

Open Letter Consultation on approach to setting the next electricity distribution price control (RIIO-ED2)

A submission by the University of Bath, Centre for Sustainable Power Distribution

We welcome Ofgem's continued regulatory efforts in promoting innovation and competition in electricity distribution, and in creating the right environment for the industry to prosper through energy transition, while at the same time pushing towards meeting the Government's decarbonisation goals and ensuring consumers – especially vulnerable consumers – have affordable and secure energy.

The transition to a smart, flexible, low cost, and low carbon energy system provides a once in a generation opportunity to shape the industry: enabling network operators (DNOs) and the wider industry to take advantage of new technologies and the opportunities of digitalisation; opening up new approaches to reducing peak prices; delivering renewables; and achieving decarbonisation goals and consumer-side improvements through informed risk taking.

We are pleased that the regulator continues to take positive steps to support the development of smart, flexible and efficient energy systems. We provide our responses to a number of pressing questions.

1. Do you have any views on the proposed objectives for RIIO-ED2?

Network companies and low carbon businesses will be the key driving forces in efforts to decarbonise our energy systems, and in accelerating our energy transition without compromising supply security or substantially increasing energy bills for consumers. It is important that these network companies and low carbon businesses are able to thrive and to continue to innovate.

The transition to low carbon energy systems should provide exciting opportunities to grow both existing and new energy businesses, with increased efficiency through innovation and competition. However, there will be significant risks to both new and emerging businesses during the initial stages of energy transition.

The incumbent network companies have deep knowledge, experience and practice in managing a large and highly complex energy system, and are already operating in the regulated environment in which they have mitigated existing risks. They have well-established practices and the work force required to maintain the quality of energy supply, and have the capability to restore energy supply should it experience interruptions. These network capabilities and practices are, however, fit for a world with incremental and predictable change, and they will take time to adapt to a radically different and dynamic energy landscape and to cope with new types of network users. Indeed, these established practices or standards could be one of the key barriers to the transition to a new energy system that meets the demands of the future.

The new entrants, such as aggregators, energy service companies (ESCOs), and large players from other energy sectors, such as Shell from the oil and gas sector, are equipped to thrive in a market environment and to be competitive through investment in innovation and an openness to risk-taking. However, they often have limited knowledge, capability and skills for maintaining supply security or improving resilience. They are flexible and well placed to manage uncertainty, to support the system needs and to provide local energy supplies; but they do not yet have the capability, nor the incentive, to contribute to supply security or resilience.

Incumbents and new businesses have highly complementary skills, one operates in a regulated environment and the other in a market environment, this position should change as we progress down the pathway to decarbonisation. At the initial stage of the energy transition, care should be taken to

understand the respective strengths and limitations of these businesses, to limit their responsibilities, and to identify conditions where competition could be introduced to the traditionally regulated network operation or network investment, with network operators competing with third parties to provide security in addition to improving efficiency, and enabling whole-system benefits.

12. In what ways could the existing arrangements drive more innovation and competition?

If third parties were to propose and lead innovation projects, they may not have practical knowledge, skills and economies of scale to deliver innovation projects to a high standard. They could also potentially underestimate the complexity of the system, thus could expose consumers to undue risks. However, their innovation could be highly original and consider whole-system solutions.

DNOs are territorial while third parties are not constrained by geographical locations and achieve economy of scale by operating in multiple regions. It is still too early to say if it is best for DNOs to fulfil the role of distribution system operator (DSO) or whether this should be fulfilled by third parties. If it is the former, then it makes sense for DNOs to continue to take the lead in innovation but widen the scope of license obligations, for example, to provide alternative low carbon energy supplies. If it is the latter, then DNOs could still focus on providing network capacity, and the third parties could take the lead on innovation with the support of DNOs' operational personnel to develop highly innovative and practical whole-system solutions.

13. To what extent should we set (and incentivise performance against) baseline totex allowances for activities where flexible solutions could be provided?

The rationale for setting and incentivising performance against baseline totex allowances for activities where flexible solutions could be provided is open to question. When measured in terms of cost, performance and risks, there may not be a clear winner between network solutions and flexible solutions, depending on the weighting placed on each category. There are still significant uncertainties over the reliability of third parties' services in the short and long-run, making it a risky proposition for scenarios where the need for network capacity is strong.

14. Should we instead set allowances based on the costs revealed through the flexibility tendering process? How might this work?

The Government's Contracts for Difference (CfD) scheme could be adapted for setting allowances, balancing between DNOs' forecast in network capacity/capacity cost and the cost revealed through the flexibility tendering process. DNOs could be rewarded if their forecasted costs is lower than tendering price, and penalised for significantly higher forecasted cost than tendering prices.

23. We welcome thoughts on how to ensure that we continue to protect the interests of vulnerable consumers, particularly in light of the energy system transition.

Our energy system is transforming towards a smart and flexible future. The impact of the transition, however, is likely to be distributed unevenly across different types of end-users [1]. This is likely to hit the poorest consumers hardest because they generally have limited disposable capital to engage in the flexibility market and are thus less likely to be able to take advantage of the benefits it offers. With the distributional effect of flexibility, vulnerability is likely to be very different from today. This may widen the gap between social groups and in turn slow the progress towards decarbonisation as public support fades [2].

The first step in ensuring that we protect the interests of vulnerable consumers is to identify flexibility-related vulnerability in future energy systems. This could be a challenging task considering the uncertainties in future system transitions and future customers' flexibility.

The next step is then to develop technical, commercial and political interventions to mitigate the risk of negative impacts and to safeguard potentially vulnerable customers through the energy system transition. Data-driven vulnerability detection and mitigation could be a strategic goal for data investment and considered at the survey design and data collection stage. The concept of “goal-oriented data investment” will be explained in Q16.

15. To what degree should DNOs modernise their handling practices to adhere to data best practice, and therefore (among other things) provide available, transparent, and interoperable data about their networks? What measures will be needed to ensure data remains secure?

Data best practice will enable public access to network data and thus enable national and international researchers to fully extract knowledge from the data and transfer back to DNOs. Both the industry and the public have benefited significantly from data sharing. For example, as early as 2010, Western Power Distribution (WPD) and the University of Bath collaborated on the first major data-driven Low Carbon Networks Fund project, LV Network Template. The sharing of data from nearly 1000 sub-stations has enabled more than 20 publications in internationally renowned journals [3-6]. WPD used the knowledge generated to undertake a voltage reduction strategy, which saved customers in South Wales £9 million in the first year of the trial and reduced the CO₂ emission in this area by 40,000 tons.

16. How should we structure RIIO-ED2 to encourage metadata to be made available, and for data to be presumed open? How should we measure DNO performance in this area, and on what basis should funding be set to deliver relevant outcomes?

It is crucial that goal-oriented decisions on data investment are made at the early stage of a project, and with knowledge and strategic inputs from the public. The public engagement will increase the long-term value of the data and the goal-oriented data investment will enable Ofgem to measure the performance of DNOs.

The challenge here is the time gap and knowledge gap between the data investor (DNOs) and data harvesters (e.g. academic researchers and software developers). The cost of data mostly occurs from the *ex-ante* investment made by DNOs such as the installation of monitoring equipment, while the value of data is often captured *ex-post* by data harvesters. The harvest process usually lasts much longer than the lifetime of a project.

Therefore, it is critical for DNOs to consider critical *ex-ante* questions like: What data should be monitored? What is the best sample size, monitoring length and resolution? The answers require knowledge and strategic insights from the data harvesters. For example, the Commission for Energy Regulation (CER) in Ireland ran Smart Metering Electricity Customer Behaviour Trials from 2007 to 2010 [7]. The data generated from this project have become possibly the most valuable smart metering datasets in the world, and are the basis of numerous high impact research reports/papers published every year [8-15]. A key to this success was the early-stage engagement with the data harvesters, e.g. academics (University College Dublin), software development platform (Github) and data sharing centre (Irish Social Science Data Archive).

It is crucial that data is open and available, and that investment in, and the use of, data is goal-oriented.

17. Do you agree with the themes we plan to include in our guidance on data best practice?

We fully agree that Ofgem should adopt the principle of Digitalisation of the Energy System in the consumers’ interest. Guidance on data best practice should explain and demonstrate the importance of investment in data, and the opportunities for utilising this data for driving forward the energy system transition, unlocking the benefits of competition, and enabling innovative approaches to

network solutions. The value of data should be linked clearly with pre-defined goals agreed by consumers and stakeholders.

We question whether DNOs are the best parties to manage this data, or the third parties with extensive expertise in data management would offer a more cost-effective approach, providing a service for storing and processing data for all DNOs.

References

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