Direction to modify NOMs Methodology

To:
National Grid Electricity Transmission Plc
[Company Number 2366977]

Scottish Hydro Electric Transmission Plc
[Company Number SC213461]

SP Transmission Plc
[Company Number SC189126]

Direction under paragraph 2L.13 of Special Condition 2L (Methodology for Network Output Measures) of the electricity transmission licence

1. Each of the companies to whom this Direction is addressed ("licensee" and jointly "the licensees") holds an electricity transmission licence under section 6(1)(b) of the Electricity Act 1989 ("the Act").

2. The licensees submitted proposals to modify the NOMs Methodology ("Methodology") to the Gas and Electricity Markets Authority ("the Authority") in compliance with paragraph 2L.10 of Special Condition 2L ("SpC 2L") of the electricity transmission licence on 16 February 2016. As the Authority did not issue a direction under paragraph 2L.12 of SpC 2L requiring the licensees not to implement such proposed modification, the licensees are now required under paragraph 2L.12 of SpC 2L to implement the proposed modification to the Methodology.

3. As set out in paragraph 2L.3 of SpC 2L the NOMs Methodology Objectives are:

    a. the monitoring of the licensee's performance in relation to the development, maintenance and operation of an efficient, co-ordinated and economical system of electricity transmission;

    b. the assessment of historical and forecast network expenditure on the licensee's Transmission System;

    c. the comparative analysis of performance over time between:
        i. geographic areas of, and Network Assets within, the licensee's Transmission System;
        ii. the licensee's Transmission System and other Transmission Systems forming part of the National Electricity Transmission System;
        iii. the National Electricity Transmission System and Transmission Systems outside Great Britain; and
        iv. the National Electricity Transmission System and Distribution Systems within Great Britain;

    d. the communication of relevant information about the licensee's Transmission System to the Authority and other interested parties in an accessible and transparent manner; and

    e. the assessment of customer satisfaction derived from the services provided by the licensee as part of its Transmission Business.

4. The Authority's view is that the Methodology should be further modified to better facilitate achievement of the NOMs Objectives.

Direction

5. The Authority hereby directs under paragraph 2L.13 of SpC 2L licensees to modify the Methodology in the manner and to the extent set out in Annex 1 to this Direction.

6. Licensees are required to modify the Methodology in accordance with the timeframes set out in Annex 2 to this Direction.

7. This Direction will take effect on and from 30 April 2016.

Min Zhu
Associate Partner, Electricity Transmission
Duly authorised on behalf of the Gas and Electricity Markets Authority

Annex 1: Required modifications to the NOMs Methodology

1. Manner of modification

1. The modified Methodology when fully developed in accordance with this Direction shall as a minimum consist of:

    A. A methodology main document (Common Methodology)

    B. A Risk Trading Model

    C. Testing, validation, and calibration plans and models

    D. Licensee Specific Appendices.

    Reference to the Methodology in this Direction means the full set of documents comprising the Methodology.

2. The extent of the modifications to the existing Methodology and specific requirements for development related to the above deliverables (documents A, B, C, D listed in paragraph 1 above) are explained in Section 2 below.

3. Licensees shall work collaboratively to deliver a Methodology that complies with this direction. They shall also ensure that Ofgem is provided with updates on progress at intervals of no less than every two months. These updates may be through minuted meetings, written summary documents, draft versions of the above deliverables, or combinations of these.

4. Ofgem may provide further clarification on development requirements following updates from licensees if required.

2. Extent of modification

5. The Methodology shall be designed to facilitate the NOMs Objectives and to comply with the principles of transparency and objectivity as described below:

    a. Transparency – i.e. the Methodology should contain sufficient detail to explain to a competent independent assessor why and how investments are prioritised and how efficient levels of past and future expenditure are determined. The publicly available elements of the NOMs should enable a competent reader without access to sensitive information or data to form a theoretical view on performance of a 'Generic TO'[1].

    b. Objectivity – i.e. the Methodology will be unambiguous and enable any two competent independent assessors (with access to the same input data) to arrive at the same view of licensees' performance (over-delivery, under-delivery, or on target delivery) and to identify and quantify the relevant factors contributing to performance.

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[1] We acknowledge that there are licensee specific factors relating to, for example, geography, network configuration, asset type, demand and generation characteristics, and operating practices, etc. that may apply differently for each of the three electricity transmission licensees. Therefore, it may be necessary to utilise licensee specific modifiers in order to adjust any generic view of performance to one that properly represents a specific licensee's performance. The performance of a 'generic TO' is the view of performance that would be formed prior to application of any licensee specific modifiers.

A. Common Methodology

General extent of modification

6. The current 'Electricity Transmission Network Output Measures Methodology' document shall be modified to the extent outlined below. Reference to the Common Methodology in this Direction mean the required modified version of this document.

7. The Common Methodology shall explain the overarching approach to evaluating the NOMs, the elements of the Methodology that are common to the three licensees, and any licensee specific approaches where it is practicable to do so.

8. The modifications shall focus on the evaluation of the network condition measure, network risk measure, and Network Replacement Outputs. Common Methodology modifications in respect of the network performance measure and network capability measure are required only in so far as they are required for the purpose of enabling the evaluation of the other three measures and/or where modifications in wording or structure will aid clarity or transparency.

9. The Methodology shall extend the current monetisation approach (or adopt another suitable Common Currency approach) to:

    a. enable the like for like comparison of Condition Risk[2] between different categories of assets and between assets in the same category but of a different voltage or asset group,

    b. help explain and justify licensees' end-to-end investment plans[3] for managing and renewing their Network Assets by quantifying the overall risk levels and trade-offs between the cost of an investment plan and the benefits the plan will deliver,

    c. help justify licensees' choice of investment plan (and elements within it) over alternative options,

    d. help identify and quantify the impact of drivers leading to changes in licensees' investment plans.

10. The Methodology shall enable evaluation of performance over a full price control period and over individual regulatory years.

11. The Methodology shall be designed to enable licensees to report the specified information required by the Authority under Transmission Licence Standard Condition B15 (Regulatory Instructions and Guidance) (SLC B15) to enable it to administer Special Conditions 2L and 2M.

Common and licensee specific parameters

12. The Common Methodology shall explain all parameters relevant to the evaluation of the network condition measure, the network risk measure, and Network Replacement Outputs plus any relevant interim steps necessary to arrive at final Model output values. Additionally it should contain:

    a. explanation of all relevant input and output parameters,

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[2] Condition Risk is the assessed risk of Network Assets failing due to predicted deterioration in condition (see Annex 3 for full definition).
[3] Investment plans may contain elements of both operational expenditure and capital expenditure.

b. all required formulae for combining parameters to arrive at network condition, network risk, and Network Replacement Output values,

c. explanation of any modifier parameters required to adjust the common approach for licensee specific factors,

d. explanation of data required to evaluate the network condition measure, the network risk measure, and Network Replacement Outputs, as well as explanation of:

    i. gaps in data held by licensees, and

    ii. plans for data collection or assumptions necessary to address data gaps.

13. The methodology shall explain all material assumptions required to determine parameter values. It shall describe the rationale for any assumptions required for quantification purposes.

14. The methodology shall explain the limitations or biases introduced through the application of assumptions or limitations in input data and shall explain future steps to be taken to eliminate or reduce these limitations or biases.

Treatment of uncertainty in parameter estimates

15. Some of the input parameters (e.g. conditions scores, asset deterioration profiles) will contain inherent levels of uncertainty. The current approach proposed by the licensees in order to arrive at final estimates of the network condition measure, network risk measure, and Network Replacement Outputs is to use point estimate values of these uncertain parameters.

16. We do not expect licensees in all cases to be able to account for all uncertainty. However, the Common Methodology shall:

a. explain where relevant how uncertainty has been accounted for and resultant confidence intervals around the main output parameters,

b. explain any adjustments or allowances necessary for varying levels of uncertainty in input data, e.g. due to differences in regularity of inspection and condition assessment, and

c. explain how licensees can provide assurance that despite the levels of uncertainty, the estimates of the network condition measure, the network risk measure, and Network Replacement Outputs are sufficient to enable the Authority to implement the NOMs Incentive Mechanism.

Asset Health

17. Asset health is related to the expected life of an asset. The Methodology currently places each asset into one of five asset health indices (AHI) from AH1 (new or as new assets) through to AH5 (asset at the end of its serviceable life) based on several factors including condition assessment scores, operating environment, and expected future deterioration. The modified methodology shall utilise the same factors used to determine AHI (and any additionally required factors) to determine for individual assets:

a. the probability of failure of the asset, or

b. probabilities of failure where it is appropriate to assume more than one failure mode or failure scenario.

18. The Methodology may translate existing AHI scores to probabilities of failure but it shall ensure that it takes sufficient account of:

    a. differences in probability of failure between different asset categories and different asset groups

    b. differences in operating environments, circuit loading, etc.

19. In designing the approach to evaluating probabilities of failure, licensees shall give sufficient consideration to alternatives to translating the five discrete AHI scores to five discrete probabilities of failure. Alternative approaches considered should include the use of greater number of discrete probabilities of failure or the use of continuous distribution functions.

20. Probability of failure values should reflect the assumption that routine maintenance required to achieve asset life will be carried out, and the probability values should be capable of being modified to reflect any planned or historical deviations from routine maintenance requirements. The Methodology should enable licensees to demonstrate whether changes in maintenance programmes are appropriate and to demonstrate the costs and benefits associated with any trade-offs between opex and capex asset management options.

Asset Criticality

21. The NOMs is concerned with the evaluation and management of Condition Risk, and as such any criticality values used for calculating risk should reflect the consequence of asset failures where asset condition is the underlying cause.

22. In order to enable the evaluation of the network risk measure the Methodology must provide for a valid (realistic and credible) estimate of the consequence of asset failures and the probability of those consequences occurring as a result of asset failures where condition is an underlying cause. Licensees are therefore required to develop a methodology for quantifying consequences of asset failure that:

    a. reflects the actual design and operation of the network and configuration of assets, including any built in redundancy,

    b. describes asset condition related failure scenarios that take sufficient account of actual sequences and concurrency of events required for given failure outcomes (monetised consequences) to materialise,

    c. takes sufficient account of the probability of relevant prevailing system conditions prior to assumed condition related asset failures and/or probability of occurrence of any sequence and concurrency of events required for given failure outcomes to materialise,

    d. takes sufficient account of any separate probabilities of environmental, safety, and system failure outcomes occurring,

    e. takes sufficient account of correlations between condition related failure outcomes,

    f. realistically quantifies the probability and monetised consequence of all material consequence condition related failures,

    g. takes sufficient account of any actions expected to be taken by the system operator to secure the system following a condition related

failure (and if appropriate the probability of the successful outcome of those actions),

h. takes sufficient account of uncertainty and range or distribution of expected failure consequences,

i. explains 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.

Condition Risk

23. The Methodology shall explain how valid Condition Risk values that represent real world condition related asset failures are derived from probability of failure and consequence of failure values for individual assets.

24. Probability of failure values and consequence of failure values must be compatible (i.e. they must reflect the same failure scenario) when used to derive risk values.

25. The Methodology shall explain how the individual condition risk of a licensee's individual assets can be aggregated to derive a valid realistic quantification of the total condition related risk of a licensee's Transmission System.

26. The Methodology shall explain how the individual licensees' Transmission System condition related risk can be aggregated to derive a valid realistic quantification of the condition related risk of the National Electricity Transmission System.

Network Replacement Output Targets

27. The Methodology shall enable the translation of existing RIIO-T1 (volume based) replacement priority targets to equivalent monetised (or alternative) output targets and shall provide the basis for setting targets in future price control periods.

28. The Methodology shall enable the translation of existing RIIO-T1 Network Replacement Outputs from replacement priority volumes to monetised risk targets so that the monetised risk targets:

a. reflect the same assumed capital programme used in setting existing replacement priority targets,

b. realistically reflect the Condition Risk taking account of assessments of individual assets at the time the targets were set.

29. To clarify requirement in paragraph 28b above, 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 category[4] being assessed as higher risk when the monetisation approach is applied (and vice versa).

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[4] Under the Current Methodology there are four replacement priority categories from RP4 (the lowest replacement priority) to RP1 (the highest replacement priority).

30. The Methodology shall:

   a. enable licensees to demonstrate, and the Authority to assess, the economic efficiency of the asset management proposals contained in forward looking business plans, and

   b. enable licensees to demonstrate, and the Authority to assess, the relative benefits of alternative asset management options.

Implementation of the Incentive Mechanism

31. The Methodology shall be designed so that it enables the objective assessment of over-delivery or under-delivery against targets.

32. The Methodology shall enable the identification of all material factors contributing to real or apparent performance against targets including but not necessarily limited to:

   a. Replacement,

   b. Refurbishment,

   c. Load related work programme and changes from assumed load related plan inherent in targets,

   d. Changes in criticality,

   e. Data revisions,

   f. Early life failure of assets,

   g. Changes in maintenance programme,

   h. Condition reassessment (unrelated to changes in maintenance programme),

   i. Changes in legal requirements.

33. The Methodology shall:

   a. enable and explain the quantification of all material factors impacting performance,

   b. enable and explain the separate quantification of individual elements of performance to enable an objective view to be formed on whether they are justified or unjustified,

   c. enable the quantification of costs associated with over-deliver or under-delivery.

Assets requiring separate treatment

34. Where additional considerations or risk factors require separate treatment for specific assets or groups of assets, for example for certain Control of Major Accident Hazards (COMAH) sites, black start sites, nuclear licence sites, then the Methodology must explain in sufficient detail:

   a. the justification for separate treatment and explain why normal treatment will lead to incorrect results,

b. how specific sites/assets are selected for separate treatment,

c. how investment decisions are made for these sites/assets and how risk trading in respect of these assets will work.

Implementation Plan

35. The Common Methodology shall outline the licensees' plans for implementing the Methodology. This shall include:

    a. the proposed timeline for implementation,

    b. any necessary phased implementation programme (i.e. if it is necessary to implement elements of the Methodology at different times),

    c. any issues to be resolved or required work necessary before full implementation can be achieved,

    d. any interim measures necessary to enable the Authority to administer the NOMs Licence Mechanisms ahead of full implementation of the Methodology.

Public availability of Common Methodology

36. The Common 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.

B. Risk Trading Model

37. The Methodology shall include a numerical model that:

    a. when used alongside related cost data will demonstrate the benefit of any trade-off between incremental cost of doing or failing to do work and incremental movements in risk,

    b. is capable of being populated with real Network Asset data,

    c. accurately reflects the description of processes and calculations described in the Common Methodology and Licensee Specific Appendices

    d. returns as outputs:

        i. individual monetised risk scores for a licensee's individual Network Assets,

        ii. an aggregated monetised risk scores for each licensee's Network Asset categories,

        iii. an aggregated monetised risk score for each licensee's Transmission Network.

Public availability of the Risk Trading Model

38. The Risk Trading Model shall be designed to be publicly available unless populated with sensitive data.

C. Testing, validation, and calibration plans and models

39. The Current Methodology (section 5.0) defines 'Calibration', 'Validation', and 'Testing'. The Methodology shall be revised to contain plans for testing, validation, and calibration that when implemented will in combination 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 significant 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. that the approach for assets requiring separate treatment (see paragraph 34) is appropriate, including demonstration of why normal treatment would lead to incorrect results,

     i. application of the Model will lead to investment decisions that maximize benefit to consumers.

40. 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. timeframes for testing, validation, and calibration.

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

   a. identification of any points of weakness in the Model,

   b. calibrated input parameter values that achieve the requirements of paragraph 39 above,

   c. identification of common or licensee specific data gaps.

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

Public availability of Testing, validation, and calibration plans and models

43. The testing, validation, and calibration plans shall be designed to be publicly available.

44. Any testing, validation, and calibration models shall be designed to be publicly available unless populated with sensitive data.

45. With the exception of resulting changes to non-sensitive parameter values, there is no requirement to make the results of testing, validation, and calibration publicly available.

D. Licensee Specific Appendices

46. Each licensee has their own Specific Appendix to the current NOMs Methodology. While these are sensitive documents and therefore not publicly available, some of the information contained in them would not ordinarily be classified as sensitive. Licensees are therefore required to, where reasonably practicable, move any non-sensitive information to the Common Methodology or to a publicly available appendix to the Common Methodology.

47. The Licensee Specific Appendices shall be clearly structured to enable unambiguous referencing from the Common Methodology.

48. Licensees shall collaborate in so far as is necessary in order to ensure that the Licensee Specific Appendices and the Common Methodology are aligned. However, each licensee is required to submit its own Licensee Specific Appendix.

Public availability of Licensee Specific Appendices

49. It is expected that the 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 2: Timeframes for modifying the NOMs Methodology

1. Licensees shall submit the following deliverables to the Authority for review ahead of consultation under SpC 2L.11 no later than 31 December 2016:

    a. Draft Common Methodology,

    b. Draft Risk Trading Model,

    c. Draft testing, validation, and calibration plans,

    d. A report explaining how a to c above comply with this direction.

2. Following review the Authority will provide feedback to licensees on compliance with this direction. Licensees shall submit final versions of the deliverables listed under paragraph 1 above for the Authority's approval no less than two months from the date of receipt of the Authority's feedback.

3. Each licensee shall submit a Licensee Specific Appendix for the Authority's approval no later than 30 April 2017.

Annex 3: 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: 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 16 February 2016 and in effect from 16 March 2016.
(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. Alternative conventions (or Common Currencies) for expressing different consequences in comparable terms may be adopted if these can be demonstrated to be more appropriate. Reference to monetisation in this Direction does not preclude licensees from proposing an alternative Common Currency if they can demonstrate that the proposed common currency is appropriate.
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.