



Steve McMahon
Deputy Director – Onshore Networks, Price Control Setting
Ofgem

24 May 2022

Dear Steve,

Treatment of Short Interruptions in RIIO-ED2

Following on from previous discussions we've had regarding Ofgem's proposed reliability incentives for RIIO-ED2, I wanted to reach out to you to highlight key issues relating to short interruptions, which we consider are important to consider for Ofgem's RIIO-ED2 Draft Determinations. I'm also attaching an updated version of our more detailed appendix (which we shared previously with Akshay in 2020) discussing the importance of acting on short interruptions for RIIO-ED2. This includes updated information on the impact of short interruption incentives in Victoria (Australia), Italy, and the arrangements in place in Norway and Finland. It also highlights relevant new information from the CEG reports, the Ofgem Challenge Group report, Citizens Advice, and UKPN on this topic.

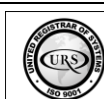
With the changing energy landscape and emerging electrification of transport and future electrification of heat, we consider that the reliability of distribution networks is growing in importance. Ofgem rightly recognised this in its RIIO-ED2 consultations. While over the period 2010 to 2019, DNOs have successfully reduced CI and CML by 32% and 42% respectively, short interruptions have increased significantly by 16%, a number which is certainly undercounted due to a lack of data. Short interruptions are becoming an increasingly important part of the overall interruption impact on customers and as highlighted by DNOs in the SRRWG, now form a significant part of customer complaints.

We welcome the useful discussions we've had to date with Ofgem to discuss short interruptions. We also welcome Ofgem's decision to introduce a guaranteed standard on multiple short interruptions as part of its Sector Specific Methodology Decision and its indication that financial incentives would be considered for RIIO-ED3. We note that the practicality of introducing such a standard is supported by UKPN proposing a standard on multiple short interruptions in its RIIO-ED2 business plan together with its proposed target for reducing short interruptions by 10% over RIIO-ED2. In addition, the ENWL and WPD CEG reports, the Ofgem Customer Challenge Group report, and the response by Citizens Advice to the business plans have all indicated that more could be done in this area.

With this in mind, it would be good to see further progress on the development of the guaranteed standard on multiple short interruptions in the RIIO-ED2 Draft Determinations.

In the longer-term for RIIO-3, we consider that there is a strong merit in introducing financial short interruption incentives, which can drive significant improvements in performance as we have seen in both Victoria (Australia) and Italy. These examples are discussed further in the appendix.

Given the importance of these issues, we would welcome the opportunity to discuss these points further. As previously indicated, we would also welcome the opportunity to join the SRRWG meetings to discuss this and other broader reliability issues with Ofgem, the DNOs, and other stakeholders as we feel we have significant value to add on these topics. To enable our ongoing research on short interruptions, we request the DNO data on CIs, CMLs and short interruptions for 2019-20 and 2020-21 so we can update our analysis to reflect this more recent information.





If you would like to discuss the contents of this letter in more detail, please contact me on 07887 298393 or Grant McEachran on 07824 797417.

Yours sincerely,

C. Watts

Chris Watts
Director - Regulatory Affairs



Appendix: Short interruption proposals and the energy system transition

In developing its thinking and methodology for RIIO-ED2, Ofgem has rightly recognised the key role that electricity distribution networks will have in enabling the transition to a smart, flexible, low cost and low-carbon energy sector. If full advantage is to be taken of the opportunities available, then reliable and flexible networks will be required to serve the evolving needs of distributed generation and other DERs as well as demand customers.

It is on this basis that reliability incentive arrangements for RIIO-ED2 should be enhanced to take account of these ongoing changes. A key part of this should be acting on short interruptions which stakeholders are already telling network companies are having significant impacts.

Impact of rapid change on electricity distribution networks

The Interruptions Incentive Scheme (IIS) was first introduced by Ofgem in April 2002 against a background of large, centralised generation feeding through the transmission and distribution networks to inflexible demand at the base of the system. The design of the IIS didn't anticipate some of the dramatic changes that are underway in the energy sector, and which will continue to evolve quickly. The main areas are summarised below.

Increasing proliferation of electronics and power electronic devices

There are a wide range of devices now used by residential and commercial customers that are sensitive to short interruptions and power quality issues. This impacts a wide range of stakeholders:

- Domestic customers are increasingly irritated at the loss of internet access and video streaming when their routers take several minutes to reset following a short interruption.
- Retail businesses are upset at the cost and lost sales while their equipment reboots.
- Factories make increasing use of digital interfaces, smart sensors and alarms which would all be affected by short interruptions and lead to lost production and waste.

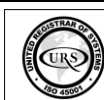
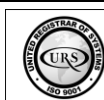
Research carried out in the US suggests that the average cost to a medium and large commercial and industrial customer for a single short interruption is over \$12,000 (£10,000).¹

Increase in distributed generation

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 30% of total capacity) is now connected to the local distribution networks. Most of this is likely to be connected to the overhead network, which will typically experience higher fault rates than the underground network.

Increasing volumes of distributed generation, means short interruptions are becoming less tolerable. Even a short interruption of 5 seconds will knock generation offline. Different types of generation have different recovery times. Some recover quickly, within a few minutes, and others may be subject to manual intervention of complex startup sequences, meaning they are offline for a longer period,

¹ Updated Value of Service Reliability Estimates for Electric Utility Customers in the United States, Ernest Orlando Lawrence Berkeley National Laboratory, January 2015.





even though the service is restored to the feeder and the load is fully present. Taken in scale (such as during a large storm with many scattered outages) this is bad news for the DNO/DSO as a growing portion of the generation is not available when it is most needed. This can aggregate from a small, local problem to a larger distribution network problem as generation availability is shifting on and off.

In summary, such short interruptions mean:

- Renewable generation is unable to export and will have a direct financial loss.
- Demand previously met by distributed generation now must be met through additional reserve from conventional generators.
- Distribution-network loading under the planning standard, must be managed in a way that does not take distributed generation into account.
- DERs such as energy storage and generation will be unable to provide services to the distribution network or other users when the network is unavailable.

Development in flexibility services and the transition to DSO

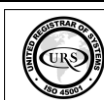
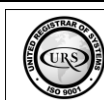
Over the past 5 years we have seen DNOs procure increasing volumes of flexibility services such as peak demand shaving from DERs through Constraint Management Zone tenders or similar approaches to defer the need for distribution reinforcement. All the DNOs have now committed to market testing significant reinforcement schemes against such alternative solutions. Ofgem and BEIS' Smart System and Flexibility Plan highlights benefits of a smarter, flexible energy system to be £17-40bn out to 2050.

Most flexibility resources will be connected to distribution feeders and therefore will depend on distribution system reliability to provide services when they are needed. Therefore, all outages including shorter duration interruptions matter. DERs cannot provide flexibility services to TSOs or DSOs or peer-to-peer services to other customers if the network is not available. Interruptions mean that such services are less reliable, and the full benefits of flexibility cannot be realised.

Implications of focus on CI and CML for the operation of the networks

Approximately 70 to 80% of faults affecting overhead lines are transient. A key part of the way in which such faults have been tackled has been to replace fuses on tee or spur lines with auto-sectionalisers. This improves 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 sectionalisers together with up-line breakers or reclosers, short interruptions increase significantly, because the auto-sectionalisers do not contain the fault to the tee or spur it occurs on. As a result, all customers on the main feeder are affected, meaning 100s or 1,000s of customers experience a disruption instead of just 10s of customers on the affected spur.

The implications of this are significant on the modern grid with large proportions of generation and other DERs connected to distribution feeders. Such interruptions trip off distributed generation for several minutes or longer. As noted above when taken at scale during a large event such as a storm, this can mean that a growing proportion of generation is not available when most needed. This loss of generation can cause further stability issues for the network. A loss of network availability will also mean that services cannot be provided on a peer-to-peer basis or to support distribution, transmission, or overall system operation.

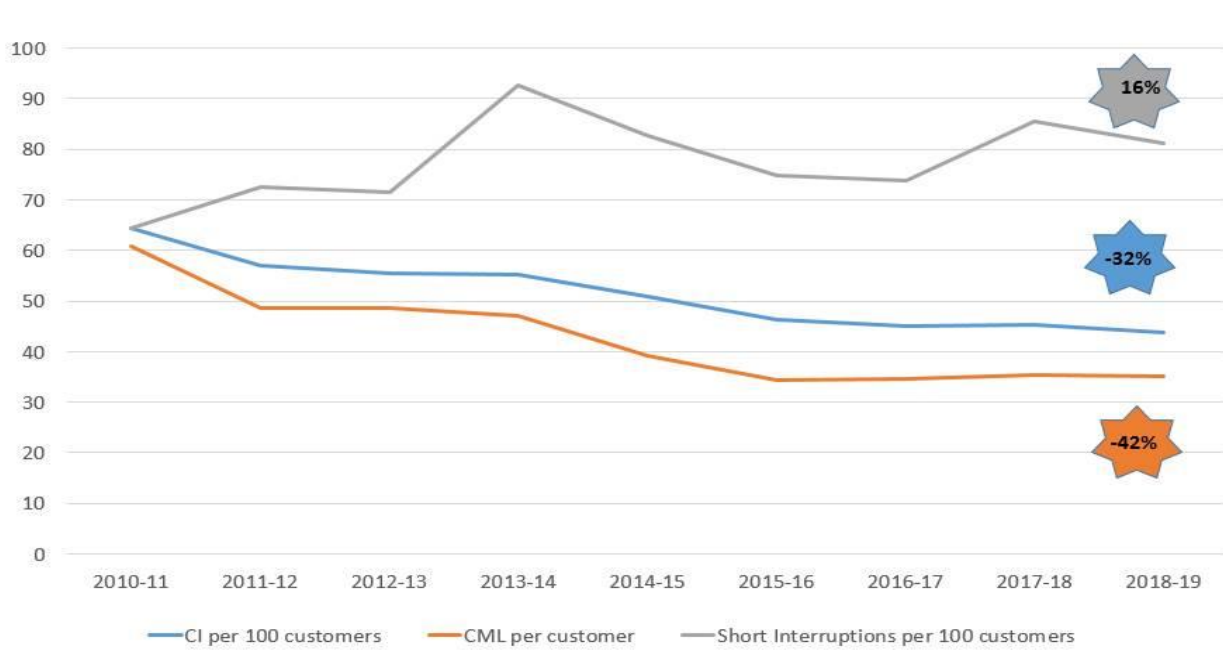




No longer enough just to address CI and CML

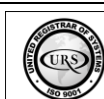
Ofgem's interruption incentives have worked well in driving major improvements in both CIs and CMLs across all the DNOs. This is emphasised in the chart below which highlights the trends in CI, CML and short Interruptions since 2010-11.

There has been a substantial improvement in sustained outage performance from 2010-11 to 2018-19 - a 32% reduction in CI and a 42% reduction CML over this period. At the same time, there has been a marked increase in short interruptions. By our analysis, reported short interruptions have increased by 16% over the same period. Further, as highlighted previously, the real increase in short interruptions may be significantly larger as there are outstanding questions over the robustness of the short interruptions data. This reflects the fact that common recording and reporting practices haven't developed in the same way as for CI and CML. Data for short interruptions has not yet been published beyond 2018-19.



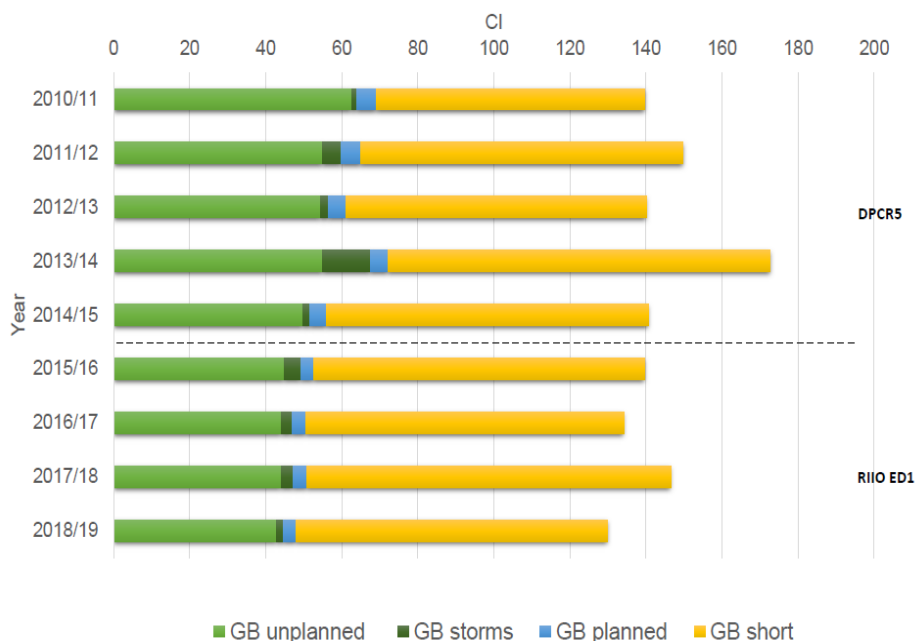
*The graph is based on Ofgem data excluding SSEN as data was not available for them the full period for short interruptions

This is reinforced by the following graph which was shared by Ofgem as part of the SRRWG. This is very helpful as it clearly demonstrates the extent to which short interruptions are a growing part of the overall reliability impact for customers.





Planned, unplanned, exceptional events and short Customer Interruptions – GB average



We consider that the reason for the distinction between the performance experienced for CI and CML and that of short interruptions is directly linked to the fact that there are currently no guaranteed standards or financial incentives associated with short interruptions.

Regulatory approaches can address short interruptions effectively

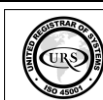
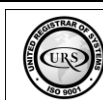
Financial incentives on short interruptions have already been successfully implemented in several countries. Some key examples are outlined below.

Victoria, Australia

In Australia, the regulatory arrangements set by the Australian Economic Regulator (AER) includes a specific financial incentive on service performance - the service target performance incentive scheme (STPIS). It includes incentives for the average duration a customer is without power (SAIDI) and the frequency of interruptions (SAIFI) per customer. However, since 2013, for the five distribution network service providers (DNSPs) in Victoria, it also includes financial incentives for the Momentary Annual Interruption Frequency Index (MAIFle)² which cover short interruptions. This specifies target levels of performance and short interruption incentive rates for each type of network – CBD, urban, short rural and long rural.

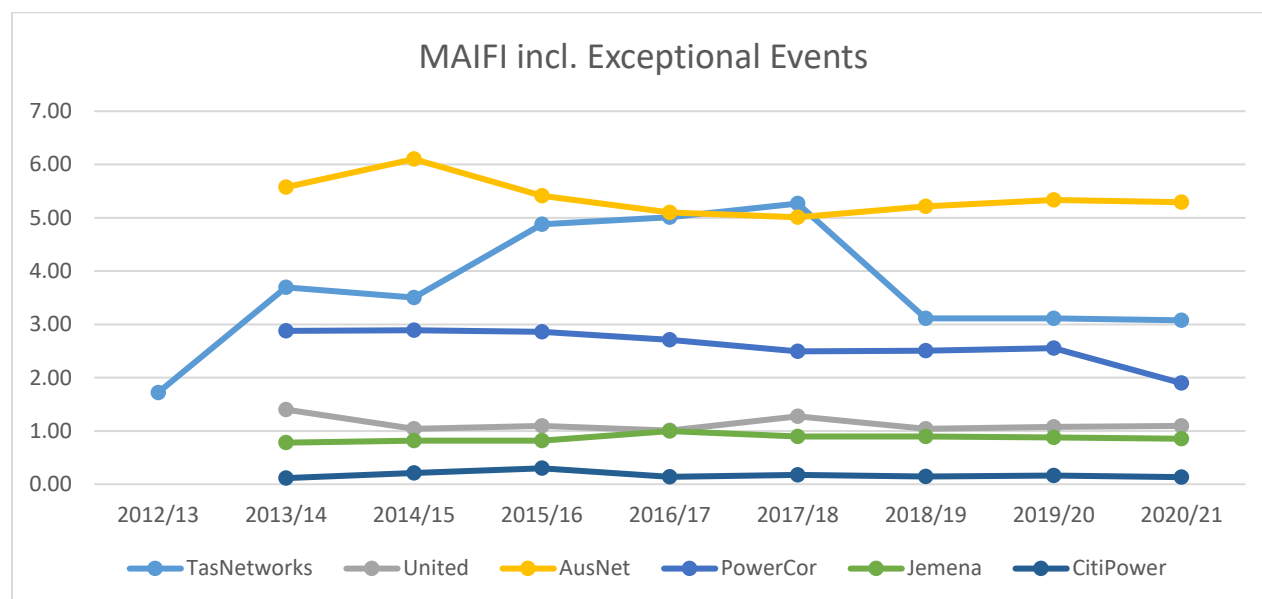
Since 2013-14 there have been improvements in MAIFle in Victoria with a weighted average reduction from 2.62 outages per customer to 2.25 outages per customer (a 14% reduction). By means of comparison, since 2012-13 in Tasmania where momentary interruptions are not incentivised,

² MAIFle means the total number of Momentary Interruption Events divided by the Customer Base for the relevant period, provided that Momentary Interruptions that occur within the first three minutes of a sustained interruption are excluded from the calculation.





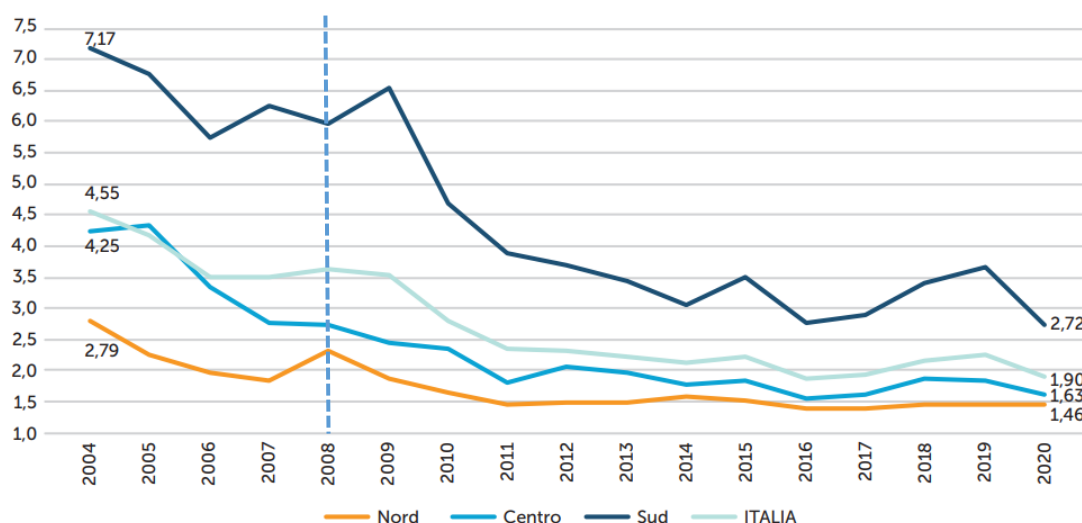
momentary outages have risen from 1.72 outages per customer to 3.08 per customer (a 79% increase). This is highlighted in the following chart³.



These changes highlight both an ongoing commitment to a focus on short interruptions and a recognition of the link to the energy system transition.

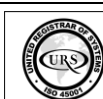
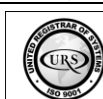
Italy

The Italian energy regulator extended financial incentives to short interruptions as well as sustained interruptions in 2008 and since then the number of short interruptions has fallen by 47% as illustrated in the chart below⁴.



³ The same level of reporting of MAIFI is not available for the Victoria DNSPs for 2012-13.

⁴ Figure 2.35 on page 181 of Relazione Annuale, Stato Dei Servizi 2020, Italian Energy Regulator, ARERA; [RA21 volume 1.pdf \(arera.it\)](#)





Others

There are a range of other examples where short interruptions are measures and reported and where this has had a positive impact on network performance.

In Norway, since 1995 network companies have been obliged to report interruptions above 1kV to the Norwegian Regulator (NVE). NVE publishes an annual report where data on continuity of supply for each network company is presented. The Costs of Energy Not Supplied (CENS), the calculated value of lost load for the customers, are deducted from allowed revenues. This provides a direct incentive for network operators to maintain their assets properly and to minimise even short/momentary power outages.

In Finland, the impact of two major storms in 2011 on an already aging power network directly led to Electricity Market Act of 2013. This set much stricter outage limits and increased reporting requirements. Fingrid (Finland's TSO) is required to report all interruptions (short and sustained) to the Finnish Energy Authority (Energiavirasto). As a result, there has been a steady increase in network investments to comply with reliability requirements.

Finally, we have also seen examples in the US of utilities measuring multiple momentaries as indicators of worst served customer performance, which have driven significant improvement in performance.

Proposed approach for short interruptions for RIIO-ED2 and stakeholder comments on the business plans

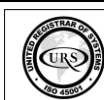
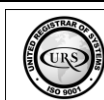
We welcome Ofgem's decision in its Sector Specific Methodology Consultation to implement a guaranteed standard on multiple short interruptions for RIIO-2. We consider this is a key first step in recognising the impact that short interruptions have on end customers and DG and places Ofgem at the forefront of developments in reliability together with jurisdictions such as Florida, Victoria (Australia) and Italy. The importance of short interruptions is highlighted by its inclusion in UKPN's business plan for RIIO-ED2 and in commentary by the Ofgem Challenge Group, Citizen's Advice, and WPD and ENWL CEG reports on the business plans.

UKPN's RIIO-ED2 business plan proposes a standard on multiple short interruptions with a commitment to make payments to customers if they experience more than 25 short interruptions a year. In addition, it is targeting a 10% reduction in short interruptions over RIIO-ED2.

The Ofgem Challenge Group Report on the Business Plan singles out UKPN as "the only network to propose a target to reduce the number of short interruptions experienced by customers". It notes its plan to reduce the number of short interruptions by 10% and propose to publish more information on frequent, short power cuts and set a voluntary target for this.

The Citizen's Advice response to the RIIO-ED2 business plan notes that "UKPN, has gone much further in its business plan on the topics of SIs." Citizens Advice explains "we believe that the UKPN position on SIs has merit for consumers in an age of increasing reliance on electricity. We recommend that Ofgem considers using the UKPN proposals as on SIs as a universal proposition for all DNOs."

WPD's CEG report on its business plan notes that the plan could have been improved by greater consideration of "whether different approaches to short interruptions should be considered." ENWL's CEG notes ENWL's plans to work with other network operators to develop a reporting framework for





short interruptions. It notes ENWL has not adopted “a leading position” on the topic and that Ofgem should “consider whether ENWL’s position on Short Interruptions is appropriate given the increasing reliance on electricity for everyday activities”.

Introducing financial incentives on short interruptions in RIIO-3

We ultimately consider that there is strong merit in introducing short interruption incentives. This can drive significant improvements in performance as we have seen in both Victoria (Australia) and Italy. We recognise that this must be founded on robust data but given the timescales it is entirely achievable for this to be considered as part of work on the development of RIIO-3.