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Agenda

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Taking stock: competition and investment in gas storage services

The 'third package' of energy liberalisation, currently being examined by the EU Parliament and Council, reinforces unbundling provisions and third-party access requirements for gas storage facilities. These measures are primarily designed to ensure that suppliers can access existing storage capacity on reasonable terms. They do not, however, directly address the possible market failures that might hinder new investment. This might be an issue at a time when the need for seasonal storage capacity is increasing

The 'third package' contains a set of detailed measures that, if adopted, will have significant implications for the structure and functioning of the market for gas storage services.[1] The Commission's proposals specify that storage system operators (SSOs) must be legally and functionally unbundled from affiliates in charge of upstream or downstream activities. The proposals also set out in detail how SSOs should allocate capacity and manage congestion, the type of services to be offered, and the transparency requirements to be implemented.

The purpose of these measures is to ensure that available storage capacity is offered to the market in a non-discriminatory and transparent manner. However, the requirements do not directly address the issue of whether existing storage capacity is sufficient, and whether the current regulatory regime delivers the right incentives to invest in additional capacity—and capacity that is of the right kind. The underlying reasoning is that, where and when SSOs are fully independent, they will respond to the price signals produced by the markets and deliver the level of storage capacity required by suppliers.

There is currently little investment in large storage facilities in European markets. Most ongoing projects relate to the re-engineering of existing fields, or the development of small-scale facilities. Such facilities are primarily used for the purpose of backing short-term balancing and trading activities; they do not hold a sufficient volume of gas to cover large fluctuations in demand or significant interruptions in the upstream supply chain.

Although the situation will vary country by country, it is questionable whether this investment pattern adequately reflects the market's needs. Looking ahead, the need for storage is likely to increase with the general growth in gas consumption and the gradual depletion of the domestic gas fields that used to provide swing capacity in certain countries. This comes at a time when most SSOs in Europe have reported to the European Regulators' Group for Electricity and Gas (ERGEG) that their capacity is already fully utilised.[2]

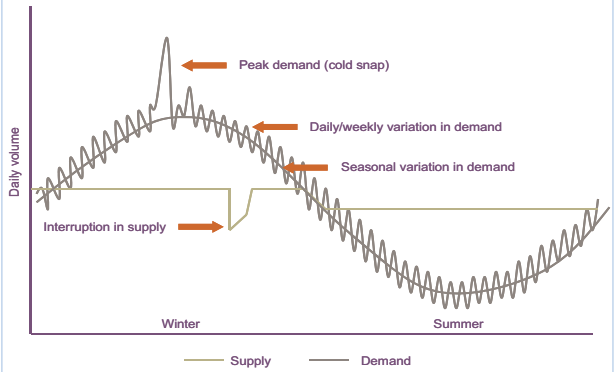
The gas crisis that occurred in the UK during the winter of 2005/06 exemplifies the potential consequences of insufficient storage capacity: a succession of cold snaps, the under-utilisation of import capacity, and an insufficient level of swing capacity of UK Continental Shelf gas fields combined to produce an exceptionally tight demand–supply balance. By mid-February 2006, the failure of the only large storage facility in the UK (Rough) sent prices soaring for several days, reaching unprecedented levels of nearly £2/therm (compared with an average of £0.4/therm in 2006).[3]

It is therefore useful to ask whether the current regulatory and market environment can promote the development of storage services in a way that is compatible with the efficient functioning of competitive gas markets, but also with security of supply objectives. Gas storage matters, not only because it is a pivotal component of the gas infrastructure chain, but also because it exemplifies some of the competition issues and security of supply concerns that affect many segments of the energy industry.

The role of storage services in gas markets

Suppliers require access to storage services in order to operate in gas markets. This is essentially because each supplier faces a demand profile that varies over time—

Figure 1 Typical supply/demand profiles for a gas supplier



Source: Based on Esnault, B. (2003), 'The Need for Regulation of Gas Storage: The Case of France', *Energy Policy*, **31**:2, pp. 167–74.

over the year (winter/summer), week (working days/weekends), and day (night/daytime). Some of these variations may be predictable (eg, more gas is needed for heating during the winter), while other variations are not (eg, unexpected temperature changes). At any rate, for any supplier's portfolio, the profile of supply is unlikely to consistently match the profile of demand (see Figure 1). Suppliers must therefore use 'flexibility instruments' to bridge the gap between the supply and demand profiles within their portfolio.

In principle, a variety of instruments are available for this purpose. The most common include:

- **trading on wholesale markets**—suppliers selling gas when they are 'long', and buying it when they are 'short';
- **production or import swing**—using available flexibility in supply;
- **interruptible contracts**—increasing flexibility in demand;
- **storage services**—suppliers injecting gas into storage when they are 'long', and withdrawing it when they are 'short'.

However, these instruments have limitations when it comes to dealing with large, recurring fluctuations in demand.

- Most wholesale markets in Europe remain fairly illiquid, and the option of trading on wholesale markets may be expensive when one supplier's flexibility need co-varies with that of the market as a whole.

- Production swing is not directly available to suppliers that do not have direct access to production, and take-or-pay contracts used for imports typically allow for only limited flexibility.

- Interruptible contracts can be used only for a small category of large, sophisticated customers.

It follows that, for certain types of flexibility need, there is no practical substitute for physical storage. This is particularly the case for seasonal arbitrage—ie, the operations required to match the winter 'deficit' with the summer 'excedent' in the portfolio.[4]

For these reasons, access to storage is necessary for suppliers to compete effectively for customers in a liberalised market. It allows them to lower their costs through arbitrage, facilitates their balancing operations, and enables them to provide greater security of supply to customers.

The strategic importance of storage services in European gas markets is likely to increase. In countries such as the UK and the Netherlands, this is largely due to the progressive depletion of domestic gas fields that were used as swing capacity, and that need to be replaced by more baseload imports from distant sources. In addition, there are political concerns with regard to the reliability of gas sources located further away (hence the need for 'strategic storage').

Because access to storage services is essential to well-functioning markets, and because the need for storage capacity is increasing, regulators and market participants are confronted with two challenges. The first is to ensure that suppliers have access to storage services on reasonable terms. The second is to ensure that sufficient storage capacity is available at the market level.

It is important to recognise that these two policy challenges are closely linked: access to existing capacity becomes particularly critical when the development of new capacity is problematic. In turn, the policy measures adopted to enable access to existing capacity might shape future incentives to invest in new facilities.

Can markets provide sufficient storage capacity?

Where access is not regulated, storage facilities can be built by integrated companies using the capacity for managing their own internal portfolios, or by independent storage operators seeking to maximise the value of their investment by selling storage services to external shippers. In either case, the financial value of storage essentially depends on differences in gas prices at different points in time, over a variety of time frames.[5] Investment will occur only if potential investors are confident that the estimated value of the facility will allow them to recover their initial costs and earn a return on their investment commensurate with the risk of the project.

A number of considerations make this valuation exercise particularly uncertain.

– **Uncertainty on the revenue side**. The price signals generated by gas markets are imperfect and limited. Even in the most developed marketplaces in Europe, such as the National Balancing Point or Zeebrugge, forward markets are typically illiquid beyond two to three years. There is also some degree of uncertainty as to whether forward prices can predict future spot prices accurately.

– **Uncertainty on the cost side**. Investment in gas storage involves very large initial costs, a substantial part of which relates to cushion gas (the volume of gas required to maintain pressure within the reservoir). Because of the uncertainty regarding gas prices, the cost of cushion gas is particularly difficult to predict. This uncertainty is heightened by the very long lead times involved in building a new facility (eg, 3–5 years for salt caverns, and 10–15 years for reservoirs developed in aquifers).

While long pay-back periods and cash-flow uncertainty increase the risk of investing in gas storage, these features are by no means specific to the sector. They also arise in a number of competitive markets, such as the pharmaceutical or aeronautical industries. In well-functioning markets, a higher business risk is typically reflected in a higher price for products; the effect of higher risk on investment is therefore offset by the potential for greater revenue. In the gas sector, however, a number of market failures can impair this linkage, and compound the uncertainties outlined above.

– **Sunk costs and regulatory commitment**. A large proportion of the initial investment costs is sunk. Without adequate safeguards, sunk costs increase the risk of ex post regulatory opportunism—ie, the possibility that the regulator requires third-party access (TPA) arrangements to be priced on marginal costs once the facility has been built.

– **Externalities**. Even where it is possible to estimate the financial value of storage, this might not guarantee that the socially optimal level of storage is built. This is because additional storage capacity brings wider benefits to the market in the form of enhanced security of supply. Even if consumers are willing to pay for this security of supply, this will typically not be reflected in market prices.

– **Market liquidity**. In relatively small or illiquid markets, the addition of substantial storage capacity might contribute to a reduction in the price spreads, which in turn can reduce the expected value of the investment.

All the difficulties outlined above are more acute for large-scale facilities (used for seasonal arbitrage) than for small-scale storage (used for peak-shaving and trading). These considerations help explain why there is currently relatively little investment in seasonal storage in European markets. Even where there is a social need for seasonal storage, market failures may hinder incentives for private, market-based investment.

This situation reflects the issue of capacity margins in the electricity sector: while customers as a whole may be willing to pay for higher capacity margins and enhanced security of supply, this will typically not be reflected in wholesale electricity prices.

What are the implications for competition?

Where market failures hinder the development of new capacity, the control of existing facilities confers a degree of market power on incumbent companies. In competition terms, existing storage capacity may have the characteristics of an essential facility (depending on whether it is economically and physically feasible to duplicate the facility). Competition may be distorted if access by third parties is denied or granted on unreasonable terms. Access terms can be deemed unreasonable if the level of charges bears no relationship to the cost of the service, or if none-price terms make access to storage services difficult or unattractive to new entrants. For example, the minimum lot size might be arbitrarily high, required credit guarantees might be excessive, and the types of services sold may be insufficiently flexible.

This is why the European Second Gas Directive provided for mandatory TPA to storage facilities. Most Member States have opted for a 'negotiated' form of TPA, where access terms can be fixed freely by the owners of the facilities, provided that they are non-discriminatory. Exemption from the TPA requirement can be granted for new facilities. TPA requirements were further specified and reinforced in ERGEG's 2005 voluntary 'Guidelines for Good Third Party Access Practice for Storage System Operators', which provide harmonised rules in areas such as transparency requirements, capacity allocation and bundles of services.

However, ERGEG subsequently found that storage system operators did not properly apply the voluntary guidelines. The regulators' reports found compliance with transparency and secondary market provisions to be weak, and identified problems with regard to discrimination and congestion management. ERGEG subsequently made a series of recommendations to the

Commission, with a view to making further TPA requirements binding.[6]

Most of these recommendations were translated into the third package. Under the Commission's proposals, SSOs must be legally and functionally unbundled from supply undertakings. The proposed rules also define how SSOs should allocate capacity and manage congestion; the type of services to be offered; and the transparency requirements to be implemented. Finally, the proposed measures enhance the powers of national regulatory authorities to oversee access to storage.

While these requirements are likely to make TPA to existing capacity more effective, there is a question as to whether they can provide the right incentives to invest in new capacity.

What are the implications for regulation?

The regulatory framework must therefore balance ex ante incentives for investment with ex post optimisation of access to capacity.

The first option is to enforce a regime of regulated TPA (rTPA) comparable to that used for transmission and distribution networks. In such a regime, the level and type of investment is typically planned centrally and agreed with the regulator.[7] The corresponding costs are then included in the regulatory asset base (RAB) and recovered through mandatory access charges.

Because rTPA gives the regulator effective control over the price and terms of access, it can be effective in solving the 'access' issue. Furthermore, it has been argued that rTPA may alleviate the 'investment' issue, for two main reasons.

– In many rTPA regimes, the regulator can require specific projects to be carried out by the licensed operators, if such facilities are deemed necessary for the efficient functioning of the market. In principle, this element of 'centralised planning' would allow the social benefits of additional storage capacity to be factored into the investment decision.

– rTPA offers the possibility of pooling the risk of specific storage projects in a large asset base, and possibly the transfer of some of this risk to customers through regular price control reviews and pass-through mechanisms. The risk attached to specific projects is left unchanged, but it is spread more widely across the customer base of the gas infrastructure, in recognition of the externalities generated by such investments.

In essence, rTPA does not genuinely tackle the market failures outlined above, but rather attempts to override them through administrative-based mechanisms. There are, however, three difficulties which could arise with this approach.

– Unbundling requirements make it increasingly difficult to pool storage assets with other regulated infrastructures in a common RAB in order to spread the risk across the customer base.

– Whatever the scope of the RAB, the lower risk that price regulation offers to investors is likely to be critically dependent on the price control mechanisms used, as well as the credibility of the regulator's commitment to cost recovery.

– Finally, and perhaps most importantly, the underlying assumption behind this model is that the regulator can decide which facilities are beneficial for the market. This assumption is questionable: as in any system of central planning, there is a risk that 'market failures' are in fact replaced by 'regulatory failures'.

For these reasons, it might not be possible or desirable to systematically take away investment risk from storage facilities. This is why most regulatory regimes allow for the development of new projects outside the system of price regulation.

This does not mean, however, that no regulatory intervention or surveillance is required. A number of more 'light-handed' regimes of negotiated TPA can be implemented. In such regimes, the regulator does not fix the access charges, but monitors the access terms offered by the SSO, the charging methodology applied or the capacity allocation mechanisms used. Regulators may also associate the exemptions from TPA requirements with pro-competitive remedies, such as use-it-or-lose-it obligations or the establishment of secondary markets for capacity. The nature and extent of market power issues should inform the appropriateness of any particular remedy or regime.

Even if market-based solutions are adopted, regulatory intervention might still be required to shape the market environment of SSOs and ensure that the best possible signals and risk-sharing tools are available. For example, the regulator can enable, or even facilitate, the use of open seasons and long-term contracts between shippers and SSOs. This can induce shippers to signal their need for storage capacity, and allow for the investment risk to be shared between the project sponsor and the shippers. The regulator can also enforce mandatory storage obligations, requiring suppliers to hold a certain quantity of gas in stock throughout the year, or at the beginning

of the winter. The idea behind such systems is to tackle the externality issue by defining and allocating clearly the responsibility for security of supply. This may be difficult for high-impact/low-occurrence risks, but it could be secured for events that are easier to forecast, such as very cold winters.

The third package leaves some discretion to national regulators regarding the precise rules to be put in place. Once the EU Parliament and Council have adopted the final provisions, SSOs and regulators will have the opportunity to tailor the rules to the nature of the market failures in each setting. The analysis of the regulatory approaches that have already been developed in European gas markets, as well as in other markets for similar issues (such as capacity margins in electricity), could inform the policy choices.

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[1] European Commission (2007), 'Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/55/EC concerning common rules for the internal market in natural gas', September 7th.
[2] ERGEG (2005), 'Final 2005 Report on Monitoring the Implementation of the GGPSSO', December 7th. GGPSSO, Guidelines for Good Third-party Access Practice for Storage System Operators.
[3] Source: Datastream.
[4] A storage facility can essentially be characterised by its volume (ie, the total amount of gas that can be stored in the facility) and its deliverability (ie, the speed at which gas can be injected into or withdrawn from the facility). Seasonal, or long-range facilities are typically characterised by large volumes, but low deliverability. They are usually built in aquifers or depleted oil or gas fields. Small-scale, or short-range facilities are characterised by small volumes and high deliverability. They are most commonly built in salt caverns.
[5] This is because storage essentially allows shippers to arbitrage between low- and high-priced periods. In practice, different methodologies are used to estimate the financial value of storage capacity. The value of large-scale facilities used for seasonal arbitrage can be approximated simply by calculating the difference between winter and summer forward prices (allowing for the costs of transportation to and from the marketplace). The valuation of high-deliverability storage capacity used for trading typically relies on option-based methodologies that attempt to capture the value of the greater opportunities for injection and withdrawal allowed by this type of service. The volatility of gas prices, rather than their mere average, is an important component of this value.
[6] ERGEG (2005) op. cit.; and ERGEG (2006) 'ERGEG Final 2006 Report on Monitoring the Implementation of the GGPSSO', December 6th.
[7] Certain rTPA regimes include mechanisms for articulating investment decisions with market signals and the needs expressed by shippers.