

SECURITY OF SUPPLY: UNRESOLVED ISSUES

(Working Paper by Sub-Group)

Scope

1. Security of energy supply covers a very wide range of (often interconnected) issues. However, in this paper we do not attempt to deal with those "strategic" issues deriving from international primary energy markets which centre mainly on the geopolitics of oil and gas. (The Panel has already had discussions with the Department on the EU Green Paper "Towards a European Strategy for the Security of Energy Supply"). Nor do we deal here with the security of the market for transport fuels. Rather, we concentrate on the security of the UK electricity and gas systems - mainly onshore, but including also UK offshore gas infrastructure, and gas and electricity interconnectors.

Potential Sources of Insecurity

2. Problems could arise if there were inadequate long-term planning and investment in gas production and storage, generating capacity, and import facilities needed to meet peak and annual demand. These are competitive activities; and one view is that emerging forward markets in gas and electricity will provide appropriate market signals on the need for investment up to five years (or more) ahead; and that the market through commercial arrangements and the costs of imbalance will deliver secure diversity in fuel sources.

On the other hand, although generally it is desirable to use competitive market mechanisms wherever possible, there remain doubts as to how "market signals" will in fact translate into effective investment. With volatile markets, such signals will often be ambiguous and intermittent rather than clear and sustained. The most critical issue is generating capacity (since electricity cannot readily be stored). At the present time this is no problem, but it could become so in the future. It can be argued that the present level of spare capacity in generation is in large measure the result of earlier market distortions surrounding the "dash for gas". Moreover, there is no "track record" to provide assurance that the present arrangements, which exclude explicit capacity payments, will always provide sufficient margins. Indeed, experience in the Nordic, Australian and Brazilian markets suggests otherwise.

3. In addition, the major transmission infrastructures need to have sufficient capacity investment to meet demand. OFGEM has recognised that the current regulatory arrangements are deficient particularly as there are inappropriate incentives to invest under "simple RPI-X"; but OFGEM proposes to remedy these deficiencies through forward capacity trading to supplement the planning process, and with improved incentives on Transco/NGC to invest. Nevertheless, there are still some concerns, namely -

(a) The major question is whether capacity auctions will provide meaningful signals for investment in electricity and gas transmission. Ideally, the auction process would reveal the price producers and suppliers would be willing to pay to gain access to market at particular locations over a certain period. In a fully competitive fragmented market, with financial instruments covering the lifetimes of the associated infrastructure assets, there would be no problem. However, this is not the case in either electricity or gas, and is unlikely to be for the foreseeable future. In addition, periods of very low auction prices would signal to investors in Transco and NGC that there was a potential problem of stranded assets, thereby increasing the cost of capital. Moreover, and most importantly in the context of supply security, auction prices would not necessarily reflect the cost of transporting gas or electricity securely for a period of years ahead.

An alternative approach to capacity auctions would be to accept that the infrastructure networks which support competitive gas and electricity markets in fact provide a monopolistic service, and that the network operators should be given an obligation to ensure entry and exist capacity.

(b) The issue here concerns electricity distribution (as well as Transco/NGC) and regulation needs also to ensure that the financial incentives to reduce manpower do not compromise the security of the system, particularly at local level. Further, security in transmission/distribution in the case of electricity relates not only to capacity, but also to the potential vulnerability of the system to physical damage arising from extreme weather conditions. Thus, a careful balance has to be struck between primary investment and (labour intensive) maintenance.

(c) There is also a need to bring offshore gas infrastructure and gas and electricity interconnectors into the debate. This raises the issue of the regulatory interface. For example, gas producers who are not shippers cannot bid for capacity under the capacity auction scheme, and hence do not know whether they can be sure of obtaining access to the national gas transmission system.

4. Problems could also arise if there were inadequacies in the short-term trading/commercial arrangements for gas and electricity. The present arrangements recognise the importance of consistency between gas and electricity, and the key joint role of NGC and Transco in managing the interactions (particularly those arising from the flexible operation of CCGTs, and commercial arbitrage by gas shippers between electricity generation and other gas markets, whether in the UK or continental Europe). Moreover, the expectation is that the introduction of NETA and recent reforms in gas balancing will provide strong incentives both to participants to achieve short-term balance, and to NGC and Transco to manage and control the costs of the two systems both separately and jointly; and that NETA and the new gas trading rules will ensure that capacity will not be withheld through the exercise of market power.

However some doubts must remain that the sheer complexity of the electricity and gas balancing systems, especially when acting together, could produce situations where supply security might be threatened; most likely by the sudden withdrawal of gas-fired generation in order to balance gas in other markets. These matters will have to be closely monitored, until a “track record” can be established.

Embedded Generation

5. While in due course the growth of small-scale embedded generation might well enhance electricity security through decentralised diversity, there could be problems of transition. The RCEP report noted that the widespread use of intermittent (renewable) energy sources and embedded generation (including CHP) would require a new approach to the management of electricity networks; and that to meet temporary shortfalls in supply from intermittent sources, either new techniques to store electricity would have to be developed and widely applied, or large amounts of fossil fuel plant would need to be maintained in reserve. The RCEP recommended that the Government should take the lead in reviewing this issue.
6. In the context of the present paper, it is important to identify ways in which the growth of embedded generation might impinge on supply security. The accommodation of a limited amount of small-scale generation may be straightforward. However, it is by no means straightforward to maintain the stability and security of a highly-embedded generation network, particularly as NGC would still need to incur the costs necessary to provide a service to sites with embedded generation, even if they did not normally import. The role of NGC under such circumstances (and the appropriate form of regulation) would need careful consideration.

[Note: Catherine Mitchell has expressed different views on the above issue.]

"Shocks"

7. Even if we were reassured that the present combination of market measures and regulatory review would secure supply in normal circumstances, this may not be enough. Crisis of supply in electricity and gas may not be the result of gradual trends, but relatively infrequent and largely unpredictable adverse combinations of circumstance which come together quite suddenly. Such events, which would not give time for remedies involving additional new investment, can reasonably be described as "shocks". These could arise from such factors as:

- severe weather
- major infrastructure failure ("pipes and wires", terminals)
- nuclear accidents (leading to large scale withdrawal of plant)
- temporary shortage of gas "at the beach".

Such risks would affect both gas and electricity (directly or indirectly).

8. Given the infrequent and unpredictable nature of "shocks", the electricity and gas systems need to be capable of flexible/rapid response if associated crises are to be avoided. Sources of such flexibility would include:

- Dual firing/standby fuels
- Interruptible contracts and demand management
- Spare capacity in gas pipelines (including offshore and interconnectors)
- Spare capacity in electricity transmission/distribution
- Spare/standby generation capacity
- "Swing" gas production
- Standby LNG terminal capacity
- Gas storage and coal stocks
- Spare coal importing facilities

The question is whether fragmented, competitive electricity and gas markets would, without intervention, provide sufficient flexibility by the above means, given that such markets tend to be adverse to providing under-utilised spare capacity or identifying suppliers of last resort.

Security Standards

9. It is clear that the present system of competitive markets and infrastructure regulation cannot guarantee security of gas and electricity supply under all circumstances. Yet if such an absolute formulation is regarded as unrealistic, what should take its place? One view is that the security standards themselves should be set by the market, which would bring the value (or price) of supply security into balance with the cost of providing it. In our majority view, such a view cannot sensibly be used as a basis for public policy since:
- (a) A market solution would require a capability for demand management across all sectors. While such capability may exist in much of large industry, it is very limited in the domestic, commercial and small business sectors, which make up some two thirds of the final use of gas and electricity. This situation is likely to continue for the foreseeable future.
 - (b) Resolution of problems of supply crises by using very high prices to balance the market is unlikely to be politically acceptable.
 - (c) The dependence of the vast majority of (small) consumers on reliable gas and electricity is such that the security of their supply is inevitably a concern of Government.

[Nigel Evans and Catherine Mitchell have serious reservations on this paragraph.]

10. But if it is accepted that security standards cannot be set by the market, they need to be laid down in some other way. Otherwise, it will not be possible to take a view on what is "adequate" investment, or what costs should be

incurred to avoid "shocks". Under the Utilities Act 2000, the Secretary of State (with OFGEM) has a legal duty to secure that, so far as it is economical to meet them, all reasonable demands for gas and electricity are met. But this formulation begs questions on the meaning of "economical" and "reasonable", and

- (a) What quantification of standards is required to give proper effect to the legal duty?
 - (b) How is the balance between cost and risk (the "risk aversion") to be determined?
 - (c) By what means are responsibilities to be placed on organisations/companies who have the means to do something about them?
11. We would regard the answers to these questions as essentially political (i.e. cannot reasonably be delegated by Government). However, a starting point would be to survey the present state of supply security obligations namely:-

Electricity

Supplies must be constant except for disconnections to discharge suppliers' functions that are caused by events outside the suppliers' control.

No obligations on generators.

Distribution: systems to meet standards in "Engineering Recommendation P.2/5". There are also guaranteed standards of service – distribution companies must pay to consumers if they do not meet these – and overall standards of service for consumers in general.

NGC: there are standards for planning, connections, quality and operating eg PLM SP2 sets a standard for the ability of the system to cope with outages of two circuits.

Gas

Suppliers required to meet domestic security standard of one year in 20 for peak daily demand, and one year in 50 for annual average demand.

No obligation on shippers.

Transmission: requirement to meet standard of one year in 20 for peak daily demand.

Do these obligations adequately yet realistically reflect the national risk aversion to interruptions to gas and/or electricity supply; and is there coherence as between gas and electricity?

Conclusions

12. The Sub-Group agrees that ensuring the security of energy supply is a public interest consideration of great importance, in which Government must have an active role. Specifically, this means that the "risk aversion" of the gas and electricity systems to supply failure must be set by Government. Thus, any comprehensive review by DTI of security of supply of the UK gas and electricity systems should include
- (i) Consideration of what quantified security standards laid down/endorsed by Government are required to give effect to the Secretary of State's legal duties (including a survey of the adequacy of existing obligations laid on the electricity and gas industries)
 - (ii) 'A priori' identification of possible "shocks" which need to be taken seriously - i.e. which would threaten the security standards laid down at (i).
 - (iii) Review (with OFGEM, NGC and Transco) of the various elements of potential flexibility in the UK electricity and gas systems (along the lines set out in para 8 above) in terms of their potential ability to deal with possible "shocks" identified at (ii), and the costs involved.
 - (iv) Establishment of joint monitoring (with Ofgem, NGC and Transco) of other security issues, including the interface of offshore/onshore gas infrastructure, and the growth of embedded generation.
13. Such an approach to the supply security issue would be compatible with the continuing operation of competitive markets, subject only to compliance with explicit security standards (analogous to emission limits), and to "arms-length" monitoring of spare capacity and other sources of flexibility. However, it is also implicit in this approach that if monitoring of trends, and of the "flexibility factors" made it clear that security of supply might be seriously prejudiced (e.g. by rapid erosion of spare generating capacity as a result, inter alia, of inadequate investment "signals"), then Government intervention could be justified where it could be shown that there was a specific failure of competitive markets to meet required security standards (although such intervention may not be free of cost or other disadvantage).

An alternative view

14. Nigel Evans has made clear that he does not agree with the line taken in this paper that Government has a role in determining security standards. Specifically, he does not accept that such standards cannot be set by the market. In many ways, this is the most important policy issue raised in this paper.

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