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Economic principles for coordinated reactions to gas supply disruptions

First appraisal of the 2016 package on sustainable energy security

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Highlights

- The rationale for the cooperation and coordination of reactions to supply disruptions can be based on political motives or economic motives; even if the rationale is political, coordinated reactions require the implementation of two economic principles.
- By using economic incentives for as long as possible and by minimising losses after economic incentives have been interrupted, countries commit to maximise the economic value of gas consumption and that creates common ground to support solidarity.
- While the proper implementation of both principles is necessary, the implementation from before the 2016 *sustainable energy security package* has several shortcomings; some of these issues are addressed in the new package.
- There is, however, room for additional improvements beyond the proposals in the package to better use economic incentives for activating demand side resources, to make the criteria for interrupting economic incentives firm and transparent such as a price cap, to orderly rank resources when economic incentives have been interrupted, and to make those on the receiving end of solidarity anticipate the end of solidarity as soon as possible.

POLICY
BRIEF

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1. Introduction

The 2016 *package on sustainable energy security*¹ introduces mandatory solidarity in the reactive stage of a gas supply disruption. In other words, Member States are required to cooperate and coordinate their reactions at the supranational level, to help each other. This is new, as the reactions to supply disruptions traditionally had been a matter of national regulation with some EU encouragement to voluntarily cooperate on the alignment of national reactions, whereas in the past EU regulation of supply disruptions was primarily oriented towards achieving market adequacy and grid adequacy², which together are the basis for preventing gas supply disruptions and which are prerequisites for any reaction scheme.

The politically motivated change from national reactions to mandatory regionally coordinated reactions has been triggered by the assertion in the 2014 Communication³ on the ENTSOG stress test that reactions with international solidarity are to be preferred over nationally oriented reactions. However, internationally coordinated reactions are only economically superior to national reactions to the extent that lower valued gas in one country is cut before higher valued gas has to be cut in another country.

To ensure that coordinated reactions indeed perform better than national reactions, it is necessary to properly implement – in addition to both market and grid adequacy prerequisites – two economic principles that together maximise the economic value of gas consumption. The first economic principle is using economic incentives for as long as possible to allocate scarce gas supplies ('economic incentives first'). The second principle is minimising the losses of gas rationing after economic incentives have played their part ('minimise losses'), e.g. when high value gas consumption is curtailed by the competent authority while supply to lower valued gas consumption is continued.

1. <https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-gas-and-heating-and-cooling-strategy>
2. On the market side, regulation includes, for instance, the ACER Gas Target Model for functioning markets, EU-wide network codes, REMIT and the supervision of long term gas contracts. On the grid side, it includes, for instance, a binding target for physical reverse flow on the entire EU gas grid, the EU Ten Year Network Development Plan and the High-Level Groups for the coordination of investment, the TEN-E regulation to facilitate the implementation of important gas infrastructure including the possibility of co-financing. The *sustainable energy security package* also introduces many improvements to the regulation to prevent disruptions: strategies to be developed for supply diversification, for gas storage and for LNG, in addition to reinvigorated efforts to complete the internal market for gas with an updated target model, to strengthen supervision of inter-governmental agreements, and to address urgent infrastructure bottlenecks.
3. Communication from the Commission to the European Parliament and the Council on the short term resilience of the European gas system: Preparedness for a possible disruption of supplies from the East during the fall and winter of 2014/2015. Brussels, 16.10.2014. COM(2014) 654 final.

This policy brief then appraises the proposals in the sustainable energy security package, addressing two questions: 1/ are both principles always necessary and, 2/ are there issues in the current implementation of both principles.

The second section of this brief presents the arguments as to why both principles are essential even if the rationale for cooperation is based on political motives, as is the case for mandatory solidarity in the sustainable energy security package. Without both principles (and both prerequisites), the long term functioning of the regionally coordinated reaction schemes to gas disruptions is at risk because the rationale for cooperation would be undermined.

The third section of this brief illustrates the shortcomings in the implementation of both principles from before the new package. Because large gas supply disruptions have been few and isolated, practical experiences with national reactions to disruptions, let alone interacting national reactions, have been very limited. For that reason, the presented illustrations are of a theoretical nature. Nevertheless, the shortcomings have to be addressed and the new package already proposes several remedies for that purpose, of which this brief takes stock, while also pointing out shortcomings and improvements not addressed in the new package.

2. Necessity of the economic principles

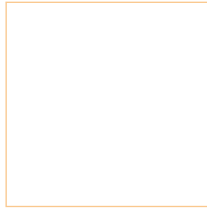
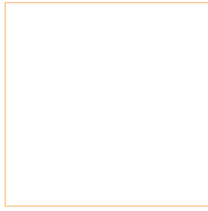
In this section, the rationale for cooperation on reactions to disruption in the new package is explored, discussing first the fundamental political reasons for cooperation, followed by the role of economic principles in the political rationale, to conclude with the observed experience with cooperation on reactions so far.

Fundamentals of the political rationale for cooperation

There are two strong political reasons to make internationally coordinated reactions to disruptions mandatory. First, solidarity between EU Member States is a fundamental principle of the EU Treaty. Second, coordinated reactions are a way to speak with one voice towards external actors who are involved in a disruption.

Both reasons presume⁴ that EU citizens and their representatives act out of sympathy with each other. In the case of gas disruptions, citizens who are aware of other citizens without a supply of gas and who understand what it means to be in such

4. Otherwise, there would be no democratic basis for the political decisions, which would not be sustainable in the long term.



a situation, would be compelled to respond and help out of a sense of reciprocity (it could happen to us).⁵

The role of economic principles in political rationale

The economic principles have a subsidiary role to the dominating political rationale. As the fundament of sympathy is the mutual understanding that two economic agents have, it is important that there is sufficient symmetry of, first, the levels of market and grid adequacy and, second, the efforts to maximise the economic value of sustained gas consumption. For instance, if a country is perceived not to invest in a resilient infrastructure, another country might believe the first country is freeriding the second country’s efforts and refuse to bail out the first country, especially if disruptions repeat.

The first and best approach to maximise value under scarcity is to rely on economic incentives to allocate scarce supplies and activate resources for as long as possible, followed by the second best option of defining what consumption is guaranteed for different consumers when economic incentives have been interrupted, e.g. because they are too slow to balance demand and supply or because the allocation becomes politically unacceptable.

Evidently, these principles can be applied to strictly national reactions as well, but it is fair to assume that more resources to react with, e.g. gas in storage, domestic production or LNG terminals, are available in a larger geographical area and a coordinated reaction would at least preserve economic value or even increase it compared to a series of uncoordinated national reactions. By ranking all resources to react with according to their economic cost and then using the lowest cost resources regardless of their geographical location, the highest economic value is achieved.

Observations on cooperation so far

Besides the example of the Baltic countries, which have voluntarily initiated, but not yet completed the development of a coordinated reaction, there are no internationally coordinated reactions on a voluntary basis. This suggests that sympathy between Member States has not been strong enough to initiate cooperation and that might be explained by shortcomings in the two prerequisites (market adequacy and grid adequacy) and/or shortcomings in the consistent implementation of the economic principles.

Making solidarity and coordinated reactions mandatory can initiate cooperation, but in the long term, it is necessary to

5. Economic theory also uses the concept of ‘commitment’ to explain the actions of economic agents out of a sense of moral duty. Citizens could, in theory, wish to send gas to citizens who are out of gas because it is the right thing to do.

ensure that the subsidiary economic principles and economic prerequisites are met. Otherwise, public support for solidarity might diminish.

The proposal in the sustainable energy security package to base the composition of the geographical regions on several criteria that can be linked to market adequacy (e.g. supply patterns, market maturity) and grid adequacy (e.g. current and planned interconnections), is a step towards ensuring common ground, even if geographical proximity, for logical reasons, remains the first criterion.

3. Implementation of the economic principles

In this section, the implementation of both economic principles from before the sustainable energy security package is discussed, illustrating shortcomings and discussing the remedial measures proposed in the new package as well as remedies that go beyond the current proposals.

3.1 Implementation of economic incentives as a first response

The principle to use economic incentives for as long as possible is implemented through, 1/ the definition of the set of resources⁶ that can be activated by means of economic incentives, and 2/ the criteria for interrupting the use of economic incentives when those incentives are no longer able to balance gas supply and demand.

There are two shortcomings related to defining the set of resources to which economic incentives are applied, and one shortcoming related to the criteria for calling the interruption of economic incentives.

First shortcoming: national preferences to exclude resources from economic incentives

The accessibility to gas resources depends on national decisions to invest in grid adequacy and market adequacy. However, even if a country has access to a resource, it does not mean that the activation of a resource after a disruption is based on economic incentives. Many countries, for instance, do not consider the potential of payments to reduce demand in case of a disruption.

6. Typical resources include using gas from storages, raising domestic production, raising pipeline/LNG imports and reducing demand.



Sustainable energy security package remedy for the first shortcoming: raising awareness

The package indirectly addresses the shortcoming through its requirement of Member States to do an impact assessment for any measure that is not based on economic incentives and compare those with measures based on economic incentives.

The proposed remedy is likely to raise awareness in the Member States about economic incentives, and Member States could benchmark each other with respect to which resources are subject to economic incentives, and which are excluded.

Additional consideration: better use of economic incentives to activate demand resources

Notwithstanding that interruptible gas contracts are relatively well established for the largest industrial consumers and that gas based electricity generation is fairly price responsive, the larger potential of reactions with demand-side resources based on economic incentives is still largely untapped. The EU could facilitate and coordinate (national) pilot studies to explore the technical, business and regulatory requirements to enable/promote large scale demand-side participation in the gas market. It could draw from the many experiences with pilot studies on activating demand response in electricity markets.

Second shortcoming: inconsistent use of imported resources

Some countries rely on imported resources to react to a disruption, which is fine. However, if several countries face a disruption at the same time and they rely on the same resource, it could lead to distortion of the economic incentives. This could, for instance, occur when two countries want to withdraw gas from the same storage, which could lead to local market power and skyrocketing prices for gas from that source.

Sustainable energy security package remedy for second shortcoming: ex ante cooperation

The package requires that Member States cooperate in preparing their reactions; the possible double use of resources would be discovered in advance, allowing the Member States to proactively look for additional resources to react with, which could dampen price increases.

Third shortcoming: national preferences for interruption criteria

Notwithstanding a few exceptions who apply quantitative thresholds to call an interruption of economic incentives such as the UK or Romania, in most countries, the decision to interrupt economic incentives, which corresponds to calling the emergency state, is based on qualitative criteria.⁷ Such non-firm interruption criteria provide some flexibility to respond to a disruption, but also make the response contestable. Consider the case in which a competent national authority rules that the severity of a disruption is such that economic incentives are unable to balance demand and scarce supply and therefore it restricts the export of gas. Other countries could challenge that claim, creating a legal dispute regarding the internal market.

The Commission does verify any national decision to interrupt economic incentives; however, it can only take non-binding actions such as requesting that the Member State restores economic incentives.

Sustainable energy security package remedy for third shortcoming: ex ante cooperation

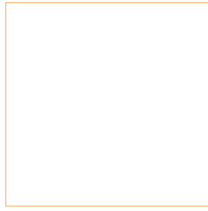
The practical implementation of the criteria to move between the stages of a crisis is still left to the national level. The package demands mandatory cooperation during the development of the coordinated reactions, which allows the discovery of inconsistencies, but does not necessarily lead to them being resolved.

Additional consideration: firm criteria for interrupting economic incentives

To make the decision to interrupt economic incentives transparent, it is necessary to define firm interruption criteria. A price cap is one implementation in which economic incentives are interrupted as soon as the price breaks the price cap level. The most challenging part of using price caps is then defining the cap level, which should be sufficiently high, while for instance also considering affordability⁸ of consumption. An alternative could be to use a volume cap as the trigger to interrupt economic incentives; that cap could, for instance, be linked to the necessary activation of supply reserves to meet supply obligations.

7. P. Zeniewski, R. Bolado-Lavin, 2012. A review of national gas emergency plans in the European Union. Energy Policy 49 (2012) 652-662.

8. Allocating scarce gas based on economic incentives could lead to excluding budget constrained consumers. While economically efficient, such an allocation might be socially unacceptable.



3.2 Implementation of a strategy to minimise losses

As soon as economic incentives are interrupted, other ways of allocating the scarce gas supplies have to be applied. This principle is implemented through the definition of how much consumption is guaranteed to different customer groups.

There is one shortcoming related to prioritising customer groups and one shortcoming related to the level of guaranteed consumption for priority consumers; two additional suggestions beyond the *sustainable energy security package* conclude this section.

First shortcoming: national preferences concerning priority consumption

In the event of a disruption, protected consumers are maximally supplied with gas. Depending on national preferences, the set of consumers whose consumption is protected can vary significantly, respecting a minimum standard (all households connected to the distribution grid) and a maximum standard (households plus small and medium sized enterprises connected to the distribution grid, essential social services, and district heating that serves households). A country that defines a smaller set of protected consumers could likely rely on economic incentives for a longer period, whereas a country with a large set of protected consumers would depend on the principle of solidarity far sooner.

Furthermore, some countries expanded the scope of the protected consumers even further, claiming that it is technically impossible to differentiate consumers connected to the same local grid.

Sustainable energy security package remedy for first shortcoming: stricter supervision

The package still leaves it to the national level to define protected consumers, but with stricter supervision on the minimum and maximum standards. Furthermore, the requirement to cooperate on the development of the reaction scheme, would allow mutual benchmarking of the respective sets of consumers by the Member States.

Additionally, the package defines priority consumers, who are a strict subset of the protected consumers composed of households, essential social services and district heating. In case there is insufficient gas to supply all priority consumers in a Member State, mandatory solidarity requires that all other Member States send excess gas to help the Member State that has declared a state of emergency. This definition then limits the volume of solidarity, and it also puts an upper limit on the duration of solidarity.

Second shortcoming: national preferences concerning guaranteed consumption

Member States have implemented minimum reserve requirements in order to ensure the sustained supply of gas to protected consumers for at least thirty days. Some Member States have gone beyond the minimum standard, which is fine from a national viewpoint, but complicates international cooperation. Consider the case where Member State A calls for help to supply its protected consumers, but Member State B refuses to contribute because B's reserves position would deteriorate below its nationally required level. To deal with that situation, Member States must temporarily lower their national supply reserves to the EU minimum in case a state of emergency has been called in any of the Member States to free up gas.

Sustainable energy security package remedy for the second shortcoming: stricter supervision

The package does not change the minimum reserves requirement, but introduces stricter supervision regarding the impact of higher national reserves requirements on other countries and regarding the mechanism to lower the reserves to the EU minimum in case of a disruption.

The effect of stricter supervision is difficult to anticipate considering that these reserve mechanisms have not been tested in practice.

Additional consideration 1: prioritising resources without economic incentives

Notwithstanding the remedies concerning priority consumption and reserves proposed in the package, internationally coordinated reactions would benefit from a common methodology to prioritise resources in the absence of economic incentives. That ranking would facilitate the orderly curtailment of non-protected consumers and, if inevitably necessary, protected consumers.

Additional consideration 2: anticipating the end of solidarity

The package defines that solidarity has to continue as long as supply to priority consumers is at risk in a Member State which is a very open-ended arrangement for Member States at the sending end of solidarity. Complementary rules about the restoration of national resources and the restoration of economic incentives could be conceived to make Member States on the receiving end of solidarity act responsibly in order to end solidarity as soon as possible. Inspiration for this can be taken from the burden sharing arrangement for frequency control



in electricity: there is solidarity in the primary response to a problem, but the next step is that the national level takes over with national resources. This makes Member States anticipate the end of solidarity by taking appropriate action at the national level.

4. Key findings

By making the international coordination of reactions to disruptions mandatory, the EU endeavours to reduce the overall impact of disruptions. Even though the rationale in the *sustainable energy security package* to shift from national reactions to coordinated reactions is mainly political, section two of this brief has demonstrated the necessity to properly implement two economic principles, which are to use economic incentives for as long as possible and, after that, minimise the losses of gas consumption which is not based on economic incentives. Without proper implementation of both principles, the long term sustainability of politically driven solidarity is questionable as the common ground of maximising the economic value of gas consumption would erode.

Therefore, the necessity to properly implement both principles creates a problem because the current implementation of both principles from before the 2016 package has several shortcom-

ings. The package, however, addresses three shortcomings with respect to using economic incentives and two more shortcomings regarding minimising losses after economic incentives are interrupted by having stricter control on the implementation of minimum standards and a clear subset of customers that receive priority in the allocation of scarce supplies in a region. Nevertheless, there are a few additional improvements to consider such as making better use of demand-side resources based on economic incentives to react to disruptions, similar to the way demand response is being developed to deal with the challenges of the electricity system, making use of firm criteria like a price cap level to interrupt economic incentives, applying a common method to prioritise resources to react when economic incentives are interrupted, and finally, implementing rules to make countries on the receiving end of solidarity anticipate the end of solidarity as soon as possible.



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