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Dear Maxine

Benchmarking of Smart Grid benefits

We are writing to express both surprise and concern at the level of change that may be implied by the new approach to benchmarking Smart Grid benefits which was outlined on Friday 31 October.

The Draft Determinations were a significant change from the Fast Track Decision, with Ofgem introducing Smart Grid savings based largely on the Transform model and the DECC Smart Metering Impact Assessment.

We recognise that Ofgem is trying to encourage DNOs to deliver benefits to customers from innovation and smart grid technologies. We also recognise that Ofgem is listening to the feedback from the DNOs on the Smart grid benefits methodology that it adopted for the Draft Determinations. However, Ofgem's revised approach presented for the first time on Friday 31 October of adopting a benchmarking approach represents a second fundamental change and our modelling in. Our modelling of Ofgem's approach included in Appendix 2 indicates a stretch of over £100m, which we find unacceptable.

We have a number of significant concerns about the approach being adopted and whether the assessment of smart grid benefits is fair and equitable. To address this Ofgem must:

1. Ensure outlier benefits are not used to set industry benchmarks, consistent with Ofgem's cost benchmarking approach;
2. Ensure upper quartile benchmarking of smart grid and smart metering benefits is applied only at a totex level;
3. Ensure all benefits treated as smart have been equitably captured, for example UK Power Networks innovative and class leading asset management approach delivers savings of £330m compared to applying the industry average asset lives and this must be included if Condition Based Risk Management and other asset management techniques are allowed as smart benefits for other DNOs.
4. Ensure that the resulting smart benefits are credible and that any increases in savings have been validated against the detailed information submitted as part of the price control process.

We have included in Appendix 2 two alternative models addressing the points above which show UK Power Networks' forecast benefits being aligned with the expected benefits (one shows our benefits ahead of the model by £14m and one shows a much smaller stretch of £18m). The two scenarios show a wide variation in potential benefits indicating that Ofgem must take great care in ensuring the overall benefits of smart grids are credible and deliverable.

UK Power Networks' consistent approach throughout the RIIO-ED1 process

UK Power Networks has always made a very clear distinction around our smart grid benefits and that these are new benefits.

In the following we have taken this opportunity to fully explain our concerns with the proposed methodology:

- i) Ofgem is adopting an upper quartile benchmarking approach at a disaggregated level, i.e. for each investment category. This is not consistent with Ofgem's Strategy decisions on cost benchmarking published in "RIIO-ED1 electricity distribution price control: Tools for cost assessment" in which the upper quartile is applied only at a totex level;
- ii) The benchmarking is being proposed based on a sparse data set. In instances with few data points the upper quartile is being defined as 75% of the frontier, which is inconsistent with Ofgem's cost benchmarking approach and in many cases leads to the application of benefits to all DNOs on the basis of a single DNO's stated Smart benefits; and
- iii) Ofgem has not sought to ensure that DNOs have a set of benefits stated on a consistent basis, i.e. by declaring what is a smart benefit and what is not, as the formal questions have only asked us to clarify the benefits we have submitted. We would be gravely concerned if benefits associated with solutions which are business-as-usual for UK Power Networks are not credited to us, but are credited as 'Smart' amongst other DNOs.

We are also unclear how this disaggregated benchmarking approach will be reconciled with Ofgem's approach to totex benchmarking, where such detailed assessments are balanced against alternative totex models, the approach to setting the IQI 'start to earn' point, and the alignment of the network health and criticality outputs. Ofgem must ensure that significant additional savings are reflected in the health and criticality indices and their supporting methodology appropriately.

We made the point to Dora Guzaleva and her team when we met them on 24 September that we have a very clear line of distinction around our Smart Grid benefits. There is ample evidence that these are new to the company and requiring us to re-organise to deliver them. Specifically, UK Power Networks:

- has established a business change programme known as the 'Smart Network Plan' with a full-time engineering lead to ensure that the Smart Grid techniques are deployed (David Boyer);
- has established a new position to lead the delivery of Flexible Connections for Distributed Generation customers (Sotiris Georgiopoulos);
- is in the process of establishing a full-time lead for Demand Side Response (Michael Clark);
- has carried out and documented a gap analysis of the change required to achieve each Smart Grid solution within the Smart Network Plan, in terms of organisational roles, training, procedures, decision tools for network planners and asset managers, IT, and associated levels of corporate investment and financial risk.

- has demonstrated the equipment associated with online partial discharge monitoring to your team, as well as the business-as-usual equipment which is used by all DNOs on a daily basis, in order to demonstrate the difference.

This should give Ofgem confidence that we have a very clear line with respect to embedded benefits.

ENW's CBRM benefit is not a new Smart technique

We note that other DNOs do not appear to have operated in the same spirit claiming benefits that are clearly business as usual in other network operators, Electricity North West for example, are the only DNO to have sought to claim the benefit of Condition Based Risk Management (CBRM). Aside from the monetary amounts implied by crediting this as Smart, we find it difficult to accept how a methodology used as part of a DNO's approach to asset replacement back in 2009 and clearly referenced on Ofgem's own website¹, can be seen as an "innovative" approach some five years later and then applied to the rest of the industry. To apply such a significant stretch based on a very subjective reading of what counts as an "innovative approach" to an area of expenditure essential to maintaining the safe operation and health of the asset base without proper due diligence would not be responsible regulation.

UK Power Networks has completed both the development and organisational change needed to adopt a more advanced method known as Asset Risk Prioritisation (ARP), which has benefitted customers through a life extension of 12% compared to the average asset lives used by DNOs and which we assessed delivers a £330m benefit (EPN £138m, LPN £121m and SPN £71m) compared to the industry average. We have treated this as business as usual and thus far have claimed this neither as a new Smart Grid benefit nor as an embedded benefit.

We would be very concerned about the implication of applying one DNO's (ENW) proposed asset replacement benefits across all DNOs. Even at 75% of the percentage stretch they have declared as this results in a £90m stretch for UK Power Networks and £350m across the other DNOs. To apply such a significant stretch to an area of expenditure essential to maintaining the safe operation and health of the asset base without proper due diligence would not be responsible regulation.

SSE's tree cutting costs are high

In the same way, SSE is the only company to claim benefits associated with the use of Ecoplugs for tree stumps (to prevent vegetation regrowth) and this is being extrapolated across all DNOs without due diligence to ascertain if this is BAU or supported by business cases in each situation. Again, this is not a new technique, and UK Power Networks make use of Ecoplugs where appropriate, although this is an expensive technique and the use is constrained to cases where regrowth would result in a significant risk and/or future maintenance cost.

We note that in Ofgem's Draft Determinations SSES gets a 25.7% (£32m) cut to their tree cutting allowance, which represents the largest cut applied to any of the licensees. On a DNO group basis,

¹ <https://www.ofgem.gov.uk/publications-and-updates/electricity-distribution-price-control-review-final-proposals-allowed-revenue-cost-assessment>

SSE's allowances have been cut by £21m, which is the most of any DNO group.² This seems a poor baseline against which to judge and extrapolate Smart benefits.

Impact of benchmarking from a sparse data set

Ofgem must be careful not to extrapolate unrealistic benefits across all DNOs based on a sparse data set. Ofgem must also ensure that comparable benefits are included for all DNOs and must assess where smart savings overlap with the cost benchmarking which has been undertaken with the impact of these smart benefits already included.

We have attempted to apply Ofgem's proposed methodology outlined last Friday to the benefits currently declared by DNOs and have appended the summary to this letter as Appendix 2. We have used the benefits summary in your 'Total Smart Benefits Assessment' supporting file. We have included the DNOs' Smart Metering benefits within the troublecall category. We have included our partial discharge technology benefits as we believe we have demonstrated the innovative nature of this, and have therefore not excluded any of the other DNOs declared benefits.

This assessment shows that UK Power Networks reinforcement benefits are largely in line with the upper quartile, as are our trouble call benefits. The significant stretches that arise are a result of the application of single DNO frontier asset replacement and tree cutting benefits, which we have critiqued above.

We have been supportive of Ofgem's challenge with respect to load-related reinforcement, and have seen many of our comments with respect to the application of Transform adopted. However, Appendix 2 demonstrates that a sparse data set is being used well beyond its appropriate limits in setting revenues in non-load areas of the price control.

We have shared with Dora Guzaleva an alternative and reasonable approach to resolve this issue of sparse data, and were the only DNO to do so. This involved calculating a level of Smart Grid benefits based on the expenditure on the Innovation Funding Incentive across the GB throughout DPCR5, excluding projects related to reinforcement and safety. This reflects each of the behaviours you are seeking: it would hold the DNOs to account to implement and achieve the benefits from each other's projects; it would penalise DNOs which had innovated very little; and would reflect the topic areas (quality of supply, asset condition, etc) in which the companies had actually worked and should expect to make savings. It has the advantage of working from a larger and more robust data set, and one which was submitted as part of regulatory reporting throughout DPCR5. It has not been progressed.

Finally, we would re-iterate that we were criticised by Ofgem at the Fast Track determination for not submitting scheme papers as supporting evidence for our load-related reinforcement. Now that we have, we trust that these have formed the basis of Ofgem's assessment and will be used to ensure that reinforcement benefits are not allocated inappropriately.

UK Power Networks Embedded benefits

We recognise that UK Power Networks has declared two embedded benefits associated with the way in which we are assessing the loading on primary and grid transformers, and the benefits from

² Table 9.4 from Ofgem's RIIO-ED1 Business Plan Expenditure Assessment issued as part of the Draft Determinations

running a meshed network in central London. We would like to take this opportunity to reinforce the reasons why Ofgem must include these in their smart benefit assessment.

These were fully documented in our Smart Grid Annex as part of our business plan submission in July 2013, and to a level of detail which has only recently been caught up by other DNOs in their March 2014 plans. We submitted a supplementary answer as one of the actions from our Costs & Outputs meeting with your team on 1 May 2014. We subsequently submitted an answer to a follow-up question on 19 September 2014, which we enclose with this letter. To date, we have not received any feedback from yourselves or your consultant engineers on this matter.

With respect to transformer loading, UK Power Networks found it necessary some time ago to develop a tool with which to assess primary and grid transformers according to the most recent weather data, transformer type and load data. The tool generates top-oil temperature estimates based on accumulated loading from the previous hours and days. In so doing it is able to derive thermal ratings based on actual load shape, transformer thermal inertia, and ambient temperature. This enables power transformers to be operated at utilisation factors appropriate to their particular operating environment, and often higher than would be feasible using standard cyclic ratings.

Unless other DNOs can demonstrate a similar tool to you, then it follows that they are not set up to achieve the same benefit, and their customers are not achieving any benefit. We have demonstrated to Ofgem on several occasions that our load-related planning decisions tend to result in a more heavily loaded network than other DNOs, and this technique is part of that philosophy.

With respect to meshed networks, other DNOs may typically have open loops at HV. By contrast, the LPN HV network typically has large feeder groups which are made of 4 or 5 feeders each. In a typical self-supporting HV 4-feeder group it is possible to load each feeder up to 75% of its rating since, in the event of an HV fault on any one feeder in the group, the load for the whole group will be picked up immediately by the remaining 3 HV feeders.

In this network configuration, we achieve 1.5x additional capacity for the same capital investment. As described in the Smart Grid Strategy Annex, Section 3.2, based on the expected HV investment in LPN of £29m, if we had done this in the conventional way, it is estimated it would have cost customers £44M (i.e. $1.5 \times £29M$), providing an overall net benefit of approximately £15m. This is only achievable through automation designed to support this specific network configuration.

Adoption of other DNOs' techniques

As we set out in Appendix 2, we have delivered a strong performance on Smart Grid benefits associated with reinforcement. We will continue to implement other DNOs' techniques in both load and non-load where appropriate.

With respect to the other DNOs' projects, we are taking the opportunity on our LCNF Tier 1 project 'Power Transformer Real Time Thermal Rating' to trial oil re-generation and are following up with Electricity North West to understand their success to date. But until we have understood the applicability to a different transformer fleet, and whose initial condition is likely to be different, it is not appropriate to extrapolate benefits from one licensee to another.

In the context of being able to adopt other DNOs' solutions, we note that Scottish and Southern Energy (SSE) have not documented £48.7m of their Smart Grid benefits in the public domain³. Of the £18.7m of non-load benefits that they have documented, £6.6m are achieved through transformer monitoring. We have trialled a number of transformer condition monitoring solutions over the years but have struggled to make a business case until the cost of existing monitoring units reduces. We cannot foresee how SSE will be able to procure the necessary monitoring equipment for ten sites for £225k, as set out in their technical annex, unless they make extremely aggressive assumptions about being able to move the equipment from one transformer to the next. Such assumptions are entirely dependent on transformer health and the need for ongoing monitoring.

Similarly, we note that ScottishPower have not documented any non-load related Smart Grid solutions in their economic evaluation of solutions⁴.

Ofgem must take a reasonable view of the allowed benefits, robustly assess what benefits are considered business as usual and ensure that the equitable and realistic benefits are assessed before any smart grid savings stretch is applied in the final determinations. We have robust reasons, however, for not implementing each and every solution considered by the other DNOs and set these out for the non-load techniques in particular in Appendix 1.

Yours sincerely



Ben Wilson
Director of Strategy & Regulation and Chief Financial Officer
UK Power Networks

³ Technical Appendix 12.1 in SSE's business plan, 'Making innovation happen', Appendix 6, page 139. The table documents only £51.3m of £100m of claimed savings.

⁴ Annex to ScottishPower's business plan, 'Smart Grid Strategy - Creating a Network for the Future', Section 8.2, page 24. The table contains no non-load or non-fault level solutions.

Appendix 1 Assessment of other techniques

Technique	Proposed by	Comment
LV fault finding techniques and LV reclosers	ENW	Forms the basis for Ofgem's faults stretch. Some already BAU
Transformer oil re-generation in-situ	ENW	Scale of the benefits likely to be different on a different transformer fleet, and whose initial condition is different.
Condition-based Risk Management (CBRM)	ENW	This was declared complete, embedded and in use by 2009. It is already superseded by the Asset Risk Prioritisation (ARP) tool within UKPN which is fully embedded in the organisation and not declared as a benefit.
Chromatic analysis of oil	ENW	Very little industry consensus, with only one other DNO declaring they will trial it, but without committing to financial benefits.
Ecoplugs	SSE	The incremental innovation is small in our view.
OLTC acoustic monitoring	ENW	UKPN participated in an all-DNO project seeking to construct an acoustic monitor previously without success.
Online (remote) partial discharge monitoring	UKPN	Provides online alerts to changes in health of switchgear and monitors the most heavily loaded sections of the connected feeders.
Wood pole condition monitoring	SSE	We agree this is an area in which innovation is required and the benefits are reasonable, if delivered from genuinely new solutions.
Transformer condition monitoring	SSE	We cannot foresee how SSE will be able to procure the necessary monitoring equipment for ten sites for £225k, bringing the delivery of benefits into question.

Appendix 2 UKPN simulation of Ofgem's proposed smart grids benchmarking

We have included three versions of our interpretation of Ofgem's proposed approach to benchmarking Smart Grid benefits. We have used the upper quartile (marked UQ) or 75% of the frontier (75% Max) to establish the benchmark and this is indicated at the top of each column.

The table below reflects our interpretation of Ofgem's approach, with inappropriate credits or extrapolation of benefits from ENWs CBRM, transformer oil re-generation and Ecoplugs. This leads to inappropriate stretches applied to thirteen DNOs based on one DNO in each case, highlighted in yellow.

	Reinforcement				Asset Replacement				Troublecall				I&M				Tree Cutting				Total		
	original	%	new		original	%	new		original	%	new		original	%	new		original	%	new		original	new	Stretch
ENWL	19.1	21%	23.7		48.5	12%	36.38		16.9	9%	3.86		0.4	1%	0.30		0	0%	1.16		84.9	65.4	-19.5
NPGN	10.6	14%	19.5		0	0%	23.74		2.2	1%	3.23		0	0%	0.22		0	0%	1.30		12.8	48.0	35.2
NPGY	20.1	22%	24.2		0	0%	30.41		3.2	1%	4.85		0	0%	0.30		0	0%	1.73		23.3	61.5	38.2
WMID	32.3	18%	41.1		0	0%	36.91		0.0	0%	4.09		0	0%	0.33		0	0%	2.52		32.3	84.9	52.7
EMID	65.0	27%	61.2		0	0%	30.74		0.0	0%	4.81		0	0%	0.30		0	0%	1.96		65.0	99.0	34.0
SWALES	7.5	18%	8.5		0	0%	21.73		0.0	0%	1.71		0	0%	0.17		0	0%	2.42		7.5	34.6	27.1
SWEST	23.2	31%	21.5		0	0%	32.80		0.0	0%	3.26		0	0%	0.23		0	0%	3.39		23.2	61.2	38.0
LPN	46.9	14%	54.8		2.5	1%	25.88		5.3	3%	3.33		0	0%	0.52		0	0%	0.01		54.6	84.6	30.0
SPN	40.4	23%	38.6		4.6	2%	25.13		4.1	2%	3.72		0	0%	0.33		0	0%	2.69		49.1	70.4	21.3
EPN	45.0	18%	55.5		1.9	0%	39.09		6.9	3%	5.39		0	0%	0.54		0	0%	5.19		53.7	105.7	52.0
SPD	20.5	19%	33.6		0	0%	21.19		0.0	0%	3.04		0	0%	0.24		0	0%	2.55		20.5	60.6	40.1
SPMW	18.9	14%	28.7		0	0%	37.71		0.0	0%	2.51		0	0%	0.31		0	0%	3.71		18.9	72.9	54.0
SSEH	14.1	25%	15.2		0	0%	18.02		0.6	1%	2.08		0	0%	0.15		0.4	1%	2.19		15.1	37.7	22.6
SSES	18.4	8%	42.0		11.1	2%	42.36		2.4	1%	3.69		0	0%	0.57		7.2	5%	5.40		39.1	94.0	54.9
Total Benefits	381.8		468.2		68.6		422.10		41.6		49.58		0.4		4.51		7.6		36.20		500.0	980.6	480.6

The table on the following page shows the same data if Ofgem were to include UKPNs £330m of APR asset management benefits:

	Reinforcement				Asset Replacement				Troublecall				I&M				Tree Cutting				total		
	original	%	new		original	%	new		original	%	new		original	%	new		original	%	new		original	new	Stretch
ENWL	19.1	21%	23.7		48.5	12%	92.32		16.9	9%	3.86		0.4	1%	0.30		0	0%	1.16		84.9	121.4	36.5
NPGN	10.6	14%	19.5		0	0%	60.26		2.2	1%	3.23		0	0%	0.22		0	0%	1.30		12.8	84.5	71.7
NPGY	20.1	22%	24.2		0	0%	77.18		3.2	1%	4.85		0	0%	0.30		0	0%	1.73		23.3	108.3	85.0
WMID	32.3	18%	41.1		0	0%	93.69		0.0	0%	4.09		0	0%	0.33		0	0%	2.52		32.3	141.7	109.5
EMID	65.0	27%	61.2		0	0%	78.02		0.0	0%	4.81		0	0%	0.30		0	0%	1.96		65.0	146.3	81.3
SWALES	7.5	18%	8.5		0	0%	55.15		0.0	0%	1.71		0	0%	0.17		0	0%	2.42		7.5	68.0	60.5
SWEST	23.2	31%	21.5		0	0%	83.24		0.0	0%	3.26		0	0%	0.23		0	0%	3.39		23.2	111.6	88.4
LPN	46.9	14%	54.8		123.7	30%	92.75		5.3	3%	3.33		0	0%	0.52		0	0%	0.01		175.8	151.4	-24.4
SPN	40.4	23%	38.6		75.9	21%	79.70		4.1	2%	3.72		0	0%	0.33		0	0%	2.69		120.4	125.0	4.6
EPN	45.0	18%	55.5		139.0	24%	129.84		6.9	3%	5.39		0	0%	0.54		0	0%	5.19		190.8	196.5	5.7
SPD	20.5	19%	33.6		0	0%	53.79		0.0	0%	3.04		0	0%	0.24		0	0%	2.55		20.5	93.2	72.7
SPMW	18.9	14%	28.7		0	0%	95.70		0.0	0%	2.51		0	0%	0.31		0	0%	3.71		18.9	130.9	112.0
SSEH	14.1	25%	15.2		0	0%	45.72		0.6	1%	2.08		0	0%	0.15		0.4	1%	2.19		15.1	65.4	50.3
SSES	18.4	8%	42.0		11.1	2%	107.52		2.4	1%	3.69		0	0%	0.57		7.2	5%	5.40		39.1	159.2	120.1
Total Benefits	381.8		468.2		398.2		1144.89		41.6		49.58		0.4		4.51		7.6		36.20		829.6	1703.4	873.8

The table on the following page reflects, in our view, a more appropriate application of a benchmarking approach, whilst still being a major change from the Draft Determinations at a very late stage in the process and therefore concerning from a process perspective. This re-sets the assessment of Asset replacement benefits to that set out in the Draft Determinations, with the exception of Partial Discharge monitoring as we believe we have demonstrated the innovative nature of this.

	Reinforcement				Asset Replacement				Troublecall				I&M				Tree Cutting				total		
	original	%	new		original	%	new		original	%	new		original	%	new		original	%	new		original	new	Stretch
ENWL	19.1	21%	23.7		0	0%	4.45		16.9	9%	3.86		0.4	1%	0.30		0	0%	0.00		36.4	32.3	-4.1
NPGN	10.6	14%	19.5		0	0%	3.29		2.2	1%	3.23		0	0%	0.22		0	0%	0.00		12.8	26.3	13.5
NPGY	20.1	22%	24.2		0	0%	4.21		3.2	1%	4.85		0	0%	0.30		0	0%	0.00		23.3	33.6	10.3
WMID	32.3	18%	41.1		0	0%	5.11		0.0	0%	4.09		0	0%	0.33		0	0%	0.00		32.3	50.6	18.4
EMID	65.0	27%	61.2		0	0%	4.26		0.0	0%	4.81		0	0%	0.30		0	0%	0.00		65.0	70.6	5.6
SWALES	7.5	18%	8.5		0	0%	3.01		0.0	0%	1.71		0	0%	0.17		0	0%	0.00		7.5	13.4	5.9
SWEST	23.2	31%	21.5		0	0%	4.54		0.0	0%	3.26		0	0%	0.23		0	0%	0.00		23.2	29.5	6.3
LPN	46.9	14%	54.8		2.5	1%	3.58		5.3	3%	3.33		0	0%	0.52		0	0%	0.00		54.6	62.3	7.6
SPN	40.4	23%	38.6		4.6	2%	3.48		4.1	2%	3.72		0	0%	0.33		0	0%	0.00		49.1	46.1	-3.0
EPN	45.0	18%	55.5		1.9	0%	5.41		6.9	3%	5.39		0	0%	0.54		0	0%	0.00		53.7	66.9	13.2
SPD	20.5	19%	33.6		0	0%	2.94		0.0	0%	3.04		0	0%	0.24		0	0%	0.00		20.5	39.8	19.3
SPMW	18.9	14%	28.7		0	0%	5.22		0.0	0%	2.51		0	0%	0.31		0	0%	0.00		18.9	36.7	17.8
SSEH	14.1	25%	15.2		0	0%	2.49		0.6	1%	2.08		0	0%	0.15		0	0%	0.00		14.7	20.0	5.3
SSES	18.4	8%	42.0		0	0%	5.73		2.4	1%	3.69		0	0%	0.57		0	0%	0.00		20.8	52.0	31.2
Total Benefits	381.8		468.2		9		57.73		41.6		49.58		0.4		4.51		0		0.00		432.8	580.0	147.2