



**Private and confidential**

The Directors  
National Grid Electricity System Operator Limited  
Faraday House  
Warwick Technology Park  
Gallows Hill  
Warwick  
CV34 6DA

12 May 2020

PwC reference: CW

Dear Sirs

**Report on compliance with the Balancing Principles Statement for the year ended 30 September 2019 (“the Year”)**

1. We have reviewed the extent to which National Grid Electricity System Operator Limited (“NGESO”), previously National Grid Electricity Transmission plc (“NGET”), in its procurement and use of Balancing Services, has complied with the Balancing Principles Statement (“BPS”) for the year ended 30 September 2019.
2. We have completed this audit work in accordance with the Form of Agreement, Project Proposal WS942194761 agreed between ourselves and National Grid Electricity Transmission Plc on 11 December 2017 and novated to National Grid Electricity System Operator Limited applicable from 1 April 2019.
3. The Form of Agreement includes a clause limiting the total liability of PricewaterhouseCoopers LLP to NGESO and all others authorised to rely upon this work, to a maximum of, unless otherwise specified in a Project Schedule, 200% of the charges incurred (excluding VAT).
4. Unless the context otherwise requires, words and expressions defined in the BPS, which is a document prepared by NGESO pursuant to Paragraph 5 of Condition 16 of its Transmission Licence, have the same meanings in this report as in that statement. During the Year, the BPS has been updated. The versions relevant to our opinion are:
  - a. Version 16.0, dated 1 April 2018; and
  - b. Version 17.0, dated 1 April 2019.

**Respective responsibilities of NGESO and Balancing Principles Statement Auditor**

5. NGESO is responsible for taking all reasonable steps to ensure its compliance with the BPS, in respect of its use of Balancing Services.
6. It is our responsibility, within the Terms of Reference, to review on a sample basis, the compliance of NGESO with the BPS in respect of the use of Balancing Services. This work is performed with a view to expressing an independent opinion as to whether NGESO has complied with the relevant requirements in the Balancing Principles Statement.

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### **Independence and Quality Control**

7. We complied with the Institute of Chartered Accountants in England and Wales (“ICAEW”) Code of Ethics, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.
8. We apply International Standard on Quality Control (UK) 1 and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

### **Basis of review and scope of work**

9. We have performed the reasonable assurance engagement in line with the requirements of the International Standard on Assurance Engagements 3000 (Revised) - ‘Assurance engagements other than audits or reviews of historical financial information’ issued by the International Auditing and Assurance Standards Board.
10. We have planned and performed our review in accordance with our review approach dated August 2019, which we have agreed with NGENSO and which is set out in our document “Supplement to the Balancing Principles Statement report for the year ended 30 September 2019” (“the Supplement”) which we have sent to both NGENSO and the Office of Gas and Electricity Markets (“Ofgem”).
11. The Supplement provides a detailed description of the approach we have adopted to the review. In particular, it describes those aspects of Balancing Services that we have examined during our review and those which are outside the scope of this review. Our review included an examination, on a test basis, of both the Balancing Services procured and used by NGENSO, and of the estimates and judgements made by NGENSO in using Balancing Services. This report should be read in conjunction with the Supplement.
12. In reaching our conclusion we assessed the risk of a material breach of the way NGENSO has used Balancing Services compared with the requirements of the BPS, whether caused by fraud or other irregularity or error, and determined the adequacy of procedures and controls established by NGENSO to eliminate or reduce such risks.
13. For the avoidance of doubt, the scope of work performed excluded Emergency Instructions and Involuntary Reductions as described in the Grid Code for use in preserving system security in exceptional circumstances, such as the Low Frequency Demand Disconnection (“LFDD”) following Generator Trips and Frequency Excursion on 9 August 2019.

### **Opinion**

14. Based on our procedures, in our opinion, NGENSO has complied with the relevant requirements in the Balancing Principles Statement in all material respects, during the year ended 30 September 2019, with regards to:
  - the receipt and validation (including application of default data) of Physical Notification (“PN”) data;
  - the consistency of demand and operational data provided to market participants during the Day Ahead and within day balancing processes to data used internally by NGENSO and confirmation that the required timetable for the issue of this data has been met;
  - the call-off of Balancing Services in cost order during the Day Ahead balancing process. Balancing Services to include Ancillary Services active power contracts only;
  - the call-off of Balancing Services in cost order during the within day balancing process. Balancing Services to include Ancillary Services active power contracts and accepted Bids and Offers in the Balancing Mechanism including Pre Gate Closure BMU Transactions (“PGBTs”); and
  - NGENSO’s adherence to internal operating procedures for activities that impact the call-off of Balancing Services during the day-ahead and within day balancing processes. For the avoidance of doubt, this includes internal operating procedures that relate to the management of transmission constraints and response/reserve holdings during the day-ahead and within day balancing processes.



#### **Use of this report**

15. This report is intended solely for the use of the Directors of NGESO and Ofgem. While we acknowledge that this report will be published on the NGESO website, this is for information purposes only and we do not intend that it should be relied upon by anyone other than the parties mentioned above (where terms are agreed with Ofgem in writing).
16. The maintenance and integrity of that website is the responsibility of the Directors of NGESO. The work that we carried out does not involve consideration of the maintenance and integrity of that website and, accordingly, we accept no responsibility for any changes that may have occurred to this report since it was initially presented on the website.
17. This report has been prepared in the expectation that NGESO and Ofgem will have sufficient experience of Balancing Services to understand the scope of our review without further background explanation and to evaluate the contents of this report in the context of the scope of our work.

Yours faithfully

*PricewaterhouseCoopers LLP*

PricewaterhouseCoopers LLP, Birmingham  
Chartered Accountants

*National Grid  
Electricity Energy  
System Operator  
Balancing  
Principles  
Statement Review*  
Review approach for  
the year ending 30  
September 2019

*August 2019*

*The Supplement*

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## ***Objective and scope of the Balancing Principles Statement Review***

- 1 The Balancing Principles Statement<sup>1</sup> (“BPS”) sets out, at a high level, National Grid Energy System Operator Ltd’s (“NGESO’s”) obligations and responsibilities in respect of the management of supply and demand over the national transmission network and has been written to be consistent with NGESO’s licence obligation to “operate the licensee’s Transmission System in an efficient, co-ordinated and economical manner”.
- 2 The objective of our review is to form an independent opinion based on our review work as to the compliance of NGESO, in all material respects, with the BPS in respect of the use of Balancing Services for the year ending 30 September 2019 (“the Year”).
- 3 The reasonable assurance engagement will be performed in line with the requirements of the International Standard on Assurance Engagement 3000 (Revised), - ‘*Assurance engagements other than audits or reviews of historical financial information*’ issued by the International Auditing and Assurance Standards Board.
- 4 This Review Approach has been prepared by PricewaterhouseCoopers LLP (“PwC”) and accepted by NGESO as the basis for the current year’s audit, as required in the contractual arrangements in place between PwC and NGESO in respect of this audit.
- 5 Condition C16 of NGESO’s Transmission Licence defines Balancing Services as:
  - (a) Ancillary Services;
  - (b) offers and bids made in the Balancing Mechanism; and
  - (c) other services available to the licensee which serve to assist the licensee in co-ordinating and directing the flow of electricity onto and over the national electricity transmission system in accordance with the Act or the standard conditions and/or in doing so efficiently and economically, but shall not include anything provided by another transmission licensee pursuant to the System Transmission Code.
- 6 The scope and subject matter for the purposes of ISAE 3000 (Revised), of our review is:
  - (a) the receipt and validation (including application of default data) of Physical Notification (“PN”) data;
  - (b) the consistency of demand and operational data provided to market participants during the Day Ahead and within day balancing processes to data used internally by NGESO and confirmation that the required timetable for the issue of this data has been met;
  - (c) call-off of Balancing Services in cost order during the day-ahead balancing process. Balancing Services to include Ancillary Services active power contracts only;
  - (d) the call-off of Balancing Services in cost order during the within day balancing process. Balancing Services to include Ancillary Services active power contracts and accepted Bids and Offers in the Balancing Mechanism including Pre Gate Closure BMU Transactions (“PGBTs”); and
  - (e) NGESO’s adherence to internal operating procedures for activities that impact the call-off of Balancing Services during the day-ahead and within day balancing processes. For the avoidance of doubt, this includes internal operating procedures that relate to the management

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<sup>1</sup> *Balancing Principles statement versions 15.0 effective from 1 April 2017 and 16.0 effective from 1 April 2019*

of transmission constraints and response/reserve holdings during the day-ahead and within day balancing processes.

- 7 For the purpose of clarity we note that in assessing internal operating procedures relevant to the above activities, those aspects that involve engineering decisions that NGESO make are expressly excluded from the scope of our review, as agreed with NGESO.
- 8 In agreement with NGESO we have excluded from the scope of our review the procedures of NGESO which address the following activities described in the BPS:
- (a) Emergency Instructions and Involuntary Reductions as described in the Grid Code for use in preserving system security in exceptional circumstances;
  - (b) operational planning activities undertaken prior to the Day Ahead stage;
  - (c) engineering decisions taken in the calculation of transmission constraints and response/reserve holdings;
  - (d) engineering decisions made in the call-off of Ancillary Services or acceptance of Bids and Offers in the balancing mechanism;
  - (e) the procurement of Balancing Services to provide services to external system operators via System-to-System Services;
  - (f) acceptance of arbitrage trades made within the Balancing Mechanism;
  - (g) the management and planning of transmission system outages; and
  - (h) the use of 'other services' as referred to in the definition of Balancing Services in paragraph 4 (c) above.
- 9 For the avoidance of doubt, it is not the responsibility of the BPS Auditor to:
- (a) confirm that the BPS is consistent with legislation/statutory obligations;
  - (b) confirm that system security has been maintained at all times; or
  - (c) review the accuracy of forecast demand as prepared by NGESO compared to actual demand.
- 10 In interpreting the BPS, we have relied on our own interpretation of that statement. We are not legal advisors and have not taken independent legal advice and shall therefore have no responsibility to NGESO or the Office of Gas and Electricity Markets ("Ofgem") were a court to interpret or construe the BPS in a different way from us.

## ***Call-off of Balancing Services in cost order***

- 11 As described above, we are required, as part of our review, to assess whether Balancing Services have been called-off in cost order. Part C paragraph 5 of the BPS, recognises that under certain circumstances it may not be possible to call-off Balancing Services in cost order and lists these circumstances. We have discussed the interpretation of cost order with NGESO as it relates to our review and have agreed that we should apply the following assumptions to our review of the call-off of Balancing Services:
- Balancing Services called-off during the day ahead balancing process (Ancillary Services active power contracts) have been selected based on lowest cost over the next 24 hour period.

- 12 Balancing Services called-off during the within day balancing process (Ancillary Services active power contracts and accepted Bids and Offers in the Balancing Mechanism) have been selected based on lowest cost over the subsequent 'Gate Closure period' following the service being called-off. The term 'Gate Closure period' is defined as the length of time between Gate Closure for a given Settlement Period and the end of that Settlement Period. Where it is not possible to call-off Balancing Services in cost order, Part C paragraph 5 of the BPS states that NGESO may take account of the 'observed and declared dynamic operating characteristics of available generation and demand Balancing Services'. During the course of our work we have assumed that the observed operating characteristics are those characteristics observed by NGESO since NETA 'go-live' on 27 March 2001.
- 13 We have assumed that PN data forms part of the 'observed and declared dynamic operating characteristics of available generation'. As such, we have assumed that actions taken by NGESO to mitigate risks to the security of the Transmission network arising from abnormal PN data is within the scope of Part C paragraph 5 of the BPS.

## ***Review approach***

- 14 Our review approach consists of the following, in respect of NGESO's use of Balancing Services:
- (a) reviewing the computer systems and/or internal operating procedures that NGESO have in place that relate to the use of Balancing Services;
  - (b) testing on a sample basis to the extent we considered necessary, the ongoing operation of the relevant computer systems and/or internal operating procedures during the Year; and
  - (c) testing on a sample basis to the extent that we considered necessary, the data processed by the relevant computer systems and/or internal operating procedures during the Year.
- 15 We will design our testing to provide reasonable assurance that the call-off of Balancing Services during the Year has been carried out in accordance with the sections of the BPS within the scope of our review.
- 16 In undertaking our review, we will assess the risk of a material non-compliance of the areas of the BPS within the scope of our review. In areas where we have identified specific risks, or where weaknesses have been identified in the operation of specific internal controls, these compliance tests will be supplemented by substantive tests of detail of the relevant underlying data. Our initial assessment of risks is presented in Appendix A below.
- 17 We will select eight Settlement Days for testing in the Year. The selection of the particular days reviewed will be based solely on our assessment of risk. It will represent a mixture of "normal" days and other days where we identify unusual factors (e.g. outages, weekends, clock change days or days around a specific event) which, in our view, represent a risk as to compliance with internal operating procedures.
- 18 In respect of our review of accepted Bids and Offers in the Balancing Mechanism we will select and review 48 half-hour periods within the eight sample days selected per paragraph 16 above. Our selection of half-hour periods reviewed will be weighted towards periods of high activity in the Balancing Mechanism and also where accepted Bids and Offers have resulted in higher System Buy Prices or lower System Sell Prices.
- 19 Where it is more efficient for us to do so, we will use Computer Assisted Audit Techniques ("CAATs") and run tests for the entire selected sample day. CAATs involve the use of data interrogation tools to perform automated tasks such as matching two or more types of records, identifying patterns and looking for anomalies.
- 20 Where we do not find sufficient samples of particular events/activities on the selected sample days we will select data from additional days to ensure that the sample sizes selected are in line with PwC policy.



- 21 Throughout our work, we will continue to monitor developments that impact upon the call-off of Balancing Services and where we identify a resulting risk in respect of our review we will assess the risk and determine an appropriate response.

## ***Materiality***

- 22 We will plan and perform our review so as to be able to provide reasonable assurance that NGESO has used the Balancing Services in all material respects in accordance with the BPS.
- 23 The assessment of what is material, and therefore what issues, if any, warrant inclusion in the BPS Report, is a matter of professional judgement. However, in applying this professional judgement, we will judge a failure on NGESO's part to comply with the BPS as being material if, in our opinion, a reasonable professional person, considering NGESO's adherence to the BPS in the round, would form a different view as to whether NGESO had complied with the BPS dependent as to whether or not the matter was disclosed to them. In applying this judgement we will take into account the following factors:
- (a) the extent to which the actual outcome would have been different had the principles set out in the BPS been applied;
  - (b) the surrounding circumstances at the time(s) of any failure to comply with the BPS;
  - (c) the aggregate impact in the Year of any failure to comply with the BPS; and
  - (d) the relative significance of the particular provision of the BPS that NGESO have failed to comply with.

## ***More detailed description of review work undertaken***

- 24 The review work that we have carried out can be divided into the main areas shown below.

### ***Receipt and validation of Physical Notification data***

- 25 Validation/accepted data:
- Sample test accepted data items, confirming data complies with required validation rules;
  - Review validation controls built into file transfers (e.g. record counts, control totals etc.); and
  - Identify and sample test key management controls over quality of data and, where relevant, sample test any instances where validation rules have been overridden for a valid reason.
- 26 Default data:
- Sample test data items that have been defaulted to check that the correct default data has been applied; and
  - Sample test defaulted data items to check that a valid PN data submission has not been made by the relevant market participant.
- 27 Incidents/exceptions:
- Review a sample of incidents where electronic transfer has been interrupted and of the actions taken designed to prevent data files being lost/duplicated;

- Review a sample of correspondence/help desk queries from market participants questioning rejection of a data files; and
- Sample test rejected items to check that data was rejected for a ‘valid’ reason.

## ***The consistency of data provided to market participants during the “day-ahead” and “within-day” balancing processes to data used internally by NGENSO***

### 28 Accepted items and controls:

- Sample test data items to check that the data had been submitted to the Balancing Mechanism Reporting Agent (‘BMRA’) directory in the required timescales;
- Sample test data items, reviewing evidence that procedures have been complied with (e.g. sign off of checklist, evidence of review and approval of value);
- Sample test controls over input of data to SORT/SPICE (e.g. sign off of input, one-for-one checking); and
- Sample test data items to check values reported to BMRA to data input sheets.

### 29 Incidents/exceptions:

- Review a sample of any complaints/disputes raised by market participants to identify any that related to the late provision of data; and
- Review a sample of operational log/fault log for IT systems to check for any system failures that have resulted in late delivery of data.

## ***The call-off of Ancillary Services contracts in cost order during the “day-ahead” balancing process***

### 30 Accuracy of data available:

- Check for a sample of days that the list from which contracts has been selected agrees to a list of contracts in place at that time;
- Sample test days to confirm that the assessment of the need for BM Startup contracts has been carried out as required and documented in procedures;
- Confirm evidence of management’s review and approval of decision; and
- Sample test BM Startup contracts called, to check that the decisions have been made in accordance with documented procedures.

### 31 Analytical review:

- Sample test BM Startup contracts called, to check the cost of contract compared to others available that met geographical or constraint limitations.

## ***The call-off of Balancing Services in cost order during the “within-day” balancing process***

### 32 Accuracy of data available:

- Confirm for a sample of days that the list from which Ancillary Services contracts has been selected agreed to a list of contracts in place at that time;
- Sample test days to confirm that the assessment of the need for Ancillary Services contracts has been carried out as required and documented in procedures;
- Check evidence of management’s review and approval of decision;
- Sample test Ancillary Services contracts called, to check that the decision has been made in accordance with documented procedures;
- Confirm evidence of management’s review and approval of decision; and
- Sample test PGBTs issued to check that the decision to issue the PGBT has been taken in accordance with the documented procedures.

### 33 Analytical review:

- Sample test Ancillary Services contracts that have been called to review cost of contract compared to others available that met geographical or constraint limitations;
- Sample test Bids/Offer to check that the “operational plan” indicates that balancing measures have been required and that the Bid/Offer accepted met requirement stated in the plan;
- Sample test Bids/Offer accepted to check the preparation of the “operational plan” that identifies the need for balancing measures and check that this has been prepared in accordance with documented procedures;
- Sample test Bids/Offer to confirm whether accepted Bid/Offer have been the least cost of the Bids/Offer available. Where this was not the case, review any explanation provided by NGENSO control engineers and check this explanation against the available information. We will review explanations provided by NGENSO for instances where the least cost Bid/Offer was not accepted for reasonableness. We are not, by profession, engineers and our challenge on engineering decisions is therefore limited as to whether the explanation seemed to us reasonable;
- Review evidence of authorisation/post-event review of decision by management;
- Review analytically Bids/Offer accepted over the course of review Year to seek to identify whether any Balancing Mechanism Units appeared to be selected more frequently than others;
- Sample test the PGBTs issued to check that such an action was appropriate in view of the operational plan produced;
- Sample test the PGBTs issued to check that a suitable number of PGBT Offers has been received by NGENSO prior to the decision to select a specific generating unit, and that the PGBT issued formed part of the least cost solution, subject to constraints, and displayed no bias.

## ***General IT Controls Testing***

- 34 The majority of transactions regarding input and output of data are sent and processed electronically. Consequently, we will review the strength of the IT controls existing over these areas.
- 35 Our review will focus on the following in respect of controls over SPICE and SORT:
- a. Program development;
  - b. Program changes;
  - c. Computer Operations; and
  - d. Access to programs and data.

## Appendix A – Risk and response table

Risk	Our response
<p><b>Engineering decisions not most economical:</b> Decisions to accept bids and offers are made to comply with variety of parameters, for example the frequency and constraints between zones. While such decisions will achieve the requirements per other parameters they may not always be the most economical contract.</p>	<p>As auditors we recognise our limitation in determining whether such decisions were most appropriate in the given circumstances. We will obtain a representation from NGESO that such decisions made did not have any more economical alternatives.</p>
<p><b>Retrospective amendments to data</b> Errors may be noted in balancing data which is available in the balancing systems or data which is published on the BMRS. Such errors may have to be retrospectively amending. Incorrect data presents a risk of errors in the balancing process.</p>	<p>Through discussions with NGESO we will identify any such errors which identified by management. Based on the nature of errors and the subsequent analysis, performed by NGESO, of the impact of these errors we will formulate additional tests to confirm compliance with the requirements of BPS.</p>
<p><b>System failures (failure of balancing systems and other events affecting balancing process)</b> System failures may require the operations staff to:</p> <ul style="list-style-type: none"> <li>- Perform certain actions and subsequently recover systems and potentially data; or</li> <li>- Take special decisions to ensure continuity of the balancing process.</li> </ul> <p>Such events increase the risk of error or actions that are not consistent with the BSC.</p>	<p>Through discussion with NGESO staff and review of Elexon circulars, we will identify any system failures experienced. We will determine the impact of any such failures on operational activities and review recovery actions taken.</p>
<p><b>Operations during balancing mechanism system outages</b> Balancing systems outages can be planned or unplanned and occur due to various reasons. The severity of these outages can vary and consequently NGESO's response will depend on the conditions existing during the outage. During some outages data is required to be input manually into the system and there is a greater risk of error than where this is performed electronically using a stable and proven system. Also, where system failure, including failure of communication links, requires fall back to manual processes there is again a greater risk of error as operations staff implement processes they are less familiar with.</p>	<p>As part of our more detailed planning for the assignment we will identify key manual inputs and interactions with the systems and will tailor our review work programme to address the inherent risk of these activities. As above we will identify, through discussion with NGESO staff and review of appropriate event logs, periods where manual processes were implemented and develop appropriate tests to review the validity of actions taken.</p>

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This document has been prepared only for and solely for the purpose and on the terms agreed with National Grid Energy System Operator Ltd. We accept no liability (including for negligence) to anyone else in connection with this document, and it may not be provided to anyone else.

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