Information and Consultation Paper

Arrangements for the Calculation of the Public Service Obligation Levy post I-SEM Implementation

Consultation Paper

Reference: CRU/19/054  Date Published: 20/05/2019  Closing Date: 28/06/2019
Executive Summary

In June 2018, the Department of Communications, Climate Action and Environment (DCCAE) published its decision on the operation of the Government’s electricity support schemes under the revised Single Electricity Market (SEM) trading arrangements arising from Integrated Single Electricity Market (I-SEM) implementation.

The CRU is publishing this information and consultation paper on its updated arrangements for calculating the Public Service Obligation (PSO) levy, post I-SEM implementation. As part of this paper, the CRU is also taking the opportunity to consolidate its various historical decisions on its arrangements for calculating the PSO levy, by summarising relevant decisions, thereby centralising information and facilitating stakeholders’ access to all relevant decisions and documentation.

The PSO levy is used to provide support for various Government schemes including Renewable Energy Feed-in Tariff (REFIT) 1-3, Alternative Energy Requirement (AER), and the Peat PSO Scheme. The policy and terms associated with the plants supported by the PSO levy are set by Government and approved by the European Commission. The CRU has no discretion over the terms of the Government’s schemes supported under the PSO levy. The CRU’s role is limited to calculating the PSO levy in accordance with the governing legislation and to ensuring that the scheme is administered appropriately and efficiently.

As part of its role in administering the PSO scheme, the CRU previously developed methodologies for calculating the annual PSO levy in line with Government policy, which are primarily set out in the following decision papers:

- CER/08/153: Arrangements for the Public Service Obligation Levy; and
- CER/08/236: Calculation of the R-factor in determining the PSO Levy.

Following the publication of DCCAE’s June 2018 decision paper, the CRU commenced a review of its arrangements for calculating the PSO levy to ensure that such arrangements align with DCCAE's June 2018 decision. Arising from the review, the CRU is publishing this information and consultation paper, which details the CRU’s proposed amendments to its arrangements for the calculation of the PSO levy. This paper also reflects other regulatory decisions, requirements and clarifications that have been issued post publication of CER/08/236.
Given the extensive array of publications that are relevant in the calculation of the PSO levy, the CRU has separated this paper into two parts:

- **Part A:** refers to sections 2-3. These sections provide a detailed overview of the PSO schemes, and a comprehensive description of the CRU's existing arrangements that are relevant in the calculation of the PSO levy (pre-I-SEM implementation). The purpose of Part A is to provide background information, thereby facilitating stakeholders in reviewing the CRU's proposed amendments to its PSO arrangements. **Part A is not subject to consultation and is provided for information only.**

- **Part B:** refers to sections 4-8. These sections include a summary of DCCAE’s June 2018 decision, and a detailed description of the CRU’s proposed revisions to its arrangements for the calculation of the PSO levy, which take account of DCCAE’s June 2018 decision. **Part B outlines proposed decisions and specific topics for consultation and invites stakeholders' feedback.**

The CRU notes that the detailed design of DCCAE’s Renewable Energy Support Scheme (RESS) has not yet been finalised. Therefore, its potential impacts on the CRU’s arrangements for the calculation of the PSO levy, if any, are not been considered as part of this information and consultation paper.

To facilitate responses to Part B of this paper, the CRU has created a consultation template addressing the key topics that may interest stakeholders when considering the CRU’s interpretation of the DCCAE’s June 2018 decision.
Public/Customer Impact Statement

The PSO levy is charged to all electricity final customers in Ireland and is used to fund various electricity generation support schemes designed by the Irish Government. The proceeds of the PSO levy are paid to eligible suppliers to cover the additional costs they incur in purchasing PSO supported electricity generation. The payment is initially made based on an estimate of what these costs will be and is then reconciled once the actual costs are known.

As part of I-SEM implementation, the Government’s PSO schemes were updated by DCCAE to reflect new wholesale electricity trading arrangements. Such updates necessitate changes by the CRU to its arrangements for calculating the PSO levy.

The publication of the CRU’s updated arrangements provide transparency on the CRU’s procedures for calculating the PSO levy and will facilitate the continued operation of the Government’s PSO schemes by ensuring an accurate calculation and recovery of PSO monies by market participants, which will protect the interests of the Irish electricity customer and support Ireland in meeting its renewable energy targets.
# Table of Contents

**Executive Summary** ................................................................................................................. i

**Public/Customer Impact Statement** ........................................................................................ iii

**Glossary of Terms and Abbreviations** ...................................................................................... vi

**Glossary of Formula Terms** ..................................................................................................... 1

1. **Introduction** .......................................................................................................................... 2
   1.1 The Commission for Regulation of Utilities .............................................................................. 2
   1.2 Purpose of this Document ......................................................................................................... 2
   1.3 Structure of Paper ..................................................................................................................... 4
   1.4 Responding to this Document .................................................................................................. 4
   1.5 Related Documents ................................................................................................................ 5

2. **Background** ............................................................................................................................ 8
   2.1 Overview of the PSO Levy ......................................................................................................... 8
   2.2 Legislation Governing the PSO Levy .......................................................................................... 9
   2.3 State Aid Notifications ........................................................................................................... 11
   2.4 Government Schemes Supported by the PSO Levy ................................................................. 12

3. **Overview of CRU’s Existing Arrangements for Calculation of PSO Levy** ............................ 18
   3.1 Calculation of Estimated REFIT Payment (ex-ante) ............................................................... 18
   3.2 Calculation of Actual REFIT Payment (ex-post) ...................................................................... 22
   3.3 Provision of Auditors’ Certificates .......................................................................................... 24
   3.4 Reconciliation of PSO Monies: R-factor .................................................................................. 25
   3.5 Interest Rate Applied to R-factor Calculations ......................................................................... 25
   3.6 Suppliers’ Compensation Streams Based on Metered Generation ......................................... 25
   3.7 AER and Peat PSO Schemes’ Revenues and Costs ................................................................. 26
   3.8 PSO Invoicing and Collection Procedures ............................................................................. 27
   3.9 Methodologies for Calculating the Renewable Fraction for Biomass Projects ................... 27
   3.10 HECHP Certification ............................................................................................................. 29
   3.11 Addressing the Risk of Bad Debt to the PSO levy .................................................................. 30

4. **Department’s Review of Electricity Support Schemes** ........................................................... 33
   4.1 Options Paper .......................................................................................................................... 33
   4.2 Proposed Decision Paper ........................................................................................................ 33
   4.3 Decision Paper ........................................................................................................................ 35

5. **Proposed Revisions: PSO Arrangements for ex-ante REFIT Calculations** ......................... 38
   5.1 Estimated REFIT Payment (ex-ante) ...................................................................................... 38
5.2 Estimated Balancing Cost Payment ................................................................. 38
5.3 Estimated Technology Difference Payment .................................................... 39
5.4 Estimated Opportunity Cost Payment ............................................................. 40
5.5 Ex-ante Benchmark Price .............................................................................. 40
5.6 Application of Exceedance Probability for Wind ............................................. 41
5.7 CPI Applied to ex-ante Estimates .................................................................. 42

   6.1 Actual REFIT Payment ................................................................................... 43
   6.2 Actual Balancing Payment ........................................................................... 44
   6.3 Actual Technology Difference Payment ....................................................... 44
   6.4 Actual Opportunity Cost Payment ................................................................. 45
   6.5 Application of CPI to ex-post Outturns ......................................................... 53
   6.6 Reconciliation of PSO Monies: R-factor ....................................................... 53
   6.7 Interest Rate Applied to R-factor Calculations ............................................. 53
   6.8 Sourcing of REFIT Outturn Data .................................................................. 54

   7.1 AER & Peat PSO Scheme Revenues and Costs ............................................ 55

8. Next Steps ......................................................................................................... 56

Appendix 1: Clarification Letter to Suppliers ....................................................... 57
Appendix 2: In-Market Generator Payments (Prior to 1 October 2018) .............. 58
Appendix 3: Out-of-Market Generator Payments (Prior to 1 October 2018) ...... 59
Appendix 4: In-Market Generator Payments (Post 1 October 2018) ................. 60
Appendix 5: Out-of-Market Generator Payments (Post 1 October 2018) ........... 62
Appendix 6: Consultation Template for Responses ............................................ 64
## Glossary of Terms and Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AER</td>
<td>Alternative Energy Requirement</td>
</tr>
<tr>
<td>BM</td>
<td>Balancing Market</td>
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<tr>
<td>CADA</td>
<td>Capacity and Differences Agreements</td>
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<tr>
<td>CHP</td>
<td>Combined Heat and Power</td>
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<tr>
<td>CRU</td>
<td>Commission for Regulation of Utilities</td>
</tr>
<tr>
<td>DAM</td>
<td>Day Ahead Market</td>
</tr>
<tr>
<td>DCCAE</td>
<td>Department of Communications, Climate Action and Environment (“the Department”)</td>
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<tr>
<td>DLAF</td>
<td>Distribution Loss Adjusted Factor</td>
</tr>
<tr>
<td>DSO</td>
<td>Distribution System Operator</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EURIBOR</td>
<td>Euro Interbank Offered Rate</td>
</tr>
<tr>
<td>GPls</td>
<td>Generator Performance Incentives</td>
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<tr>
<td>ION</td>
<td>Interim Operational Notification</td>
</tr>
<tr>
<td>I-SEM</td>
<td>Integrated Single Electricity Market</td>
</tr>
<tr>
<td>MG</td>
<td>Metered Generation</td>
</tr>
<tr>
<td>MGLF</td>
<td>Metered Generation Loss Factored</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>MWh</td>
<td>Megawatt Hour</td>
</tr>
<tr>
<td>NDA</td>
<td>Net Demand Adjustment</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>PSO</td>
<td>Public Service Obligation</td>
</tr>
<tr>
<td>QM</td>
<td>Metered Quantity</td>
</tr>
<tr>
<td>QMLF</td>
<td>Metered Quantity Loss Factor</td>
</tr>
<tr>
<td>REFIT</td>
<td>Renewable Energy Feed-in Tariff</td>
</tr>
<tr>
<td>RO</td>
<td>Reliability Option</td>
</tr>
<tr>
<td>S.I.</td>
<td>Statutory Instrument</td>
</tr>
<tr>
<td>SEM</td>
<td>Single Electricity Market</td>
</tr>
<tr>
<td>TLAF</td>
<td>Transmission Loss Adjusted Factor</td>
</tr>
<tr>
<td>TMR</td>
<td>Total Market Revenue</td>
</tr>
<tr>
<td>TSO</td>
<td>Transmission System Operator</td>
</tr>
<tr>
<td>RESS</td>
<td>Renewable Energy Support Scheme</td>
</tr>
</tbody>
</table>
# Glossary of Formula Terms

<table>
<thead>
<tr>
<th>Variable /Parameter</th>
<th>Long Name</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABCP</td>
<td>Actual Balancing Cost Payment</td>
<td>€</td>
</tr>
<tr>
<td>AMC</td>
<td>Actual Market Costs</td>
<td>€</td>
</tr>
<tr>
<td>AMR</td>
<td>Actual Market Revenues</td>
<td>€</td>
</tr>
<tr>
<td>AOCP</td>
<td>Actual Opportunity Cost Payment</td>
<td>€</td>
</tr>
<tr>
<td>AOG</td>
<td>Actual Output Generated</td>
<td>MWh</td>
</tr>
<tr>
<td>ARP</td>
<td>Actual REFIT Payment</td>
<td>€</td>
</tr>
<tr>
<td>ARRP</td>
<td>Actual REFIT Reference Price</td>
<td>€/MWh</td>
</tr>
<tr>
<td>ATDP</td>
<td>Actual Technology Difference Payment</td>
<td>€</td>
</tr>
<tr>
<td>CONPUud</td>
<td>Constraint Payments</td>
<td>€</td>
</tr>
<tr>
<td>CPP_{uc}</td>
<td>Capacity Payments</td>
<td>€</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
<td>%</td>
</tr>
<tr>
<td>CPREMIUMud</td>
<td>Premium Component Payment</td>
<td>€</td>
</tr>
<tr>
<td>EBCP</td>
<td>Estimated Balancing Cost Payment</td>
<td>€</td>
</tr>
<tr>
<td>ENPU_{ud}</td>
<td>Energy Payments</td>
<td>€</td>
</tr>
<tr>
<td>EOCP</td>
<td>Estimated Opportunity Cost Payment</td>
<td>€</td>
</tr>
<tr>
<td>EOG</td>
<td>Estimated Output Generated</td>
<td>MWh</td>
</tr>
<tr>
<td>ERP</td>
<td>Estimated REFIT Payment</td>
<td>€</td>
</tr>
<tr>
<td>ERRRP</td>
<td>Estimated REFIT Reference Price</td>
<td>€/MWh</td>
</tr>
<tr>
<td>ETDP</td>
<td>Estimated Technology Difference Payment</td>
<td>€</td>
</tr>
<tr>
<td>ETP</td>
<td>Estimated Technology Payment</td>
<td>€</td>
</tr>
<tr>
<td>ETRP</td>
<td>Estimated Technology Reference Price</td>
<td>€/MWh</td>
</tr>
<tr>
<td>PMD_{uv}</td>
<td>Deemed Market Price</td>
<td>€</td>
</tr>
<tr>
<td>PPA</td>
<td>PPA Price</td>
<td>€/MWh</td>
</tr>
<tr>
<td>RRP</td>
<td>REFIT Reference Price</td>
<td>€/MWh</td>
</tr>
<tr>
<td>UNIMPU_{ud}</td>
<td>Uninstructed Imbalance Payments</td>
<td>€</td>
</tr>
<tr>
<td>XBP</td>
<td>Ex-ante Benchmark Price</td>
<td>€/MWh</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 The Commission for Regulation of Utilities

The Commission for Regulation of Utilities (CRU)\(^1\) is Ireland’s independent energy and water regulator. Our mission is protecting the public interest in Water, Energy and Energy Safety. Further information on the CRU’s role and relevant legislation can be found on the CRU’s website at [www.cru.ie](http://www.cru.ie).

1.2 Purpose of this Document

The Irish Government ("the Government"), through its various EU State Aid approved support schemes (i.e. Renewable Energy Feed-in Tariff “REFIT” 1-3, Alternative Energy Requirement “AER”, and Peat PSO Support) provides payments to eligible renewable and peat-fired generation projects, which are funded by a Public Service Obligation (PSO) levy on electricity supplied to final customers.

The method of calculating the support payments under the various schemes and calculating the PSO levy depends on the workings of the wholesale Single Electricity Market (SEM) where electricity is sold by generators and bought by suppliers on the island of Ireland. While the terms and conditions for the various schemes are set by Government, the CRU is required to determine the detail of the PSO levy calculations.

Following I-SEM implementation, the CRU is updating its regulatory decisions regarding its existing arrangements for the calculation of the PSO levy, which are primarily contained within the following decision papers:

- CER/08/153: Arrangements for the Public Service Obligation Levy; and
- CER/08/236: Calculation of the R-factor in determining the Public Service Obligation Levy.

The CRU’s proposed updates to the arrangements for the calculation of the PSO levy are required to reflect the Department of Communications, Climate Action and Environment’s ("the Department", June 2018 decision to update its PSO funded electricity support schemes in order to take account of I-SEM implementation (i.e. “Electricity Support Schemes I-SEM Arrangements Decision Paper”). In addition to updating its regulatory decisions to take

\(^1\) Previously known as the Commission for Energy Regulation (CER)
account of the Department’s June 2018 decision, the CRU is also updating its 2008 papers to reflect other regulatory decisions, requirements and clarifications that were issued post 2008.

The objective of this paper is as follows:

i. to inform stakeholders of the CRU’s proposed changes to its arrangements for the calculation of the PSO levy, and invite feedback, prior to the publication of a decision paper on this matter. Publication of the decision paper will facilitate market participants in recovering PSO payments under the revised SEM trading arrangements arising from I-SEM implementation.

ii. to summarise and consolidate historical decisions regarding the CRU’s arrangements for calculating the PSO levy, thereby centralising information and facilitating stakeholders’ access to all relevant decisions and documentation.

The CRU notes that the Government’s PSO schemes for electricity operate on the basis of estimating costs and revenues for each upcoming PSO levy period with subsequent reconciliations being made after the PSO levy period when actual generation and other market data are known. Hence, while the revised SEM arrangements (arising from I-SEM implementation) have already gone live (1 October 2018), details of the CRU’s arrangements for calculating the PSO levy will not need to be finalised until January 2020, when market participants commence reconciliation calculations for the 2018/19 period (to be included in the 2020/21 PSO levy calculation). Nevertheless, the CRU is consulting now with a view to determining the revised methodology prior to the end of 2019.

With reference to the Department’s Renewable Energy Support Scheme (RESS), the CRU also notes that the detailed design of the scheme has not yet been finalised. Therefore, its potential impacts on the CRU’s arrangements for the calculation of the PSO levy, if any, are not being considered as part of this paper.
1.3 Structure of Paper

This paper is structured as follows:

- **Section 1**: introduction;

**Part A – For Information**

- **Section 2**: provides background information on the PSO levy and the various Government subsidy schemes supported under the PSO levy. Additionally, this section summarises the legislative framework governing the PSO, and relevant State Aid decisions;

- **Section 3**: explains the CRU’s existing arrangements for calculating the PSO levy;

**Part B – Subject matter for Consultation**

- **Section 4**: summarises the key changes that the Department has made to the electricity support schemes, in view of the recent changes to the wholesale electricity market;

- **Sections 5-6**: explain the changes the CRU is proposing to its ex-ante REFIT calculations (Section 5) and its ex-post REFIT calculations (Section 6).

- **Section 7**: explains the CRU’s proposed arrangements for calculating the AER and Peat PSO Schemes’ revenues and costs; and

- **Section 8**: outlines next steps.

1.4 Responding to this Document

Responses to this paper should be forwarded by close of business on Friday, 28 June 2019, preferably an electronic version of the consultation template, to PSO@cru.ie or alternatively by post to:

Sheena Byrne  
Commission for Regulation of Utilities  
The Grain House,  
The Exchange, Belgard Square North  
Tallaght, Dublin 24
Unless marked confidential, all responses may be published on the CRU’s website. Respondents may request that their response is kept confidential. The CRU shall respect this request, subject to any obligations to disclose information. Respondents who wish to have their responses remain confidential should clearly mark the document to that effect and include the reasons for confidentiality. Responses from identifiable individuals will be anonymised prior to publication on the CRU website unless the respondent explicitly requests their personal details to be published. Our privacy notice sets out how we protect the privacy rights of individuals and can be found here.

1.5 Related Documents

CRU Papers:
- CER/03/013 PSO Invoicing and Collection Procedures
- CER/04/128 Decision on Turlough Hill MIC for PSO Purposes.
- CER/08/153 Arrangements for the Public Service Obligation Levy
- CER/08/170 Ex-post Correction Factor to apply in the calculation of the Public Service Obligation Levy – Proposed Decision Paper
- CER/08/236 Calculation of the R-factor in determining the Public Service Obligation Levy – Decision Paper
- CER/17021 Notification to Suppliers: Engagement of Auditors Regarding Certification of the PSO Levy
- CER/17/073 Decision on ESB Networks’ Updated PSO Levy Cost Allocation Methodology
- CRU/18/038 Notification to Suppliers – Submissions to the CRU for the 2018/19 Public Service Obligation (PSO) Levy
- CRU/18/258 Notification to Suppliers - Engagement of Auditors Regarding Certification of the PSO Levy.
- CRU/18/261 Addressing the Risk of Bad Debt to the PSO Levy
- CRU/19/016a Information Note: EPL’s Methodology for Determining Electricity Output for its Co-Firing Plant for the purposes of Calculating REFIT 3 Payments
- CRU/19/017 Information Note: Clarification on 2019/20 PSO Submissions
- CRU/19/034 Information Paper: Application of the PSO Levy to Commercial Storage

Department Papers:
- Options Paper – Renewable Electricity Support Scheme: Transitioning to I-SEM (Options Paper), May 2017
- Proposed Decision Paper – Electricity Support Schemes I-SEM Arrangements, November 2017
• Decision Paper – Electricity Support Schemes I-SEM Arrangements, June 2018
• REFIT Terms and Conditions (available on Department’s website)
• Notification of Public Service Obligations to be imposed on ESB (November 2000)
• Reference Prices for REFIT: 2019 Reference Prices for REFIT

EU Commission State Aid Decisions:

• EC C(2001)3265, State aid n° N 6/A/2001 – Ireland, “Public Service Obligations imposed on the Electricity Supply Board with respect to the generation of electricity out of peat”;
• EC C(2002) 5, State aid n° N 826/01 - Ireland, "Alternative Energy Requirements I to IV”;
• EC C(2002) 3, State aid N 553/01 – Ireland, “Aid to promote renewable energy sources in Ireland” (AER V);
• EC C(2003)4488, State aid N/475/03 – Ireland, “Public Service Obligation in respect of new electricity generation capacity for security of supply” (Capacity and Differences Agreements (CADA));
• EC C(2007)4317, State aid N 571/2006 – Ireland, “RES-E support programme” (REFIT 1);
• EC C(2012)8, State aid SA.31236 (2011/N) – Ireland, “Renewable Feed In Tariff” (REFIT 2); and

Relevant Legislation:

• Electricity Regulation Act, 1999 (as amended)
• S.I. No. 217/2002 - Electricity Regulation Act 1999 (Public Service Obligations) Order 2002 (as amended)
PART A

For Information
2. Background

2.1 Overview of the PSO Levy

The PSO levy is used to fund various subsidy schemes designed by the Government to support its national policy objectives related to renewable energy, indigenous fuels (e.g. peat) and security of energy supply.

The PSO levy is charged to all electricity final customers\(^2\) in Ireland, and the associated proceeds are used to compensate the:

i. additional costs\(^3\) incurred by market participants in purchasing/generating PSO-supported electricity generation\(^4\) (which are not recovered in the electricity market); &

ii. administrative expenses incurred by suppliers, the Distribution System Operator ("DSO" i.e. ESB Networks) and the Transmission System Operator ("TSO" i.e. EirGrid) in the period concerned in collecting payment of the PSO levy.

The policy and terms associated with the generation plants supported by the PSO levy are mandated by Government in legislation and have received state aid approval from the European Commission (following the issuance of State Aid Notifications). The CRU has no discretion over the terms of PSO schemes. The CRU's role in relation to the PSO is primarily limited to calculating the levy in accordance with Government policy and ensuring that the scheme is administered appropriately and efficiently.

The CRU calculates the PSO levy in advance of the forthcoming PSO year (i.e. 1 October to 30 September). The CRU's PSO levy calculation is based on:

\(^2\) In accordance with Electricity Regulation Act, 1999, final customer means a person being supplied with electricity at a single premises for consumption on those premises.

\(^3\) Additional costs as referenced in the 2002 Order does not define what is meant by such costs other than to state in Article 2(3) of the 2002 Order that they include costs incurred by the Board (i.e. ESB) in complying with its obligations under Article 5(1) and (b) (i.e. Public service obligations for Peat), Article 6A or 6B (i.e. Public service obligation for short-term peaking capacity), Article 6(C) (i.e. CADA), and the costs incurred by a supplier in complying with its obligations under Article 6D (i.e. Public service obligations for REFIT contracts). Under the CRU's current arrangements for the PSO levy, the relevant market participants are not entitled to recover such additional costs, unless those costs are in accordance with the relevant State Aid Notifications, legislation and the terms and conditions of the relevant schemes.

\(^4\) Under PSO support schemes such as REFIT, this electricity is procured via Power Purchase Agreements (PPAs) that suppliers (also referred to as off-takers) enter into with electricity generators.
i. The estimated eligible costs that are forecast for the forthcoming PSO period. These costs are the additional costs above the level of market revenue, which is forecast to be earned. The market revenue is forecast based on a benchmark wholesale electricity price, “the ex-ante Benchmark Price”, which is set by the CRU, and on the forecast generation as submitted to the CRU by the relevant market participant.

ii. A reconciliation for the PSO period two periods prior to the forthcoming PSO period. As the ex-ante component of the PSO levy for each year is based on estimated costs, there is an adjustment made when the actual costs are known and certified (e.g. estimates for the 2018/19 PSO cycle would be corrected in the 2020/21 PSO cycle). This reconciliation is known as the R-factor. The R-factor may be positive or negative, depending on whether the actual costs incurred are higher or lower than had been estimated. The differences can arise primarily due to differences between the estimated and the actual level of generation and to differences between the estimated and the actual market price received. The PSO levy for each 12-month period therefore includes both the estimate of the levy costs for that period, and the R-factor adjustment for the PSO period two years previous.

The collection of the PSO levy from electricity final customers is administered by electricity suppliers. The levy collected by electricity suppliers is passed to the DSO and then from the DSO to the TSO. The TSO pays out the appropriate PSO amounts to the relevant parties (upon instruction from the CRU). Although the PSO levy ultimately funds specific electricity generation projects, payments are not made directly to the generators but to the supplier who contracts with the generator, via a PPA. The supplier is obliged to purchase the output of the REFIT supported generation plant at a defined minimum price, and the additional costs arising from complying with that obligation are funded by the PSO levy.

2.2 Legislation Governing the PSO Levy

Electricity Regulation Act 1999
In accordance with Section 39 of the Electricity Regulation Act 1999, as amended, “the Act”, the CRU is directed by order of the Government to impose the PSO on those electricity market participants who are party to the support schemes. Additionally, in accordance with Schedule 2 of the Act, the calculated PSO levy is allocated annually across three categories of electricity
customer (i.e. Domestic Accounts, Small Accounts & Medium Large Accounts)\(^5\) based on the maximum demand in respect of each category, as a proportion of the sum of the three maximum demand figures. The attribution of the maximum demand in respect of each category of electricity account is carried out by the DSO for each levy period, in accordance with Section 39 (5A) (b) of the Act (refer to CER/17/073\(^6\) for further details).

**2002 Order**

The Electricity Regulation Act 1999 (Public Service Obligations) Order 2002 (Statutory Instrument No. 217 of 2002) (as amended) – “the 2002 Order” - sets out more detail in relation to issues such as:

- **PSO Schemes**: Articles 5, 6, and 6A through to 6D require the CRU to oblige ESB and the suppliers to purchase supported generation under the various schemes;

- **PSO Calculations**: Articles 7 to 10 refer to the procedure for estimating, calculating and certifying PSO payments and the PSO levy;

- **Duties of suppliers**: Article 11 obliges suppliers to collect the PSO levy from customers and pay it to the DSO (Article 12) and to the TSO (Article 13).

- **Duties of the DSO**: Article 14 obliges the DSO to collect payments of the PSO levy from suppliers, put in place and implement procedures to recover the PSO levy from suppliers, and to account for and pay to the TSO all appropriate amounts received by it in respect of the PSO levy. Article 17 states that it is the duty of the DSO to inform the CRU if the level of payments received by them in respect of the PSO levy is materially different from that anticipated by the CRU as being payable in respect of a particular levy period and of the measures being taken to recover monies due.\(^7\)

- **Duties of the TSO**: Article 15 obliges the TSO to collect payment of the PSO levy from suppliers and the DSO, and to put in place and implement procedures to recover the PSO levy from suppliers and the DSO. Article 15 obliges the TSO to account for

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\(^5\) In accordance with Schedule 2 of the 1999 Act, Domestic Accounts means electricity accounts held by final customers and which are identified by the DSO as liable for distribution use of system charges at the rate for urban domestic customers or the rate for rural domestic customers. Small Accounts means electricity accounts held by final customers which are not Domestic Accounts or Medium-Large Accounts, while Medium-Large Accounts means electricity accounts held by final customers which, in respect of each such account, the DSO certifies as having a maximum import capacity of not less than 30kVA.

\(^6\) Decision on ESB Networks’ Updated PSO Levy Cost Allocation Methodology.

\(^7\) In accordance with Condition 23 of the DSO licence, the Licensee shall also comply with any public service obligation imposed on it by the CRU pursuant to Section 39 of the Act.
and pay relevant market participants all appropriate amounts received in respect of the PSO levy. Article 17 states that it is the duty of the TSO to inform the CRU if the level of payments received by them in respect of the PSO levy is materially different from that anticipated by the CRU as being payable in respect of a particular levy period, and to inform the CRU of the measures being taken to recover monies due.\footnote{In accordance with Condition 25 of the TSO licence, the Licensee shall also comply with any public service obligation imposed on it by the CRU pursuant to Section 39 of the Act.}

- **Duties of final customers:** Articles 16 states that it shall be the duty of each final customer, which duty is owed to the electricity supplier which invoices such customer, to pay to that supplier the amount of the PSO levy properly invoiced to such customers.

- **Recovery of contract debt:** Article 18 states that a supplier, the DSO and the TSO may recover as a simple contract debt in any court of competent jurisdiction, any amount due and owing in respect of the PSO levy.

- **Documenting of procedures by market participants:** Article 19 states that each person, other than a final customer, who has duties imposed on him or her shall submit a document to the CRU for approval in such form as may be required by the CRU from time to time specifying the procedures which he or she will adopt in order to comply with those duties.

- **Provision of information:** Article 20 states that it shall be the duty of each person who has duties pursuant to provide such information and documents to the CRU as it may require for the purpose of ensuring that they comply with their duties including information regarding amounts invoiced, received, accounted for and paid, and the administrative expenses incurred.

### 2.3 State Aid Notifications

The Government is required to notify the terms of each support scheme under the PSO to the European Commission and obtain approval. The original State Aid Notification of November 2000 sets out the broad areas that may be covered by the PSO as listed in Section 39 of the Act. These include security of supply through the use of indigenous fuel sources, as well as environmental protection. Since the original notification, various Government support schemes that are funded by the PSO have been notified to the EU Commission and have received state aid clearance, including:
1. EC C(2001)3265, State aid n° N 6/A/2001 – Ireland, “Public Service Obligations imposed on the Electricity Supply Board with respect to the generation of electricity out of peat”;

2. EC C(2002) 5, State aid n° N 826/01 - Ireland, "Alternative Energy Requirements I to IV”;

3. EC C(2002) 3, State aid N 553/01 – Ireland, “Aid to promote renewable energy sources in Ireland” (AER V);

4. EC C(2003)4488, State aid N/475/03 – Ireland, “Public Service Obligation in respect of new electricity generation capacity for security of supply” (Capacity and Differences Agreements (CADA));

5. EC C(2007)4317, State aid N 571/2006 – Ireland, “RES-E support programme” (REFIT 1);

6. EC C(2012)8, State aid SA.31236 (2011/N) – Ireland, “Renewable Feed In Tariff” (REFIT 2); and


The 2002 Order has been amended by successive S.I.s to provide for the recovery of costs under the PSO for such schemes.

2.4 Government Schemes Supported by the PSO Levy

The PSO levy is currently used to fund the following Government electricity support schemes:³

i. REFIT;

ii. AER; and

iii. Peat PSO Support.

2.4.1 REFIT

REFIT schemes are the main financial supports provided to renewable electricity generators at this time, with approximately 3,700 MW of REFIT supported capacity. Specifically, there are three renewable energy support schemes in Ireland based on a feed in tariff (i.e. REFIT 1, REFIT 2 and REFIT 3)¹⁰ and the relevant REFIT reference prices to support the various

³ The PSO levy has also supported other schemes (i.e. “Capacity 2005”). This scheme, which is now expired, involved contracts between Electric Ireland and generators to ensure security of supply. Aughinish Alumina (160MW) and Tynagh (400MW) received support under this scheme. The PSO for these plants was notified to the EU Commission in October 2003 in order to secure additional capacity to meet an anticipated generation capacity shortfall in 2005 and were cleared by the EU Commission at the end of 2003. These arrangements were put in place for a 10 year period, and ended in 2016.

¹⁰ REFIT 1 was designed to support the construction of up to 400MW of biomass, hydro and wind generation to be connected by 31 December 2010. REFIT 2 was designed to support the construction of up to 4000MW of onshore wind hydro and landfill gas projects to be connected after 1 January 2010 but before 31 December 2017, whilst REFIT 3 was intended to incentivise the addition of 50MW of anaerobic digestion, 100MW of biomass CHP, and
technologies are set by the Department.\textsuperscript{11} In all three REFIT schemes, support has been allocated to eligible applicants, on a first-come-first-served basis.

Generators that have been accepted into a REFIT scheme will contract with a licensed electricity supply company via a PPA of 15-year duration (or for the remainder of the REFIT term if shorter).\textsuperscript{12} The participating supplier thereby undertakes to purchase exported metered generation from the REFIT supported generator, with whom they have concluded contracts, at the PPA price (which must at least equal the applicable REFIT reference prices as set by the Department)\textsuperscript{13}.

The REFIT support to the generator is granted in the form of a price floor tariff. For purchasing under the PPA, the supplier will receive a REFIT payment, which is funded through the PSO levy. However, the CRU notes that each REFIT PPA is commercially negotiated between the relevant parties, and the price paid by the supplier is a matter for negotiation between the supplier and the generator (but must at least equal the applicable REFIT rate).

With reference to the purchase of exported metered generation, it should be noted that in accordance with the relevant REFIT terms and conditions, PSO monies are not payable for electricity generation consumed onsite (i.e. only exported metered generation may be eligible for REFIT support) and all individual generation projects accepted into REFIT must be metered separately. Additionally, in the case of hybrid generators, the electricity used for house-load by the generating unit is regarded as having the same composition as the exported electricity from the same source (i.e. the market participant cannot nominally transfer the green component of electricity used for house-load to the exported electricity).

\textsuperscript{11} REFIT reference price (expressed in €/MWh) refers to the price for a particular category of electricity (e.g. large scale wind, small scale wind, hydro, biomass, etc.) which has been set by the Department and adjusted annually by way of indexation, based on the Consumer Price Index (CPI).

\textsuperscript{12} The backstop dates for REFIT support under the various schemes are as follows REFIT 1 – 31 December 2027, REFIT 2 – 31 December 2032 and REFIT 3 – 31 December 2030.

\textsuperscript{13} Refer to Section 3.6 of REFIT 2 and 3 terms and conditions for further detail.
REFIT 1:
The terms and conditions for REFIT 1 are published by the Department, which in effect stipulate that the REFIT payment to the supplier comprise three separate compensation streams:14

i. **Opportunity Cost Payment**15
   This payment compensates the supplier for the additional cost of buying REFIT generation. A REFIT reference price is set equal to the deemed cost of the cheapest category of REFIT supported generation (i.e. large scale wind), and the payment is equal to the amount, as measured over the levy year, by which cost of buying at the REFIT reference price exceeds the cost of buying from the market. Section 3.2.3 of this paper provides further details on existing arrangements for the calculation of the In-Market Opportunity Cost Payment (where the PSO supported generator is registered in SEM) and Out-of-Market Opportunity Cost Payment (where the PSO supported generator is not registered in SEM).16

ii. **Technology Difference Payment** (also referred to as a Premium Payment)17
    Under REFIT 1, this payment is made to a supplier to promote diversity in renewable generation technologies by compensating the supplier for the additional cost of the PPA for technologies other than large scale wind, over and above the REFIT reference price. The maximum premium for any particular category of generation is the amount by which a reference price for that technology exceeds the REFIT reference price.

iii. **Balancing Cost Payment**
    This payment equals 15% of the REFIT reference price for large scale wind. On the basis that typical REFIT-supported generation is intermittent, the payment

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14 The details of the compensation streams are referenced in Section 5 of REFIT 1 terms and conditions and paragraph 20 -24 of the EU Commission's State Aid Decision (N 571/2006).
15 Referred to as a Market Price Equalisation Payment in the EU Commission’s State Aid Decision –N571/2006. For REFIT 1, the CRU applied the concept of Opportunity Cost Payment, when referring to the Market Price Equalisation Payment.
16 Out-of-Market involves the generation being directly purchased by a supplier, which reduces the demand the supplier has to purchase from the SEM.
17 The technology difference payment is the difference between a technology reference price for the particular technology – large wind, small wind, small hydro, landfill gas or other biomass and the technology reference price for large scale wind. As the reference price for large scale wind and the REFIT reference price are one and the same, there can be no technology difference payment/premium payment for large scale wind.
compensates suppliers for the cost of purchasing additional power when the REFIT supported generator is unavailable.

Under REFIT 1, and in contrast to the AER and Peat PSO scheme, suppliers do not return money to the PSO if the total revenue they receive from contracting with REFIT supported generators is greater than the costs they incur from contracting with a REFIT supported generator.

REFIT 2 & 3

Under REFIT 2 and 3 suppliers do not receive a distinct Technology Difference Payment. Additionally, suppliers are not entitled to an automatic 15% Balancing Cost Payment. In accordance with Section 5.5 – 5.7 of the relevant REFIT terms and conditions, a supplier can receive a Balancing Cost Payment of up to a maximum of €9.90 MWh (which is not subject to any increases in CPI) in respect of the eligible electricity exported to the grid. The criteria for a supplier’s receipt of a Balancing Cost Payment is as follows:

- A €9.90 MWh Balancing Cost Payment is payable to the supplier where the market payment is less than or equal to the relevant REFIT reference price set by the Department (Section 5.7 of REFIT 2 terms and conditions, and Section 5.8 of REFIT 3 terms and conditions).

- No Balancing Cost Payment is payable to the supplier where its market payment is greater than or equal to the combination of the relevant REFIT reference price plus the Balancing Cost Payment (Section 5.8 of REFIT 2 terms and conditions and Section 5.9 of REFIT 3 terms and conditions).

- A reduced Balancing Cost Payment is payable to the supplier in the event that its market payment exceeds the reference price but is less than the total of the reference price plus the €9.90 MWh balancing payment. Specifically, the Balancing Cost Payment shall be €9.90/MWh less the amount by which the market payment exceeds the relevant REFIT reference price (Section 5.9 of REFIT 2 terms and conditions and Section 5.10 of REFIT 3 terms and conditions).

With regards to the overall REFIT payment made to a supplier under REFIT 2 and REFIT 3, Section 5.4/5.5 of the relevant REFIT terms and conditions states the following:

18 In accordance with REFIT 2 and REFIT 3 terms and conditions, market payment is defined as meaning all relevant revenues, determined in accordance with the relevant CRU decision (CER/08/236) in the context of the trading arrangements and any further decisions the CRU may make in this regard.
“there is no REFIT payable to the supplier where the market payment is equal to or greater than the sum of the REFIT reference price plus balancing payment. Where the REFIT reference price plus balancing payment exceed the market payment, payment to the supplier under the scheme is the difference between the two”.

Any shortfall between the market payment received by the electricity supplier and the suppliers REFIT costs is made good by a REFIT payment to the supplier from the PSO. Like REFIT 1, no REFIT payment is made back to the PSO if the supplier’s market payment is greater than the costs incurred by the supplier when contracting with REFIT generators.

2.4.2 AER

AER is a renewable electricity support scheme that predates REFIT. The AER scheme is based on a competitive allocation process organised by the Department, whereby a generator wishing to receive support submitted a bid into a tender. Successful tenderers were presented with a 15-year PPA from the relevant supplier (i.e. Electric Ireland) at the tendered price, such that Electric Ireland provides a guaranteed price to the successful tenderer.19

Under the AER scheme, Electric Ireland is entitled to a PSO payment to cover its excess cost if the total revenue it receives for selling the contracted electricity is less than their total allowable costs for contracting with the renewable generator. Similarly, Electric Ireland returns money to the PSO in the event of over-compensation (i.e. its total revenue is greater than its total allowable costs). In the event the total revenue received by Electric Ireland equals its total allowable costs, no payment is made to Electric Ireland.

Since the AER auctions were launched by the Department in 1994, six AER competitions have taken place.20 The technologies supported under the schemes have included onshore and offshore wind energy, small-scale hydropower, Combined Heat and Power (CHP), biomass (landfill gas), biomass-CHP and biomass-anaerobic digestion. The AER scheme is closed to new entrants and there are only two projects remaining under the AER scheme (approximately 30 MW of capacity is currently supported under the PSO). Support for the last project is due to terminate at the end of 2021.

19 The AER scheme provided for a mechanism (referred to as “uplift”) where support payments are increased for the first half of the 15 year period of support. Under this methodology the payment (“x” eurocent/kWh) is adjusted upwards by 35% in years 1 to 7.5 and adjusted downwards by 35% in years 7.5 to 15. Accordingly, for some AER contracts a reduction of 35% to payments applied for the second half of the term of the contracts.

2.4.3 Peat PSO Scheme

The Peat PSO Scheme has been providing support for generation from peat harvested within Ireland. The scheme required ESB to construct, commission and buy peat for two new peat-fired power stations, Lough Ree Power Station at Lanesboro and West Offaly Power Station at Shannonbridge – replacing a number of less-efficient peat-fired power stations – and obliged ESB to enter into a PPA to purchase the output of Edenderry power station.

As detailed in the November 2000 notification and summarised in the October 2001 Decision, the scheme has allowed ESB to recover from the PSO levy the difference – positive or negative - between specified costs of building and operating the new power stations, costs of the PPA and the costs of closing the less-efficient power stations, and the time-weighted market price of electricity plus any other revenues, including reactive power. As with AER, the notification also provides for the indexation of costs by the CPI and the application of interest at EURIBOR rates to reconciliation amounts.

The PPA with Edenderry Power Limited expired at the end of 2015, while the obligations in respect of Lough Ree and West Offaly expire at the end of 2019.
3. Overview of CRU’s Existing Arrangements for Calculation of PSO Levy

Details of the CRU’s current methodology for calculating the annual PSO levy are primarily set out in the following decision papers:

- CER/08/153: Arrangements for the Public Service Obligation Levy; and
- CER/08/236: Calculation of the R-factor in determining the Public Service Obligation Levy.

These decision papers (i.e. CER/08/153 and CER/08/236) present, inter-alia, the CRU’s decisions regarding arrangements for the calculation of the PSO levy, and the ex-ante and ex-post methodology that is applied by the CRU to determine the PSO levy.

An overview of the CRU’s decisions regarding its methodology for calculating the PSO levy is detailed in Sections 3.1 – 3.7 of this paper. Additionally, Sections 3.8 – 3.11 of this paper outline other PSO arrangements that are relevant in the administration and calculation of the PSO levy, namely:

- PSO invoicing and collection procedures;
- methodologies for the calculation of the renewable fraction for waste and biomass/peat plants;
- the provision of High Efficiency Combined Heat and Power (HECHP) certificates; and
- mechanisms for addressing the risk of bad debt to the PSO.

3.1 Calculation of Estimated REFIT Payment (ex-ante)

As per CRU’s annual notification to suppliers (e.g. CRU/18/259), suppliers are required to provide the CRU with a completed REFIT Estimate Template for the forthcoming PSO year.21

The template is submitted to the CRU, via the CRU’s online portal for PSO submissions.

Section 4.5 of CER/08/236 states that, in completing the REFIT Estimate Template, the onus is on the supplier to provide its best estimate regarding generation output for its REFIT contracted generation, in order to “ensure that the difference between ex-ante estimates and

21 When making submissions for new REFIT generation projects, the contracting supplier is also required to provide the CRU with a copy of the REFIT Letter of Offer, evidence of a signed PPA, and evidence of a supply licence. Separate to suppliers’ REFIT submissions, ESB is required to make its own annual PSO submission to the CRU when seeking to recover costs associated with the AER and Peat PSO Support.
ex-post known values are kept to a minimum”. Additionally, the CRU confirmed that “P90, P75 or P50 figures may be used, but this may be subject to review at a later date”.

The supplier’s completed REFIT Estimate Template is used by the CRU in determining a supplier’s Estimated REFIT Payment for contracting with a REFIT supported generator in a particular PSO year. Given that the PSO year (1 Oct -30 Sept) is no longer a calendar year (1 Jan – 31 Dec), the supplier is required to provide separate data on estimated generation for two time periods (i.e. 1 Oct – 31 Dec & 1 Jan - 30 Sept) to facilitate the application of CPI (which is based on a calendar year) to the CRU’s ex-ante calculations – refer to Section 3.1.5 of this paper for further details.

As stated in Appendix B of CER/08/236, the Estimated REFIT Payment is calculated by the CRU by summing the Estimated REFIT Payment, the Estimated Technology Difference Payment and the Estimated Opportunity Cost Payment.

### 3.1.1 Estimated Balancing Cost Payment

Under REFIT 1, as per Appendix B (i) of CER/08/236, the calculation of a supplier’s Estimated Balancing Cost Payment involves multiplying the Estimated REFIT Reference Price for large scale wind by their Estimated Output Generated, which is subsequently multiplied by 15%.

When calculating the Estimated Balancing Cost Payment for REFIT 2 and REFIT 3 projects (which is not reflected in CER/08/236), the CRU caps the Estimated Balancing Cost Payment Rate at €9.90/MWh and multiplies it by the Estimated Output Generated. If the ex-ante Benchmark Price is less than or equal to the Estimated REFIT Reference Price, then the Estimated Balancing Cost Payment Rate equals €9.90/MWh. If the ex-ante Benchmark Price is greater than the Estimated REFIT Reference Price and less than the Estimated REFIT Reference Price plus €9.90/MWh, then the Estimated Balancing Cost Payment Rate equals the Estimated REFIT Reference Price plus €9.90/MWh minus the ex-ante Benchmark Price. If the ex-ante Benchmark Price is greater than or equal to the Estimated REFIT Reference Price + €9.90/MWh, the Estimated Balancing Cost Payment Rate equals zero.

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22 Prior to setting the 2008/09 PSO levy, the annual PSO levy that was calculated by the CRU was based on a calendar year.

23 The Estimated REFIT Reference Price is calculated by multiplying the REFIT reference price for large scale wind by the estimated Consumer Price Index (CPI).
3.1.2 Estimated Technology Difference Payment

As per Appendix B (i) of CER/08/236, the calculation of a supplier’s individual Estimated Technology Difference Payment involves multiplying the Estimated REFIT Technology Payment by the Estimated Output Generated. In accordance with REFIT 1 terms and conditions (Section 5.5 & Section 5.6), there are two scenarios relevant to the Estimated REFIT Technology Payment:

- **Scenario 1:** If the PPA price is equal to or greater than Estimated Technology Reference Price, then the supplier shall be paid, for every kWh purchased under the PPA, the difference between the Estimated REFIT Reference Price and the Estimated Technology Reference Price.

- **Scenario 2:** If the PPA price is less the Estimated Technology Reference Price, then the supplier shall be paid, for every kWh purchased under the PPA, the difference between the PPA price and the Estimated REFIT Reference Price, provided the PPA price is greater than the Estimated REFIT Reference Price.

Under REFIT 1, the Estimated Technology Difference payment is set to zero for wind projects that are >5MW. While not reflected in CER/08/236, the CRU also sets the Estimated Technology Difference Payment to zero for all REFIT 2 and 3 projects.

3.1.3 Estimated Opportunity Cost Payment

As per Appendix B (i) of CER/08/236, the calculation of a supplier’s individual Estimated Opportunity Cost Payment involves subtracting the ex-ante Benchmark Price from the Estimated REFIT Reference Price (provided that the ex-ante Benchmark Price is less than the Estimated REFIT Reference Price), and subsequently multiplying by the Estimated Output Generated. For REFIT 1, the Estimated REFIT Reference Price is based on large scale wind. In contrast to REFIT 1, the Estimated REFIT Reference Price for REFIT 2 and 3 is based on a technology specific reference price.

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24 The Estimated Technology Reference Price is calculated by multiplying the Technology Reference Price by the estimated CPI. Each year, the Department publishes the Technology Reference Prices for the current year. These apply to the first three months – 1 October to 31 December – of the upcoming levy period. However, for the remaining nine months – 1 January to 30 September – the published Technology Reference Prices are indexed by an estimate of the CPI for the next year. Refer to Section 3.1.5 of this paper for further details.
3.1.4 Ex-ante Benchmark Price

Decision paper (CER/08/153) sets out the methodology used by the CRU in determining the ex-ante Benchmark Price for REFIT schemes in the context of the PSO levy. Specifically, Section 2.2.2 of the decision paper states that "the ex-ante Benchmark Price will be an estimated time-weighted average SMP, which will be a forecast of the relevant 12 month PSO period, with a capacity adder". The inclusion of a capacity adder was also confirmed in Section 3.6 of CER/08/236, where the CRU noted that it "deemed it appropriate to include a capacity adder in the ex-ante benchmark price because suppliers receive payment for that capacity from the pool".

The ex-ante Benchmark Price is the CRU’s forecast of the average annual market price (energy + capacity in €/MWh), which is expected to accrue to a supply company (acting as an intermediary) for the contracted generation supported by the PSO.

3.1.5 Consumer Price Index Applied to Ex-ante Calculations

When calculating the supplier’s Estimated Technology Reference Price and the Estimated REFIT Reference Price, the CRU updates the Department’s REFIT reference prices where necessary with estimated CPI data.

The 12 month PSO period spans two separate calendar years, whereas the CPI is calculated on a calendar year basis. This means that two different REFIT reference prices are used within one PSO period, due to the application of CPI to these prices. The first of these prices is used as published by the Department, with actual CPI applied. The second price, calculated by the CRU, is based on forecast CPI as published by the ESRI.

Details of the application of the CPI to the Department’s REFIT reference price are elaborated further within Section 3.2 of CER/08/236, which confirms that:

- "CPI values for a given year are considered in effect from 1st of January of the following year"; and

25 Prior to decision paper (CER/08/153), the CRU used the Best New Entrant (BNE) price for the ex-ante benchmark price. The BNE price comprised the all-in cost per MW of a BNE Combined Gas Turbine operating at baseload, and at efficiencies, availabilities and cost parameters determined by the CRU.

26 Prior to I-SEM implementation and the introduction of the Capacity Remuneration Mechanism, the capacity payment (for the purposes of the ex-ante Benchmark Price), was calculated by dividing the Annual Capacity Payment Sum by the modelled Available Energy for the PSO period to give a €/MWh rate.

27 Refer to “CPI_Euribor” Spreadsheet, which is published in conjunction with this paper, for an example as to how the CPI is applied to PSO calculations.
“CPI is applied on an annual basis and is not pro-rated for the number of months the reference price is applied for. Therefore, the CPI figure applied for any given month in a given year is the same”.

3.2 Calculation of Actual REFIT Payment (ex-post)

When submitting its REFIT Outturn Template (for actual REFIT costs incurred two years previous), via the CRU’s online portal for PSO submissions, the supplier is required to calculate the Actual REFIT Payment that it is due, in accordance with Appendix B (ii) of CER/08/236.

The calculation of the Actual REFIT Payment mirrors the ex-ante calculation but uses actual data rather than estimates. Specifically, the supplier’s calculation of the Actual REFIT Payment, for REFIT 1, is based on the calculation and subsequent addition of the three compensation streams:

- Actual Balancing Payment;
- Actual Technology Difference Payment - where applicable; and
- Actual Opportunity Cost Payment provided the suppliers Actual Market Costs are greater than its Actual Market Revenues.

In the ex-post calculation, Actual Market Revenue, being dependent on SMP, could be higher than the Actual Market Costs in one half hour but lower in another. It is thus important to note that the Actual Market Revenue and Actual Market Cost are evaluated for the whole PSO levy year, and Actual Opportunity Cost Payment calculated on the basis of a comparison of these annual values.

With reference to REFIT 2 and 3 projects (which is not reflected in CER/08/236), the suppliers calculate their Actual REFIT Payment in accordance with the relevant REFIT terms and conditions, which do not include a distinct Technology Difference Payment.

28 Following a notification to suppliers (27 March 2015), the CRU clarified that the In-Market Opportunity Cost Payment and Out-of-Market Opportunity Cost Payment should be calculated by the supplier over the 12 month period (i.e. 1 October – 30 September) and not by reference to half-hour trading periods. Refer to Appendix 1 for further details.
3.2.1 Actual Balancing Payment

As per Appendix B (ii) of CER/08/236, the calculation of the Actual Balancing Payment (under REFIT 1) involves multiplying the Actual REFIT Reference Price (large scale wind)\(^{29}\) by the Actual Output Generated by the PPA contracted generator, and subsequently multiplying the figure by 15%.

When calculating the Actual Balancing Payment for REFIT 2 and REFIT 3 projects, suppliers calculate the Actual Balancing Payment in accordance with Section 5.5. – 5.7 of the relevant REFIT terms and conditions (which is not reflected in CER/08/236).

3.2.2 Actual Technology Difference Payment

As per Appendix B (ii) of CER/08/236, the supplier’s calculation of its Actual Technology Difference Payment is similar to the approach outlined in Section 3.1.2. of this paper, with the exception that the calculation is based on actual costs as opposed to estimates. For REFIT 2 and 3 contracted projects, the CRU notes that suppliers cannot apply a Technology Difference Payment, when calculating its REFIT payment. Similarly, for wind REFIT 1 projects (≥5MW), suppliers don’t recover any Actual Technology Difference Payment.

3.2.3 Actual Opportunity Cost Payment

In order to calculate its Actual Opportunity Cost Payment, a supplier is required to calculate its Actual Market Revenue and Actual Market Costs, as per Section 4.8 of CER/08/236. Specifically, the CRU identified the various revenues and costs that suppliers should take into account in establishing how much they are to be compensated under the opportunity cost mechanism for both In-Market REFIT contracts (i.e. contracted generator is bidding into SEM) and Out-of-Market REFIT contracts (i.e. contracted generator is not bidding into SEM).

**In-Market REFIT Opportunity Cost Payment**

With reference to a supplier’s calculation of its In-Market REFIT Opportunity Cost Payment, Section 4.8 of CER/08/236 confirmed that the payment is calculated as the difference between Revenues (i.e. Energy Payment + Constraint Payment + Capacity Payment) and Costs (i.e.

\[^{29}\text{Actual REFIT Reference Price} = \text{REFIT Reference Price} \times CPI.\]

23

**Out-of-Market Opportunity Cost Payment**
As per Section 4.9 of CER/08/236, an Out-of-Market Opportunity Cost Payment is the contract cost to a supplier at the REFIT reference price (i.e. REFIT Reference Price * MG/MGLF) less what it would have cost the supplier to buy the equivalent volumes from the market (i.e. SMP + Capacity Charge + Imperfections Charge + Market Operator Charge, which is multiplied by MG/MGLF).

**3.2.4 Consumer Price Index Applied to Actual Outturns**
As stated in Section 4.3 of CER/08/236, the actual values for CPI will be known ex-post and will be applied to the REFIT reference prices in calculating the actual payments due.

**3.3 Provision of Auditors’ Certificates**
Section 4.5 of CER/08/236 states that a supplier’s PSO submission must contain an independent audit certificate, certifying their actual outturn costs for contacting with a REFIT supported generator, in accordance with the relevant PSO legislation, CRU decisions and REFIT terms and conditions. With reference to the relevant legislation, Article 10 of S.I. No. 217 of 2002 (as amended) states that:

- “each supplier shall provide the Commission details of the actual additional costs incurred by that supplier in complying with the obligation imposed on it by that Article…. together in each case with a separate auditor’s certificate, detailing the actual amounts of the costs and expenses referred to in subparagraphs (a), (ab) and (b,) as appropriate, and certifying that the costs and expenses in question have been incurred and the amounts recorded have been properly extracted from the books and records of the company”.

In order to provide additional clarity regarding CRU’s auditing requirements, the CRU will be publishing (CRU/19/052), which supersedes CER/17/021 and CRU/18/258.

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30 For information, Appendix 2 and Appendix 3 provide details on all the In-Market Generator Payments and Out-of-Market Payments that existed prior to I-SEM Go-Live (1 October 2018).
3.4 Reconciliation of PSO Monies: R-factor

The R-factor for a given PSO period is calculated as the difference between the ex-post amounts actually due to suppliers under the relevant PSO scheme for that period (based on submitted, audited statements that are consistent with governing legislation and relevant CRU decisions) and the ex-ante amounts that were paid to them based on estimates for that same period. The R-factor amount will be paid out two PSO periods later, along with the ex-ante amount due to the supplier in question for that later PSO period.

3.5 Interest Rate Applied to R-factor Calculations

As required by the Order, the R-factor payments are adjusted for inflation, using EURIBOR compounded over a two year period. Specifically, an average rate in the first year is calculated by taking the average of the EURIBOR 3 month rates for each of the 12 months. For the second year, not all the monthly rates are known at the time of calculation, and so an average is calculated of just those months for which the EURIBOR 3 month rate is available. Subsequently, when the remaining rates are known, a correction is calculated, and an adjustment made the following year.31

3.6 Suppliers’ Compensation Streams Based on Metered Generation

With reference to a supplier’s Balancing Cost Payment and Technology Difference Payment (for contracting with both In-Market and Out-of-Market generation), the CRU confirmed that the basis for suppliers compensation will be delivered generation (i.e. Metered Generation “MG” or Metered Generation Loss Factored “MGLF”) as opposed to the contracted generator’s Market Scheduled Quantities (MSQs).32 The CRU also confirmed that the metered generation can be based at the gate of the generation plant or at the trading point, as referenced in Section 4.2 of CER/08/236:

- Output at Gate – MG: Active Power (as defined in the Trading & Settlement Code) produced at the Export Point (being the nominal commercial point of entry to the Transmission or Distribution System of the Active Power generated at a Transmission connected or Distribution connected site).

31 Refer to “CPI_Euribor” Spreadsheet, which is published in conjunction with this paper, for an example as to how the EURIBOR is applied to PSO calculations.

32 Refer to section 2C of CER/08/170 – “Ex-post Correction Factor to apply in the calculation of the Public Service Obligation Levy Proposed Decision Paper” - for further details.
• At Trading Point - MGLF: Metered Generation adjusted to reflect transmission losses and (where applicable) distribution losses (DLAFs and TLAFs) at the Trading Boundary.

With reference to the Opportunity Cost Payment, CER/08/236 confirmed that revenues should be calculated based on MSQ, while the costs should be calculated based on MG/MGLF.

3.7 AER and Peat PSO Schemes’ Revenues and Costs

With reference to generators supported under the AER and Peat PSO Schemes, Section 4.1 of CER/08/236 confirmed that the CRU will apply the approach outlined in section 2.2 of CER/08/093,33 which is summarised in Table 3.4 below:

Table 3.4: AER and Peat PSO Schemes’ Revenues and Costs

<table>
<thead>
<tr>
<th>For contracts and plants supported under the PSO, other than under the REFIT the calculation for PSO revenues is as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> Total revenues = the sum of all actual revenues earned (SMP, capacity payments, ancillary services payments, etc)34 during the levy period;</td>
</tr>
<tr>
<td><strong>B.</strong> Total Allowable Costs = the sum of the total monies paid to the generator and recoverable under the PSO during the levy period;</td>
</tr>
<tr>
<td><strong>C.</strong> Where subtracting B. from A. results in either a positive/negative number this represents an over/under recovery under the PSO and the relevant amount is included in the R-factor with interest.</td>
</tr>
</tbody>
</table>

For energy sold to suppliers outside the SEM, i.e. where energy is netted off the demand of the supplier, the CRU noted that a similar calculation is required (i.e. calculation will be based on the half hourly metered output of the plant in question which will determine the total revenues that would have been earned if this energy were traded in the market).

33 CER/08/093: Arrangements for the Public Service Obligation Levy – A Consultation Document.

34 While not specified in CER/08/236, the CRU notes that the calculation of total revenues includes energy income, constraints payments, capacity payments, uninstructed imbalance payments, ancillary services (reactive power & reserve), Generator Performance Incentive (GPI) charges, trips and short notice declaration penalties and secondary fuel test payment.
3.8 PSO Invoicing and Collection Procedures

CER/08/153 acknowledged the CRU’s approval of the DSO’s and the TSO’s PSO collection and payment procedures (as set out in CER/03/013) and provided further details on the procedures for the collection and distribution of PSO monies. To ensure that the procedures for the calculation and distribution of PSO monies are reflective of existing market arrangements, the CRU will publish an update to CER/03/013 in 2019.

3.9 Methodologies for Calculating the Renewable Fraction for Biomass Projects

REFIT is used to support various biomass technologies including Anaerobic Digestion (CHP and non-CHP), Biomass CHP and Biomass Combustion (non-CHP, including co-firing with peat), which may use energy crops and other biomass. Under the current arrangements for administering the PSO, the CRU requires details of the exact methodology used for the calculation of the renewable fraction(s) of biomass, which must be in line with that outlined in the terms and conditions of REFIT. To date, the requirement to provide such a methodology has been applied to Waste to Energy and Biomass/Peat Co-firing Plants.

Calculation of Renewable Fraction for Waste to Energy Plants

With reference to REFIT 3 terms and conditions, Section 4.6 states the following regarding the waste to energy calculation:

- “For the calculation of the renewable portion of waste to energy, the intention is to use a recognised European Standard (EN) as set out by CEN (European Committee for Standardisation.) This standard is in development and once it has been finalised, this will be the future methodology used. In the interim, the ‘mass balance’ system will be used, whereby waste is sampled on a set basis and a breakdown of the components by calorific value is used to estimate the renewable component for the ex-ante

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35 Section 2.1 of REFIT 3 terms and conditions define energy crop as “a crop grown specifically for use as an energy source, including perennial species such as willow or miscanthus, or cereal grains, but not including waste and residues from agricultural production”.

36 Section 2.1 of REFIT 3 terms and conditions define biomass as “the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste”. For clarity, sludge qualifies as biomass under the terms and conditions of REFIT 3 and the electricity generated from the renewable fraction of sludge is therefore eligible for support under REFIT 3.

37 Only relevant for biomass projects with a renewable fraction or that are claiming the 2 different support rates for “energy crops” and for “all other biomass”
calculation. For the ex-post reconciliation, it is hoped that the CEN standard will be available and if not, a different methodology (to be determined) will have to be used”.

The CRU notes that the recognised standard referred to in Section 4.6 of the REFIT 3 terms and conditions is in place and refers to I.S. EN 15440:2011 (Solid Recovered Fuels – Methods for the Determination of Biomass Content). Following confirmation from the Department, the CRU permits relevant market participants to use reference data that is derived in accordance with I.S. EN 15440:2011, as opposed to the standard being applied to samples taken directly at the generation site. Additionally, following confirmation from the Department, the CRU permits the relevant market participants to combine data from I.S. EN 15440:2011 with waste characterisation survey data that is demonstrated to be representative of the waste composition at the particular generation site.

Regarding suppliers PSO cost submissions (for waste to energy plants), the CRU requires that the ex-post renewable fraction calculation be verified by an independent third party (on an annual basis). The verification statement from the independent third party shall include, but not be limited to, the following:

- Details of the renewable fraction calculation, including any reference data used;
- Confirmation that the methodology used for the determination of the outturn renewable fraction of electricity eligible for support is in accordance with the methods outlined in the standard I.S. EN 15440:2011, either through the direct application of these methods or through the use of reference data obtained in accordance with this standard;
- Confirmation that the calculation applied to arrive at the submitted outturn renewable fraction has been completed correctly; and
- Where applicable, confirmation that the fundamental assumptions on waste characterisation are taken from the most up to date figures published by the relevant sources.

Calculation of Renewable Fraction for Biomass/Peat Co-firing Plant

The REFIT 3 terms and conditions do not explicitly state what standard should be applied by a market participant when calculating the renewable fraction for Biomass/Peat Co-firing plants. To date, the market participant, to whom the renewable fraction methodology is applicable,

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38 As per Section 4.7 of REFIT 3 terms and conditions, “the verification shall be completed by an independent person in accordance with the requirements for assurance engagements prescribed in ISAE 3000, or an equivalent standard as may be agreed with CER”.

39 In accordance with Section 4.1 of REFIT 3 terms and conditions, a co-firing plant is permitted to claim REFIT support for biomass for up to 30% of the capacity of the plant (up to a maximum of 50 MW).
have used their fuel handling activities (governed by an EPA issued Greenhouse gas permit and associated legislation),\(^{40}\) as a basis for determining their renewable fraction on a daily basis (refer to CRU/19/016a for further details).

It is the intention of the CRU to publish all future accepted methodologies, from REFIT 3 co-firing plants. Such methodologies may also be subject to further review by the CRU. From an I-SEM implementation perspective, the CRU is of the view that I-SEM implementation does not necessitate changes to the renewable fraction methodologies for biomass plants and is therefore not considered in Section B of this paper.

### 3.10 HECHP Certification

EU Directive (2004/8/EC)\(^ {41}\) creates a framework for promoting cogeneration and focuses on establishing a common methodology for the evaluation of CHP as High-Efficiency CHP based on an economically justifiable demand for heat – i.e. useful heat. Within Ireland, the CRU is the appointed body to certify high-efficiency CHP (HE CHP) as set out in SI 298, SI 299 and SI 499 of 2009.

From a PSO perspective, Sections 4.8 – 4.11 of the REFIT 3 terms and conditions states the following:

- **Section 4.8**: “In the case of the HE CHP generation, an applicant who has been certified by CER as eligible, shall be deemed to be in the HE CHP category (and using the allocated limits in that category) for the duration the project is in REFIT 3, even if the electricity exported is paid at the biomass combustion rate for periods during which they don’t meet the HE CHP criteria”.

- **Section 4.9**: “Developers should note that for any year in which a CHP plant does not achieve either the required energy efficiency, or the required Primary Energy Savings as per Directive 2004/8/EC, only the appropriate non-CHP rate for that technology will be paid in respect of electricity exported from said plant”.

- **Section 4.10**: “Only electricity produced from combined heat and power as defined in section 2(1) of the Electricity Regulation Act 1999 (as amended by section 6 of the

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\(^{40}\) Commission regulation (EU) No 601/2012 Monitoring and Reporting of Greenhouse gas emissions.

\(^{41}\) Directive 2004/EC – Promotion of cogeneration based on a useful heat demand in the internal energy market.
Energy (Miscellaneous) Provisions Act 2009) and as determined in the context of relevant governing Irish legislation shall attract the CHP rate for electricity output”.

- **Section 4.11**: “A plant that applies for the biomass combustion tariff (including co-firing) and receives REFIT 3 at that rate cannot move into a CHP rate, unless prior to REFIT payments commencing in respect of the project, it withdraws and submits a new application which meets the terms and conditions for the CHP rate and there is sufficient capacity availability”.

Under the current arrangements for administering the PSO, the CRU requires that a supplier’s annual PSO submissions (when contracted with HECHP that is supported under the PSO) contain a valid HECHP certificate issued by the CRU (the relevant HECHP certificates should cover the period to which the outturn calculations are determined). In the event that a valid certificate is not provided, only the appropriate non-CHP rate for that technology will be paid.  

To clarify, for a REFIT-supported CHP plant, the CHP REFIT rate is only payable for electricity output that is certified as HECHP. If the output is not certified as HE CHP, the non-CHP REFIT rate for the relevant technology is applicable.

From an I-SEM implementation perspective, the CRU is of the view that I-SEM implementation does not necessitate changes to its arrangements for HECHP certification and is therefore not considered in Section B of this paper.

### 3.11 Addressing the Risk of Bad Debt to the PSO levy

In December 2018, the CRU published a Decision Paper (CRU/18/261), which confirmed that the CRU will apply a withholding mechanism to PSO payments in respect of generation projects that have failed to meet a specific milestone in terms of generation commencement.

For generation projects connecting to the distribution system, the CRU decided that the appropriate trigger point to release such withheld funds is the third stage payment of connection charges. Similarly, the CRU decided that the appropriate trigger point to release such withheld funds for generators units connected to the transmission network is proof of

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42 Under REFIT 3, Biomass CHP plants are eligible for PSO support. However, different REFIT reference rates are applied depending on whether these plants are certified as CHP. The difference between the CHP and non-CHP reference rates varies depending on technology, scale, etc.
obtaining an Interim Operational Notification (ION) from the TSO. Proof of reaching the relevant milestones must be provided to the CRU by the supplier before PSO payments will be initiated. In the event that a supplier cannot provide proof of the third stage connection payment or ION as applicable, CRU/18/261 states that the CRU will consider other evidence from the supplier that clearly demonstrates the new generation project will commence commercial generation within the applicable PSO year.

The CRU will continue to monitor the risk of bad debt and will update its strategy for addressing the risk of bad debt if deemed necessary. However, any such updates are not being considered as part of this paper.
PART B

For Consultation
4. Department’s Review of Electricity Support Schemes

4.1 Options Paper
In May 2017, the Department commenced a review of its electricity support schemes for generation projects (funded by the PSO levy) in order to ensure that the Department’s electricity support schemes are compatible with the new wholesale electricity market design arising from I-SEM implementation. The Department's review focused primarily on identifying the necessary amendments to market revenue/cost calculations for the various PSO schemes, and identified two core issues that needed to be addressed, namely the:

i. calculation of the energy component of the Total Market Revenue (TMR) calculation; and

ii. selection of the most appropriate market reference price (e.g. Day Ahead Market - DAM, Balancing Market -BM).

4.2 Proposed Decision Paper
In November 2017, following consultation with industry, the Department published a proposed decision paper on its revisions to its electricity support schemes. A summary of the Department’s proposed decisions and other guidance are summarised in Table 4.1.

Table 4.1: Proposed Decisions and Guidance

<table>
<thead>
<tr>
<th>i.</th>
<th>Market Reference Price Applied to TMR Calculations for Wind Generation (Above 5MW) in AER, REFIT 1 and REFIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The energy component of the TMR calculations for wind generation (above 5MW capacity) will be based on the lower of:</td>
</tr>
<tr>
<td></td>
<td>• a blend of 80% of the DAM price and 20% of the BM price; and</td>
</tr>
<tr>
<td></td>
<td>• the DAM price.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ii.</th>
<th>Market Reference Price Applied to TMR Calculations for De Minimis Supported Wind Generation (Below 5MW) in AER, REFIT 1 and REFIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The energy component of the TMR calculations for wind generation (below 5MW capacity) will be based on the lower of:</td>
</tr>
</tbody>
</table>

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• a blend of 70% of the DAM price and 30% of the BM price; and
• the DAM price.

iii. Market Reference Price Applied to TMR Calculations for Non-Wind Generation under REFIT 1, REFIT 2, REFIT 3 and the Peat PSO Scheme
The energy component of the TMR calculations for technologies other than wind (e.g. hydro, peat, biomass) will be based on the DAM price.

iv. Treatment of Capacity Market Costs
The PSO levy “will not cover the costs related to capacity market participation”. In respect of the Capacity Market, the calculation of market revenue for the purposes of calculating the PSO levy for all supported generation will take into account only capacity market revenues, i.e. auction revenues, but not capacity market costs, i.e. difference payments paid when market price goes above the reliability option strike price;

v. Treatment of Capacity Market Revenues
For PSO supported projects, the Department indicated that “if supported generation participate in the CRM auctions only the capacity revenue will be considered as part of the TMR calculation”. With reference to co-firing or part renewable plant, the Department stated that their capacity revenue will be based on the proportion of the capacity supported by the PSO levy that clears in the I-SEM capacity auction and that it expected that further detail on this will be set out in the updated CRU paper on PSO levy calculation arrangements for the I-SEM.

vi. Market Reference Price
In order to set the ex-ante PSO levy calculation, the Department stated that it “expected that the CRU would use an estimate of the DAM and BM prices as appropriate derived from modelled forecasts to set the ex-ante PSO levy calculation in a similar manner to how the SEM Single Marginal Price is calculated for the current PSO levy forecast”.

For the purpose of calculating TMR for wind generation (ex-post), the Department confirmed that it is of the view “that the relevant market reference price for purpose
of calculating the TMR should be the generation (wind) weighted average price. Additionally, with reference to technologies other than wind (including hydro and biomass) participating in renewable electricity subsidy schemes supported by the PSO levy, the Department proposed that the calculation of market revenue will be based on the DAM time weighted average price. The Department also noted that the energy portion of the market revenue calculated for the remaining peat contracts receiving support through the PSO levy should be based on the DAM price.

vii. Treatment of Constraints Revenue
The Department indicated that “this will be treated as per current arrangements insofar as constraints payments are relevant in the I-SEM arrangements. It is expected that further detail on this will be set out in the updated CRU paper on PSO levy calculation arrangements for the I-SEM”.

viii. Treatment of DS3 System Service Revenues
With reference to the calculation of the REFIT payment, the Department stated its view “not to include potential DS3 System Service revenues to TMR on the basis that to do so would reduce or even eliminate any incentive on such wind generators to participate in the System Services market which would not be in the long-term interest of the industry and indeed of the end customer”.

ix. Calculations and Data Inputs
The Department noted that the precise calculations and data inputs necessary for the determination of the TMR will be set out by the CRU.

4.3 Decision Paper
In June 2018, the Department published its decision paper on the treatment of Electricity Support Schemes under I-SEM arrangements. The Department’s decision paper did not make any material changes relative to what was communicated in the Proposed Decision Paper (see Table 4.1), and its decisions were as follows:

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44 The CRU notes that the generation (wind) weighted average price is referred to as the wind weighted reference price in DCAE’s decision. Therefore, the CRU has interpreted the wind weighted reference price to mean the deemed price by trading period (€/MWh) multiplied by the individual generation (MW) of each wind farm by trading period.
• **Decision 1**: The market revenue calculation for the purposes of calculating the PSO levy for supported wind generation (AER, REFIT 1 & 2) will be amended to adapt to the Integrated Single Electricity Market. The market revenue calculation for wind generators will, for the energy component, be based on the lower of a blend of 80% of the Day Ahead Market Price and 20% of the Balancing Market Price, and the Day Ahead Market Price for all supported wind generators above 5MW capacity. For supported wind generators below 5 MW, the market revenue calculation will, for the energy component, be based on the lower of a blend of 70% of the Day Ahead Market Price and 30% of the Balancing Market Price, and the Day Ahead Market Price.

• **Decision 2**: The market revenue calculation for the purposes of calculating the PSO levy for other supported generation (under REFIT 1, REFIT 2, REFIT 3 and the Peat PSO Scheme) will be amended to adapt to the Integrated Single Electricity Market. For these generators (peat, hydro and biomass) supported under the PSO levy, the market revenue calculation for the energy component will be based on the Day Ahead Market Price.

• **Decision 3**: The market revenue calculations for the purposes of calculating the PSO levy for all supported generation will take into account only capacity market revenues and not capacity market costs.

The Department’s June 2018 decision paper also noted “that the deemed reference market refers to the DAM or BM on a trading period basis, i.e. that the actual deemed reference price in each trading period is multiplied by the individual generation of each windfarm to calculate the energy portion of the total market revenue”. Additionally, the Department confirmed that when calculating market revenue ex-post, “the same approach for wind can be applied to other supported generation with the detail to be determined by the CRU as part of the implementation” (i.e. for technologies other than wind, the energy component of the revenue calculation will be based on the generation weighted DAM price).

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45 As per CRU/18/259, the CRU received queries from market participants seeking clarity from the CRU regarding the Department’s decision and the calculation of PSO monies, namely, if the calculation of REFIT total market revenue and total market costs in each PSO period are based on a 12-month period or change to a half hourly period. The CRU’s interpretation of DCCAE’s June 2018 decision paper is that there is no deviation required to the CRU’s current approach to calculating total costs and total revenues over a 12-month PSO period.
The CRU notes that certain elements with respect to the PSO levy will not be affected by the Department’s June 2018 decision paper, namely the Department’s REFIT reference prices and balancing payment rates. With reference to the Department’s REFIT reference prices, the CRU notes that they will remain at the levels specified by the Department, which are updated annually for inflation (using CPI). Regarding the issue of balancing payments, the CRU notes that balancing cost payments will also remain at the levels specified by the Department (i.e. 15% of the REFIT reference price (for large scale wind) in REFIT 1, and up to €9.90 per MWh for REFIT 2 and REFIT 3).
5. Proposed Revisions: PSO Arrangements for ex-ante REFIT Calculations

The proposed revisions within this section are made to take account of the Department’s June 2018 decision, and the REFIT 2 and 3 terms and conditions which were not reflected in the CER/08/236 decision paper.

5.1 Estimated REFIT Payment (ex-ante)

For REFIT 1, the formula for the calculation of the Estimated REFIT Payment (ERP) involves adding the Estimated Balancing Cost Payment (EBCP), the Estimated Technology Difference Payment (ETDP) and the Estimated Opportunity Cost Payment. The CRU does not propose amending its calculation of the Estimated REFIT Payment (ERP) for REFIT 1. The formula is as follows:

\[ ERP = EBCP + ETDP + EOCP \]

The formula for calculating the ERP should also reflect the REFIT 2 and REFIT 3 terms and conditions and reflect the fact that there is no distinct Technology Difference Payment. Therefore, the calculation of the Estimated REFIT Payment (ERP) for REFIT 2 and 3 involves adding the Estimated Balancing Cost Payment (EBCP) and the Estimated Opportunity Cost Payment (EOCP). The formula is proposed as follows:

\[ ERP = EBCP + EOCP \]

5.2 Estimated Balancing Cost Payment

For REFIT 1, the formula for the calculation of the Estimated Balancing Cost Payment involves multiplying the Estimated REFIT Reference Price (ERRP) by Estimated Output Generated (EOG), and subsequently multiplying by 15%. The CRU does not propose amending its calculation of the Estimated Balancing Cost Payment (EBCP) for REFIT 1. The formula is as follows:

\[ EBCP = 0.15 \times ERRP \times EOG \]

For REFIT 2 and 3, the CRU notes that the formula for calculating a supplier’s Estimated Balancing Cost Payment (EBCP) should be stated in this paper in order to reflect the REFIT 2 and 3 terms and conditions.
Specifically, the calculation of the Estimated Balancing Cost Payment (EBCP) for REFIT 2 and REFIT 3 projects should reflect the fact that suppliers receive a fixed balancing payment of up to a maximum of €9.90/MWh (not subject to any increases in CPI). Therefore, the calculation of the Estimated Balancing Cost Payment (EBCP) under REFIT 2 and REFIT 3 is proposed as follows:

- if the ex-ante Benchmark Price (XBP) is less than or equal to the Estimated REFIT Reference Price (ERRP), the Estimated Balancing Cost Payment (EBCP) equals Estimated Output Generated (EOG) x €9.90/MWh;

  \[
  \text{If } XBP \leq \text{ERRP},
  \]
  \[
  EBCP = EOG \times €9.90/\text{MWh}; \quad \text{or}
  \]

- if the ex-ante Benchmark Price (XBP) is less than the Estimated REFIT Reference Price (ERRP) + €9.90/MWh and greater than the Estimated REFIT Reference Price (ERRP), the Estimated Balancing Cost Payment (EBCP) equals Estimated Output Generated (EOG) x (€9.90/MWh + ERRP – XBP);

  \[
  \text{If } \text{ERRP} < XBP < (\text{ERRP} + €9.90/\text{MWh}),
  \]
  \[
  EBCP = EOG \times (\text{ERRP} + €9.90/\text{MWh} – XBP); \quad \text{or}
  \]

- if the ex-ante Benchmark Price (XBP) is greater than or equal to the Estimated REFIT Reference Price (ERRP) + €9.90/MWh, the Estimated Balancing Cost Payment (EBCP) equals zero.

  \[
  \text{If } (\text{ERRP} + €9.90/\text{MWh}) \leq XBP,
  \]
  \[
  EBCP = 0.
  \]

### 5.3 Estimated Technology Difference Payment

For REFIT 1, the CRU does not propose amending its calculation of the Estimated Technology Difference Payment (ETDP). The Estimated Technology Difference Payment (ETDP) is calculated by multiplying the Estimated Technology Payment (ETP) by Estimated Output Generated (EOG). The formula is proposed as follows:
\[ ETDP = ETP \times EOG \]

where

\[ ETP = PPA - ERRP \quad \text{if} \quad ERRP < PPA < ETRP \]
\[ ETP = ETRP - ERRP \quad \text{if} \quad ETRP \leq PPA \]

Note the PPA price (PPA) cannot be less than the Estimated REFIT Reference Price (ERRP).

For REFIT 2 and REFIT 3, there is no explicit Technology Difference Payment, with more expensive technology categories being compensated instead through the use of technology-specific reference prices in the calculation of Opportunity Cost Payment.

### 5.4 Estimated Opportunity Cost Payment

For REFIT 1-3, the CRU does not propose making any revisions to the calculation of the Estimated Opportunity Cost Payment (EOCP). However, the CRU notes that in REFIT 1 the Estimated REFIT Reference Price (ERRP) is a single REFIT 1 reference price (i.e. large scale wind) whereas in REFIT 2 and 3 the ERRP is a technology specific reference price. Therefore, for REFIT 1, REFIT 2 and REFIT 3 the formula is proposed as follows:

If \( XBP < ERRP \),

\[ EOCP = EOG \times (ERRP - XBP); \quad \text{or} \]

If \( ERRP \leq XBP \),

\[ EOCP = 0 \]

### 5.5 Ex-ante Benchmark Price

The calculation of the ex-ante Benchmark Price needs to be updated to reflect the relevant market price under the revised SEM arrangements, arising from I-SEM implementation.

In order to calculate the ex-ante Benchmark Price (currently derived using a validated SEM PLEXOS model), the CRU propose continuing to use a single price. The ex-ante Benchmark Price will be a time weighted average of the estimated DAM price, which will be a forecast for the relevant 12-month PSO period. The capacity payment will be calculated based on the
results of the most recent CRM auctions and subtracted from the applicable supplier’s PSO ex-ante payment.\textsuperscript{46}

The CRU does not propose undertaking separate modelling of Day Ahead Market (DAM) and Balancing Market (BM) prices. Therefore, the ex-ante Benchmark Price modelling will not distinguish between the two (i.e. DAM and BM) or between the 80%/20% and 70%/30% blended prices used for wind generators and DAM only price used for non-wind generators.

Additionally, in principal, the CRU notes that the ex-ante Benchmark Price could be generation-weighted rather than time-weighted. The CRU considers that it would be impractical to calculate a generation-weighted average for each PSO supported generator. It would, however, be possible to calculate an average price weighted by total forecast generation in each trading period and/or system demand or weighted by forecast aggregate wind generation in each trading period to give a wind specific benchmark price, using the wind base years used in the validated PLEXOS model. However, this approach would depend to a much greater extent on specific modelling assumptions than would using a simple time-weighted average.

\textbf{5.6 Application of Exceedance Probability for Wind}

As noted in Section 3.1 of this paper, suppliers are required to provide the CRU with a completed REFIT Estimate Template for the forthcoming PSO year. As part of this submission, suppliers are required to provide Estimated Output Generated (EOG) for each REFIT contracted generator. The onus is on the supplier to “ensure that the difference between ex-ante estimates and ex-post known values are kept to a minimum”.

In CER/08/236, the CRU noted that exceedance probabilities of “P90, P75 or P50” “may be used, but this may be subject to review at a later date”. The CRU therefore intends to review the use of exceedance probability to improve the accuracy of PSO estimate submissions as part of this consultation process.

\textsuperscript{46} Historically for the purpose of the PSO capacity payment, an estimate price was used to approximate the revenue a generator would earn from the Capacity Payment Mechanism (CPM) in the SEM. The CPM is a mechanism, which remunerated generators for the provision of generation capacity. The Annual Capacity Payment Sum (ACPS) was calculated by the Regulatory Authorities, and this data was used as a proxy to calculate the PSO capacity payments for a given PSO period. Deviations between the estimation and actual remuneration was rectified through the R-factor. The mechanism for the remuneration of capacity is fundamentally different in the new SEM market, arising from I-SEM implementation. Capacity providers will only receive capacity payments if they are successful in a Capacity Auction.
Exceedance probability refers to the chances that a particular measure will be surpassed in value by another, randomly selected measure. Exceedance probabilities are commonly used in the planning and financing stages of a wind farm project when calculating energy yields predictions and are expressed as P values, the “P” stands for probability.

In the instance of P50 for example, the probability of reaching a higher or lower energy production for a given period is 50%? If P90 exceedance probability is applied when estimating output generation, the probability of that EOG not being reached is 10%.

The reconciliation between Estimated Output Generation (EOG) and Actual Output Generation (AOG) is one of the key factors, which determines the size of the R-factor.

The CRU notes that the larger the mis-alignment between EOG and AOG the larger the resulting R-factor. The CRU also notes that historically, estimated output generation predictions submitted by suppliers to the CRU tend to overestimate expected generation, contributing to negative R-factors.

The CRU proposes that an application of a mandatory exceedance probability on all future generation estimates for wind assets be introduced to help better align estimated and actual output, thereby reducing the size of the R-factor. Feedback is invited from stakeholders on the most suitable p value.

5.7 CPI Applied to ex-ante Estimates

The CRU does not propose making any revisions to its arrangements for the calculation of the PSO in terms of its methodology for applying a CPI to its ex-ante estimates.
6. Proposed Revisions: PSO Arrangements for ex-post REFIT Calculations

The proposed revisions within this section are made to take account of the Department’s June 2018 decision, and the REFIT 2 and 3 terms and conditions which were not reflected in the CER/08/236 decision paper. For clarity, the basis of the calculations will continue to be the Metered Quantities (QM) and Loss Adjusted Metered Quantities (QMLF), which are the I-SEM direct equivalents of Metered Generation and Metered Generation Loss Adjusted in the pre I-SEM arrangements.

6.1 Actual REFIT Payment

For REFIT 1, the CRU does not propose amending its overarching calculation of the Actual REFIT Payment (ARP). However, the CRU notes that the calculation of Actual Market Revenues (AMR) used in the derivation of the Actual Opportunity Cost Payment (AOCP) will change. The overarching formula for calculating the Actual REFIT Payment (ARP) is as follows:

$$ARP = ABCP + ATDP + AOCP$$

For REFIT 2 and 3, the CRU notes that the formula applied by a supplier when calculating its Actual REFIT Payment (ARP) requires modification to reflect REFIT 2 and REFIT 3 terms and conditions, as:

- the calculation of the Actual Balancing Cost Payment is different; and
- there is no distinct Actual Technology Difference Payment (ATDP).

Therefore, the formula for calculating the Actual REFIT Payment (ARP) for REFIT 2 and 3 is proposed as follows:

$$If \ (AMC > AMR), \ ARP = ABCP + AOCP$$
### 6.2 Actual Balancing Payment

For REFIT 1, the calculation of the Actual Balancing Cost Payment (ABCP) involves multiplying the Actual REFIT Reference Price (ARRP) by Actual Output Generated (AOG), and subsequently multiplying by 15%. The CRU does not propose amending its calculation of the Actual Balancing Cost Payment (ABCP) for REFIT 1. The formula is as follows:

\[
ABCP = ARRP \times AOG \times 0.15
\]

For REFIT 2 and 3, the CRU notes that the formula for calculating a supplier’s Actual Balancing Cost Payment (ABCP) should be stated in this paper in order to reflect the REFIT 2 and 3 terms and conditions. The formula for calculating the Actual Balancing Cost Payment (ABCP) under REFIT 2 and 3 is proposed as follows:

If \(AMR \leq (ARRP \times AOG)\),
\[
ABCP = AOG \times €9.90/MWh; \text{ or}
\]

If \((ARRP \times AOG) < AMR < ((ARRP + €9.90/MWh) \times AOG)\),
\[
ABCP = ((ARRP + €9.90/MWh) \times AOG) - AMR; \text{ or}
\]

If \(((ARRP + €9.90/MWh) \times AOG) \leq AMR\),
\[
ABCP = 0
\]

### 6.3 Actual Technology Difference Payment

For REFIT 1, the CRU does not propose amending the calculation of the Actual Technology Difference Payment (ATDP). The Actual Technology Difference Payment (ATDP) is calculated by multiplying the Actual Technology Payment (ATP) by Actual Output Generated (AOG). The formula is as follows:

\[
ATDP = ATP \times AOG
\]

**where**

\[
ATP = PPA - ARRP \quad \text{if } ARRP < PPA < ATRP
\]

\[
ATP = ATRP - ARRP \quad \text{if } ATRP \leq PPA
\]

Note the PPA price (PPA) cannot be less than the Actual REFIT Reference Price (ARRP).
For REFIT 2 and REFIT 3, the CRU notes that there is no distinct Technology Difference Payment, as the more expensive technology categories are compensated through the calculation of Opportunity Cost Payment.

### 6.4 Actual Opportunity Cost Payment

The CRU is not proposing any change to the calculation of Actual Opportunity Cost Payment from Actual Market Revenues (AMR) and Actual Market Costs (AMC), which remains as follows:

\[
\text{If AMR} < \text{AMC}, \\
\quad \text{AOC} = \text{AMC} - \text{AMR} \\
\text{or if AMR} \geq \text{AMC} \\
\quad \text{AOC} = 0
\]

For both In-Market and Out-of-Market generators, the determination of Actual Market Costs remains the same, being the Actual Output Generated, purchased under the PPA, priced at the REFIT Reference Price, as per Tables 6.1 and 6.2 below. However, in light of the Department’s decisions and the changes arising from the introduction of I-SEM, changes to the determination of Actual Market Revenues are required\(^\text{47}\)\(^\text{,48}\).

### 6.4.1 Rationale for Updating Actual Market Revenues Calculation

The CRU recognises that the inputs into the formulae for calculating a supplier’s In-Market Opportunity Cost Payment and Out-of-Market Opportunity Cost Payment require modification in light of the revised SEM trading arrangements and to reflect the following Department decisions:

1. deemed market price for wind;
2. deemed market price for technologies other than wind;
3. treatment of capacity market costs;

\(^{47}\) Appendix 4 provides details on all the In-Market Generator Payments that exist after I-SEM Go-Live (1 October 2018).

\(^{48}\) Appendix 5 provides details on all the Out-of-Market Payments that exist after I-SEM Go-Live (1 October 2018).
iv. treatment of DS3.

Deemed Market Price for Wind
The CRU recognises that a modification to the calculation of the Opportunity Cost Payment is necessary to reflect the Department’s June 2018 decision that the calculation of the energy revenue calculation should assume that all wind generation receives a “deemed market price”. The Department’s decision is that the deemed market price for a particular trading period will be:

- For wind generation above 5MW, the energy component of the revenue calculation will be based on the lower of: a blend of (a) 80% of the DAM price and 20% of the BM price and (b) the DAM price; and
- For wind generation equal to or less than 5MW, the energy component of the revenue calculation will be based on the lower of: (a) a blend of 70% of the DAM price and 30% of the BM price and (b) the DAM price.

Deemed Market Price for Technologies other than Wind
In accordance with the Department’s June 2018 decision regarding the calculation of the energy component, the revenue calculations for technologies other than wind will be based on the DAM price.

Treatment of Capacity Market Costs
The mechanism for the remuneration of capacity is different in the revised SEM market, arising from the I-SEM. In the revised SEM, the administratively determined CPM is being replaced by the Capacity Market. In accordance with the Department's decision, going forward, the market revenue calculation for the purposes of calculating the PSO levy for all supported generation should take into account capacity market revenues only, being the revenues received by the generator for the sale of capacity market obligation, and not capacity market costs, being difference charges the generators must pay at times of “system stress”.

For co-firing plants that are successful in the capacity auction, a distinction must be made between capacity market revenues attributed to the ‘green’ portion of the plant i.e. biomass/waste and the ‘brown’ portion of the plant i.e. peat. The CRU will calculate this using the plant’s renewable fraction as referenced in section 3.9.

Treatment of DS3
In accordance with the Department’s decision, the CRU notes that DS3 will not be included in the calculation of AMR.
Revised SEM trading arrangements: In-Market
With reference to energy payment, the bulk of payments for energy under the revised SEM trading arrangements occur through the ex-ante markets (i.e. DAM and IDM). However, any energy produced by a generator that is not sold ex-ante, is sold as an imbalance through the BM at the Imbalance Settlement Price. It is also possible that a generator is ‘oversold’ in the ex-ante markets, in which case the shortfall between the energy that has been sold ex-ante and the energy that is generated is bought back at the Imbalance Settlement Price. Hence, in addition to the ex-ante market revenues, there is an Imbalance Component Payment or Charge, which can be positive or negative, depending on whether there is a surplus or shortfall. In addition, where a generator has been curtailed then there is an additional Curtailment Payment or Charge that, together with the Imbalance Component Payment or Charge, ensures that any shortfall occurring as a result of the curtailment is bought back through the BM at a price that reflects the price of the generator’s ex-ante sales.

It is these three revenue streams – ex-ante market revenues, Imbalance Component Payment or Charge and Curtailment Payment or Charge (each of which may be positive or negative) – which the CRU proposes are in aggregate replaced by the energy payment, calculated using the blended 80%-DAM / 20% BM or 70% DAM / 30% BM price⁴⁹, as applicable in accordance with the June 2018 decision of the Department.

Constraint payments are replaced in the revised SEM market principally by Premium Component Payments and Discount Component Payments. These differ slightly from Constraint Payments in the previous SEM arrangements in that:

a) in the revised SEM trading arrangements, the payments represent only the difference between the price at which a generator was constrained off or on and the Imbalance Settlement Price, with the Imbalance Settlement Price component of the constrained-on offer or constrained off bid being included in the Imbalance Component Payment or Charge; whereas:

b) in the previous SEM, the payment or charge for the energy delivered as part of the constrained on offer or constrained off bid is included in the Constraint Payment

In addition, under the revised SEM trading arrangements, an Offer Price Only Accepted Offer Payment and Bid Price Only Accepted Bid Payments are adjustments to ensure that Offers and Bids intended to reverse previous Balancing Market actions are remunerated at the Offer

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⁴⁹ BM price is more correctly known as the Imbalance Settlement Price.
Price or Bid Price, as the case may be, and not, as can happen in some circumstances, at the Imbalance Settlement Price. Finally, Fixed Cost Payments or Charges cover additional costs that may be incurred by a unit as a result of following dispatch instructions.

**Revised SEM trading arrangements: Out-of-Market**

Under the revised SEM trading arrangements, for the purposes of calculating the PSO, the SMP is replaced by the deemed market price which is multiplied by Metered Quantity (QM) or Loss Adjusted Metered Quantity (QMLF) as applicable. Additionally, the CRU notes that under the previous SEM trading arrangements a Net Demand Adjustment (NDAvh) was added to Net Demand (NDvh) to reflect Residual Error Volumes, to give Settlement Net Demand (SNDvh), which is then priced at SMP to give the Energy Charge. Under the revised SEM trading arrangements, Residual Error Volumes give rise to a separate Residual Error Volume Charge; hence, this Residual Error Volume Charge should be considered as part of the actual market cost calculation. Separate to the above, the CRU notes that the Imperfections Charges and Market Operator Charges in the previous SEM will remain in place under the revised SEM trading arrangements.

**6.4.2 Proposed Amendments to the Calculation of In-Market Opportunity Cost Payment**

Taking recent market developments into consideration (as detailed in Section 6.4.1), the In-market Actual Opportunity Cost Payment is calculated based on costs and revenues as outlined in Table 6.1.50

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50 Appendix 4 provides details on all the In-Market Generator Payments that exist after I-SEM Go-Live (1 October 2018).
Table 6.1: In-Market Actual Opportunity Cost Payment

<table>
<thead>
<tr>
<th>Actual Market Revenues</th>
<th>Actual Market Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Actual Market Revenue for unit u in levy year Y (AMR&lt;sub&gt;uY&lt;/sub&gt;) is the sum of three components (i.e. Energy Payment, Constraints Payment and Capacity Payment).</td>
<td>REFIT Reference Price * AOG</td>
</tr>
</tbody>
</table>

**Energy Payment**

\[ AMR_{uY}(\text{Energy}) = \sum_{\gamma \in Y} (\text{PMD}_{u\gamma} \cdot \text{QMLF}_{u\gamma}) \]

where PMD<sub>u\gamma</sub> is the deemed market price, being the blended rate or DAM price, as appropriate, and QMLF<sub>u\gamma</sub> is the Loss Adjusted Metered Quantity and \( \sum_{\gamma \in Y} \) is the summation over all Imbalance Settlement Periods, \( \gamma \), in the levy year, Y.

**Constraints Payment**<sup>51</sup>

\[ AMR_{uY}(\text{Constraints}) = \sum_{d \in Y} (\text{CPREMIUM}_{ud} + \text{CDISCOUNT}_{ud} + \text{CAOOPO}_{ud} + \text{CABBPO}_{ud}) + \sum_{b \in Y} (\text{CFC}_{ub}) \]

where \( \sum_{d \in Y} \) is the summation over all Settlement Days, \( d \), in the levy year, and \( \sum_{b \in Y} \) is the summation over all Billing Periods, \( b \), in the levy year.

**Capacity Payment**

\[ AMR_{uY}(\text{Capacity}) = \sum_{c \in Y} \text{CCP}_{\Omega c} \]

where \( \sum_{c \in Y} \) is the summation over all Capacity Periods, \( c \), in the levy year.

With reference to the calculation of the In-Market Actual Opportunity Cost Payment as detailed in Table 6.1, the CRU notes the following:

i. For large wind (above 5 MW) the deemed market price, PMD<sub>u\gamma</sub>, is the lower of the DAM price or a blend of 80% DAM price and 20% BM price. For small wind (below 5 MW), the deemed market price, PMD<sub>u\gamma</sub>, is the lower of the DAM price or a blend of 70% DAM price and 30% BM price. For non-wind technologies, the PMD<sub>u\gamma</sub> is the DAM price.

---

<sup>51</sup> CPREMIUM<sub>ud</sub> refers to Premium Component Payment, CDISCOUNT<sub>ud</sub> refers to Discount Component Payment, CAOOPO<sub>ud</sub> refers to Payments or Charges for Offer Price Only Accepted Offers, CABBPO<sub>ud</sub> refers to Payments or Charges for Bid Price Only Accepted Bids + CFC<sub>ub</sub> refers to Fixed Cost Payment or Charges.
ii. The calculation of Actual Market Revenues, unlike the calculation of costs, uses QMLF, and not a choice of QM or QMLF depending on the PPA. This is because QMLF, and not QM, is the quantity used in the Trading and Settlement Code for determining the relevant revenues. In contrast, the calculation of Actual Market Costs has previously allowed, and will continue to allow, the use of QM or QMLF, depending on the terms of the PPA.

iii. Revenue calculation does not include DS3 System Service revenues.

iv. With reference to co-firing or part renewable plant, their capacity revenue will be based on the proportion of the capacity supported by the PSO levy that clears in the capacity auction. Additionally, for generators to whom the renewable fraction methodology is applicable, the QMLF shall be based on the renewable fraction.

v. If supported generation participate in the CRM auctions capacity costs shall not be considered as part of the cost calculations. The PSO levy will not cover the costs related to capacity market participation.

vi. Actual Output Generated (AOG), being defined as the output purchased under the PPA, should be measured with respect to the station gate, i.e. not loss-adjusted, or measured with respect to the SEM" Trading Point", i.e. loss-adjusted, as specified in the PPA.

vii. In REFIT 1 the REFIT Reference Price (is a single REFIT 1 reference price (i.e. large scale wind) whereas in REFIT 2 and 3 the REFIT Reference Price is a technology specific reference price.

viii. For suppliers contracted to generators to whom the renewable fraction methodology is applicable, the QM/QMLF shall be based on the renewable fraction when determining cost.
6.4.3 Proposed Amendments to the Calculation of Out-of-Market Opportunity Cost Payment

Taking recent market developments into consideration (as detailed in Section 6.4.1), the Out-of-Market Opportunity Cost Payment is calculated based on Actual Market Revenues and Actual Market Costs, as outlined in Table 6.2.

Table 6.2. Out-of-Market Actual Opportunity Cost Payment

<table>
<thead>
<tr>
<th>Actual Market Revenues</th>
<th>Actual Market Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Actual Market Revenue in levy year $Y$, $AMR_{uY}$, is given by: $AMR_{Y} = \sum_{\gamma \in Y} (PMD_{\gamma} + PIMP_{\gamma} \cdot FCIMP_{\gamma} + PREV_{\gamma} \cdot RMVIP_{\gamma} + PCCSUP_{\gamma} \cdot FQMCC_{\gamma} + PVMO_{\gamma}) \cdot AOG_{\gamma}$</td>
<td>REFIT Reference Price x AOG</td>
</tr>
<tr>
<td>where $PMD_{\gamma}$ is the deemed market price, being the blended rate or DAM price, as appropriate; and $AOG_{\gamma}$ is the Actual Output Generated in Imbalance Settlement Period, $\gamma$, which is loss-adjusted or not, as per the terms and conditions of the PPA; and $\sum_{\gamma \in Y}$ is the summation over all Imbalance Settlement Periods, $\gamma$, in the levy year, $Y$.</td>
<td></td>
</tr>
</tbody>
</table>

With reference to the calculation of the Out-of-Market Actual Opportunity Cost Payment as detailed in Table 6.2, the CRU notes the following:

i. For Out-of-Market generation, the Actual Market Revenue is the cost of purchasing demand from the SEM avoided by the Supplier, rather than a revenue received in respect of the generator, as is the case with an In-Market generator. However, the Difference Payment Socialisation Charge, the Achievable Difference Payment are not included, as per the Department’s decision that capacity costs would not be included.

ii. $PIMP_{\gamma} \cdot FCIMP_{\gamma}$ is the Imperfections Price in year $Y$ times the Imperfections Charge Factor in Imbalance Settlement Period $\gamma$; and $PREV_{\gamma} \cdot RMVIP_{\gamma}$ is the Residual Error Volume Price for year $Y$ times the Residual Meter Volume Interval Proportion for year $Y$ in Currency Zone $e$. Under SEM, the Residual Error Volume was included in the Imperfections Price but, under I-SEM, are separate.

iii. $PREV_{\gamma} \cdot RMVIP_{\gamma}$ is the expression for the Residual Error Volume Charge per unit of demand (QMLF) for interval metering and ignoring non-interval metering. Note that, assuming a low value of RMVIP, Out-of-Market generation has the effect of increasing the proportion of Supplier Unit demand taken
through non-interval metering, and hence increases the Residual Error Volume Charge per unit of demand. This is reflected in low value of PREVY^\*RMVIPY.

iv. Actual Generator Output (AOG), is defined as the output purchased under the PPA, and hence is measured with respect to the station gate, i.e. not loss-adjusted, or measured with respect to the SEM" Trading Point", i.e. loss-adjusted, as specified in the PPA.

v. In REFIT 1 the REFIT Reference Price is a single REFIT 1 reference price (i.e. large scale wind) whereas in REFIT 2 and 3 the REFIT Reference Price is a technology specific reference price.

vi. For suppliers contracted to generators to whom the renewable fraction methodology is applicable, the QM/QMLF shall be based on the renewable fraction when determining costs.
6.4.4 Proposed Amendments to Deriving the Deemed Reference Price for the Opportunity Cost Payment

The CRU notes that the Department’s June 2018 decision does not specify how the deemed reference price will account for the fact that the DAM is priced on an hourly basis whereas the BM is priced on a half hourly basis. The CRU has identified two options for the calculation of the blended deemed market price, as outlined in Table 6.3 below. The CRU’s preferred approach is Option A on the basis that it is best aligned with actual market prices.

Table 6.3: Options for Calculating the Deemed Reference Price

<table>
<thead>
<tr>
<th>Option A</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this option the blended market price is derived on a half hourly basis. The same hourly DAM price is used for both half hourly intervals. Example: The hourly DAM price is assigned to the first 30-minute period of the given hour (t1) and the second 30 minute of a period in the given hour (t2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DAM</th>
<th>t1</th>
<th>€80.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t2</td>
<td>€80.00</td>
</tr>
<tr>
<td>BM</td>
<td>t1</td>
<td>€65.00</td>
</tr>
<tr>
<td></td>
<td>t2</td>
<td>€90.00</td>
</tr>
</tbody>
</table>

Under this option the blended price is derived on a half hourly basis. For a windfarm above 5MW the blended price would be:

\[ t1 = 0.8 \times €80 + 0.2 \times €65 = €77 \]  
\[ \text{therefore the blended price is } €77 \]  
\[ \text{(Blended)} \]

\[ t2 = 0.8 \times €80 + 0.2 \times €90 = €82 \]  
\[ \text{therefore the blended price is } €82 \]  
\[ \text{(DAM)} \]

**Option B**

In this option the blended market price is derived on an hourly basis. The two half hourly BM prices are averaged to derive one average BM price on an hourly basis.
Under Option B the blended price is derived on an hourly basis. For a windfarm above 5MW the blended price would be:

\[ 0.8 \times \varepsilon 80 + 0.2 \times \varepsilon 77.5 \text{ therefore the blended price is } \varepsilon 79.50, \text{ and the deemed reference price is } \varepsilon 79.50 \]

(Blended)

### 6.5 Application of CPI to ex-post Outturns

The CRU does not propose making any revisions to its arrangements for the calculation of the PSO in terms of its methodology for applying the CPI to its ex-post outturns.

### 6.6 Reconciliation of PSO Monies: R-factor

The CRU does not propose making any revisions to its methodology for calculating the R-factor. The R-factor is calculated by taking the Actual REFIT Payment (ARP) incurred minus the Estimated REFIT Payment

\[
RF = ARP - ERP
\]

### 6.7 Interest Rate Applied to R-factor Calculations

The CRU does not propose making any revisions to its arrangements for the calculation of the PSO in terms of the application of an interest rate to its R-factor calculation.
6.8 Sourcing of REFIT Outturn Data

Under the CRU’s proposals, the calculation of Actual REFIT Payments for In-Market generators that are not Dispatchable and not Controllable, and which are not in the Capacity Market, requires only the generator’s Metered Quantity (QM) or Loss Adjusted Metered Quantity (QMLF) in each half-hourly Imbalance Settlement Period and the corresponding DAM prices and Imbalance Settlement Prices, from which to calculate the appropriate blended price. BM and DAM prices are readily available from the Single Electricity Market Operator (SEMO) and the Day Ahead Market operator, SEMOpx, while Metered Quantity data is likely to be readily available to the generator.

Similarly, the calculation for Out-of-Market generators requires only the generator’s Metered Quantity (QM) or Loss Adjusted Metered Quantity (QMLF) in each Imbalance Settlement Period and the prices as set out in Table 6.2. Thus, in each case, the Metered Quantity (QM) or Loss Adjusted Metered Quantity (QMLF) is the only data that is specific to the generator, which minimises or even avoids the need to analyse settlements reports.

In principle, it would be possible for the price data that is common to the calculation of all PSO submissions to be provided to all Suppliers by a third party as determined by the CRU, potentially simplifying the task of preparing those submissions. However, the publication of such data would not absolve parties and their auditors of their obligations to certify that their submissions had been correctly calculated, including the correctness of the common data.

For In-Market generators that are Controllable and/or Dispatchable, the calculation will almost certainly require analysis of the settlement reports provided in order to determine all of the cashflows necessary to calculate the Actual Market Revenues. While this analysis may be more complex than is the case for non-Dispatchable or non-Controllable or Out-of-Market generators, such generators will have had to have analysed settlements reports in order to calculate pre I-SEM Actual Market Revenues.

Hence the CRU considers that the calculations and data sources required for the calculations post I-SEM will not involve significantly more complexity than the equivalent calculations pre I-SEM.

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52 Dispatchable and Controllable are defined in the Trading and Settlement Code (and derived from related terms in the Grid Code). They are used typically in respect of wind-generators to mean that the generator can vary its output in response to an instruction from the TSO, and thereby be constrained and/or curtailed.
7. Proposed Revisions: Arrangements for AER & Peat Calculations

7.1 AER & Peat PSO Scheme Revenues and Costs

Reflecting the Department’s June 2018 decision, the calculation of the AER and Peat PSO Scheme revenues and costs are proposed in Table 7.1 below.

Table 7.1: AER & Peat PSO Schemes’ Revenues and Costs

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> Total revenues = the sum of all actual revenues earned(^{53}) during the relevant period;</td>
<td></td>
</tr>
<tr>
<td><strong>B.</strong> Total Allowable Costs = the sum of the total monies paid to the generator and recoverable under the PSO during the relevant period;</td>
<td></td>
</tr>
<tr>
<td><strong>C.</strong> Where subtracting B. from A. results in either a positive/negative number this represents an over/under recovery under the PSO and the relevant amount is included in the R-factor with interest.</td>
<td></td>
</tr>
</tbody>
</table>

For energy sold to suppliers outside the SEM, i.e. where energy is netted off the demand of the supplier, the calculation will be based on the metered output of the plant in question which will determine the total revenues that would have been earned if this energy were traded in the market.

\(^{53}\) The calculation of total revenues includes energy payments (based on the appropriate reference price as specified in the Department’s June 2018 decision), constraints payments, capacity payments and other payments under the Trading & Settlement Code, as well as payments for DS3 system services.
8. Next Steps

The CRU invites feedback from all interested stakeholders, based on the questions outlined in the CRU’s consultation template (Appendix 6). To facilitate responses an editable word version of this template is published alongside this consultation paper. Responses to this consultation paper should be sent by close of business on Friday, 28 June 2019, preferably in electronic format to PSO@cru.ie or alternatively by post to:

Sheena Byrne
Commission for Regulation of Utilities
The Exchange
Belgard Square North
Tallaght
Dublin
Re: PSO Period Clarification for REFIT

Dear Supplier,

I refer to the recent CER notification (Ref D/15/4171) of 27th February 2015 requiring the submission to the CER by 2nd April 2015 of information in relation to 2015/16 PSO costs. The CER wishes to clarify one aspect in relation to this matter.

The CER clarifies that the PSO period to be applied in the calculation of REFIT opportunity costs to determine eligible PSO payments is the 12 month period from 1st October to 30th September. Hence the REFIT opportunity cost payment should be calculated over the 12 month period and not by reference to half-hour trading periods.

Related to this matter, the in-market and out-of-market REFIT opportunity cost payments referred to in Sections 4.8 and 4.9 of the CER/08/236 Decision paper are clarified, with our clarifications in bold below:

In Market Payments

“For in-market REFIT, the opportunity cost payment is calculated as the difference between the total revenues received from the market versus the total cost of purchasing metered energy from the generator, based on the REFIT reference price, for each 12 month PSO period, i.e. 1st October to 30th September.”

Out of Market Payments

“For the purposes of the out-of-market opportunity cost payment, the difference between the total cost to suppliers at the REFIT reference price and what it would have cost them in total to buy the equivalent volumes from the market over the 12 month PSO period is used to determine any payment due.”

In the past, if you made annual PSO submissions to the CER on the basis of half-hour trading periods (rather than a 12-month period, as clarified above), please advise the CER, and provide an estimation of any reconciliation amounts with your submission by 2nd April.

This applies to all PSO submissions since the commencement of REFIT in 2006.
Appendix 2: In-Market Generator Payments (Prior to 1 October 2018)

For in-market generators, under the SEM prior to 1 October 2018, payments to generator units comprised\(^\text{54}\):

i. Energy Payments (ENPU\(_{ud}\)), being the Market Schedule Quantity priced at SMP;

ii. Constraint Payments (CONPU\(_{ud}\)), being compensation – negative or positive – in the event that a generator is dispatched to a different level than the Market Schedule Quantity; and

iii. Capacity Payments (CPP\(_{uc}\)), being a payment for being available.

iv. Uninstructed Imbalance Payments (UNIMPU\(_{ud}\)), being compensation – negative or positive – in the event that a generator deviates from the level to which it is dispatched;

v. Make Whole Payments (MWPU\(_{ub}\)), being a payment made under certain circumstances in which the Energy Payments do not compensate a generator adequately for its costs; and

vi. Testing Charges (TCHARGE\(_{ud}\)), being charges made on units under test.

These payments are variously in respect of Settlement Days, Billing Periods and Capacity Period but, in any case, must be summed over the levy [period/year].

\(^{54}\) Trading and Settlement Code Part A, Sections 6.117 to 6.124A.
Appendix 3: Out-of-Market Generator Payments (Prior to 1 October 2018)

For Out-of-Market generators, under the SEM prior to 1 October 2018, charges for supplier comprised:

(i) Total Energy Charges for Energy (ENCV_{vd}), being a charge for energy priced at SMP;

(ii) Total Imperfections Charges (IMPCV_{vd}), being a charge to cover amongst other things the costs of constraints, and equal to loss-adjusted net demand priced at the Imperfections price (IMP_y) multiplied by the Imperfections Charge Factor (IMPF_h);

(iii) Capacity Charge (CPC_{vd}); equal to loss-adjusted net demand priced at the Capacity Payments Demand Price (CPDP_h); and

(iv) Variable Market Operating Charge (VMOC_{vd}); equal to loss-adjusted net demand priced at the Variable Market Operator Price (VMOP_y).

55 Trading and Settlement Code, Part A, Sections 6.117 to 6.124A.
Appendix 4: In-Market Generator Payments (Post 1 October 2018)

For in-market generators, under the SEM post 1 October 2018, payments to generators comprise:

(i) ex-ante market payments, for sales (and purchases) of energy in the DAM and Intraday Market (IDM), in respect of the generating unit;

(ii) Imbalance Component Payments or Charges (CIM\textsubscript{uv}), being payments – positive or negative - for the difference between the energy delivered (after adjusting for losses) and the energy sold (and bought) in the DAM and IDM;

(iii) Premium Component Payments (CPREMIUM\textsubscript{uv}) and Discount Component Payments (CDISCOUNT\textsubscript{uv}), being compensation for deviating from the level of generation specified in a declared or deemed Physical Notification;

(iv) Offer Price Only Accepted Offer Payments or Charges (CAOOP\textsubscript{uv}) and Bid Price Only Accepted Bid Payments or Charges (CABBPO\textsubscript{uv}), being adjustments necessary in certain circumstances when a previously accepted offer or bid is ‘unwound’ by a subsequent acceptance of an offer or bid;

(v) Curtailment Payments or Charges (CCURL\textsubscript{uv}), being payments or charges that ensure that curtailed energy is compensated not at the Imbalance Settlement Price but at the average price of the ex-ante energy trades made in respect of the generator unit;

(vi) Uninstructed Imbalance Charges (CUNIMB\textsubscript{uv}), being charges in the event that generators deviate from the level to which they have been dispatched

(vii) Information Imbalance Charges (CII\textsubscript{uv}), being a charge in the event that a generator does not follow it’s Physical Notification (plus any accepted offers and bids);

\footnote{For paragraphs (ii) to (x), see Trading and Settlement Code Part B, Sections G.4.11 and G.4.12; these quantities are reported by SEMO under Appendix, Table 8. Ex-ante market revenues, in paragraph (i) are reported separately by NEMO.}
(viii) Fixed Cost Payment or Charges (CFC\textsubscript{ub}), being compensation made under certain circumstances when payments for accepted offers do not compensate a generator adequately for its costs;

(ix) Testing Charges (CTEST\textsubscript{uv}), being charges made on units under test;

(x) Capacity Payments (CCP\textsubscript{c}) being the payment for holding capacity obligations; and

(xi) Difference Charges (CDIFFCTOT\textsubscript{c}) being the costs of capacity market referred to in the Department’s decision.
Appendix 5: Out-of-Market Generator Payments (Post 1 October 2018)

For Out-of-Market generators, under the SEM post 1 October 2018, charges to suppliers comprise:

(i) ex-ante market charges, for purchases (and sales) of energy in the DAM and Intraday Market (IDM);

(ii) Imbalance Component payment or Charge (CIMB_{νγ}), being charges – positive or negative - for the difference between the energy delivered (after adjusting for losses) and the energy sold (and bought) in the DAM and IDM, and priced at the Imbalance Settlement Price (PIMB_{ν})

(iii) Imperfections Charge (CIMP_{νγ}), being charges to cover amongst other things the cost of the Premium Component Payments (CPREMIUM) and Discount Component Payments (CDISCOUNT), and priced at the Imperfections Price (PIMP_{ν}) times the Imperfections Charge Factor (FCIMP_{ν});

(iv) Currency Adjustment Charge (CCA_{νγ}), being a charge to recover costs arising from variations in exchange rates used in settlement, and priced at the Currency Cost Price (PCC_{ν}) times the Currency Adjustment Charge Factor (FCCA_{ν}); and

(v) Residual Error Volume Charge (CREV_{νγ}), being a charge to cover the cost of Residual Error Volumes, and priced at the Residual Error Volume Price (PREV_{ν}) times \{((1-RMVIP_{ey})*FNIEP_{νγ} + RMVIP_{ey}*(1-FNIEP_{νγ}))\}, where RMVIP_{ey} is the Residual Meter Volume Interval Proportion and FNEIP_{νγ} is the Non-Interval Energy Proportion Factor;

(vi) Achievable Difference Payment (CDIFFACHIEVE_{νd}), being payments in respect of difference payments received holders of reliability options;

(vii) Capacity Charge (CCC), being a charge to fund Capacity Payments, priced at the Supplier Capacity Charge Price (PCCSUP) times the Capacity Charge Metered Quantity Factor (FQMCC_{ν})

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57 For paragraphs (ii) to (vi), see Trading and Settlement Code, Part B, Section G.5.6.1. For paragraphs (vii) to (ix), see Trading and Settlement Code, Part B, G.5.7.5, G.5.7.2 and
(viii) Difference Payment Socialisation Charge \((\text{CSOCDIFFP}_{\nu})\), being a charge contributing to the funding of Difference Payments, priced at the Supplier Capacity Charge Price \((\text{PCCSUP}_{\nu})\) times the Capacity Charge Metered Quantity Factor \((\text{FQMC}_{\nu})\) and Difference Payment Socialisation Multiplier \((\text{FSOCDIFFP}_{\nu})\); and

(ix) Variable Market Operator Charge \((\text{CVMO}_{\nu})\), priced at Variable Market Operator Price \((\text{PVMO}_{\nu})\);
Appendix 6: Consultation Template for Responses

CRU Consultation Template

<table>
<thead>
<tr>
<th>Company name if applicable</th>
<th>Enter Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Name:</td>
<td>Enter Name here</td>
</tr>
<tr>
<td>Contact Details:</td>
<td>Enter contact details here</td>
</tr>
</tbody>
</table>

This Consultation Template is broken into two sections:

**Section 1:** outlines the proposed decisions detailed in Part B of the paper, which the CRU has identified as necessary to align the PSO calculations with the Department's June 2018 decision. While the CRU is of the view that these amendments are simply the implementation of the Department's June 2018 decision, the CRU welcomes feedback from interested stakeholders in the case that they consider there to be any misalignment with the Department's decision.

**Section 2:** details specific consultation questions which the CRU invites all interested stakeholders to consider and provide feedback on in the text boxes provided.
Section 1

CRU Proposed Decisions:

Question 1: PSO Revenue & Costs

The CRU has outlined proposed amendments to the calculations of PSO revenue and costs under the revised SEM trading arrangements in Part B Section 5 and Section 6 of the paper.

If you do not agree with the proposed amendments to the calculation, please provide relevant details and proposed alternatives?

Question 1: PSO Revenue & Costs
Insert Text Here

Question 2: Calculation of the deemed reference price

In Part B Section 6.4.3 of the consultation document the CRU outlined its preferred option (option A) for deriving the deemed reference price for the opportunity cost payment.

If you do not agree with the proposed option, please provide details of a proposed alternative?

Question 2: Calculation of the deemed reference price
Insert Text Here
Section 2

CRU Consultation Questions:

Question 3: Modelling of Benchmark Price

Do you agree with CRU's approach to forecasting the ex-ante Benchmark Price as detailed in Part B Section 5.5? If not, please provide relevant details including proposed alternatives?

Question 4: Submission of estimate generation data

In order to keep the difference between ex-ante estimates and ex-post known values to a minimum should the CRU introduce mandatory P values for submitting Estimated Output Generation for wind generation? If yes, should the P value be P90, P75, P50 or other?
Responses to this consultation paper should be forwarded by close of business on Friday 28 June 2019, preferably an electronic version of the consultation template, to PSO@cru.ie or alternatively by post to:

Sheena Byrne
Commission for Regulation of Utilities
The Grain House,
The Exchange, Belgard Square North
Tallaght, Dublin 24

Unless marked confidential, all responses may be published on the CRU’s website. Respondents may request that their response is kept confidential. The CRU shall respect this request, subject to any obligations to disclose information. Respondents who wish to have their responses remain confidential should clearly mark the document to that effect and include the reasons for confidentiality. Responses from identifiable individuals will be anonymised prior to publication on the CRU website unless the respondent explicitly requests their personal details to be published. Our privacy notice sets out how we protect the privacy rights of individuals and can be found here.