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Article 13 – Clean Energy Package (CEP) Redispatching

Annual Report - 2023

NESO
National Energy System Operator

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1.0 Introduction

Article 13 of the REGULATION (EU) 2019/943 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the internal market for electricity[1] outlines principles for redispatching. Most of the article has been retained in GB regulation via the Electricity and Gas (Internal Markets and Network Codes) (Amendment etc.) (EU Exit) Regulations 2020 (The Recast Electricity Regulation amended by SI 2020/1006[2]).

As per Article 2 of the regulation – Definitions – 'redispatching' means a measure, including curtailment, that is activated by one or more transmission system operators by altering the generation, load pattern, or both, in order to change physical flows in the electricity system and relieve a physical congestion or otherwise ensure system security.

Balancing actions for energy purposes are not in scope of the Redispatching term. Redispatching in this context is used for system reasons.

This report details the then Electricity System Operator's (ESO) (Now National Energy System Operator [NESO] as of 1st October 2024) level of the compliance for redispatching in Great Britain for 2023 as agreed with Ofgem, based on the Clean Energy Package Article 13 (4) and (5).

2.0 Reporting Requirements

The reporting requirements are outlined in this section. Further information on our compliance with these requirements can be found in section 3, 4 and 5.

Article 13 Paragraph (4) - The transmission system operators and distribution system operators shall report at least annually to the regulatory authority, on:

(a) the level of development and effectiveness of market-based redispatching mechanisms for power generating, energy storage and demand response facilities;

(b) the reasons, volumes in MWh and type of generation source subject to redispatching;

(c) the measures taken to reduce the need for the downward redispatching of generating installations using renewable energy sources or high-efficiency cogeneration in the future including investments in digitalisation of the grid infrastructure and in services that increase flexibility.

Article 13 Paragraph (5)[3] - Subject to requirements relating to the maintenance of the reliability and safety of the grid, based on transparent and non-discriminatory criteria established by the regulatory authority, transmission system operators and distribution system operators shall:

(a) guarantee the capability of transmission networks and distribution networks to transmit electricity produced from renewable energy sources or high-efficiency cogeneration[4] with minimum possible redispatching, which shall not prevent network planning from taking into account limited redispatching where the transmission system operator or distribution system operator is able to demonstrate in a transparent way that doing so is more economically efficient and does not exceed 5% of the annual generated electricity in installations which use renewable energy sources and which are directly connected to their respective grid, unless otherwise provided by the regulatory authority in which electricity from power-generating facilities using renewable energy sources or high-efficiency cogeneration represents more than 50% of the annual gross final consumption of electricity;

(b) take appropriate grid-related and market-related operational measures in order to minimise the downward redispatching of electricity produced from renewable energy sources or from high-efficiency cogeneration;

(c) ensure that their networks are sufficiently flexible so that they are able to manage them.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R0943&from=EN
[2] https://www.legislation.gov.uk/uksi/2020/1006/schedule/4/paragraph/13/made
[3] ESO are providing this information for transparency purposes, but it is not a reporting obligation.
[4] NESO interpret high-efficiency cogeneration to include CHP facilities.

3.0 Great Britain Generation Redispatching – 2023 Data & Analysis

NESO continue to operate the system economically and efficiently (via economic dispatch) and remain fuel neutral but will monitor levels of compliance with Article 13 on an ongoing basis.

The table 1 below shows that in 2023, 39% of Great Britain's (GB) energy requirement was met by renewable generation and High Efficiency Co-generation (HEC). 4.2%[5] of downwards redispatching was required of renewable generation, which is below 5% limit as defined in Article 13, paragraph 5 (a).

Table 1: Yearly Generation Redispatching

Data Set	2023	Notes
Total Generation Output	**296.7TWh**	All Transmission connected generation, Interconnectors Import and best estimate of embedded PV and wind
Renewable Generation (Inc CHP & Biomass)	**115.1TWh**	Embedded PV and Wind, Transmission connected wind, hydro, biomass and CHP
Bids on Renewable Generation (Inc CHP & Biomass)	**4.04TWh**	Embedded PV and Wind, Transmission connected wind, hydro, biomass and CHP
Renewable Generation (Exc CHP & Inc Biomass)	**108.4TWh**	Embedded PV and Wind, Transmission connected wind, hydro, biomass
Bids on Renewable Generation (Exc CHP & Inc Biomass)	**4.024TWh**	Embedded PV and Wind, Transmission connected wind, hydro, biomass
Renewable Generation (Exc CHP & Biomass)	**95.2TWh**	Embedded PV and Wind, Transmission connected wind, hydro
Bids on Renewable Generation (Exc CHP & Biomass)	**4.023TWh**	Embedded PV and Wind, Transmission connected wind, hydro
Renewable output (Including CHP & Biomass) vs Total generation output	**38.8%**	
Bid volume of renewables (Inc CHP & Inc Biomass) against Total Renewable generation output (Inc CHP & Inc Biomass)	**3.5%**	
Renewable output (Exc CHP & Inc Biomass) vs Total generation output	**36.5%**	
Bid volume of renewables (Exc CHP & Inc Biomass) against Total Renewable generation output (Exc CHP & Inc Biomass)	**3.7%**	
Renewable output (Excluding CHP & Biomass) vs Total generation output	**32.1%**	
Bid volume of renewables (Exc CHP & Biomass) against Total Renewable generation output (Exc CHP & Biomass)	**4.2%**	

[5] This calculation includes embedded generation and excludes CHP and biomass.

The reasons, volumes in MWh, and type of generation source subject to redispatching (as per paragraph 4(b) of article 13) are shown in table below.

Data set assumptions:

- NESO interprets the requirement in paragraph 5 “There is a requirement to limit the redispatch of generation from renewable sources to 5%, unless there is more than 50% of total energy being produced from renewable and high-efficiency cogeneration” as only relevant to downwards redispatching actions (given the purpose of the article is to encourage renewable generation / HEC on the system, this data monitors downwards redispatching actions) and the data that will be provided in the report will reflect this.
- As the scope of redispatch doesn’t include energy actions for balancing purposes, this data isn’t included. The data used in this analysis covers the system actions undertaken by the then ESO for system risks and transmission security purpose, including ROCOF, thermal constraints and voltage control (table 2).

Table 2: Downward Redispatching

Constraint Type	Generation Recource	Downward Redispatching (MWh)
RoCoF	INTERCONNECTOR	450
	PUMP STORAGE	2551.544
Thermal	AGGREGATED	456.506
	BATTERY	3404.365
	BIOMASS	872.363
	CCGT	873049.068
	CHP	12762.914
	GAS	650.364
	INTERCONNECTOR	78077
	NPSHYD	325913.721
	OTHER	1014.366
	PUMP STORAGE	682821.7
	WIND	3696757.09
Voltage		0

The comparison of the redispatching of renewable generation and High Efficiency Co-generation (HEC) in 2022 and 2023 is shown below in table 3. There has been a significant reduction in redispatching for the purposes of RoCoF (Rate of Change of Frequency), which is explained in detail in Section 4. The redispatching due to the management of thermal constraints has increased in 2023 compared to 2022. This is due to actions taken to relieve network congestion. NESO have been implementing and working on a series of initiatives with the industry to mitigate the risk of needing to take these actions in the future. More details of these initiatives can be found in Section 5 and on NESO’s Balancing Costs webpage[6].

[6] Balancing costs | National Energy System Operator (neso.energy)

Table 3:Comparison table between the last two consecutive years

Constraint Type	Generation resource	Downward Redispatching (MWh)		Trend
		2022	2023	
ROCOF	CHP	0	0	0
	BIOMASS	0	0	0
	HYDRO	0	0	0
	WIND	19	0	-19
	Sub-Total	**19**	**0**	**-19**
Thermal	CHP	32	12,763	12,731
	BIOMASS	135	872	737
	HYDRO	394,646	325,914	-68,732
	WIND	3,184,785	3,696,757	511,972
	Sub-Total	**3,579,565**	**4,036,306**	**456,741**
Voltage	CHP	0	0	0
	BIOMASS	0	0	0
	HYDRO	0	0	0
	WIND	0	0	0
	Sub-Total	**0**	**0**	**0**
All type	**TOTAL**	**3,579,584**	**4,036,306**	**456,722**

4.0 Development and effectiveness of market-based redispatching mechanisms

The level of development and effectiveness of market-based redispatching mechanisms for power generation, energy storage and demand response facilities are detailed in this section, including the tools, services and policy changes used to mitigate redispatching of renewable generation.

One of the most significant improvements has resulted from the implementation of the Frequency Risk and Control Report (FRCR) from May 2022 which changes how we manage loss risks on the system. During the last two years, new fast-acting frequency response services Dynamic Containment (DC), Dynamic Moderation (DM) and Dynamic Regulation (DR) have also been launched to help us improve the resiliency of the network and to support the increase of renewables and other low carbon energy sources onto the network through standardised market mechanisms. The volumes of interventions for inertia control that the then ESO has been required to take in market dispatch through trades or BM actions has decreased significantly compared with previous years.

- The Frequency Risk and Control Report includes an annual assessment of the magnitude, duration and likelihood of transient frequency deviations, as well as a forecast of the impact and cost of securing the system. The FRCR then also confirms which risks will or will not be secured operationally. NESO's role is to analyse the risks, impacts and controls, their impact on reliability and cost, and present a recommendation for where the appropriate balance might lie with consultation and the engagement from industry stakeholders to keep it open and transparent. With the introduction of the FRCR, NESO are able to operate the system with more dynamic parameters, such as being able to reduce the minimum inertia requirement on the system.
- Dynamic Containment (DC) is a fast-acting post-fault frequency service, which contains frequency within the statutory range of +/-0.5 Hz. DC provides a method of rapidly injecting active power into the system, providing a very effective control for containing frequency deviations. The design and implementation of this service in 2022 has provided us with a very effective frequency control and the steady growth of the DC market is a key enabler of us being able to assess the feasibility of operating the system with a lower minimum inertia requirement. As of January 2023, we have more than 2 GW of quantified DC capability, and we have seen an increase in participation in the market over recent years.

Another development has been NESO's Power Available (PA) project. Since it was first implemented in May 2022, the integrated PA signal has grown from 90 renewable generators to 120 generators in phase 2 of the project, providing further potentials in balancing services.[7]

- New wind farms are obliged to provide the PA signal through industry governance codes, however it is optional for those who connected to the network prior to 2016.
- Work is underway to make PA for solar available at a later date.

5.0 Future projects including investments in digitalisation of the grid infrastructure

Network Procurement Services (NPS) Constraint Management Intertrip Service (CMIS)

The CMIS, which launched in 2019, looks for ways to reduce the volume of energy and cost of managing constraints at various places in the electricity system, maximising renewable generation on the system and lower costs for the end consumer. New update of the project are as follows:

1) Contracts have been successfully awarded to 15 generators for the Anglo-Scottish (B6) Boundary CMIS 2024-25 service delivery.
2) The EC5 CMIS aims to reduce network congestion costs in the East Anglian (EC5) region by building post-fault intertrip links between generation across the East Anglia region and the East Anglia Operational Tripping Scheme (EAOTS). The then ESO launched a market-wide tender in late 2023, that will aim to contract for a EC5 CMIS service to begin in 2025.

Local Constraints Market

A new Local Constraint Market (LCM) is being trialled to facilitate access to new providers of flexibility and provide competition to tackling the management of the Anglo-Scottish (B6) Boundary - GB's most congested boundary. The anticipated growth in renewable generation in Scotland is increasing power transfer across the Scottish boundaries, which are forecast to increase constraints at or above the B6 boundary and ultimately at a cost to the end consumer. Sometimes it requires renewable generation to be turned down pre-fault.

Net Zero Market Reform (NZMR)

The NZMR is a phased programme which was established in early 2022, aiming to examine the current GB electricity market and facilitate a smooth market and investment policy transition to meet the net zero target. The current Wholesale market trading signals prior to gate closure were designed in a world without rising renewable penetration and system constraints. NESO have advocated the introduction of locational pricing and more granular temporal signals to help reduce redispatch and reduce balancing costs.

Offshore Coordination Project

The NESO offshore coordination project was set up in March 2020 to enable the speed and scale growth of offshore wind deployment in a way that is efficient for consumers and takes into account the impacts on communities and the environment. Phase 1 of the project progressed at pace to assess the costs and benefits of a coordinated offshore network, the technical considerations, and how the offshore connections regime could change to drive greater coordination. The Pathway to 2030 Holistic Network Design (HND) was published in July 2023. Work on Holistic Network Design Follow up Exercise (HNDFUE) commenced in late 2023[8].

Balancing Transformation

A new IT system called the Open Balancing Platform (OBP) was launched in December 2023 to provide a modern set of optimising and console capability for the Electricity National Control Centre (ENCC) to balance the system. The scope of Release 1.0 in 2023 was to provide the utilisation of battery assets in the balancing mechanism. The new tool will replace existing System Operation - Real Time (SORT), Energy Balancing System (EBS) & platform for ancillary service (PAS) gradually in the following few years. New capabilities will be built in the following Release, such as MW Dispatch, Bulk Dispatch, Enhanced Visualisation, Constraint Management.

[7] Power Available: unlocking renewables' potential to help balance the electricity system | National Energy System Operator (neso.energy)
[8] September 2023 Offshore Coordination update

Balancing Costs Strategy

The Balancing Costs team at NESO have developed a strategy to tackle Balancing Costs over the coming years. NESO aims to keep the electricity system as low-cost as possible, and our Balancing Costs report details all the initiatives and the timeline for when they are to deliver savings in context with expected trends in the future. For more information on these other initiatives, please refer to the Balancing Costs report[9].

[9] PowerPoint Presentation (neso.energy)

6.0 Further References:

The following NESO reports and weblinks provide additional information on our strategy and additional projects which will help to reduce the need for the downward redispatching on renewable energy sources and high-efficiency cogeneration.

- Annual Operability Strategy Report
- FES 2023 scenarios
- ETYS 2023
- NOA Constraint Management Pathfinder
- Frequency Risk and Control Report (FRCR)
- The Pathway to 2030 Holistic Network Design (HND)
- September 2023 Offshore Coordination update
- Balancing Strategic capability review
- BP1 End of Scheme Evidence Chapters