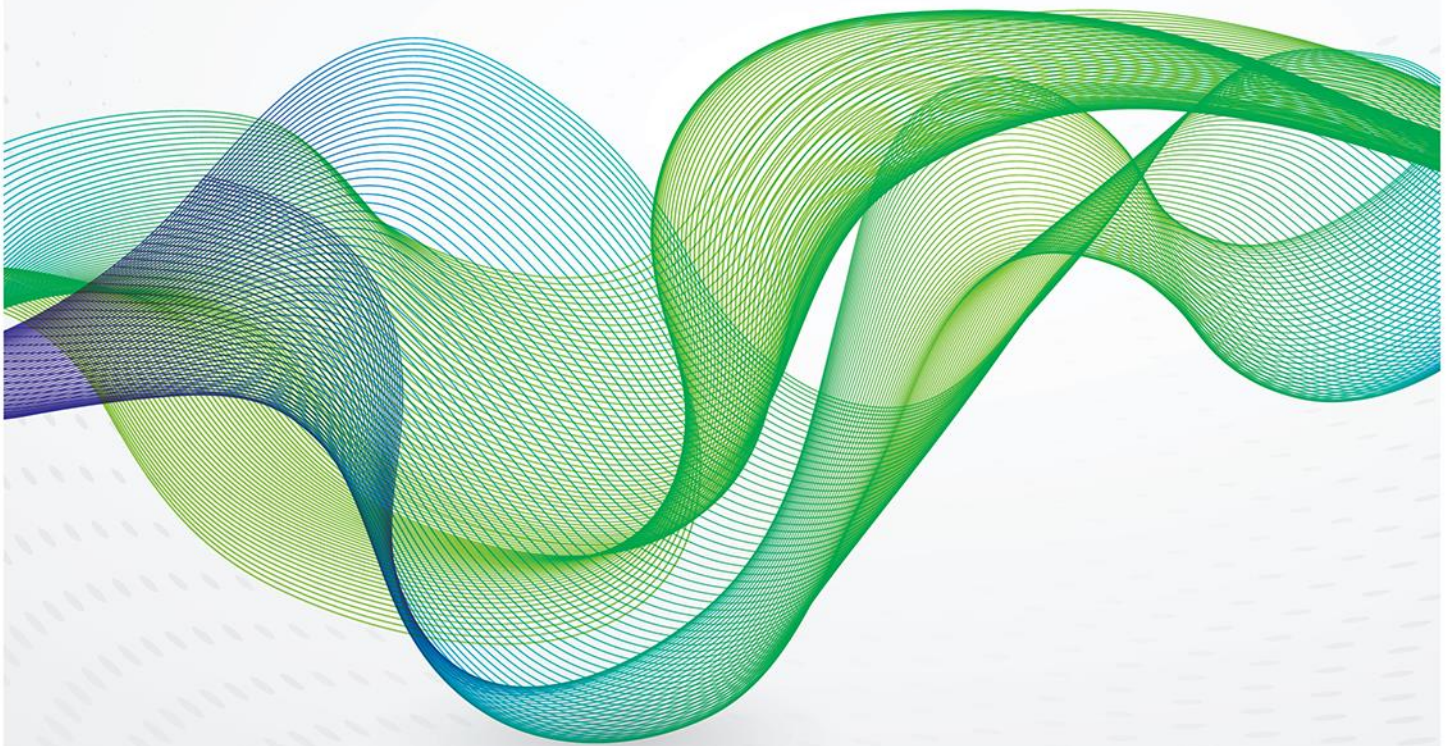


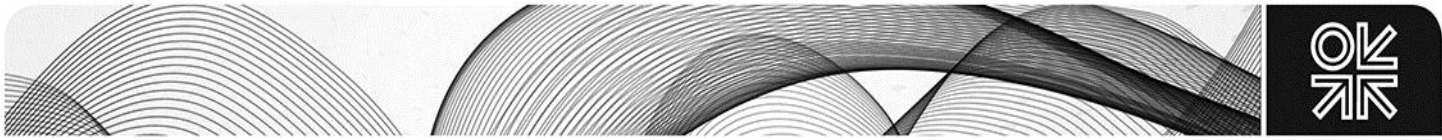


THE OXFORD
INSTITUTE
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STUDIES

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UK Storage encounters a Rough patch





Introduction

On April 12 Centrica Storage¹ (CSL) announced the suspension of injections at the Rough gas storage facility until at least May 2018. The decision was the result of an extensive well testing programme that had confirmed “different potential failure modes in a number of the wells”.

The announcement follows on from several previous alerts from CSL restricting the availability of Rough in terms of working capacity, injection and deliverability². Whilst the market had to some extent been pre-warned of the problems the relatively muted response was, nevertheless, surprising³. Only a few years ago the prospect of Rough gas storage capacity being unavailable for an extended period would have sent paroxysms through the gas market. Does this signal a declining role for long range storage or is the market in for a big shock? Is this foolish optimism or have the fundamentals in relation to the value of flexibility shifted irrevocably away from seasonal storage?

The removal of Rough takes a huge amount of working capacity out of GB’s storage inventory, reducing it from 4.3 bcm to 1.3 bcm – or from 6.4% to 1.6% of 2015 annual gas demand. The impact, however, is dampened by two key factors: the deliverability and re-cycling capability of other storage assets and the availability of other forms of flexibility.

Rough, other storage and other forms of flexibility

Working capacity of storage is an important security of supply consideration. From a market and trading perspective, however, a more important measure is the injection and deliverability capacity of a storage asset – particularly in the case of fast cycle salt cavity storage. These facilities can switch rapidly from withdrawal to injection and back to withdrawal and are likely to do this many times during a winter season. Working capacity is therefore less meaningful as volumes stored can increase at any time. This is illustrated in Figure 1 showing volumes of gas stored in all facilities except Rough⁴ during the 2016/17 winter and for previous years. During the late December, early January period gas was being injected into these facilities and volumes stored almost returned to levels seen at the start of the winter period. Injections were also apparent during February and March

A further factor dampening the importance of Rough is the availability of other forms of flexibility. This is illustrated in Figure 2 that shows the maximum potential supply by source compared with predicted peak day demand during a 1 in 20 cold winter. There is a surplus of supply capacity of nearly 150 mcm/d which falls to 100 mcm/d if Rough is excluded.

¹ http://188.114.118.106/sites/default/files/remit_rough_120417.pdf

² See Le Fevre C., Gas Storage in Great Britain, OIES, 2013 for a full description of the role of storage in the GB gas market. <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/01/NG-72.pdf>

³ On April 13 Platts reported that Front-month May was seen trading at 38.65 p/th, 0.30 p/th higher than the previous assessment, with the Q3 17 and Winter 17 contracts changing hands at 38.70 p/th and 46.55 p/th respectively – spreads subsequently fell back.

⁴ Referred to as medium-range storage (MRS). Rough is sometimes called long-range storage (LRS).

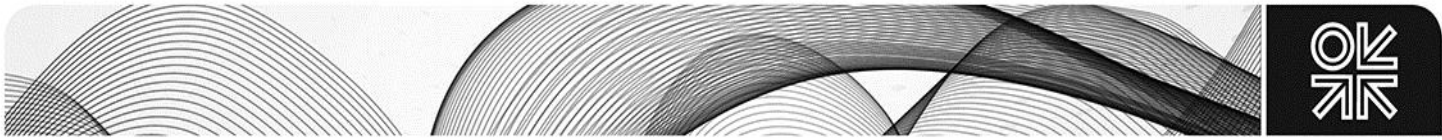
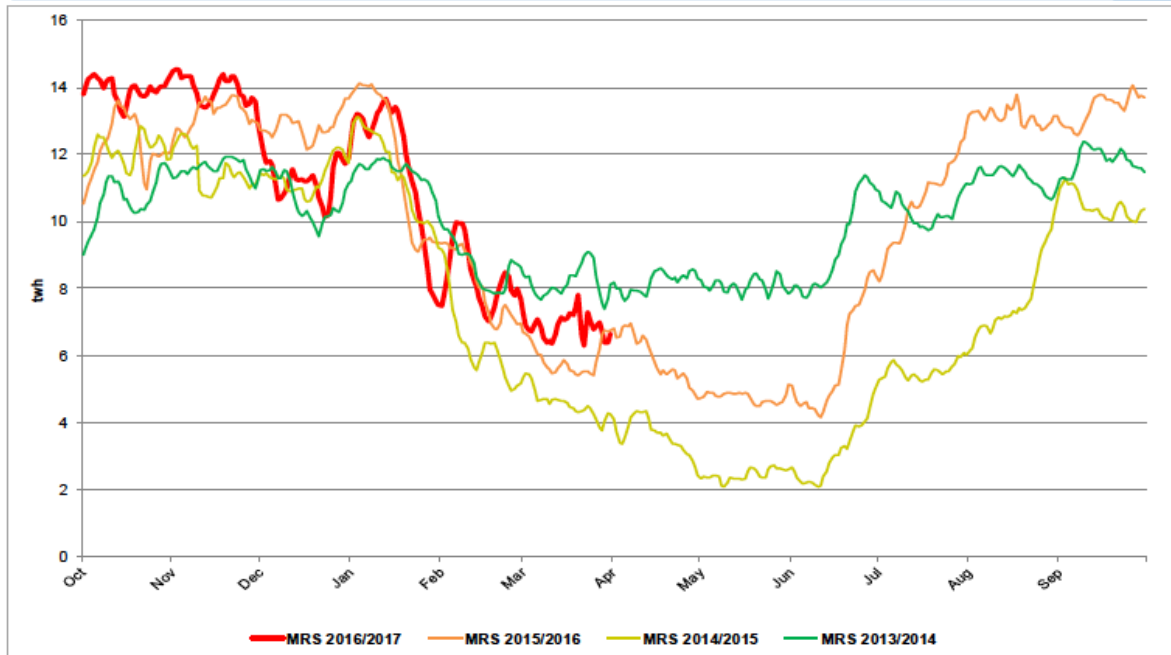
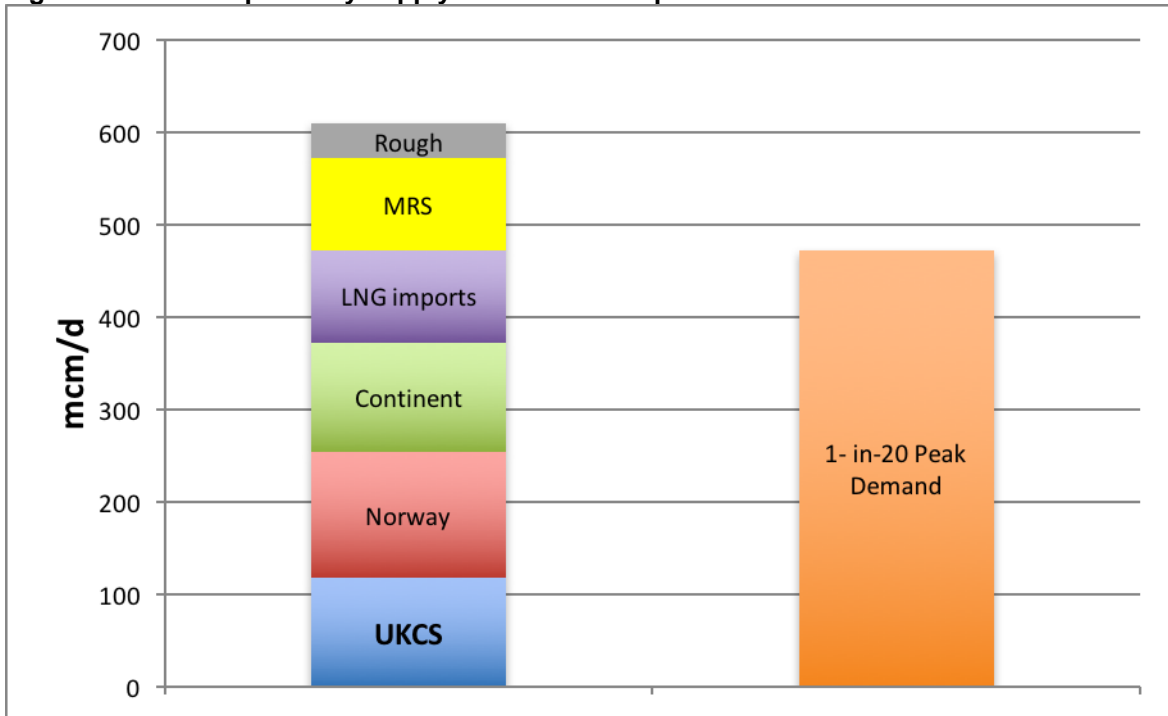


Figure 1: Medium-range Storage Stocks - Winter 2016/17 vs previous years

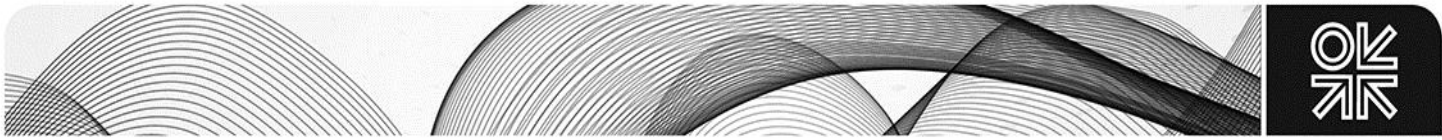


Source: National Grid Operational Overview April 2017 <http://www2.nationalgrid.com/uk/industry-information/gas-transmission-system-operations/gas-operational-forum/>

Figure 2: Potential peak day supply and demand capacities - Winter 2016/17

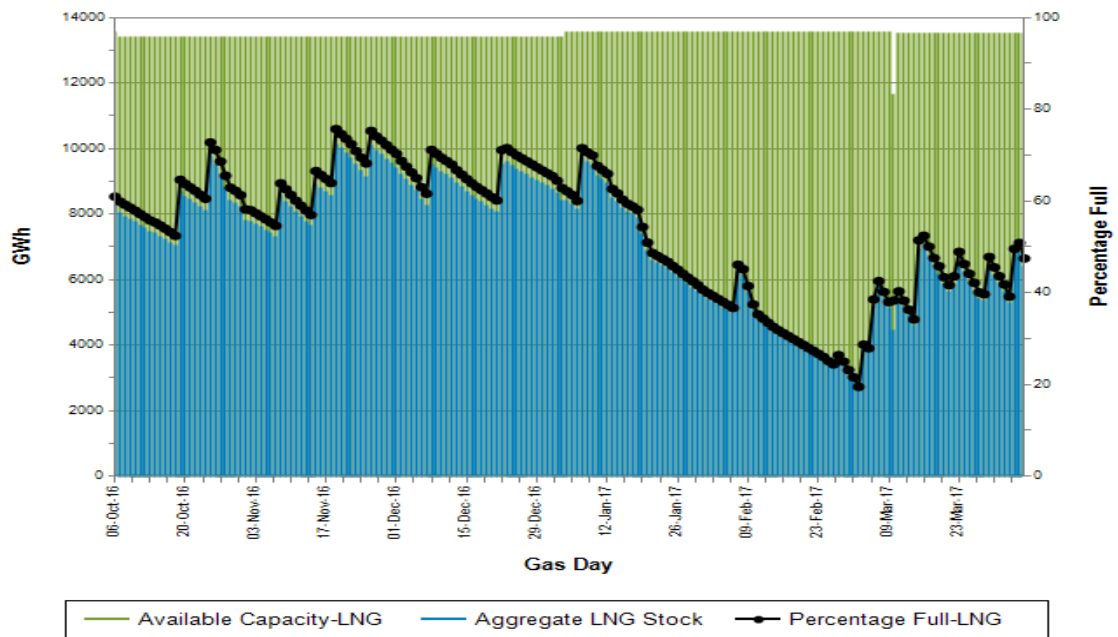


Source: Author based on National Grid Winter Outlook 2016/17



Whilst Norway and UKCS supplies might not be particularly flexible, those from the continent (which include access to continental storage capacity) and LNG are. Indeed, as shown in Figure 3 LNG stocks at terminals also exhibited a pattern of injection and withdrawal during the recent winter. Unlike MRS, however, LNG deliveries are influenced by global market dynamics and significant LNG shipments may not coincide with periods of high demand. So, for example, during the January/February period LNG deliveries into terminals were minimal though throughout the winter period deliveries from LNG terminals into the NTS ranged between 12 and 40 mcm/d on most days.

Figure 3: LNG Storage Volumes - Winter 2016/17



Source: National Grid Prevailing view: <http://mip-prod-web.azurewebsites.net/PrevailingView/Index>

On the evidence of recent winters, it could be argued that LNG and medium range storage combined represent the GB gas market’s version of “The Magic Porridge Pot”⁵. The facilities are capable of being constantly replenished to ensure maximum supplies throughout the period of highest demand. This, of course, assumes there are lulls in demand allowing MRS to replenish and that sufficient LNG cargoes (which may take some time to reach the UK) are available.

Figure 4 shows the relative contribution of the various supply sources during the last seven winters. The wide range of contributions from IUK and LNG confirm that these sources have tended to primarily play the role of marginal supply sources. The growing share of Norwegian supplies suggests that supply from Norway might be becoming more flexible.

⁵ A Grimm’s Fairy Tale about a porridge pot that produced endless supplies of porridge

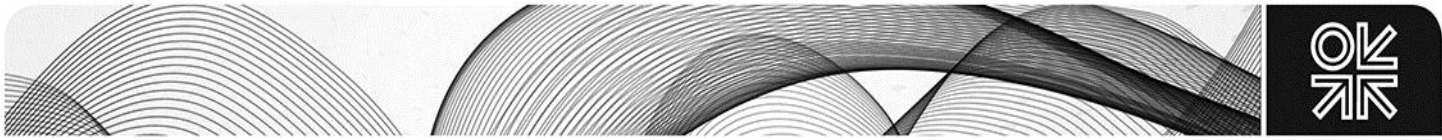
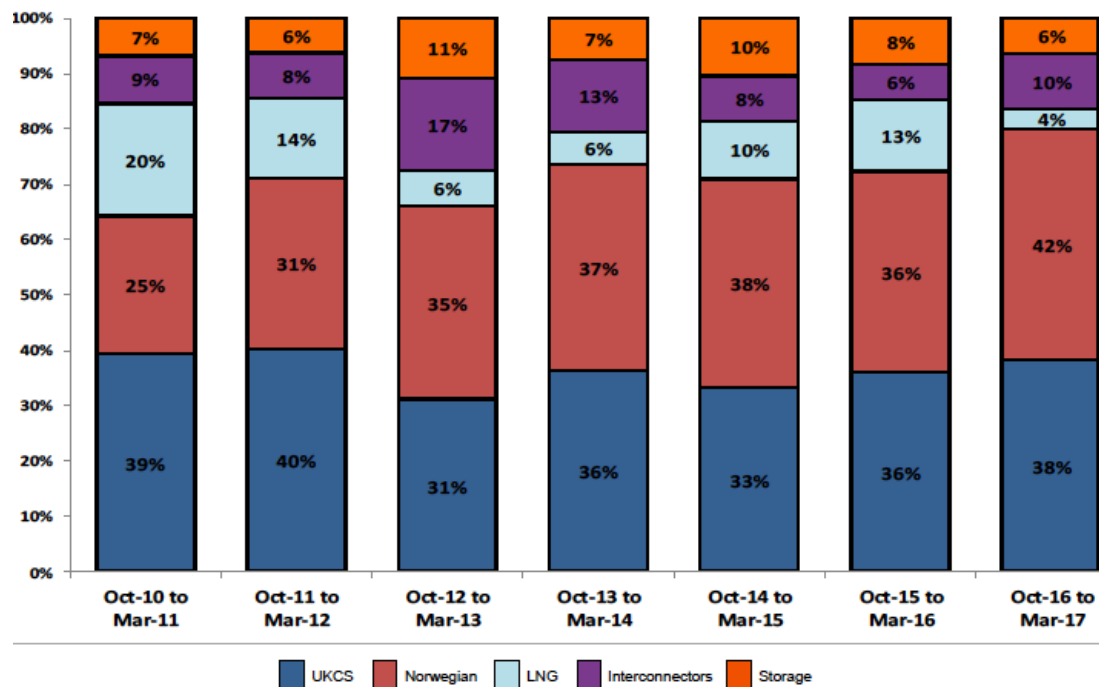


Figure 4: Gas supply breakdown for October- March period - 2010/11 to 2016/17



Source: National Grid Operational Overview April 2017 <http://www2.nationalgrid.com/uk/industry-information/gas-transmission-system-operations/gas-operational-forum/>

A Rough end game?

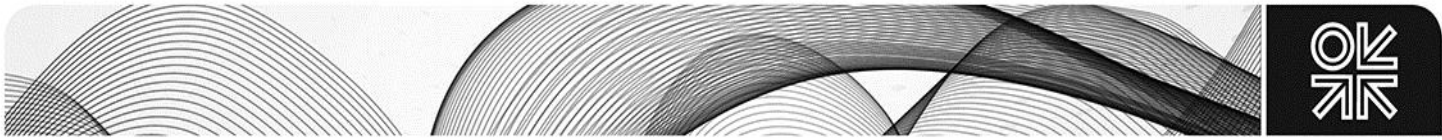
Does all of this mean that large scale seasonal storage has had its day? The arguments against a facility such as Rough can be summarized as follows:

- Pore based storage (depleted fields and aquifers) generally operate on a seasonal injection and withdrawal cycle and so lack the flexibility of fast cycle salt caverns more favoured by traders
- Rough's offshore location means it will have higher operating cost and greater vulnerability than an equivalent land based facility
- The storage facilities were commissioned in 1985. There have been well documented maintenance problems in recent years and this suggests that major expenditure commitments will be required to keep the facility operating at full capacity
- The size of Rough is one factor inhibiting the attractiveness of new storage investments (projects at Preesal, Keupers and Island Magee plus others are still being actively promoted) that might proceed otherwise.
- Closure could be attractive to CSL if it could blow-down the cushion gas (see below). It would also enhance the profitability of other storage assets and providers of flexibility such as IUK⁶.

On the other hand:

- Rough was designed as a seasonal facility to provide support for sustained periods of cold weather as typified by a 1 in 50 year cold winter. Whilst, as described above, the likelihood of sustained physical gas shortages is less likely, an extreme winter could combine high and sustained demand with UKCS supply difficulties and shortages of continental supplies. These

⁶ See <http://www.timera-energy.com/the-uk-gas-market-without-rough/>



conditions could precipitate short term physical shortages and price spikes. Rough has tended to play a major role in reducing market volatility and price spikes.

- As the recent paper on Brexit⁷ shows, NBP volatility and security of supply concerns could increase. This would particularly be an issue if the UK comes out of the Security of Gas Supply Regulation sharing mechanism⁸.
- The increased risk to price security could create further market instability if retail price caps were introduced and suppliers were unable to pass on high prices.
- The three Rough Bravo platforms were designed and built to a very high standard and represent a significant sunk cost. The information available from CSL suggests the present problems relate to well integrity which presumably could be dealt with by an extended workover programme. It is quite likely that such a programme will represent lower cost option than alternative approaches to providing an equivalent level of long term security.
- Early closure of Rough would trigger substantial decommissioning costs and may also impact on the Easington terminal operating costs.

Possible outcomes

The most desirable outcome from a supply security perspective is that CSL undertakes the necessary remedial work and the Rough asset returns to full use. Given, however, the commercial challenges facing all forms of flexibility⁹, this may be difficult to justify without some form of external support. Rough still represents a relatively low cost source of seasonal security and given the existential uncertainty facing other sources such as LNG and interconnectors it would be improvident to allow this asset to simply disappear without examining alternative options.

A range of possible approaches includes:

- The facility could be reduced in size to provide an optimal level of capacity and deliverability for a given level of investment;
- There may be a case for supporting the existing owners if commercially based investments cannot be justified – for example a tender for seasonal storage services in which Rough could participate;
- Some form of market testing such as requiring that Rough is put up for sale;
- Allowing the asset to be acquired and operated as a regulated facility for example by becoming part of National Grid Transmission.

Any intervention needs to be carefully considered to avoid undermining other existing and planned investments¹⁰. The role of the CMA undertakings¹¹ is a further complicating factor. In any event, the future role and multifaceted impact of an asset such as Rough, should be widely assessed by regulators and industry before any final decision is taken.

The relatively relaxed market response to the possible demise of Rough is a rational reaction based on the relatively small probabilities of supply disruption and sustained high demand. The fact that such a combination remains possible suggests that it is too soon to call time on long range storage in Great Britain.

⁷ Bros T., Brexit and security of supply for the UK and Ireland, OIES 2017 <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/01/Brexit-impact-on-gas-markets-OIES-Energy-Insight.pdf>

⁸ <https://ec.europa.eu/energy/en/news/agreement-reached-new-security-gas-supply-regulation-0>

⁹ Storage assets have particularly suffered from falling seasonal spreads and reduced price volatility

¹⁰ Both Government and regulator have argued against intervention in recent years – see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/318466/gas_risk_assessment.pdf

¹¹ CMA 2016 https://assets.publishing.service.gov.uk/media/571a2323e5274a201400000f/Rough_gas_storage_undertakings_review_final_report.pdf