

Review of potential models for the regulation and remuneration of the electricity system operator

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1 Introduction and summary

Background

The electricity system operator (ESO) performs a variety of roles within the GB electricity system. These include the management of system frequency, planning and coordination of the transmission system, collecting charges for the use of transmission infrastructure, and the implementation of some Government interventions in generation markets. The ESO role is currently carried out by National Grid Electricity Transmission (NGET) and subject to economic regulation by Ofgem.

Ofgem's regulation of National Grid's ESO activities has, to date, involved a distinction between its "external costs" and its "internal costs". The external costs include costs incurred by the ESO to make payments to electricity system participants such as generators, for what have been described as ancillary services or balancing services. The internal costs include the costs of the staff and IT systems used by the ESO to carry out its activities.

Ofgem recently amended its regulatory approach to the ESO's external costs, moving away from the historical approach which placed emphasis on mechanistic ex ante regulatory incentive schemes. Ofgem's new approach, introduced with effect from April 2018, places more weight on regulatory (and stakeholder) expectations of good performance and behaviour from the ESO, with a broad performance evaluation carried out annually by Ofgem and informed by stakeholders. The ESO's internal costs and some other aspects of its performance remain subject to the RIIO-T1 price control that is applied to NGET. The RIIO-T1 control places emphasis on ex ante regulatory incentives, and runs for an eight-year period until the end of March 2021.

Ofgem intends to set new price control arrangements for the ESO from April 2021 that are separate from those for National Grid's electricity transmission business. This reflects the greater separation between transmission owner (TO) and ESO activities within National Grid Group, including a separation of TO and ESO licences from April 2019. This presents an opportunity to tailor the price control framework to the services and features of the ESO and to apply a more coherent approach across the regulation of the ESO's internal and external costs.

In this context, Ofgem appointed Reckon LLP (supported by Tim Keyworth) to carry out a "Review of potential models for regulation/remuneration of the Electricity System Operator". Ofgem emphasised to us that it was open-minded about the future regulatory framework for the ESO.

Development and assessment of options for the ESO price control framework

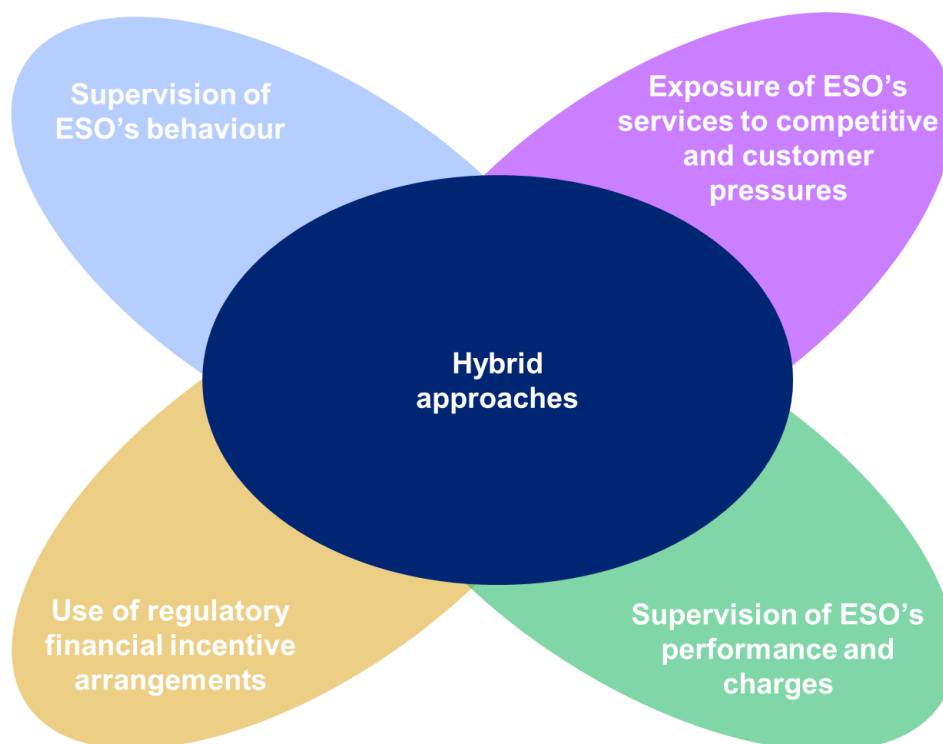
Our intention has been to explore a variety of options and alternative trajectories for the ESO price control framework. We have drawn on examples of regulatory approaches from other sectors and countries, and on our own experience and ideas. Ofgem shared our view that there is unlikely to be

a good off-the-shelf regulatory model that we can take and apply directly to the ESO from April 2021. The real task is not to choose a model or approach, but to choose a coherent and well-balanced mix of regulatory approaches and tools which is suitable for the ESO.

We identified features of the ESO that seem important for the design of a new price control framework. These include: the nature and diversity of services provided by the ESO; the idiosyncrasy of the ESO's role within the GB electricity system; its relatively asset-light operational structure; and the possibility of further separation of the system operator role from National Grid Group in the future (though this is not currently proposed by Ofgem). The features of the ESO differ in significant ways to the GB energy network companies regulated under the RIIO framework. Section 2 provides further information on features of the ESO that we identified as relevant.

Price control frameworks are composed of many elements and can employ a range of regulatory tools. As a means to bring some organisation to these elements and tools, and to help put together practical options for the ESO price control framework, we identified four broad high-level approaches that could be used to try to achieve "good outcomes" from the ESO. These approaches are shown in Figure 1 and described in more detail in section 4.

Figure 1 Broad categorisation of ways of achieving good outcomes from the ESO



In practice, price control frameworks will tend to involve a hybrid approach that uses several, and perhaps all, of the four broad approaches, to varying degrees. They will also differ in the way that these approaches are implemented.

The development of the ESO price control framework can be guided by choices relating to the emphasis and balance across these four approaches, and then, at a more detailed and technical level, by choices on the specific regulatory tools and interventions that can be used to give effect to these approaches.

We drew on this perspective to develop six potential packages of options for the ESO price control framework. The role of the packages is to help flesh out coherent sets of regulatory options which can then be compared in terms of their benefits and drawbacks. The packages provide a useful starting point for Ofgem’s next phase of work on the ESO framework, although there is no reason to be bound by their details as development of the framework moves forward.

Table 1 shows how the six packages differ in terms of the balance and intensity of the four regulatory approaches from Figure 1 above. In this table, a darker shade of blue indicates a greater role for, or intensity of, regulatory activity within a broad approach for the specified package. For instance we can see that package E would place the greatest emphasis, across the six package, on the use of regulatory financial incentive arrangements.

Section 5 provides further information on the packages, including their common elements and the regulatory tools that differentiate them. We very briefly introduce the packages as follows. Package A involves minimal change from the status quo arrangements, with the ESO’s external costs subject to the new evaluative approach and its internal costs subject to arrangements similar to RIIO-T1. Package B is the simplest approach, adopting a reduced version of the new evaluative approach for both the ESO’s internal and external costs. Package C extends the evaluative approach from package B in various ways intended to improve outcomes. Package D builds on package C, and brings a greater focus on the services of the ESO. Package F would be focused on the development of holistic financial incentive schemes relating to the ESO’s performance and influence within the GB electricity system. Package F is a variant on package C which involves more hands-on regulatory supervision of the ESO.

Table 1 Packages defined by weight placed on four broad approaches to achieving good outcomes

	Package					
	A	B	C	D	E	F
Supervision of ESO’s performance and charges	Dark Blue	Light Blue	Very Dark Blue	Very Dark Blue	Dark Blue	Very Dark Blue
Use of regulatory financial incentive arrangements	Dark Blue	Light Blue	Light Blue	Light Blue	Very Dark Blue	Light Blue
Exposure of ESO to competitive and customer pressures	Light Blue	Light Blue	Light Blue	Dark Blue	Light Blue	Light Blue
Supervision of ESO’s behaviour	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Very Dark Blue

We provide in section 6 a high-level assessment of the six packages against a number of evaluation criteria. We adopted a hierarchical approach to the evaluation criteria, considering high-level criteria relating to the price control framework for the ESO, as well subsidiary criteria that feed into each of these. Table 2 summarises our assessment of the packages against the high-level or first tier criteria. Table 3 elaborates on subsidiary criteria that feed into the capability of the price control framework to deliver good outcomes from the ESO (which is one of the high-level criteria) and compares the packages against these.

Table 2 Comparison of packages against first tier assessment criteria

	A	B	C	D	E	F
Capability to deliver good outcomes	Dark Blue	Dark Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Implementation complexity and risk	Light Blue	Light Blue	Light Blue	Medium Blue	Dark Blue	Light Blue
Regulatory effort and burden	Medium Blue	Light Blue	Medium Blue	Dark Blue	Dark Blue	Dark Blue
Transparency	Medium Blue	Medium Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Adaptability to future developments	Medium Blue	Medium Blue	Medium Blue	Light Blue	Dark Blue	Medium Blue



Table 3 Comparison of packages against second tier criteria relating to good outcomes

	A	B	C	D	E	F
Contribution to whole-system efficiency, coordination and transformation	Dark Blue	Dark Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
ESO service quality aligned with what customers want	Medium Blue	Dark Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Aggregate level of ESO charges	Medium Blue	Dark Blue	Medium Blue	Light Blue	Light Blue	Medium Blue
Fair and cost-reflective ESO charges to customers	Medium Blue	Medium Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Enabling the ESO to finance its activities	Medium Blue	Medium Blue	Medium Blue	Medium Blue	Medium Blue	Medium Blue

The assessment is subject to some uncertainty and reflects our project team’s judgement; we provide more information on our reasoning in section 6.

Our assessment indicates that package D performs best in terms of its capability to deliver good outcomes from the ESO, its transparency and its adaptability to future developments. Against this, it is not the most simple or low-risk package to implement (though it does have lower risk than

package E). Package D would involve greater regulatory resource requirement and burden than some of other packages, especially in the initial move to this type of approach.

Package D would build on Ofgem's new evaluative approach to system operator incentives from April 2018. This would be complemented and enhanced by a focus on the services that the ESO provides, with greater transparency on the costs it incurs and the relationship between these costs and the charges for specific ESO services. Under package D, there would not be any mechanistic regulatory financial incentive arrangements applied to the costs incurred by the ESO. The price control framework would, in the first instance, restrict the ESO's revenues to cover the costs it incurs plus a reasonable allowance for its financing costs, to be determined by Ofgem. The ESO's costs and efficiency would form part of an annual evaluative assessment of its performance led by Ofgem with stakeholder input. The ESO's efficiency and wider performance would also be subject to disciplines arising from stakeholder and competitive processes, including the ESO's relationships with its customers, the potential for the ESO role to be transferred outside of National Grid in the future and the possibility for competition to emerge in some aspects of the ESO's services.

Approach to price control remuneration of ESO financing costs

In specifying the six packages, we left open the regulatory options relating to the price control remuneration of the ESO's financing costs (cost of capital). For each package, there would be an allowance, to be determined by Ofgem, for the costs of the financing needed to support the ESO's activities. Although there are some interactions between options relating to the ESO's financing costs and decisions on other aspects of the ESO price control framework, we found it helpful to draw out these options for separate consideration.

At present, part of the allowance for NGET's financing costs under the RIIO-T1 control is for ESO activities and the financial capital requirements to support these activities are embedded within NGET's regulatory asset value (RAV). The introduction of new price control arrangements for the ESO, which are separate from the NGET control, presents opportunities as well as risks in relation to the RAV.

There is a question of whether the new ESO price control arrangements should use a RAV at all. This question is complicated by the different roles that a RAV can play. An ESO RAV can play a useful role as a means to: (a) provide transparency about depreciation allowances feeding into the calculation of the ESO's maximum regulated revenue and charges; (b) keep track of the remuneration of its capital expenditure over time; and (c) inform the assessment of the ESO's cost of capital. To work best, the RAV would involve different pots, with different asset lives, to support a fair remuneration of capital costs between current and future customers.

There would, however, be some serious downsides with an approach that sought to use the ESO RAV to provide a high degree of long-term commitment to remuneration of the ESO's capital

expenditure. This is particularly so in a context where the services required from the ESO may change over time and where there is some potential for competition or substitution in relation to the ESO's role and services. It is questionable whether the potential reductions to financing costs from such a commitment would outweigh these downsides.

Regardless of whether a RAV is used for the ESO price control framework, there is a strong case for a RAV valuation and allocation exercise that considers the capital requirements supporting the current ESO activities. This would be used to allocate the NGET RAV between the TO and ESO activities at 31 March 2021, in a way that helps reduce risks that, from April 2021 onwards, customers pay more simply as a result of the separation between the NGET and ESO controls.

The determination of price control allowances for the ESO's financing costs could draw on approaches used as part of the RIIO framework. However, some adaptation seems necessary to take account of the ESO's features and circumstances. The notional efficient capital structure for the ESO is likely to look quite different to that for an energy network infrastructure company. The ESO's financing costs will not be proportional to its RAV or to the value of its fixed assets; this is true of network infrastructure companies but more acute for the ESO. Attention needs to be given to the full set of capital requirements arising from ESO activities and services (including working capital for cash-flow management and equity capital to provide a buffer against financial risk) and it will be important to consider interactions between financing costs and the design of the price control framework (e.g. the scale of financial upside and downside under any incentive arrangements).

Finally, consideration needs to be given to the way that the ESO price control framework takes account of the fact that the ESO is owned by National Grid Group. The separate licence and separate control for the ESO may point towards an approach to remuneration of financing costs that treats the ESO as if it were a hypothetical standalone company. But this does not seem desirable; it could create a situation where customers are exposed to the drawbacks of the ESO being part of National Grid Group without receiving any of the benefits of this ownership arrangement in terms of financing costs.

Overarching questions on the direction of travel for the ESO price control framework

Further to our work on the development and review of coherent packages of options for the ESO price control framework, and on price control remuneration of the ESO's financing costs, it is helpful to take a step back and draw out some broader questions concerning the framework and how Ofgem develops this in the period leading up to April 2021, and beyond. This is particularly so as there are ideas and choices that matter at a relatively fundamental level in terms of the regulatory approach, which may get lost in comparisons of the six packages. The specification and assessment of the packages is a useful analytical exercise, but questions about the "direction of travel" are more important, at this stage, than the finer details of price control arrangements.

We feel that we gained considerable insight from the process of developing, refining and evaluating the packages introduced above. This led us to identify several overarching questions that can help guide the evolution of the ESO price control framework, which we list in Table 4. These are ultimately questions for Ofgem to consider, in the light of its statutory duties and wider strategy. But Ofgem was keen to hear our own views. We provide our project team’s suggested answers to these questions in Table 4. We elaborate on the reasoning behind these answers in section 9.

Table 4 Overarching questions for Ofgem and some suggested answers

Question	Suggested answer
1). Should we withdraw the ex ante incentives approach from the ESO’s internal costs?	Yes
2). Should we develop a suite of service-level price controls for different ESO services, along with cost transparency on these services, with the aim of drawing on market participants and other stakeholders to help shape the role of the ESO and discipline its efficiency and performance?	Yes
3). Should we develop new mechanistic ex ante financial incentive arrangements that encourage the ESO to achieve good outcomes across the full range of its activities and responsibilities?	No
4). How much regulatory resource and complexity should we allow for the ESO price control framework, given that there is no shortage of potential initiatives and tools that could be used to help improve outcomes from the ESO?	Quite a bit: more than for the ESO regulation in the past, especially for implementation of the new approach

Concluding remarks

The introduction of separate price control arrangements for the ESO from April 2021 provides a superb opportunity for Ofgem. Although there are some tricky issues to work through, especially in relation to the price control remuneration of financing costs, time is on Ofgem’s side. There seems much to gain from tailoring the price control framework to the services and features of the ESO, and enabling a more coherent approach across the ESO’s internal and external costs. The new ESO incentive arrangements introduced in April 2018 provide a platform that can be developed and enhanced. An approach that places greater regulatory focus on the ESO’s services seems highly attractive in terms of achieving good outcomes in the nearer term, the paths that it would open up in the future, and its adaptability to technological and institutional innovation.

Acknowledgements

We would like to thank the Ofgem team for helpful feedback and discussion, and especially for the open and constructive way in which it approached this project. This allowed us to explore a wide variety of regulatory options, and then to draw out and refine some high-level distinctions and questions that look important for the next stage of Ofgem’s work in this area.

Structure of the report

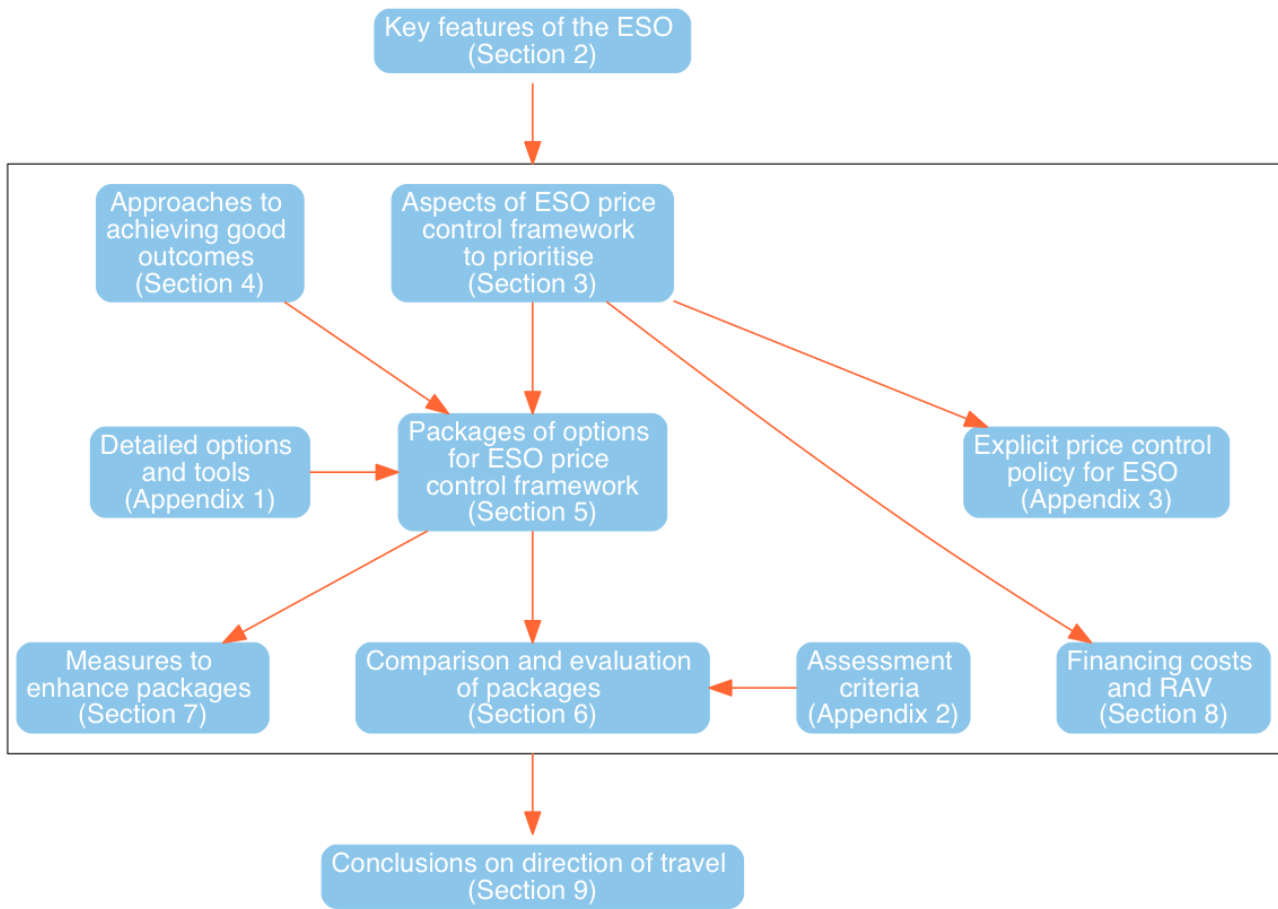
The remainder of this report is organised as follows:

- Section 2 sets out a number of features of the ESO which seem particularly relevant to the development of a new price control framework to apply to the ESO from April 2021.
- Section 3 explains which aspects of the potential future price control arrangements for the ESO we prioritised for review in this project.
- Section 4 describes four very high-level regulatory approaches that could be used, as part of the ESO price control framework, to try to get good outcomes from the ESO.
- Section 5 outlines six potential packages of options for the ESO price control framework, which we developed by drawing on the high-level regulatory approaches from section 4 and on ideas for more detailed aspect of the framework.
- Section 6 presents a comparative assessment of these six packages.
- Section 7 highlights and discusses three further issues, which are particularly relevant to ways in which these packages could be applied or enhanced, to achieve better outcomes from the ESO.
- Section 8 discusses questions and options that relate to the approach to remuneration of the ESO's financing costs, and the potential use of a RAV, within the overall price control package.
- Section 9 presents conclusions, with a focus on more fundamental questions relating to the direction of travel for the ESO price control framework.

In addition, we have three appendices. Appendix 1 provides information on more detailed questions and regulatory options that are relevant to the development of the ESO regulatory framework. Appendix 2 summarises our approach to assessment criteria. Appendix 3 discusses the potential contribution from Ofgem developing a policy statement on its approach to the ESO price control, which could take a position on some strategic questions for the ESO price control framework that emerge from the main body of the report.

Figure 2 (overleaf) provides a diagram to show the main relationships between the various different parts of the report.

Figure 2 Diagram of relationship between main sections of the report



2 Key features of the ESO

This section discusses a number of features of the ESO which seem particularly relevant to the development of a new price control framework for the ESO from April 2021. We take the following features in turn:

- The diverse set of services provided by the ESO.
- Potential for competition and substitution in some services provided by the ESO.
- The ESO as a for-profit commercial company.
- The ESO as separate licenced company within National Grid Group.
- The potential for full separation of the ESO from National Grid group in the future.
- The asset-light nature of the ESO licensee.
- The idiosyncratic nature of the ESO role.
- Regulatory legacy from previous price controls.

The diverse set of services provided by the ESO

The ESO is engaged in a range of activities, and provides a diverse set of services.

It is not straightforward to define the services provided by the ESO. We set out in Table 5 one possible perspective on some of the main services provided by the ESO, as a means to demonstrate the range and diversity of these services. This is an approximation for the purposes of this report; there are, no doubt, different ways to summarise and categorise the ESO's services and there may be further services that are missing. In the table we have included some subsidiary activities of the ESO, which feed into the main ESO services, and which might be seen as services in their own right (albeit services supplied internally from one part of the ESO to another). Within some of the services in the table it may be possible to further decompose services, but this is not necessary for the purposes at hand.

In setting out the approximation of services, we have sought to go beyond the idea that the system operator provides “balancing services” and question what these are, and for whose benefit they are provided. There is a temptation to treat everything that the ESO does as for the benefit of “the system” and to stop there. But in fact, certain activities carried out by the ESO benefit some participants in the system more directly than others. For example, the extent to which generators (or suppliers buying energy from those generators) benefit from the procurement by the ESO of blackstart and reserve arrangements depends on factors such as the type and scale of generation

used and the extent to which the power flows attributable to that generation use the transmission and distribution systems. The fact that, in benefitting some system participants directly, the ESO's actions also lead to wider system benefits (e.g. system stability), and benefit final consumers, does not detract from our ability to link the ESO's actions to specific services and customers.

Table 5 **Approximation of services provided by ESO (not comprehensive)**

ESO Service (or subsidiary service)		Comment
1	Provision of use of system services for GB electricity transmission infrastructure	As system operator, the ESO essentially provides the core transmission network services to users, acting as the commercial interface for transmission use of system services, setting charging methodologies and collecting revenue which is then passed on to the onshore and offshore TOs Question as to whether ESO acts as a wholesaler or agent in respect of this service
2	Managing frequency on the GB electricity transmission and distribution systems	Can be seen as subsidiary activity/service to 1 above, which feeds in to affect the quality and reliability of energy supplied to energy consumers
3	Managing voltage on the GB transmission system	Can be seen as subsidiary activity/service to 1 above, which has implications for the costs of transmitting electricity over the transmission system (since voltage affects losses)
4	Constraint management	Can be seen as a subsidiary activity/service to 1 above, which reflects the idea that transmission use of system services are "oversold" in the sense that services are offered beyond those which can be provided through available physical capacity
5	Provision of back-up arrangements for generation	Enables generators that pose risk of disrupting system-wide frequency to be connected to system without needing to arrange their own dedicated back-up arrangements against unexpected shut down (which would feed through to greater need for frequency management activity)
6	Restoration services and blackstart services	Enables those generators incapable of starting on their own (i.e. independently of the system) to start up by drawing power from other generation connected to the system
7	Agent to TOs in relation to development of new physical connections to transmission system	ESO acts as commercial interface for new TO network connections Possible view that TO acts as a wholesaler rather than agent
8	Management of access to physical electricity transmission and outage planning	Enables TOs to work safely on transmission network assets for purposes such as maintenance and upgrades

ESO Service (or subsidiary service)		Comment
9	Long-term planning and coordination of GB transmission system	Might be seen as a subsidiary activity/service to 1 above, but planning functions go wider as ESO is expected to take a whole-system view (including non-network options) and to consider interactions across transmission and distribution rather than focusing on transmission in isolation
10	Provision of information/data which is useful for market participants and other stakeholders	Information such as demand and generation forecasts may be produced as part of ESO's other activities (e.g. managing frequency) but there is also a service of providing information to market participants
11	Administrative functions in relation to various industry code governance processes and European network codes	Note that besides administrative functions, ESO may also be expected to participate in industry code governance processes to achieve specific objectives (see item 13 below)
12	Advice and implementation work for Government relating to EMR (capacity market and contracts for difference)	In some sense, the ESO acts as a consultant/professional advisor/subcontractor to the Government in relation to aspects of EMR implementation, displacing work that might otherwise be done by civil servants and their advisors
13	Advice to Ofgem, and participation in and leading industry processes with aim to improve whole system competition and coordination issues and tackle areas where parts of system/market are not working well for customers	This may include (but is not limited to) advice to Ofgem in project identification process and supporting tenders in relation as part of potential future competitive regime for onshore transmission infrastructure

The variety of these services seems of a different magnitude to those provided, at present, by the GB energy network companies subject to the RIIO controls.

The variety seems relevant to the design of the regulatory framework. Approaches that may work well in one area, may not work well in others. There may be benefits in seeking to distinguish different services, or different categories of services, in terms of how they are regulated.

The demand for the services of the ESO can be expected to change over time, with new services being requested of the ESO and perhaps other services becoming less important.

Potential for competition and substitution in some services provided by the ESO

An implicit assumption behind Ofgem's plan to introduce a separate price control for the ESO from April 2021 is that, in the absence of such a control, the ESO will not face sufficient constraints on its activities to protect the interests of customers.

As part of the development of a new regulatory framework for the ESO, this assumption warrants some further review. As highlighted above, the ESO provides a range of services. For some, there may be a degree of competition, or potential competition, which has implications for the choice of

options for the regulatory arrangements. There is not just the question of whether to apply price controls. The type of price control that is most appropriate will depend on competitive conditions and opportunities amongst customers for self-supply, and even weak competitive pressures may open up options for regulatory approaches that may otherwise not be attractive.

It is beyond the scope of this project to carry out a competition assessment for ESO activities. But it seems critical to take some account of the possibilities that may exist across the range of services provided by the ESO. It may turn out that the ESO's services fall into several different categories:

- Cases where the ESO can be seen to provide a service to “the GB transmission system” rather than specific customers, and this service is inherently linked to the monopoly positions that exist in relation to transmission infrastructure/capacity to such a degree that the ESO service is also monopolistic.
- Cases where the ESO provides a service to specific customers, and would have a dominant position in the absence of price control regulation.
- Cases where the ESO provides a service to customers, and it is only the efficiency of the ESO (e.g. achieving efficiencies arising from its central system position and coordination opportunities) that could mean that the ESO has a dominant position in that service, without effective competition from other service providers.
- Cases where the ESO provides a clearly defined service to customers and faces competitive constraints in doing so (or would do in the absence of a price control).

Part of the difficulty at the moment is that the ESO's services seem rather bundled together, including for charging purposes. A risk with bundling is that the existence of significant services in the first and second categories above leads to a monopoly position across a wider range of activities.

There are questions about the potential for a degree of competition and self-supply under current market structures, arrangements and technologies. There are also questions about future developments.

Developments over time may affect the ESO in different ways, ranging from direct competition to the ESO in some areas to more indirect effects on the demand for services provided by the ESO. There may be greater scope for competitive dynamics in relation to aspects of the services provided by the ESO in the future. For instance, as the regional DNOs start to engage in more active management of their electricity distribution networks, they may start to become a supplier of services to the transmission system operator in some areas and/or a form of competitor to the transmission system operator in other areas. There may also be effects at the more local level, arising from community energy initiatives or from smart “home hubs” that could find alternative ways

to provide energy consumers with stable energy supplies that require less activity by the ESO. It is also possible that future developments enable the ESO to expand the range of services that it can usefully provide.

The potential for competitive dynamics in relation to at least some aspects of the ESO's services has several implications for the regulatory framework:

- There may be opportunities to design the price control framework for the ESO in such a way as to make use of potential competitive dynamics and disciplines on the ESO, which could provide a degree of protection to customers that is not available in the case of price controls for more monopolistic energy network companies.
- The price control framework (and related charging methodologies) can affect the development of competition, and choices about the framework may have different implications for the risks that otherwise viable forms of competition are prevented from emerging.
- There are risks that the ESO engages in activities that limit the emergence of innovative arrangements, to the detriment of consumers, and there may be merit in regulatory measures to limit these risks (beyond general competition law).

The ESO as a for-profit commercial company

The ESO licensee will be a company within a for-profit corporate group. The for-profit nature has implications for the type of regulatory approaches that are likely to work well.

On one hand, the for-profit nature supports the use of company-level financial incentives as part of the regulatory framework. Used in the right circumstances, and implemented well, these can be a strong driver of performance to the benefit of customers. Financial incentives can help ensure that the company has skin in the game. Subject to the regulatory framework, a for-profit structure may also make it easier for the ESO to take on (and justify) risky innovation, knowing that it faces the downside as well as upside. On the other hand, with a for-profit structure, there are particular risks that the ESO takes opportunities to do things which are profitable but act to the detriment of customers or other stakeholders. The balance between the effectiveness of financial incentives compared to reputational incentives will also be affected by the for-profit status.

The for-profit nature of the ESO's corporate group is also relevant when drawing insights from other countries and sectors. For example, models for regulation and remuneration of system operators outside the UK may reflect their status as non-profit entities. This does not mean that we cannot draw ideas or insight from these cases, but we would need to think through how potential approaches could translate when applied to a for-profit company.

The ESO as separate licenced company within National Grid group

The new ESO will be a separately licensed company that is part of National Grid Group plc.

The work on ESO licencing and other arrangements to achieve greater separation between National Grid's ESO and TO activities mean that some regulatory approaches that may not have been suitable for ESO activities in the past may be more suitable going forwards. The ESO can be expected to behave in a more independent way than when it was integrated with TO activities as part of NGET.

However, the separation of licences and other ring-fencing measures do not necessarily eliminate the risks of the ESO being influenced by a degree of conflict of interest or wider strategic consideration given the role of National Grid in transmission infrastructure (whether as a TO under RIIO or potentially as a bidder under the CATO process). Our view is that it is prudent to proceed on the basis that some residual risk may remain in this area, and consider whether potential regulatory and remuneration models differ in terms of their susceptibility to any residual risk.

There is a further implication of the ESO being part of National Grid. The ESO is small financially compared to the whole of National Grid. Whether the ESO performs well or badly against any regulatory financial incentives seems unlikely to have a significant impact on National Grid's corporate performance (unless those were calibrated in a way that was disproportionate to the size of the ESO). At the same time, National Grid can be expected to want to retain a strategic interest in the ESO rather than selling it off. In this context, the potential contribution from capital market competition (e.g. takeover activity) seems less relevant to the ESO than for other companies subject to UK price control regulation, which may weaken the effectiveness of financial incentives and profit opportunities as a driver of good performance by the ESO.

The potential for full separation of the ESO from National Grid group in the future

As part of Ofgem's ITPR project, and other work on the GB energy sector, the idea of an independent system operator (ISO) has been raised. One possibility is that the ESO role would be carried out independently of National Grid, by some form of public sector body with specified duties.

The question of whether there should be an independent system operator is well beyond the scope of this project, but the possibility that this approach may be implemented in the future is relevant.

We see two main implications for the design of the regulatory framework for the ESO:

- The potential for National Grid to be replaced by another entity in the role of ESO is likely to affect the behaviour of National Grid – with the prospect of competitive actions to head off the risk of displacement. The development of the regulatory framework could be designed to reflect and exploit this situation, to the benefit of current and future customers. There may be less of a

need for detailed regulation of the ESO's costs and service quality if National Grid expects poor performance to lead to displacement (insofar as poor performance is detectable).

- There is a danger of investing considerable regulatory resources in the development of regulatory arrangements for the ESO which become redundant if an independent system operator (ISO) model is introduced. This means that there is a benefit from regulatory approaches to the ESO that are adaptable to potential future developments, including an ISO model. This adaptability should be taken into consideration alongside other factors in deciding on the regulatory approach for the ESO.

The asset-light structure of the ESO

Ofgem's RIIO framework was developed for the regulation of GB energy network companies, subject to RAV-based incentive regulation. This does not mean that it is necessarily unsuitable for the ESO, but the implications of the more asset-light nature of ESO seem relevant:

- The role of the RAV/RAB/RCV in the UK approach to utility regulation emerged in the context of investment in long-lived infrastructure assets, and there is a question as to whether a RAV-based approach is as appropriate for an asset-light ESO. A RAV-based approach to regulation can bring benefits to customers by providing forms of regulatory commitment to investment remuneration which can help reduce financing costs, but against this there are risks of greater customer exposure to the costs of assets that turn out not to be needed to the degree anticipated, and risks to competition. The ESO will have significant assets – whether through IT systems, or planning and design assets – but the value of these will be small compared to the value of GB energy infrastructure assets.
- Even if a RAV-based approach is retained, there is a need to consider the implications for the size of the ESO's RAV for the remuneration of financing costs. Depending on the regulatory model and approach to incentives, there is the potential for the financial risk to the ESO to be very high compared to the size of the RAV, raising questions about the level of WACC and the degree of "operational gearing". Financial incentives and risk that is currently borne on the ESO side but off the back of NGET's very large RAV may not be feasible or desirable for a separately licensed ESO.

The asset-light structure has implications beyond questions about the RAV. A separate control for the ESO, combined with the relatively asset-light structure, may expose more clearly the links between choices about the design of the regulatory framework and the financing costs of the ESO. For instance, decisions about the scale of financial incentives on the ESO may have appreciable implications for the ESO's cost of capital, which customers are ultimately exposed to. The costs to customers of financial incentive schemes, and other decisions affecting the risks to the ESO, will be more apparent.

The idiosyncratic nature of the ESO's role

The long-term incentive properties of Ofgem's RIIO framework – and the UK model of RAV-based incentive regulation more generally – work most effectively where there are good opportunities for benchmarking regulated companies. This is the case for both cost/efficiency incentives and incentives relating to outputs and service quality. Benchmarking may involve various forms of cost comparison (e.g. top-down econometric modelling to activity-level unit cost comparisons) as well as comparisons of measures of service quality. Benchmarks may also be based on external models or forecasts of costs that draw on a range of different information.

The importance of benchmarking and comparative assessment within the context of ante incentive regulation tends to be under-appreciated, but seems highly relevant to questions about the regulatory framework for the ESO. There is no close comparator, in the UK, for the ESO.

The idiosyncrasy of the ESO role is not new. But it seems set to become more of an issue with a more independent ESO. With the ESO internal costs regulated within the RIIO-T1 price control alongside NGET's other transmission opex and capex, the ESO internal costs are relatively small within the overall cost assessment. But when the ESO internal costs form part of a legally separate ESO, the challenges for cost assessment will become more exposed and acute.

Regulatory legacy from previous price controls.

At present, GB electricity system operator activities are carried out by NGET and there is a single RIIO price control covering NGET's TO and ESO activities. This is supplemented with additional regulatory incentive schemes and arrangements relating to ESO activities (including EMR activities). The RIIO-1 control will end on 31 March 2021.

This study is based on the assumption that, in line with proposals in Ofgem's RIIO-2 consultation, there will be a separate price control for the ESO licensee from April 2021.

The separation of price controls raises questions about the NGET RAV:

- The RIIO-T1 control for NGET includes a RAV which covers both TO and ESO activities, with separate reporting of the TO and ESO elements of the RAV. This RAV involves a degree of regulatory commitment on expenditure allowed through Ofgem's price control framework which has yet to be remunerated through the revenue control that constrains customers' bills. Consideration needs to be given to how this will be treated from April 2021, as part of ESO and/or TO controls.
- Under the current RIIO-T1 controls, there is a single allowance for financing costs across TO and ESO activities provided via the WACC on the combined RAV. The financing costs allowance is not built up separately from independent analysis of ESO and TO financing costs.

There is a possible view that the financing of the large TO asset base has supported the risks relating to ESO activities and the current ESO and TO RAV values are intertwined. If there are to be separate RAVs for each of the separate TO and ESO controls, it may be appropriate to carry out a more detailed allocation exercise for the NGET RAV (drawing on regulatory precedent) rather than just using the ESO and TO RAV values that currently exist.

There may be some further legacy issues related to the RIIO-1 controls, and the ESO incentive scheme from 2018, which will need to be taken into account in setting the new ESO control from 2021.

3 Prioritising aspects of the ESO price control framework

Introduction

Ofgem emphasised to us that it was open-minded about the future regulatory framework for the ESO and was keen to explore a variety of options. Our intention has been to consider a diverse range of options and alternative trajectories for the ESO regulatory framework.

Ofgem shared our view that there is unlikely to be a good off-the-shelf regulatory model that we can take from ESO regulation in another country, or from another UK regulated sector, and apply directly to the ESO from 2021. Furthermore, there may be opportunities to innovate in a way that adapts established approaches to better accommodate the circumstances and features of the ESO. The implication we have drawn is that we are not looking to examples from other sectors or countries to provide models for the entire price control framework for the ESO. Instead, we are interested in models, options and ideas for *specific aspects of the regulatory framework* that can be combined into a coherent approach overall.

As part of our approach to developing potential approaches for a new price control framework for the ESO, we prioritised specific aspects of the framework for the purposes of the project. This section summarises our approach to prioritisation and then provides an introduction to each of the main prioritised areas.

Prioritising our work on options for the future ESO regulatory framework

Table 6 identifies a number of high-level aspects or dimensions of a regulatory or price control framework that could be applied to the ESO. These are intended to represent key areas of decisions on regulatory strategy and policy towards the ESO – they are not intended to cover the details of implementation. We have set out in Table 6 our approach to prioritisation for the development and review of options in each dimension. Within each dimension further judgement on the prioritisation of issues and options is needed. These dimensions are themselves complex areas: it is not the case that there are three or four alternative options to identify in each dimension; for some of them there are numerous questions that arise and numerous paths that could be followed, each with sub-branches of further options.

Further to the various potential elements of the price control framework highlighted in Table 6, we also identified overarching questions about the “regulatory strategy” for the ESO price control framework as a high priority for Ofgem’s work in the near term. Economic regulation – and the fulfilment of the regulator’s statutory duties – involves trade-offs between a range of different considerations and risks. A regulatory strategy can be used to improve the consistency and governance of the key trade-offs, taking account of the specific characteristics of the activities or services in question. And as regulatory frameworks evolve over time, the strategy can steer the

direction of evolution, and affect what is feasible in the future, which reduces the risk that regulatory action is limited to what is the most appropriate approach at a given point in time, given prevailing constraints. We pick up on some of the more strategic questions in the conclusions to our report in section 9. In addition, we discuss in Appendix 3 the potential benefits and drawbacks of Ofgem developing and publishing an explicit price control policy statement for the ESO.

Table 6 Prioritisation of our work on development of options for ESO regulatory framework

High-level aspects of regulatory framework	Our approach
Scope and form of control	<p>Higher priority – within scope</p> <p>A major question for the regulatory framework for the ESO concerns the choice between:</p> <ul style="list-style-type: none"> • A single control which covers all (or most) ESO activities. • Separate controls for different services provided by the ESO. <p>Here, we use the term “control” loosely – it could be a formal ex ante price or revenue control or it could be rules on cost recovery, cost orientation and transparency.</p> <p>We see this question as high priority. The second approach above would represent a more radical change to the regulation of the ESO, and should be considered early in the work on the framework.</p>
Outputs and service quality	<p>Higher priority – within scope</p> <p>The use of regulatory measures to encourage the provision of high-quality services by the ESO, which fit well with customer/users’ needs and preferences, is an important part of the price control framework for the ESO.</p> <p>We consider this a high priority area.</p>
Cost recovery and efficiency	<p>Higher priority – within scope</p> <p>We use “cost recovery and efficiency” as a broad term that encompasses three interrelated areas:</p> <ul style="list-style-type: none"> • Providing investors with a reasonable prospect of recovery of efficient costs (and protecting customers from exposure to excessive costs). • The general approach to any ex ante cost assessment, determination of cost allowances and rules on cost recovery. • The potential role of cost incentives on internal and external costs and/or other arrangements to support cost efficiency. <p>We consider this a high priority area.</p>
Financing costs and RAV	<p>Higher priority – within scope</p> <p>The development of a new control for the ESO will raise questions about the approach to the remuneration of the financing costs of the ESO (including profit and allowance for risk). We have identified this as a high priority area.</p> <p>We do not consider the approach to financeability assessment (e.g. analysis of financial metrics) nor the approach to allowances for corporation tax.</p>

High-level aspects of regulatory framework	Our approach
Role of stakeholders and customers in price control processes	<p>Considered as part of priority areas above, where particularly relevant</p> <p>We include consideration of options around the role of stakeholders and customers in price control processes where they are particularly relevant to priority areas above. For instance, under the approach to cost incentives and cost recovery, there are options that allow for a high degree of stakeholder involvement and we consider these as part of that work.</p>
Duration of control	<p>Not covered in the project</p> <p>We do not consider the duration of the control. This is something of a second-order consideration, since it depends on other aspects of the framework and can be decided further down the line.</p>
Uncertainty mechanisms	<p>Not covered in the project</p> <p>We do not consider potential options relating to the use of uncertainty mechanisms as part of the ESO price control. The application of uncertainty mechanisms is a more detailed aspect of the regulatory framework and we do not consider it a priority at this stage.</p>
Special innovation funding schemes	<p>Not covered in the project</p> <p>We do not consider potential options for the application of special funding arrangements for innovation (e.g. the network innovation allowance and network innovation competition under the RIIO-1 controls). These schemes can be seen as something of an optional add-on to the price control framework, and decisions on whether to apply these to the ESO can be taken at a later date.</p>

It is worth highlighting a number of issues that we have taken to be outside of the scope of the project. These are: questions about alternatives to National Grid ownership of the ESO and moves to ISO models; the work on separation between the ESO licensee and other parts of National Grid; and questions about what services the ESO ought to be providing and what activities it ought to be engaged in for the benefit of customers.

Scope and form of the ESO price control arrangements

Our working assumption for this project is that some form of price control regulation will be needed for at least some of the ESO's services or activities from April 2021 onwards. This seems a reasonable assumption to make, given the current structure of the GB electricity system, the role expected of the ESO in that system, and the fact that the ESO licensee is part of a for-profit corporate group. However, this does not mean that all services provided by the ESO require price control regulation; and this is something that may change over time.

On the basis of our working assumption, a major question that follows for the regulatory framework for the ESO concerns the choice between:

- A framework based on a single aggregate revenue control which covers all of the ESO activities (with provision to exclude a defined set of services from the scope of price control regulation, for example because they are considered to be subject to effective competition).
- Separate controls for different services provided by the ESO, with the potential for variation, across services, in how these work (and provision for some services to be outside the scope of price control regulation). By separate controls, we envisage (a) separate restrictions on the revenues and/or charges applied to each defined service (or defined category of services) provided by the ESO; and (b) recognition of this separation in the price control review process and in the administrative decisions documents to implement these controls (though the same process and document could well cover multiple controls).

The exclusion of some services from an aggregate revenue control, or the introduction of separate controls for different ESO services, does not mean that the economic assessment to set these controls should be made on a conceptually stand-alone basis. For instance, there may be synergies and joint costs across different services that affect the efficient levels of costs needed to provide any one of them, and these may need to be taken into account.

The current regulatory arrangements for the ESO do not fit neatly into the category of a single revenue control, in particular because of the separate treatment of the ESO external costs outside the RIIO-T1 control for NGET. However, the current arrangements do not represent separate controls by service, as the distinction between internal and external costs is not aligned with a distinction in service provision.

An adaptation of the RIIO-1 approach to the separate ESO licensee could suggest a single revenue control covering the range of activities of the ESO. This has the benefit of simplicity in terms of the definition of the scope of the price control, though the determination and mechanics of revenue controls tend not to be simple.

The introduction of separate controls for different services provided by the ESO would represent a more radical option for the ESO, and would involve an initial phase of work to properly identify the various different services provided by the ESO and assign these to different categories for the purposes of price control regulation. This option has several advantages:

- As discussed in section 2, the ESO provides a range of different services and engages in a number of distinct activities. Separate controls could be more tailored to the characteristics of each service (or to similar groups of services).
- Following on from this more general point, UK regulatory practice has tended to tailor price control regulation to the competitive conditions of the services in question, with different approaches applied to services that are perceived as entrenched natural monopolies compared

to services for which forms of competition may develop in the future. Applying a single revenue control, without further consideration, may suggest a presumption that the competitive situation is similar across all ESO services. Furthermore, regulators have recognised that broad RAV-based revenue controls covering a range of different services may not be well-suited to areas where greater competition could emerge over time (e.g. concerns about cross subsidies).

- Following on from the last point, the extent to which customers need regulation to protect them depends on their opportunity to respond to the performance of the ESO (e.g. in terms of costs or service quality) by arranging alternative methods of service provision instead of the ESO. These opportunities could vary across different ESO activities, for example depending on whether the users of an ESO service are the generality of electricity demand customers or a small set of large generators. Charging methodologies used for recovery of the ESO's costs will affect the financial incentives that such parties have to take these opportunities where they have them.
- The demand for the services of the ESO seems more open to change and less stable than the demand for the services of GB energy network companies such as electricity distribution networks. The set of services expected from the ESO has changed over time, with the activities of NGET in its system operator role extended to support the Government's EMR reforms, and its role in system planning and coordination deepened following Ofgem's ITPR project. Furthermore, the emergence of distribution system operators may affect the nature and quantity of system operation services needed from the ESO. A single ESO revenue control may be less adaptable to these changes than a suite of separate controls.
- Part of the challenge of regulating the electricity system operator in the GB relates to the complexity and idiosyncrasy of the ESO's role and activities. We sense that, at least in part, this reflects a lack of clarity on the *services* provided by the ESO (as opposed to *activities* carried out) and the bundling together of a range of different services that are carried out for different reasons on behalf of different groups of users or customers. The activity of the ESO may be less complex and less idiosyncratic when broken down into a series of separate and well-defined services. There may be greater opportunity for the use of cost and performance benchmarking for specific ESO services, than for the totality of the ESO's operations.

If there is a single control for the whole set (or most) of the ESO's activities, it seems probable that the only viable option for the structure of this control is an aggregate revenue control (with potential for combination with various uncertainty mechanisms). In contrast, the introduction of a suite of controls for separate ESO services would open up further options beyond an aggregate revenue control, such as an average revenue control (e.g. revenue per unit of output or service provided); a specified maximum price for a service; or a tariff basket approach. We do not cover these subsidiary questions in this report.

We set out in appendix 1 some further questions and options that relate to the scope and form of price controls for the ESO.

We have drawn on the discussion above, and the further points in appendix 1, as we have sought to develop coherent approaches and packages of options for designing the ESO price control in a way that achieves good outcomes from the ESO (see sections 4 and 5).

Outputs, service quality, cost recovery and efficiency

We have treated the role of the ESO price control framework in relation to “outputs and service quality” as high priority, but focused more on high-level approaches than the full range of detailed policy options that fall under this area.

We agreed with Ofgem to give particular attention to the role of the ESO in strategic system-wide planning and coordination. This aspect of ESO performance is of great importance to the regulatory framework for the ESO. The reforms arising from the ITPR project, and the legal separation between ESO and TO activities within the National Grid group, will count for little if the regulatory framework does not enhance (or even undermines) the quality of the ESO’s system-wide planning and its role in the wider efficiency, coordination and transformation of the electricity system.

There are a range of regulatory options for consideration in relation to the ESO’s system planning role. At one extreme, it may be possible to develop some form of financial incentive structure that exposes the ESO financially to the long-term consequences of its planning work (e.g. a scheme that exposes it to a proportion of long-term whole system costs against a reasonably exogenous benchmark). Other regulatory options would be to focus regulation on policies and processes, with the idea that this provides a practical way for the regulator to have oversight and influence of the quality of planning, in the context where measurement of the ultimate outputs of planning is challenging. Some initiatives have already emerged through the RIIO framework for GB electricity transmission planning: the network development policy (NDP); the network access policy (NAP) and the network options assessment (NOA). This kind of policy and process based approach has also been used in various ways in range of other jurisdictions (e.g. ISOs in the US) and other sectors (e.g. air traffic management and airports).

There are strong interactions here with the dimension of the price control relating to “cost recovery and efficiency”, also identified as a high priority for the project. If the regulatory framework is designed to encourage efficiency by the regulated company, through strong financial incentives on its expenditure, the pressure for cost reductions or cost control may pose risks to service quality. If those risks can be addressed through an effective set of regulatory arrangements on all aspects of service quality, then there is opportunity for the financial incentives on costs to promote efficiency without undermining service quality – and this could provide the basis for a coherent overall regulatory framework. However, if it is difficult to monitor and assure service quality, there may be

serious concerns about quality. These may be alleviated, to some degree, by removing the strong financial incentives for reductions to the company's expenditure, but doing so may have adverse consequences for the company's costs. In short, there may be trade-offs between risks to quality and risks to efficiency. These issues are directly relevant to the ESO, especially in relation to system planning and coordination:

- **Measuring performance.** The long-term nature of planning means that it can be difficult to measure and judge success. The outcomes from good or bad planning may not be felt until many years after a planning decision is taken. Furthermore, there is difficulty from the lack of a counterfactual or benchmark against which performance can be assessed: while we can observe certain metrics of performance (e.g. constraint costs, overall system costs, scale of movement towards decarbonisation) it can sometimes be difficult to establish a counterfactual. This is especially so in the context of dramatic system-wide change that makes comparisons with the data from past periods of limited value.
- **Uncertainty.** There is considerable uncertainty about things that matter to system planning, reflecting the long-term horizon, the extent of technological change and innovation, and the role of politics and democracy in forming GB energy policy strategy and priorities. A good regulatory model would be one that encourages the ESO to manage uncertainty well, and not to optimise under the assumption that one particular view of future developments. It is difficult to assess, with the benefit of hindsight, how well the ESO done in managing uncertainty.
- **Planning costs incurred by ESO.** The costs of GB electricity system planning are small compared to: (a) the costs of the transmission system assets that may be developed (or not developed) as a consequence the planning functions; (b) the costs of constraint management and other system operation costs that fall on consumers and are influenced by planning decisions; and (c) the wider benefits to customers from good system planning.

One potential implication is that placing high-powered financial incentives on the ESO's costs (or some areas of its costs) may be detrimental overall. Small reductions by the ESO to its own costs could lead to substantial worsening of outcomes for GB energy customers in the longer term, if these are achieved by exercising discretion to limit expenditure on transmission system planning, and reducing the quality of that planning activity. There may be arguments that the costs of good planning are so small compared to the benefits and costs of transmission investment decisions, and success so difficult to measure and incentivise, that there is a case for regulatory models that enable the ESO to recover the costs it incurs, combined with some regulatory measures to provide backstop protection to other parties in the customers (e.g. industry governance and participation models). In a sense, this approach is implicit in regulatory models for independent system operators in the US in cases where a not-for-profit structure is used, rather than seeking to introduce financial incentives through corporate profit opportunities.

We set out in appendix 1 some more detailed questions and options that relate to the approach to outputs and service quality and to cost recovery and efficiency.

In section 4, we describe how we have sought to bring some structure to these more detailed questions, which we draw on in the development of coherent packages of options in section 5.

Financing costs and the RAV

We have identified the broad approach to financing costs and the RAV as a high priority area for the project. This reflects several factors:

- There are significant differences between the ESO and GB energy networks for which the RIIO control was developed, which seem pertinent to the approach to financing costs and the RAV. These include the asset-light nature of the ESO, and its role in the provision of a diverse set of services which seems quite different to the role of GB energy network companies which involves extensive activity in infrastructure asset management.
- In 2017 the independent electricity system operator in Northern Ireland brought an appeal to the CMA in relation to a price control licence modification decision by the Utility Regulator. This appeal involved consideration of issues relevant to the approach to financing costs for the ESO, some of which concern the roles and asset-light nature of the ESO.
- Ofgem highlighted to us that it had questions and concerns about the suitability to the ESO of approach to financing costs and the RAV used in the RIIO framework.
- Within its recent work on reforms to the ESO and to ESO regulation, and the introduction of a new set of incentive arrangements for electricity system operator activities from April 2018, Ofgem has not yet had opportunity to consider the options concerning ESO financing costs.

In section 8 we consider a number of issues and options in relation to the approach to financing costs and the RAV for the ESO price control framework. These are:

- The potential role of an ESO RAV and alternative options.
- RAV allocation exercise as part of ESO and TO price control separation.
- Interactions between financing costs and design of the ESO price control framework.
- The suitability of the RIIO approach to remuneration of ESO financing costs.
- Principles on the relationship assumed between the ESO and National Grid Group.

One set of issues that we have not sought to consider is the role of any additional and explicit mechanisms intended to tackle risks that regulated companies are able to earn high returns through the price control framework, at the expense of customers, without this necessarily arising from exceptional performance in cost efficiency or service delivery. Ofgem has given consideration to issues around “fair returns” in its RIIO-2 consultation, identifying various tools that could be applied such as caps and floors on the levels of returns, discretionary adjustments, sharing factors on RORE and constraining totex sharing factors.¹ While the same issues might be relevant to the ESO, they seem second-order questions at this early stage in the development of the ESO regulatory framework. The risks of unduly high returns depends, for example, on the extent to which controls are set using ex ante forecasts or assumptions and the degree to which they adjust as new information (e.g. on costs or volumes of work required) is revealed. Though we do not consider the application of such additional tools as part of this project, this is not intended to rule them out of consideration once more detailed work on the ESO regulatory framework has begun.

¹ Ofgem (2018) *RIIO-2 Framework Consultation*, March, pages 103-107.

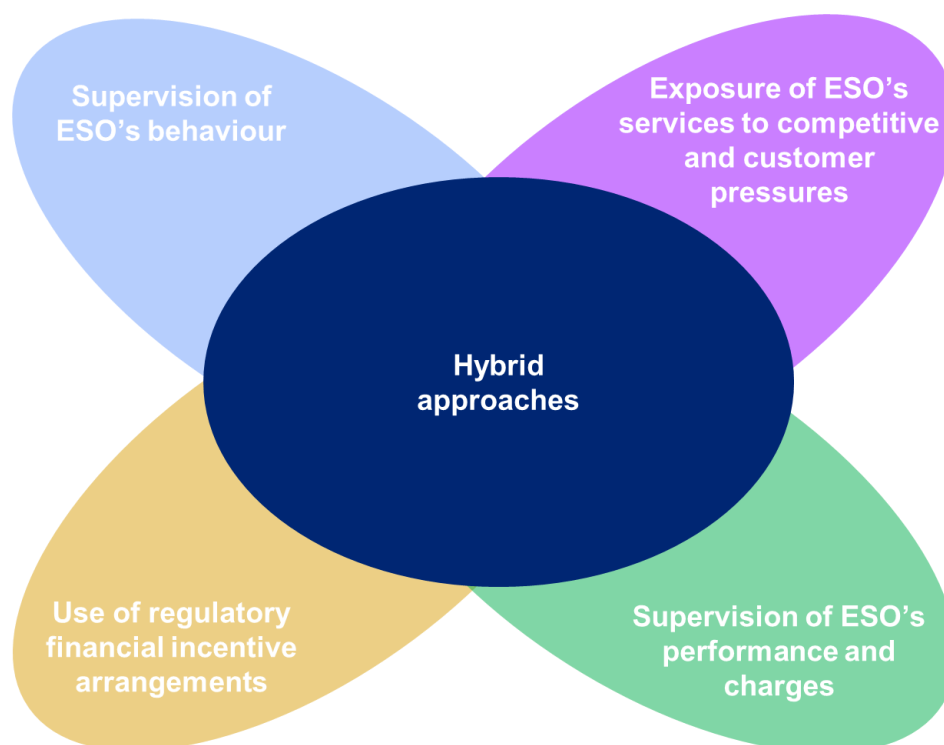
4 Ways of achieving good outcomes from the ESO

Introduction

The previous section identified a range of questions about the development of a new regulatory framework for the ESO, and these are expanded upon in Appendix 1. This section seeks to bring some structure to the way that these questions can be addressed, with a particular focus on three aspects of the overall framework: the scope and form of ESO price controls; outputs and service quality; and cost recovery and efficiency. At a broader level, questions relating to these three aspects can be addressed by considering *how* the regulatory framework is designed to achieve good outcomes from the ESO.

We have identified, at a very high level, four main ways to use the price control framework to achieve good outcomes from the ESO. These are shown in Figure 3. As indicated in the figure, although these approaches pull in different directions, if applied in their pure form, they can also be applied in combination (hybrid approaches).

Figure 3 Broad categorisation of ways of achieving good outcomes from the ESO



In practice, regulatory approaches will often include several (and sometimes all) of these different means of influencing outcomes, and can differ markedly in terms of how each of the four approaches are applied. Distinguishing between them is helpful, though, for at least three reasons.

First, it can help to highlight where different regulatory options may be best understood as variants of the same kind of broad approach rather than giving rise to alternative approaches altogether. For instance, increasing the role of stakeholder engagement can be highly beneficial to regulatory processes, but its purpose can often be understood as improving one or more of the four approaches above, as opposed to offering a more fundamentally distinct alternative. For example, a stakeholder panel can form part, and help improve the effectiveness, of the supervision of the ESO's performance and charges.

Second the distinction we draw above can assist in the development of coherent packages of options for the ESO regulatory framework, by allowing this to be considered in two phases:

- Packages can be considered firstly in terms of the different levels of emphasis/reliance that are to be put on each of the four approaches above. This can help define packages by reference to broader regulatory strategies and ideologies.
- Potential options for the implementation of each package can then be considered. It is helpful to separate this second step as, to some degree, the overall packages may draw on overlapping components/building blocks, and differ in terms of how much weight is put on the development and use of those components.

We have adopted this approach for our development of possible packages for the ESO regulatory framework which are presented in section 5.

The third benefit of distinguishing between the four approaches above is that it helps to draw out the regulatory strategy that is embodied within a particular set of regulatory arrangements that have emerged or are proposed. This can then be useful in terms of checking how these arrangements fit with policy intentions, and revealing opportunities to better tailor the arrangements to strategic priorities. It can also help with understanding differences between price control frameworks that we see in practice.

For instance, network price controls in the GB energy sector have been characterised by an emphasis on the application of mechanistic ex ante financial incentives, and the price control arrangements can be understood as involving a form of incentive contract. But other approaches to price controls are different in important ways. Some price caps, such as those often seen in the telecoms sector, simply specify that the average price for a defined basket of services must not exceed a specified level. The introduction of such a control will have financial incentive effects, but those effects arise because of the pricing constraint that has been applied, and there is less regulatory attention paid to the design of detailed incentive arrangements. This type of approach can be seen as placing greater emphasis on supervision of performance and charges and less emphasis on regulatory financial incentive arrangements than the RIIO approach to GB energy networks.

The remainder of this section introduces each of the four approaches, in the specific context of the ESO.

In Appendix 1 we provide a more detailed identification of options for different aspects of the ESO regulatory framework. Appendix 1 maps these options to the four different approaches discussed in this section. This helps to show the range of options available under each approach. It also helps to flesh out more fully what the approaches may involve in practice.

Supervision of the ESO's performance and charges

This broad approach is concerned with some form of ex ante specification of what is expected or required of the ESO, in terms of its performance (e.g. service quality) and charges, alongside some ex post review of the ESO's performance and charges.

Within this broad approach, the form and scope of ex ante specification can be a key source of potential variants. At the minimum, this might include licence conditions that set out what the role of the ESO is, and some high-level expectations concerning how that role is conducted. But this could be elaborated on in various ways, including through the inclusion of ex ante rules concerning performance and/or charge levels. For example, there may be:

- An explicit rule that charges or revenues must not exceed a defined level.
- A rule concerning the permissible relationship between charges and costs (e.g. a "cost orientation" requirement).
- Some specified minimum performance levels.

The nature of the ex ante specification can affect the overall character of the approach. For example, where ex ante requirements are specified in a relatively detailed manner, a core part of the ex post supervision process will concern questions of compliance (and may also address whether those ex ante requirements merit revision going forward). However, where ex ante requirements are presented in more high-level terms, supervision will involve a more evaluative process. In practice, a combination of more and less detailed ex ante requirements might be used such that the ESO would be evaluated in terms of its performances against some relatively high-level requirements, while at the same time ensuring that its charges and performance level satisfied some more detailed conditions.

Apart from through compliance with detailed conditions or obligations, this broad approach can help achieve good outcomes as the process of supervising the ESO's performance can result in desirable procedural, reputational and/or financial incentives:

- Procedural incentives may encourage the ESO to report on and account for its performance and charges in ways that can be expected to lessen the burden of supervision, for example through the use of transparent and robust assurance processes.
- Reputational incentives may encourage the ESO to put more effort into improving outcomes in a number of ways. The process of having to account for performance and charges can be expected to have some desirable effects (as the ESO will know that the outcomes of its work will be subject to review). Professional reputations (within the sector and more broadly) may also encourage efforts to ensure that the supervision process is reputation-enhancing. The use of explicit ex ante requirements in terms of charge and performance levels can help intensify reputational incentives by clearly establishing, in advance, some circumstances under which more intense scrutiny and challenge are likely to be triggered.
- Financial incentives can be relevant in implicit and explicit ways. Financial incentives may be implicit where supervision can affect reputation: the risks of other types of regulatory response that may be financially detrimental to the ESO's owners may be affected. Financial incentives can also be more explicit and may be used to bolster the significance of the supervisory process, as is the case with the discretionary reward/penalty arrangements under Ofgem's evaluative approach for the ESO incentives from April 2018.

In the third case, we may see an approach involving supervision of performance and charges being augmented by an approach involving regulatory financial incentive arrangements (discussed in the next subsection below).

By focusing supervisory attention on ESO performance and charges, rather than on the ESO's behaviour, this approach can provide the ESO with flexibility in terms of how it actually provides services and achieves improvements over time.

Within this approach, there are a range of ways in which particular assessment and review processes can vary, including the following:

- **What is the purpose of the review or assessment process?** The scope for variation includes: audit-type activities aimed at checking compliance or identifying manifest failings, including in terms of expenditure; broader (two-sided) assessments of performance that provide for both positive and negative assessment outcomes; and assessments aimed at motivating the identification and consideration of potential areas for improvement in the future.
- **What roles are played by different parties in the process?** There are choices around the roles for the ESO (e.g. potential self-assessment or responsibility for arranging third party assurance); customers and other stakeholders; technical experts given a formal role in the

process; and Ofgem (e.g. is the regulator the primary reviewer or are decisions made on the basis of reviews, reports and recommendations of others?).

- **What consequences does the review process have?** For example, there are a wide range of possible outcomes: increased regulatory scrutiny and involvement in detailed decision-making (some loss of control and flexibility and increase in procedural burden); disallowance of the recovery of some costs; regulatory directions/enforcement proceedings; and a financial reward or penalty depending on the outcome.

Ofgem's new evaluative approach for ESO incentives from April 2018 can be understood as involving the supervision of ESO performance and charges, combined with some use of regulatory financial incentive arrangements (which we turn to in the subsection below). It provides a formal means of engaging stakeholders in a broad evaluation process, and allows for a financial reward/penalty within a pre-determined range, the level of which depends on the outcome of the review process.

Use of regulatory financial incentive arrangements

Within the broad approach of regulatory financial incentive arrangements, we mean to capture a range of approaches that provide the ESO with financial incentives to act in a way that is considered desirable.

The way in which regulatory financial incentives may help achieve good outcomes is relatively straightforward: if the price control framework provides (or leaves) the ESO with financial benefits from acting in a way that is conducive to good outcomes, then the ESO will have profit opportunities available from acting in that way. Similarly, if the framework provides (or leaves) the ESO with financial downsides from acting in a way that is associated with bad outcomes, then the ESO will face risks to its profits if it acts in that way. Provided the ESO operates in a profit-seeking manner, we would expect such incentives to steer its behaviour towards actions that are conducive to good outcomes and against actions that are associated with bad outcomes.

The important differentiation between price control frameworks, in this area, is not whether they involve financial incentives at all, but the emphasis that is placed on the use of regulatory financial incentives to achieve good outcomes from the ESO.

This broad approach includes mechanistic ex ante financial incentive schemes as well as the type of discretionary financial reward or penalty that forms part of Ofgem's new evaluative approach to ESO incentives from April 2018. In addition, regulatory measures or tools that are primarily put in place for other reasons (e.g. supervision of performance and charges) may create beneficial, financial incentives on the ESO.

We see mechanistic ex ante financial incentive schemes as providing clearer and sharper financial incentives than more discretionary ex post incentive arrangements, and consider that the ex ante approach places much greater weight on the broad approach of using regulatory financial incentive arrangements.

Before the move to a more evaluative approach from April 2018, Ofgem's regulation of the ESO external costs involved a relatively mechanistic ex ante financial incentive scheme for these costs and the overall approach emphasised the use of regulatory financial incentive arrangements. More generally, the use of regulatory financial incentives forms a major part of the RIIO framework.

The difficulties of giving emphasis to regulatory financial incentives in the case of the ESO have been widely recognised, and have formed an important part of the motivation for the development of Ofgem's new evaluative approach. Two issues are particularly noteworthy here:

- **Ex ante calibration difficulties:** as the ESO's costs will depend on the network circumstances it has to deal with, the setting of ex ante targets can be a challenging task that involves developing a reasonable means of forecasting or estimating what (efficient) costs would be.
- **The potential for adverse unintended consequences:** the financial incentives may inadvertently encourage responses that do not lead to the improved outcomes, but those response may be difficult to monitor or constrain. For example, reductions in the ESO's internal costs (that provide financial benefit to the ESO under an incentive scheme) may come at the expense of activities that would be expected to reduce system costs over the longer term.

While these concerns have been a feature of the movement away from applying mechanistic financial incentives to the ESO in recent years, they need not imply that such an approach is unfeasible or undesirable if applied in a different way at some point in the future.

Exposure of ESO's services to competitive and customer pressures

The underlying rationale for supervising the ESO's performance and charges, and/or subjecting it to financial incentive arrangements, is that competitive and customer pressures would otherwise be insufficient to motivate the ESO to act in ways that protects the interests of customers. As a substitute or a complement to these more direct forms of intervention, it is open to regulators to take steps to seek to enhance the role that competitive and customer pressures might be able to play.

The potential for such an approach to improve outcomes stems from the available opportunity to lessen the extent of the imbalance of economic power between the ESO and (at least some) stakeholders in relation to ESO activities. By increasing the ability and incentive of other actors to challenge the ESO, the ESO can face incentives and pressures to "up its game".

In the specific context of the ESO, the motivation for this line of approach is as follows:

- Market participants receiving services from the ESO and who have relevant knowledge (e.g. energy suppliers and generators) may be capable of exerting some discipline on the ESO, to help guard against it operating inefficiently, by raising queries and disputes with the ESO where they identify costs of the ESO as being inefficiently high or being incurred unnecessarily.
- Market participants may have good ideas about how the ESO could innovate and operate more efficiently, or carry out its functions more effectively, and make constructive suggestions for the ESO to take on board.
- In some cases market participants may be able to offer a degree of competitive constraint on the ESO, through the ability to arrange self-supply of specific services provided by the ESO. And in some cases there may be potential for competition and substitution in the provision of specific services, especially if these are offered by the ESO separately from its more monopolistic services.
- The ownership and/or control of the ESO is subject to forms of competitive dynamics. Given the numerous examples of ISO models in other jurisdictions, and calls for ISO model to be implemented in Great Britain,² National Grid can have no certainty about its ownership and control of the ESO in the future. While the ultimate decisions about an ISO approach would be a political and regulatory matter, National Grid is likely to recognise that such a decision would be influenced by the reputation it has for doing the ESO role well. Perception of poor performance would tend to increase the likelihood of National Grid being displaced. As part of this, the ESO is under some competitive pressure to perform well, control its costs and achieve improvements over time.
- Regulated companies, even those with a monopoly position in the services they provide, may engage in forms of competitive behaviour relating to their reputation with the regulatory and other stakeholders. Their reputation, relative to other regulated companies or indeed other organisations that have a voice in the wider system, may matter to them for strategic reasons. There may be ways to use the price control framework for the ESO, and other regulatory tools, to improve outcomes from the ESO by harnessing competition for (regulatory) reputation.

There are a variety of tools that regulators can use to help increase the role for competitive and customer pressures. These include, for example:

- Definition of services and consideration of competitive opportunities in each of these.

² See for example: House of Commons Energy and Climate Change Committee (2016) *Low carbon network infrastructure: first report of session 2016-17*.

- Introducing separate price controls for separate services or different parts of the value chain.
- Cost allocation and cost orientation requirements that concern the links between charges and costs and can affect the participation of customers in the processes above.
- Limiting the use of other regulatory approaches which may act (as a side-effect) to impede the role of competitive and customer pressures.
- Regulatory comparisons of performance and costs across different organisations.

Furthermore, when considering the role that competitive and customer pressures might play, it can be helpful to recognise that one rationale for the ESO stems from a range of externality issues that can arise within electricity systems. The ESO is an institution that addresses these externalities by providing a number of coordination functions. In practice, though, the form and nature of externalities in any given context will be dependent on the definition of property rights. In an electricity transmission network context, that implies that the extent to which other parties (acting individually or cooperatively) can be expected to face incentives to find ways to address issues that might otherwise be regarded as part of the ESO's role are likely to be dependent on the details of how the rights and responsibilities of network users are defined. This may have particular significance when the potential role of distribution system operators is being considered as a potential source of desirable competitive pressure on the ESO.

A critical point to recognise is that the broad approach we have in mind here does not entail a regulatory strategy to promote competition until the point is reached where formal price control regulation can be withdrawn. That might be one possibility, at the extreme end of a range of plausible scenarios. But there is no necessity for that to be the intended destination. There seems to be considerable opportunity for the ESO regulatory framework to make use of competitive and customer pressures to achieve better outcomes from the ESO, even in the absence of any observable head-to-head competition against the ESO. It may play a complementary role alongside other broad approaches, such as approaches involving supervision of the ESO's performance and charges by the regulator.

In practice, the scope for these kinds of competitive and customer pressures to provide a material source of constraint and impetus is likely to vary significantly across the different services that the ESO provides. That means that the benefits from this kind of approach are likely to be closely linked to broader decisions concerning the design of the overall regulatory framework that the ESO faces. That is, the scope for exposure to competitive and customer pressures to play a greater role in the regulation of the ESO over time is likely to be heavily dependent on the extent to which the overall regulatory framework seeks to encourage separate and effective identification, costing and charging for different services that the ESO provides (in a context where that set of services may diminish in some ways and grow in others as the system evolves).

The separate identification and treatment of different ESO services need not be considered as a one-off task. Rather, an incremental approach could be adopted such that a relatively limited set of services might be initially identified, with scope for additional services to be identified for separate treatment over time. In line with this, steps to try to increase the exposure of ESO services to competitive and consumer pressures could be developed incrementally, both in terms of changes to the arrangements for particular services and in terms of the set of services that are identified for separate treatment.

Supervision of the ESO's behaviour

This approach is something of a fall back option when considered on a stand-alone basis. Ideally we might think that the regulatory framework for a commercial regulated company should be targeted at ensuring the quality of services and outputs/outcomes provided by the company and setting limits on prices/revenues that reflect the efficient costs of service provision and provide incentives for efficiency and innovation over time. There are legitimate concerns about economic regulators getting too far into the details of how the regulated company should be running its business and how it should be providing services to customers. This recognises the risks of regulatory micro-management and blurred responsibilities.

Even so, sometimes it can be better for the regulator to “get its hands dirty” in the way the regulated company is operating, than to adopt a more hands-off approach, especially if this can be done in a careful manner. If the circumstances are such as to mean that alternative approaches (e.g. the three types of approach above) are not likely to be effective on their own, then the risks posed to customers from poor services and high costs may outweigh those arising from concerns about micro-management. Furthermore, there are ways to tailor and target the supervision of a company's behaviour to strike a good balance between the benefits of intervention and the drawbacks.

Ofgem has adopted this type of approach as part of its overall framework for regulating energy networks under RIIO. For instance, Ofgem has started to make more use of an approach in which it requires a regulated company to develop and comply with an approved methodology or policy, which sets out how the company will carry out aspects of its functions. Examples are the network options assessment (NOA) methodology required from National Grid and the network access policies (NAP) required of the three onshore transmission companies. More generally, some of the outputs and deliverables falling under RIIO-1 are closer to intermediate inputs than outputs, implying a degree of supervision of behaviour.

For the ESO, it may be that some aspects of its activities are considered better suited to this kind of more detailed and input-based supervisory approach. This may be particularly so in relation to system planning related activities, where it may only be possible to judge performance in terms of outcomes many years into the future (and even then there is the problem of counterfactuals); more

direct and ongoing regulatory engagement in the ESO’s planning activities may be considered justified, given the materiality of the issues at stake.

The hands-on approaches described here differ from the more outcome-focused supervision of performance approach that was set out above. It is notable though that outcome-focused supervisory approaches are often supported by a range of more detailed conduct requirements that are intended to provide a framework and information base that supports subsequent ex post performance reviews. For example, more detailed supervision might draw on the use of information/data reporting requirements and consultation requirements. This highlights the way in which the different approaches above can be used in conjunction, rather than representing complete alternatives.

Implications of approaches for different aspects of the price control framework

In the table below we provide a high-level indication of how an emphasis on each of the four approaches above might affect prioritised aspects of the price control framework that were identified in Section 3. We pick up on these issues in more detail in our specification of alternative packages of regulatory options for the ESO in section 5.

Table 7 Some implications of approaches for different aspects of ESO price control framework

Option	Supervision of the ESO’s performance and charges	Use of regulatory financial incentive arrangements	Exposure of ESO services to competitive and customer pressures	Supervision of the ESO’s behaviour
Scope and form of control	Either single control covering all ESO services or separate controls for different services		Separate controls for different services likely to be necessary	Either single or separate controls
Outputs and service quality	Combination of ex ante expectations/rules and evaluating performance	Mechanistic financial incentives, requiring identification of performance measures	Efforts made to expose ESO provision of outputs to more competitive and customer challenge.	More detailed regulatory involvement in how outputs and service quality are delivered
Cost recovery and efficiency	Combination of ex ante expectations/rules and evaluating performance	Mechanistic financial incentives, requiring identification of cost or efficiency measures	Efforts made to expose ESO charges and efficiency to more competitive and customer challenge	More detailed regulatory involvement in budget approvals and constraints
Role of stakeholders and customers	Range of options, from engagement in consultation processes only, through to a formal part of processes for supervising behaviour	Engaged through consultation on the incentive arrangements	Integral to the process of enhancing ESO exposure to competitive and customer pressures	Range of options, from engagement in consultation processes only, through to a formal part of processes for supervising behaviour

While, in practice, price controls will involve a mix of approaches, the above table helps to highlight a number of points that are relevant to the way we have considered different potential options. For example, the question of whether a single ESO control is applied, or separate controls are applied for some different services, has a material bearing on the likely effectiveness of an approach that puts significant weight on exposure of ESO services to competitive and customer pressures. That is, in order to pursue an overall approach that aims to put significant weight on such exposure, some separate identification and treatment of services looks likely to be necessary (at least for such an approach to have a reasonable prospect of improving outcomes).

How these approaches help to show differences across regulators and services

As a final part of this section, we draw links between the somewhat theoretical approaches to price control regulation categorised above, and some example of price control frameworks applied in the UK.

Table 8 provides a high-level illustration of how the price control frameworks that some UK regulators have applied in relation to various services can be differentiated on the basis of the four broad regulatory approaches that we have identified. We consider some price controls applied in the UK energy, water and telecoms sectors. In the energy sector, we take Ofgem's RIIO-ED1 approach to electricity network companies and the approach taken to the electricity transmission system operation (TSO) price control for SONI in Northern Ireland. In this table, a darker shade of blue indicates a greater role for, or intensity of, regulatory activity within the specified broad approach. For instance, we can see that the RIIO-ED1 control is indicated as placing a greater emphasis on the approach of regulatory financial incentive arrangements than on the other three broad approaches, with the supervision of behaviour approach having the least emphasis.

The categorisations in the table are only intended to provide a rough snapshot in each case, but in doing so can help to reflect some relevant differences in the emphasis and reliance that is put on different types of approach. The main aim of the table is to illustrate the idea that, in practice, price control frameworks make use of a range of different approaches, rather than implementing a single approach, and differ, at the very high level, in terms of the intensity and balance given to these approaches.

Table 8 Indicative overview of the mixes of approaches used by some different regulators

	Supervision of performance and charges	Use of regulatory financial incentive arrangements	Exposure to competitive and customer pressures	Supervision of behaviour
Ofgem RIIO-ED1 : 2015-2023	Dark Blue	Very Dark Blue	Light Blue	Medium Blue
Utility Regulator SONI TSO control: 2015-2020	Dark Blue	Dark Blue	Very Light Blue	Dark Blue
Ofwat PR14 wholesale controls: 2015-2020	Dark Blue	Very Dark Blue	Light Blue	Medium Blue
Ofwat PR14 non-household retail: 2017-2020	Dark Blue	Light Blue	Very Dark Blue	Very Light Blue
Ofcom: BT wholesale charge controlled services	Very Dark Blue	Light Blue	Dark Blue	Very Light Blue
Ofcom: BT wholesale services subject to principles-based requirements	Light Blue	Very Light Blue	Very Dark Blue	Very Light Blue

The degree to which the price control framework leans more heavily on one approach than another will be affected by the nature of the regulated companies and services as well as the applicable legislation. It will also reflect other factors, such as history, ideology, customs, experience and innovation.

It seems particularly useful to draw out some comparisons between the ESO and the electricity distribution network companies subject to the RIIO-ED1 controls. Are there contrasting features between the ESO and energy network companies that would affect the balance across the four approaches? We highlight three aspects here, drawing on the analysis on the key features of the ESO from section 2.

First, there is the relative idiosyncrasy of the ESO. In its regulation of electricity distribution companies, Ofgem has the ability to draw on extensive benchmarking analysis across the set of distribution companies to inform its regulatory cost assessment work for those network companies, which feed into the ex ante expenditure baselines around which financial incentives apply. For the purpose of the ESO's costs the opportunities for benchmarking the ESO are more limited, due to the unique role it plays within the energy sector in Great Britain. This, in turn, makes it harder to build an approach that is grounded on regulatory financial incentives.

Second, the ESO plays a role in the long-term planning and coordination of the GB transmission system, and it seems difficult to apply an approach that emphasises financial incentives. The

provision of strong incentives on ESO's planning costs may lead to narrow efficiency in ESO activities but worse outcomes from a system-wide perspective (as discussed in section 3). In contrast, while the DNOs are involved in significant planning activities, these primarily concern their own networks. The consequences of this planning will be felt in their business in future periods, and the anticipated future regulation and risks relating to their network infrastructure costs can have a positive influence on the quality of DNO planning.

One possible consequence of the limitations in relation to financial incentives is that greater weight may need to be placed on other approaches. The role given to "supervision of behaviour" in the table above for the SONI price control in Northern Ireland reflects, in part, the difficulties of applying financial incentives to the TSO price control, especially around transmission system planning.

Third, as discussed in section 2, there does seem to be something different between the DNOs and the ESO in the extent to which at the services they provide could be amenable to some form of competitive and customer pressures. This suggests opportunities for the ESO price control framework that are not available to the same degree for the regulation of the DNOs. If this view is adopted, then choices around the balance of approaches within the price control framework could be informed by the regulation of the UK telecoms sector, which shows significant differences to the RIIO approach as applied to DNOs.

5 Potential packages of options for the ESO price control

This section outlines a number of alternative “packages” of regulatory options for the ESO price control framework, which we then compare and evaluate in section 6. The section is organised as follows:

- We provide an overview of our approach to the development of the packages.
- We take each of the six packages in turn and introduce some of their key features.
- We provide a more detailed description of these packages in the form of a table that compares their components and features.

Approach to the development of the packages

The role of the packages we have specified is to help flesh out - and then compare the benefit and drawbacks of – plausible options for the overall price control framework for the ESO. Given the complexity of price control frameworks, and the interactions between their parts, it can be helpful to outline some hypothetical frameworks by reference to a set of features that each possess, some of which will overlap across packages.

Our work to develop packages of options draws on other parts of this report:

- Our view on the key features of the ESO which matter for the development of the ESO price control framework, which is set out in section 2.
- The identification in section 3 of which aspects of the price control framework to prioritise. This provides guidance on what aspects of potential future ESO price control arrangements are most important to cover in the specification of alternative packages.
- The discussion presented in section 4 of four broad ways of seeking to use the price control framework to achieve good outcomes from the ESO, which may be applied in combination with choices around the weight given to each broad approach.
- The more detailed questions and options relating to different aspects of the ESO price control framework, and the mapping of these options to the broad approaches from section 4, which is set out in appendix 1.

We have tried to ensure that the packages are internally coherent and involve a clear strategic view on the overall approach to the regulation of the ESO. We have defined packages by reference to differences in the intensity and balance of regulatory arrangements that are directed towards each of the four broad approaches from section 4 above.

Table 9 shows, at a high level, the relationship between each package and these four approaches. In this table, a darker shade of blue indicates a greater role for, or intensity of, regulatory activity within a broad approach for the specified option. For instance we can see that package E would place the greatest emphasis, across the six packages, on the use of regulatory financial incentive arrangements.

Table 9 Packages defined by weight placed on four broad approaches to achieving good outcomes

	Package					
	A	B	C	D	E	F
Supervision of ESO's performance and charges	Dark Blue	Light Blue	Very Dark Blue	Very Dark Blue	Dark Blue	Very Dark Blue
Use of regulatory financial incentive arrangements	Dark Blue	Very Light Blue	Light Blue	Light Blue	Very Dark Blue	Light Blue
Exposure of ESO to competitive and customer pressures	Very Light Blue	Very Light Blue	Light Blue	Dark Blue	Very Light Blue	Light Blue
Supervision of ESO's behaviour	Light Blue	Light Blue	Light Blue	Light Blue	Very Light Blue	Very Dark Blue

Package A is based most closely on the status quo. Package B package is a simple approach with a relatively limited regulatory burden. Packages C, D, E and F go beyond package B in different ways but, as shown in the table, it is not the case that each of these four packages can be treated primarily as an application of each of the four broad approaches. There is more to the packages than that, and considerable overlap in the features of these packages, as we will see when we set out these features in more detail later in this section. Package C builds on package B by increasing the extent of regulatory activity that contributes to three of the four broad approaches (all except regulatory financial incentives). Package E builds on package B primarily by introducing a major role for regulatory financial incentives. Packages D and F build on package C by adding features to strengthen the package in respect of one of these approaches, without losing significant features of package C.

In developing packages, we considered whether they should also be differentiated in terms of the options around the approach to making an allowance, within the ESO price control, for the ESO's financing costs and options relating to the use of RAV. We decided against this. Although there are some links between the approach taken to financing costs and the RAV and the emphasis placed on the four broad ways of achieving good ESO outcomes, these links are not strong or particularly constraining. If we were to differentiate packages in this way, this could lead either to an unmanageable number of packages, or to somewhat arbitrary allocation of some of the financing cost and RAV options to each of the six packages above. Our approach, instead, is to exclude the questions relating directly to financing costs and the RAV from the specification of the main

packages and then consider, at a separate stage, the interactions between these questions and each package. We turn to these issues in section 8.

We have tried to develop a manageable set of packages that brings diversity in the range of options considered without becoming unwieldy. Limiting the number of packages, as we have done, helps with the assessment of their relative performance and increases the overall clarity of presentation. There are many more combinations of options that could be adopted for the ESO, beyond those presented in this section. The packages should not be seen as fully specified and or reflective of the full range of reasonable regulatory approaches that could be applied.

The packages are intended as a starting point for Ofgem's development of the new price control framework for the ESO. The packages focus on options that might be implemented from April 2021, and are intended to provide a base from which potential variants, and questions concerning the evolution of the regulatory framework over time, can then be considered.

Package A: minimal change to status quo

This package is intended to allow for minimal changes from the current price control arrangements applied to National Grid's ESO activities. It is the nearest we have to a status quo option (some degree of change seems inevitable as a consequence of the separation of the ESO price control from the NGET price control).

This approach would retain a RIIO-style approach to the regulation of the ESO's internal costs, including an ex ante expenditure allowance set by Ofgem following a process to review internal cost forecasts provided by the ESO (e.g. over of a five-year period). The ESO would be subject to mechanistic financial exposure of any variations in its outturn internal costs relative to the ex ante expenditure allowance, with the extent of exposure governed by an Ofgem decision on the efficiency incentive rate / cost sharing factor (e.g. 50% or some other rate). There could also be uncertainty mechanisms

Other than for the ESO's internal costs, the price control framework for the ESO would be based on the new evaluative approach that Ofgem introduced for the ESO from April 2018. Ofgem summarised this approach as involving the following elements:³

- Seven "principles" covering the breadth of the ESO's roles, designed to set clear expectations about the baseline behaviours that Ofgem expects from the ESO under its licence.
- A requirement on the ESO to engage with its stakeholders each year to produce a Forward Plan, which would demonstrate how it will meet each of these principles and also add additional

³ Ofgem (2018) *The Electricity System Operator regulatory and incentives framework from April 2018*, February 2018.

value for consumers.

- A requirement on the ESO to produce a set of performance metrics, which would be developed as part of the Forward Plan process, and which the ESO would report on regularly throughout the year.
- The introduction of a new Performance Panel, which will challenge the ESO on its plans and evaluate its performance, including at the end of year, when it will score the ESO's performance based on up front evaluation criteria.
- A decision by the Authority to financially reward or penalise the ESO up to a maximum cap and floor of plus or minus £30m, informed by the Performance Panel's end of year recommendation, and other evidence presented to Ofgem.

Under package A, this evaluative assessment approach would apply to the ESO's external costs (i.e. those not falling under the RIIO-style ex ante financial incentives) and to its performance in terms of service quality and the outputs and outcomes relating to its roles and functions. The scope of the evaluative assessment would include aspects of ESO performance that are currently treated as outputs under the RIIO-T1 control.

Subject to the provisions above, and other regulatory safeguards, under package A the ESO would be entitled to recover its external costs through charges to its customers. This might be seen as a form of cost pass-through, as distinguished from ex ante incentives, but it is important not to overlook the role of regulatory arrangements that safeguards customers in relation to these costs and mean that the package is not one of pure cost pass-through. The evaluative assessment and potential financial reward/penalty would include considerations of the ESO's performance in respect of the external costs it incurs. Furthermore, under package A, as under Ofgem's current RIIO controls, there would be a safeguard provision that Ofgem could disallow recovery of any costs found to be demonstrably inefficient or wasteful.

Package A would use other regulatory tools that are currently applied to the ESO under the RIIO framework and which fall under the broad approach of supervising the behaviour of the ESO. In particular, there would be a role for the Network Options Assessment (NOA), under which the ESO is required to develop and follow an Ofgem-approved methodology relating to its system planning and coordination activities.

The price control framework would operate as a single revenue control covering the whole of the income from ESO activities, other than any activities that Ofgem decides to exclude from the scope of the price control (e.g. any services found subject to effective competition). The revenue control would include a revenue correction factor to adjust the maximum allowed revenue in one year

according to any variation between what it collected in the previous year relative to the maximum allowed revenue in that year.

Package B: simpler approach

Package B is intended to be a simpler and more coherent approach than package A. It would prioritise limiting the regulatory resource requirement, complexity and burden associated with the ESO price control framework. This would be subject to providing some degree of regulatory oversight of the ESO's performance and charges and achieving a coherent approach overall. This package provides a useful reference point against which packages that involve more elaborate regulatory initiatives can be compared.

Package B would remove the ex ante incentives approach applied under package A for the ESO's internal costs. Instead, the ESO's internal costs would be treated the same as its external costs. The ESO would be allowed to recover the level of costs that it incurs (whether internal or external) under the price control, subject to its performance in relation to these costs forming part of the broad evaluative assessment and other regulatory safeguards on its costs. This variation on package A would allow for a substantial reduction in regulatory resource requirements and complexity, as there would be no need for Ofgem to produce a regulatory assessment of the ESO's medium-term expenditure requirements for internal costs and there would be no role for incentive and risk-sharing arrangements and uncertainty mechanisms in relation to these costs.

Package B would retain the general idea of an evaluative assessment approach as under package A, but this would involve a somewhat simpler process, without a formal stakeholder panel. The evaluative assessment would consider the ESO's performance in relation to its external costs, internal costs and any other relevant aspects of its performance. There would be a consistent treatment of internal and external costs within the price control framework.

There would be no financial reward or penalty according to the outcome the assessment, but the assessment would provide a reputational incentive on the ESO. The ESO would also be expected to take account of the assessment in developing its business plan for the next year.

The absence of a financial reward or penalty would tend to reduce the cost of capital that needs to be remunerated through the price control framework and simplify the assessment of the ESO's financing costs.

As under package A, the price control framework would operate as a single revenue control covering the whole of the income from ESO activities (other than any excluded services) and with a revenue correction factor.

Package C: extended evaluative approach

Package C builds on and extends package B by increasing the extent of regulatory activity that is intended to achieve good outcomes from the ESO.

In particular, measures would be taken to enhance the effectiveness of the evaluative assessment approach:

- Formal role for stakeholders in evaluative assessment approach, as under package A.
- Work by Ofgem to develop performance measures and benchmarks for the ESO that are reasonably independent of National Grid, to help support the assessment.
- It could include some comparative assessment of the performance of the ESO against other regulated companies (e.g. energy network companies regulated by Ofgem or the electricity system operator in Northern Ireland) on matters that are cross-cutting rather than sector or service-specific (e.g. quality of business plans and customer engagement, quality of regulatory reporting).

As for package B, there would be a consistent treatment of the ESO's internal and external costs within the price control framework. The package would avoid exposing the ESO to any direct ex ante financial incentive arrangements on the costs it incurs. The price control framework would restrict the regulated revenue of the ESO to the costs it incurs (subject to safeguards) and an allowance for financing costs set by Ofgem. The ESO's costs would be taken into consideration as part of the broad evaluation of the ESO's overall performance.

A financial penalty or reward would be applied according to the outcome of the evaluative assessment.

This package would involve some targeted use of tools to supervise the ESO's behaviour, particularly around long-term system planning and the ESO's procurement activities. This would include the requirements for an Ofgem-approved NOA methodology, as under package A, and rules to provide some transparency around the ESO's procurement activities.

As under package A, the price control framework would operate as a single revenue control covering the whole of the income from ESO activities (other than any excluded services) and with a revenue correction factor.

Package D: suite of service-level price controls with evaluative approach

Package D would build on package C, but place greater emphasis on the services that the ESO provides. It would give weight to the idea that exposure of the ESO services to potential competitive and customer pressures (broadly understood) could provide a worthwhile and valuable contribution

to the achievement of good outcomes from the ESO, especially where there are concerns about the likely effectiveness and unintended consequences of seeking to apply ex ante financial incentives to the ESO. The package would be designed to increase the likelihood of competitive and customer pressures being harnessed in beneficial ways. At the same time, the design of this package recognises that there are limits to what can be expected from competitive and customer pressures in isolation, and so there would be a range of other regulatory measures within the price control framework.

The price control framework would involve a suite of price controls, each applying to different services provided by the ESO (or groups of similar services taken together). Ofgem would determine the set of controls and what activities and services they cover, drawing on analysis and stakeholder input on the services that the ESO provides. The set of service-level price controls could adapt over time (e.g. perhaps starting with several broader categories of services and then moving to controls for more granular services over time, where this seems most useful). More generally, the services provided by the ESO could evolve over time and Ofgem would take decisions on which should be controlled via the price control framework as well as decisions which affect the range of services that the ESO provides.

The default approach for the service-level price controls would be revenue controls, with revenue correction factors. As for package C, the price control framework would restrict the regulated revenue of the ESO to the costs it incurs (subject to safeguards) and an allowance for financing costs set by Ofgem. The point of departure from package C is that this restriction would not operate at the level of the aggregate ESO costs and revenues, but would be separately specified for each of the separate ESO controls. So, if there was a separate control for the ESO's system planning and coordination activities, the revenue it could collect under this control would be restricted to the costs it incurs which are reasonably attributable to those activities.

There would be further tools intended to harness any available competitive and customer pressures, including the following:

- A requirement on the ESO to provide a high degree of transparency on the costs it incurs (other than by exception where doing so would distort competition or have significant adverse consequences for the ESO's efficiency).
- A requirement on the ESO to use a transparent model and methodology to show how the costs it incurs are attributed to its services and price controls.
- Greater regulatory review (with stakeholder input) of the charging methodologies applied by the ESO.

Although the link between costs incurred by the ESO and the revenues it can recover from customers would be differentiated by separate controls relating to different ESO services, these controls would form part of an integrated price control framework. The framework would, at least in its initial stages, be implemented through a single administrative decision document. Service-level price controls would draw on common elements that apply across these controls (e.g. an evaluative assessment approach as elaborated on below). And the allowances for ESO financing costs could be set using a common assessment process, albeit one that takes accounts of differences between the services. Indeed, the financing costs decisions (e.g. cost of capital) could potentially be made by taking all/several services together, and then applying an approach to attribute the estimated financing costs to the service-level controls.

Package D would include a similar evaluative assessment approach to that used for package C. The efforts to encourage competitive and customer pressures to help achieve good outcomes from the ESO would be complementary to, rather than a substitute for, that assessment. Over time, this evaluative assessment process could focus more on those aspects of ESO costs and performance for which competitive and customer pressures are found less likely to be effective. The potential for a financial reward or penalty according to the outcome of the assessment would be an optional element of this package.

Further to the default approach above, there would be the possibility, perhaps further down the line, to set ex ante price caps for specific ESO services. Rather than specifying a maximum revenue allowance that is linked directly to the costs that the ESO incurs, the regulatory restriction could be on the price or tariff for a specific service, and this could be based on an Ofgem assessment of an appropriate amount, taking account of information on the ESO's costs and other available information. There may be greater benefits of this approach in areas where the ESO may face a degree of competition in its service provision. This is merely an option within the broad scope of package D, but it is an option opened up by the introduction of service-level price controls.

Package E: holistic ex ante incentives

This package would give weight to the development of new financial incentive arrangements to apply to the costs of the ESO and wider aspects of its decision-making and performance within the GB electricity system. The design of these arrangements would give emphasis to the objective that the financial incentives faced by the ESO are coherent and holistic from a system-wide perspective.

For instance, suppose that the ESO has an influential role in transmission system planning and is subject to strong financial exposure to the constraint management costs it incurs over the medium and long term, but has no direct financial exposure to transmission network costs. These arrangements would seem to give a perverse financial incentive to the ESO to seek uneconomic over-expansion of transmission network capacity or network capability. The sphere of influence of

the ESO is such that this is just one of numerous possible examples where a regulatory incentive scheme intended to encourage the ESO to contribute to system-wide efficiency could backfire.

Under package E, the development of the new ex ante incentive arrangements would be directed at solutions to this type of problem, through development of coherent measure of performance and ways of achieving long-term regulatory credibility. In contrast, the approach to tackling this type of problem under packages B, C, D and F is to remove the ex ante incentives altogether.

The design of potential arrangements is well beyond the scope of this paper, but we outline below some points which help to better define package E.

In contrast to some of the financial incentive arrangements applied to ESO external costs in the past, under package E Ofgem would take greater ownership of the cost benchmarks or performance measures at the heart of the incentive scheme, with less weight given to forecasts and modelling provided by National Grid.

The development of coherent measure of performance in terms of costs and efficiency might be approached from one of two angles:

- **Start with the ESO's costs and work outwards.** Under this approach, the development of a performance measure for the ESO would start with the costs incurred by the ESO (e.g. ESO internal costs and ESO external costs) and then expand on these to also cover things which are significantly (in £m) affected by the quality or performance of the ESO in carrying out its functions. For instance, given the ESO's role in transmission system planning, the total level of charges imposed on customers for use of transmission networks seems relevant and could be incorporated into the performance measure. In extending the measure, the costs indirectly affected by the ESO would be given the same weight as those that the ESO incurs directly (e.g. £1m of ESO expenditure treated the same as £1m of transmission network expenditure) to avoid perverse financial incentives.
- **Start with electricity tariffs and then whittle down.** The level of the ESO's costs will feed through to the electricity tariffs that consumers face for electricity supplies. Similarly, the ESO's quality and performance in system planning and coordination will ultimately feed through to affect electricity tariffs (albeit perhaps with a delay due to time taken between planning work and the physical network infrastructure costs being incurred). Quite a large element of the costs which affect the level of the tariffs that electricity suppliers impose on consumers could conceivably be affected by the actions and decisions of the ESO. This suggests the possibility of producing a measure of performance for the ESO that starts with a benchmark of electricity tariffs and then adjusts this to try to strip out elements that feed into this and which are not significantly affected by the ESO (e.g. some Government-led subsidy schemes).

The second approach would be a more radical change from past ESO incentive schemes but has a more direct relationship with what matters to consumers. Furthermore it helps avoid the problem with an incentive scheme focused on measures of aggregate costs: that the regulated company may be able to reduce costs by restricting supply and discouraging demand.

Under either of these approaches, the financial exposure to the ESO is likely to go well beyond exposure to the costs that it incurs directly. Its own costs would affect the performance measure but so would other things, potentially to a large degree. It is better to see the incentive arrangements as being a separate incentive scheme to be placed on top of an approach that allows the ESO to recover the costs it incurs (subject to safeguards) rather than forming part of an approach involving ex ante expenditure allowances as under the RIIO-T1 approach for ESO internal costs. This type of approach is more in line with that adopted in the past for the electricity ESO incentives, where an incentive scheme with caps and collars was applied on top of provisions enabling the ESO to recover its external costs through its charges to customers.

While the performance measure above could involve a very large amount of money, and/or be very volatile, the incentive strength applied to the ESO could be calibrated in a way that is proportional to the scale of the ESO's business. For instance, if a measure of system-wide costs were used the ESO could be subject to say 10% or 1% or 0.1% of any variation in these costs. If a tariff-based benchmark is used, the incentive scheme could be calibrated by reference to the scale of financial rewards and penalties under plausible upside and downside scenarios. The strength of financial incentive scheme would be calibrated to be meaningful and important from perspective of ESO business, but not so high as to lead to disproportionate financing costs for the ESO,

It would be essential that the incentive scheme does not provide the ESO with perverse financial incentives to maximise performance in the short term at the expense of higher costs and worse outcomes in the future. In this respect, it would not be effective to reset the performance baseline (the point above which the ESO earns a reward and below which it incurs a penalty) every year, or every five or ten years, based on a fresh forward-looking assessment which is significantly influenced by decisions taken by the ESO in the past.

There would have to be some long-term credibility around the ESO's exposure to the scheme. One way this might work is if the baseline is first set using long-term forecasts (a baseline set for the next 20 years) and arrangements are then developed to allow these baselines to be adjusted for the effects of changes over time that are deemed outside the control of the ESO (similar to uncertainty mechanisms under the RIIO framework). For instance, if the performance measure is based on an electricity tariff benchmark, there could be adjustments for the estimated effects on that benchmark of exogenous factors affecting wholesale energy prices, such as the weather, UK population and gas import prices. The development of this type of long-term incentive scheme with adjustment

mechanisms would be challenging, perhaps approaching the bounds of complexity and ambition seen in UK regulatory practice; but it may be possible.

There are other aspects of the ESO's performance that may be relevant beyond those captured by the type of performance measure discussed above. For example, these may relate to the ESO's effects on the reliability of electricity supplies or renewable energy generation and decarbonisation. Additional incentive schemes would be developed for these under package E, and the strength of incentives calibrated to give a coherent balance of financial incentives across the schemes.

The new ex ante incentive scheme would be the main focus of work to implement package E. Package E could make use of some elements from the other packages, but the incentive arrangements would act as a substitute for some parts of these packages. For example, there seems to be a more limited role for the evaluative assessment approach if the performance of the ESO is to be subject to holistic ex ante financial incentive arrangements.

Package F: hands-on regulatory supervision

Package F is a variation on package C that would give more emphasis to the idea that the features and role of the ESO mean that a feasible and effective way to get good outcomes from the ESO is to adopt a relatively hands-on approach to regulatory supervision of the ESO.

Compared to package C, package F would involve more detailed review and influence over the processes, work and costs of the ESO, such as:

- Requirements for ESO to have Ofgem-approved approved policies and processes intended to give confidence it will provide operate efficiently and provide high-quality services (e.g. in areas of system planning and coordination).
- Regulatory review and challenge of ESO approach to key activities (e.g. planning and options appraisal).
- Requirements for the ESO to adopt certain approaches deemed good practice (e.g. rules relating to procurement of services from third parties or on engagement with stakeholders).

The package would avoid exposing the ESO to any direct ex ante financial incentive arrangements on the costs it incurs. The price control framework would restrict the revenue that the ESO can provide to the costs it incurs (subject to safeguards) and an allowance for financing costs set by Ofgem. An additional tool applied under option F, on an optional and case-by-case basis, would be the use of Ofgem-approved maximum budgets (for price control remuneration purposes) for ESO expenditure on specific activities or projects.

Other than the greater role for these tools, package F would involve the same elements as package C. There would be a broad evaluative assessment approach. The price control framework would operate as a single revenue control covering the whole of the income from ESO activities (other than any excluded services) and with a revenue correction factor.

Comparison of the features of the packages

Having given an introduction to each package above, Table 10 provides a more detailed description of these packages in the form of a table that compares their main components and features. It shows elements that are common across several packages and how the packages differ.

This table draws, in part, on the identification of regulatory options and practical examples from other regulated companies/sectors which is set out in Appendix 1. In line with the approach explained in the introduction to this section, the specification of these packages does not cover detailed options around financing costs and the RAV, which we turn to in section 8.

It is important to keep in mind that these packages do not exhaust all reasonable regulatory approaches and the development of the ESO regulatory framework should consider potential variations on them. To take just one example, there might be a view that package C would be better if the performance assessment had a reputational rather than financial incentive; this could help reduce financing costs and tackle a possible concern that stakeholders may be reluctant to contribute good ideas to the ESO if this is perceived to give National Grid a large financial reward and that omitting the financial reward/penalty could help foster greater cooperation. So there is a variation on option C that might be worth considering. There are numerous other cases where something in the package could be tweaked, with potentially material consequences. This does not detract from the role of the packages in helping to guide the development of a new regulatory framework for the ESO, but they should be taken more as a starting point than a sealed box.

Table 10 Detailed description and comparison of packages A to F

Dimension	Regulatory arrangements and provisions included within package	A	B	C	D	E	F
Scope and form of control	Single total revenue control for ESO activities (other than any activities put outside scope of controls)	✓	✓	✓		✓	✓
	Suite of separate controls defined for different ESO services (or by category of services/activities)				✓		
Outputs and service quality	Ofgem provides clear statement of role of the ESO and what is expected of it (beyond licence obligations)	✓	✓	✓	✓	✓	✓
	ESO prepares and consults on annual business plan / strategy, reflecting on input from Ofgem and stakeholders	✓	✓	✓	✓	✦	✓
	Annual evaluative assessment by Ofgem of ESO's performance (details of this vary by package – see below)	✓	✓	✓	✓	✦	✓
	Ofgem-led benchmarking / modelling for aspects of ESO's performance, feeding into the evaluative assessment			✓	✓		✓
	Ofgem establishes an external technical review body to help with the evaluative assessment			✦	✦		✦
	Financial incentive applied (penalty/reward) depending on outcome of evaluative assessment	✓		✓	✦		✦
	Evaluative assessment includes comparison with other UK regulated companies on cross-cutting aspects			✓	✓	✦	✓
	Requirement on ESO to provide transparency on key processes and policies it uses (e.g. for network planning)			✓	✓		✓
	Some targeted use of tools to influence ESO behaviour (e.g. requirements for Ofgem-approved NOA methodology)			✓	✓		✓
	ESO outputs, service quality and performance forming part of holistic ex ante incentive arrangements					✓	
	Ofgem takes quite a hands-on approach, making extensive use of regulatory tools to influence ESO behaviour						✓
Comparisons with other ESOs focused on best practice and approaches/processes						✓	
Cost recovery and efficiency	Ofgem sets ex ante expenditure allowance (internal costs) based on review of ESO business plan & historical costs	✓					
	RIIO1-style financial incentives (e.g. 50% sharing) and uncertainty mechanisms applied in relation to internal costs	✓					
	ESO entitled to recover actual costs it incurs, <i>subject to other regulatory provisions that apply</i> : ESO internal costs		✓	✓	✓	✓	✓
	ESO entitled to recover actual costs it incurs, <i>subject to other regulatory provisions that apply</i> : ESO external costs	✓	✓	✓	✓	✓	✓

Dimension	Regulatory arrangements and provisions included within package	A	B	C	D	E	F
	Broad discretionary evaluation (and any financial incentive) includes review of ESO performance on its costs	✓	✓	✓	✓		✓
	Ofgem-led benchmarking / modelling for aspects of ESO's costs, feeding into the evaluative assessment			✓	✓		✓
	ESO costs can only be recovered from the individual service-level controls that they are reasonably attributable to				✓		
	ESO required to provide high degree of transparency on the services its buys and costs it incurs				✓		✓
	ESO required to use transparent model & methodology to attribute costs it incurs to its services and price controls				✓		
	Setting ex ante price cap for specific ESO services on case-by-case basis				✘		
	ESO internal and external costs form part of holistic ex ante incentives applied to its costs and wider performance					✓	
	ESO's recovery of costs subject to Ofgem-approved budgets for broad areas of activity or for specific services			✘	✘		
	ESO's recovery of costs subject to Ofgem-approved budgets for specific activities or projects						✘
	Comparisons with other ESOs directed at best practice and approaches/processes than costs benchmarks						✓
	Provision that Ofgem may disallow recovery of any costs that are demonstrably inefficient or wasteful	✓	✓	✓	✓	✘	✓
Role of stakeholders and customers	Participation in Ofgem and ESO consultation processes related to price control	✓	✓	✓	✓	✓	✓
	High degree of stakeholder involvement in specification of role of ESO and expectations of its performance	✓		✓	✓		✓
	Formal role in reviewing ESO's performance as part of broad evaluative assessment (including any reward/penalty)	✓		✓	✓		✓
	Stakeholders Integral to the process of enhancing ESO exposure to competitive and customer pressures				✓		
	Formal role in review and challenge of ESO's approaches in specifying requirements for good practice policies						✓
Financing costs	Price control calculated to include Ofgem-determined allowances for ESO's financing costs	✓	✓	✓	✓	✓	✓

6 Comparison and evaluation of the packages

Introduction

This section presents our comparison and evaluation of the packages of options for the ESO price control framework set out in section 5, drawing on assessment criteria agreed with Ofgem (see Appendix 2 for more information on the assessment criteria we used).

This section is structured as follows:

- We provide an evaluation of packages against our assessment criteria.
- We provide supporting analysis to help explain the assessment we have made in key areas.

Evaluation against assessment criteria

In the summary of our approach to assessment criteria in Appendix 2, we identify a hierarchical approach involving two tiers of criteria.

The first tier concerns the most high-level criteria that seem relevant for the ESO and combines a very broad notion of the capability of the regulatory framework to achieve “good outcomes” from the ESO with other features of the regulatory framework that may be desirable or undesirable besides this (e.g. the complexity of the framework and regulatory burden). The second tier concerns subsidiary elements which feed into each of the first tier criteria. For example, in Appendix 2 we identify “Regulatory effort and burden” as a first tier criterion and, feeding into this, identify several second tier or subsidiary criteria: (a) regulatory resource requirements for implementation; (b) ongoing regulatory resource requirements; and (c) regulatory burden on ESO and other stakeholders.

Table 11 compares the packages against the first tier criteria. Table 12 elaborates on what we mean by “capability of the regulatory framework to achieve good outcomes” (which is a first tier criterion) and compares the packages against those second tier criteria which relate to this. Because of the importance of the good outcomes criterion, and the range of issues that lie behind it, it is useful to provide this additional level of detail. We have not provided an explicit comparison for the other first tier criteria besides good outcomes, but have taken account of the second tier criteria within each of these (as shown in Appendix 2) when making the assessment shown in Table 11.

In Table 11 (and those that follow), a darker blue shading shows where a package performs relatively worse against the specified criterion and a lighter shading shows where a package performs relatively better. The assessment made is relative between the packages, and is not intended to indicate absolute levels of performance or risk. Where packages are ranked at the

same level of performance, this does not necessarily mean that they are precisely equivalent in respect of the assessment criterion, but rather that they are treated as similar and not differentiated for the purposes of the high-level assessment presented here.

Table 11 Comparison of packages against first tier assessment criteria

	A	B	C	D	E	F
Capability to deliver good outcomes	Dark Blue	Dark Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Implementation complexity and risk	Light Blue	Light Blue	Light Blue	Medium Blue	Dark Blue	Light Blue
Regulatory effort and burden	Medium Blue	Light Blue	Medium Blue	Dark Blue	Dark Blue	Dark Blue
Transparency	Medium Blue	Medium Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Adaptability to future developments	Medium Blue	Medium Blue	Medium Blue	Light Blue	Dark Blue	Medium Blue



Table 12 Comparison of packages against second tier criteria relating to good outcomes

	A	B	C	D	E	F
Contribution to whole-system efficiency, coordination and transformation	Dark Blue	Dark Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
ESO service quality aligned with what customers want	Medium Blue	Dark Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Aggregate level of ESO charges	Medium Blue	Dark Blue	Medium Blue	Light Blue	Light Blue	Medium Blue
Fair and cost-reflective ESO charges to customers	Medium Blue	Medium Blue	Medium Blue	Light Blue	Medium Blue	Medium Blue
Enabling the ESO to finance its activities	Medium Blue	Medium Blue	Medium Blue	Medium Blue	Medium Blue	Medium Blue

The most complex part of the assessment is the evaluation relating to the good outcomes criterion. We provide more detailed information on our reasoning on that in the subsection that follows. Before that, we give some brief comments on the assessment for the other four first tier criteria.

Package E seems the most complicated and ambitious package to implement, given the challenges involved in seeking to develop and apply holistic incentive arrangements that would expose the ESO to the impacts of its actions on whole system costs, in the near term and in the longer term. Package D has greater implementation risks than packages A, B, C and F due to the extent of the departure from familiar territory (e.g. the RIIO framework).

The nature of the implementation risk for package E is important. It is not just a risk of the envisaged benefits of package E not materialising. Package E not working well could lead to a

situation of really quite bad outcomes. For example, implementation problems with package E could create perverse financial incentives that adversely affect the ESO's decisions and behaviour in relation to trade-offs between different activities in the system and trade-offs over time. We do not see a similar degree of risk for the other packages:

By design, package B has the lowest regulatory resource requirement and burden, and the greater burden is seen for the three packages that use a more complex or resource-intensive set of arrangements to achieve good outcomes: packages D, E and F.

The differences between packages in terms of transparency are limited: each can be implemented in a way that provides a reasonable degree of transparency on the regulatory framework and on the performance and charges of the ESO, but package D is designed to provide further initiatives in terms of the exposure of the services of the ESO and the costs attributable to them. The more mechanistic approach under package E adds to its transparency but this effect seems to be offset by the likely complexity of the incentive scheme.

We have identified package D as the most adaptable to future developments. We consider that separating out ESO services, and having the ability to tailor price control arrangements to each of these, would be beneficial in terms of adaptation in a context of technological change and innovation. This separation could also give greater optionality to potential changes to institutional arrangements (e.g. ISO or design authority). Option E seems the least adaptable for two reasons. First, if the holistic financial incentive scheme is to bring benefits to longer-term efficiency and coordination there will need to be expectations that this scheme will be maintained into the future, and this could limit changes of regulatory approach over time. Second, if there were to be a move to a public sector ISO then this type of financial incentive approach would be far less useful than for a profit-seeking ESO.

Supporting analysis for assessment in terms of capability to deliver good outcomes

The high-level comparison of packages above reflects our project team's subjective judgement. This is especially so for the assessment under the first tier criteria for "capability to deliver good outcomes": this is a challenging thing to assess given the numerous factors affecting it. There are risks of pretence of knowledge given the uncertainties involved and the scope for variation in how any package could be implemented. It would be possible to take a different view on the relative performance of the various packages than we have taken in Table 11 and Table 12 above. The overall assessment could vary according to the weight placed on different theories as to what will contribute to the achievement of good outcomes from the ESO and on various risks to the realisation of good outcomes.

In this context, and to give further explanation on the reasoning behind our assessment, we provide supporting analysis in Table 13. This exposes differences between the packages in the way that

they would contribute to good outcomes and summarises our analysis of their vulnerability to different types of risks affecting the realisation of good outcomes. The comparison in Table 13 is particularly relevant to differentiating between the packages in terms of their performance against two specific dimensions of the second tier criteria for good outcomes: (a) contribution to whole-system efficiency, coordination and transformation; and (b) the total charges to customers for costs of ESO functions. For instance, specific features (and risks) of packages A to F will affect the performance of the price control framework in encouraging efficiency and innovation by the ESO in relation to the costs it incurs; this will feed through to affect the total charges to customers for costs of ESO functions, which will also be affected by other factors (e.g. the financing costs which need to be remunerated through the price control).

The supporting analysis shown in Table 13 provides a more objective way to compare and distinguish between the packages, but the distinctions drawn in this table do not map directly to outcomes that matter. The links between this table and Table 11 and Table 12 above is a matter of judgement. Table 13 is intended only to support the assessment under the good outcomes criterion rather than all issues feeding into other first tier criteria (e.g. on regulatory burden).

Table 13 Supporting analysis relating to capability to deliver good outcomes

	A	B	C	D	E	F
Ofgem-led supervision of ESO performance and recoverable costs	Light Blue	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue
Ofgem-led direct influence/control on ESO's behaviour and processes	Light Blue	Dark Blue	Light Blue	Light Blue	Dark Blue	Light Blue
Direct financial exposure of ESO to the costs it incurs	Light Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Dark Blue
Direct financial exposure of ESO to system-wide costs and performance	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Dark Blue
Competitive pressures and processes acting on ESO	Dark Blue	Dark Blue	Light Blue	Light Blue	Dark Blue	Light Blue
Reduction of economic power of ESO relative to customers & stakeholders	Light Blue	Dark Blue	Light Blue	Light Blue	Dark Blue	Light Blue
Susceptibility to potential NG strategic bias and viewpoint risks	Light Blue	Dark Blue	Light Blue	Light Blue	Dark Blue	Light Blue
Robustness of approach to uncertain future developments (e.g. ISO)	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue	Light Blue
Risks of harm from regulatory micro-management	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue
Scale of ESO financing costs to be borne by customers	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue	Light Blue
Ability to tailor details of implementation to specific ESO services / activities	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Risks of disruption to charging methodologies	Light Blue	Light Blue	Light Blue	Dark Blue	Light Blue	Light Blue
Coherence of overall package (insofar as this affects outcomes)	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Overall (subjective) rating on capability to achieve good outcomes	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue

To help understand the supporting analysis presented in the table above it is perhaps best to start by looking at package C, taking this as a central reference point. Package C scores a medium-rating on nearly all the criteria.

Package A performs better than C in terms of the direct financial exposure of ESO to the costs it incurs, through the use of ex ante financial incentives on the ESO internal costs. However this is offset by the worse performance of package A in terms of the overall coherence of the price control package, particularly from the inconsistency in the direct financial incentives between the ESO's internal costs and external costs. Package A does not perform as well as C under the criteria relating to "Ofgem-led supervision of ESO performance & costs" and "Financial exposure of ESO to wider system efficiency and outcomes". This is because, while packages A and C both involve a broad evaluative assessment approach, this is enhanced and strengthened in various ways under C. Furthermore, the effectiveness of the evaluative approach would tend to be weakened under package A by the direct financial incentives provided for marginal reductions in ESO internal costs, without this being compensated for by similar incentives on all aspects of its performance and quality.

Package A performs less well than package C in terms of the contribution from competitive pressures and processes. This is partly because package C would involve a degree of regulatory benchmarking between the ESO and other regulated companies, on cross-cutting aspects of performance. And partly because package C seems somewhat more adaptable to an ISO model which could enhance the competitive pressures on the ESO relating to its role in the system.

Package B performs worse than package C across several areas, reflecting the smaller set of regulatory tools intended to achieve good outcomes than under package C, and less depth of regulatory analysis and review. The advantages of package B come in terms of lower financing costs for the ESO (through removal of the financial penalty or reward arrangements from the evaluative assessment) and lower risks relating to micro-management.

Package D performs better than package C in a number of areas. This should not be a surprise, since the design of package D is, for the most part, to take package C and augment and enhance it in various ways so as to make greater use of competitive and customer pressures and to reduce the disparity of economic power (in respect of ESO's activities) between National Grid and other stakeholders. In doing so, it also reduces the residual risk that the ESO's decision-making is influenced to a greater degree by consideration of the interests of National Grid Group rather than the interests of the ESO's customers and of the wider system.

We identified that a downside of package D is that it may lead to some disruption to charging arrangements. Indeed, the separation of services would call for greater separation of charges for the ESO's activities and this may affect the structure of these charges. While developments to ESO charging arrangements could be beneficial, there is some risk that things get worse before they get

better; though this risk should not be overstated given the starting point. That aside, we did not identify anything else significantly worse about package D compared to C, other than the issues picked up already in the assessment against the first tier criteria in Table 11, concerning implementation complexity and risk, and regulatory effort.

We considered whether the separation of controls under package D could lead to potential problems of inconsistency around the boundaries of the controls, such as distortions to efficient decision-making by the ESO and gaming opportunities. We did not identify this to be a more significant issue for package D compared to the other packages. The details of package D, as specified, are important here. The nature of price control separation under package D does not imply that the service-level price controls are independent: the price control review process, and potentially some elements of the controls, would be common across them. In terms of the costs incurred by the ESO, the default approach under package D is that the price control framework would restrict the regulated revenue of the ESO to the costs it incurs (subject to safeguards) and an allowance for financing costs set by Ofgem. This avoids the problems that can arise from applying different marginal financial incentives to different categories of costs (e.g. differences in network price controls in the past between the marginal incentives on opex and capex, or in the case of package A between the ESO's internal and external costs). Furthermore, package D would retain the evaluative assessment approach from package C; this would look across services and could take account of any important interactions between controls in terms of performance to the same degree as under package C. There are some potential boundary issues between the ESO and NGET, and perhaps the ESO and National Grid's gas transmission activities, but these seem of a similar scale across all packages (apart from package A which in some circumstances could be slightly better in this respect).

On this basis, we identify no downside of package D in relation to boundary issues, coherence or gaming risks. But we do recognise that the separate controls and other arrangements under package D mean that this is a more complex package overall than package C. This means that package D carries additional risks of unintended (and unanticipated) consequences; we capture this under implementation risk and complexity in the first tier assessment present in Table 11 above.

The assessment of package E relative to package C (and other packages) seems especially open to judgement. We summarise our reasoning below but this is not the only plausible perspective.

For the incentives under package E to work well, they need to encourage the ESO to identify and make efficient trade-offs across the GB electricity system, over the long term. These trade-offs involve balancing shorter-term costs and benefits against and longer-term costs and benefits, and balancing costs that arise in different parts of the system. As identified in section 5 in the description of package E, it seems very challenging and ambitious to develop effective long-term system-wide incentives while avoiding disproportionate financial risk on the ESO. This concern is

already captured within the rating for package E in the first tier criterion for “Implementation complexity and risk” in Table 11 (and hence left outside of the scope of Table 13).

The potential benefits of package E (if implemented well) come from the direct financial exposure of the ESO to the costs that it incurs and to its performance and influence within the system. Taken in isolation, it would be reasonable to think that this would help drive performance and efficiency improvements beyond those attainable by the evaluative assessment approach under package C. However, the potential benefits of package E in these areas seem to be offset by two further factors:

- The profits generated by the ESO are likely to be a small component of National Grid Group’s overall profits. As discussed in Section 2, we do not consider it safe to assume that the work done by Ofgem and National Grid to create a separately licensed ESO company within National Grid Group and separate this from other parts of the group eliminates all risks that the ESO operates with a strategic bias in favour of the wider interests of the corporate group. This is not to question the merits of that work, because it can make a positive contribution; but residual risk still applies. It does not seem conceivable to set the financial incentives on the ESO in a way that means that these are the dominant source of profit within the overall corporate group (or relative to other electricity interests such as TO activities and interconnectors). There does seem to be a concern that wider corporate objectives and interests may override the ESO incentive arrangements when it comes to whole-system efficiency, coordination and transformation. We capture this concern under “Susceptibility to potential NG strategic bias and viewpoint risks” within Table 13 above.
- There are questions about whether the ESO will exist as a profit-making corporate entity in ten, twenty or fifty years, with the potential introduction of an ISO model in the future. And even if the ESO role is left with National Grid, it is difficult for Ofgem to make long-term commitments on the details of the ESO regulatory framework in the context of a changing energy system. In this context, even a scheme that is designed well, in a narrow context, to expose the ESO financially to both shorter-term and longer-term system costs (or performance) may, in practice, provide perverse financial incentives for the ESO to adopt solutions that limit shorter-term costs and maximise shorter-term profits as future ESO profit streams are discounted by uncertainty about their availability and their drivers. We capture this concern under “Robustness of approach to uncertain future developments” within Table 13 above.

Package E also seems worse than package C in terms of the competitive pressures acting on the ESO. Package C is much more adaptable than package E to the introduction of an ISO model and that, by itself, enhances the competitive pressures on the ESO.

Finally, we turn to package F. This package is, as seen in the package descriptions in section 5, quite similar to package C. The main difference is that package F involves a greater role for regulatory activity that seeks to improve outcomes by influencing or controlling the behaviour,

processes and decision-making of the ESO. This provides some potential for improvements over package C. It also brings drawbacks for package F, in terms of the risks relating regulatory to micro-management that arise from greater influence and control the ESO. Whether package C or F performs better will depend on details and circumstances which are beyond the scope of the assessment of packages presented in this report.

When thinking about the ESO price control framework, it might be best to see packages C and F as more minor variations on a similar high-level framework. We make use of this idea to help simplify the choices facing Ofgem about the framework as we present conclusions in section 9 below.

7 Measures that can be used to enhance the packages

Introduction

Sections 5 and 6 outlined and assessed six high-level packages of options for the ESO price control framework. These packages differ according to the weight placed on the four broad approaches introduced in section 4. This section provides a discussion of three more detailed issues that struck us as particularly relevant to highlight in terms of the ability of the ESO price control framework to achieve good outcomes, which have had limited attention in the preceding sections. These are:

- Customer and stakeholder engagement processes.
- Development of cost and performance benchmarks.
- Expert technical challenge body.

These three issues are not tied to any single approach and have applicability across the six packages described in section 5. However, the precise way in which they will be most useful is likely to be affected by the mix of approaches used.

The attention given to developing these three areas will be influenced by decisions on the scale of resource that it is considered desirable to devote to the regulation of the ESO (an issue we pick up on in the conclusions we draw in section 9). This is because each of them provides a way to try to get more out of the ESO price control framework, albeit with greater resource requirement from Ofgem or other parties. We take each issue in turn below.

Customer and stakeholder engagement processes

Customer and stakeholder engagement will form some part of whatever approach is adopted to regulating the ESO. At a minimum, this will include the standard consultation opportunities that regulators provide (and often must provide) when taking decisions with material effects on customers and stakeholders. But regulators have devoted considerable resources over time to seeking to develop/encourage approaches that go well beyond this.

One key aspect of this has been the concern that regulated businesses can become too regulator-focused, with customer and stakeholder views and interests regarded rather narrowly and primarily in terms of those specific things that the regulator has chosen to prioritise. Among other things, this has led to the development of tools that aim to encourage regulated businesses to do more, and better, in terms of their own stakeholder engagement. Ofgem's proposals under RII0-2 to require companies to establish an independently chaired Customer Engagement Group can be understood in this context, as can Ofwat's introduction of Customer Challenge Groups for PR14. By making the regulator's willingness to be satisfied by company submissions dependent on the effectiveness of

engagement with their customers, and requiring the establishment of engagement groups with a duty to provide some form of assurance function, companies can face sharper incentives to take more notice and account of customer and other stakeholder interests than they might otherwise.

The underlying model here puts primacy on the relationship between the regulator and the regulated business when price controls are being set: companies must show they have taken sufficient account of customers when dealing with the regulator. However, some regulatory models have sought to adopt a different approach which aims to give primacy to the relationship between the regulated business and its customers and other stakeholders, with the regulator intended to play more of a framing or backstop role. This is apparent in efforts to promote “negotiated settlements” and, in the UK, the CAA’s approach to constructive engagement is an example of this.

These efforts can be understood as focusing primarily on imbalances of economic power between regulated companies and their customers, with the extent of these imbalances underpinning the case for economic regulation. Where there is a large number of relatively less-well informed consumers and stakeholders, the prospects for bargaining to achieve desirable outcomes can be more limited, and this is reflected in the way that regulators often effectively represent consumers in price control processes. But where there are a smaller number of relatively well-informed consumers/stakeholders, the prospects for bargaining approaches can be much better, as the regulator may be able to act in ways that alleviates the imbalance of economic power but fall short (at least most of the time) of stepping in to act on behalf of all affected parties. The regulator can seek to act more as a rule maker and referee than as on one side of the bargaining process.

The CAA’s experience with airport regulation highlights how this type of approach can evolve, albeit with legislative developments that were supportive of the underlying changes. The CAA’s approach to setting price controls at Gatwick Airport is particularly notable, as this has involved moving to a position where the price control has become explicitly used as a means of providing backstop protection in terms of charging levels, and making a set of commitments that are supportive of more productive engagement between Gatwick and its customers.⁴

An important issue here is that there is a risk that the parties doing the negotiating in such processes have interests that may not be well aligned with those of final customers or other stakeholders. This can be particularly so when there are significant system issues at play because this can increase the likelihood that actions which are advantageous for a particular user nevertheless result in poorer overall system outcomes. In the Gatwick case, the CAA explicitly recognised this risk and sought to mitigate it through its oversight functions: that is, it assessed whether there was evidence of material risks of adverse effects that should cause it to intervene.

⁴ See, for example: <http://publicapps.caa.co.uk/docs/33/CAP1102.pdf>

System issues are potentially more pronounced for the ESO than they are for specific airports, as airports represent specific nodes within a broader network rather than being networks themselves. But airports examples are useful to consider for two reasons:

- Not all ESO activity is necessarily system activity: as highlighted in section 2, some ESO activity can be understood as providing services to particular parties or groups and this activity may be more amenable to approaches that place emphasis on the relationship between the regulated company and its customers.
- They highlight ways in which customers and stakeholders can engage with regulatory processes, and how this engagement can change the focus of the regulated company in desirable ways. In part, this follows from the broader and more diverse set of challenges that such approaches can bring to bear on the regulated company.

In terms of the role for customer and stakeholder engagement, Ofgem's new approach to ESO regulation from April 2018 can be understood as adopting an intermediate position. The stakeholder group has a formal role in evaluating ESO performance, but the practical significance of that role is likely to depend on the practicalities of how the arrangements are developed. The effectiveness of the group will be dependent on the ability and incentive of stakeholders to engage in ways that are likely to improve overall outcomes.

Incentives to engage will be heavily affected by the perceived likelihood of change as a result of participation. If the output of the stakeholder engagement process is likely to be implemented unless a specific concern triggers regulatory interest, then this can be expected to make the process appear much more valuable to join than one in which its significance is more opaque and questionable. Consideration of incentive issues also highlights the significance that charging arrangements can have: attention to charges (and the prospects of reducing them) can encourage users to find ways of improving system outcomes by engaging in stakeholder processes. This type of relationship can tend to make the arrangements more "normal", in that one would typically expect customers in a competitive market to be motivated by the charge levels they face, rather than by some overall measure of the charges that all consumers face.

Over time, there may be opportunities for the role of customer and stakeholder engagement processes to evolve in ways that put the relationship between the ESO and its customers, rather than the ESO and the regulator, more to the fore. This is especially so under package D, which places emphasis on the services provided by the ESO.

Development of cost and performance benchmarks

If the ESO price control framework places emphasis on mechanistic ex ante financial incentives (e.g. under package E), then there will be a need for performance benchmarks for the ESO. These

may relate to the costs it incurs, wider metrics of system costs and efficiency or other aspects of the ESO's service quality or performance. Within a mechanistic incentive scheme, performance benchmarks (or baselines) would be used to determine, for example, the level of performance above which the ESO earns a financial reward or below which it incurs a financial penalty.

However, even where no mechanistic incentive scheme is used, and emphasis is placed on a broad evaluative assessment (e.g. under packages A, C, D and E), there is a role for performance benchmarks that can be used as part of the information base feeding into that assessment.

In either of these cases, the effectiveness of the approach seems likely to be dependent upon the extent to which performance benchmarks used are independent of National Grid.

For instance, if the ESO's performance is primarily compared against what it has done in the past, there is an incentive problem: improvements to performance today could lead to anticipation of more demanding performance benchmarks in the future, and this could act as a deterrent against those performance improvements being achieved in the first place. Furthermore, if performance benchmarks emanate from the ESO, whether in terms of its historical performance or its proposed targets for the future, there will be questions as to whether these are sufficiently challenging. There will be particular concerns about unfairness to customers if the ESO is able to achieve financial rewards, funded through charges to customers, from out-performance against benchmarks that the ESO has played a major role in developing or calibrating.

For these reasons, a useful avenue of work for the ESO price control framework concerns the development of benchmarks and other comparative information to shed light on the ESO's performance, in a way that is reasonably independent of National Grid (e.g. independent of its own forecasts or its own past decisions or approaches). This is clearly a difficult area, as illustrated by the experiences with the performance benchmarks used for financial incentive schemes for the ESO's external costs in the past, which have placed weight on modelling work led National Grid.

To help overcome such difficulties, a key point is to appreciate that even if benchmarks and forecasts produced outside of National Grid are less accurate, in some sense, than those produced by National Grid, they may still have considerable value within the price control framework. This is because, for example, they provide a means to tackle the issues above relating to incentive deterrence and unfairness to customers, and provide a different perspective which can help tackle concerns about benchmarks that are not sufficiently challenging. On this basis, modelling of system costs led by Ofgem could play a useful role even without any expectation that such modelling can produce more accurate predictions than the ESO can produce in-house.

The idiosyncrasy of the ESO means that there are difficulties with cross-company comparisons of the ESO's performance, whether in terms of costs, service quality or other aspects outputs. Wide-ranging international comparisons are limited by differences across jurisdictions and energy

systems, and by the sensitivity of comparisons to fluctuating exchange rates. However, there may be scope for using comparative information from other systems on a more targeted basis, especially with the Northern Ireland system operator SONI. Furthermore, and especially under package D, if the ESO's services are exposed more clearly there may be greater opportunities to use benchmarks from other companies than when the ESO is taken as a whole.

Finally, a lack of close comparators to the ESO need not remove any scope for formal benchmarking or performance comparisons amongst regulated companies. Ofgem and Ofwat have developed regulatory arrangements that encourage companies to compete against each other in terms of the quality of their business plans, data submissions and their wider regulatory reputation (e.g. initiatives such as Ofgem's RIIO-1 fast-tracking and Ofwat's company monitoring framework). It would seem possible to compare some aspects of the ESO's performance with other regulated companies, such as energy network companies. We identified this possibility in our specification of packages C, D and F which include a role for comparisons with other UK regulated companies on cross-cutting aspects of performance.

Expert technical challenge body

Assessing the performance of the ESO, and challenging the ESO to evaluate and potentially undertake different kinds of activities, can require a significant degree of both competence and resource commitment. These requirements stem from the underlying nature of many of the system issues that the ESO has to contend with: developing coherent options for improvement requires an understanding of how the complex arrangements currently function and what potential alternatives are sufficiently realistic and practical to merit further attention. For roles such as system planning and coordination, the ESO may have informational and resource advantages over other stakeholders that make it difficult for other parties to engage constructively in the development and assessment of options.

This situation raises the risk of a lack of effective technical challenge to the ESO from stakeholders, because the costs of providing an appropriate overall level of challenge may be prohibitive for stakeholders on a standalone basis.

There is potential merit in the option of establishing a body with technical competence to provide some review and challenge to the ESO's functions. To some extent, such an approach can be understood as providing some form of competitive processes in relation to the relevant ESO activities, by increasing the role played by other well-equipped parties and bringing a greater diversity of ideas to bear on ESO activities. This may be particularly useful in areas, such as system planning and coordination, where there is less opportunity and motivation for individual stakeholders to engage effectively as customers of ESO services.

One example of this kind of technical review body is the Performance Review Commission (PRC), which is part of Eurocontrol, and has provided technical challenge in relation to Air Traffic Management arrangements across Europe through a range of research and reports since it was established in 1998. To some extent, the Payments Strategy Forum (PSF), which was created by the Payment Systems Regulator to develop a strategy for payment systems in the UK, can be understood as having a form of “prodding” role. By identifying aspects of what a desirable set of future arrangements might look like, the PSF can generate pressure for change, and priorities that the PSR can then seek to assess and, where appropriate, promote.

The type of technical challenge institution envisaged here is materially different from the role proposed for RIIO-2 challenge groups. The key role envisaged would involve the ability to provide competent technical challenge that is independent of the ESO, and so the composition of the challenge group, and the resources it has, would need to reflect this.

In a context where system pressures and opportunities look as though they may change markedly over time, technical challenge could be an especially important issue. In particular, in the absence of sufficiently effective challenge, there may be tendencies for a range of defensive responses in relation to system planning that are difficult – for customers/stakeholders and Ofgem – to detect and to counter. Technical challenge responsibilities could be established in relation to those ESO services where significant risks of insufficient challenge are thought to remain. The institution could be charged with duties that addressed particular areas of concern, such as whole system effects/improvements and innovation. It would provide an alternative perspective, helping to guard against risks of undue reliance on existing approaches and proposals from the ESO.

8 ESO financing costs and RAV

Introduction

This section concerns the approach to the price control remuneration of the ESO's financing costs, including questions about the use of a RAV-based approach. This is an aspect of the ESO price control framework that we identified in section 3 as being high priority for the project, which we have not considered in any detail in the presentation and evaluation of the six packages of options in sections 5 and 6 above.

This section takes the following topics in turn:

- The potential role of an ESO RAV and alternatives to the use of a RAV.
- RAV allocation exercise as part of ESO and TO price control separation.
- Interactions between financing costs and design of the ESO price control framework.
- The suitability of the RIIO approach to remuneration of ESO financing costs.
- Principles on the relationship assumed between the ESO and National Grid Group.

The set of topics covered reflects issues and options that we identified as relatively high priority for consideration in the early phases of the development of a new price control framework for the ESO, as well as some questions and concerns that Ofgem raised in its preliminary discussions with us.

The final part of this section considers interactions with the six packages described in section 5. We highlight, in particular, where some packages would fit more naturally with particular approaches to financing costs and the RAV.

The potential role of an ESO RAV and alternatives to the use of a RAV

An important feature of the RIIO price control framework, which has been applied to NGET's TO and ESO activities, is the RAV. Ofgem's RIIO2 framework consultation identified questions about the role of the RAV within a new ESO price control framework.⁵

Within the RIIO framework, the RAV is a regulatory construct which represents notional investment in the regulated company, and is used to calculate the return on capital to be allowed under the price control as well as price control allowances for depreciation (or "slow money"). In very loose terms, the value of the RAV represents a measure of the value of financial investment from the

⁵ Ofgem (2018) *RIIO-2 framework consultation*, page 39.

company's investor's which, under the terms of the price control arrangements, the company has yet to recover through charges to customers.

The role of the RAV in the UK approach to utility regulation (also known as the RAB or RCV) has emerged in the context of investment in long-lived infrastructure assets.⁶ The RAV can play a number of different roles within a price control framework. It can provide transparency about the regulatory allowances for depreciation or slow money feeding into the calculation of maximum regulated revenue and regulated charges, and it can keep track of the price control remuneration of the company's capital expenditure over time (e.g. from one price control period to the next). It can inform the assessment of the allowances for the company's cost of capital (in £m) and financing costs.

The RAV can also provide a form of regulatory commitment to the remuneration of the company's investment in future price control periods.⁷ This commitment may benefit investors and customers, by reducing the perceived risk to investment in the regulated company and thereby reducing financing costs. But there are also potential downsides to this use of a RAV and the associated regulatory commitments.

There is a question as to whether an approach that uses a RAV is appropriate for the ESO. The ESO will have significant assets, such as IT infrastructure and systems, and perhaps some planning and design assets. But these assets will not have the long asset lives and scale of costs that we see for energy network infrastructure. And if a RAV is used, there are questions about its role in the ESO price control framework.

One possible alternative to a RAV is a wider regulatory policy to allow recovery of actual costs incurred, including capital expenditure (potentially subject to a provision to exclude demonstrably inefficient costs). Within this approach, there are two broad options:

- Recovery of investment costs through depreciation allowances (and return on capital recognising value of investment yet to be recovered through depreciation).
- Full recovery of totex each year (100% "fast money"). Under this approach, all expenditure would, in effect, be expensed and recovered in the year it is incurred. So investment in a new IT

⁶ In using the term RAV, we do not mean to include all approaches that involve a regulatory assessment of the company's "asset value" as part of the calculation of price controls. Instead we mean the type of approach used by Ofgem in the RIIO framework (and similarly by Ofwat in the wholesale price controls for water and wastewater activities in England and Wales). Under this approach, the RAV spans price control periods, with the opening value of the RAV in one price control period calculated from the closing value of the RAV at the end of the previous price control period and rules on how regulatory allowances for expenditure, and the company's outturn expenditure, feed into the RAV.

⁷ Ofgem's *RIIO handbook* (2010, page 109) stated that "The RAV provides a commitment on the revenues to be raised from future consumers during subsequent price control periods".

system would be recovered in the year it is incurred rather than having its costs spread over several years through depreciation charges.

The first approach would allow for a more reasonable allocation of investment costs between current and future customers than the second approach. Under the first approach, there would be no strict need for a RAV, and the ESO would be entitled to recover its capital expenditure through recovery of depreciation charges based on its historical expenditure. However, we see no material benefit in dropping the concept of the RAV in this case. A measure of the capital expenditure incurred by the ESO, but yet to be remunerated through charges to customers, would seem very useful for the regulatory framework. It would play a role in transparency and record-keeping and would also be relevant to regulatory decisions on the allowances for financing costs or cost of capital for the ESO control. Something like the RAV would probably be reinvented.

However, there is opportunity for one refinement in relation to the use of the RAV: rather than using a RAV with a single depreciation rate, it would be more logical to record several sub-pots within the RAV which allow for different depreciation policies in each. Without this flexibility on depreciation, the benefits of more reasonable allocation of investment costs between current and future customers may be lost (e.g. as the appropriate time profile for depreciation will differ across ESO investments). Using several sub-pots adds increases complexity to some degree compared to a single pot. But, in the same way that a company could hypothetically achieve simplification of its internal accounting by applying the same depreciation rates for all of its fixed assets, there seems a weak case for adopting a single pot on simplicity grounds. As an example, the price control framework for Northern Ireland Electricity (NIE) involves several sub-pots within the overall RAV, with different asset lives used for regulatory depreciation calculations, and the Competition Commission took the step of introducing a further RAB pot for five-year assets in its 2014 determination of the NIE price control.⁸

We see no strong reason why the ESO regulatory framework should adopt the second approach above, involving 100% fast money, unless there are major concerns about risks of distortions to the ESO's behaviour and efficiency in respect of the balance between its operating expenditure and capital expenditure (e.g. concerns of capital expenditure bias). Furthermore, there would be complexities in adopting this approach because, in the past, some ESO costs have been funded through a depreciation-based approach so a move to 100% fast money might need to be phased in.

A quite different approach to the use of a RAV would be to set controls based on a forward-looking regulatory assessment of the efficient costs of service provision. The price controls for the ESO's services (or some part of the ESO's services) could be calculated using regulatory estimates of the efficient costs of providing those services, without regard to any historical RAV. These estimates

⁸ Competition Commission (2014) *Northern Ireland Electricity Limited price determination*, paragraph 57.

could draw on information on the ESO's own historical costs and forecast costs as well as other available information (e.g. cost benchmarks from other companies for specific ESO services or activities or adjustments to figures provided by the ESO). The regulatory assessment of efficient costs would allow for the costs of investment (e.g. fixed assets) either through estimates of depreciation and return on capital or using annuity-based allowances. This assessment would be ahistorical, allowing for a more forward-looking view of the costs of service provision without being bound by the investments the ESO has made in the past or any regulatory expenditure allowances underpinning past price control decisions. This approach has several benefits:

- It would help protect customers from exposure to the costs of ESO investment (or regulatory allowances for ESO investment) that turn out to be less efficient than alternative methods of service provision.
- It would help protect customers from exposure to the costs of ESO investment that was made for the purpose of providing ESO services that customers no longer require.
- It would tackle the risks to the development of competition and choice in services provided by the ESO. RAV-based price controls pose risks to competition, for example by potentially underwriting investment risks that potential competitors, or alternative suppliers, may need to bear themselves.

These benefits may come with the drawback of significantly higher financing costs, compared to a RAV-based approach (all else equal), to reflect the greater financial risks to the ESO's investors; these would need to be incorporated into the ESO controls and would feed through to the charges to customers. In addition, an alternative to the RAV-based approach could create additional complexity and implementation issues, especially when it comes to setting allowances for the financing costs of the ESO (e.g. determining the costs of capital). There is also the question of how the regulatory assessment of efficient costs could be made.

From this perspective, there is a stronger case for moving away from a RAV-based approach, and setting controls by reference to more forward-looking measures of costs, if there is a regulatory strategy to try to promote or test the potential for some form of competition and choice in relation to (some of) the ESO's services and activities, or if the significant changes over time in the services and activities that customers want or need from the ESO is such that protection against the costs of unused or inefficient investment is worth higher financing costs (see discussion of approaches involving competitive and customer pressures in section 4).

The opportunity to apply this non-RAV approach is closely connected with the question of a potential RAV valuation and allocation exercise as part of the separation of TO and ESO controls. There is a potential for a windfall gain to National Grid at the expense of customers (and some conceivable possibility of the reverse) if the ESO return on capital is to be remunerated on the basis of a

forward-looking estimate of its capital investment requirements, while the NGET RAV is allocated between TO and ESO controls in a way that does not take account of the full financial capital value being attributed to the ESO. So there is a particularly strong case to carry out a RAV allocation exercise under this approach (discussed in separate subsection below).

We also see a potentially attractive intermediate option: the price control framework would allow the ESO to set charges in a given year that enable it to recover the sum of its operating expenses in that year, a depreciation charge for its capital assets used in that year and an Ofgem-determined allowance for its financing costs for that year. This might be seen as a form of cost pass-through but it differs from pass-through of capital expenditure in some important ways. The ESO would be allowed to recover its reasonable depreciation charge relating to its capital costs. However, the regulatory commitment would be to a policy that ESO price controls should allow for recovery of the efficient costs of service provision, rather than to the recovery of the historical investment reflected in the RAV. This could potentially lead to higher financing costs for the ESO compared to a hypothetical approach that involves a high degree of regulatory commitment around recovery of the RAV. But it also has benefits compared to that approach, in terms of: protecting customers from exposure to the costs of investment that may turn to be unnecessary in the future; providing greater discipline on the ESO's capital expenditure decisions; and being more compatible with competition and substitution emerging in some services provided by the ESO.

Within this type of intermediate approach, we can see a beneficial role for the RAV, not primarily as the focus of regulatory commitment, but as a means to support the policy that ESO price controls should allow for recovery of the efficient costs of service provision by: (a) providing transparency about depreciation allowances feeding into the calculation of the ESO's maximum regulated revenue and charges; (b) keeping track over time of the price control remuneration of capital expenditure; and (c) informing the assessment of the ESO's financing costs.

In Table 14 we provide a summary of some high-level options on the role of the RAV within the ESO price control framework. These focus on the way in which investment costs are remunerated. There are further questions, which we turn to in separate subsection further below, on the role of a RAV within the estimation of the financing costs of the ESO (since the RAV is a potential measure of the capital employed in a regulated business). There are links between the options in the table and these further options but they are not absolute: for instance it may be feasible to adopt a RAV-based approach to remuneration of the ESO's capital investment requirements while calculating its financing costs by reference to a margin benchmark on its total costs.

Table 14 High-level overview of options on role of RAV

Option	Brief overview of pros and cons
<p>1. RAV-based approach with some degree of long-term regulatory commitment</p>	<ul style="list-style-type: none"> • Most consistent with RIIO framework • Compatible with approaches based on cost recovery or ex ante expenditure allowance • Contribution to low financing costs, through some regulatory commitment around RAV • Applying a single depreciation profile/rate to all ESO investment is crude in a context where different assets have different asset lives, and this may lead to unfair allocation of costs between current and future customers and potentially financeability issues • Some risks that RAV approach distorts competition • Some risk of exposing customers to costs of investment that turns out to be inefficient or unnecessary
<p>2. No RAV - recovery of costs incurred / allowed on a cash basis (100% fast money)</p>	<ul style="list-style-type: none"> • Departure from RIIO framework • Somewhat simpler than RAV approaches but materiality of difference questionable • Compatible with approaches based on cost recovery or ex ante expenditure allowance • May contribute to low financing costs as all expenditure financed on cash basis • However, may exacerbate other financing costs issues due to more asset-light structure • Concern about unfair allocation of ESO costs between current and future customers • Similar risks to competition and customers as under (1) above, possibly exacerbated
<p>3. No RAV - price controls set on regulatory assessment of efficient costs of service provision</p>	<ul style="list-style-type: none"> • Greater departure from RIIO framework than option (2) • Requires ex ante regulatory assessment of costs of service provision • Likelihood of significantly higher financing costs than RAV approach (all else equal) • Tackles concern that RAV distorts competition and helps protects customers from exposure to costs of investment that turns out to be inefficient or unnecessary • Would probably need to be accompanied by RAV allocation exercise between TO and ESO
<p>4. RAV-based approach without long-term regulatory commitment to RAV recovery</p> <p>Regulatory commitment is to a policy that ESO price controls should allow for recovery of the efficient costs of service provision</p> <p>RAV keeps track of price control allowances for depreciation charges for capital investment</p> <p>Different pots within RAV to allow for different asset lives</p>	<ul style="list-style-type: none"> • Intermediate approach between (1) and (3) • Compatible with approaches based on cost recovery or ex ante expenditure allowance • RAV provides transparency on, and helps keep track of, regulatory depreciation allowances, and helps assessment of ESO financing costs • Helps tackle concern that RAV distorts competition and helps protects customers from exposure to costs of investment that turns out to be inefficient or unnecessary (but possibly not as effective as option 3) • Addresses concern about balance of charges between current and future customers from depreciating all investment at the same depreciation rate under option (1) • Some additional complexity but materiality of difference questionable

RAV allocation exercise as part of ESO and TO price control separation

The RIIO-T1 control for NGET incorporates a RAV which covers both TO and ESO activities, with some separate reporting of TO and ESO elements of the RAV. This RAV involves a degree of regulatory commitment on past expenditure allowances under Ofgem's price control framework which has yet to be remunerated through customers' bills.

If a RAV is to be used for the ESO price control framework from April 2021, there is the question of how the opening RAV for the new ESO framework is determined. Even if there is no role for a RAV concept in the ESO price control framework, there is still a question about the opening value for the RAV for the new, separated TO control from April 2021, under RIIO-2 (we take as given that the RIIO-2 control for NGET's TO activities will involve a RAV-based approach).

So, our view is that regardless of whether a RAV concept is used for the ESO price control framework from April 2021, there is a question of how to allocate the RAV that is currently used for the RIIO-T1 control between TO and ESO activities.

The simplest approach would be to take the prevailing value of the ESO RAV and TO RAV reported for the RIIO-T1 control applied to NGET. However, there are a number of reasons why this simple approach may be inappropriate, as we explain below.

The reported ESO RAV may relate predominantly to fixed assets currently used by the ESO business and not cover other investor capital that supports the ESO functions but is less visible than fixed assets (and the RAV itself may only have a weak link to identifiable capital investment relating to the ESO due to the use of a totex approach under the RIIO-T1 control). Beyond capital to finance investment in fixed assets, the current ESO activities may require investment as follows:

- **Investor capital to support financial risk of ESO.** The current regulatory framework for the ESO, including the ESO incentive arrangements and the incentives relating to ESO activities under the RIIO-T1 control (e.g. totex incentives applied to over-spend or under-spend on ESO internal costs) exposes the ESO activities to financial risk.
- **Investor capital to help manage timing of cash flows.** Apart from the risk of incurring (permanent) losses, the ESO is likely to require working capital to enable it to manage cash flow.

If these elements of the investment required to enable ESO activities are not recognised in the ESO RAV figures used to split between ESO and TO activities, then there is a major risk of customers paying more in total under the separate NGET TO controls and ESO controls, than under current arrangements.

If there are significant elements of ESO capital requirements that are currently remunerated through the NGET control (e.g. working capital and risk capital) and if these are allocated to the TO rather than ESO from April 2021, then there is a high risk of double counting:

- These elements would be remunerated through the NGET RIIO-2 control, since they would form part of the TO RAV and feed into the total revenue allowance to NGET under the TO control.
- When it comes to setting the ESO control, it will become clear that the financing costs of the ESO extend beyond financing costs for its fixed assets. Ofgem may decide that it is necessary to set the ESO control in a way that remunerates it for financing costs implied by the ESO RAV but also for further ESO investment requirements (e.g. working capital and risk capital) that are additional to the ESO RAV. The CMA's determination in the *SONI* case in 2017 highlights the importance of considering the various different sources of capital requirements in setting price controls for system operator activities.

Apart from double-counting risks, there are two further concerns:

- If the ESO RAV is under-valued (or over-valued), this could distort the valuation and use of services provided by the ESO in cases where there is a potential for competition or alternative means of provision in the future (e.g. distribution system operators or other parties). These distortions could be avoided, or reduced, through an exercise of RAV revaluation. And since the ESO is small relative to NGET, aligning the ESO RAV better with the economic value of ESO assets and other ESO capital requirements is unlikely to have significant adverse effect on the NGET RAV.
- If the ESO RAV is under-valued, this could exacerbate the degree to which the ESO is seen to be asset light, which may have implications for the approach to setting the cost of capital.

There are different ways in which a RAV valuation and allocation exercise could be done, and there are advantages and disadvantages of each. It is beyond the scope of this study to consider alternative approaches to RAV allocation. The key point, at this stage, is that there is a question for Ofgem as to whether to adopt a simple approach of using the reported ESO RAV and TO RAV figures to allocate the NGET RAV or whether to consider RAV allocation in more detail and allocate purposefully through a regulatory process.

There is regulatory precedent from the GB energy sector and other sectors for engaging in an exercise to consider how best to allocate the RAV as part of the separation of price controls between two companies or sets of services/activities.

In its regulation of the England and Wales water industry, Ofwat is in the process of separating the current wholesale water and wholesale wastewater controls into further components: water resources; network plus water; network plus wastewater and bioresources. For both wholesale

water and wholesale wastewater, Ofwat has set out an approach to allocate the existing RCV between the new controls. In the case of the wastewater control, Ofwat required companies to carry out a detailed assessment of the “economic value” of their bioresources assets and plans to use this as the basis for setting the opening RCV for bioresources from 1 April 2020 (the opening wastewater network plus RCV will be calculated from the closing value of the wholesale wastewater RCV minus the amount allocated to bioresources).

A further alternative to a RAV allocation exercise, to address risks of double counting to the detriment of customers, would be to adopt a simple approach to RAV allocation and then make a separate adjustment, as part of the NGET TO price control for any identified double counting, so that the overall return across ESO and TO controls would be no more than if the financing costs had been determined for a combined ESO and TO business (all else equal). For example, if the approach used for ESO financing costs allowed for financing costs to the ESO that went beyond the financing costs calculated from a WACC*RAV approach applied to the ESO RAV (or implied RAV) then this element of financing costs could be deducted from the allowed return calculated for the TO business. This would be similar to the “wholesale adjustment” approach adopted by Ofwat when setting separate retail and wholesale controls for water companies in England and Wales for the 2015-2020. This approach has a benefit of avoiding the need for an asset allocation exercise and is quite a direct way to tackle the concern of double counting.

However, for the ESO it could be problematic to use this approach of adjusting the allowed return as it would create a significant interdependence between the ESO and TO controls that raises practical and implementation problems (e.g. in relation to CMA appeals against the ESO or TO controls, and in relation to Ofgem decision-making processes, especially if the ESO and TO price control lengths differ). Furthermore, the validity of this approach is questionable if the risk profile of the ESO regulatory framework differs in the future compared to the current situation: it may be difficult to make an adjustment that reasonably disentangles an adjustment for the allocation between ESO and TO controls from changes to the ESO financing costs over time (e.g. due to changes in the regulatory framework).

We provide a summary of options in relation to the RAV allocation in Table 15.

Table 15 High-level options relating to RAV allocation between TO and ESO controls

Option	Overview of pros and cons
<p>No RAV allocation exercise</p> <p>Allocate NGET RAV between ESO and TO on basis of reported “SO RAV” and “TO RAV” within the combined RIIO-T1 control</p>	<ul style="list-style-type: none"> • Simpler approach, with lower regulatory burden • Major concern about double counting of financing costs to detriment of customers • Risk of harming the cost-reflectivity of charges for ESO services (now and in the future)
<p>RAV allocation exercise between TO and ESO controls, which takes account of the economic value of ESO services and capital requirements of ESO</p>	<ul style="list-style-type: none"> • A way to tackle double counting concerns • Can help improve cost-reflectivity of charges for ESO services • Some regulatory resource requirement, burden and implementation risk • Work on RAV allocation should provide useful information to support subsequent work on ESO financing costs (i.e. some work which is probably needed anyway on ESO capital requirement done as part of RAV allocation)
<p>As for first option combined with:</p> <p>Potential adjustment to TO cost of capital allowance to remove any identified double counting of ESO financing costs</p>	<ul style="list-style-type: none"> • A way to tackle double counting concerns • Some regulatory resource requirement, burden and implementation risk, but less in the short term than under RAV allocation exercise • Less suitable if the risk profile of ESO regulatory frameworks differs in the future compared to current situation • Less transparent way to remunerate financing costs of ESO and TO than options above • Potential for problems from interdependencies created across ESO and TO controls

Interactions between financing costs and design of the ESO price control framework

The design of the ESO regulatory framework will have a major impact on the financial risks that the ESO faces and the financing costs that need to be allowed for in setting price controls for the ESO.

At one extreme, there might be an approach in which all of the ESO’s costs are subject to full cost pass-through and any regulatory assessment of ESO’s service quality and performance has only a reputational, and not financial, consequence for the ESO. This could involve a high degree of risk protection for the ESO and very low financing costs.

At the other extreme, an approach that exposes the ESO to potentially large financial upside and downside according to a combination of its performance and/or exogenous factors, could lead to a situation where the capital investment in the ESO is high risk (e.g. compared to investment in GB energy network companies) and its financing costs are high compared to its other costs.

Even where risk is considered diversifiable, and not relevant to the asset beta under a CAPM approach to the estimation of the cost of equity, it may affect the ESO’s overall financing costs. For

instance, more risky conditions may affect the opportunities for the ESO to finance its activities through lower-cost debt finance, and may affect the extent of its working capital requirements.

The points above apply to price control regulation more widely; they are not specific to the ESO. But because of the asset-light nature of the ESO, and the scale of transmission revenues that it handles, the financing costs of the ESO may be more sensitive to the details of the price control framework than is the case for GB energy network companies. We see three practical implications for the development of the ESO regulatory framework:

- **Understanding the relationship between risk and ESO financing costs.** For the ESO it may be particularly important to carry out work to understand how the various aspects of the regulatory framework affect the risk of the ESO and how these feeds through to its financing costs.
- **Considering the overall balance of risk.** One of the lessons from the CMA's determination in *SONI* is that, for an asset light system operator, asymmetric risk exposure under the price control framework could be found to create a situation where the CAPM approach is insufficient, on its own, to fully remunerate equity investment for risk and there may be a need, in some circumstances, for separate financing cost allowances for asymmetric risk to ensure a "fair bet" for investors (or customers). This suggests that it is important to consider the balance and symmetry of risk as part of the assessment of financing costs. This can include potential cases of asymmetric risk to the detriment of companies/investors and cases of asymmetric risk to the benefit of companies/investors.
- **Refining price control design in the light of initial assessment of financing costs.** It seems possible, for example, that preliminary work to estimate the financing costs of the ESO could indicate high financing costs and raise questions about whether the factors contributing to these financing costs (e.g. relatively high-powered incentive arrangements within the proposed price control framework) are worthwhile from a customer perspective. This work may then suggest that there is benefit in refining aspects of the price control framework, to improve the balance between the benefits and drawbacks to customers of the risk exposure of the ESO. From this perspective, it seems important to avoid locking in to the details of the price control design before implications of the design for financing costs have been considered.

It is also possible that work on financing costs identifies aspects of the services provided by the ESO that could be adapted. For instance, if the ESO's role in the transfer of large sums of money between market participants (e.g. suppliers) and TOs leads to significant working capital requirements for the ESO, there may be ways to alleviate the financing costs arising for the ESO by modifying the ESO's role to reduce volatility in the ESO's cash flows. The opportunities for this type of adaptation are greater if there is clarity on the relationship between the ESO's financing costs and the specific services and activities that the ESO is involved in.

The suitability of the ROCE approach to remuneration of ESO financing costs

There is a question of whether the approach to estimation of the financing costs of regulated companies that is adopted under the RIIO framework is suitable and appropriate for the ESO. This approach is based on calculating allowances for financing costs, included within an aggregate revenue control, using a WACC*RAV calculation and with the cost of equity component of the WACC estimated using CAPM. There is extensive precedent for this approach in UK economic regulation.

The WACC*RAV approach can be understood as falling within a broader approach of estimating a company's financing costs by reference to a level of return on capital employed (ROCE), that takes account of the riskiness of the debt and equity capital invested in the business. Analysis of ROCE has been used by the CMA (and before that the Competition Commission) in many cases across different sectors of the UK economy. It is not specific to monopoly utilities or infrastructure companies.

However, there are significant differences between the ESO and GB energy networks, for which the RIIO control was developed, which seem pertinent to the approach to financing costs. These include the asset-light nature of the ESO, and its role in the provision of a diverse set of services which seems quite different to the role of GB energy network companies which involves extensive activity in infrastructure asset management.

UK regulators have used alternatives to a ROCE approach in some cases. In particular, there are approaches that define a reasonable allowance for a regulated company's financing costs by reference to a margin on a measure of revenues or costs. Margin-based approaches have been used, for example, for retail price controls in the past in the GB energy sector and by Ofwat in setting price controls for non-household retail water services.

The appeal to the CMA in 2017 of the price control for the Northern Ireland electricity system operator SONI is particularly relevant to some of the question above. The SONI case involved extensive consideration of questions relating to the approach to financing costs for SONI's TSO (transmission system operator) price control, taking account of the activities covered by the TSO control and the small size of SONI's RAB compared to the scale of its revenues, costs and activities. Of particular relevance to the development of the ESO price control framework:

- The CMA upheld the use of a WACC*RAB approach to the remuneration of financing costs for the asset-light electricity system operator in Northern Ireland, but this decision reflected recognition that the Utility Regulator had provided an uplifted WACC that made allowance for the high "operational gearing" of the ESO compared to more asset-heavy regulated network companies. The WACC calculation used by the Utility Regulator also allowed for a notional financial structure for the system operator based on 100% equity financing (i.e. zero gearing).

- The CMA considered that it was also necessary to allow an additional source of financing costs relating to SONI's role in "revenue collection" activities (e.g. on behalf of the TO) and the potential working capital and non-zero risks that the CMA associated with these activities.
- The CMA considered it necessary to remunerate the financing costs associated with a parent company guarantee that the owners of the ESO were required to provide to support the activities of the ESO. The parent company guarantee can be seen to provide an additional layer of equity investment at risk in relation to the ESO, beyond that represented by SONI's RAB.

In this context, two questions come to light in relation to the broad approach to price control allowances for the financing costs of the ESO: (a) is the RIIO approach suitable; and (b) should the ESO price control framework be based on a margins approach rather than ROCE approach?

On the first question, our view is that there are significant risks that, without some adaptation, the RIIO approach does not work well for the ESO price control. There are two main concerns here.

First, the RIIO approach may not provide enough flexibility to accommodate the risk profile of the ESO. Ofgem's application of the RIIO approach provides some flexibility to allow for differences in the risks faced by regulated companies, by varying the notional gearing assumption (e.g. companies with a high totex or capital investment programme relative to RAV may be assumed to have lower notional gearing). But this might not be enough, especially if the ESO price control framework exposes the ESO to large financial upside and downside relative to the scale of its RAV or asset value.

For example, suppose that a RAV-based approach is used for the ESO and its RAV is £150 million. Suppose that it is exposed to a broad financial incentive scheme on performance with plausible upside and downside scenarios of plus or minus £30 million per year. At a 50% notional gearing assumption this would mean potential impacts on the return on regulatory equity (RORE) of plus or minus 40% (alternatively, plus or minus 20% at 100% equity). This could lead to plausible ranges for RORE that are far beyond those anticipated by Ofgem in setting controls for energy network companies under RIIO. It does not seem a safe approach, in this context, to remunerate assumed equity investment in the ESO through an approach that focuses on CAPM and uses similar estimates for asset beta, and similar notional gearing assumptions, as for regulated network companies.

The second concern is that some sources of ESO financing costs may receive insufficient attention, particularly in relation to working capital, because these are of minor importance to network infrastructure companies. The RIIO-1 price control allowances for NGET may provide for remuneration of equity and working capital that support ESO activities, even if these have not been explicitly assessed as part of price control determinations in the past. With more separation between National Grid's ESO and TO activities, the role of the ESO in collecting large amounts of

money from suppliers to pay to other industry participants (e.g. network operators and interconnectors) comes more to the fore. The financing costs of these activities may be relatively small and unseen in the context of an integrated transmission infrastructure company with a very large RAV: any financing costs might be a rounding error in NGET's return on its RAV. But, for a separate ESO price control, the issue of financing costs for revenue collection activities may warrant greater attention.

The concerns above arise if a RAV*WACC approach (or similar) approach is adopted for the ESO and applied simplistically without taking account of the features and circumstances of the ESO.

But there is no need to abandon that broad type of ROCE approach; there are opportunities to extend and adapt it. We summarise below what we describe as a "ROCE approach tailored to ESO". This draws on the RIIO1 approach but is more tailored to the key features of the ESO, including the potential for a relatively large financial exposure relative to the scale of its RAV or fixed assets (e.g. compared to network companies subject to RIIO) and the ESO's role in provision of a diverse range of services:

- Recognise upfront that the financing costs of the ESO are driven by the risks the ESO faces, and the scale of these risks cannot be approximated by the scale of the ESO's fixed assets or RAV. Consideration is needed of what are the sources of risk that the ESO faces and what drives their magnitude (the concept of "cost drivers" can also be applied to financing costs).
- Assess the ESO financing costs by considering the various different services provided, and activities undertaken, by the ESO, and by considering the potential working capital and risk capital requirements associated with these services and activities.
- Recognise the possibility of assuming a notional efficient financial structure for the ESO that involves 100% equity and no long-term corporate debt. A 100% equity assumption would also mean that separate "financeability assessment" using estimates of financial metrics used by credit rating agencies, which forms part of Ofgem's approach to energy network price controls, may not be informative for the ESO.
- Recognise the possibility of assuming notional efficient financial structures for the ESO that involve an "equity buffer" that represents investor capital at risk beyond that represented by the ESO's RAV or the valuation of its fixed assets. This may be the case, for example, if there is evidence that even with a 100% equity assumption on the RAV or fixed assets, there may be insufficient notional equity to accommodate the risks borne by the ESO. The financing costs of the ESO could be calculated so as to include an allowance for the cost of capital on this notional equity buffer (either by recognising the equity buffer within the overall capital requirement on which a return is allowed or by making a separate allowance for the cost of capital for the equity buffer). If customers are being required to pay for the financing costs of an equity buffer that

exceeds the readily identifiable investment in the business, there is also a question of whether the ESO's investors should be asked to provide a funding commitment to support the ESOs activities (contingent capital) that reflects the assumed notional equity buffer.

- Consider the use of a CAPM approach that uses benchmarks from other regulated sectors (e.g. asset beta from energy network companies) but make adjustments for differences in the risk borne by the ESO compared to the regulated companies from which benchmarks are taken (e.g. making adjustments for differences in measures of “operational gearing”, insofar as these are relevant to differences in risk affecting the cost of capital).

We now turn to the question of whether the ESO price control framework should be based on a margins approach rather than ROCE approach. It is beyond the scope of this report to give this question detailed consideration, but we highlight three issues that seem highly relevant:

- One of the potential arguments for a margins-based approach is that it does not assume that a company's financing costs are driven primarily by the scale of its fixed assets or RAV (rather than, for example, its overall costs and revenues). But this is more an argument against the use of an oversimplified $WACC \times RAV$ approach, or naïve assumptions about the relationship between the RAV and financing costs. It is not an argument against the type of approach described above under “ROCE approach tailored to ESO”.
- A margins approach can be applied even if there is no RAV. A ROCE approach can also be applied if there is no RAV, but would require work to consider the ESO's requirements for capital employed.
- For the ESO, there may be severe difficulties in applying a margins-based approach to the totality of the ESO's functions, due to the lack of suitable benchmarks. If a margin is applied to ESO costs or revenues, should this be 1%, 5%, 10% or 20%? Measures of margins achieved by companies operating in competitive sectors of the economy can vary widely. Without close comparators to the ESO, there is a risk that margin benchmarks are spurious. There seems a stronger case for applying a margins-based perspective for specific aspects of the ESO's services or activities, where there may be more relevant benchmarks for the appropriate margins.

Given these points, it is questionable whether the development of the regulatory framework for the ESO should take firm position on margins approaches versus ROCE approaches. This is a more technical matter for implementation of the framework. For instance, a hybrid approach could be adopted. This could start from recognition of the merits in a ROCE approach which considers the amount of capital investment needed to support the ESO's activities and the riskiness of the capital investment (taking account of both the nature of the activities and the nature of risk protection and risk exposure arising from the regulatory framework). This could be complemented by a recognition

that, at least for some elements of the ESO financing costs (e.g. working capital associated with revenue collection on behalf of TOs) there may be merit in using information from margins-based comparisons, either as an additional source of evidence or instead of a ROCE approach. The choice of approach should be guided by the quality and availability of suitable benchmark data from other companies and sectors that can inform the cost of capital for the ESO, and other relevant considerations that will be affected by other aspects of the overall framework (such as risk of perverse incentives).

Table 16 provides a brief comparison of approaches. We stress that this is a high-level comparison and further work would be needed to take a firm position on the merits of alternative approaches.

Table 16 High-level approach to estimation of ESO financing costs

Option	Overview of pros and cons (not exhaustive)
RIIO approach, based on RAV*WACC	<ul style="list-style-type: none"> • Benefit of consistency with RIIO approach and familiarity • Key concern is a risk that a simplistic application of this approach does not enable a financeable price control package for the ESO – flexibility in the notional gearing assumption may not be enough to allow for sufficient remuneration of the risk borne by ESO and approach may not be well-suited to identification and remuneration of some sources of capital requirement (e.g. working capital) • Wider concern that (simplistic application of) approach may not give enough attention to risks faced by ESO under price control framework • Some risk that approach promotes a capital expenditure bias by the ESO, especially where ESO price control framework involves large degree of cost pass-through
Margins approach	<ul style="list-style-type: none"> • May help address some concerns with a simplistic application of RIIO approach, by providing more flexibility for a financeable price control package • Serious concern that there is a lack of benchmark companies or sectors that can provide good benchmarks for the margins, especially if applied to the overall ESO • Might be a relatively simple approach compared to ROCE, but this could be offset by difficulty of finding suitable comparator benchmarks • Some risk that margins approach provides perverse incentives, especially where ESO price control framework involves large degree of cost pass-through (e.g. margin on costs may provide incentive to increase costs and avoid efficiency improvements)
ROCE approach tailored to ESO and with recognition of potential use of margins approach for some services/activities	<ul style="list-style-type: none"> • Can be seen as an adaptation and evolution of the RIIO-1 approach, with more flexibility to cater for risk profile of ESO and the nature and source of its requirements for capital • Does not treat ROCE and margins-based approaches as discrete choices, but recognises that each may make a contribution • Some concern of perverse incentives (as for approaches above), but more emphasis on linking financing cost remuneration to ESO risk should help to mitigate this concern • Possible downside is greater complexity and work needed to implement well

Principles on the relationship assumed between the ESO and National Grid Group

We briefly turn to a further topic concerning the remuneration of the financing costs of the ESO which has not been discussed above.

UK regulators often approach the assessment of financing costs, when setting price controls, not by considering the financing costs of the actual company, but by considering the financing costs of a notional efficient company (or license) that carries out the activities within the scope of the price control. This approach abstracts from the details of the financial structure adopted by the company (e.g. the specific corporate debt instruments it uses and the mix of debt and equity) and can protect customers from exposure to financing decisions taken by the company which turn out inefficient as well as providing incentives for the company to adopt an efficient financial structure. To apply this approach well, it is necessary to define the notional efficient company, setting out the ways in which the notional efficient company is assumed to differ from the actual company under consideration. Where differences are assumed, there should be a rationale for these and checks that the assumptions are compatible with the statutory duties of the regulator (e.g. in relation to licensees' financing of activities).

In the case of the ESO, there are questions of principle relating to whether/how the factual relationship between National Grid Group and the ESO (the ESO will be a separately licensed company within National Grid Group) should be taken into account in the approach and assumptions used to estimate the financing costs of the ESO's activities that should be remunerated through the ESO price control framework and, ultimately, charges to customers. Under an approach that considers a notional efficient licensee, these questions can be seen to relate to the definition of the notional efficient licensee and whether it is defined as a standalone corporate entity or part of a wider corporate group.

For example, there are questions relating to the following:

- **Financing costs of hypothetical standalone ESO versus wider corporate group.** In estimating the financing costs of the ESO, there may be a material differences depending on whether the ESO (or notional efficient ESO licensee) is assumed to be an independent standalone company or recognised as part of a much larger corporate group such as National Grid Group. For instance, there may be some economies of scale in the costs relating to the raising of debt or equity (e.g. arising from transaction or monitoring costs) which mean that the cost of raising finance (per £ raised) is somewhat higher for a standalone ESO than for National Grid Group (or for a hypothetical combined business carrying out National Grid's ESO and TO activities). There may also be issues relating to counterparty risk (e.g. should the ESO be remunerated for financing costs associated with hypothetical counter-party risk between ESO and TO?).

- **Financial benefit to National Grid Group from ESO ownership.** It is possible that the ESO business has strategic value to National Grid that extends beyond the direct profit that can be generated through the ESO's activities (i.e. beyond the future profit streams reported for the separate ESO company). Furthermore, if the ESO business were to be put up for sale it may have value to other corporate entities with interests in the GB energy sector, which goes beyond the direct profits that can be generated through the ESO's activities. In this context, there is a question of whether the approach to financing costs for the ESO price control framework should make some estimation of the strategic value accruing to the ESO owner and deduct this from the financing costs calculated for the ESO.

Rather than addressing these types of issues on an ad hoc and potentially inconsistent basis, there is merit in considering, early in the development of the ESO price control framework, the principles that should guide whether and how the relationship between the ESO and National Grid Group (including NGET) should be taken into account in setting the ESO controls.

In its appeal to the CMA in 2017, the Northern Ireland electricity system operator SONI argued that the “financeability of each individual licence holder should be assessed on a standalone basis” and described this as a “principle on which the entire UK regulatory framework for price controls” is based.⁹ While this point was made in the specific context of SONI's appeal, and not the broader discussion above, it highlights the relevance of questions around the concept of a standalone ESO.

There are some arguments in favour of an approach that recognises the ownership on the ESO by National Grid Group and does not apply a strict assumption of a standalone ESO.

There is a concern that estimating the ESO's financing costs by reference to a notional standalone ESO that may expose customers to theoretical costs that the ESO would incur if it were operated on a hypothetical standalone basis but which it does not in fact incur under the current ownership arrangements. There is a question of whether there is any justification for imposing such theoretical costs on customers. This concern seems particularly relevant in a context where customers are exposed to the potential downsides of the ESO being, in practice, part of National Grid Group (e.g. residual risks of conflict of interest, strategic bias and transmission asset owner perspective affecting ESO decision-making and planning).

The concern is that customers may pay more than is necessary. For instance, if the hypothetical competitive price for ownership of the ESO would reflect significant strategic value in the ESO, then not recognising this value could imply over-estimation of the compensation that (actual) investors require to fairly remunerate them for financing the ESO role. There could be a concern that the charges to customers for ESO services under the price control framework do not allow sufficient

⁹ CMA (2017) *SONI Limited v Northern Ireland Authority for Utility Regulation: final determination*, paragraph 7.267.

recognition for the full financial benefit of the ESO being part of National Grid Group. However, it may be difficult to try to assess whether or not there is a material strategic value in the ESO and, if so, to try to estimate this.

There may be further issues for financing concerning the relationship between National Grid Group and the ESO, such as consideration of the implications of any parent company guarantees provided to the ESO by the corporate group.

Summary of key issues and interactions with packages of options

This subsection draws out some guidance on the price control remuneration of ESO financing costs and the RAV, based on the discussion above, and then considers interactions between the options discussed in this section and the six packages of options for the ESO price control described in section 5.

There is a major question of whether the new ESO price control arrangements should use a RAV. This question is complicated by the different roles that a RAV can play. An ESO RAV can play a useful role as a means to (a) provide transparency about depreciation allowances feeding into the calculation of the ESO's maximum regulated revenue and charges; (b) to keep track of the remuneration of its capital expenditure over time; and (c) inform the assessment of the ESO's cost of capital. To work best, this type of RAV would involve different pots, with different asset lives, to support a fair remuneration of capital costs between current and future customers.

There would, however, be some serious downsides with an approach that sought to use the ESO RAV to provide a high degree of long-term commitment to remuneration of the ESO's capital expenditure. This is particularly so in a context where the services required from the ESO may change over time and where there is some potential for competition or substitution in relation to the ESO's role and services. It is questionable whether the potential reductions to financing costs from such a commitment would outweigh these downsides.

Regardless of whether a RAV is used for the ESO price control framework, there is a strong case for a RAV valuation and allocation exercise that considers the capital requirements supporting the current ESO activities. This would be used to allocate the NGET RAV between the TO and ESO activities at 31 March 2021, in a way that helps reduce risks that, from April 2021 onwards, customers pay more simply as a result of the separation between the NGET and ESO controls.

The determination of price control allowances for the ESO's financing costs could draw on approaches used as part of the RIIO framework. However, some adaptation seems necessary to take account of the ESO's features and circumstances. The notional efficient capital structure for the ESO is likely to look quite different to that for an energy network infrastructure company. The ESO's financing costs will not be proportional to its RAV or the value of its fixed assets; this is true

of network infrastructure companies but more acute for the ESO. Attention needs to be given to the full set of capital requirements arising from ESO activities and services (including working capital for cash-flow management and equity capital to provide a buffer against financial risk) and it will be important to consider interactions between financing costs and the design of the price control framework (e.g. the scale of financial upside and downside under any incentive arrangements).

Finally, consideration needs to be given to the way that the ESO price control framework takes account of the fact that the ESO is owned by National Grid Group. The separate licence and separate control for the ESO may point towards an approach to remuneration of financing costs that treats the ESO as if it were a hypothetical standalone company. But this does not seem desirable; it could create a situation where customers are exposed to the drawbacks of the ESO being part of National Grid Group without receiving any of the benefits of this ownership arrangement in terms of financing costs.

We now turn to consider the interactions between the six packages specified above and the questions relating to the ESO financing costs and the RAV. Our overall view is that there are some interactions but these are not so strong as to be integral to the specification of the packages. Table 17 provides comments on the interactions we have identified between the six packages and the questions and options on the approach to financing costs and RAV that are identified in this section.

Table 17 Interactions between packages and questions on approach to financing costs and RAV

Question raised on ESO financing costs and RAV	Comment on interactions with packages A to F
<p>Does the ESO price control framework involve a RAV and if so what is its role?</p>	<ul style="list-style-type: none"> For package D, the most coherent approach would involve an adapted RAV approach to support transparency of the link between ESO capital investment requirements and price control remuneration of that investment, but without using a RAV to provide longer-term regulatory commitment to price control remuneration of capital expenditure The most internally coherent approach under packages A, B, C, E and F would be to retain use of a RAV for the ESO (with potential to move to adapted RAV approach with different sub-pots having different depreciation profiles); it does not seem necessary to provide same degree of regulatory commitment to recovery of the ESO RAV in these packages as under RIIO controls, so this would be optional For package B, which seeks to limit the regulatory burden an approach of recovery of investment on a cash basis (100% fast money) is also a possible option, which would avoid need for RAV, but the simplicity benefits of this seem small and this does not seem a necessary part of package B
<p>Should there be an exercise to work out how best to allocate the NGET RAV between ESO and TO controls?</p>	<ul style="list-style-type: none"> Particularly strong case for “yes” under option D due to the contribution that RAV allocation exercise can make to setting more cost-reflective charges for ESO services Strong case for “yes” under all other packages besides B, but exercise not integral to the coherent implementation of these packages (less strong case for “yes” under package B where the aim is to limit the regulatory burden)
<p>What general approach to estimation of ESO financing costs should be used?</p>	<ul style="list-style-type: none"> For packages A, C, D, E and F there is a strong case for adopting the approach described as “Flexible ROCE approach tailored to ESO”, which tackles some of the limitations in the RIIO-style WACC*RAV approach and would contribute to the coherence of these packages However, a margins approach is also compatible with these packages. There would be a stronger case for package B than the other packages for a simpler margins approach that recognises the low risks to the ESO; but the limitations of such an approach would need to be considered compared to the alternative of the “Flexible ROCE approach tailored to ESO” which could also be applied to package B
<p>What principles should be assumed for the relationship between the ESO and National Grid Group in estimating ESO financing costs?</p>	<ul style="list-style-type: none"> No significant interactions identified between choice of approach on this issue and which package A to F is adopted

9 Concluding thoughts on the direction of travel

Besides our more detailed work on the development and review of coherent packages of options for the ESO price control framework, and on price control remuneration of the ESO's financing costs, it seems helpful to take a step back and draw out some broader questions concerning the framework and how Ofgem develops this in the period leading up to April 2021, and beyond. This is particularly so as there are ideas and choices that matter at a relatively fundamental level in terms of the regulatory approach, which may get lost in comparisons of the six packages. The specification and assessment of the packages is a useful analytical exercise, but questions about the direction of travel are more important, at this stage, than the finer details of price control arrangements.

We feel that we gained considerable insight from the process of developing, refining and evaluating the packages introduced above. This led us to identify several overarching questions that can help guide the evolution of the ESO price control framework, which we discuss in this section.

Addressing these questions can be used to take a judgement on the overarching approach or strategy. This is particularly useful because the development of a coherent approach cannot be left to a series of cost-benefit analyses or impact assessments on individual aspects of the framework, yet taking firm decisions on a specified package of options to adopt may be premature before the details of the package have been examined and potential variations explored. This, in turn, is partly because the costs and benefits of identified options and packages are unknowable and efforts to quantify them liable to a pretence of knowledge. It is also difficult to be confident about the likely performance of regulatory options before these have been worked up and fleshed out in detail, but doing so for all conceivable options (and combinations of options) is impractical. Developing a position on the questions below can provide clarity on the avenues and options that are considered most promising, while leaving open some of the more technical work on the details of the price control framework.

Where next for the ESO price control framework?

Four overarching questions can help guide the evolution of the ESO price control framework:

1. Should we withdraw the mechanistic ex ante incentives approach from the ESO's internal costs?
2. Should we develop a suite of service-level price controls for different ESO services, along with cost transparency on these services, with the aim of drawing on market participants and other stakeholders to help shape the role of the ESO and discipline its efficiency and performance?
3. Should we develop new ex ante financial incentive arrangements that encourage the ESO to achieve good outcomes across the full range of its activities and responsibilities?

4. How much regulatory resource and complexity should we allow for the ESO price control framework, given that there is no shortage of potential initiatives and tools that could be used to help improve outcomes from the ESO?

These questions can be linked to the six packages we developed and evaluated. Within the context of the six packages, question 1 concerns the choice between package A and the other five packages. Question 2 concerns the choice between package D and the other five packages, and in particular the choice between C and D. Question 3 concerns the choice between package E and the other five packages, and in particular the choice between C and E. Question 4 concerns choices between packages B, C, D, E and F. However, the four questions go well beyond the details of these packages, and apply at a more fundamental level.

Q1: Should we withdraw the mechanistic ex ante incentives from ESO internal costs?

Ofgem recently amended its regulatory approach to move away from ex ante financial incentives in relation to the ESO's external costs. Ofgem's new arrangements for ESO incentives from April 2018 remove direct financial exposure of National Grid to variations in these costs around an ex ante cost baseline, and adopt a different type of approach. The new approach places more weight on regulatory (and stakeholder) expectations of good performance and behaviour from the ESO, with a discretionary financial reward or penalty applied to the ESO, according to a broad annual evaluation by Ofgem and informed by stakeholders. The ESO's internal costs are still subject to ex ante financial incentives as part of NGET's eight-year RIIO-T1 price control, which runs until the end of March 2021.

Given the developments in the regulation of the ESO's external costs, one natural step would be to adopt the same approach for the treatment of the ESO's internal costs. Rather than setting ex ante expenditure allowances and applying financial incentives on over- and under-spend around these, the price control arrangements could restrict the ESO's charges to no more than the recovery of the costs it has actually incurred (plus a separate price control allowance for financing costs).

Ofgem could then include an assessment of the ESO's performance in respect of these costs as part of the broader evaluative assessment process, building on that developed for the ESO incentives from April 2018. There are a range of further regulatory tools that could be used to provide safeguards on the level of the ESO's costs (e.g. budgetary approval processes and provisions to disallow any demonstrably inefficient expenditure).

Ofgem emphasised to us that it wants the ESO price control framework to be coherent. This step would lead to a framework that is much more coherent than one which (as at present) applies ex ante financial incentives to the costs that the ESO incurs on the staff and IT systems used to procure services from generators and applies no similar incentives on the costs it incurs making payments to generators for those services.

Besides coherence, there are other problems with the use of an ex ante incentive approach for the ESO's internal costs. Due to the difficulty of gauging the quality of the ESO's performance (e.g. in terms of long-term system planning and coordination) there is a serious risk that financial incentives on the ESO's costs will come at the expense of lower quality and worse outcomes overall. Furthermore, and as is the case for its external costs, the lack of good cost benchmarks for the ESO's internal costs, which are reasonably independent of National Grid, will tend to limit what ex ante financial incentives can actually achieve, risk a poor deal for customers relative to investors, and raise questions about the legitimacy of the regulatory framework.

The removal of ex ante incentives on internal costs, and the incorporation of these within a broad evaluative approach, would provide a reasonably safe foundation for the ESO price control framework. On its own, this would not be the most ambitious approach available in terms of encouraging cost efficiency and wider performance by the ESO. But it seems internally coherent, and provides a useful baseline position from which the merits and drawbacks of more complex and ambitious approaches could then be considered.

Q2: Should we develop service-level ESO price controls and cost transparency?

There is a temptation to treat everything that the ESO does as for the benefit of the GB electricity system and to stop there. But the ESO is engaged in a range of activities: it provides a diverse set of services and some of its services benefit some market participants more directly than others. Moreover, the degree to which the ESO has economic power is likely to vary across its services.

Our view is that, for the ESO price control framework, the most promising avenue to explore is the development of a suite of separate price controls for the different ESO services (or different categories of services). These could emanate from a common price control review process, and may share common features, but there would be greater attention to the relationship between the ESO's costs and the services it provides. This would be coupled with measures to bring a high degree of cost transparency for each of these services. The overall aim would be to create an environment in which market participants, network companies and other stakeholders help to shape the role of the ESO and to improve its efficiency and performance:

- If market participants have knowledge and motivation, they can provide useful challenge to the ESO's activities, costs and service quality. They may also be able to offer ideas and perspectives that the ESO can use, to the benefit of the wider system.
- In some cases, market participants may offer a degree of competitive constraint on the ESO, through their ability to arrange self-supply of specific services provided by the ESO. In some cases there may be potential for more direct competition and substitution in the provision of specific services, especially if offered by the ESO separately from its more monopolistic activities.

- Regulated companies, even those with a monopoly position in the services they provide, may engage in forms of competitive behaviour relating to their reputation with the regulator and other stakeholders. National Grid's role as ESO is also subject to some competitive pressures: the GB energy system might move to an ISO model in the future, and the case for such a change will depend on perceptions of National Grid's performance in its ESO role. Greater exposure of ESO services, and transparency on their costs, could enhance the beneficial effects of these processes.

The point is not that these arrangements provide for a good price control framework by themselves, but rather that they could enhance the framework. At least in the near term, they could be applied as part of a broader regulatory approach that combines provisions for the ESO to recover incurs from charges to customers (rather than ex ante expenditure allowances with financial incentives), subject to regulatory safeguards on costs and a broad evaluative approach to the assessment of the ESO's performance (potentially with financial reward and penalties). Over time, the approach may evolve in different ways for different ESO services.

The approach above would involve quite a change to the regulatory arrangements for the electricity system operator. There are regulatory resource costs and implementation risks that Ofgem will need to consider.

There is another aspect of such a change which is either a benefit or drawback depending on the position taken on a broader question. Are the interests of the GB energy system, recognising the need for system-wide coordination and planning, best achieved by a single powerful body or through a more even balance of power across the range of organisations involved in the system? This question goes well beyond the scope of our report, but is relevant because efforts to make use of stakeholder and competitive pressures as part of the ESO price control framework will tend to constrain the power and influence of the ESO. This may be seen as a good or bad thing depending on one's views on the right balance between centralisation and decentralisation in the GB energy system.

Q3: Should we develop new mechanistic financial incentives for the ESO?

Although the type of mechanistic ex ante incentive arrangements applied in the past does not seem suitable going forwards, we do not rule out completely the possibility of developing a new approach for regulating the ESO that places much greater emphasis on financial incentives.

Used in the right circumstances, and implemented well, mechanistic regulatory incentive arrangements can be a strong driver of performance to the benefit of customers.

To be effective in the specific case of the ESO, this type of approach would need to involve something rather different and far more ambitious than the types of incentive schemes applied to

electricity system operator activities in the past. Ofgem would need to take greater ownership of cost/performance benchmarks than in the past, with less weight given to forecasts and modelling provided by National Grid. Broader and more holistic measures of performance seem necessary, covering both the costs incurred by the ESO and other aspects of its performance that ultimately feed through to the prices that customers face for electricity supplies (e.g. the success of the ESO in quality of forecasting and long-term system planning and coordination).

This does not strike us as an attractive path to follow, especially in the near term. The implementation challenges seem large. It is difficult to be certain about the likely success or failure of this type of approach, especially before more work has been done on the detailed design of candidate incentive schemes. But we are doubtful whether it is even possible to develop incentive arrangements that promote good long-term behaviours by the ESO while limiting risks from unintended consequences and avoiding the need for customer to pay high costs to remunerate the ESO for large financial risks under the incentive scheme.

It is important to highlight here the nature of the implementation risk for this type of mechanistic incentives approach. It is not just a risk of the envisaged benefits not materialising. The approach not working well could lead to a situation of really quite bad outcomes. For example, there could be perverse financial incentives that adversely affect the ESO's decisions and behaviour in relation to trade-offs between different activities in the system, and in relation to trade-offs over time. We do not see a similar degree of risk for the other types of approach we have considered.

If Ofgem does see merit in exploring this type of mechanistic incentive approach, we suggest taking this in stages.

The benchmarks and performance measures that could underpin such an approach could be used first within the context of a broad evaluative assessment of the nature introduced for the ESO incentives from April 2018. There would be no mechanistic link between performance against these measures and financial penalties/rewards. Instead, the performance measure would form part of the evidence base that feeds into the overall evaluation of performance (and decisions on any discretionary financial penalty/reward). This would allow such measures to be tested and refined over time, limiting risks from unintended consequences. The point may then come when the measures developed are found suitable for application in a mechanistic ex ante incentive scheme.

The use of mechanistic financial incentives is not incompatible with an approach, as discussed above, which gives weight to the different services provided by the ESO – at least in the nearer term where the price control framework for the ESO is likely to involve a broad mix of approaches. However, there are some tensions between the two, and attempting both at the same time seems challenging and could lead to loss of focus.

Indeed, the application of mechanistic financial incentives may have higher chances of success if this is done after putting the ESO services into separate price controls, as suggested above. It is probably more feasible to develop effective incentive schemes for specific ESO services/activities than for all aspects of its services and performance. And these might be better targeted at areas where alternative regulatory approaches are found to be less effective.

Q4: What degree of regulatory burden and complexity should be allowed?

Whatever choices are made on the three questions above, there will remain, at a more detailed or technical level, a variety of tools that could be used to develop the regulatory framework for the ESO, with the aim of improving outcomes and protecting customers.

As Ofgem identified in its approach to ESO incentives in the period from April 2018 to March 2021, there are potential benefits from formal processes for stakeholder involvement, and from financial rewards/penalties according to the outcome of the evaluation (though reputational incentives alone may have some power, and would involve lower financing costs for the ESO). The role of stakeholders in these processes is something that can be developed further over time.

In addition, within a discretionary evaluative approach, there would be benefit from the development of measures of performance (or other evidence) which are reasonably independent of National Grid. This could include estimates of the efficient costs of certain ESO activities, informed by benchmarking and statistical analysis, as well as examples of good practice. There may be opportunities to draw on some comparisons with system operators outside Great Britain.

Another possibility is the introduction of a technical review body, ultimately responsible to Ofgem, which would provide an additional layer of challenge and review to the ESO's activities, providing input to both the ESO's own engagement and to Ofgem-led regulatory processes.

These are just examples. The key point is that there are a variety of tools that could be used to develop the regulatory framework for the ESO, with the aim of improving outcomes by bringing greater scrutiny to bear on the ESO. Their main downside comes in terms of the regulatory resource requirement and burden of the price control framework and the implementation risks associated with a more elaborate approach.

The key question we see, at this stage, is not about which of these quite detailed and technical tools to use, but how much regulatory resource and complexity to allow for in the ESO price control framework. Once a position is taken on this question, the choice of technical tools to adopt can be based on prioritisation, taking account of a comparative assessment of their likely benefits and risks.

There will also be choices about the extent to which the price control framework uses initiatives that involve more direct influence over the behaviour and operational approach of the ESO. The framework can make use of approaches that focus on "good behaviours" by the ESO as well as

“good outcomes”. The use of requirements around system planning policies (e.g. NOA) can be seen as an example here. While this type of approach can be more vulnerable to criticism on grounds of micro-management, there seems to be a reasonable case for it for aspects of the ESO’s activities. This is because, for example, of the difficulty of assessing the performance of the ESO in system coordination and planning in terms of outputs and outcomes (given long planning horizons and difficulties around counterfactuals). More hands-on approaches to the regulation of the ESO are part of a broader range of tools that could be selected on prioritisation grounds as above.

Although it may be possible to apply a relatively simple price control framework for the ESO, our impression is that a considerable extension of regulatory resource and complexity beyond this would be justifiable by the statutory duty to protect the interests of customers. On their own, the costs incurred directly by the ESO (internal and external) are of the order of £1,000 million per year and the decisions and performance of the ESO will tend to have effects on market participants and electricity customers well beyond these costs through the ESO’s influence on system planning and development. And the idiosyncrasy of the ESO’s role makes price control regulation more challenging than cases where close performance benchmarks and comparators are available.

There may also be merit in comparing estimates of the regulatory resource applied elsewhere in the GB energy system (e.g. energy network companies) as part of decisions on the scale and balance of resources for the new ESO price control framework.

Our project team’s suggestion on the direction of travel

The questions above are ultimately for Ofgem to consider, in the light of its statutory duties and wider strategy. But Ofgem was keen to hear our own views. We provide our project team’s suggested answers to these questions in Table 18.

Table 18 Suggested answers to the overarching questions on direction of travel

Question	Suggested answer
1). Should we withdraw the ex ante incentives approach from the ESO’s internal costs?	Yes
2). Should we develop a suite of service-level price controls for different ESO services, along with cost transparency on these services, with the aim of drawing on market participants and other stakeholders to help shape the role of the ESO and discipline its efficiency and performance?	Yes
3). Should we develop new mechanistic ex ante financial incentive arrangements that encourage the ESO to achieve good outcomes across the full range of its activities and responsibilities?	No
4). How much regulatory resource and complexity should we allow for the ESO price control framework, given that there is no shortage of potential initiatives and tools that could be used to help improve outcomes from the ESO?	Quite a bit: more than for the ESO regulation in the past, especially for implementation of the new approach

We also see some broader, and really quite positive, points to make about the development of the ESO price control framework. The introduction of separate price control arrangements for the ESO from April 2021 provides a superb opportunity for Ofgem. Although there are some tricky issues to work through, especially in relation to the price control remuneration of financing costs, time is on Ofgem's side. There seems much to gain from tailoring the price control framework to the services and features of the ESO, and from a more coherent approach across the ESO's internal and external costs. The new ESO incentive arrangements introduced in April 2018 provide a platform that can be developed and enhanced. An approach that places greater regulatory focus on the ESO's services seems highly attractive in terms of achieving good outcomes in the nearer term, the paths that it would open up in the future, and its adaptability to technological and institutional innovation.

Appendix 1: More detailed regulatory options and tools

This appendix provides some further information on questions and options that are relevant for the development of the ESO regulatory framework. The main body of this report discusses a number of key issues and alternative high-level options, but does not get too far into the details of the various tools and approaches that could be used. This appendix provides an additional layer of detail on questions and options. We developed the material presented in this appendix primarily in the early stages of the project, and then drew on it as we proceeded, especially in terms of the issues and ideas presented in sections 4, 5 and 8 of the main report.

We take the following topics in turn:

- Scope and form of control.
- Outputs and service quality.
- Cost recovery and efficiency.
- Financing costs and the RAV.

In each case we present a table that identifies questions for the regulatory framework, some options for each question and then some practical example and insight that is relevant to each option.

Where possible, we have sought to map the options in these tables onto the four broad approaches to achieving good outcomes for the ESO which we introduced in section 4. We have done the mapping by colour coding the rows in the tables below, drawing on the colours in Table 5.

Table 19 Colour codes relating broad approaches to achieving good outcomes

	Supervision of ESO's performance and charges
	Use of regulatory financial incentive arrangements
	Exposure of ESO's services to competition and customer pressures
	Supervision of ESO's behaviour

Some of the options considered do not fall unambiguously under one approach rather than another. In our mapping, we have sought to distil the fundamental "mechanism" underlying each option – what is the underlying feature, or driving force, that makes the option work, contributing to good outcomes – and identify which of the four approaches that most naturally falls under. This is

somewhat approximate, as options may involve multiple approaches, and in some cases there might be arguments for allocating an approach to a different approach than indicated.

The mapping does not cover all of the options listed. Some of the options identified relate to questions of the regulatory framework that are transversal to several (or all four) of the broad approaches, and do not fall within one approach any more than within another. That is the case, for example, with options on questions relating to having a single revenue control or separate controls for different ESO activities, or to questions relating to financing costs and treatment of the RAV. In the tables, we did not attribute a colour code to those options where we considered this to apply, and in the case of the table capturing options relating to financing costs and treatment of the RAV we did not include a column for colour coding at all.

This appendix is not intended as a comprehensive checklist of all material questions nor as a catalogue of all feasible options. It reflects, in particular, questions and issues that seemed important during early stages of the work. Nonetheless, it may provide a useful contribution to Ofgem’s work to develop the ESO regulatory framework, in conjunction with the higher-level approaches and packages discussed in the main body of the report.

Table 20 Questions and options relating to the scope and form of control

Question	Options	Examples and sources of insight	Type
Is there a single control covering all ESO activities or separate controls for different activities or services?	Revenue control covering all services provided by ESO licensee (other than defined services outside the scope of regulation)	<ul style="list-style-type: none"> RIIO-1 model applied to electricity distribution network operators and gas distribution network operators 	
	Combination of revenue control on internal costs with separate incentive scheme on external costs	<ul style="list-style-type: none"> RIIO-T1 control covering ESO internal costs combined with separate ESO external costs incentive scheme 	
	Suite of separate controls for the separate services provided by the ESO (insofar as these are regulated at all)	<ul style="list-style-type: none"> Ofcom’s regulatory approach to BT CAA setting of NATS price controls: separate price control for <i>en route</i> air traffic management services (with separate arrangements for Oceanic and relevant Terminal control services) Ofgem’s retail price controls in the context of energy market liberalisation 	

Table 21 Questions and options relating to outputs and service quality

Question	Options	Examples and sources of insight	Type
Who takes decisions about what outputs, services, service quality the ESO should provide?	Determined by ESO, subject to broad rules specified by regulator		
	Determined by regulator, drawing on ESO business plan and stakeholder consultation	<ul style="list-style-type: none"> More standard approach historically in UK utility regulation 	
	Determined by regulator, but involving processes that involve considerable engagement by ESO with customers and other stakeholders	<ul style="list-style-type: none"> Ofwat's ex ante acceptance of opportunities to earn financial rewards is partly dependent on companies demonstrating effective engagement in the development of ODI proposals 	
	Determined (subject to checks by regulator) by groups of customers or stakeholder groups	<ul style="list-style-type: none"> Constructive engagement in UK airport regulation 	
	Determined by Government	<ul style="list-style-type: none"> Guaranteed Standards Schemes (energy and water sectors) 	
What approaches (if any) are used to encourage or ensure the performance of the ESO in outputs and service quality?	Specification of outputs and/or deliverables as part of price control package	<ul style="list-style-type: none"> Common feature of RIIO-1 approach 	
	Requirements for ESO to develop and follow approved policies, approaches and processes that are intended to support high-quality outputs	<ul style="list-style-type: none"> Some use within RIIO-1 for NGET (e.g. NAP and NDP, and then NOA) 	
	Measures to provide information to customers and stakeholders on aspects of performance (to support performance incentives relating to reputation)	<ul style="list-style-type: none"> Used for elements of RIIO-1 outputs 	
	Requirements on ESO to compensate those customers affected by poor service quality	<ul style="list-style-type: none"> Guaranteed Standards Schemes (energy and water sectors) Liquidated damages arrangements for service disruption to train operators caused by Network Rail 	
	Arrangements to enable the ESO to compete against other (regulated) entities in terms of its certain aspects of its performance or activities	<ul style="list-style-type: none"> Ofgem fast-track approach to company business plans for RIIO-1 Ofwat company monitoring framework 	

Question	Options	Examples and sources of insight	Type
	Approach based on formal (or notional) contract with ESO specifying services and performance levels, with bespoke arrangements developed to cater for cases of poor performance	<ul style="list-style-type: none"> Infrastructure provider and operator for UK payment systems 	
What tools (if any) are used for assessing and encouraging desired performance?	Mechanistic ex ante financial incentive scheme based on defined performance metrics	<ul style="list-style-type: none"> VoLL incentive for GB electricity transmission capacity reliability under RIIO-1 controls for NGET 	
	Discretionary financial reward / penalty based on evaluation of performance (not mechanistic)	<ul style="list-style-type: none"> New electricity ESO incentive scheme developed by Ofgem for 2018-2021 period 	
	Requirements to compensate those customers affected by poor service quality	<ul style="list-style-type: none"> See similar item above 	
	Rely on reputational incentives	<ul style="list-style-type: none"> Some aspects of RIIO-1 controls 	
What is the scope of any regulatory performance assessment(s)?	Separate performance assessment for separate categories of outputs or dimensions of service quality	<ul style="list-style-type: none"> Generally the RIIO-1 approach to outputs 	
	Combined performance assessment for a set of different ESO outputs or dimensions of service quality	<ul style="list-style-type: none"> Ofwat's SIM measure in water sector price controls 	
	Comprehensive or broad performance assessment covering all/most outputs and service quality and cost performance	<ul style="list-style-type: none"> New electricity ESO incentive scheme developed by Ofgem for 2018-2021 period 	

Table 22 Questions and options relating to cost recovery and efficiency

Question	Options	Examples and sources of insight	Type
What is the broad approach to cost recovery and efficiency incentives?	Direct financial exposure of ESO around an ex ante expenditure allowance or baseline (potentially combined with risk protection measures, e.g. sharing factor on over- or -under-spend)	<ul style="list-style-type: none"> Main approach in RIIO regulatory framework and RIIO-1 controls Ofwat's wholesale water and wastewater price controls (2015-2020) Extensive precedent in other UK regulated sector price controls 	
	Price control arrangements that restrict ESO's revenues or charges to recovery of its costs incurred (plus potential allowance for financing costs)	<ul style="list-style-type: none"> Elexon – BSC cost recovery and charges Used as part of rules relating to charges for new network connections in the water industry 	

Question	Options	Examples and sources of insight	Type
	Price control arrangements that restrict ESO's revenues or charges to recovery of its costs incurred (plus potential allowance for financing costs) combined with (and subject to) additional regulatory tools to encourage efficiency and/or protect customers from inefficiency	<ul style="list-style-type: none"> Transmission network pre-construction costs incurred by Northern Ireland electricity system operator (SONI) under 2015-2020 TSO price control GB smart metering data communications company (DCC) New electricity ESO incentive scheme developed by Ofgem for 2018-2021 period Various US ISO examples 	
	Price control set using regulator's estimate of efficient cost-based charge / revenue requirement for ESO's services, drawing on information on ESO's costs and other cost information	<ul style="list-style-type: none"> Ofcom approach to regulation of various services provided BT Openreach and, further back in time, regulation of services provided by BT that are now deemed competitive Ofcom approach to regulation of mobile termination charges 	
If ex ante expenditure allowance / baseline is used, how should this be set?	Review by regulator (and its consultants), with weight given to ESO's own business plan and historical costs	<ul style="list-style-type: none"> Main approach used for Ofgem's RIIO-1 regulation of NGET (2013-2021) 	
	Weight given to benchmarks that are external to the regulated company (e.g. comparator companies or bottom-up models)	<ul style="list-style-type: none"> Ofwat's PR14 wholesale water and wastewater price controls (2015-2020) Ofgem RIIO-ED1 controls for electricity distribution network operators (2015-2023) 	
What external cost benchmarks (if any) are used as part of the regulatory framework, to encourage efficiency and protect customers from inefficiency?	Benchmarking of costs across independent system operators	<ul style="list-style-type: none"> International benchmarking by Performance Review Body for the European Commission as part of approach for air traffic management in the UK 	
	Benchmarks for sub-categories of expenditure and unit costs	<ul style="list-style-type: none"> Competition Commission (2013-14) use of unit costs benchmarks for DNOs as part of assessment of asset replacement expenditure for NIE price control inquiry Various UK regulators' use of HR cost benchmarks from other sectors as part of broader cost assessment exercise 	
	Bottom-up modelling of ESO costs	<ul style="list-style-type: none"> ESO external cost incentive scheme applied to NGET up to 2018 For UK air traffic management, use of modelling to apply financial incentives to external costs (e.g. use of Flight Efficiency metric, and processes that apply to its application, review and development) 	

Question	Options	Examples and sources of insight	Type
	Benchmarks based on costs of other UK companies that perform similar services to one or more services provided by ESO	<ul style="list-style-type: none"> Various regulators have sought to use broader benchmarking when considering retail margins (e.g. Ofwat at PR14) 	
What additional tools could be used to encourage efficiency and protect customers from inefficiency?	Provision to disallow demonstrably inefficient or wasteful expenditure (DIWE)	<ul style="list-style-type: none"> Provision to disallow costs that are demonstrably inefficient or wasteful part of RIIO-T1 price control for NGET (provision also applies to other Ofgem price controls) Part of arrangements for price control treatment of transmission network pre-construction costs in Northern Ireland 	
	Wider-ranging ex post efficiency review	<ul style="list-style-type: none"> GB smart metering data communications company (DCC) US FERC rate hearings 	
	Ex ante regulatory approval of maximum budget(s) for specific projects	<ul style="list-style-type: none"> Part of arrangements for price control treatment of transmission network pre-construction costs in Northern Ireland 	
	Discretionary financial reward / penalty based on assessment of ESO's performance in terms of cost control and efficiency (forming part of wider assessment)	<ul style="list-style-type: none"> Part of regulatory framework for GB ESO from 2018-2021 	
	Management incentive plan related to cost performance, approved by regulator	<ul style="list-style-type: none"> ORR's regulation of Network Rail 	
	Rule that charges for ESO services/activities are to be justified by reference to information on the ESO's costs, with potential for further rules on charging methodology	<ul style="list-style-type: none"> Ofcom use of cost orientation requirements 	
	"Open by default" or radical cost transparency on all / various categories of ESO costs	<ul style="list-style-type: none"> Open by default approach to public procurement being considered in UK by Government Digital Service Radical transparency in public procurement (e.g. initiatives in Slovakia, Canada) 	
What role for customers and other stakeholders?	No formal role beyond opportunity to respond to consultations by ESO and Ofgem	<ul style="list-style-type: none"> Approach to UK utility regulation further back in time 	

Question	Options	Examples and sources of insight	Type
	Processes involving extensive engagement with customers and stakeholders on ESO expenditure plans	<ul style="list-style-type: none"> The use of a separate customer challenge group for each water company, as part of Ofwat's PR14 process for wholesale water and wastewater (2015-2020) Various US ISO examples 	
	Formal role of stakeholder body to "approve" key elements of cost recovery and efficiency framework (e.g. budgets or ex ante allowance)	<ul style="list-style-type: none"> Constructive engagement in UK airport regulation US examples of negotiated settlements in energy 	
	Potential customer appeal to Ofgem or dispute resolution process (e.g. if charges do not seem justified by reference to costs or based on inefficient costs)	<ul style="list-style-type: none"> Challenges to BT's compliance with cost orientation requirements in telecoms 	

Table 23 Questions and options relating to financing costs and the RAV

Question	Options	Examples and sources of insight
What tools (if any) should be used to provide investors with confidence about future remuneration of efficient investment?	Some degree of long-term regulatory commitment to remuneration of costs recorded in RAV	<ul style="list-style-type: none"> RIIO-1 price controls Other UK precedent (water, airports)
	"Fair bet" principle for efficient investment	<ul style="list-style-type: none"> Ofcom regulation of BT
	Regulatory commitment to recovery of actual costs incurred, including capital expenditure (potentially subject to provisions in respect of inefficient costs)	<ul style="list-style-type: none"> Aspects of US cost of service regulation Regulation of Data and Communications company (DCC)
	No role for RAV as regulatory commitment tool Financing costs for investment required for efficient approach to service provision taken into account as part of calculation of revenue price control, but no long-term commitment	<ul style="list-style-type: none"> Ofwat's approach to retail price controls for water and wastewater services (2015 onwards)
How is the TO RAV (and ESO RAV if used) to be calculated from 1 April 2021?	Based on closing value at 31 March 2021 of notional reported TO RAV under RIIO-T1 control, with any ESO RAV based on ESO RAV under RIIO-T1 price control	<ul style="list-style-type: none"> Some links to previous Ofgem use of "unfocused" approach to RAV allocation (e.g. gas metering, gas storage), but also some differences of approach
	Exercise to allocate current NGET RAV between TO and ESO price controls - ESO RAV calculated using a forward-looking estimate of the	<ul style="list-style-type: none"> Ofwat's introduction of separate controls for bioresources, involving allocation of existing wholesale wastewater RCV to

Question	Options	Examples and sources of insight
	economic value of the ESO's assets and working capital requirements	<p>bioresources based on assessment of economic value of bioresources assets</p> <ul style="list-style-type: none"> Electricity metering - a forward-looking value approach was used when electricity metering was separated from DNOs in DPCR4.
What is the overall approach to calculation of the allowance for financing costs?	Specific form of ROCE (return on capital employed approach) that is used for RIIO-1 controls, based on WACC*RAV	<ul style="list-style-type: none"> RIIO-1 controls for GB energy network companies, including approach of assuming lower notional gearing as part of cost of capital calculation in cases where financial risk to investors is greater (notional equity wedge) CAA approach to airport price controls
	Adapted version of ROCE approach that is more tailored to the asset light nature of the ESO	<ul style="list-style-type: none"> Electricity system operator in Northern Ireland (SONI) transmission system operator price control 2015-2020 (pre and post CMA remedies), with increased rate of return to reflect asset light nature and risk CMA (2015) provided for uplift to WACC for Bristol Water to reflect relatively high operational gearing of Bristol Water compared to other water companies used as source for data on CAPM beta
	Calculation of a margin on revenues or costs	<ul style="list-style-type: none"> CMA approach to financing costs for Northern Ireland system operator's "revenue collection" activities, as part of remedies to appeal in 2017 Retail price controls that Ofgem previously applied to British Gas Ofwat retail price controls for household water and wastewater retail (2015-2020)

Appendix 2: Assessment criteria for ESO framework

This appendix outlines the assessment criteria we have used to assess the packages of options for the price control framework of the ESO. It considers two questions:

- What factors constitute a set of relevant assessment criteria?
- How can the assessment be structured so as to recognise the different contexts within which it may be necessary and/or helpful to use the identified criteria.

In practice, we found it helpful to focus on the second question first, as this has a bearing on the issue of what factors should be included within the set of assessment criteria. This follows as we understand the criteria as needing to play at least two key roles in the assessment process:

- To provide a high-level evaluation framework that helps with judging between potential overall packages of options.
- To provide a more micro-level assessment framework that helps with judgements between options that sit within the overall packages that might be adopted.

We have sought to identify a wide range of relevant considerations in order to support the analysis of options (and to some extent further motivate the option development process through highlighting salient features of the assessment process).

Our proposed way of addressing the multiple assessment requirements in a coherent manner is to develop criteria within a hierarchical (or tiered) structure. This can allow for a relatively short set of high-level criteria/factors to be developed and presented in relatively general terms, which are relevant across the broad range of options/questions that will stand to be assessed. The rest of the assessment framework can then focus on identifying the different dimensions of those high-level factors that it may be relevant to consider (depending on the particular questions being addressed), and identifying some more specific factors/questions that are likely to be important to consider in some types of assessment. Adopting this kind of structure can allow the high-level criteria to be used to provide practical assistance for a range of assessment questions, without that resulting in what might otherwise be a relatively lengthy and complex list.

Table 24 sets out this framework of criteria. In terms of the set of high-level (first tier) criteria, our approach is to include one broadly defined factor that is concerned with likely success in the achievement of good outcomes from the ESO. The remaining high-level factors are then concerned with “how?” questions, and in particular with whether an approach has characteristics that might make it more or less desirable for reasons other than those concerned directly with the achievement of good outcomes. In particular those other first tier factors concern implementation issues

(including implementation costs and ongoing regulatory costs and burdens), transparency and clarity, and flexibility/adaptability to future changes.

Table 24 Approach to assessment criteria

First tier (high-level) criteria	Second tier criteria – subsidiary dimensions and considerations
1. Capability to deliver good outcomes	<ul style="list-style-type: none"> a) Contribution to whole-system efficiency, coordination and transformation b) ESO service quality aligned with what customers want c) Aggregate ESO charges across GB customers to remunerate ESO d) Fair and cost-reflective ESO charges to customers e) Enabling the ESO to finance its activities
2. Implementation complexity and risk	<ul style="list-style-type: none"> a) Extent of move away from current regulatory arrangements b) Implementation challenges arising from complexity c) Uncertainty as to whether implementation is feasible at all
3. Regulatory effort and burden	<ul style="list-style-type: none"> a) Regulatory resource requirements for implementation b) Ongoing regulatory resource requirements c) Regulatory burden on ESO and other stakeholders
4. Transparency	<ul style="list-style-type: none"> a) Implications for engagement b) Implications for legitimacy
5. Adaptability to future changes	<ul style="list-style-type: none"> a) Impediments to future regulatory developments? b) How option-specific are implementation costs? c) Adaptability to technological change d) Adaptability to market developments

The second tier concerns key dimensions in relation to each of the high-level criteria. Judging whether an approach would be expected to perform well in terms of achieving good outcomes clearly raises a broad set of sub-questions, and we have proposed various dimensions that can may be relevant. Presenting things in this way can help ensure that the full range of relevant potential effects on customer outcomes is considered, without resulting in a long and cumbersome list of high-level criteria.

In practice, considering a given dimension is likely to raise a number of subsequent, more detailed questions/issues, that can be treated as forming a third level of assessment, which we labelled “supporting analysis” in section 6. This concerns the factors, features or risks of alternative options that affect the performance of these options against the first tier and second tier criteria. For example, in relation to the first tier criteria concerned with achieving good outcomes from the ESO

such more detailed questions relevant to supporting analysis include: the direct financial exposure of ESO to the costs it incurs; competitive pressures and processes acting on ESO; robustness of approach to uncertain future developments (e.g. ISO); and risks of harm from regulatory micro-management.

This tier of supporting analysis is also where a range of relevant contextual factors can be identified and considered. For example, the extent to which a given option can be expected to perform well in terms of the promotion of whole system based responses may depend in part on the availability and degree of engagement of a diverse range of “voices” from those in a position to challenge current modes of operation in constructive and effective ways. And the degree of engagement of such voices is likely to be influenced by the extent to which they have a stake in system improvements, with this in turn likely to be affected by both charging arrangements and competitive conditions (as this can affect the ability and/or incentive of different parties to move to/promote different modes of provision).

The framework we developed incorporated criteria that were highlighted in the study’s terms of reference, and drew on relevant principles from the Ofgem document: *Our strategy for regulating the future energy system*, and from our experience of developing assessment criteria for regulatory frameworks in a number of different contexts and sectors. It was also refined as part of an iterative process, through our work reviewing alternative packages and options.

Appendix 3: Potential for explicit price control policy for ESO

This appendix briefly discusses the pros and cons of developing and publishing a more explicit statement on regulatory policy for the ESO price control framework. It then picks out some of the issues that would seem particularly relevant to this for the ESO price control, drawing on conclusions and lessons from the main report.

The benefits and drawbacks of a price control policy statement for the ESO

We have identified the regulatory strategy as an over-arching question about the approach to the development of future regulatory arrangements for the GB ESO. Ofgem has already carried out work on its overall regulatory strategy, as set out in the publication *Our strategy for regulating the future energy system* (2017).

There is the potential to go further, and develop a “price control policy statement” which is tailored to the services and characteristics of the ESO. This policy statement would apply at a more operational level than Ofgem’s wider strategy. There are several potential benefits from this:

- Economic regulation – and the fulfilment of the regulator’s statutory duties – involves making trade-offs between a range of different considerations and risks. A price control policy statement can be used to improve the consistency and governance of these trade-offs. It can provide guidance to those engaged in more detailed work on the development and assessment of options for the regulatory framework, and on the implementation of those options.
- Regulatory frameworks evolve over time, and the strategy can steer the direction of this evolution. A strategic perspective may help reveal longer-term options, and the benefits and drawbacks of particular approaches, which go beyond decisions about what is the most appropriate approach at a given point in time.
- A price control policy statement developed for the ESO could help tackle the risks that the regulatory framework for the ESO is unduly influenced by the regulatory approaches that Ofgem applies elsewhere, potentially in quite different circumstances. This is important because Ofgem’s RIIO framework embodies a strategy developed for monopoly infrastructure companies. The ESO has a number of features which differ from the GB energy networks such as an asset-light structure, provision of a range of services and activities, and potentially greater role for competition and displacement, and these may call for a different regulatory approach.

As highlighted above, a key role for a price control policy statement for the ESO would be to recognise some of the key trade-offs that arise in relation to the regulation of the ESO and to take a stance that helps to resolve these trade-offs in a way that is consistent across different aspects of the ESO regulatory framework and reflective of Ofgem’s broader priorities.

Against the potential benefits, there are potential drawbacks and risks from seeking to develop an explicit price control policy statement:

- This will take up time and resource, including that of senior decision-makers (who may need to be involved, given the strategic questions at hand). There is a risk of spending a disproportionate amount of time finessing a published document, which may come at the costs of less time available to spend addressing more practical questions about how to regulate the ESO.
- There is a potential concern that a published policy statement for the ESO is drawn into wider public relations exercises, and there is a loss of focus on it as a tool to guide more technical work on the development of the ESO regulatory framework.
- There is a risk that a high-level policy, which is developed separately from the implementation of the regulatory framework and does not benefit from learning-by-doing processes, may turn out not to be well-suited to the specific issues that arise in practice for the regulation of the ESO, and may act to unduly constrain the application of otherwise attractive policy options.

On balance, we consider that there are quite strong grounds for the development of some form of regulatory strategy for the ESO. But there is good reason to limit the level of detail, ensure that the statement is only prepared after thorough consideration of alternative options and approaches for the price control regulation of the ESO, and ensure that it can be readily adapted as conditions change and more is learned about the ESO's services and effective ways to regulate them.

We have not sought to develop the substance of a price control policy statement as part of this report. This is a matter for Ofgem. Nonetheless, the conclusions we provide in section 9 help draw out what we see as some of the key strategic questions. We provide further suggestions below on how such a statement for the ESO could provide strategic direction to the more technical work on price control design by setting out the weight and emphasis to be placed on different types of regulatory approach.

What might be the focus of a policy statement for the ESO price control framework?

In its 2017 wider strategy document,¹⁰ Ofgem set out its overall aim of ensuring a regulatory framework that drives innovation, supports the transformation to a low carbon energy system and delivers the sustainable, resilient, and affordable services that all customers need. The document set out five principles that it considered its overall aim would be best met by following:

¹⁰ Ofgem (2017) *Our strategy for regulating the future energy system*.

1. Aligning the ESOs' and network companies' interests with those of consumers, through clear obligations and well-designed incentives.
2. Ensuring that charging for monopoly services reflects incremental costs and benefits and recovers other revenue requirements in ways that are fair and reduce distortions.
3. Ensuring that regulation is neutral between different technologies, systems and business models, while encouraging new entry and innovation by, for example, promoting a level playing field between entrants and existing companies, and between network reinforcement and alternative solutions.
4. Providing a predictable regulatory regime which supports efficient investment and allocates risks efficiently.
5. Promoting competition and harnessing market based mechanisms where it is in consumers' interests to do so.

This provides helpful guidance on the ways that Ofgem intends to try to meet the overall aim described above. While the principles are clearly relevant to the ESO, it could be beneficial for Ofgem to try to provide additional guidance for the development of the ESO price control arrangements. In part, that is because of the types of benefits referred to above that can come from providing a clearer explanation of how relatively high-level principles are being applied at a more operational level in a given area.

This is highly relevant when the first principle is considered, as an ESO price control policy statement could say more on how the issue of aligning ESO interests with those of customers will be approached, in terms of the use of "clear obligations and well-designed incentives". Given the range of options and challenges that will be faced when seeking to apply this principle, it may be helpful for a policy statement to provide further guidance on the balance between different types of approach for the ESO, including:

- ex ante mechanistic financial incentives;
- ex post discretionary/evaluative financial incentives; and,
- more detailed obligations (e.g. on conduct and behaviour).

This may be valuable, in particular, because the circumstances that affect the relative desirability of these different approaches for the ESO can differ markedly from those that are typically relevant in the context of the RIIO price controls.

A further issue in relation to which the development of a price control policy statement may be particularly valuable concerns the weight that should be given to exposing ESO services to

competitive and customer pressures when developing the ESO price control arrangements. Our conclusions in section 9 highlighted this as likely to be a key issue for the process of assessing how best to proceed.

On one reading, Ofgem's overall strategy could be understood as already making clear that exposing ESO services to competitive and customer pressures should be given considerable weight. For example, the strategy document includes the following comments:¹¹

*“One of our key principles means that system users should pay for the costs they create for balancing the system and be paid for the benefits they provide. Not only is this fair, but it is also likely to lead to more efficient use of the energy system. **By putting incentives on system users to manage costs, this can also reduce the need for intervention by the monopoly SO and drive greater scope for innovation and new business models**” (p10, emphasis added).*

*“Different means of providing signals for network users can affect the role of the SO and network companies, **and consequently what needs to be incentivised through RIIO-2 and incentives for the SO**. For example, under some models there would be less need for the SO or DNOs to directly procure flexibility services as the necessary signals would be provided through access arrangements or prices. We will manage these interactions as we progress thinking on user signals and develop the RIIO-2 framework’ (p14, emphasis added).”*

In practice, though, the strategy document could also be read as implying that these issues of network incentives should be understood, and progressed, as network charging issues. On this view, the above comments might be regarded as telling us little about the weight that should be given to exposing ESO services to competitive and customer pressures *when developing the ESO price control arrangements*. This latter reading would fit with a longstanding distinction that Ofgem has drawn between its regulation of:

- **The overall (or aggregate) level of customer charges:** which has been addressed through network price controls; and
- **The structure of charges:** which has been addressed through development in charging principles and methodologies.

Following this distinction allows price control regulation to be focused on the incentives that the regulatory arrangements put on the network business, and charging policy to be focused on the incentives that network charging arrangements result in for system users, given the signals they generate.

¹¹ Ofgem (2017) *Our strategy for regulating the future energy system*.

This distinction can be a convenient and practical distinction to draw when network monopoly businesses are being considered. However, when there is a reasonable prospect that user and/or customer responses could have a material bearing on the financial position of a business (by substituting away from using its services to a material degree), then the helpfulness and appropriateness of the distinction becomes much more questionable. In line with this, it is unsurprising that this distinction between the level and structure of charges is used much less in sectors (such as telecoms) where competitive pressures are typically more intense.

The difficulty with effectively drawing a firm distinction between the level and structure of charges when considering how to regulate the ESO is that it can materially diminish the set of options that Ofgem might adopt. Considering ways in which the price control framework can be used to enhance the extent to which the ESO is exposed to competitive and customer pressures opens up a set of alternative options that may allow less reliance to be put on regulatory judgements, because those pressures can provide an alternative source of constraint and impetus (at least in relation to some of the services that the ESO provides).

Given this, and the significance it has to the choice of overall approach for the ESO, there may be considerable benefit from the development of a price control policy statement which is tailored to the services and characteristics of the ESO.