (National security of supply measures should be reviewed to ensure that they do not hinder competition in an excessive way.)

In an open, fully liberalized gas market, where effective gas-to-gas competition exists and market participants can access transmission and storage infrastructure, both producers and consumers can flexibly respond to changing market circumstances. Transparency of information should help better capacity allocation and congestion management.

At the same time, exposing market participants to the full costs of disruptions, may serve as an incentive to take precautionary measures and provide flexible answers to risks. Promotion and transparent operation of commercial storages, diverse supply interconnections, rapid demand reduction through interruptible contracts are also suitable tools to tackle supply problems.

The idea of setting up ACER (Agency for Cooperation of Energy Regulators) and enhancing the power of regulators is considered as a step towards greater predictability of European energy regulation.