

Ofgem
10 South Colonnade
Canary Wharf
London
E14 4PU

14 March 2019

Dear Sir/Madam,

IET response to RIIO-2 sector specific methodology consultation

The Institution of Engineering and Technology (IET) welcomes the growing understanding, including within Ofgem, that to address Britain's energy challenges successfully, we have to understand and take into account the essential interactions between the components and sub-systems of our energy systems.

We have focused our answers on the question in Chapter 5 – Enabling whole systems solutions. We have raised fundamental concerns about the definition of Whole System proposed in response to the previous Ofgem consultation on the Whole System licence condition consultation and the associated letter we wrote to Dermot Nolan dated 11th February¹. The IET has played a leading role in exploring and promoting Whole System thinking, in particular, through the Future Power System Architecture (FPSA) programme, in partnership with the Energy Systems Catapult and have attached a supporting document with more information which we submitted alongside our previous consultation.

In summary, the IET recommends the following:

- Ofgem should **reconsider its use of the term Whole System** in transmission and distribution network licences and associated RIIO-2 policies;
- Ofgem should give further consideration to the ways in which **the RIIO-2 framework can encourage the regulated companies to play their part in genuine Whole System solutions**, while respecting the formal boundaries of the companies; and
- Ofgem should actively support **wider consideration by government and stakeholders in developing mechanisms to ensure Britain has the necessary coordination across the true Whole System** as this underpins the context within which Ofgem operates and its policies will be implemented.

Yours faithfully,



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¹ We note Ofgem's response to this letter and will be following up on points raised.

Enabling Whole System Solutions

CSQ8. Do you feel we have defined the problem correctly?

The need for whole system planning is described well in the Introduction and Background sections of Chapter 5. We welcome the reference to the work of the FPSA programme. However, the RIIO mechanisms directly impact only the activities of the transmission and distribution companies and the ESO. They can therefore encourage better co-ordination between these parties but they cannot deliver true whole system solutions as these involve unregulated parties and other energy vectors. We think Ofgem should be more forthcoming about the constraints that apply to it and argue for changes, perhaps legislative, that would address them.

CSQ9. What views do you have on our proposed approach to adopt a narrow focus for whole systems in the RIIO-2 price control, as set out above?

We disagree fundamentally with this approach. We would refer you to our letter of 11 February to Dermot Nolan on this point. With the narrow focus on the current scope, it is not a true whole systems approach. We understand that the regulated electricity and gas sub-systems are only part of the whole energy system and Ofgem only has oversight of these sub-systems. In this document we therefore refer to this as the T&D sub-systems that are part of the wider Whole Energy System.

CSQ10. Where might there be benefits through adopting a broader scope for some mechanisms? Please provide evidence.

The FPSA reports of recent years provide ample evidence of the need for, and benefits of, true whole system approaches to the transformation of the electricity system. They can be found at <https://www.theiet.org/impact-society/sectors/energy/energy-news/fpsa3-fast-track-to-britain-s-future-power-system/>. The most recent publication was launched in November last year; “Fast Track to Britain’s Future Power System”.

CSQ11. Do you have reasons and evidence to support or reject any of the possible mechanisms outlined in this chapter? Do you have views on how they should be designed to protect the interests of consumers?

The mechanisms are appropriate within the narrow focus that has been adopted. We would propose that network companies should set out in their business plans the actions they can take to play their part in not only the T&D sub-systems, but truly whole system solutions, and also the actions that they consider other parties must take to deliver those true whole system benefits.

CSQ12. Which of the possible mechanisms we have outlined above could pose regulatory risk, such as additionality payments or incentivising the wrong behaviour?

Not answered.

CSQ13. Are there obstacles to transferring revenues between networks that disincentivise those networks from using a coordinated solution (please give details and suggest any changes or solutions)?

Not answered.

CSQ14. Can you recommend approaches that would better balance financial incentives between networks to enable whole system solutions?

Not answered.

CSQ15. Are there other mechanisms that we have not identified that we should consider (please give details)?

Not answered.

CSQ16. Are there any additional framework-level whole system barriers or unlocked benefits, and if so, any price control mechanisms to address these?

Ofgem should recognise the limits imposed by its statutory remit in delivering whole system outcomes and take a lead to work with others to find ways of addressing this constraint. Government needs to play its part as it currently, by default, has the role of system architect for all our energy systems.

CSQ17. Are there any sector specific whole system barriers or unlocked benefits, and if so, any sector specific price control mechanisms to address these?

There are many barriers in the electricity sector. These have been explored and reported in the FPSA reports. Perhaps the most significant one is the disconnect between the innovations and new business development taking place on the customer's side of the meter and their potential benefits in terms of the future planning and operational management of the power system. These benefits are not visible at present due to the market structures in place. These limitations could have ramifications for not only benefits, but where the functionality may already exist but is unknown for either the Distribution or Transmission price controls, resulting in higher costs to consumers than necessary.

CSQ18. Which of the proposed mechanisms would be most suitable in circumstances where a broader definition of whole system is likely to deliver benefits to network consumers?

This question should be considered in detail when a broader definition of whole system is proposed or agreed.

Supporting Document

Ofgem RIIO-2: IET's concerns arising from a Systems perspective

1. The IET's concerns in brief:

Ofgem's RIIO-2 December 2018 consultations^{2 3} address a wide span of regulatory policy topics. It looks to the future and contains fresh thinking and constructive proposals. This note identifies an exception to that generally welcome pattern of developments. It highlights an area of fundamental concern that, from a system engineering perspective, has serious consequences for government decarbonisation goals and the costs that customers will face.

As RIIO2 is the forthcoming price control period for the electricity (and gas) sector, it follows that policy being developed now will have significant impact on the focus and funding of the regulated companies, especially the networks, into the late 2020's. As these are influential parties in the sector, the proposed approach by Ofgem will have wide impact on energy system developments, imposing constraints on transformative change. Generation, Transmission, Distribution, and the system on the consumer side of the meter are treated separately at the moment, but this no longer reflective of the system we see today and will see in the future.

The root cause of the potential difficulties arises from the changing nature of the national energy system, that is resulting in a significant requirement for data automation and intelligent systems. To operate successfully this requires a measure of technical coordination across the systems and between the parties. If this is to be resolved there is a need to think afresh about some areas of the regulatory model that have been broadly unchanged since privatisation in 1990.

Britain led the world in that original regulatory formulation; now is the opportunity to refresh that thinking in response to new challenges in the energy sector. This challenge is of relevance in liberalised markets internationally. We offer suggestions for consideration by Ofgem and BEIS so that policy course-corrections can be developed in good time as we move into RIIO2 and tackle the new challenges ahead. This would be consistent with the message of recent speeches from BEIS and Ofgem senior management that expressed a desire to lead the way in the energy transformation.

Core concerns about Ofgem's documents are:

(i) *They currently mislead the reader in a key respect:* Ofgem's draft policy widely uses the term Whole System in a plain English context; however on close reading (not explained until page 35) this term is defined to mean the 'transmission and distribution networks'. These are only part of the true whole system supply chain that now

² **Main consultation:** <https://www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-consultation>

³ **Licence wording consultation:** <https://www.ofgem.gov.uk/publications-and-updates/consultation-licence-conditions-and-guidance-network-operators-support-efficient-coordinated-and-economical-whole-system>

encompasses the emergent 'smart' energy system on the customer's side of the meter comprising activities such as integrated home generation, home energy storage and electric vehicle charging.

(ii) *Ofgem's proposed definition of Whole System will have adverse outcomes:* this narrow definition will result in the focus of the electricity and gas network companies and their System Operators being restricted to only part of the end-to-end supply chain. While this is in itself a not unhelpful step and is probably a reasonable remit within the context of the regulated companies, it has worrying aspects. Considered from the perspective of an increasingly complex energy system with many 'moving parts', it presents a sub-optimisation that is concerning when considered from the view of experienced systems design practitioners. The systems here include both commercial and engineering systems, incorporating data, communications, analytics and automation. They include mechanisms that will be required to support DSO roles, demand flexibility, energy services to customers, and to utilise smart meter data. To some extent they also impinge on market design. The future 'moving parts' will include forecasting and decision support tools necessary for asset management, investment and operations by companies in every part of the end-to-end system. In the future this may extend to multi-vector working, so is important to put it on a firm footing. If quite reasonably this is not a role for the regulated companies or for Ofgem, whose role should it be?

(iii) *The consequences of this definition are deeply anchored in RII0-2 policy:* this narrow definition of Whole System has implications deeper than simply matters for clarification in the glossary. For example Ofgem's draft policy proposes only to fund investments that support the narrowly defined 'whole system', it proposes to reward the network companies whose business plans focus on the delivery of 'whole system' solutions, and it proposes to target future innovation incentives on the narrowly defined 'whole system'. We note that Ofgem encourages network companies and SOs to engage with wider stakeholders to develop 'non build' solutions to network constraints - but this is what might be described as 'one way' and does not require the network companies to play their part in wider energy system optimisation.

The second consultation document mentioned here concerns writing this narrow definition of Whole System into regulated company licences, in effect making the definitions 'law' and greatly diminishing the scope for any looser interpretations.

(iv) *The impact of this is serious and far-reaching:* systems engineering experience drawn from many sectors highlights that *end-to-end systems coordination* is a prerequisite for an energy system transformation that's increasingly distributed, automated and, in the longer term, multi-vector. System-of-systems coordination is an unavoidable necessity if the government's decarbonisation policy objectives are to be achieved and efficient and seamless new services are to be made available to users through vibrant energy markets.

2. There's a knotty problem here

Ofgem's narrow definition of Whole System (i.e. the T & D networks and their System Operators for electricity and gas) reflects their long-standing position and the traditional interpretation of their remit in statute. For many years following privatisation, the term 'system' was synonymous with the transmission and distribution networks. This was reasonable shorthand when customers were passive demand-takers, generation was centralised, and there was for practical purposes no electricity storage. However, while the energy sectors are now changing out of all recognition from this traditional world, Ofgem policy appears to focus on moving towards ring-fencing itself and the companies it regulates to the boundaries of yesterday's energy system. Arguably this is a de facto outcome of the 1990's regulatory model, and highlights a fundamental need for government to rethink this aspect of energy regulation. We envisage BEIS would be the lead party for this rethinking, building on their Smart Systems and Flexibility plan.

There is much evidence to demonstrate that transformational changes will be required in our energy systems. For example FPSA⁴, the Future Power Systems Architecture project, has described 35 new power system functions⁵ that will be required between now and 2030. FPSA reports that this new functionality has a distinctive characteristic in that it has cross-system impacts and will need to be implemented in a coordinated way across boundaries of ownership, voltage level, and energy vector, and in many cases this will include the customer side of the meter, local energy enterprises, and new commercial parties.

Delivering this functionality underpins energy flexibility and mechanisms that will unlock savings⁶ estimated to be in the range £17-40 billion by 2050. The key issue here is that in the absence of true end-to-end system coordination, it will simply be impractical to get beyond demonstrations and to successfully roll-out innovative flexible energy developments at national scale.

Here is the key question: In this emerging context, whose role is it to ensure effective end-to-end technical coordination of the new commercial and engineering systems, who is accountable and who oversees this integration activity? Note that we are not describing here any form of 'central planning'. The requirement is for a holistic systems-of-systems integration activity of the type that is widely established in other commercially led sectors where multi-party complexity is managed successfully, including for example the data and protocol standardisation activities that underpin the mobile phone networks, international aviation, and the World Wide Web.

End-to-end system coordination is about more than facilitating new services (whether for the network companies or for new commercial parties); it also has a key task of ensuring the end-to-end stability of multiple automated systems to avoid 'hunting' instability, counter-acting control actions, data incompatibilities, and system 'crashes' of the kind

⁴ <https://es.catapult.org.uk/publications/fast-track-to-britains-future-power-system/>

⁵ "power system functions" refer to new technical and commercial capabilities that will be needed, spanning timescales from investment planning to real time operations and settlement.

⁶ BEIS and Ofgem (2017) <https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan>
upgrading-our-energy-system-smart-systems-and-flexibility-plan, based on Imperial College and Carbon Trust analysis commissioned by BEIS

we experience from time to time on our computers or Apps. These outcomes risk widespread system disruption are totally unacceptable in the context of critical national infrastructure.

Ofgem, by staying closely aligned with its traditional remit, is at risk of narrowing the activities of the network companies, incentivising them to sub-optimize within and between the T & D networks, and restricting them from playing a wider part in the coordinated development of the end-to-end national energy system. It may not be (or indeed should not be) the role of the regulated network companies to secure end-to-end energy system coordination but it is still vitally important that this functional requirement is not ignored.

Ofgem's consultation documents make no reference to this emerging need for a cross-boundary coordination role together with ongoing accountability for its delivery and resilience. This is a serious gap as it is an essential and challenging task, involving for example agreement on standards and data protocols and their ongoing adaptation and enhancements as requirements evolve. Failing to address this integration activity will accumulate new risks, deter innovation, and be a blocker to open systems that avoid proprietary lock-in and reduce customer choice. This will result in additional costs to customers, and likely frustrations when smart energy systems crash or, going forward, fail to upgrade seamlessly.

The core of the knotty problem is that Ofgem is operating within its traditional role and remit: perhaps Ofgem's role should be redefined, and/or should there be another party who addresses whole end-to-end technical coordination? These would appear to be questions for government as much as for Ofgem. However the BEIS/Ofgem Smart Systems and Flexibility Plan⁷ does not address this matter.

3. What recommendations should be made to Ofgem?

Note the context - Ofgem's regulatory review cycle commences with electricity transmission (ET2) and, while paragraph 2.2 of their methodology consultation says that Ofgem is not at this stage consulting on ED2, the same paragraph acknowledges that the "... measures set out in our current thinking ... could, in principle, apply to RIIO-ED2".

The issues that we raise are fundamental to all the networks and it is therefore important to address them at this stage of RIIO-2. The second consultation document to which we have referred describes intended Licence changes that paragraph 4.2 explicitly states will apply to all network owners⁸ including electricity distribution.

In view of this context, our recommendations are that:

⁷ <https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan>

⁸ Para 4.2 states: "We propose that these provisions should apply to electricity Distribution Licensees, both DNOs and IDNOs, and onshore transmission owners (TOs), with the accompanying Guidance sitting alongside all of these.¹⁷ We consider that a single Guidance document covering the relevant Network Licensees will help to ensure consistency and coordination."

(i) **Ofgem** should be invited, in response to its consultation, to reconsider the way in which its policy statements adopt the plain English use of 'whole system' while defining it very narrowly. A suggestion would be to refer to '**T&D Sub-systems that make up part of the whole energy system**' and make the definition **clear at the start of its documents** to avoid the risk of readers being misled, and misleading wording being permanently embedded into licences. Note that many new parties are coming into the energy sector and they will not be familiar with regulatory jargon. Greater clarity will support delivery of cost efficiencies and decarbonisation policy goals.

(ii) **Ofgem** should be invited to reconsider the proposed licence wording changes to **avoid over-prescriptive narrowing of network company activities**. These companies are significant parties with important knowledge and capabilities who should be **encouraged to play an appropriate part in end-to-end energy system transformation**. This might require for example, willingness (and funding allowed under RII0-2) to engage with parties on the customer side of the meter in the development of standards and data exchanges **where there is necessarily an interaction with the networks and wider power system**. Where cross-boundary issues have to be resolved, engagement is necessary but *accountability* is a further fundamental factor that will need to be addressed. Ofgem draft policy makes reference to engagement with wider stakeholders, but only where it benefits the 'whole system' as narrowly defined.

(iii) **BEIS**, with Ofgem and other interested parties, should be asked to **bring forward meaningful proposals to address the looming gap in end-to-end system coordination**. We will be pleased to meet and discuss the evidence for this gap. It may assist to note that FPSA has identified a number of options⁹ to respond to this challenge. Also the wider context has been referenced by Dieter Helm¹⁰ and Laura Sandys¹¹. It is evident that there is no quick fix here, as today's liberalised market has no party currently positioned to undertake this integrating role. A way forward might be to **put in place a development process** tasked with resolving this challenge and for it to be **delivered in the early stages of the RII0-2** period so that all parties have time to contribute and **adjust in a measured way**, avoiding the need for rapid changes. Deferred action and late changes would add risk for the regulated companies and their investors, and stall entrepreneurship, innovative products and jobs in the energy sector.

(iv) We look forward to these recommendations resulting in changes in certain policy areas. **If BEIS and Ofgem do not accept the policy case for the points we make here**, we request that they set out an explanation. Also, **if they do not see these issues as their responsibility to resolve**, we ask them to explain **whose responsibility** it should be and where **accountability** lies for essential end-to-end coordination.

⁹ See FPSA3 supporting report: <https://es.catapult.org.uk/wp-content/uploads/2018/11/3.-FPSA3-Enabling-the-Energy-Transition-Report.pdf>

¹⁰ <https://www.gov.uk/government/publications/cost-of-energy-independent-review>

¹¹ <https://www.imperial.ac.uk/grantham/publications/redesigning-regulation-powering-from-the-future.php>