

Ofgem
10 South Colonnade
Canary Wharf
London
E14 4PU

11 February 2019

Dear Sir/Madam,

Consultation on licence conditions and guidance for network operators to support an efficient, coordinated, and economical Whole System

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.

However, we have a fundamental concern about the definition of Whole System proposed in this consultation. 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 System Catapult. Ofgem's definition simply includes the transmission and distribution networks, but doesn't extend into adjacent and interlinked vectors such as heat or transport.

As a result we have taken the step of writing directly to Dermot Nolan, CEO of Ofgem to raise our concerns. Our response to this consultation is therefore made up of the letter and a more detailed supporting document.

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,



James Robottom
Energy Lead
Strategic Engagement and Partnerships

Mr. Dermot Nolan
CEO
Ofgem
10 South Colonnade
Canary Wharf
London
E14 4PU

11 February 2019

Dear Mr. Nolan

Consultation on licence conditions and guidance for network operators to support an efficient, coordinated, and economical Whole System

The Institution of Engineering and Technology (IET) is taking the unusual step of writing directly to you in regard to a matter of fundamental concern raised by this consultation.

The 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. This applies not only within each energy vector (e.g. gas, electricity, oil) but also between them. This is now commonly referred to as the Whole System challenge.

The IET's Core Concern

The IET has played a leading role in exploring and promoting Whole System thinking. In particular, it has worked in partnership with the Energy Systems Catapult through the Future Power System Architecture (FPSA) programme¹. The FPSA programme has proposed a definition of the Whole System in the context of the power system. This is provided in the notes of this letter alongside the definition proposed by Ofgem.

The FPSA definition includes every component of the power system including all the equipment on the customer's side of the meter. It also embraces the IT infrastructure supporting the system as well as the regulatory, commercial and market rules that facilitate its operation. Similar definitions can be applied to the gas system. In stark contrast, Ofgem's definition simply includes the transmission and distribution networks, but doesn't extend into adjacent and interlinked vectors such as heat or transport. A better term for this could be the Total Network System.

The IET considers it wholly inappropriate to use the term Whole System in such a narrow way. We consider it to be misleading. As stakeholders in the energy sector work to address the new challenges and complexities that we face, it is really important that we try to adopt a common language. While we accept that there is no single, recognised definition of the term. Whole System, we have never seen it used simply to describe a transmission and distribution system.

Further, we are concerned that adoption of this definition will have seriously adverse outcomes. We accept that the remit of the network owners is limited by their licences. But it seems short-sighted and inappropriate to further lock these restrictions in when we should be encouraging the network owners to develop genuine Whole System innovations.

¹ <https://es.catapult.org.uk/projects/future-power-system-architecture-fpsa/?EKXSHOW=SHOW>

Ofgem's narrow definition of Whole System has implications deeper than simply matters for clarification in the glossary. For example the RIIO-2 methodology policy consultation 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.

Our understanding is that by writing this narrow definition of Whole System into regulated company licences, it effectively makes the definitions 'law' and greatly diminishes the scope for any flexible interpretations to customers' benefit.

Governing the Whole System

This debate about the definition of the term Whole System in reality reveals a bigger and more fundamental issue. We recognise that Ofgem does not, and indeed should not, regulate the true whole system; this responsibility rests, by default, with government. We intend to write to government separately on this point.

Conclusion

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.

We have discussed these issues with Ofgem in a number of forums previously and we would be pleased to meet again to further explore these important questions and expand upon the findings from the FPSA programme. Please contact James Robottom, Energy Lead at the IET on jrobottom@theiet.org or call on 07841 865 354

Yours faithfully,



Dr. Simon Harrison BSc PhD CEng FIET
Chair, IET Energy Policy Panel
Chair, FPSA Programme Delivery Board



Simon Edwards
Director of Governance and External
Engagement, IET

Notes

FPSA Definition of Whole System

Whole System includes:

- The physical energy system equipment;
- Consumers and the equipment they control;
- The touch points with other energy vectors e.g. gas, heat and transport;
- Associated communications, data and digital platforms;
- Energy system regulations and market rules;
- Commercial transactions, business models and contracts.

Ofgem Definition of Whole System

In contrast, Ofgem's consultation offers a quite different definition of Whole System to be used in the proposed new licence condition. This alternative definition, which is widely applied in Ofgem's recent RII0-2 policy methodology consultation, is as follows:

Whole System: For the purpose of this licence condition, means the national electricity transmission system and the distribution systems of all authorised electricity operators which are located in the national electricity transmission system operator area.

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.

RIIO-2 is the forthcoming price control period and 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, creating barriers to transformative change.

The root cause of the potential difficulties arises from the changing nature of the national energy system that is resulting 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 RIIO-2 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 encompasses the emergent 'smart' energy system on the customer's side of the meter

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>

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 rings alarm bells 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. 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 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

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

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 deeply unsatisfactory to ignore this functional requirement.

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 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:

(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 **'total network system'** and make the definition **clear at the start of its documents** to avoid the risk of readers being misled and misleading wording being embedded into Licences permanently. Note that many new parties are coming into the energy sector and they will not be familiar with

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."

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.

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End of document

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>