S&C ELECTRIC COMPANY
Excellence Through Innovation

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

Marcia Poletti
Associate Partner, Strategy
Networks Division
Ofgem
London
SW1P 3GE

4 September 2017

Dear Marcia,

S&C Electric Company response to Ofgem's Open Letter on the RIIO-2 framework

S&C Electric Company welcomes the opportunity to provide a response to your open letter on the RIIO-2 Framework.

S&C Electric Company has been supporting the operation of electricity utilities in the UK for over 60 years, while S&C Electric Company in the USA has been supporting the delivery of secure electricity systems for over 100 years. S&C Electric Company not only supports "wires and poles" activities but has delivered over 8 GW wind and over 1 GW of solar globally. S&C Electric Company has been actively engaged in deploying Battery Energy Storage Systems since 2006, providing a full range of services and using a range of battery technologies. It currently has 76 MW/189 MWh in operation, including the UK Power Network's 6 MW/ 10 MWh battery that provides local peak load support and frequency services to National Grid, the GB System Operator.

As Ofgem has highlighted in its open letter on the RIIO-2 framework, the energy system is currently going through a period of extensive change, with demand having fallen, over 50% of renewable capacity now connected to the distribution networks and the costs for new technology including storage, solar and wind quickly falling. These changes will continue with further rebalancing of both supply and demand as greater volumes of DG are connected, there is a shift towards electric vehicles and electrification of heat and the DNO transition towards DSO accelerates. In its Future Energy Scenarios, National Grid estimates that up to 60% of total generation capacity could be connected to the distribution networks by 2050.[1] In this context, it is welcome that Ofgem is consulting early on the development of the RIIO-2 framework and considering issues such as how transmission and distribution incentives should be harmonized to achieve appropriate whole system solutions and how existing outputs and incentives may need to be refined or additional outputs created to reflect the changing nature of the energy system.

While we address many of the broader questions as part of this response, drawing on our industry experience including my role at Ofgem on the last round of RIIO price control reviews, we are particularly focusing on issues of reliability outputs and incentives and the development of outputs and incentives supporting efficient use of flexibility resources. These are areas where our solutions for distribution automation, energy storage and voltage control are particularly relevant.

[1] "Future Energy Scenarios in 5", National Grid, July 2017, http://fes.nationalgrid.com/media/1245/fes-in-5-for-web.pdf

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

We would be keen to take part in forthcoming workshops and relevant working groups on the development of the RIIO-2 framework. We are particularly interested in the following working groups:

- Responding to the wider changes in how networks are used; and
- Efficient delivery solutions and innovation.

The remainder of our response focuses on the specific answers to Ofgem's consultation questions and our justification for the inclusion of new reliability incentives on short interruptions. If you would like to discuss the contents of this letter in more detail, please contact me on 07887 298393.

Yours sincerely,

C. Watts.

Chris Watts
Regulatory Affairs Director, EMEA

S&C ELECTRIC COMPANY
Excellence Through Innovation

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

Our response to Ofgem consultation questions

1. Do you agree with our overarching objective for RIIO-2 and how we propose to achieve it?

We agree with the broad nature of the objective, but we are surprised that there is no longer specific reference to the transition to a low carbon economy, perhaps together with affordability and security of supply. This contrasts with the objective set out in Ofgem's Strategy for regulating the future energy system which specifically emphasizes these elements.

2. How can we strengthen the consumer voice (primarily end-consumers), in the development of business plans and price control decisions?

We agree that it is important to strengthen consumer and stakeholder voices in the development of price controls and, as part of this, there is a need to consider how different categories of consumer/connectee are appropriately represented and addressed in the regulatory framework.

The rapid growth of the digital economy and distributed generation means that consumers/connectees are more differentiated than ever before with DG connectees, different scales of I&C and domestic connectees with their own generation and consumers that are demand only. Clearly there will be trade-offs here between different and sometimes opposing stakeholder views, but It is important that consumers/connectees and other stakeholders are engaged from the outset so that they play a key role in influencing the output and incentives framework and companies' business plans.

For the electricity distribution and transmission networks, it is important that the views of providers of flexibility, DG and non-domestic consumers are adequately reflected. This may mean more elements to the broad measure of customer satisfaction and changes to the way other output incentives, such as the reliability incentives, are designed.

3. How should we support network companies in maintaining engagement with consumers throughout the price control period?

See answer to question 2 above.

4. Does this structured approach to defining outputs provide the right level of clarity around delivery?

The approach of defining output categories, primary outputs and secondary deliverable is a good one and should continue to be applied for the RIIO-2 controls in refining existing outputs and adding new ones. These should be based on measurable outcomes wherever possible.

The "Network Output Measures" (NOMs) or "Network Asset Secondary Deliverables" as they have alternatively been called should ideally transition to being a Primary Output related to asset risk for RIIO-2. They are step forward in how asset replacement and asset refurbishment are addressed as part of price controls. They provide an evidence-based approach to what work is required and whether the outcomes from the associated investment programme have been met. They also provide tools for networks to reprioritize their investment plans as new information becomes available and underpin a large element of costs in all the network price controls. They will clearly continue to be refined

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

significantly in RIIO-1 onwards against actual data on failures and faults and associated expenditure information.

One key aspect that merits further thinking as part of RIIO-2 is setting a target profile for asset health, criticality and monetized risk for each network company over the new regulatory periods. The current mechanisms for these outputs are too focused on delivery at the end of the period rather than the appropriate management of asset risk over the whole period, which may lead to unintended incentives to defer expenditure within the price controls.

5. How can the outputs framework be improved, including the introduction of additional output categories for example around efficient system operation for distribution network companies?

There may need to be additional outputs and associated incentives around the efficiency of whole system costs. It would be worth considering whether it is feasible to have some joint incentives associated with system operation whereby the GBSO, TOs and DSO would share in outperformance or underperformance relative to suitable baselines. Currently there no mechanism for DNOs/DSOs to share in the wider system benefits enabled by smart operation of the distribution networks including appropriate use of distributed energy resources.

Further work is needed to identify what output measures could be used to measure and drive whole system efficiency such as whole system capacity, flexibility capacity etc. Some new requirements may be needed as part of the DSO transition such as DSOs carrying out well evidenced CBA analysis of expenditure options including smart alternatives such as energy storage, voltage and frequency support and demand side response. It may be appropriate for Ofgem to develop its existing CBA guidelines, as developed and applied in RIIO-GD1 and ED1, as part of a new common methodology for justifying investment expenditure.

The reliability incentives for electricity distribution should be reviewed and enhanced to take account of the changing energy system. This should include further financially incentivized outputs to take account of short interruptions and consideration of power quality. This is discussed further in our answers to question 6 below and our appendix on short interruptions.

6. Did the outputs target the right behaviors?

In most cases, they target the right behaviors for RIIO-1, but this does not mean that it is appropriate for them to remain the same for RIIO-2. The changing energy system will mean that existing outputs and incentives need to be refined and new outputs and associated financial incentives may be needed.

For example, with the much greater penetration of DG on the distribution networks and the accelerating move to a digital economy, more sensitive equipment is being connected to the distribution network via power electronics such as inverters for DG, smart sensors, alarms and automated production lines. This means that the impact of both short and longer duration interruptions and power quality is greater for a broader range of customers and connectees.

We consider that Ofgem should carry out a broad review of the interruption incentive scheme for RIIO-ED1 as it has now been in place for 15 years and there are wider issues of reliability and power quality that should be reflected. We consider that there is a strong case for introducing short interruptions as

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

a financially incentivized output measure as part of the RIIO-2 framework for electricity distribution. We set out the case for this in the appendix to this letter. We also consider it may no longer be appropriate to give all customers/connectees the same weight in the interruption incentive scheme regardless of whether they are generation or demand connectees or the size of their connection or consumption. This issue has been recognized in work to-date on the review of Engineering Recommendation P2/6.

7. How can we address areas of expenditure for which a clear output is difficult to define?

There is scope for more outputs to be defined for other areas of direct expenditure. For example, the NOMs for electricity distribution currently only cover a proportion of network assets. It would be worthwhile expanding this to cover all network assets to that the DNOs can trade-off and optimize the level of risk in a comprehensive manner.

A similar approach to asset health, criticality and risk could be applied to cover maintenance and tree cutting in electricity distribution. Unless appropriate maintenance is undertaken, the health of an asset will in some cases deteriorate faster than the typical degradation curves, which assume regular maintenance will be undertaken. The risk of vegetation encroaching or causing faults to nearby overhead lines could be added to models which currently capture condition based risk for such assets. Modelling of flood risk and other high impact low probability events could also be more effectively integrated with the NOMs measures.

Closely associated indirects could potentially be mapped onto outputs associated with direct activities. For business support costs and non-op capex, developing appropriate outputs is more difficult as they are more of an overhead or enabling expenditure. However, as insourcing/outsourcing decisions will affect the proportion of such costs that fall into directs and indirects, it is still important to consider how such costs relate to the delivery of outputs to enable an equitable assessment of expenditure.

As discussed in the appendix to this response, there are now smart devices which can capture measured improvements in short interruptions, another element of reliability, which is linked with investment in this area.

8. Were the output targets and associated financial incentives set for RIIO-1 appropriate, reflecting what consumers value and are willing to pay for?

We consider that the financial output incentives were generally set appropriately but there needs to be improvements in the way target setting is carried out.

Marginal incentives for outputs should reflect consumers' willingness to pay for improvements or willingness to accept a deterioration in performance. However, some discretion will always need to be used in determining the value of such incentives given that willingness to pay may vary substantially depending on the context. For example, the willingness to pay for reliability improvement varies by type of consumer, generation and demand connectee, time of the day and year etc. The work done by the Lawrence Berkeley National Laboratory in the US on the cost of interruptions is one of the most highly regarded studies on the financial impact of interruptions in the US and would be worth consideration as part of work to update incentive rates. This is discussed further in the appendix to our response on short interruptions together with relevant references.

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

Setting appropriate targets for output based incentives is a significant challenge. There are opportunities for refinements in how this is done. For example, for the electricity distribution interruptions incentives there is scope for greater use of econometrics both at an aggregated and detailed level to forecast future CI and CML performance. It would be worth Ofgem looking in detail at how actual performance and targets have evolved since incentives were first introduced in April 2002 to reveal how companies have outperformed, the scope for further improvements and to inform future targets.

9. What changes in the RIIO framework would facilitate returns that are demonstrably good value for consumers?

Further research needs to be done in advance of the RIIO-2 price controls to look again at what areas different types of consumers/connectees consider to be important, how they value them and how this is likely to change during RIIO-2 given changes in the energy system. There would be benefits in improved techniques such as econometrics to determine the targets for incentives as highlighted above.

10. How can we minimise the scope for forecasting errors?

This covers a broad range of different topics such as demand forecasting, generation forecasting and forecasting of future expenditure. Careful consideration needs to be given to the underlying demand/supply scenarios for price controls as they underpin large elements of expenditure across multiple sectors.

In terms of expenditure forecasting, fast tracking, the IQI and Ofgem's benchmarking and cost assessment can all potentially act as a check on over-forecasting of expenditure. However, this is not an area where a one-size-fits-all approach is likely to be appropriate. Fast-tracking, the IQI and cost assessment arguably work better where there are more comparators of a similar scale such as for electricity and gas distribution. Alternative approaches are likely to be needed for transmission which place more weight on the cost assessment of companies' business plans and mean that new assessment techniques may be needed. Reference network type approaches and, international unit cost modelling are worth considering in addition to detailed scrutiny of forecasts.

11. What constitutes a fair return for a regulated monopoly network company, and how can we ensure that returns remain legitimate in the eyes of stakeholders?

Not applicable.

12. What factors do you think are relevant for assessing and setting the cost of capital so it properly reflects the risks faced by companies?

Not applicable.

13. Can we improve our methods for the indexation of the costs of debt and equity?

Not applicable.

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

14. Are there specific amendments to any core aspects of financeability that we should be considering in light of performance during RIIO-1 and the change in the financial environment?

Not applicable.

15. Should we consider moving to CPIH (or another inflation index) and how should we put into effect any change to ensure it is present value neutral for investors?

Not applicable.

16. Do you think there are sufficient benefits in aligning the electricity price controls to off-set the disadvantages we have outlined?

We consider that there would be significant benefits in aligning the price controls for electricity distribution and transmission given the need to ensure that there are appropriate outputs for both sectors that relate to system flexibility and more aligned incentives that drive whole system efficiency. Work on these should be done in an integrated way for both sets of reviews.

Given the need for whole system flexibility and efficiency, it may be appropriate to have some common incentives on managing constraints. It will also be important for generation and demand scenarios to be developed in an integrated manner that uses the best information from both transmission and distribution companies and their stakeholders.

It is worth noting that the Information Quality Incentive (IQI), as currently set up, will result in different totex incentives strengths for different network operators. This may not be appropriate going forwards, given the importance of whole system solutions and increased coordination, where distribution solutions may resolve transmission constraints and vice-versa.

If the price controls are aligned, from a practical perspective it will be important that there are sufficient resources for the Ofgem teams to carry out both reviews alongside each other.

17. Are there any other realignment options we should consider?

See answer to question 16.

18. What amendments to the RIIO framework, if any, should we consider in supporting companies to make full use of smart alternatives to traditional network investment?

A lot of useful work was done across the Joint Regulators Network (now UKRN), GD1 and ED1 in developing guidance and a framework for assessing CBAs. Similar work was also done by ENTSO-E and the Florence School of Regulation. This should be enhanced further into a more formal Ofgem guidance for CBAs and could be part of a common methodology for justifying investment expenditure that gives appropriate consideration to all realistic options including smart alternatives. It would also be worthwhile continuing to develop the thinking on real options analysis which was done for RIIO-GD1 and which could be brought more fully into the CBA framework. Real option value is likely to be

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

of increasing importance to investment decisions given the uncertainty associated with load-related expenditure and rapid changes to electricity systems.

However, the use of CBA analysis needs to be targeted and proportional. It is likely to be most appropriately used in areas such as making decisions between traditional reinforcement and smart solutions, deciding appropriate levels of investment to manage asset risk, optimizing reliability and where whole-life costs may justify higher initial expenditure.

19. Given the uncertainty around demand for network services, how much of an issue might asset stranding be and how should this risk be dealt with?

There are likely to be growing issues of asset stranding given the changing nature of the energy system and underlying generation and demand. This underlines the real option value associated with distributed energy resources such as electricity storage, voltage support and demand side response, which can allow investment in long-lived assets such as network reinforcement to be deferred until better information is available. The DSOs should be optimizing between all available solutions using appropriate CBA analysis and making least regrets investments.

In certain cases, there may be a need for a DSO to make riskier investment choices such as investment ahead of need for the efficient development of the networks. In such limited cases, it may be appropriate to have a mechanism that rewards them with an increased return if the capacity is used, and a reduced return if it becomes stranded. This would place the incentives on DNOs to minimize the risk of asset stranding.

20. How do we need to adapt the RIIO framework, and the uncertainty mechanisms to deal with this uncertainty?

The development of uncertainty mechanisms needs to be prioritized in RIIO-2 and therefore should be started early in the process. For example, the parameters or unit costs used in load-related volume drivers may have a major impact on allowed revenue and need to be carefully considered to avoid giving network companies unintended penalties or windfall gains.

Given the uncertainty over input prices associated with Brexit and movements in exchange rates, it would be appropriate to revisit indexation of real input prices. Ofgem has already highlighted that a significant proportion of totex outperformance for both RIIO-GD1 and RIIO-T1 is associated with the forecasts for real price effects which turned out much lower than expected. An indexation mechanism could ensure that both network companies and consumers are protected from windfall losses or gains.

21. Is an eight-year price control period with built-in uncertainty mechanisms still appropriate given the greater range of plausible future scenarios?

An 8-year price control period is compatible with certain elements being set for shorter periods. It is important to recognise that not all elements of the price controls will be equally uncertain. Many elements of price control expenditure such as asset replacement, refurbishment, network operating costs or indirect cost are likely to be relatively certain or not that variable with changes in demand and generation over RIIO-2. For example, asset replacement and refurbishment costs are based on condition rather than loading and could be forecast out effectively for longer periods. By contrast,

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

future load-related expenditure is highly uncertain and therefore it would be reasonable for baselines for such expenditure to be set for shorter periods or equivalently have appropriate uncertainty mechanisms around longer-term forecasts such as through a specific mid-period review, volume drivers or windows for triggering reopener assessments. However, a 5-year price control may be a practical compromise as it would allow both TO and DNO/DSO price control periods to be aligned with a longer set of GBSO incentives. This is discussed further in our answer to question 36.

22. What improvements should be made to the assessment of business plans?

Careful consideration needs to be given to how to trade-off different elements of the network companies' business plan submissions in forming an overall assessment. For example, the forecast return on equity, forecast expenditure, output targets proposed, stakeholder engagement plans and innovation strategies. The use of Return on Regulatory Equity (RORE) measures or monetising elements of plans can be helpful to address some of this.

It is important for the cost assessment models to be developed sufficiently ahead of the submission of the business plans allowing for appropriate scrutiny and discussions with the networks companies and other stakeholders. Ideally Ofgem should have a view of allowed revenue before the business plans come in to enable immediate comparisons. This would help in identifying whether the plans are realistic and what elements of the plans need more detailed review. This allows the main discussions in the price review to focus on the key issues of why the costs differ from the benchmarks and where further justification is needed, rather than focusing on issues such as what combination of cost drivers is better. Clearly the models will need to continue to be developed further post business plan submission as more information becomes available, but early development enhances the independence of the modelling.

It would be worthwhile carrying out early work developing and enhancing the totex drivers for distribution controls including the role that output measures or secondary deliverables can play in such analysis. There needs to be an understanding of totex-output trade-offs so these can be taken account in benchmarking either explicitly through cost drivers or through normalization of costs. For example, some DNOs may have already delivered high levels of asset risk reduction and further reductions may come at a higher marginal cost.

It will also be important to integrate output measures such as reliability and NOMs more effectively into the more disaggregated cost assessment analysis. Ideally NOMs information together with CBAs can be used to determine appropriate profiles of asset risk and associated asset replacement and refurbishment volumes, while unit cost analysis can then be overlaid to determine efficient expenditure.

Company specific factors are another element that can be addressed in advance giving other network companies and stakeholders the opportunity to review and comment on network proposals before the main business plans are submitted.

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

23. Should we consider companies' historic performance against their business plans?

This is an essential part of RIIO-2 as it is necessary to know whether the outperformance represents genuine efficiencies which should factor into the modelling of the next round or under-delivery of outputs, in which case shareholders should bear the appropriate share of costs of "catching up". The cost assessment benchmarking should make effective use of historical data to take account of such efficiency improvements.

24. Should we determine the revenues an "efficient" network company requires before seeking information from the companies themselves?

There are both advantages and disadvantages to such an approach. On the one hand, this could potentially provide an initial challenge to companies to drive more efficient forecasts but on the other, if the Ofgem view is not set at an appropriate level, this could potential undermine fast tracking. The forecasts at RIIO-ED1 revealed significant further costs reductions at RIIO-ED1, which meant that the Ofgem benchmarked costs for the DNOs were significantly lower than if the models had relied on historical costs alone.

The development of an early view on the appropriate revenue requirements becomes more difficult where elements of costs are changing or there may be additional one-off costs. This may be the case with the DSO transition and development of markets for flexibility services. It would also be necessary for Ofgem to be clear on the output assumptions being made as otherwise differences between the Ofgem and DNO views of efficient costs may relate to output delivery.

In line with question 22 above, it is important to develop the cost assessment models early so Ofgem can do comparisons as soon as the business plans come in, but whether Ofgem should go a step further and publish its own assessment before the business plans are submitted, is a finely balanced issue.

25. What has an eight-year price control period allowed network companies to accomplish or plan for that would not have occurred under a shorter price control period?

There are a range of benefits from an 8-year price control period. One of the reasons that S&C Electric Company has placed growing focus on the UK market is the greater stability and certainty that comes from an 8-year price control. After an initial period of up to 2 years as new plans are implemented and new procurement and contractual arrangements are put in place, it allows companies to plan for 6 more years as business as usual. By contrast in a 5-year price control period, there would only be 3 more years which could be planned for as business as usual.

The benefits from a longer price control period in terms of DNOs working more effectively with their supply chains have been seen in the degree of totex efficiencies already seen over the RIIO-1 period to date.

However, as discussed in our answers to questions 21 and 36 the changing energy system and focus on whole system flexibility and efficiency may mean that a 5-year price control is a pragmatic compromise that can facilitate alignment of controls between the DNOs/DSOs, TOs and GBSO.

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

26. How well has the IQI and efficiency incentive worked in revealing efficient costs through the business plan process and encouraging efficiency throughout the price control period?

This is not a one-size fits all answer. We consider that the IQI and fast-tracking have worked more effectively in electricity distribution than either gas distribution or transmission in revealing efficient forecasts. This is likely to be due to several factors including additional time that was used to refine the cost benchmarking models ahead of RIIO-ED1, a longer lead-time for DNOs to prepare their business plan submissions and a greater number of comparators, particularly relative to tranmisssion. In transmission, there is a risk that the IQI forecasting incentive unwinds because Ofgem's view is largely based on a review of the to the companies' forecasts.

27. What alternative approaches could we consider to encourage companies to give us high quality information that minimises the damage from their information advantage?

Several issues are worth considering in developing the IQI or alternatives approaches to ensuring high quality information going forwards

- **Moving the mechanism up a level** - should the mechanism be moved up a level to consider total revenue forecasts and revenue sharing so that there is an increased focus is on companies providing a robust overall package? Totex and financeability costs all contribute to the total level of revenue and there may be benefits in having cost sharing for such a broader definition of costs.
- **Behavioural economics and risk aversion -** network companies may choose to increase their forecasts under the IQI to secure insurance against uncertainty in terms of lower efficiency incentive rates. If this is the case, the incentives need to be refined to still ensure that companies reveal efficient forecasts (incentive compatibility).
- **Harmonising incentive rates** – it may be appropriate to harmonise incentive rates across electricity network price controls to facilitate coordination and whole system efficiency or at least make sure they are within a reasonable range. (See answer to 16)
- **The IQI works based on spot forecasts** - Does this make sense given the extent of uncertainty on some elements of costs such as load-related expenditure? Would it be more appropriate for there to be forecast ranges for expenditure, with some stepping of totex incentive rates if companies fall outside their forecast range to ensure that both companies and consumers are better protected? For example, lower rates outside a defined band as it provides protection to companies if Ofgem’s view of costs turns out to be unrealistically low or to customers if DNOs have significantly inflated their forecasts.
- **How should outputs be factored in? -** There will a relationship between forecasts outputs and expenditure but this hasn’t been explicitly captured in previous iterations of the incentives.
- **How do fast-track and the IQI relate to each other? –** There may need to be further consideration of the interactions between these incentives.

The totex incentives have worked very well in terms of revealing more efficient costs but we understand that there are concerns about the share of outperformance that goes to customers. Careful consideration should be given the optimal strength or range of strengths for the totex incentives and the drivers that underpin this. We would not wish to see much weaker incentives

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

undermining the DNOs' incentive to innovate and adopt smart solutions at a time when transformative changes are happening in the industry.

28. What impact has the innovation stimulus had on driving innovation and changing the innovation culture?

We consider the innovation initiatives have had an extremely positive effect on the industry and have laid the foundation for a large range of elements of the DSO transition but we sense but sense that DNOs are now starting to suffer from innovation fatigue. We consider that there should be greater focus on enabling a broader range of third-parties to participate in the schemes and a focus on network companies adopting each other's innovations.

29. Have the incentives inherent in the RIIO model encouraged network companies to be more innovative and what should we consider further?

It has fostered a step change in innovation culture but it is important to see this translating to business as usual. It is important to see more innovation translating to business as usual than today as we've seen relatively low adoption to date.

30. Do you agree that the scope of competition should be expanded in RIIO-2? What further role can competition play?

There should be scope for further large transmission projects such as North West Coast Connections to go out to competition but there may be a wide range of opportunities at an electricity distribution level in RIIO-2, particularly relating to the development of flexibility markets.

31. Which elements add the most complexity and how do you think that these and the broader RIIO framework could be simplified?

Complexity is not necessarily inappropriate if it means putting in place the right incentives on network companies and right protection for consumers/connectees. For example, while measures such as the Network Output Measures may add to complexity, they were one of the key developments during the DPCR5 and RIIO-1 price controls which complement the effectiveness of the totex incentives. Having an accurate means of understanding and assessing the condition of companies' assets should allow for much more robust decisions on asset replacement and refurbishment expenditure and expose more fundamental questions such as what is the appropriate level of asset risk or asset-risk/revenue trade-off.

Uncertainty mechanisms can potentially add a lot of complexity to price controls so it is important to keep these down to a manageable number and ensure that they focus on key priority areas.

32. What improvements could be made to the format and presentation of the business plans?

The RIIO-1 business plans were a step change improvement in terms of levels of information available and the quality of plans, particularly for the DNOs and we would wish to see this trend continue into RIIO-2, particularly in the context of a changing energy system. However, it would help stakeholders such as ourselves if there were some more commonality in how information is provided. The changing

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

patterns of both generation and demand should have a more prominent role than in the plans for the RIIO-1 controls for transmission and electricity distribution.

33. Should the plans be revised at any stage during the price control, for example annually?

Ideally as part of their annual RIIO Business Plan Commitment reports, networks should discuss how these plans have been updated and refined during the period, explaining the key changes in their plans, how priorities have been revised and how these changes affect the delivery of outputs.

34. Should we retain fast tracking and if so, for which sectors?

There seems to be a much stronger case for fast tracking in the distribution sectors as there are sufficient reasonable similar comparators. In RIIO-ED1, the competition for fast-tracking meant that the forecasts revealed challenging reductions in costs. However, if would be worth reconsidering the appropriate size of the fast-tracking rewards and how they relate to the benefits from fast tracking.

35. Do we collect the right information in the right format and are there better ways to monitor the performance of companies?

We understand that Ofgem has done a lot of work to refine the RIGs data that is collected, particularly in electricity distribution, including making sure it is used in the price control process and for monitoring their performance against the price control determinations. However, more of the information should be made publicly available as this would give stakeholders such as ourselves a greater opportunity to participate in the price control process and subsequent monitoring. While we understand detailed releasing project level information could interfere with tendering processes, there is a lot more information that could be made available that isn't subject to the same confidentiality concerns.

36. What are your views on how the changing role of the electricity SO should be factored into the RIIO framework, including whether the electricity SO should have a separate price control?

The GB SO, TOs and DSOs will play a key role in the changing energy system. It is important that there is sufficient consistency between the controls to enable a whole system approach. The relatively short term nature of the current SO incentives relative to the 8-year length of TO and DNO controls seems to play against that and consideration should be giving to lengthening the SO controls.

We consider that there is value in having a separate SO control and this fits well with the direction of travel on the regulatory arrangements towards a more independent SO. A 5-year price control period may provide a sensible compromise which would enable the GBSO, DNO/DSO and TO controls to be aligned.

37. Do you agree with our broad stakeholder engagement approach set out above?

In broad terms this seems sensible but as highlighted in the answer to previous questions, there needs to be more focus on the different types of consumers/connectees.

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

Other comments

We consider there is a strong case for the introduction of a financially incentivized output measure on short interruptions, ideally as part of a potential RIIO-ED1 mid-period review, but if this is not the case this should be a part of the RIIO-2 framework for electricity distribution as part of a wider review of the interruption incentive scheme looking at the treatment of different categories of customers and considering new metrics for power quality such as voltage variations. The appendix to this response sets out our case for the introduction of a financially incentivized output measure for short interruptions, which we also included as part of our response to the Ofgem open letter on a potential RIIO-ED1 mid-period review.

While the Ofgem open-letter asks a broad range of relevant questions relating to the RIIO-2 framework, there is a need for Ofgem to prioritize the issues that require further development. It would worth identifying a smaller number of key areas for refinements and enhancement that deliver the most value in RIIO-2. These are likely to include further developments to the forecasting and totex incentives, financing costs, cost assessment and elements of the outputs and incentives framework that address the changing energy system including the reliability incentives.

It’s worth highlighting the need for Ofgem to devote sufficient resources to start work on the cost assessment toolkit early together with work on the high-level strategy framework. From experience, it takes at least 2 years to develop, refine and audit the models and new tools are needed for transmission cost assessment.

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

Appendix 1 - Case for the introduction of a financially incentivized output measure on short interruptions

Introduction

We consider that there is a need for an additional financially incentivized output measure relating to short interruptions, which is justified by the changing nature of the energy system and the needs of both distribution generation connectees and both larger and smaller consumers in an increasingly digitalized economy. We recommend that this is introduced as part of a mid-period review for RIIO-ED1, but if not, consideration is given to including this as part of a wider review of the interruption incentive scheme for RIIO-ED2.

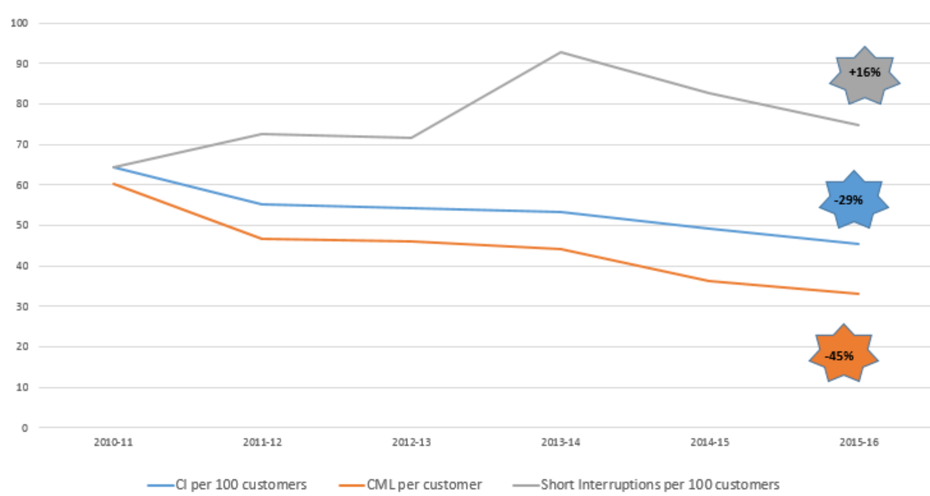
Interruption Incentives and Short Interruptions

The Interruptions Incentive Scheme was first introduced by Ofgem in April 2002 against a background of large centralized generation feeding through the transmission and distribution networks to inflexible demand at the base of the system. The incentive scheme gives equal weighting to all users of the networks and it focuses on sustained interruptions which last for 3 minutes or longer.

The form of these reliability incentives has remained broadly the same since then although there have been refinements in the rules defining the measurement of interruptions, the treatment of planned interruptions, and exceptional events. The targets, incentive rates and caps and collars on the incentives have been reset with each successive price control.

The incentives have worked very successfully in terms of driving major improvements in both CI and CMLs across all the DNOs. These improvements have been achieved through a range of approaches such as more effective deployment of field crews, improved condition-based asset replacement and refurbishment, automated switching, reclosing and using auto-sectionalizers to manage transient faults on tee or spur lines.

The chart below highlights the GB trends in CI and CML and Short Interruptions since 2010-11.



*The graph is based on Ofgem data excluding SSEN as data was not available for them the full period for short interruptions

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

There has been a vast improvement in sustained outage performance from 2010-11 to 2015-16 - a 29% reduction in CI and a 45% reduction CML over this period. However, there's something that has been missed here, which is not well reported. There has been a corresponding increase in short interruptions. The reason for this is that there are no outputs or financial incentives associated with short interruption. Reported short interruptions have increased by 16%. However, the real increase in short interruptions may be significantly larger as there are questions over the robustness of the short interruptions data, as common recording and reporting practices haven't developed in the same way as for CI and CML. There are also large regional variations in the data including much higher levels of short interruptions than average in the north of Scotland, South Wales and southwest England.

The strategies being used to manage CI and CML are giving rise to another problem in the form of short interruptions. Approximately 70 to 80% of faults affecting overhead lines are transient in nature. A key part of the way in which CI and CML have been tackled for transient faults is to replace fuses on tee or spur lines with auto-sectionalizers. This meets the objectives of improving reliability in terms of longer duration interruptions because you no longer have transient faults blowing fuses which requires the line crews to go to the field searching for a problem that is no longer there. However, when you take fuses out and use sectionalizers together with up-line breakers or reclosers, short interruptions increase significantly, because all customers on the main feeders are now affected. Such technologies worked well in the conventional energy system, but aren't well suited to the modern grid.

Growth in DG

The current design of the Interruption Incentive Scheme didn't anticipate some of the dramatic changes that are underway in the energy sector and which will continue to evolve quickly.

As highlighted in Ofgem's June open letter on the RIIO-2 framework, over the past decade the share of electricity generation from renewable sources has increased dramatically as the costs of new technology (including storage, solar and wind power) have fallen at rapid rates. Over 50% of total renewable electricity generation capacity (and 34% of total capacity) is now connected to the local distribution networks. Most this is likely to be connected to the overhead network, which will typically experience higher fault rates than the underground network. In its 2017 Future Energy Scenarios, National Grid has forecast that distributed generation could increase to up to 60% of total generation capacity by 2050.[2]

Short interruptions have a major impact when large amounts of DG are connected to distribution feeders as they will knock the DG offline. Generation connections have a direct financial loss associated with such outages. Further, when all the DG is knocked offline on a feeder, typically they are off for 5 minutes or more before they can restart. For this approximately 5-minute window, the DNO needs to fully support power to that feeder, which previously had a lower apparent load because the DG was offsetting some demand. This means the DNO still needs to provide capacity for peak demand with no DG support, even though that capacity is only called on for minutes at a time, which is in clearly inefficient.

[2] "Future Energy Scenarios in 5", National Grid, July 2017, http://fes.nationalgrid.com/media/1245/fes-in-5-for-web.pdf

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

The tolerance for such short interruptions as increasing volumes of DG penetrate the distribution feeders will become less and less over time.

At the same time the requirements of end consumers have changed with a move to an increasingly digitalized economy. There is an increasing proliferation of electronics and power electronic devices that are sensitive to short interruptions and power quality issues. Factories make increasing use of human machine interfaces, smart sensors and alarms which would all be affected.

Evidence on the impact of short interruptions on consumers

Short interruptions, are causing frustration and increasing costs for today's users of sensitive digital technology. Domestic customers are growing irritated, for example, at having to reset clocks and security systems more frequently. Retail businesses are equally upset at the disruption, costs, and lost sales that occur when customers leave rather than waiting for electronic cash registers to reboot. Manufacturing plants incur major costs due to lost production and idle workers while product assembly-line controls are reset. They may even have to scrap material and clean up messes caused when factory processes stop suddenly when the electricity "blinks."

In the United States, in what is regarded as the most comprehensive analysis there on power interruptions in 2004, the Lawrence Berkeley National Laboratory estimated the cost of interruptions at approximately $80 billion in 2004[3] and a recent update to this in 2016[4] showed the costs have risen to $110 billion. Over half of these costs relate to short interruptions, with most of this falling on I&C customers.

At a meeting one of our colleagues recently attended in the US, a hospital facility manager stood up noting they had 40 short interruptions in a single day. Those short interruptions were short enough not to trip on the standby generators but had an impact on other important hospital equipment.[5]

The issue of short interruptions has arisen in DNO stakeholder workshops. In its response to the Strategy Consultation for RIIO-ED1 UKPN[6] set out, "We are still getting strong feedback from some customer groups about the impact of short interruptions, with questions raised about the three-minute threshold. These customers may even be sensitive to transient interruptions or disturbances."

3 "Understanding the Cost of Power Interruptions to U.S. Electricity Consumers", K.H. LaCommare and J.H. Eto, Ernest Orlando Lawrence Berkeley National Laboratory, September 2004, https://emp.lbl.gov/sites/all/files/lbnl-55718.pdf

4 "The National Cost of Power Interruptions to Electricity Customers – An Early Peek at LBNL's 2016 Updated Estimate", Presentation to the IEEE, Distribution Reliability Working Group, July 19 2016, http://grouper.ieee.org/groups/td/dist/sd/doc/2016-09-02%20LBNL%202016%20Updated%20Estimate-Nat%20Cost%20of%20Pwr%20Interruptions%20to%20Elec%20Custs-Joe%20Eto.pdf

5 "A Growing Utility Dilemma: Momentary Power Outages", S&C Gridtalk article, May 9, 2017 https://www.sandc.com/en/gridtalk/2017/may/9/a-growing-utility-dilemma-momentary-power-outages/

6 UKPN response to the RIIO-ED1 strategy consultation, November 2012, https://www.ofgem.gov.uk/ofgem-publications/47138/ukpned1stratresponse.pdf

Brunel Park, Brunel Way,
Baglan Energy Park,
Neath.
United Kingdom.
SA11 2FP

Customers at a WPD stakeholder workshop raised the following issues.[7] A business customer representative said "resetting heating and security systems can be a real issue because 'even a short power cut can cause lots of knock-on issues for us and sometimes this is not recognized". An environmental representative was frustrated that the DNO did not count or record power cuts which are under 3 minutes long. They felt that they were irritating as they happen a lot. "Devices in homes are reset in times of a power cut even if it is a second long." A business customer representative was of the view any loss of power "is a big cost for business."

Financial incentives based on measured performance improvements

Ofgem has collected information on short interruptions per customer since 2001 but has not so far introduced financial incentives in this area. In its Strategy Decision for the RIIO-ED1 price control Ofgem noted "We also have concerns that the short interruption data is not sufficiently robust to support a financial incentive. We intend to revisit the reporting of this data during RIIO-ED1."

There are now smart devices such as single phase reclosers that can tell you accurately what has been happening to short and sustained interruption performance based on recorded event or trip logs. Instead of waiting around for years to collect data to try to establish a baseline, a financial incentive can be based on directly recorded improvements in performance. This would incentivize DNOs to deploy smart technologies in the right places to best improve reliability and customer service, immediately benefitting DG and end consumers as well as the overall security and reliability of the system. Such an incentive would encourage DNOs to optimize their networks considering both shorter and sustained interruptions.

There needn't be conflict between a short interruption incentive and incentives on CI and CML as the latest technologies can address both to the benefit of end consumers and DG.

Financial incentives on short interruptions have already been implemented in several countries internationally and it would be worthwhile Ofgem following these examples. For example, the Service Target Performance Incentive Scheme (STPIS) for 2016-20 for Powercor in Victoria, Australia includes financial incentives for the Momentary Annual Interruption Frequency Index (MAIFI) which specifies target levels of performance and short interruption incentive rates for urban, short rural and long rural networks. The CENS reliability in Norway applies to both short interruptions and sustained interruptions.

Ultimately strong financial incentives are needed on short interruptions to improve performance.

[7] WPD Stakeholder report for workshop in Exeter on 12th November 2012, Green Communiqué, https://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Our-future-business-plan/Supporting-Stakeholder-information/April-2013-stakeholder-workshop-report-Exeter.aspx