

## **Regulating the Electricity System Operator: Lessons for Great Britain from around the world**

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This study explores the international experience with independent system operators (ISOs) with respect to the incentives that system operators face to operate the electricity network efficiently (from the point of view of society). It does so in the light of the emerging challenge of rising distributed renewable generation. We look for lessons that we can learn from this experience for the future regulation of the Great Britain (GB) System Operator (National Grid Electricity Transmission) as it transitions to a more independent entity within its parent company. We look at seven ISOs from the USA, where the model seems to be successful but with some cost issues within the system operator itself. We also examine system operators from Australia (AEMO), Chile (SIC/SING) and Peru (COES). Our findings are supported by a short survey that was sent directly to our contacts in the system operators from our sample of ISOs.

We suggest that the regulation of the SO is not primarily about assessing the efficient amount of revenue the SO requires but about the efficiency of its ancillary service procurement process, its system optimisation (to set procurement levels) and its stakeholder governance process.

The aim of this paper is to conduct an international review of how independent system operators were regulated in order to ensure that they are maximising social welfare. This is an important question because system operators impose both internal (direct) and external (ancillary service market procurement) costs, as well as indirectly influencing the efficiency of whole system energy markets and network costs. It is not simply a question of monitoring their internal costs. For a typical ISO in the US the ISO internal cost is around 50 cents per MWh and hence very small in relation to the total customer bill. Conventional UK network regulation based on comparing costs across groups of similar entities seems particularly ill suited to properly assessing ISO performance. This is because ISOs are inherently difficult to compare between jurisdictions: there are significant scale and scope effects; many of the external costs are energy price related; and the demands on ISOs are location specific and changing. ISOs are themselves regulatory bodies responsible for real time system operation and for taking a view about the future development of the

system and hence must be sufficiently resourced. They must be subject to regulatory oversight but they also have to provide appropriate levels of voice, accountability and training to their stakeholder community which may be expensive in themselves.

We find that ISOs in the US tend to be subject to annual budget approval processes for internal costs. This would seem to have advantages in terms of flexibility to respond to new demands on the system in contrast to longer term price control incentives in GB. Price control periods in GB were designed for capital intensive sectors, not for responsive system operators, facing uncertain demands. Reducing the ex-ante nature of internal cost regulation and moving to shorter term, possibly even ex post budgetary approval would seem to merit consideration. By contrast, US ISOs, have relatively little oversight of their external costs, and leave these to be monitored by wider stakeholders rather than the regulator. This may be a weakness of US regulation, but given the lack of stability in the regulation of external costs in GB, moving the monitoring of external costs to wider stakeholders might also have some merits against the current mechanism.

We document the ways in which ISOs are subject to regulatory oversight and how proposed changes to their activities need to be approved, both via ISOs' own stakeholder management process and by the regulatory authority responsible for overseeing them (e.g. FERC in the US). They are usually explicitly required to operate the system efficiently. In the face of long-term trends in renewable penetration, some jurisdictions such as Australia and PJM have responded with proposals for radical market redesign of price resolution in order to sharpen signals in the energy market. It is important that the GB SO is incentivised to the benefit of present and future consumers and this may involve a combination of radical market redesign to reduce external and overall system costs, as well as incremental changes.

We discuss how stakeholders play a key role in the proposal of and design of detailed implementation rules for new initiatives for the best ISOs. Complex voting rules are observed which attempt to balance out competing interests. These rules are worthy of study for the lessons they might have for GB. It is important to stress that these rules may be complex but they may give rise to good processes for representing stakeholder interests in a way that both takes them seriously but also prevents them being over-weighted. Participation incentives are important, as well as participation costs. There are some examples of good practice in training of stakeholders, encouragement to participate and the use of remote electronic voting.

High levels of internal and external oversight of ISO decision making are associated with impressive amounts of publicly available information on ISO performance. Decisions around the SO are becoming more complex and subject to high levels of uncertainty. This suggests that high levels of monitoring and attention to the capacity to learn quickly from new information would seem to be important as we move towards a system with high shares of intermittent distributed renewables. State of the Market Reports provide excellent examples of regular updates on key recommendations for future market design.

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