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Electricity transmission licensees
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Further instructions to electricity transmission licensees on modifications to their Network Output Measures Methodology to better meet the objectives of the April 2016 Direction

On 26 May 2017 we published a letter¹ confirming that we did not intend to reject the Network Output Measures (NOMs) methodology that the three onshore electricity transmission Licensees (National Grid Electricity Transmission plc (NGET), Scottish Hydro Electric Transmission plc (SHE-T), and SP Transmission plc (SPT)) jointly submitted for the Authority's approval. The modified NOMs Methodology (Issue 16) therefore came into effect on 27 May 2017.

This letter explains the reasons for not rejecting the modified NOMs Methodology, and provides instructions to Licensees on further development of their Methodology as well as additional work necessary to better meet the NOMs Objectives.

Background

Our RIIO (Revenue = Incentives + Innovation + Outputs) price control framework gives a greater focus on outputs and associated secondary deliverables. Secondary deliverables are leading indicators which enable us to monitor companies' long-term performance. The NOMs help to quantify the impact of the actions taken and expenditure incurred by the companies on their networks. They enable Ofgem and stakeholders to see what the companies have delivered and inform us on what to expect in return for future investments.

NOMs Methodology Requirements

Electricity transmission licences require Great Britain's onshore electricity transmission network owners (ETOs²) to have a Common Network Output Measures Methodology ("NOMs Methodology"). Under Special Condition 2L, the ETOs are required to work together

¹ <https://www.ofgem.gov.uk/publications-and-updates/notice-intention-not-reject-modified-electricity-transmission-network-output-measures-noms-methodology>

² The terms "ETOs" and "Licensees" are used interchangeably. They refer to the three onshore electricity transmission Licensees (National Grid Electricity Transmission plc (NGET), Scottish Hydro Electric Transmission plc (SHE-T) and SP Transmission plc (SPT)).

to develop and submit a NOMs Methodology that facilitates the achievement of the NOMs Methodology Objectives³.

Requirements of 2016 Direction to Modify the NOMs Methodology

We issued a Direction⁴ ("2016 Direction") to Licensees under paragraph 2L.13 of Special Condition 2L on 29 April 2016. The Direction required the Licensees to jointly submit the items (a to d) listed below for approval and set out in detail what each of them was required to achieve.

- a. A modified Common Methodology
- b. A Risk Trading Model (RTM)
- c. Calibration, Testing, and Validation Plans
- d. A "Compliance Report" explaining how a to c comply with the Direction.

On 28 April 2017, the Licensees submitted the items listed above for the Authority's approval.

Our assessment of the Licensees' compliance with the 2016 Direction

Having reviewed the Licensees' submissions, we are satisfied that they have used reasonable endeavours to comply with the Direction in the work they have done to date. A summary of our review and the reasons we have arrived at this view are provided in Appendix 1. Further work is required to fully meet the requirements of the Direction as set out below and in the attached Appendix 2.

Next Steps

We have set out detailed requirements for further development of the Methodology and related documents in Appendix 2 in order to fully meet the requirements of the 2016 Direction. We expect the three Licensees to work together to successfully achieve the required outcomes. As was the case in the last phase of development, we will work with the Licensees to ensure they have clarity over what is required.

The timeframes for completing the modifications set out in Appendix 2 to this letter shall be as follows:

1. Licensees shall submit the following planning deliverables to the to Ofgem:
 - A. Development Plans** – no later than 31 July 2017
 - B. Implementation Plans** – timing for submission to be set out in the Development Plan
2. Licensees shall submit the following deliverables to Ofgem no later than 30 April 2018.
 - C. Common Network Output Measures Methodology**
 - D. Network Asset Risk Annex**
 - E. Licensee Specific Appendices**
 - F. Assumptions Logs**
3. The timing for submission of the following deliverables shall be set out in the Development Plan to enable Licensees to submit their **Rebased monetised targets** to the Authority for approval no later than 31 October 2018.
 - G. Uncertainty Methodology**
 - H. Risk Trading Model**

³ The NOMs Objectives are set out in the Electricity transmission licence Special Condition 2L, Part B

⁴ 2016 Direction: <https://www.ofgem.gov.uk/publications-and-updates/decision-direct-modifications-electricity-transmission-network-output-measures-methodology>

I. Calibration, Testing and validation plans

J. Calibration, Testing and validation outputs

K. Rebasing methodology

4. The following shall be submitted no later than 31 October 2018:

L. Rebased monetised targets

5. Licensees shall implement the NOMs Methodology in order to submit monetised risk data as part of their 2018/19 regulatory reporting under Standard Licence Condition (SLC) B15. Detailed reporting requirements are to be developed in accordance with provisions of SLC B15.

Yours sincerely,

Min Zhu,
Associate Partner, Networks

Appendix 1: Review of the Direction deliverables

Common Methodology

The 2016 Direction required that the Licensees jointly take forward the monetisation approach that had been introduced in the previous version of the NOMs Methodology, and to develop a common methodology that all three Licensees would use to quantify asset and network risk. While we expected there to be some differences in implementation approach between Licensees, we considered that it would be possible to align the asset management practices of each of the three ETOs to an extent where a Common Methodology (that provided us with assurance that risk estimates produced by each of the three ETOs would be comparable) could be produced.

It has always been acknowledged that there is no one right approach to estimating risk and prioritising asset interventions. The ETOs apply two different asset management approaches. NGET uses failure modes and effects analysis (FMEA), whereas both SPT and SHE-T use the Condition Based Risk Management (CBRM) platform. Understanding how to reconcile these two approaches into a Common Methodology has taken more time than expected at the time of issuing the Direction, and has delayed progress in other areas.

The Direction set out nine broad areas for development of the Common Methodology. These are itemised below with brief explanations of work that has been done and the further work required to fully achieve the 2016 Direction requirements. More detailed explanation of the further work required is given in Appendix 2.

1. Common and Licensee specific parameters

The Common Methodology properly explains the derivation of the majority of relevant parameter values. However, some parameters, in particular those used for asset health scoring, require further development and explanation. While the methodology explains a large proportion of the assumptions applied, the explanations are dispersed throughout the Common Methodology and Licensee Specific Appendices. A more comprehensive assumptions log would help improve transparency.

2. Treatment of uncertainty in parameter estimates

The Common Methodology explains a generic approach to treatment and estimation of uncertainty. The generic approach is limited to normally distributed input variables. Further development will be required to provide sufficient understanding of all sources of uncertainty within the models and to provide confidence that the model outputs can be used as intended.

3. Asset Health (probability of failure)

Both FMEA and CBRM use asset health scoring (end of life modifier, EoLmod) to estimate probability of failure for individual assets. In both approaches the EoLmod of any given asset is used to identify where the asset is in its life-cycle and ultimately the probability of the asset failing within a defined time period.

Derivation of EoLmod is explained in the relevant process Appendices. A key focus in the next stage of development will be on trying to align EoLmod scoring across the three Licensees. We accept that the way EoLmod is then used to estimate probability of failure will vary depending on whether a Licensee uses FMEA or CBRM.

Additionally, further work will be required to provide more clarity on how available data and other information is used to derive life-cycle (probability of failure) curves, as well as how various intervention options affect EoLmod and probability of failure.

4. Asset Criticality (consequence of failure)

Consequence of failure is divided into four broad categories: safety, environmental, financial and system. Licensees developed a common approach for estimating consequences in these four categories. Of the four categories, system consequence is the most complex and therefore received the most attention in development and is now well developed. Our view is that the focus in the next stage of development should be in bringing safety, environmental, and financial consequences up to the same level of development as system consequence.

5. Condition Risk

The 2016 Direction required that the focus of the NOMs methodology should be on Condition Risk. This is the type of risk that can be reduced by proactive replacement or refurbishment of assets, and where the need for replacement or refurbishment can be determined by assessment of the current and predicted future health of the assets.

We are satisfied that Licensees' development has focused on Condition Risk and the next phase should maintain this focus.

6. Network Output Targets

ETOs' Network Output Targets are set out in Table 1 of Special Condition 2M. The 2016 Direction required Licensees to explain:

- a. how the existing volumes based targets will be translated to monetised ones that can be used for implementation of the incentive mechanism, and
- b. how asset management investment decisions are made.

The Common Methodology provides a high level explanation of how various types of intervention (maintenance, repair, refurbishment, and replacement) address failure modes. Given the current stage of development the high level explanation is sufficient. Further development required to achieve the objectives (a and b) above are set out in the *Rebasing methodology* and *Risk Trading Model* sections of Appendix 2.

7. Implementation of the Incentive Mechanism

Appendix 1 to the Common Methodology explains in general terms how the methodology will be implemented. This explanation includes:

- how NOMs outputs will be used for investment decision making
- current reporting requirements
- how RIIO-T1 targets were set and high level explanation of how existing targets will be converted to equivalent monetised ones
- methodologies for evaluation of the other two Network Output Measures (not covered by the core methodology), i.e. the Network Performance Measure, and the Network Capability Measure.

At this stage, given where we are in terms of development, the level of detail provided within Appendix 1 is appropriate. We have recently started development work with all network companies to inform how we will implement the RIIO-1 mechanism. We expect that ETOs will engage constructively with this work and

further develop the required elements of their methodology to align with and feed into this parallel workstream.

8. Assets requiring separate treatment

The 2016 Direction only required that Licensees provide justification for any assets they consider to require separate treatment. In response to feedback we issued during the development, Licensees removed the section related to High Impact Low Probability (HILP) assets (which in their view warrant separate treatment) from the Common Methodology. This section is included in the Compliance Report (Appendix II), which was submitted by Licensees alongside the Common Methodology.

In our view, sufficient justification has not been provided for separate treatment of any assets. We have provided further clarification on requirements for demonstrating the need for separate treatment in the *Assets Requiring Separate Treatment* section of Appendix 2.

9. Implementation plan

Appendix 1 also contains a flowchart illustrating the various elements of an implementation plan. We agreed with Licensees prior to their submission that provision of a further detailed plan would be of no benefit until the methodology itself reaches a more final stage of development. We expect Licensees in the next phase to provide detailed implementation plans. Requirements for detailed plans are set out in the *Implementation Plans* section of Appendix 2.

Risk Trading Model

We require Licensees to develop Risk Trading Models (RTM) that apply the processes explained in the Common Methodology, and allow us to implement the NOMs Incentive Mechanism, and to demonstrate how they make investment decisions. We agreed with Licensees prior to their submission that the RTM can only be fully developed once the Common Methodology is finalised. Licensees therefore submitted a high level explanation of the aims and architecture of the RTM to be developed as well as an example Excel spreadsheet reflecting SHE-T and SPT's methodology.

We provide further clarification on RTM development requirements in the *Risk Trading Model* section of Appendix 2.

Calibration, Testing, and Validation Plans⁵

Licensees carried out significant work in developing their approach to calibration, testing, and validation. This is explained at a high level in Chapter 6 of the Common Methodology along with explanation of further work required. We are satisfied that Licensees have made sufficient progress towards developing a comprehensive calibration, testing, and validation plan. However, as alignment of processes has not been possible, the importance of robust calibration, testing, and validation has become even greater than previously assumed. We have set out requirements for further development in the *Calibration, Testing and Validation (CTV) Plans* section of Appendix 2.

⁵ The Direction refers to 'testing, validation, and calibration'. We have agreed with Licensees that in future this should be referred to as 'calibration, testing, and validation' to align with the flow of inputs, processes, and outputs respectively within a model.

Compliance Report

We agree with the views stated in the Compliance Report that the Licensees have jointly used reasonable endeavours to comply with the 2016 Direction in the work they have done to date.

Appendix 2: ET NOMs Development Instructions and associated work

This Appendix sets out the further development needed to ensure that the methodology fully meets the requirements of the 2016 Direction, and therefore the NOMs Objectives. It also set outs additional work that will accompany this development such as the plans for implementation of the methodology.

Further development of the NOMs methodology shall adhere to the overarching principles set out in paragraphs 5 and 8 to 14 of the 2016 Direction.

1. Required deliverables

1.1 Licensees are required as a minimum to submit:

Part A: NOMs Planning Deliverables

A. **Development Plans** – separate submission for each Licensee

B. **Implementation Plans** – separate submission for each Licensee

Part B: NOMs Methodology Documents

C. **Common Network Output Measures Methodology** – one joint submission for all three Licensees

D. **Network Asset Risk Annex** – one submission for NGET, and one for SPT and SHET jointly

E. **Licensee Specific Appendices** – separate submission(s) for each Licensee

F. **Assumptions Logs** – both joint and Licensee specific submission required

G. **Uncertainty Methodology** – both joint and Licensee specific submission required

Part C: Associated Deliverables

H. **Risk Trading Model** - one set of submissions for NGET, and one set for SPT and SHET jointly

I. **Calibration, Testing and validation plans** – both joint and Licensee specific submission required

J. **Calibration, Testing and validation outputs** – both joint and Licensee specific submission required

K. **Rebasing methodology** – one joint submission for all three Licensees

L. **Rebased monetised targets** – separate submission(s) for each Licensee

Reference to the “Methodology” in these instructions means collectively the documents C to G listed above.

1.2 The extent of the modifications to the existing Methodology and specific requirements for development related to the above deliverables (documents A to L listed in paragraph 1.1 above) are explained in Parts A to C below.

Part A: NOMs Planning Deliverables

2. Development Plans

2.1 Licensees shall submit development plans to Ofgem no later than 31 July 2017. The plans shall be specific to each Licensee but we expect Licensees to work together to align all plans to the same timeline for development and delivery of outputs. Common workstreams shall be fully aligned.

2.2 The Development plan should cover the following areas:

a. Overview of the timelines with key milestones such as:

- i. Schedule of key meetings between Licensees, and Licensees and Ofgem
 - ii. Submission of draft deliverables to Ofgem for review
 - iii. Submission of final deliverables to Ofgem for approval
 - b. Ways of working
 - i. Internal Licensee working
 - ii. Interactions with other Licensees
 - iii. Interactions with Ofgem
 - c. Parallel workstreams; including how these will interact with the main development workstream
 - d. Internal resources for development and implementation of the methodology and other deliverables
- 2.3 Once the development plan is agreed, changes to it that may significantly impact final deliverables shall not be made without providing adequate explanation to Ofgem.
- 2.4 Further details are included in relevant specific sections below

3. **Implementation Plans**

- 3.1 Licensees shall submit an implementation plan that in addition to the licence requirements following modification of the NOMs Methodology, includes the following:
- 3.2 An explanation of:
- a. how implementation of the new methodology will change the current risk management practice/processes
 - b. the proposed timeline for implementation in order to deliver rebased targets by 31 October 2018, and to submit monetised risk data as part of the 2018/19 regulatory reporting under Electricity Transmission, SLC B15.
 - c. any necessary phased implementation programme (i.e. if it is necessary to implement elements of the Methodology at different times),
 - d. any issues to be resolved or required work necessary before full implementation can be achieved,
 - e. any interim measures necessary to enable the Authority to administer the NOMs Licence Mechanisms ahead of full implementation of the Methodology.

Part B: NOMs Methodology Documents

4. **Common Network Output Measures Methodology**

- 4.1 Common methodology document covering the evaluation of all five Network Output Measures as set out in the licence
- a. the network assets condition measure
 - b. the network risk measure
 - c. the network performance measure

- d. the network capability measure
- e. the Network Replacement Outputs

4.2 High-level explanation only of a, b, and e. Detailed explanation to be covered in the 'Network Asset Risk Methodology'

5. Network Asset Risk Annex

5.1 When fully developed the Network Asset Risk Annexes in combination with the Common Network Output Measures Methodology will meet the requirements for a Common Methodology as set out in Part A of the 2016 Direction.

5.2 The Network Asset Risk Annexes shall provide detailed explanation of methodology for evaluation of:

- the network assets condition measure
- the network risk measure
- the Network Replacement Outputs

Document Structure

5.3 Licensees shall submit two separate Network Asset Risk Methodology documents.

- a. NGET Network Asset Risk Methodology: to be submitted by NGET
- b. SPT/SHE-T Network Asset Risk Methodology: to be submitted jointly by SPT and SHE-T

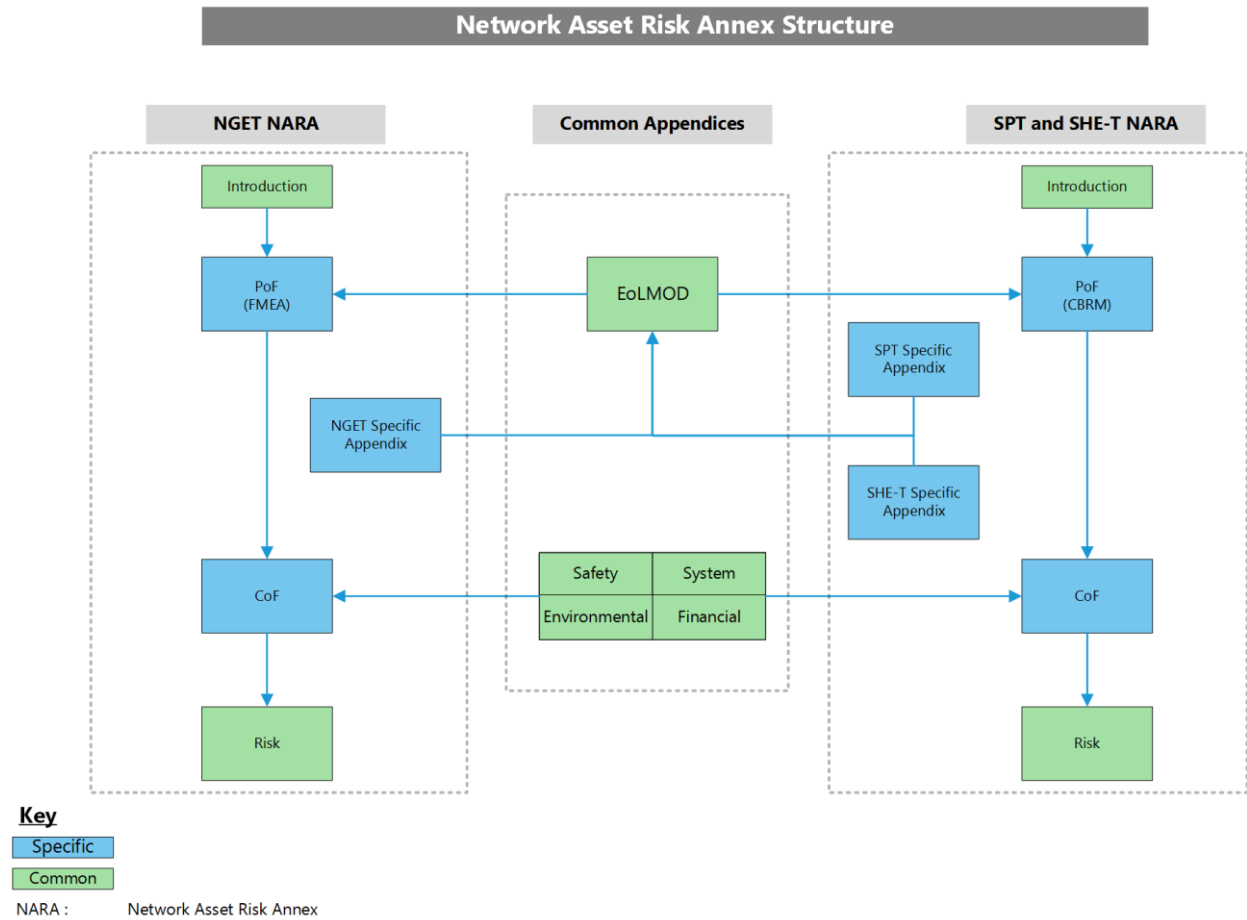
5.4 While two separate submissions are required, these shall contain common elements and Licensees shall work together to ensure as much consistency as possible. Table 1 below summarises the required modifications to the existing Common Methodology and Figure 1 illustrates the proposed new structure.

Table 1: Summary of required modifications to Common Methodology (as submitted in Issue 16)

Current Section	Summary of required modification	Commonality
1. Introduction	This section should be revised and brought to a high enough level to be consistent for all ETOs	All common
2. Probability of Failure	<ul style="list-style-type: none"> • NGET’s FMEA and SPT and SHE-T’s CBRM to be developed along separate workstreams with focus on further development of: • EoLMod parameters and score values and their application to deriving PoF • Explanation of data, and input and output parameters to be used in derivation of PoF • Common EoLmod Appendix 	<ul style="list-style-type: none"> • EoLMod parameters and scores developed on common and consistent basis. • Terminologies

3. Consequence of Failure	Focus on Safety, Environment, and Financial consequence	All common
4. Network Replacement Outputs	<p>To be separated into two standalone deliverables outside of the core methodology document</p> <p><u>Uncertainty</u></p> <ul style="list-style-type: none"> • How all factors of input uncertainty are used to estimate output uncertainty. • How differences in Licensee processes impact uncertainty <p><u>Rebasing of RIIO-T1 Targets</u> Develop a methodology for the systematic conversion of volume targets to monetised risk targets</p>	<p><u>Uncertainty</u> The factors of input uncertainty</p> <p><u>Rebasing of RIIO-T1 Targets</u> All common</p>
5. Risk Trading Model	To be developed as standalone deliverables outside of the core methodology document	Inputs and Outputs
6. Calibration, Testing and Validation	To be developed as standalone deliverables outside of the core methodology document	Inputs and Outputs
Appendices		
Appendix 1 – Implementation of Incentive Mechanism for RIIO-T1	Amend it to a higher level and reference how methodology is going to interact with the cross sector workstream	All common
NGET Process Appendix	Expect material here to be merged into the NGET document	N/A
SPT/SHE-T Process Appendix	Expect material here to be merged into the SPT/SHE-T document	N/A

Figure 1



Introduction Section

Condition Risk

- 5.5 We are satisfied with the current Methodology’s proposition that condition risk will be derived from the mathematical combination of the likelihood of a failure occurring (expressed as probability of failure) and the consequence of that failure occurring (expressed as a monetised value) to give an overall monetised risk value.
- 5.6 This section of the methodology shall be further refined such that it is limited to the above high-level principles and provide an overall explanation of how PoF and CoF are combined to arrive at risk. Details pertaining to the derivation of PoF and CoF shall be moved into their respective sections.
- 5.7 We expect that this section will be the same for all three ETOs.

Probability of Failure Section

- 5.8 The current methodology proposes a common FMEA approach for the derivation of probability of failure. The Licensees’ process Appendices provide further detail on the two approaches to deriving PoF. NGET’s process Appendix takes forward its application of FMEA, whereas the SPT/SHE-T process Appendix explains how they use Condition Based Risk Management (CBRM) tool to derive PoF.

- 5.9 Despite Licensees' efforts to align FMEA and CBRM we consider that full alignment between the two approaches is not possible. While we are satisfied that both approaches may be capable of producing robust and comparable results we think that the next phase of development should approach these as separate but parallel workstreams. The separation of these workstreams will mean even greater reliance on calibration, testing, and validation to demonstrate that both approaches produce robust and comparable results.
- 5.10 All Licensees shall carry out further development of the EoL Modifier parameters and their score values on a common and consistent basis. The application of these parameters to derive probability of failure may vary depending on different approaches.
- 5.11 All Licensees shall further develop and provide explanations for the scoring processes and parameters in the derivation of the End of Life modifier for the different asset categories (including transmission towers). This shall include:
- a. The use of common terminology
 - b. Exhaustive definitions for all equations and the terms/parameters that constitute them
 - c. High level explanations of derivation of parameter score values
 - d. Detailed explanations for the derivation of parameter score values shall be included in the Licensee specific Appendices. They shall be explained in a manner that facilitates transparency and enables an independent assessor to critically interrogate them.
 - e. How failure curves are derived e.g. details of the data and information used
 - f. Explanations of data to be used, including:
 - i. Sources e.g. internal, External database,
 - ii. Type e.g. transmission/distribution, asset categories, voltage
 - iii. Size of database
 - iv. An explanation of how comparable, and therefore applicable the failure data is to UK transmission network
 - v. Explanation of where expert views are used to supplement (or in lieu of) data, how this is done, and how objectivity is maintained.
 - g. Provide an explanation of the derivation of all input parameters (for example constant c and k values used in the PoF equation for the CBRM approach).
- 5.12 We expect that this section will be different for NGET (FMEA), and SPT and SHE-T (CBRM).

Consequence of Failure Section

- 5.13 We are relatively satisfied with the development of the System consequence so far. We would however expect Licensees to continue to consider potential improvements, the ways in which it interacts with other areas of development, and whether any of these developments warrant further modification.
- 5.14 Further development in this area shall build on the current methodology with focus on Safety, Environmental, and Financial Consequence and provide:
- a. A detailed explanation of how consequence values will be estimated and applied to individual assets
 - b. Evidence and justification for the inclusion of each proposed calculation input i.e. that consumers should bear all or part of the consequence for that input
 - c. sufficient account of any separate probabilities of failure consequences,
 - d. sufficient account of correlations between condition related failure outcomes,
 - e. realistically quantification of probability and monetised consequence of all material consequence condition related failures,
 - f. sufficient account of uncertainty and range or distribution of expected failure consequences,
 - g. explanation of how scenarios are combined to arrive at a single expected monetised consequence of failure for each asset or range or distribution of expected monetised consequences.

5.15 We expect that this section will be the same for all three ETOs.

Risk Section

- 5.16 This section shall cover the process for combining probability of failure and consequence of failure according to the Licensee specific approaches to derive monetised risk.
- 5.17 We acknowledge that there will be differences between the two approaches in the section but the general approach shall be consistent.

6. Licensee Specific Appendices

- 6.1 Licensees shall ensure that Licensee Specific Appendices that comply with the requirements of Part C of the 2016 Direction are submitted alongside Common Methodology.

7. Assumptions Log

- 7.1 To fully comply with paragraph 13 of the 2016 Direction, Licensees shall submit an Assumptions Log containing:
- a. an explanation of the assumption
 - b. a description of the rationale for any assumptions required for quantification purposes

- c. Review and update schedule
- d. an explanation of the limitations or biases introduced through the application of assumptions or limitations in input data
- e. an explanation of future steps to be taken to eliminate or reduce the limitations or biases.

8. **Uncertainty Methodology**

- 8.1 The current methodology addresses at a general level how input uncertainty is used to estimate output uncertainty. The general approach described appears reasonable to address some of the input uncertainty to estimate the resultant output uncertainty.
- 8.2 To further comply with paragraphs 15 and 16 of the 2016 Direction, the final methodology needs to explain the following in relation to treatment of uncertainty:
 - a. How all material inputs, including those that are not normally distributed, will be treated.
 - b. How uncertainty introduced by data gaps will be estimated.
 - c. How age of data inputs will be taken into account (e.g. time since last inspection).
 - d. How differences in processes between Licensees contribute to differences in output uncertainty and how the process elements introducing the greatest uncertainty differences will be identified.
 - e. How estimates of output uncertainty are derived when the process equations cannot be broken down into combinations of the function types. A more complex approach to estimating output uncertainty (such as Monte Carlo simulation) may be required when non-linear algebraic functions or maximum/minimum functions (or nested maximum/minimum functions) are used.

9. **Assets Requiring Separate Treatment**

- 9.1 Paragraphs 34 of the 2016 Direction sets out requirements relating to justification for any separate treatment of assets. We have not yet seen sufficient evidence to suggest that normal implementation of the NOMs Methodology and the associated incentive mechanisms will lead to or incentivise the incorrect management of any network assets. Our view is therefore that all network assets forming part of the Licensees Network Replacement Output targets (as specified in table 1 of SpC 2M) should fall within the scope of normal treatment under the NOMs Methodology.
- 9.2 To further clarify the requirements of paragraph 34 of the 2016 Direction, to justify separate treatment for any assets then Licensees must explain in sufficient detail:
 - a. the outcomes to be mitigated and/avoided.
 - b. the sequence of events that could lead to the outcome and how it might be triggered or exacerbated by loss of specific transmission assets proposed separate treatment.

- c. how specific assets are identified as requiring separate NOMs treatment.
- d. what good practice (effective asset management) in respect of these assets is. This means the ETOs must as a minimum explain:
 - i. how these assets are treated when designing an intervention plan
 - ii. how these assets are treated during plan implementation; for example, how new information, such as updated condition or criticality assessment information, is used to decide whether assets are moved out of or brought into plan
 - iii. how treatment (i and ii) differs from the treatment of other similar network assets
 - iv. the reasons for any different treatment.
- e. the elements of best practice that normal application of the NOMs Methodology and overall NOMs Licence Mechanisms will cause the Licensee not to apply or disincentivise it from applying.
- f. how the normal application of the NOMs methodology to these assets would result in Licensees not complying with their legal obligations or penalise it for doing so.
- g. why the NOMs Methodology could not be designed to ensure that normal treatment enables ETOs to apply the relevant best practice elements (referred to in e above).
- h. the specific separate treatments necessary to maintain good practice and the reasons for them.

Part C: Associated Deliverables

10. Risk Trading Model

10.1 Section B of the 2016 Direction sets out requirements for development of a Risk Trading Model (RTM).

10.2 We further clarify these requirements as follows:

Licensees may choose suitable delivery platforms for their risk trading model. Each model shall adhere to the following:

- a. be fully auditable, and accurately reflect the description of processes and calculations described in the Common Methodology
- b. be consistent but are not necessarily required to be common
- c. be consistent for the same assets across all Licensees

- d. explain all processes
- e. ensure that different delivery platforms shall lead to equivalent results
- f. ensure that lifetime benefit of interventions can be measured
- g. produce suitable outputs to allow the robust assessment of:
 - i. why and how investments are prioritised by consideration of whole life costs and benefits
 - ii. the benefit of any trade-off between incremental cost of doing or not doing work, and incremental movements in risk
 - iii. an objective overview of the Licensees' performance against their targets
- h. Returns as outputs in an MS Excel table(s):
 - i. an aggregated monetised risk scores for each Licensee's Network Asset categories,
 - ii. an aggregated monetised risk score for each Licensee's Transmission Network.
- i. The model shall take into account the individual monetised risk scores for a Licensee's individual network assets. These value shall not be provided as a matter of course but the ability to make them available if required should be built in.
- j. The model shall articulate the information necessary to make policy decisions on desired levels of risk and the investments required to efficiently deliver those required levels of risk.

10.3 Licensees shall detail deliverables in their development plan that enable Ofgem to assess the following;

- a. Provide assurances that the final deliverables will comply with 9.1 above
- b. Judge progress towards final delivery during development
- c. Ensure consistency across Licensees' RTMs

11. Calibration, Testing and Validation (CTV) Plans

11.1 Section C of the 2016 Direction sets out requirements for Calibration, Testing, and Validation. Further clarification on CTV requirements are set out in paragraphs 11.2 to 12.1 below.

11.2 Licensees shall share data and actively collaborate to ensure robust CTV.

11.3 The methodology shall:

- a. explain what is involved in each of the stages; Calibration, Testing and Validation
- b. detail how the stages reflect the common and Licensee specific sections of the methodology

- c. have equivalent exercises across Licensees for those stages

11.4 The Methodology shall build on the current proposal for calibrating, testing and validating the model such that when implemented, it will provide sufficient confidence that:

- a. the Methodology achieves the NOMs Methodology Objectives as set out in Part B of Special Condition 2L,
- b. the model described by the Methodology works mechanistically as intended,
- c. the Risk Trading Model accurately reflects the processes described in the Common Methodology,
- d. the Model works across a suitable range of credible scenarios,
- e. individual parameter input values have been suitably sensitivity tested and therefore that small or credible variations will not lead to disproportionate changes in overall results,
- f. the risk scores output by the model are credible and reflective of real world asset condition related failure scenarios,
- g. Model outputs are consistent and comparable across:
 - i. geographic areas of, and Network Assets within, each Licensee's Transmission Systems,
 - ii. a Licensee's Transmission System and other Transmission Systems forming part of the National Electricity Transmission System (NETS),
 - iii. the NETS and Distribution Systems within Great Britain,
- h. application of the Methodology will lead to investment decisions that maximise benefit to consumers.

11.5 The testing, validation, and calibration plans shall include:

- a. explanation of the approaches to testing, validation, and calibration,
- b. explanation of the data to be used, including any approach utilising data samples. In order to comply with SpC 2L.11(e), where reasonably practicable, testing, validation, and calibration should utilise ten years of historical data,
- c. any ongoing work necessary to refine and identify potential improvements to the Methodology,
- d. time frames for testing, validation, and calibration.

11.6 The Methodology must be designed to enable parameters to be easily adjusted to reflect results of the testing, validation, and calibration exercises.

12. Calibration, Testing and Validation Outputs

12.1 Outputs from the testing, validation, and calibration process shall include:

- e. identification of any points of weakness in the Model,
- f. calibrated input parameter values that achieve the requirements of risk trading model set out above,
- g. identification of common or Licensee specific data gaps.

13. Rebasing methodology

13.1 Paragraphs 27 to 29 of the 2016 Direction set out requirement on translation of existing RIIO-T1 (volume based) replacement priority targets to equivalent monetised ones. The Methodology shall build on Licensees' current proposals as set out in paragraphs 13.2 to 14.1 below.

13.2 This shall include a step by step explanation of how monetised targets that are equally challenging as those set out in SpC 2M shall be derived.

13.3 In designing the Methodology, Licensees must not be constrained by trying to arrive at the same replacement priorities as indicated by Table 1 (Replacement Priority Outputs) of SpC 2M. The monetisation approach, for example, may result in some assets currently in a low replacement priority category⁶ being assessed as higher risk when the monetisation approach is applied (and vice versa).

13.4 Licensees shall set out the deliverables (and their timing) for this section in the development plan.

14. Rebased monetised targets

14.1 Rebased monetised targets shall be submitted by each Licensee in accordance with the approved rebasing methodology.

14.2 Timings for delivery to be set out in development plan.

⁶ Under the previous Methodology there are four replacement priority categories from RP4 (the lowest replacement priority) to RP1 (the highest replacement priority).

Part D: Other instructions

15. Implementation of the Incentive Mechanism

- 15.1 Development of the incentive mechanism is on-going on a cross sector basis. Licensees shall engage constructively in this process and work to implement the results of that workstream together with the new developed methodology.
- 15.2 This will be dependent on the cross sector output being aligned to the ET NOMs development timeline.

16. Public availability of the methodology and associated deliverables

- 16.1 The Methodology shall be designed to be publicly available or require minimal redaction so as to make it publicly available. Any required redactions should not materially reduce transparency or the understanding that can be obtained from the Common Methodology.
- 16.2 It is expected that the Licensee specific Appendices will contain sensitive information and data. There is therefore no requirement to design the specific Appendices to be publicly available. However, there should be a description of the content of such Appendices in the publicly available Common Methodology, with explanation of how they feed into the implementation of the Methodology and to what extent they differ amongst the Licensees.

Annex 1: Definitions

Term	Definition
Asset category	The categories of assets set out in Table 1 of each Licensee's Special Condition 2M (Specification of Network Replacement Outputs).
Asset Group	Asset group is a subset of assets within an asset category with similar expected deterioration characteristics and expected asset life.
Common Currency	See "monetisation" below.
Condition related (asset) failure	The failure of an asset where the asset condition is the underlying cause.
Condition Risk	The assessed risk of Network Assets failing due to predicted deterioration in condition. It is formed by: <ul style="list-style-type: none"> a. the product of the expected consequence of condition related asset failure and the probability of that condition related asset failure occurring, or b. the sum of such products in the case of multiple possible failure modes or failure consequences.
Current Methodology	The version of the NOMs Methodology submitted to the Authority on 28 April 2017 and in effect from 26 May 2017.
(The) Model	The overall processes described by the NOMs Methodology.
Monetisation/ monetised	The convention of assigning monetary values to the consequences of asset failures in order to express different consequences in comparable terms. When appropriately combined with the probability of these consequences of failure occurring, monetisation of consequence will produce monetised risk values for the relevant assets.
NOMs Licence Mechanisms	The mechanisms set out in Special Conditions 2L and 2M of the electricity transmission licence.
Sensitive (data or information)	Sensitive in respect of information or data means any information or data that may be damaging to national security, security of supply, or to a Licensee or commercial partner if improperly accessed.
Rebasing of Targets	The derivation of monetised targets that are equally challenging to those set out in Special Condition 2M
Equally challenging	<i>Definition (in the context of electricity transmission) be agreed during development</i>
EoLmod (End of Life Modifier)	An indicator of an asset's or asset component's position on its life-cycle curve.