

DRAFT



Updated Assessment of the Future of Local Energy Institutions and Governance

Prepared for Scottish and Southern Electricity Networks

30 May 2022

Annex to NERA (23 March 2022), An Assessment of Alternative DSO Governance Models, prepared for Scottish and Southern. Link: [An Assessment of Alternative DSO Governance Models \(nera.com\)](https://www.nera.com/en/insights/publications/assessing-alternative-dso-governance-models).

CONFIDENTIALITY

Our clients' industries are extremely competitive, and the maintenance of confidentiality with respect to our clients' plans and data is critical. NERA Economic Consulting rigorously applies internal confidentiality practices to protect the confidentiality of all client information.

Similarly, our industry is very competitive. We view our approaches and insights as proprietary and therefore look to our clients to protect our interests in our proposals, presentations, methodologies and analytical techniques. Under no circumstances should this material be shared with any third party without the prior written consent of NERA Economic Consulting.

© NERA Economic Consulting

Project Team

Richard Druce

Leen Dickx

Riccardo Paccioretti

Siying Wu

NERA Economic Consulting
Marble Arch House
66 Seymour Street
London, UK W1H 5BT
+44 207 659 8500
www.nera.com

Contents

1.	Introduction and Background	2
2.	NERA's Previous Assessment of Alternative DSO Governance Models	5
3.	Assessment of the Strategic Case for Change to Local Energy Institutions and Governance	9
4.	Alternative Local Energy Frameworks	24
5.	Updated Assessment of the Welfare Effects of Alternative Local Energy Governance Models	30
Appendix A.	Present Value of Quantifiable Costs of the Cross Sectoral Separation Models	37
Appendix B.	Avoidable Expenditure for the Cross-Sectoral Governance Models	39

Executive Summary

On 26 April 2022 Ofgem published a Call for Input on the future of local energy institutions and governance (“Call for Input”, hereafter) requesting inputs from stakeholders regarding the effectiveness of the existing institutional and governance arrangements at a sub-national level to support the delivery of net zero at least cost, and the case for alternative approaches. In this report, commissioned by Scottish and Southern Electricity Networks (SSEN), we provide an independent view to support its response to the Ofgem Call for Input by building on NERA’s previous report, in which we assess alternative DSO governance models.

Based on our previous report, we have shown that the barriers to effective market facilitation, planning and operation within the current DNO-DSO governance arrangements identified by Ofgem in its Call for Input constitute theoretical concerns only, and are already extensively addressed by the design of the current regulatory framework. Any remaining bias could be better addressed by alternative measures which do not involve separation and would likely lead to lower costs to consumers.

However, we also acknowledge that a “gap” in whole system energy planning exists at the local level, and there may be scope for Ofgem to create a “Local Net Zero Coordinator” with a long-term strategic and network planning role across sectors. Such a role – if focused on long-term strategic planning – would support achievement of net zero across energy vectors, while avoiding the loss of efficiency in the interface between the DSO and DNO that would come from legal separation of these closely related functions. It is likely that imposing separation between the existing Gas Distribution Networks (GDNs) and their operational activities would also impose high costs without any tangible benefit.

Based on our updated top-down, quantitative assessment, we continue to conclude that separation between the DSO and DNO is not justified, and the most cost-beneficial solution is still DNO and DSO integration, but we recognise some potential benefits of pursuing ring-fencing option over the coming ED2 control period. This could be done at the same time as establishing a Local Net Zero Coordinator with long-term whole system energy planning roles, covering both electricity and gas, and taking responsibility for local decarbonisation in consort with Local Authorities. Both options would have limited downside risk and bring optionality for both industry and Ofgem to pursue further separation if new evidence emerges that further business separation is necessary.

1. Introduction and Background

1.1. Background

On 26 April 2022 Ofgem published a Call for Input on the future of local energy institutions and governance (“Call for Input” hereafter) requesting inputs from stakeholders regarding the effectiveness of the existing institutional and governance arrangements at a sub-national level to support the delivery of net zero at least cost, and the case for alternative approaches.¹

In the Call for Input Ofgem discusses the existing governance arrangements for the electricity distribution sector but acknowledges that the transformation of the electricity system is interlinked to changes across the wider energy system. Therefore, in its assessment of alternative governance arrangements for the local energy transition, Ofgem widened its focus by considering other sectors’ implications (namely gas(es) and heat).

In this context, Ofgem identifies a set of functions that it considers are required at a sub-national level to meet evolving energy system needs, namely: the market facilitation of flexible resources, planning of the energy system, real time operation of local energy networks and enabling function, and digitalisation of the system. It then outlines four high level framework models for enduring institutional arrangements for the electricity distribution system that would maximise the synergies across these functions and assesses those against a set of criteria (namely: accountability, credibility, competence, coordination and simplicity).

Ofgem’s framework models range from a light-touch change model encompassing an internal separation of the DSO function within the existing DNOs to models that would involve wider and more structural changes to the industry and include the creation of independent regional planners with cross-sectoral responsibilities. Whilst Ofgem has outlined four framework models, it states that these are not intended to be exhaustive of all possible governance options, but rather a starting point for further debate regarding the potential options for reform.

1.2. Our Scope of Work and Approach

In this context, NERA Economic Consulting (NERA) has been commissioned by Scottish and Southern Electricity Networks (SSEN) to provide an independent view to support in responding to the Ofgem Call for Input by building on NERA’s previous work on the assessment of alternative DSO governance models.²

Our objective is to provide an independent, constructive assessment of Ofgem’s proposals set out in the Call for Input and, building on our previous work, provide further evidence on the costs and benefits of alternative DSO governance models, considering the need to enable net zero at the lowest cost, whilst protecting security of supply.

1.3. Limitations

Our updated quantitative analysis has adopted an evidence-based approach, updating our previous cost-benefit analysis following Ofgem’s Call for Input. However, given the tight

¹ Ofgem (26 April 2022), Call for Input: Future of local energy institutions and governance.

² NERA (23 March 2022), An Assessment of Alternative DSO Governance Models: Prepared for Scottish and Southern Electricity Networks. Link: [An Assessment of Alternative DSO Governance Models \(nera.com\)](https://www.nera.com/en/assessments/alternative-dso-governance-models).

timelines available for this assignment and the fact that the framework models that Ofgem has set out in its Call for Input are only defined in very high-level terms, it is not possible to quantitatively assess the costs and benefits of these models comprehensively. Hence, we do not attempt to quantify the costs and benefits of Ofgem's models but rather provide an updated albeit preliminary quantitative assessment of an extended version of the models presented in the previous NERA report,³ which also consider some cross-sectoral governance models (electricity and gas).

However, this quantitative analysis materially relies on the approach, assumptions, and data used to prepare our previous NERA report, and therefore the limitations to our analysis are similar to those set out in our previous report.

In particular, there is no direct evidence on the costs of separation from the electricity or gas distribution sectors. An accurate estimate of the costs of separation under each different model would require gathering data directly from DNOs and GDNs, in line with the process followed by Ofgem in assessing the legal separation of the Electricity System Operator (ESO). Hence, we have instead adopted a top-down approach and relied on a number of secondary sources.

- For electricity, sources include publicly available data for ED2, cost information provided by SSEN, the actual costs of ESO legal separation from National Grid, broader economic literature, and studies and evidence from other regulated sectors.
- For gas, due to the short timeline available for this assignment, our analysis relies instead on limited data derived from our previous assessment for the electricity sector, and the costs of separation are inevitably driven by assumptions, albeit reasonable and informed by past literature and case studies.

We estimate costs of separation from our own modelling and forecast of total expenditure (totex) over a modelling horizon up to 2050. This modelling relies on our understanding of the RIIO regulatory framework, public information regarding forecast expenditure and cost drivers, and our own assumptions regarding future expenditure growth. Any changes in the final and actual expenditure allowed at RIIO-2 or other regulatory parameters will necessarily impact the results presented in this report.

There are some costs associated with different degrees of separation which cannot be quantified because of the nature of the costs or because of the evolving (and as yet unknown) nature of Ofgem's intended governance and institutional arrangements at the time of writing this report. This may include for instance the costs associated with setting up new organisations or institutions, which may be publicly funded (such as a "Local Net Zero Coordinator", as we discuss in Section 3.3 of the report). Hence, the cost estimates presented in this report are necessarily preliminary.

1.4. Structure of the Report

The remainder of this report is structured as follows:

³ NERA (23 March 2022), An Assessment of Alternative DSO Governance Models: Prepared for Scottish and Southern Electricity Networks. Link: [An Assessment of Alternative DSO Governance Models \(nera.com\)](https://www.nera.com/An-Assessment-of-Alternative-DSO-Governance-Models).

- Chapter 2 provides a summary of our previous work on the assessment of alternative DSO governance models, including our approach and key recommendations.
- Chapter 3 provides an assessment of Ofgem’s strategic case for change set out in the Call for Input and the criteria it has identified to assess institutional and governance arrangements.
- Chapter 4 assesses Ofgem’s proposed framework models and identifies an expanded set of DSO and local energy governance models building on our previous work and Ofgem’s Call for Input.
- Chapter 5 provides an updated assessment of the potential costs and benefits of the alternative governance models set out in Chapter 4, including the impact on net zero.

Appendices provide further details of our research and analysis presented in this report.

2. NERA's Previous Assessment of Alternative DSO Governance Models

On 23 March 2022, NERA published a report “An Assessment of Alternative DSO Governance Models” in which we assessed the costs and benefits a set of alternative governance models for the electricity distribution sector in Great Britain. In the remainder of this chapter, we summarise our approach to assessing the costs and benefits, our key recommendations and include commentary where required regarding the implications of Ofgem's Call for Input for our assumptions and conclusions.

2.1. The Policy Debate Regarding DNO-DSO Governance Arrangements

Decarbonisation of the generation mix, decentralisation of supply, and digitalisation of the power system are changing the electricity sector rapidly. While DNOs have historically taken a role of managers of passive infrastructure, they are now required to manage the system more actively in real time and coordinating local markets for flexibility. This new emerging role is commonly described as the DSO role. Given the anticipated growth of DERs, the DSO will be crucial in the transition of the British electricity system to net zero.

Because DNOs own network infrastructure and are currently responsible for procuring alternatives to it, there is a question as to whether the integrated DSO-DNO business model can achieve an economically efficient balance between network and non-network solutions, without distorting and limiting the market for flexibility services. Similar concerns at the transmission level led Ofgem and BEIS to separate the Electricity System Operator (ESO) from National Grid's Transmission Operator (TO) business, and more recently resulted in the creation of the Future System Operator (FSO).⁴

While the debate on ESO separation will affect stakeholders' thinking on whether DSOs should be separated from the DNOs, transmission and distribution systems are different in many ways, as also noted by Ofgem in its Call for Input.⁵ The SO function within National Grid was established and operated for over 15 years before being separated, whereas the DSO function has only recently emerged. Hence, no evidence of conflicts of interest between the DNO and DSO can have emerged. The nature of distribution system investments is also substantially different from transmission, with DNOs requiring far more interventions on their networks than TOs, which would potentially need to be coordinated and approved by the DSO.

Hence, as well as considering possible degrees of business separation of the DNO and DSO roles from ring-fencing and legal separation, to ownership unbundling and ESO/FSO amalgamation we also defined (working with SSEN) a range of possible definitions of the business activities that could be included within the separated DSO business. Hence, we assessed evidence on the costs and benefits of different options regarding the scope of activities that the separated DSO could undertake. We labelled these options “Narrow”, “Wider” and “Widest”, with the “Widest” option capturing the option with the DSO taking on the largest role. As further explained in Chapter 4 below, under the Widest definition of

⁴ Ofgem and BEIS (22 April 2022), Future System Operator, Government and Ofgem's response to consultation.

⁵ Ofgem (26 April 2022), Call for Input, para.3.29-3.31.

the DSO, the separated entity would carry out all current DSO functions and roles, from the market facilitation of flexible resources, long-term network planning as well real time operation of the distribution networks.

2.2. We Found the Potential Benefits from DSO Separation Are Negligible

As discussed in our previous report, the main possible benefits from separation of the DNO and DSO roles arise from the avoidance of conflicts of interest. Ofgem's impact assessment of ESO separation considered two main sources of benefit: avoidance of distortions to competition in the competitive procurement of networks, and an avoidance of asset ownership bias. However, we found that these benefits applied to distribution are smaller and less relevant than they would be in transmission:

- The *avoidance of distortions to competition in competitive procurement of networks* is only a theoretical concern in the distribution sector as competitive procurement of networks is at a very early stage of development and has yet to be applied at the transmission level. Even if benefits exist in this area for distribution, these would be much lower than at transmission given that investments in distribution networks tend to be small and made on a continual basis, rather than the fewer, large, discrete investments required in transmission.
- The *avoidance of an asset ownership bias* may exist in theory but would be materially smaller than in transmission, where Ofgem/FTI assumed – without any published justification – that the bias would increase total expenditure between 1 and 10 per cent. The design of the current regulatory framework in distribution, primarily through the totex incentive mechanism (applied to all costs, including operating and capital expenditure as well as costs for procuring flexibility services from third parties) and the emergence of local markets for flexibility, already provide important mitigants to this problem. Therefore, we found that if any benefits may exist of avoiding asset ownership those are unlikely to be more than 1-2 per cent of avoidable expenditure.

Overall, we concluded that the benefits of DNO-DSO separation are likely negligible with the conflicts of interest either absent or already mitigated through existing rules and regulations.

2.3. We Also Found that the Potential Costs of DSO Separation are Substantial

The quantifiable costs of separation include the one-off costs of implementing business separation, as well as the loss of economies of scope due to the duplication of currently shared activities and costs (e.g., IT, finance, premises). However, many of the costs associated with separation remain unquantifiable and are associated with a loss of operational and informational synergies from operating the DNO and DSO separately, the loss of intangible synergies such as leveraging currently shared know-how and capabilities, and the loss of financial synergies.

In our previous report, we quantified the cost of separation due to loss of economies of scope and one-off costs of separating the DSO and DNO using a top-down approach drawing on empirical evidence from past literature and case studies from other sectors, the costs incurred by National Grid for ESO legal separation and our own assessment of the costs shared

between the DNO and DSO. However, significant unquantifiable costs mean our estimated costs of business separation are likely conservative.

We find that separation costs rise with the degree of functional separation as well as with the level of business separation. Overall, our analysis shows that, regardless of the degree of DNO-DSO separation, the costs of separation would be substantial, and could be up to around £2.8 billion in Present Value (PV) terms at the GB level. This equates to around £41 (2020/21 prices) for a typical residential customer.

2.4. Overall, We Found that DSO Separation Will Have a Negative Impact on Consumers

The high costs of separation mean that Ofgem and government would need to make a very clear case that benefits exist before deciding to incur them. While quantitatively assessing the costs of separation is possible, estimating the potential benefits from separation is qualitative in nature. We therefore estimated the required percentage reduction in avoidable expenditure needed to offset the costs associated with each form of separation (see Table 2.1).

Table 2.1: Required Threshold of Benefits Required Under Each DSO Governance Model at the GB Sector Level, £m 2020/21 prices

	Ring-Fencing		Legal Separation		Ownership Separation		ESO Amalgamation	
	Low	High	Low	High	Low	High	Low	High
Narrow	0.5%	1.3%						
Wider	0.8%	2.0%	4.2%	5.9%	5.5%	7.7%	4.2%	7.8%
Widest	1.0%	2.5%	5.3%	7.3%	6.6%	9.3%	5.1%	9.4%

Source: NERA analysis.

Given our finding that the potential benefits of separation are unlikely to be more than 1 to 2 per cent of DNOs' avoidable expenditure, the results of our analysis suggested that the costs of legal and ownership separation, and ESO amalgamation, are significantly greater than the possible benefits. These forms of separation require cost savings of at least 4.2 per cent, which is unlikely in distribution given the state of the regulatory regime and our previous discussion in Section 2.2.

Our analysis shows that only ring-fencing has potential for a positive cost-benefit trade-off. The ring-fencing option would be relatively low cost to implement and would come with few downside risks, although it may be less effective in avoiding existing or perceived conflicts of interest.

We also find that that the "Wider" definition of the DSO is preferable if ring-fencing is pursued. This is because the "Widest" definition involves the DSO taking day-to-day decisions on the operation of the network, with its role extending beyond planning and procuring flexibility services (as in the "Narrow" and "Wider" options). This creates, as we also discuss further in Section 4.2 and 4.3 below in response to Ofgem's Call for Input, the potential for operational difficulties and loss of synergies in the DNO-DSO interface that would harm customers. The "Narrow" option has lower net benefits than the "Wider" option

because the “Narrow” option does not include the evaluation of alternative system solutions among its functions, a key area where perceived long-term asset ownership bias exists.

Hence, while our analysis suggested the most cost-beneficial solution is DNO-DSO integration, **we recommended pursuing ring-fencing a Wider DSO over the coming ED2 control period** due to the limited downside risk and optionality for both industry and Ofgem to pursue further separation if new evidence emerges that further business separation is necessary.

2.5. DSO Separation Would Interfere with Achieving Net Zero

Finally, in our previous report we note that the decision regarding possible governance arrangements in the DNO-DSO context will also have implications with respect to achieving net zero. The decarbonisation targets set by the UK government require high levels of investment and human capital, as well as coordination among all stakeholders in the supply chain for electricity. Particularly distribution and transmission will have a crucial role, accommodating new means of flexible generation and connection to the grid. If DNOs devote very significant resources to the separation of DNOs and DSOs, this could substantially interfere with achieving net zero and increase the costs of the transition to net zero, by increasing the levels of coordination required at the industry.

2.6. Conclusion

As briefly set out above, in our previous report we discussed and assessed the costs and benefits of a set of alternative DSO governance arrangements, which we defined based on the degree of business and functional separation of the current DSO roles from the DNO.

Overall, we found that the case for separation was limited, but recommended pursuing ring fencing for a Wider DSO at ED2 given the limited downside risks and the optionality for the industry. The Wider DSO would have a role in facilitating flexibility markets as well as network planning and evaluating system solutions, by identifying and defining constraints and assessing potential flexibility requirements and identify the most cost-effective solutions from flexibility, asset build or smart options.

Our assessment did not cover alternative governance arrangements that would involve the creation of new entities with cross-sectoral responsibilities for instance in long-term energy system planning. However, as noted in Chapter 1 above, Ofgem’s Call for Input covers a wider range of potential alternative local energy governance and institutional arrangements.

Therefore, building on our previous work, in the remainder of this report we provide further evidence on the costs and benefits of an extended set of alternative DSO governance models – including cross-sectoral models – to help inform the upcoming policy choices by Ofgem in this area. As further described below, while we expand on our previous work, Ofgem’s Call for Input does not materially change the conclusions and recommendations set out in our previous report.

3. Assessment of the Strategic Case for Change to Local Energy Institutions and Governance

As noted briefly in Chapter 1, in its Call for Input, Ofgem identifies a set of functions that it considers necessary at a sub-national level to meet evolving energy system needs: the market facilitation of flexible resources, the planning of the energy system, the real time operation of local energy networks and the digitalisation of the system. Ofgem then outlines four high level framework models for enduring institutional arrangements for the electricity distribution system that would maximise the synergies across these functions and assesses them against a set of criteria.

In the remainder of this section, we first review the criteria Ofgem uses to assess its sample framework models. We then review and discuss Ofgem’s assessment of the barriers within the existing governance and institutional arrangements that prevent the effective delivery by DNOs of each of the above functions. We identify where certain “barriers” may not be real problems with current arrangements or may be better addressed by alternative means that do not involve separation of the DSO from the DNO.

3.1. Ofgem’s Choice of Criteria for Assessing Institutional and Governance Arrangements

As mentioned in Chapter 1, Ofgem’s objective with the Call for Input is to identify the institutional and governance arrangements at a sub-national level that allow driving “the most cost-effective decarbonisation outcomes”.⁶

To support achieving this overarching objective, Table 3.1 below lists the qualitative criteria Ofgem uses to assess existing and alternative governance arrangements for local energy systems. While these criteria provide a useful starting point for evaluating the merits of alternative governance models, a much more rigorous evaluation of the costs and benefits of the alternatives would be needed to identify those leading to the “most cost effective” or “least-cost” transition to net zero.

Table 3.1: Ofgem’s Proposed Criteria for Assessing Institutional and Governance Arrangements

Criteria	Description
Accountability	There needs to be clarity on the roles and responsibilities being performed by institutions, with recourse for non-delivery.
Credibility	Institutions are both trusted and perceived to be credible in delivering their respective roles and responsibilities.
Competence	Institutions have the necessary skills and competencies to deliver their roles and responsibilities effectively.
Coordination	There is effective coordination and information exchange between institutions at the sub-national and national level, supported by robust engagement.
Simplicity	Institutional and governance arrangements are simple, such that stakeholder can engage with a given set of arrangements.

Source: Ofgem (26 April 2022), Call for Input, para.2.20.

⁶ Ofgem (26 April 2022), Call for Input, para.1.10.

Hence, while the criteria shown above are important attributes of governance models that might achieve Ofgem's overarching objective, ultimately the alternative governance models will need to be evaluated carefully to assess which will best ensure the whole-system least cost path to achieving net zero, in a timely matter. In practice, introducing this criterion will require Ofgem to identify a series of quantifiable and non-quantifiable costs and benefits at the energy system level (i.e. across vectors and institutions) of alternative local energy governance models, whilst assessing the effects of each model on delivering net zero, both in terms of timing and costs.

This criterion will also require Ofgem to identify and quantify (where possible) the costs associated with the implementation of each alternative governance model, and not just the degree to which any potential alternative governance model is under Ofgem's control for implementation. Indeed, Ofgem's current assessment of the "ease of implementation" of each framework model focuses primarily on whether there would be a need (or not) for primary legislation,⁷ but fails to consider the wider set of implementation requirements for the industry and costs of administering alternative governance models, including for example the creation of new regulatory frameworks and processes as well as new industry codes, procedures and contracts.

It will also be important to consider and quantify where possible the inefficiencies caused by separating the responsibilities currently performed by vertically integrated entities into different bodies. While vertical unbundling and/or the creation of new bodies to support the low carbon transition may generate some benefits, these may also come at the cost of a loss of synergies between functions that are currently performed by single entities.

Further, to achieve its stated objective, it will be important for Ofgem to consider carefully the degree to which each proposed framework would be adaptable and resilient to changes in the energy system as a whole. As the transition to net zero is rapidly and continuously changing the energy system and the role of participants in the system, any institutional and governance arrangement ultimately selected by Ofgem, as well as the associated regulatory framework, must be able to quickly respond to new challenges.

A comprehensive and robust assessment of local energy governance arrangements should therefore also consider the ease of implementation, the cost of implementation, and the degree of adaptability of each alternative governance model.

3.2. Ofgem's Assessment of the Suitability of Current Arrangements to Achieve Effective Market Facilitation

As explained by Ofgem in its Call for Input, today DNOs are responsible for facilitating the markets for flexibility resources, which involves performing a range of activities. These include: defining the rules and processes for these markets, providing accurate, user-friendly and comprehensive market information, facilitating and operating the markets and ultimately procuring flexibility resources (by defining the contracts, tendering the contracts, securing the contracts, and performing settlement).⁸ These services, as noted by Ofgem, are used to

⁷ Ofgem (26 April 2022), Call for Input, para.4.30.

⁸ Ofgem (26 April 2022), Call for Input, para.2.14.

procure flexibility services to alleviate network constraints and support the restoration of supply on electricity distribution networks.⁹

Ofgem states that to achieve *effective* market facilitation of flexible resources there should be “simple, fair and transparent rules and processes for procuring flexibility services, that enable service providers to participate easily in different markets”.¹⁰ This requires, according to Ofgem, “open and transparent markets, that are coordinated and mesh smoothly at all levels” (namely, at the local, national and European level) as well as the provision of accurate and comprehensive information to ensure flexibility providers respond to accurate market signals of system needs.¹¹

Going beyond this high-level ambition, Ofgem’s Call for Input identifies three possible barriers to effective market facilitation within the current DNO-DSO governance arrangements, namely: a potential or perceived conflict of interest where DNOs may prefer traditional network solutions over flexible ones, a potential lack of coordination across different markets, and a potential gap in the resources and skills of DNOs. As we explain in turn below, whilst some of these barriers may exist in theory but not in practice. Where they do exist, they may also be better addressed by alternative measures besides separation of existing entities.

3.2.1. Contrary to Ofgem’s statement, DNOs have a strong incentive to procure flexibility resources within the price control period

In its Call for Input, Ofgem states that “potential providers of flexibility may not have confidence that there will be a secure revenue stream from DNO markets if they perceive there to be a conflict where DNOs would prefer traditional network solutions over flexible ones”.¹² Ofgem then notes that “even the perception of conflicts” could have the “potential to lower stakeholder confidence and discourage participation” which in turn may result in lower than efficient levels of flexibility resources being offered, and therefore require DNOs to meet their needs through traditional network solutions.¹³ These concerns warrant careful scrutiny before embarking on any regulatory process that considers separating existing entities within the electricity value chain.

First, regarding the suggestion that DNOs have a conflict of interest leading them to favour solutions they develop themselves over procuring flexibility services, Ofgem has not put forward any evidence that suggests such conflicts exist (or are perceived) in practice, and certainly no evidence of DNOs responding to such conflicts by undertaking inefficient levels of investment themselves where flexibility could provide a cheaper solution. In particular, Ofgem fails to consider how existing regulatory mechanisms mitigate DNOs’ incentives to favour asset solutions over flexibility resources. Indeed, as we explained in the detail in our

⁹ Ofgem (26 April 2022), Call for Input, para.2.11.

¹⁰ Ofgem (26 April 2022), Call for Input, para.2.13.

¹¹ Ofgem (26 April 2022), Call for Input, para.3.17.

¹² Ofgem (26 April 2022), Call for Input, para.3.17.

¹³ Ofgem (26 April 2022), Call for Input, para.3.17.

previous report, Ofgem has already developed a series of regulatory mechanisms that mitigate this risk, namely:¹⁴

- The **totex incentive mechanism (TIM)** encourages DNOs to make a least-cost trade-off between all categories of operating and capital expenditure within the price control period, so that an operating expense (like payments to a flexibility provider) is treated in the same way as a capital expense. In practice, the TIM treats all categories of totex in the same way, so that if a DNO spends £1 above its target, it bears the same share of this additional £1 of expenditure irrespective of the cost category in which it is incurred. It achieves this by applying a common sharing factor to all categories of costs, and a fixed capitalisation rate, such that the same proportion of DNOs' expenditure enters the RAV, irrespective of the actual ratio between operating and capital costs. The TIM therefore seeks to remove any incentive to favour capital over operational expenses, or to favour DNO-provided solutions over flexibility contracts. Hence, within the control period, DNOs may in practice have an *excessive* incentive to procure flexibility resources over capital solutions since using the flexibility contract allows DNOs to make larger savings within the price control relative to the least cost capex solution, and retain part of these savings through the TIM.¹⁵
- Beyond the TIM, there are also other regulatory mechanisms which help ensure DNOs use flexibility instruments to make efficient trade-offs with asset solutions, these include for instance:¹⁶
 - A commitment by DNOs in December 2018 to the “Flexibility First” approach, coordinated by the Energy Networks Association (ENA), under which DNOs have committed to include in their operations smart flexibility services, to test the market to compare the traditional network-based solutions to flexibility contracts, and to work with Ofgem to ensure financial incentives in RIIO-2 do not favour network reinforcement over flexibility.¹⁷
 - Business plan requirements which involve DNOs demonstrating they have appraised the different options available for managing network requirements, with CBAs submitted as a minimum requirement of the Business Plan Incentive (BPI). To avoid excessive development of the network, Ofgem expects DNOs to fully exploit existing network capacity and flexibility services before building new capacity.¹⁸ The CBAs must evaluate all possible solutions that were under consideration to meet the network needs, including asset-based solution and using flexibility resources. The decision

¹⁴ See Section 4.3 of the NERA Report dated 23 March 2022.

¹⁵ See Section 4.3.3 of the NERA Report dated 23 March 2022 which reports the following example: Consider the case of an increase in demand that the DNO can accommodate either with a £100 capex investment lasting 40 years or with a £10/year 5-year flexibility contract. Evaluating the two options with a very simplistic approach using an annuity calculation using a 5 per cent cost of capital, the capex solution would imply annual costs of £5.83 and the flexibility service of £10. While this capex solution may be preferable (least-cost) in the long term if the demand increase is permanent, within the price control the DNO is incentivised to choose the flexibility contract. Using flexibility allows the DNO to make £50 of savings in the current control period and retain part of these savings through the TIM.

¹⁶ See Chapter 4 of the NERA Report dated 23 March 2022 report for a full discussion.

¹⁷ ENA (December 2018), Energy Networks Association's Flexibility Commitment.

¹⁸ Ofgem (30 September 2021), RIIO-ED2 Business Plan Guidance, p. 53.

must consider not only the costs and the potential value of the reinforcement deferral, but also other factors such as carbon emissions and societal impacts.¹⁹

- The upcoming cost assessment process at RIIO-ED2, along with the Business Plan Incentive (BPI), encourage DNOs to submit well-justified business plans and releases funding only when well-justified. Specifically, DNOs must provide evidence that both justifies projections of anticipated demand and the efficiency of the proposed solution.²⁰ Ofgem has stated that the cost-assessment in RIIO-ED2 will not just prioritise technology neutrality (limiting the opex-capex trade-off), but will also make sure that the implemented solution does not hinder the achievement of the net zero targets.²¹
- The introduction of the Common Evaluation Methodology (CEM) tool across all DNOs to allow an objective evaluation of the choice between flexibility solutions and traditional interventions by defining a common strategy DNOs should adopt to evaluate flexible vs. non-flexible solution to meet network needs.²² The objective of the CEM is to develop a standard approach for the DNOs and create greater transparency for both the flexibility providers and Ofgem. All DNOs agreed to start using the CEM starting from 1 April 2021.
- The replacement of Engineering Recommendation P2/6 with P2/7 now allows DNOs to make more use of flexibility products in their network planning decisions. Engineering Recommendation P2/7 constrains DNOs to ensure a minimum level of security of supply to consumers, and, when evaluating the security requirements of a system, DNOs can now consider the contribution from network assets as well as Distributed Generation (DG), demand facilities with Demand Side Response (DSR) schemes and Electricity Storage (ES) connected to the network.²³

The above regulatory measures already provide strong mitigants to any potential asset ownership bias by DNOs and, as discussed above, the financial incentives conveyed to DNOs via the TIM actually encourages DNOs to favour flexibility resources over asset solutions (i.e. to a greater extent than is efficient in the long-run), to maximise opportunities for short-run outperformance.

3.2.2. Any potential long run bias towards asset solutions, would not be mitigated by the separation of the DSO role

As discussed in our previous report,²⁴ despite the role of the TIM in equalising incentives between all categories of expenditure within the control period, DNOs may still have some incentives to expand the network beyond the efficient level of investment in the long-run. This is because DNOs' capitalisation rates are adjusted at each price control review to reflect

¹⁹ Ofgem (8 October 2021), RIIO-ED2 Cost Benefit Analysis (CBA) Guidance.

²⁰ Ofgem (17 December 2020), RIIO-ED2 Sector Specific Methodology Decision: Overview, p. 36-37.

²¹ Ofgem (17 December 2020), RIIO-ED2 Sector Methodology Decision: Annex 2, p. 36-37.

Ofgem (17 December 2020), RIIO-ED2 Sector Methodology Decision: Annex 2, p. 36-37.

on the application of Engineering Recommendation P2: Security of Supply, p. 14.

²⁴ See Section 4.3.7 of the NERA Report dated 23 March 2022.

the expected share of operating and capital costs in DNOs' business plans. Therefore, by convincing Ofgem that high levels of capex are required through their business plans, DNOs may be able to inflate their capitalisation rate and achieve higher RAV growth, irrespective of how much totex they deliver and the outturn ratio of opex (including flexibility) to capex.

If DNOs were to exhibit a preference for capital over operating expenditure in their business plans in this way, the TIM would not wholly moderate the incentive to deploy more capital investment and make less use of flexibility solutions than would be economically efficient.

However, as noted in Section 3.2.1 above, DNOs' ability to exaggerate the need for capex in their business plans is moderated by Ofgem's cost assessment and BPI process, Ofgem's business plan guidance, oversight of the business planning process and other regulatory mechanisms (e.g. common CBA guidance), that encourage DNOs to adopt neutral decision making between asset-solutions and procuring flexibility contracts.

Further, there may be constraints on the amount of resources in the input factor markets (labour, materials, etc) that limit the industry's ability to deliver the large capital schemes needed to achieve net zero. Given such constraints, both during the price control and in the longer term, DNOs may need to limit the number of capital schemes they deploy and rely on flexibility solutions to avoid peaks in workload and limit excessive increases in capital schemes' unit costs that would penalise DNOs under the totex incentive mechanism. Hence, even if DNOs were to inflate their capex requirements in their business plans, this would only have real effect if these other regulatory mechanisms (notably the TIM) and market dynamics failed to prevent an exaggerated capex projection.

It follows that while this effect is likely to be limited, it may arise if DNOs have informational advantages that they use to exaggerate the need for capex in a way that cannot be identified through these other "checks and balances" currently embedded in the regulatory framework. However, if the DNO does have informational advantages of this kind, it would retain these advantages after separation under all the framework models suggested by Ofgem in its Call for Input. This is because the DNO would still be the only party with detailed working knowledge of its own network assets, and both Ofgem and the separated DSO might continue to be at an informational disadvantage (if any such disadvantage exists).

Thus, DNOs may need to deliver higher levels of capital expenditure if the supply of flexibility is limited (in turn increasing the value of DNOs' businesses). As discussed in our previous report,²⁵ it follows that DNOs may have limited incentive to facilitate the long-term development of flexibility markets that would increase the supply of competing DERs. For instance, DNOs could invest money to either advertise flexibility markets or educate large energy users in their regions on how they could enter them. However, the RIIO-ED1 framework provides no funding for DNOs to implement such programmes, though RIIO-ED2 may provide incentives or funding for such activities. DNOs may still choose to promote flexibility, but their incentive to do so would be limited, as it would come from increased opportunities to outperform the price control in the next 1 to 5 years, and would be moderated by any long-term preference DNOs have for capital solutions.

While there is no clear evidence that a bias towards asset solutions exists, addressing this potential or perceived longer-term conflict of interest through DSO separation would entail

²⁵ See Section 4.3.8 of the NERA Report dated 23 March 2022.

significant costs and risks as our previous analysis has shown (see Section 2.3 above). Hence, it may be more efficient – and cheaper for consumers – to require and fund DNOs to promote flexibility markets at RIIO-ED2, recognising also that flexibility markets are nascent and it would be premature to draw conclusions on the extent of any long run conflicts in performing the market facilitation function until liquidity is much greater, and markets operate closer to real time.

3.2.3. Potential coordination challenges between DSO and ESO could be addressed through less costly measures than separation

In its Call for Input Ofgem suggests that there is a potential risk that the national and local system operators (ESO and DSOs) may have an incentive to “give priority to the development of their own flexibility markets to meet their needs more quickly or maximise their revenue” which in turn would lead to “inefficient outcomes for the system” and prevent flexibility providers from “easily participating across multiple markets and stacking value, which would limit their ability to receive their full value to the system”.²⁶ This in turn, according to Ofgem “could limit much needed investment”.²⁷

We understand that Ofgem’s concern is that the lack of coordination in the organisation of local and national markets for flexibility may result in higher transaction costs for participants in these markets, and inefficient outcomes in terms of location and amount of flexibility resources being developed across Great Britain. However, Ofgem’s statements contradict other statements in its Call for Input, and fail to consider existing regulatory mechanisms that promote ESO-DSO coordination:

- Firstly, Ofgem’s statement that DSOs would give priority to develop their markets to “maximise revenue” contradicts with its previous statements that DSOs may not have an incentive to develop markets for flexibility because of a potential bias towards asset solutions.
- Secondly, as Ofgem notes, both the ESO and DSOs have obligations to develop coordinated markets through their licence obligations and the regulatory price control process.²⁸ For instance, the ESO has completed in 2021 a project which identified potential solutions to optimise coordination of Active Network Management with Balancing Services markets, and plans to start follow-on projects with several stakeholders, including generators, DNOs, and Ofgem.²⁹ Also, network operators are required to maintain and update annually a Coordination Register.³⁰ It follows that whilst DSOs may have an incentive to develop their own flexibility markets first because of the potential financial benefits from outperformance under the TIM, such an incentive is balanced against their obligations to coordinate with the ESO.
- Thirdly, even without these obligations, DNOs would have strong incentives to coordinate with the ESO to maximise their potential for outperformance by avoiding

²⁶ Ofgem (26 April 2022), Call for Input, para.3.18.

²⁷ Ofgem (26 April 2022), Call for Input, para.3.18.

²⁸ Ofgem (26 April 2022), Call for Input, para.3.18.

²⁹ National Grid ESO (6 May 2022), 2021-23 Mid-Scheme Review: Evidence Chapters, p. 143.

³⁰ Ofgem (1 April 2021), Decision to implement the Whole Electricity System Licence Condition D17/7A for Transmission Owners and Electricity Distributors, p. 19.

potential additional costs from the lack of coordination. Similarly, the ESO would wish to avoid penalties under its incentive package.

- As noted above, through the TIM DNOs have an incentive to minimise their total expenditure and choose the least-cost options to address their network needs through making use of flexibility resources as well as coordinate with the ESO to avoid instances in which the lack of ESO-DNO coordination may result in incremental costs to the DNO.
- Unlike DNOs, the ESO is regulated under a cost pass-through arrangement and does not face a similar cost incentive. However, it does face incentives from opportunities to obtain bonuses under its evaluative incentive scheme, including in areas covering DSO-ESO coordination.³¹
- Ofgem also ignores the fact that market participants themselves face commercial choices about the markets into which they sell flexibility resources, and the costs their presence within the distribution system imposes on the DNO:
 - Under current industry arrangements, DERs can offer flexibility to DNOs where they can obtain a contract. They can also choose to offer their capacity into national markets for system services or the wholesale markets for energy and capacity. Some of these services cannot be provided at the same time, e.g. a storage facility performing energy arbitrage in the wholesale market may preclude it from providing flexibility to the DNO as the storage may not be available during the contingency events for which the DNO procured it. Hence market participants themselves face a commercial trade-off regarding how they sell into different markets, and how/whether they can “stack value”. The ESO and the DSOs (as regulated natural monopolies) can only hope to design products that meet the needs of their systems and create market platforms in which these products can be competitively provided.
 - Flexibility resources also have a choice regarding the types of connection agreement they enter, e.g. they can connect at the transmission or distribution level, and can have firm or interruptible connection terms. These choices affect the “whole system” costs of accommodating them onto the grid, but optimising such choices does not require DSO-ESO coordination, but rather regulated connection charging policies that encourage the market participants themselves to reach an efficient decision about how and where to connect to the grid.
- Finally, DNOs and the ESO are already actively coordinating despite the nascent nature of flexibility markets at the distribution level. As mentioned by Ofgem, the Open Network project led by the ENA has “facilitated good coordination in a number of areas” and further work is envisaged for 2022 to improve coordination.³² This includes for instance improving the existing standard agreement for procuring flexibility services across DSO and ESO, aligning flexibility services procurement processes across DNOs and ESO as well as reviewing interoperability of systems across DNOs and ESO systems

³¹ Under its evaluative incentive scheme, a Performance Panel assesses how well the ESO has achieved its stated objectives. In this regard, the ESO brings forward (within “role 3 performance”) its engagement with stakeholders and DNOs to design a sound DSO strategy. Source: National Grid ESO (25 October 2021), 2021-22 Mid Year Report Evidence chapters, p. 116. [e](#)

³² Ofgem (26 April 2022), Call for Input, para.3.18

and defining and implementing “primacy rules” for the ESO and DNOs to manage service conflicts.³³ Also, all DNO group have included in their RIIO-ED2 DSO strategies proposals and actions to facilitate coordination with the ESO. Proposals include for example introducing a new, transparent approach to sharing data, promoting operational network visibility, and coordinating provision of flexibility services via common baseline methodologies.³⁴

Even if Ofgem were to conclude that DSOs and ESO may still have insufficient incentives to coordinate under the current regulatory arrangements to the extent that would hinder the efficient development and deployment of flexibility services, resorting to the separation of the DSO to address this coordination challenge may lead to added coordination challenges which could be more costly to customers. For instance, while the amalgamation of the DSO function within the ESO / FSO may solve some of the coordination challenges between local and national markets, it would remove synergies between the DNO/DSO:

- Each of the fourteen DNOs would still need to provide detailed information to the FSO regarding their flexibility needs at the local level. As flexibility markets grow over the coming years, the number of requests and interactions between the DNOs and FSO is likely to increase (especially as flexibility moves down voltage levels), thus magnifying the negative impact of losing such informational synergies.
- The separation of the DNO and DSO functions would make it more challenging and costly for DNOs to efficiently trade-off asset vs. flexibility solution when assessing their network needs, as they would need to interact and coordinate with the FSO. Any delays in information sharing or lack of coordination in the procurement process of flexibility resources by the FSO for DNOs may prevent DNOs from making efficient least-cost decisions and result in additional costs to customers.

Hence, it will be important that Ofgem carefully balances the expected benefit from moving the DSO market facilitation function into a separated entity (if any such benefit exists) against the loss of operational and informational synergies that exists today between the DNO and DSO. As described above, existing regulatory arrangements already encourage ESO-DSO coordination, and therefore Ofgem could address any additional coordination challenges (if any) by providing funding and further incentives to DNOs and ESO to coordinate as part of the RIIO process.

This could include for example funding and providing incentives around information sharing, standardisation of interfaces and procurement processes, to ensure transparent and comparable information is available about the needs, tenders and procured flexibility at the local and national level. These processes would allow flexibility providers to easily access multiple markets and provide their services where and when needed, at least cost for the energy system.

³³ See ENA website, Open Network project, Flexibility Services workstream: [Flexibility services – Energy Networks Association \(ENA\)](#).

³⁴ See, for example: SSEN (December 2021), Powering Communities to Net Zero: Our Business Plan for RIIO-ED2 2023-2028, p. 117, 121; NPg (December 2021), Our Business Plan for 2023-2028, p. 69-70.

3.2.4. DSO separation would not address (and may exacerbate) the resources and skill gap Ofgem identifies

Ofgem states the growth of flexibility markets “may be hindered if DNOs continue to perform the market facilitation role as they currently do” as they may lack resources and skills in “market design and operation, areas in which others already have significant experience (for example the ESO)”.

Flexibility markets, and thus the DSO role, are nascent. Therefore, it is natural that DNOs’ skills in this area are also still developing. The lack of required skills is inevitable given this early stage of market development and it is therefore not reasonable to suggest that any lack of skills can be addressed through business separation.

Ofgem’s suggestion that the ESO might be better placed to provide these skills also fails to consider the nature of skills and resources required to provide and procure effective and efficient flexibility resources. The market facilitation function of flexibility resources does not only require an understanding of how markets operate, but more importantly requires an in-depth understanding of the needs for flexibility resources at the distribution level, for which DNOs are primarily responsible. In-depth technical understanding of distribution networks assets is necessary to identify and assess in a timely matter the need for flexibility resources, and trade those off against alternative means for addressing network and local system needs. Whilst the ESO can provide knowledge and understanding around operation and market design, it cannot provide the insights and skills that DNOs have developed over decades of managing their own networks which are considerably more decentralized than the transmission network.

Hence, as the role of flexibility markets at the distribution level evolves, any gaps in skills and resources could be addressed through funding for recruitment, training and development of DNOs’ staff. Further, as noted above, it is crucial to encourage collaboration and sharing of knowledge and information with ESO/FSO in specific areas where the latter has significant experience, rather than resorting to costly and risky separation.

3.3. Ofgem’s Assessment of the Suitability of Current Arrangements to Achieve Effective Energy Planning

In its Call for Input Ofgem has defined energy system planning as the “process of taking a forward look at the needs of the energy system and deciding what needs to be put in place to meet those needs” with a focus on the “planning of the energy system at a sub-national level to drive and support the most cost effective decarbonisation outcomes”.³⁵

As noted by Ofgem, this function is currently performed by multiple organisations within the energy sector, including:

- DNOs and GDNs, who are responsible for planning respectively the electricity and gas distribution networks through detailed network development plans that inform future investment decisions;

³⁵ Ofgem (26 April 2022), Call for Input, para.2.7.

- Local government institutions, which undertake a range of planning activities (from project specific approvals to developing local energy plans); and
- The ESO, which is responsible for developing the electricity system scenarios (and in its future FSO role also the gas system) and planning the transmission networks.³⁶

Ofgem states that *effective* energy planning requires coordination across the energy system both at a local and national level and across sectors, to deliver informed decisions on the most efficient long-term investments.³⁷ This therefore requires, according to Ofgem, that the network planning function “both informs and is informed by wider energy planning activities (such as transport, gas, heat, hydrogen and CCUS), and that network planning is also coordinated between transmission and distribution”.³⁸

However, in its Call for Input, Ofgem identifies some potential barriers to effective energy system planning within the current governance arrangements, especially driven by lack of coordination, differences in mandates, priorities and approaches to planning and potential conflicts of interests. These factors, which we discuss in turn below, do not allow, according to Ofgem, effective energy system planning that achieves the most cost-effective decarbonisation outcomes.

3.3.1. Existing local energy governance arrangements may fail to achieve effective *long-term* planning and whole system cost optimisation

In its Call for Input, Ofgem states that there could be credibility challenges with DNOs carrying out certain planning activities on grounds that DNOs could be, or are perceived to be, conflicted in the choosing between short-term flexibility needs and long-term investments in network assets. This may be driven, as Ofgem notes, by “inbuilt technical and risk bias towards asset solutions, resulting in underutilisation of flexible solutions”.³⁹

As discussed in Section 3.2 above, existing regulatory arrangements and mechanisms already mitigate any potential or perceived conflicts of interest by DNOs in favouring asset-solutions, and any long-term biases may be addressed through less costly and risky measures such as funding and encouraging DNOs to rely on flexibility resources.

Likewise, as noted in our previous report,⁴⁰ any concerns around potential conservatism in network planning and over-investment due to a culture of prioritising security of supply and reliability of the network, if not yet addressed through the new network planning standards, are unlikely to be addressed through any form of business separation of the DSO role. Fully separated DSO and DNO entities would still have strong reputational incentives to ensure security of supply, and thus would still employ asset planners who may be inclined to follow traditional network planning practices.

While the regulatory framework overcomes most, if not all, potential or perceived conflicts of interest in DNOs’ network planning decisions, it may not be able to address longer term

³⁶ Ofgem (26 April 2022), Call for Input, para.2.10.

³⁷ Ofgem (26 April 2022), Call for Input, para.2.8.

³⁸ Ofgem (26 April 2022), Call for Input, para.2.9.

³⁹ Ofgem (26 April 2022), Call for Input, para.3.9.

⁴⁰ See Section 4.4.1 of the NERA Report dated 23 March 2022.

biases from DNOs and GDNs in their views and advice to Ofgem, Government and local government institutions on the pathways and technological solutions to transition to net zero.

Both DNOs and GDNs have vested interests in their respective sectors and may therefore not be independent, or perceived to be independent, when providing advice to Ofgem, national and local government institutions around the longer-term paths to net zero. This is particularly the case for GDNs, which may face a larger challenge from the transition to net zero if gas networks were decommissioned, and not converted to hydrogen at scale, in favour of electrifying heat and transport across the UK. A bias or perception of bias in the advice given to policy makers may result in sub-optimal decisions for consumers or delays in the decision-making process around the paths to achieve net zero.

Also, as the country transitions to net zero, DNOs and GDNs may lack the tools or the incentives to coordinate to assess effectively the trade-offs between alternative technological solutions to achieving net zero while minimising whole system costs (across electricity and gas(es)). Despite the efforts in coordinating planning standards and procedures,⁴¹ DNOs and GDNs have a unique position at the centre of their local electricity and gas systems. Any separation of solely the DSO network planning role would not address the potential lack of long-term incentives or tools to perform a holistic and whole system-wide optimisation on the means to achieve net zero at the local level.

Instead, as we discuss further below, to effectively address this potential barrier to achieving net zero at least cost for consumers, there could be a role for an independent (and possibly democratically accountable body) at the centre of the local energy systems. This new entity could play a key role in coordinating and providing strategic long-term planning and optimisation across sectors (including electricity, gas(es), heat and transport).

3.3.2. Lack of coordination and differences in mandates, priorities and approaches may not allow delivery of net zero at least cost

In its Call for Input, Ofgem notes that despite evidence of some coordination in distribution and transmission network planning, and between some networks and local authorities, there is often a lack of consistency in terms of methodological approach to planning. Further, it is challenging to identify the body accountable for ensuring consistency, “as well as for ensuring there is effective coordination between actors to deliver efficient planning outcomes overall”.⁴² Such fragmentation of approaches and objectives may indeed, as Ofgem notes, lead to “sub-optimal outcomes or at least make it more difficult to consider different plans in a consistent way in order to determine most efficient outcomes” for consumers.⁴³

The challenges, as well as the potential long-term conflicts and biases in DNOs’ and GDNs’ advice regarding the long-term network needs to transition to net zero, provide a possible

⁴¹ For example, the ENA Open Network Work Stream 4 was built to allow the electricity transmission and distribution sectors to progress tackling whole system challenges by working closely with, e.g., GDNs. Further, individual DNOs have put forward proposals to work in collaboration local GDNs. Sources: ENA (January 2021), Open Networks Project: 2021 Project Initiation Document, p. 64; WPD (December 2021), Whole Systems Strategy RII0-ED2, p. 9.

⁴² Ofgem (26 April 2022), Call for Input, para.3.13.

⁴³ Ofgem (26 April 2022), Call for Input, para.3.12.

rationale for a new organisation with responsibilities around the long-term strategic planning of local energy systems.

This body, which we call below a “Local Net Zero Coordinator”, would be responsible for coordinating and ensuring application of standardised methodologies and approaches to network planning across sectors (including also transport, heating, and commercial development planning). For example, it could be responsible for the development the Distribution Future Energy Scenarios (DFES) to be used by DNOs and GDNs (and other parties) when making their network planning decisions and preparing their business plans. However, while the Local Net Zero Coordinator would be responsible for the accurate application of network planning standards and providing inputs to the design of those standards, the latter would be set by different entities (likely BEIS and/or Ofgem).

Similar to the FSO, the Local Net Zero Coordinator would have a duty aimed at achieving net zero at least cost to consumers whilst ensuring security of supply. However, as we further discuss in Section 4.4 below, it would have no responsibilities for the market facilitation of flexibility resources or real time operation of local networks. In fact, these would still require, as we discussed above, detailed and technical understanding of local energy network needs, and the separation of such functions from the DNO could bring considerable losses of synergies.

It may also be beneficial for these bodies to have a democratic mandate, such as through direct accountability to the electorate, and/or to be subject to supervision by Ofgem and BEIS to ensure alignment and coordination with the national regulatory and energy policy.

3.4. Ofgem’s Assessment of the Suitability of Current Arrangements to Achieve Effective Real Time Operation

Ofgem defines the real time operation of the local energy networks as the real-time management of electricity flows on the distribution network, including through the dispatching or curtailment of assets either directly or via aggregators, which contract and manage multiple assets.⁴⁴ As noted by Ofgem, real-time operation of distribution energy networks is key to ensuring network reliability and system stability. In carrying out this activity, DNOs must consider the potential for DERs to “both cause and alleviate network constraints, which requires DNOs to have sufficient visibility of their networks”.⁴⁵

In its Call for Input, Ofgem then sets out that *effective* real time operation of energy networks means “doing the right thing at the right time”. In other words, it means ensuring transparent and efficient real time decision making to address planned and unplanned outages and network constraints, such that any “conflicts between market instructions or consumer choices” are signalled and addressed through primacy rules “to allow dispatch instructions to be issued in a way that supports overall system efficiency”.⁴⁶

Similar to its assessment of the network planning function described above, in assessing the suitability of current arrangements, Ofgem notes that potential or perceived conflicts of interest, coordination challenges and gaps in resources and skills may hinder the effective real

⁴⁴ Ofgem (26 April 2022), Call for Input, para.2.15.

⁴⁵ Ofgem (26 April 2022), Call for Input, para.2.15-2.16.

⁴⁶ Ofgem (26 April 2022), Call for Input, para.2.17.

time operation of distribution systems by DNOs. As we set out in turn below, Ofgem does not provide substantive evidence that these problems exist or have substantive effect, and any challenges around conflicts of interest or coordination could be addressed through less onerous measures:

- As discussed already in Section 3.2 above, under the current regulatory framework the integrated DNO-DSO has an incentive to identify the least cost solution to meet its customers and network needs. Also, given that using installed distribution assets typically has a near-zero marginal cost, it is efficient to make the widest possible use of them before dispatching flexibility resources. As such, there can be no bias in operational time horizons that would lead DNOs inefficiently to favour network over non-network solutions when taking dispatch decisions. There is no bias for the separation of the DSO and DNO functions to address.
- It is also far from clear that any coordination problems exist in dispatch at the ESO/FSO-DNO/DSO interface. The ESO/FSO and DSO put in place contracts with some DERs, requiring them to support their systems in return for defined payments. These DERs then either commit to following the required dispatch instructions, or pay penalties for failing to do so. Market participants can therefore choose which services to supply, and these decisions – as well as wholesale energy market signals – dictate how they are dispatched in real time.
- There could also be detrimental effects associated with amalgamating the DNO's current obligations for secure system operation into the ESO/FSO. The very complex nature of distribution networks, with millions of assets and parties connected, and the challenges around defining clear responsibilities for security of supply between the separated DNO and DSO (or FSO with DSO responsibilities) suggests that the loss of coordination may outweigh any cost from amalgamating the DNO/DSO and ESO/FSO. Indeed, as further discussed in Section 4.3 below, under a separated DSO model the DNO / DSO may not have the incentives or the tools to make least-cost trade-offs across different solutions to address constraints, and may even free ride on each others' responsibilities.

Hence, if Ofgem's primary concern is around potential conflicting instructions between national and regional markets, this issue could be addressed through enhanced product design or operational procedures in the flexibility and system services market rather than through changing the governance model. Indeed, as noted above in Section 3.2.3, we understand that DNOs and ESO are already working on common primacy rules.

- Finally, in its Call for Input, Ofgem recognises the large challenge that lie ahead for DNOs to manage and operate distribution networks in real time in the future. Ofgem notes that DNOs must consider the potential for DERs "to both cause and alleviate network constraints, which requires DNOs to have sufficient visibility of their networks", and that "a decentralised energy system may also require the secure digital and active integration of complex software systems for the provision of new services, to be operated by third parties such as aggregators and demand-side response companies".

If anything, the complex and decentralised nature of distribution networks, coupled with uncertainty around the future evolution of the system, lends itself to a higher degree of integration of the DNO and DSO roles, rather than separation. In this context, achieving effective operation of distribution systems may require Ofgem to re-think the regulatory framework to focus on promoting innovation and digitalisation to ensure that in a DNOs

and flexibility operators are equipped with the tools and resources to tackle the challenges ahead.

3.5. Conclusion

In this chapter, we review the criteria Ofgem relies upon to assess its sample framework models and recommend that to achieve Ofgem's stated objective, it will be important for Ofgem to account for the "whole-system least cost path to achieving net zero", identifying the quantifiable costs and benefits of each potential alternative governance model.

We also review Ofgem's assessment of the barriers within the existing governance and institutional arrangements that prevents the effective delivery by DNOs of each of the above functions. We find little evidence that the barriers Ofgem identifies in the current arrangements are likely to cause inefficiency in achieving net zero. Even if the barriers were likely to cause some inefficiency, they may be better addressed by alternative means that do not involve costly separation. However, we do recognise the potential for long-term conflicts of interest and bias in DNOs' and GDNs' long-term network planning and vision to achieving net zero, given the vested interested of companies in both – potentially competing – sectors.

We also acknowledge there could be inefficiency in coordination associated with planning across different sectors and identifying the whole-system least cost solution across technologies and sectors under the current fragmented governance arrangements. Hence, as we further suggest below, there may be benefits to having a Local Net Zero Coordinator with a long-term strategic and network planning role across sectors. However, we also conclude that any form of separation of the real time operation, day-to-day operation and planning of networks by DSOs (including procuring flexibility resources) is unnecessary and would result in coordination costs and loss of synergies. This would ultimately translate in additional costs faced by customers, as we showed in our previous report.

4. Alternative Local Energy Frameworks

Drawing on our review of Ofgem's assessment of the existing governance arrangements at the local energy system level summarised in the previous section, in this section we assess Ofgem's four sample framework models. Specifically, we map Ofgem's models onto our existing framework for assessing alternative DSO governance models and expand the framework to also include potential alternative cross-sectoral governance models.

4.1. Ofgem's Proposed Framework Models Envisage the Separation of All DSO Roles from the DNO

Based on its assessment of the existing governance and institutional arrangements, Ofgem has identified four potential alternative local energy governance arrangements, namely:

- **Internal separation of DSO roles within DNOs** (Model 1) where the DSO would be either ring-fenced or legally separated from the DNO.
- **Independent Distribution System Operator(s) (IDSO)** (Model 2) where a fully independent DSO (IDSO) would be established as a fully separate entity therefore requiring ownership unbundling from the DNOs' parent company.
- **Regional System Planner and Operator(s)** (Model 3) where new entities would be established to carry out DSO roles and have cross-sector responsibilities for energy planning.
- **Interacting organisations** (Model 4) where multiple entities would be responsible for different DSO roles, depending on their core competences and areas of expertise.

Figure 4.1 below maps Ofgem's proposed framework models onto our matrix of alternative DSO governance models from our previous report, based on the degree of functional and business separation. As the figure shows, under all options Ofgem foresees that the ring-fenced or separated entity/entities would be responsible for performing all current DSO roles, namely: the market facilitation of flexible resources, the long-term network planning, and monitoring of the distribution system for emerging network constraints and managing constraints by dispatching or curtailing assets (operation).

Under Models 1 and 2 all these roles would be carried out by the separated DSO (albeit the degree of separation under the two options is materially different). Under Model 3 these would be performed by a Regional System Planner (RSP). Under Model 4 these roles would be split between the RSP and the ESO/FSO.⁴⁷ Unlike Model 1 and 2, under the Regional Planner and Interacting Organisation framework models proposed by Ofgem (i.e. Model 3 and Model 4, respectively), the RSP and/or the FSO would have long-term network planning roles across sectors (including therefore electricity and gas).

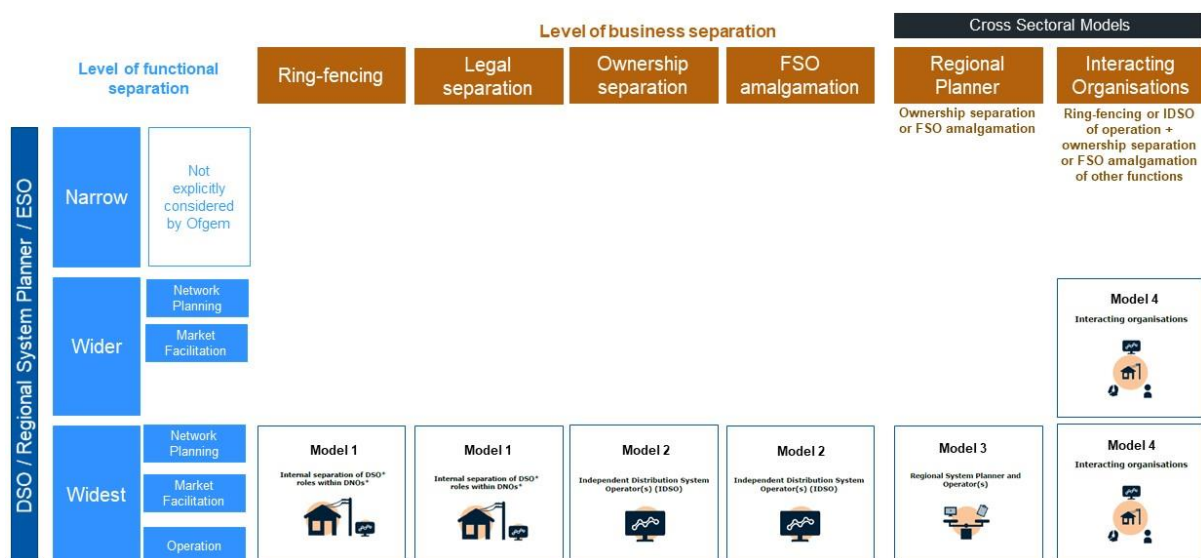
It follows that Ofgem's Call for Input only considers governance arrangements that envisage the separation of *all* current DSO roles, without considering narrower options of functional

⁴⁷ Based on Ofgem's Call for Input we understand that under Model 4, the market facilitation role would be performed by the FSO or a new body, and the network planning roles by either the FSO or the RSP, whilst the operation role by the DNO or DSO.

separation. As a result, under all framework models the DNO would be solely responsible for maintaining network reliability and ensuring safety of the system.

With regards to business separation, as Figure 4.1 shows, Ofgem considers a similar set of options as the ones we assessed in our previous report, envisaging as a minimum ring-fencing or legal separation under Model 1, and ownership separation or FSO amalgamation under Models 2, 3 and 4. Unlike the options we considered in our previous report, ownership separation or FSO amalgamation would here be coupled with the creation of new entities and/or with potential ring-fencing or legal separation of some functions under Model 3 and 4 respectively.

Figure 4.1: Mapping of Ofgem's Four Sample Framework



Source: NERA analysis.

4.2. Ofgem Fails to Consider the Loss of Accountability for Reliability and Security of Supply from Separating all DSO Functions

As summarised above, in its Call for Input, Ofgem only considers governance arrangements that envisage separating all current DSO roles from the DNOs, with the latter still being responsible for maintaining network reliability and security of supply.

In practice however this means that under Ofgem's proposed governance arrangements neither the DNO nor the DSO would be solely responsible for network reliability and security of supply creating moral hazard problems because:

- DNOs would have to adhere to minimum standards of performance set out in their licences and be encouraged to ensure security of supply through the Interruptions Incentive Scheme (IIS). They would also be responsible for delivering and implementing the network plans set out by the DSO, would retain operational responsibility for restoring service after faults arise, and may need to retain some degree of discretion and autonomy in the decision-making around specific investment decision, especially to address short-term network needs and constraints.

- The separated DSO, however, would be responsible for network planning and identifying as well as procuring network and non-network solutions to address both network maintenance and network expansion requirements. The DSO would also, according to Ofgem's proposed framework, be responsible for monitoring the distribution system for emerging network constraints and managing constraints by dispatching or curtailing assets and coordinating with FSO where appropriate. In other words, the DSO would play a role that is pivotal in maintaining security of supply, as well as in providing information and instructions to the DNO for the latter to play its role in ensuring security of supply and network reliability.

Hence, any delays or inaccuracies in the communications between the DSO and the DNO regarding network upgrades or maintenance needs, emerging network constraints and short-term dispatching decisions, or any other day-to-day decision to ensure security of supply may result in delays in those actions being taken. In turn, this may cause higher costs to customers and/or impact security of supply. As explained in our previous report, such higher costs may arise both in a business-as-usual operating mode, but could increase materially under extreme event conditions (e.g., storms) where the clear identification and attribution of responsibilities is essential to ensure reliability of the network and security of supply for customers.

Hence, the full separation of all DSO roles, as currently proposed by Ofgem in its Call for Input, may result in a deterioration in the level of network security and reliability because of the practical challenges in defining responsibilities between the DNO and DSO, the potential accountability and moral hazard problems, and the costs and delays entailed in the interactions between the separated businesses.

4.3. Ofgem Fails to Consider the Loss of Synergies and Coordination Challenges from Separating all DSO Functions

We understand that Ofgem's rationale for considering a full separation of all DSO roles either through ring-fencing (Model 1), or the creation of a separate entity (Models 2 and 3) or across multiple entities (Model 4) is to maintain existing synergies within and across DSO roles or maximise the benefits of specialisation from allocating roles to those institutions that have the best skillset and competences to perform them.

Whilst indeed there may be synergies within and across existing DSO functions, Ofgem's Call for Input fails to account for the potential loss of operational and informational synergies in the DNO-DSO interface following separation. As explained in our previous report:

- There is a constant flow of information between the DSO and DNO which would need to be maintained under the separated governance arrangements. While efficient information flows are conceptually possible under a separated governance model through the introduction of industry codes and procedures, separation would almost certainly increase coordination and transaction costs relative to an integrated DNO/DSO due to the complexity of the distribution networks and real-time operational challenges that the distribution system will face in the future as DER penetration grows.
- Under an integrated DNO/DSO model, there are no regulatory or business separation barriers in coordination between planning decisions and operational decisions since all decisions are internalised within the integrated entity, which has an incentive under the current regulatory framework to minimise total expenditure, and therefore to make

efficient trade-offs between alternative solutions to address customer needs. Under the fully separated DSO models proposed by Ofgem, the DSO and DNO would need to coordinate their decision-making processes and information sharing to be able to make these trade-offs efficiently. Also, the regulatory framework would need to evolve to ensure the separated entities' incentives are aligned in minimising whole system costs and ensuring network reliability. Whilst conceptually possible through codes and procedures, the latter are likely to be imperfect and increase coordination and transaction costs for customers.

It follows that, while full separation of the DSO would not increase the synergies within or across existing DSO functions, separation is likely to result in incremental coordination costs and loss of synergies in the DNO-DSO interface. Whilst these costs could be substantial in a business-as-usual mode, these could increase exponentially in case of extreme events and in the long-term as distribution networks will increasingly become more challenging to operate and manage on a real-time basis.

Finally, the coordination costs and loss of synergies would be even more relevant under Ofgem's proposed Interacting Organisation framework model (model 4) which envisages separating all DSO roles from the DNO but allocating each function to different organisations based on Ofgem's assessment of core competences. These include: the market facilitation role to the FSO, the network planning to RSP or FSO and the real time operation of markets to a separated DSO. Whilst there could potentially be specialisation gains, these are likely going to be outweighed by the incremental costs of coordination, the loss of synergies, and the challenges in defining and allocating clear responsibilities to all separate entities.

4.4. Alternative Models Not Considered by Ofgem Could Maximise Cross-Sectoral Synergies in Long Term Network Planning and Minimise Coordination Costs

Based on the above, we recommend that Ofgem considers "narrower" governance model options which envisage a more limited degree of functional separation of the DSO and which would allow to retain at least some of the synergies that exist between the DNO and DSO roles, and avoid the coordination and accountability challenges described above. As illustrated in Figure 4.2 below, the potential options for functional separation we defined in our previous report as "Narrow", "Wider" and "Widest" provide an example for the degrees of functional unbundling Ofgem could consider:⁴⁸

- Under the "Narrow" governance model the separated entity would be responsible for some of the market facilitation roles ("light" market facilitation role) and long-term network planning of the system, including forecasting system requirements.
- Under the "Wider" governance model the separate entity would also take on a more active role in planning and evaluating system solutions, by identifying and defining constraints ("light" operation role) and assessing potential flexibility requirements and identify the most cost-effective solutions from flexibility, asset build or smart options.
- Under the "Widest" definition of governance model the separated entity would be carrying out all current DSO functions and roles, from the market facilitation of flexible

⁴⁸ Chapter 3 of the NERA Report dated 23 March 2022 for a detailed description of the functions and activities under the different function separation options.

resources, long-term network planning as well as managing and despatching operational flexibility.

Alongside considering DSO governance options with a narrower functional scope, Ofgem could consider creating a new organisation with responsibilities around the long-term strategic planning of local energy systems (including, e.g., transport, heating, buildings' energy efficiency) which would address a gap in the current arrangements. Currently, wherein there is no public body that is responsible for providing a strategic, long-term view on the path to net zero of local energy systems as a whole. Further in addressing such a gap, the new organisation could address some of the potential longer-term conflicts of interest DNOs and GDNs may have in favouring their own network assets over other solutions to meeting customers' needs and transitioning to net zero, such as advice regarding the long-term technological mix and local energy needs to transition to net zero.

As described in Section 3.3.2 above, a "Local Net Zero Coordinator" could be made responsible for coordinating and ensuring standardisation of methodologies and approaches to network planning across sectors. Further, the Local Net Zero Coordinator could be responsible for example for the development of the Distribution Future Energy Scenarios to be used by DNOs and GDNs (and other parties) as inputs when taking their network planning decisions and preparing their business plans. In doing so it would rely on inputs from DNOs, GDNs and other stakeholders such as Local Authorities regarding future local energy networks needs and assess alternative options to achieving net zero and forecast future system needs.

The Local Net Zero Coordinator would have a duty to support achieving net zero at least cost to consumers within its geographic area whilst still contributing to ensuring long-term security of supply, without being involved in day-to-day operations or planning activities nor in the market facilitation of flexibility resources. This approach would avoid separating the operational and investment planning activities that is likely to create inefficiency, or splitting the responsibilities for security of supply which could create a "moral hazard" problem.

Its key role would be to ensure effective coordination across energy vectors (power, gas, heat and transport) and sectors (distribution and transmission). It would also be responsible for whole system optimisation and decision making around the long-term path to achieve net zero in its local area. Finally, it would contribute to the definition of planning standards of energy systems, alongside the FSO, Ofgem and BEIS helping to drive the transition to carbon neutrality in a coordinated and consistent way. In applying those standards at the local level, but in coordination with national energy policy objectives, the Local Net Zero Coordinator would aim to identify the least-cost path to net zero within its local area, whilst accounting for the longer-term security of supply of the GB energy system as a whole.

As Figure 4.2 shows, the creation of the entirely separate Local Net Zero Coordinator could then be combined with any level of business separation between the DSO and DNO, from ring-fencing to full ownership separation of some or all the DSO functions. In line with our previous report, we do not consider the case can be made for any form of business separation beyond ring-fencing in combination with the narrow functional definition of the DSO activities. The high costs of implementing more stringent business separation options would not be justifiable by evidence of any scope for discrimination in favour of network solutions, and the possible conflicts of interest surrounding very long-term planning would be solved by creation of a Local Net Zero Coordinator.

Figure 4.2: Mapping of Ofgem's Four Sample Framework

Level of functional separation		Level of business separation				Cross Sectoral Models		
		Ring-fencing	Legal separation	Ownership separation	FSO amalgamation	DSO and Local Net Zero Coordinator		
						DSO Ring-fencing	DSO Legal Separation	DSO Ownership Separation
DSO / Local Net Zero Coordinator	Narrow	Long-term Network Planning	Assessed as part of NERA previous report			Local Net Zero Coordinator		
		"Light" Market Facilitation				Light Market facilitation by ring-fenced DSO		
	Wider	Long-term Network Planning	Assessed as part of NERA previous report	Assessed as part of NERA previous report	Assessed as part of NERA previous report	Local Net Zero Coordinator	Local Net Zero Coordinator	Local Net Zero Coordinator
		Market Facilitation				Market facilitation & light operation by ring-fenced DSO	Market facilitation & light operation by legally separate DSO	Market facilitation & light operation by fully separate DSO
		Light "Operation"						
	Widest	Long-term Network Planning	Model 1 <small>Internal separation of DSO's roles within DSO's</small>	Model 1 <small>Internal separation of DSO's roles within DSO's</small>	Model 2 <small>Independent Distribution System Operator (DSO)</small>	Local Net Zero Coordinator	Local Net Zero Coordinator	Local Net Zero Coordinator
		Market Facilitation	Assessed as part of NERA previous report	Assessed as part of NERA previous report	Assessed as part of NERA previous report	Market facilitation & operation by ring-fenced DSO	Market facilitation & operation by legally separate DSO	Market facilitation & operation by fully separate DSO
		Operation	Assessed as part of NERA previous report	Assessed as part of NERA previous report	Assessed as part of NERA previous report			

Source: NERA illustration.

Given that we have already assessed the costs and benefits of DSO-only governance models, in the next chapter we focus our assessment of the costs and benefits of the potential alternative cross-sectoral local energy governance models illustrated in Figure 4.2 above.

5. Updated Assessment of the Welfare Effects of Alternative Local Energy Governance Models

Drawing on our updated assessment of potential alternative local energy governance models set out in the previous chapter, in the remainder of this report we provide an update of our matrix of costs and benefits for the above set of expanded governance models illustrated in Figure 4.2 above.

In line with our approach set out in our previous report, we have drawn on evidence regarding the potential costs of separation, but given the short timeframe available for this assignment we make some simplifying assumptions regarding the expected costs associated with the new cross-sectoral governance models set out above. We do not attempt to quantify the costs associated with setting up Local Net Zero Coordinators as the scope and number of these organisations has not been defined. Also, an accurate estimate of the costs of separation and creation of new entities under each cross-sectoral governance model would require a data gathering process by DNOs and GDNs, followed by an assessment of submitted costs by Ofgem, in line with the process followed by Ofgem when assessing the case for the legal separation of the Electricity System Operator (ESO) from the rest of National Grid.

In the absence of actual data across the companies (and mainly for the GDNs), we have adopted a top-down approach to estimating the cost of alternative governance models by relying on a number of sources, as further described below, and making informed assumption regarding the potential costs associated with the alternative governance arrangements.

Similar to the approach we adopted in our previous report, our assessment of potential benefits from different governance models is qualitative in nature, and mostly relies on academic and industry literature, past case studies, and discussions with experts from SSEN. Rather than providing an exact quantification of the potential benefits of the separation options, we examine the theoretical foundations for any concerns around removal of potential conflicts of interest across both electricity and gas and make an informed assumption about what reasonable percentage of expenditure could be achieved through separation.

5.1. Assessing the Potential Costs of Separation

In line with our previous approach to quantifying cost of separating the DSO, we have investigated evidence on both the upfront costs of implementing separation, as well as the increase in on-going costs caused by the separation of businesses and the resulting loss of vertical economies. Drawing on our previous assessment of the costs of separation, we rely on a top-down approach to quantifying the costs of separating the DSO as well as setting up a Local Net Zero Coordinator body responsible for long-term planning across the electricity and gas sectors.

As noted in Section 1.3, we have updated our previous cost-benefit analysis to incorporate new insights and reflect the possibility for introducing cross-sectoral governance models as described in the Ofgem Call for Input. However, there is no direct evidence on the costs of separation from the electricity or gas distribution sectors, so as we explain below we have adopted a top-down approach and relied on a number of secondary sources to make a preliminary estimate of on-going and one-off separation costs of alternative local energy governance models.

5.1.1. On-going costs of separation

As explained in our previous report, the actual costs that DNOs would incur from separation will only become available once the full details of separation are known and defined by Ofgem. Therefore, to estimate the ongoing costs of DSO separation we rely on the empirical evidence from the literature on the economies of scope in the electricity sector, the costs incurred by National Grid for the ESO legal separation, and our own assessment of the areas costs shared between the DNO and DSO.

We assume that the adoption of cross-sectoral local energy governance models would not change our estimates of the on-going costs of separation of the DSO, but may result in some additional costs in the gas distribution sector through duplication of costs between the GDNs and the new cross-sector local system operator. We therefore rely on broadly the same sources of information to provide a high-level and preliminary estimate of the potential ongoing costs of separating the long-term network planning function from GDNs and amalgamating it with the electricity distribution sector's planning function (through the creation for instance of Local Net Zero Coordinators).⁴⁹ To do this, we assume that:

- The costs of ownership separation identified in our previous report on the basis of the on-going costs of ownership separation for the ESO (excluding any additional costs associated with setting up industry grid codes) provide a reasonable starting point for estimating the costs of full ownership separation of a similar set of functions and roles in the gas distribution sector.⁵⁰ We estimate these costs to range between £40.4 million and £48.4 million (in 2020/21 prices) at the GDN sector level, assuming there are four GDN groups.⁵¹
- There would be duplication of costs associated only with the network planning activities of the GDNs. Hence, we assume that only 36 per cent of the above total costs of ownership separation would be duplicated if the network planning activities of gas and electricity were amalgamated through, for instance, the creation of a Local Net Zero Coordinator. The latter has been calculated as the ratio of the number of shared network planning cost items (equal to 11) over the total shared cost items in the DNO/DSO sector (equal to 44 in total).⁵² It assumes a one-to-one relation between costs and the number of shared cost items, and assumes that the nature of network planning costs of GDNs is similar to the DNOs/DSOs.⁵³

⁴⁹ Note we do not include in our estimates the costs of setting up or creating or running the Local Net Zero Coordinator. The actual costs involved with setting up such an organisation will only become available once the full details of the new governance arrangements are known and defined by Ofgem.

⁵⁰ We assume that each of the 4 GDN groups would incur the same level of costs incurred by ESO for its legal separation (excluding ESO/GSO costs) of £8.1 million per year (2020/21 prices) plus a range of £2 to £4 million per year (2020/21 prices) in line with the assumption made by Ofgem/FTI when appraising the costs of ESO ownership separation. See Section 5.4 of the NERA Report dated 23 March 2022 for a detailed description of the assumptions underpinning our calculations.

⁵¹ See Section 5.4.2 of the NERA Report dated 23 March 2022 for a detailed description and page 49 of FTI report, GB System Operator Review: report prepared for Ofgem, in January 2021 for reference.

⁵² See Section 5.2.7 of the NERA Report dated 23 March 2022 for a detailed description of the areas of duplication.

⁵³ This is a simplifying assumption and as described in Section 1.2 a data gathering process would be required by Ofgem to estimate the actual costs of separation for DNOs and GDNs once the alternative governance models are defined in detailed by Ofgem.

- There could be some synergies from amalgamating the gas and power long-term planning and decision-making process around net zero into for example Local Net Zero Coordinators. At this stage we do not make an assumption around the geographical scope of the Local Net Zero Coordinators, nor do we attempt to estimate the costs of running these, but assume for simplicity that there could be cross-sectoral coordination synergies in planning, of around 31 to 53 per cent of separation costs. These percentages are in line with the cost saving assumptions associated with the improved “whole system” planning and forecasting across gas and electricity estimated by BEIS as part of its cost-benefit assessment of Option 2 for the creation of the FSO under which the gas planning and forecasting functions are integrated with the electricity planning function.⁵⁴

Based on the above, we therefore estimate that moving the gas network planning function would result in additional on-going costs of between £4.6 million and £9.3 million per year (2020/21 prices) at the sector level. These costs would be the same across cross-sectoral governance models illustrated in Figure 4.2.

Table 5.1 summarises the results of our analysis showing a range of estimates of on-going separation costs to reflect uncertainties around the actual costs of DSO /GDN separation. All estimates reported include an estimate of on-going regulatory costs we expect Ofgem to incur upon separation in line with our previous assessment.⁵⁵

Table 5.1: Initial Estimate of the On-going Separation Cost at the GB Sector Level, £m per year 2020/21 prices

	DSO Separation Models								Cross Sectoral Models					
	Ring-Fencing		Legal		Ownership		Amalgamation		Ring-Fencing		Legal		Ownership	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Narrow	6.5	14.5							11.0	23.9				
Wider	9.6	22.3	59.2	77.3	71.2	101.3	53.9	101.3	14.1	31.6	63.8	86.6	75.8	110.6
Widest	11.6	27.2	74.0	96.4	86.0	120.4	64.9	120.4	16.1	36.6	78.6	105.7	90.6	129.7

Note: Reported costs include both DNO/GDN on-going costs as well as regulatory on-going costs. Same colour coding in Figure 4.1 and Figure 4.2 applies.

Source: NERA analysis.

5.1.2. One-off costs of separation

As noted above, actual data on the costs of separation for the electricity and gas distribution sectors will only be available once the details of separation are detailed and known. Hence,

⁵⁴ In Option 2 of BEIS’s FSO impact assessment, BEIS assumes that incorporating the gas forecasting and planning functions with the ESO are expected to enable further cost reductions of between £80-£600 million, due to improved “whole system” decision making. BEIS also estimates that the resulting costs of implementation of Option 2 are around £90-£270 million reflecting the additional gas and electricity roles and responsibilities taken on by the FSO. Hence this equates to a range of cost savings of 31 to 53 per cent of total implementation costs. Source: BEIS (22 December 2021), Final Impact Assessment: Future of the System Operator, p.3.

⁵⁵ We assume on-going regulatory costs between £1.8 and £2.9 million per year (2020/21 prices) reflecting the assumptions in the Cave Review (2008) for the water sector that estimated regulatory costs between £1.2 and £2 million per year (2007 prices) based on information provided by Ofwat and stakeholders on the additional regulatory costs following separation of water retail. See Section 5.4.3 of the NERA report dated 23 March 2022 for further details and paragraph A55 of Cave Interim Review, Independent Review: of competition and innovation in Water Markets, published in November 2018 for reference.

in line with our previous report, we have estimated one-off separation costs for the DSO role with reference to the costs incurred by National Grid for the legal separation of the ESO, and other studies on the separation of functions and roles from National Grid as well as from other sectors (e.g., water).

We assume that the adoption of cross-sectoral local energy governance models would not change our estimates of the one-off separation costs of the DSO, but may possibly result in some incremental costs associated with the amalgamation of the electricity and gas planning roles into one entity. We assume therefore that:

- The costs of ownership separation identified in our previous report provide a relatively good starting point for estimating the one-off costs of full ownership separation of a similar set of functions and roles in the gas distribution sector.⁵⁶ These costs are equal to £50.1 million, and reflect our lower bound estimate assumption for the one-off costs of separation estimated on the basis of data regarding the costs of the ESO legal separation, excluding any additional costs associated with setting up industry codes (2020/21 prices).
- Between 0 and 54 per cent of these costs would need to be incurred by GDNs / customers to ensure the transition of the GDN network planning role into the Local Net Zero Coordinator.⁵⁷ The lower bound value reflects the potential synergies from amalgamating both the electricity and gas network planning function into the new entity, which would result in virtually no incremental one-off costs relative to the DSO only separation and which we account for in our cross-sectoral estimates. Whereas the upper bound value reflects the potential incremental costs associated with financial and staff costs for the new gas planning functions.⁵⁸
- Finally, that the resulting one-off costs would need to be incurred at the GDN group level by each of the four GDN groups currently existing in Great Britain.

Based on the above, we therefore estimate that moving the network planning function would result in additional one-off costs of around £107.4 million (in 2020/21 prices), including the additional regulatory costs Ofgem may need to incur. These costs would be the same across all cross-sectoral governance models.

Table 5.2 summarises the results of our analysis, showing a range of one-off separation cost estimates to reflect uncertainties around the actual costs of separation. All estimates reported include also an estimate of the one-off regulatory costs we expect Ofgem to incur to implement separation.⁵⁹

⁵⁶ See Section 5.5.2 of the NERA report dated 23 March 2022 for further details and page 22 of Ofgem Decision, Future Arrangements for the Electricity System Operator: Response to Consultation on SO Separation, published in 2017 for reference. We exclude the additional of implement DSO codes and arrangements.

⁵⁷ Note we do not include in our estimates the costs of setting up or creating or running the Local Net Zero Coordinator. The actual costs involved with setting up such an organisation will only become available once the full details of the new governance arrangements are known and defined by Ofgem.

⁵⁸ The upper bound reflects the share of shares of financial, business change, and staff costs incurred by the ESO (equal to £29.4) over total costs of separation incurred the ESO (of £50.1 million in 2020/21 prices).

⁵⁹ We include one-off regulatory implementation costs between £1.1 million and £11.1 million (2020/21) reflecting Ofgem's own estimate of the costs of implementing the ESO legal separation. The upper bound value assumes that Ofgem's costs increase linearly with the number of DNO and GGS groups subject to separation (6 DNOs and 4 GDNs).

**Table 5.2: Initial Estimate of the One-off Separation Cost at the GB Sector Level,
£m 2020/21 prices**

	DSO Separation Models								Cross Sectoral Models					
	Ring-Fencing		Legal		Ownership		Amalgamation		Ring-Fencing		Legal		Ownership	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Narrow	23.5	100.8							23.5	212.6				
Wider	38.4	163.5	132.9	302.8	297.3	409.1	249.3	435.2	38.4	275.4	132.9	414.7	297.3	521.0
Widest	48.0	203.8	166.8	379.0	373.4	512.6	313.1	545.3	48.0	315.7	166.8	490.9	373.4	624.5

Note: Reported costs include both DNO/GDN one-off costs as well as regulatory one-off costs.

Source: NERA analysis.

5.2. Assessing the Potential Benefits of Separation

The electricity and gas distribution sectors share similarities in terms of characteristics of the network and investments (small scale, and local) and the regulatory framework applied by Ofgem, especially around the totex incentive mechanisms. Hence, we expect the potential benefits from separation associated with the cross-sectoral models described in Section 4.4 above to be similar to the benefits applicable to the DSO separation only and discussed in Section 2.2 above and more extensively in our previous report.⁶⁰ However, as summarised above in Section 2.2 for distribution, these benefits are smaller and less relevant than they would be in transmission:

- The *avoidance of distortions to competition in competitive procurement of networks* remains only a theoretical concern in the distribution sector, due to the nascent nature of the competitive procurement of electricity distribution networks. As already stated in Section 2.2, even if this category of benefit did exist, it would be much lower than at transmission given the smaller scale nature of investments needed in distribution networks relative to transmission.
- The *avoidance of an asset ownership bias* may exist in theory but would be materially smaller than in transmission, where Ofgem/FTI has assumed – without any published justification – that the bias increased total expenditure between 1 and 10 per cent, for both electricity and gas.⁶¹ The design of the current regulatory framework in both electricity and gas distribution mitigates this potential bias. As discussed extensively in our previous report focussing on electricity, several features of the regulatory framework for electricity and gas (e.g. the totex incentive mechanism) and the emergence of local markets for flexibility in the electricity sector, already address this issue. Therefore, we continue to find it reasonable to assume that, if any benefits of avoiding asset ownership in the long-term may exist at all, these are unlikely to be more than 1-2 per cent of avoidable expenditure.

This is an upper end value, and we assume that actual costs should sit within this range reflecting some potential efficiencies in the regulatory process.

⁶⁰ See Chapter 4 of the NERA report dated 23 March 2022 for further details.

⁶¹ FTI (January 2021), GB System Operator Review: report prepared for Ofgem, p. 54, 51.

The creation of integrated body for gas and electricity for local system planning may however lead to additional benefits beyond those associated with avoidance of potential conflicts of interest. Specifically, an integrated entity could benefit from new operational or informational synergies by performing whole system local planning across fuels. As described in Section 5.1.1, we account for these potential synergies in our assessment of the costs of alternative local governance models by scaling down the on-going duplication costs (see Section 5.1.1).

Hence, in line with our previous conclusions, the benefits of separation are likely negligible with the conflicts of interest either absent (i.e., being theoretical concerns only) or already mitigated by existing rules and regulations both under a DSO-only separation and when considering cross-sectoral models of separation.

5.3. The Overall Net Welfare Impact from Separation

In line with our previous report, we then calculate the PV of total costs of separation and compare to the PV of future avoidable expenditures for both the electricity and gas sectors.⁶² Our approach to calculating the PV of future avoidable expenditure for electricity has remained unchanged relative to our previous approach, whereas we have included an estimate of the avoidable expenditure in the gas distribution sector from amalgamating the long-term gas (and electricity) planning roles.

For the gas sector we therefore assume that all capital expenditure (including capex and repex) and 50 per cent of controllable operating expenditure can theoretically be avoided following the creation of the Local Net Zero Coordinator. In line with our approach for the electricity sector, we rely on a forecast of GDNs' expenditure up to 2050 based on the latest published information from RIIO-GD2 and our own modelling of expenditure going forward.⁶³ This forecast assumes a flat real growth in capital expenditure over the forecast horizon for the gas sector and a continuation in the role of gas networks – either for the conveyance of natural gas or hydrogen – until 2050.

The ratio of separation costs to these total future distribution costs identifies the percentage of avoidable expenditure through to 2050 that would need to be saved in order to cover the quantifiable separation costs under each alternative governance model set out in Figure 4.2 above.⁶⁴

The results of our analysis are presented in Table 5.3 below.

⁶² See Section 6.2 of the NERA report dated 23 March 2022 and Appendix A for further details.

⁶³ See Section 6.2 of the NERA report dated 23 March 2022 and 0 for further details on the totex forecast for DNOs and GDNs.

⁶⁴ See Section 6.2 of the NERA report dated 23 March 2022 and 0 for further details on the avoidable expenditure calculation for DNOs and GDNs.

Table 5.3: Required Threshold of Benefits Under Each Governance Model at the GB Sector Level, £m 2020/21 prices

	DSO Separation Models								Cross Sectoral Models					
	Ring-Fencing		Legal		Ownership		Amalgamation		Ring-Fencing		Legal		Ownership	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Narrow	0.5%	1.3%							0.6%	1.6%				
Wider	0.8%	2.0%	4.2%	5.9%	5.5%	7.7%	4.2%	7.8%	0.8%	2.2%	3.6%	5.4%	4.6%	6.9%
Widest	1.0%	2.5%	5.3%	7.3%	6.6%	9.3%	5.1%	9.4%	0.9%	2.6%	4.5%	6.6%	5.6%	8.2%

Source: NERA analysis.

Given our finding that the potential benefits of separation are unlikely to be more than 1 to 2 per cent of DNOs' and GDN's avoidable expenditure, the results of our extended cost benefit analysis suggest that the costs of legal and ownership separation of the DSO coupled with amalgamation of the long-term gas (and electricity) planning roles (e.g. through the creation of the Local Net Zero Coordinator), are significantly greater than the possible benefits. These forms of separation require cost savings of at least 3 per cent which is unlikely in distribution.

In line with our previous analysis, only ring-fencing of the DSO and possible creation of a Local Net Zero Coordinator with a long-term whole system energy planning role has the potential for a positive cost-benefit trade-off.⁶⁵ Similar to the case of DSO separation only, the ring-fencing option would be relatively low cost to implement and would come with few downside risks, and may better avoid existing or perceived conflicts of interest in long-term asset ownership bias through the creation of the Local Net Zero Coordinator.

We also find that that the "Wider" definition of the DSO is preferable if ring-fencing is pursued. This is because the "Widest" definition involves the DSO taking day-to-day decisions on the operation of the network, with its role extending beyond planning and the procurement of flexibility services as in the "Narrow" and "Wider" options. This creates the potential for operational difficulties in the DNO-DSO interface that would harm customers. The "Narrow" option has lower net benefits than the "Wider" option because the "Narrow" option does not include the evaluation of alternative system solutions among its functions, a key area where perceived asset ownership bias exists.

Hence, while our analysis still suggests the most cost-beneficial solution is DNO-DSO integration, we recommend pursuing either ring-fencing a Wider DSO over the coming ED2 control period or, when considering also the gas sector, ring-fencing with the creation of a Local Net Zero Coordinator with long-term whole system energy planning roles. Both options would have limited downside risk and optionality for both industry and Ofgem to pursue further separation if new evidence emerges that further business separation is necessary.

⁶⁵ Note that as described in Section 1.2 this conclusion is based on an analysis that does not account for the costs of setting or running the Local Net Zero Coordinator.

Appendix A. Present Value of Quantifiable Costs of the Cross Sectoral Separation Models

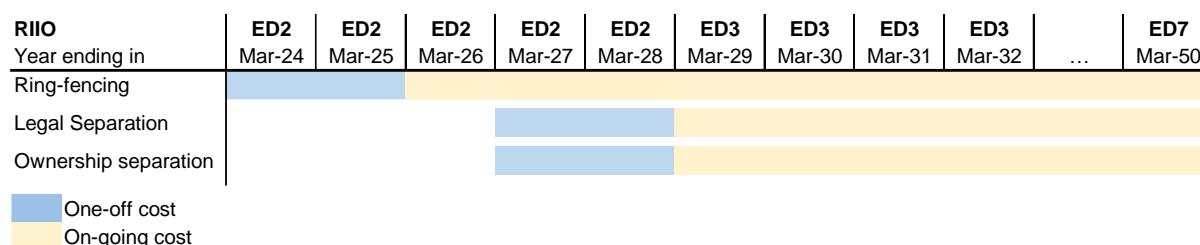
To quantify the overall welfare costs of the alternative business separation options, we need to make assumptions on the timing of the potential separation measures. Based on our review of the ESO legal separation process and our current understanding of Ofgem's plan for reviewing the DNO-DSO governance arrangements, we assume that more significant changes to the industry structure would take longer to implement, with ring-fencing measures being the sole measures that could possibly be implemented before the end of RIIO-ED2.

In line with our previous report, we assume that separation could be implemented with the following timings:

- Ring-fencing as from 1 April 2025 (mid of RIIO-2); and
- Legal separation, and ownership unbundling as from RIIO-ED3.

Based on these assumptions, Figure A.1 shows our assumptions on the timing when different categories of separation costs would need to be incurred, and therefore feed into our overall welfare analysis. As the figure shows, we assume one-off costs are incurred 2 years ahead of separation taking place (spread evenly over two years), whereas on-going costs are incurred after separation has taken place.

Figure A.1: Assumed Timeline for Incurring One-off and On-going Separation Costs for Cross-Sectoral Models



Source: NERA analysis.

We expect the DSO role to expand substantially in the future as we decarbonise the UK economy and achieve net zero. Hence, we assume on-going costs of separation grow at a constant rate of 7.2 per cent (in real terms) during ED3 and ED4 assuming estimated industry DSO totex will double by the end of ED4 relative to average DSO totex in ED2. From ED5 onwards we assume on-going costs grow at a constant rate of 0.2 per cent (in real terms) in line with long-term industry average DNO totex forecasts.⁶⁶

We do not assume any growth in on-going costs for GDNs.

We assume the separation costs are predominantly opex or short-lived capital investments like IT, and are therefore recovered in the year they are incurred, with no depreciation over time.

⁶⁶ NERA analysis and modelling of GB DNO totex at the industry level until 2050.

We use the HM Treasury Social Time Preference Rate (STPR) of 3.5 per cent to calculate the Present Value (PV) of separation costs as of 31 March 2022. We use a modelling horizon through to 31 March 2050 and obtain a time series of separation costs with ongoing costs of separation incurred each year over the forecast horizon, and the one-off cost spread evenly in the two years ahead of separation.

Table A.1 shows the present value of total separation costs based on our estimates of the one-off and on-going costs of separation under the alternative cross sectoral governance models discussed in this report. In summary we find that the PV of separation cost rises with the degree of functional separation (from Narrow to Wider) as well as with the level of business separation.

Table A.1: PV of Total Costs of Separation at the GB Sector Level for the Cross-Sectoral Models, £m as of 31 March 2022

	Ring-Fencing		Legal Separation		Ownership Separation	
	Low	High	Low	High	Low	High
Narrow	247	690				
Wider	336	936	1,360	2,021	1,740	2,593
Widest	393	1,093	1,686	2,470	2,102	3,065

Source: NERA analysis.

Appendix B. Avoidable Expenditure for the Cross-Sectoral Governance Models

In line with our approach set out in Section 6.2 of our previous report, we estimate compare the PV of total costs of separation with the PV of future avoidable expenditures for both the electricity and gas sectors. Our approach to calculating the PV of future avoidable expenditure for electricity has remained unchanged relative to our previous approach, but for completeness summarise that again here below. Whereas we have included an estimate of the avoidable expenditure in the gas distribution sector from creating a Local Net Zero Coordinator which has long-term gas (and electricity) planning roles.

We have used a forecast of all GDNs' totex out to 2050 by using total expenditure data as of RIIO-GD2 and assuming flat real growth in total expenditure over the forecast horizon for the gas sector and a continuation in the role of gas networks until 2050.

We then convert this future totex into a stream of customer bill impacts due to the expenditure that we assume will be incurred in the future and that could be avoided following separation and the creation of the Local Net Zero Coordinator, namely:

- All capital expenditure (including capex and repex) on the assumption it can be avoided following the creation of the Local Net Zero Coordinator.
- 50 per cent of controllable operating expenditure following the creation of the Local Net Zero Coordinator. The 50 per cent share is an assumption, informed by our econometric analysis of business support costs in the electricity sector which suggests that approximately half of the business support costs at the industry level would need to be duplicated upon separation.⁶⁷ We estimate controllable operating expenditure by assuming a capitalisation rate of 32 per cent at the industry level for capital expenditure and 100 for repex.

We then compute a stream of customer bill impacts associated with the above “avoidable” expenditure by:

- Depreciating capital expenditure and repex over an average asset life of 45 years,⁶⁸ in accordance with Ofgem's current depreciation policy for the gas distribution sector.
- Multiplying the undepreciated capital costs by a Vanilla WACC (post tax equity, pre-tax debt) of 3.1 per cent, in accordance with the Ofgem's latest estimate for GD2. We use a Vanilla WACC to calculate post-tax return because any tax liabilities associated with GDNs' future totex would constitute a transfer, that is not relevant for the purpose of performing welfare analysis.
- Assuming all controllable operating costs are recovered as fast money in the year when the expenditure is incurred.

Finally, we sum the avoidable expenditure for the DNOs and GDNs as estimated above, and obtain a stream of future avoidable expenditure and assume that benefits can only accrue after

⁶⁷ See Section 6.2 of NERA report data 23 March 2022.

⁶⁸ We assume that Ofgem continues to apply a common depreciation profile of 45 years to the RAV.

separation has taken place, that is after 1 April 2025 for the ring-fencing option, and as from RIIO-ED3 for legal separation and ownership unbundling option.

In line with our approach to calculating the PV of costs set out above, we use the STPR of 3.5 per cent to calculate the PV future avoidable expenditure as of 31 March 2022 and use a modelling through to 31 March 2050.

Qualifications, assumptions and limiting conditions

This report is for the exclusive use of the NERA Economic Consulting client named herein. This report is not intended for general circulation or publication, nor is it to be reproduced, quoted or distributed for any purpose without the prior written permission of NERA Economic Consulting. There are no third party beneficiaries with respect to this report, and NERA Economic Consulting does not accept any liability to any third party.

Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been independently verified, unless otherwise expressly indicated. Public information and industry and statistical data are from sources we deem to be reliable; however, we make no representation as to the accuracy or completeness of such information. The findings contained in this report may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties. NERA Economic Consulting accepts no responsibility for actual results or future events.

The opinions expressed in this report are valid only for the purpose stated herein and as of the date of this report. No obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

All decisions in connection with the implementation or use of advice or recommendations contained in this report are the sole responsibility of the client. This report does not represent investment advice nor does it provide an opinion regarding the fairness of any transaction to any and all parties.

NERA

ECONOMIC CONSULTING

NERA Economic Consulting
Marble Arch House
66 Seymour Street
London, UK W1H 5BT
+44 207 659 8500
www.nera.com