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The Brattle Group

This newsletter looks at the use of Independent System Operators (ISOs) to address conflict of interest concerns in the EU energy sector. Proposals for an ISO solution can arise in both regulatory and competition proceedings. This issue should therefore be of interest to utility executives, regulators, competition lawyers and others working in the sector.

The Brattle Group regularly advises on ISO issues in the U.S. and has been involved in existing ISO arrangements in Europe.

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Independent System Operators for EU Energy Markets

Introduction

The recently concluded European Commission inquiry into the energy sector identified a **"systemic conflict of interest inherent in the vertical integration of supply and network activities"**.¹ To address this conflict, the Commission has proposed the creation of Independent System Operators, which would operate but not own transmission networks for gas and electricity across the EU.²

A system of Independent System Operators (ISOs) offers two potential advantages in relation to the liberalisation of European gas and electric markets. First, establishing ISOs would remove any incentive for network operators to favour their own affiliates. Second, a single ISO could manage the networks of multiple Transmission Owners (TOs), as the Great Britain System Operator (GBSO) does in the UK, and the Regional Transmission Organizations (RTOs) do in the United States. By doing so, they could accelerate regional market integration. They could also help remedy the inter-TSO co-ordination problems that have contributed to major blackouts in Italy and Germany in recent years.

However, getting the most out of an ISO system requires careful attention to fundamental issues of design. In this newsletter we discuss four key design issues for ISOs in Europe:

- **ISO functions:** *what should be the division of responsibilities between ISO and Transmission Owner, in particular regarding investment authority?*
- **Regional Integration and Co-ordination:** *how should regional ISOs be designed so as to promote regional markets and improve inter-TSO co-ordination?*
- **Independence:** *what is the minimum set of rules to ensure that the ISO is genuinely independent of other market players?*
- **Incentives:** *how can regulators provide appropriate incentives for safe and efficient system operation by an ISO?*

We illustrate our points by drawing on experience of existing ISO structures in Great Britain and the U.S., as well as proposed ISOs in Europe.



ISO Functions and Investment Planning

■ Probably the most fundamental design issue is the division of responsibilities between ISO and Transmission Owner. In particular, what role will the ISO play in investment planning? The Sector Inquiry has identified under-investment by vertically integrated utilities as a key barrier to competition, finding evidence for example that “in a number of cases, companies have only invested in capacity expansions if their related supply arms had previously confirmed their interest for the bulk of

the extra capacity. By contrast, the investment did not take place if the interest in extra capacity merely stemmed from competitors.”³

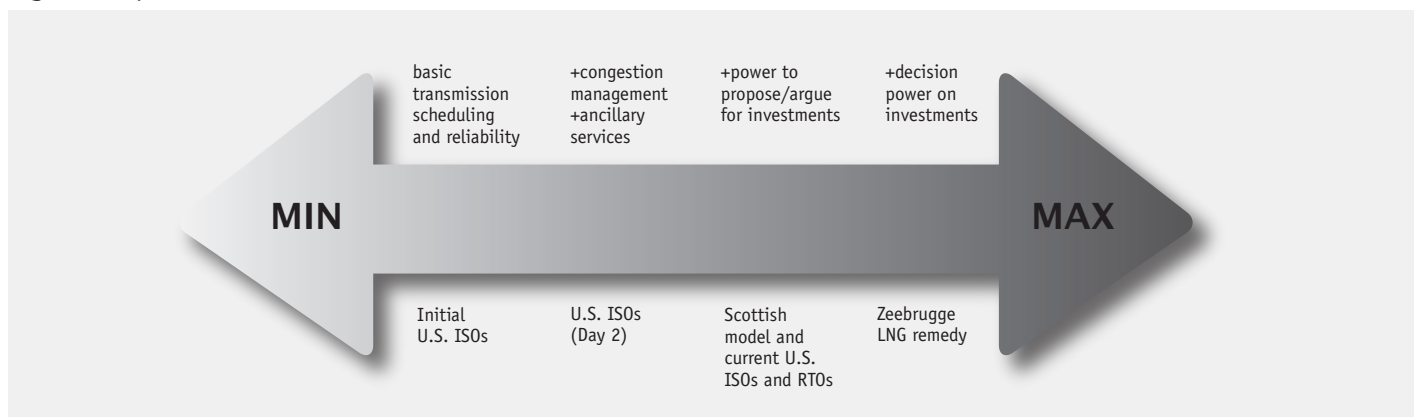
Existing ISO models show a range of possible arrangements, as illustrated in Figure 1 below. At one extreme, the ISO would be restricted to providing and scheduling transmission service, and ensuring that the grid was operated in a reliable manner. A more ambitious scope (known in the U.S. as the “Day Two” model) would see the ISO also manage congestion and procure/provide ancillary services such as balancing energy.

However, while these two models reflect early U.S. practice, they do not appear to address the European Commission’s concerns with investment planning. Nor do they reflect current U.S. practice, where transmission planning is now a central responsibility. Most U.S. ISOs also qualify as “RTOs” under the U.S. Federal Energy Regulatory Commission’s (“FERC”) guidelines for independence, operational control, planning functions, and regional geographic scope.

RTOs conduct regional planning with strong input from the TOs. Although RTOs cannot force TOs to build lines that are called for in the plan. They also have little ability to offer rewards. However, until recently transmission investment in the U.S. has been problematic for many longstanding reasons so it is not appropriate to single out ISOs as the cause of under-investment. If anything, region-wide ISO plans have probably helped, given that RTOs can now accommodate construction of transmission facilities by parties other than the incumbent TOs.

Under the arrangements in place in Scotland the ISO has a significant role in investment planning, backed up by a detailed and transparent regulatory framework.⁴ Nonetheless it is the TOs that are ultimately responsible for investment decisions planning based on input from and co-operation with the ISO.⁵ Despite concerns from market participants that letting the TOs plan investments could harm competition, the GB authorities opted for an approach to planning that largely relied on regulatory oversight to avoid discriminatory investment by the TOs.

Figure 1. Spectrum of ISO functions



The recent GdF/Suez merger proceedings led to a remedy that would create an ISO arrangement for the Zeebrugge LNG terminal.⁶ Under the arrangement the merged GdF/Suez could have majority ownership of the terminal, but another firm (Fluxys) would operate it. GdF/Suez would be a minority shareholder in Fluxys, with strict restrictions on its ability to exert control. Fluxys would therefore become an ISO for the terminal. Crucially, Fluxys would have **exclusive powers regarding the investment plan for the terminal**, with the owners retaining only very weak veto powers.

Giving the ISO investment authority addresses concerns that a TO with generation ownership could under-invest to block competition. It also helps to limit the asymmetry of information that would otherwise tend to favour the TO and its affiliates over other players. However, there is also the potential for inefficient distortions. For example, network investments can often reduce operating costs. But if the ISO is incentivised to reduce its operating costs it might do so by requiring inefficiently high levels of investment by the TO. Minimising these distortions requires careful work in designing the ISO/TO interface and its regulatory oversight.

Regional Integration and Co-ordination

■ At present Europe's high voltage power grid is a system of separate networks which were designed primarily to transport energy within each country, but not between countries. The high pressure gas transmission network was designed in part to carry gas across borders, but around a

specific set of historic contracts. In a liberalised market these grids are no longer fit for purpose. They lack the cross-border capacity that would support adequate levels of competition, given the high levels of concentration in national markets.

In electricity the inter-TSO co-ordination arrangements are not able to cope with the increased uncertainty about dispatch patterns and loop flows brought about by liberalisation. Failure of co-ordination between TSOs underlay the major black-outs seen in Italy (2003) and in parts of Germany and neighbouring countries (2006).

The introduction of ISOs could help address the problem of integration through increasing cross-border investment. Integration and co-ordination could both be further enhanced by the creation of "regional ISOs", i.e., a single system operator responsible for operating a number of inter-connected transmission networks, along the lines of the GBSO described above, and the RTOs seen in the U.S.

In many ways the European situation has strong similarities with the U.S. As in Europe, the transmission system was not originally designed with a regional wholesale market in mind, but rather to connect utilities which were often the only providers of electricity in a given service territory. The purpose of transmission lines was to allow a utility to supplement its generation capacity by drawing from neighbouring utilities under bilateral agreements. Liberalisation has also changed the pattern of flows in the U.S., and put the system under pressure.

The U.S. has tried to address these problems through the development of RTOs that operate the assets of up to 40 member sys-

tems.⁷ The RTOs are responsible for neutral and independent operation of both wholesale electricity markets and the grid itself. They manage a sophisticated regional planning process for generation and transmission expansion, and are responsible for ensuring the reliability of the transmission system. The RTOs also determine the available transmission capacity – a process impossible for any single TO to do on its own, since flows in one part of the grid will affect the available capacity in another part.

European policy makers, in consultation with industry and other stakeholders, must therefore decide whether new legislation should envisage the creation of regional ISOs, rather than a system of one ISO for each existing TSO. If so, the industry and public authorities will have to address a host of major questions. Defining the regions over which each ISO should operate will require careful economic and engineering analysis to forecast future cross-border flows and identify which arrangements will maximise the benefits from enhanced integration. The creation of a regional ISO will also entail major changes to arrangements for tariff setting, ancillary service provision and procurement, and many other areas.

Independence

■ As Figure 2 illustrates, the most important feature of an ISO is that it is independent of any supply or generating assets. To take the example of electricity, the ISO should not own any generating assets that could benefit from its decisions. However, this may be hard to define in practice. Suppose a firm with generat-

ing assets in Country A was the ISO for the network in Country B. By failing to connect generators in a timely way, the ISO could raise electricity prices in Country B. In the absence of congestion between countries A and B, this would benefit the ISO’s generating assets. During the development of the British ISO arrangement some players expressed similar concerns because the ISO (National Grid) owned transmission assets in a neighbouring control area,⁸ and could have incentives to operate the system in a way that would shift costs away from its own network and onto the Scottish transmission owners.

Again, the U.S. electricity market – which has been through a similar debate on the independence of ISOs – provides a useful reference point. In its rulemaking on RTOs the FERC required that all RTOs should be independent of market participants, defined as “[a]ny other entity that the [FERC] finds has economic or commercial interests that would be significantly affected by the [RTO’s] actions”.⁹

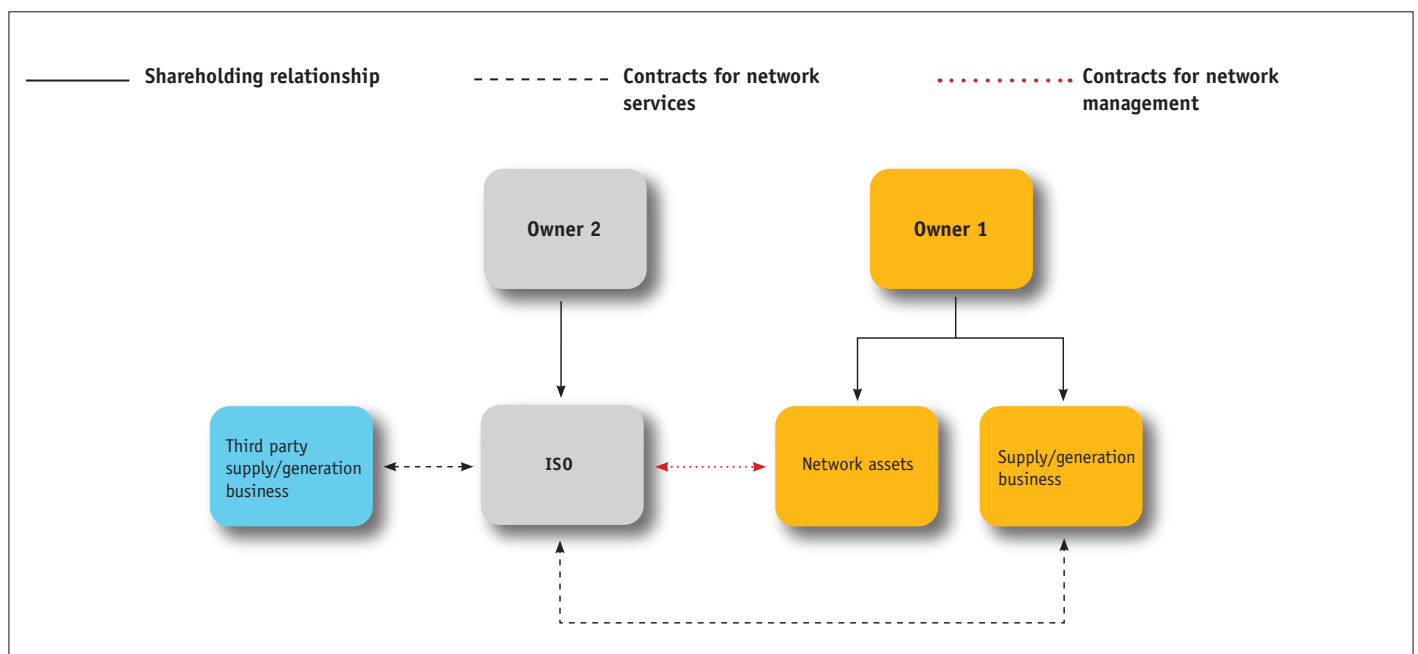
RTOs are therefore set up with a governance structure designed to account for the views of all stakeholders in the grid, while at the same time ensuring that decisions are non-discriminatory. For example, PJM – the largest RTO in the U.S. – has an independent

board of directors. A members committee comprised of representatives of power generators, transmission owners, electricity distributors, power marketers and consumers provides advice to the board by proposing and voting on rule-changes and new investments.

With regard to the geographic issue of, for example, whether an owner of plant in California could own an ISO on the other side of the U.S., the FERC concluded that “it would be virtually impossible to apply a geographically delineated standard” and that it would assess applications on a case-by-case basis.

If Europe applied the U.S. standards it is likely that, for example, the main British transmission company National Grid, which is already the ISO in Great Britain, could be an ISO for a German TO. Whatever standards of independence are eventually applied, it seems that a European regulatory mechanism (e.g., harmonised decision-making via the European Regulators’ Group) would be required to establish the geographic area over which an ISO’s actions could confer economic benefit, and rule on which parties were eligible to act as ISOs in a given area. A tender process could then be used to determine the winner, as was the case in Great Britain.¹⁰

Figure 2. ISO structure



Designing Incentives for the ISO

■ The ISO would have control over most of the costs of operating the transmission network – for example the costs of balancing the system, dealing with constraints, and other operational matters. Economists recognise that giving a regulated firm an incentive to reduce its costs will benefit customers over time. For example, the regulator can set a target level for costs, allow the regulated firm to keep a proportion of any savings relative to the target, but reduce the firm’s revenue if its costs exceed the target.

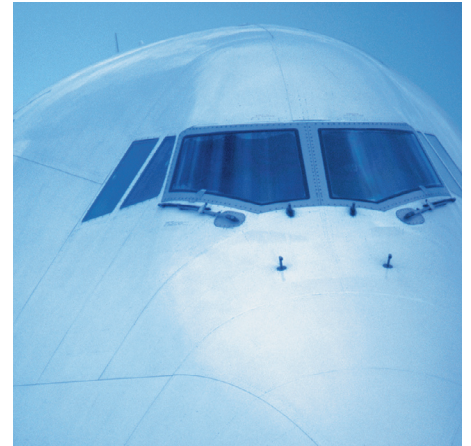
Such incentive regulation schemes have been applied with some success in several member states, including Denmark and Great Britain. For example, the GB regulator introduced an incentive scheme for National Grid in 1996, which led to a reduction in operating costs from £500 million to £400 million within three years.¹¹

In contrast, in the U.S. ISOs are not-for-profit with no direct incentives provided by regulation. Perhaps as a result, recently there have been complaints about the rising costs of U.S. ISOs and calls for reform.

While incentives improve efficiency, the separation of asset ownership and operation could create a problem for such schemes. The ISO would have few assets and little working capital. But, as the GB example illustrates, the sums of money that the ISO could be responsible for could be relatively large. To give the ISO a meaningful incentive, the regulator would not only have to be able to reward ISOs, but also ‘fine’ them for any cost overrun.

Yet even a small fine could cause financial difficulties for an ISO that had no assets and little equity. The experience of the National Air Traffic Services in the UK (see box) provides an example of what can happen to a poorly financed private firm subject to incentive regulation.¹² Reducing the incentive to a level that the ISO could afford to lose might make the incentives so weak as to be ineffective.

Specification of the ISO capabilities for pre-qualification might therefore need to include requirements on its financial structure, to ensure that it could be subject to appropriate incentive regulation.



CASE STUDY

In 2001 the UK Government partly privatised the National Air Traffic Services (NATS). NATS earned 75% of its revenue from charging each plane in its control area and these charges were subject to an “RPI-X” (“incentive regulation”) style price cap: if NATS could reduce its costs it would make higher profits, but it also bore volume risk – if air-traffic declined, so did NATS’ revenues.

At the time of privatisation, the regulator raised concerns regarding NATS’ very high level of debt, and “its subsequent ability to meet its obligations under the loan facilities and its ability to fund its development programme if it is buffeted by plausible adverse shocks”.¹³ Such a shock arrived in the form of September 11th. Air traffic volume fell, NATS’ revenue for the remainder of the financial year was £55 million less than forecast, and was projected to fall by £190 million over the price-control period, equivalent to about one-third of NATS’ Regulated Asset Base.

As a result, NATS experienced considerable financial distress, eventually resulting in a mixture of deferred expenditure and a ‘regulatory bailout’ (in the form of an increase in the regulated asset base). The case of NATS illustrates that a regulated firm must be robust to the financial incentives it faces. Designing regulatory incentives for European ISOs could present similar challenges, given the ISOs’ potentially limited financial resources and the large cost-bases that they will manage.

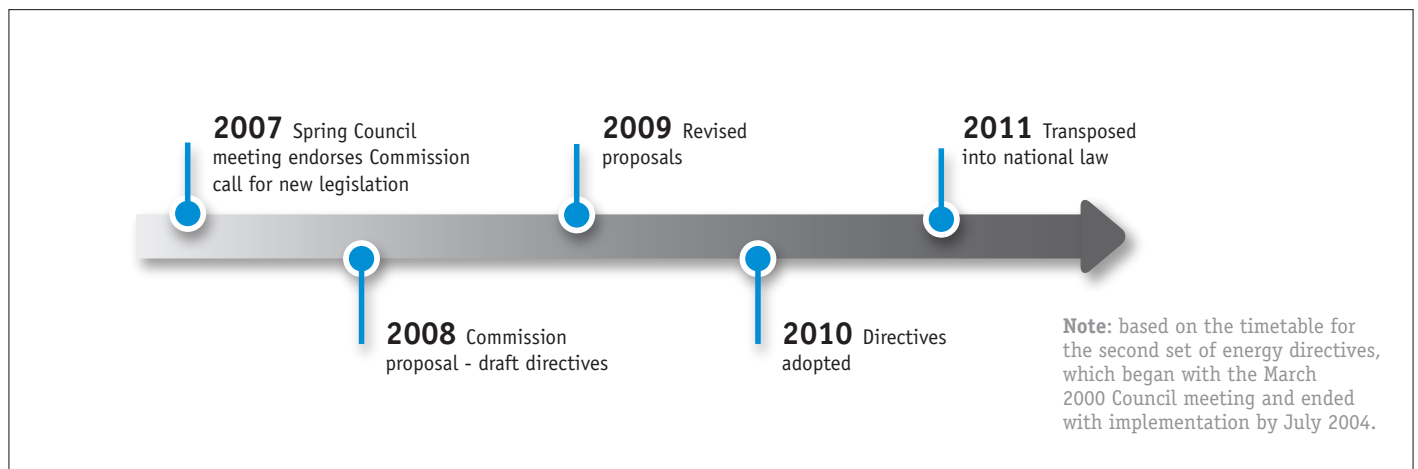
CONCLUSIONS

The proposal to introduce ISOs into the European energy landscape introduces some difficult but fascinating issues of market design and regulation, with which experience in other jurisdictions and industries can assist. Although new legislation will take some time to agree upon and implement (see illustrative timeline in Figure 4 below), the coming months provide a crucial window for consultation before draft legislation is proposed.

Figure 3. Ownership Unbundling in the European Union ¹⁴

Member State	Gas	Electricity
Austria	N	N
Belgium	N	N
Czech Republic	N	N
Denmark	Y	Y
Finland	N	Y
France	N	N
Germany	N	N
Hungary	Y	N
Ireland	N	N
Italy	N	Y
Netherlands	Y	Y
Poland	Y	N
Portugal	Y	Y
Romania	Y	Y
Slovakia	N	Y
Slovenia	N	Y
Spain	Y	Y
Sweden	Y	Y
United Kingdom	Y	Y

Figure 4. Possible Legislative Timeline



ENDNOTES

1. See p.14, "DG Competition Report on Energy Sector Inquiry", Brussels, 10 January 2007, SEC(2006) 1724. Many of the largest TSOs in the European Union are not 'ownership unbundled' but are part of utility companies which also own electricity generation and or retail gas and electricity supply businesses (see Figure 3, page 6).
2. See p.7, "An Energy Policy for Europe", Brussels, 10 January 2007, COM(2007) 1 Final.
3. "DG Competition Report on Energy Sector Inquiry", Brussels, 10 January 2007 SEC(2006) 1724.
4. The relation between ISO and TOs is governed by the System Operator Transmission Owner Code (www.nationalgrid.com/NR/rdonlyres/9F6BCA75-863A-4D18-8C3A-62C69AE23C1F/13824/STCdesignationcleanv2_rev20.pdf).
5. Electricity transmission assets in Scotland belong to Scottish Power and Scottish and Southern Energy. The England & Wales system belongs to National Grid, which also acts as an ISO operating all three grids. All three companies are private, for-profit entities, but unlike the two Scottish companies National Grid has no role in electricity generation or supply.
6. European Commission press release: Mergers: summary of the remedies offered by GDF and Suez, MEMO/06/424, 14 November 2006.
7. For example, there are six member systems in the New England ISO, seven member systems in the New York ISO, 15 member systems in PJM and 40 member systems in the Midwest ISO.
8. Note that National Grid would not be able to shift costs from one regulatory jurisdiction to another, as could happen in continental Europe, since there is a common regulator for Scotland, England & Wales.
9. The details of the U.S. standards of ISO independence can be found in FERC Order No. 2000, pp. 152-217.
10. A tender process was used to select the GBSO, although only one application was received.
11. See NGC Incentive Schemes from April 2000, Transmission Services Uplift and Reactive Power Uplift. A Decision Document. Ofgem (25 February 2000).
12. The acquisition of Dwr Cymru Cyfyngedig (a water company in Wales) by Glas Cymru Cyfyngedig in 2001 raised similar issues. The water company was to be 100% debt financed, and the regulator expressed concerns that it would be in financial jeopardy if it failed to meet its efficiency targets. However, the regulator ultimately decided to leave the issue to the financial markets to judge, rather than prevent the deal going ahead. See 'The proposed acquisition of Dwr Cymru Cyfyngedig by Glas Cymru Cyfyngedig', a position paper by Ofwat, January 2001.
13. House of Commons, Transport, Local Government and the Regions - Eighteenth Report, 17 July 2002.
14. See footnote 12, p.7, "An Energy Policy for Europe", Brussels, 10 January 2007, COM(2007) 1 Final.

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