ESO

Article 13 Clean Energy Package Redispatching Annual Report - 2022

12th October 2023

Contents

1. 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 Electricity System Operator (ESO) level of the compliance for redispatching in Great Britain for 2022 as agreed with Ofgem, based on the Clean Energy Package Article 13 (4) and (5).

[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

2. Reporting Requirements

The reporting requirements on ESO 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 nd 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 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.

[3] ESO are providing this information for transparency purposes, but it is not a reporting obligation.

3. Great Britain Generation Redispatching – 2022 Data and Analysis

ESO continues 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 below shows that in 2022, Great Britain's (GB) 39.9% of energy requirement was met by renewable generation and High Efficiency Co-generation (HEC). Downwards redispatching required 3.8%[4] of renewable generation, which is below 5% limit as defined in Article 13, paragraph 5 (a).

Data Set	1st Jan -31st Dec 2022	Notes
Total Generation Output	290.2 TWh	All Tranmission connected generation, Interconnectors Import and best estimate of embedded PV and wind
Renewable Generation (Inc CHP & Biomass)	115.7 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass and CHP
Bids on Renewable Generation (Inc CHP & Biomass)	3.58 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass and CHP
Renewable Generation (Exc CHP & Inc Biomass)	109.2 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass
Bids on Renewable Generation (Exc CHP & Inc Biomass)	3.58 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass
Renewable Generation (Exc CHP & Biomass)	94.2 TWh	Embedded PV and Wind, Transmission connected wind, hydro
Bids on Renewable Generation (Exc CHP & Biomass)	3.58 TWh	Embedded PV and Wind, Transmission connected wind, hydro
Renewable output (Including CHP & Biomass) vs Total generation output		**39.9%**
Bid volume of renewables(Exc CHP & Inc Biomass) against Total Renewable generation output (Exc CHP & Inc Biomass)		**3.3%**
Renewable output (Excluding CHP & Biomass) vs Total generation output		**32.5%**
Bid volume of renewables(Exc CHP & Biomass) against Total Renewable generation output (Exc CHP & Biomass)		**3.8%**

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:

- ESO 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.

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

- As the scope of redispatch doesn't include energy actions for balancing purposes, this data isn't included. The data used to analysis covers the system actions undertaken by ESO for system risks and transmission security purpose, including ROCOF, thermal constraints and voltage control.

Constraint Type	Generation Recource	Downward Redispatching (MWh)
ROCOF	BIOMASS	0
	CCGT	18,152
	CHP	0
	GAS	0
	HYDRO	0
	OCGT	0
	INTERCONNECTOR	743
	OTHER	0
	PUMP STORAGE	0
	WIND	19
Thermal	BIOMASS	135
	CCGT	2,388,647
	CHP	32
	GAS	770
	HYDRO	394,646
	OCGT	204
	INTERCONNECTOR	0
	OTHER	1,627
	PUMP STORAGE	521,916
	WIND	3,184,785

The comparison of the redispatching of renewable generation and High Efficiency Co-generation (HEC) in 2022 and 2021 is shown in the table below. The redispatching has effectively decrease in ROCOF, which is explained in detail in Section 4. The redispatching due to the managements of thermal constraints has increased significantly in 2022. This is mainly due to the inevitable network congestion. A series of mitigative innovations and projects are conceived by ESO and progressed together with our stakeholders. More details can be found in Section 5.

Constraint Type	Generation resource	Downward Redispatching (MWh)		Trend
		2021	2022	
ROCOF	CHP	373,498	0	↓
	WIND	14,234	19	↓
	TOTAL	**387,732**	**19**	↓
Thermal	BIOMASS	2,035	135	↓
	CHP	0	32	↑
	HYDRO	312,558	394,646	↑
	WIND	2,175,504	3,184,785	↑
	TOTAL	**2,490,097**	**3,579,597**	↑
Voltage	BIOMASS	175	0	↓
	HYDRO	39	0	↓
	TOTAL	**214**	**0**	↓
All type	**TOTAL**	**2,878,043**	**3,579,616**	↑

4. Development and effectiveness of market-based redispatching mechanisms

The level of development and effectiveness of market-based redispatching mechanisms for power generating, energy storage and demand response facilities are detailed in this section, including the tools, services and policy changes that have been implemented in the control room to develop market-based redispatching.

One of the most significant improvements is the results after the implementation of the Frequency Risk and Control Report (FRCR) in May 2021 which changes how we manage loss risks on the system. During last two years, new fast-acting frequency response services Dynamic Containment (DC), Dynamic Moderation (DM) and Dynamic Regulation (DR) have been launched to help us to improve the resiliency of the network and to support the increase of renewables and other low carbon energy sources onto the network. The volumes of interventions that the 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, forecast impact and the cost of securing the system and confirms which risks will or will not be secured operationally. ESO'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.

- Dynamic Containment (DC) is a fast-acting post-fault frequency service, which contains frequency within the statutory range of +/-0.5Hz. 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 2021 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 2GW of quantified DC capability, and we have seen an increase in participation in the market over recent years.

Another development has been seen is the Power Available (PA) project. Since the first implement in May 2021, 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.

- 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 pre 2016.

- Work is underway to make PA for solar available at a later date.

5. Future projects including investments in digitalisation of the grid infrastructure

- NOA Constraint Management Pathfinder (CMP)

  The CMP service, which is launched in 2019, looks for ways to reduce the cost of managing constraints at various places in the electricity system, aiming to reduce the impact of network constraints, maximise renewable generation on the system and lower costs for the end consumer. New update of the project is as follows: (1) Contracts have been successfully awarded to 15 generators for the Anglo-Scottish (B6) Boundary CMP 2024-25 service delivery. (2) The EC5 Constraint Management Intertrip Service (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 ESO will be launching 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 costs to the end consumer. Sometimes it requires renewable generation to be turned down pre-fault. Trials are now under way with our 3rd party platform provider Piclo leading the onboarding, registration and asset qualification process.

- Net Zero Market Reform (NZMR)

  The NZMR is a phased programme which was established in early 2021, 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 is designed without consideration of rising renewable penetration and system constraints. We advocated introducing locational pricing and more granular temporal signals to help reduce redispatch and reduce balancing costs.

- Offshore Coordination Project

The ESO 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 account of 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) is published in July 2022. Work on Holistic Network Design Follow up Exercise (HNDFUE) commenced in late 2022. More info can be found in references September 2023 Offshore Coordination update.

- Balancing Transformation

A new IT system Open Balancing Platform (OBP) will be launched in December 2023 to provide a modern set of optimiser and console capability for the ENCC to balance the system. The scope of Release 1.0 this year is 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.

Project development Roadmap:

ESO is working across networks, government and the energy sector to break down the obstacles to deliver a net zero power system by 2035. The forecasting roadmap of the forementioned projects and innovations are shown in the following figure. Key activities and milestones are labelled with yellow stars and red stars represent expected start time for the projects to be effective.

	FY 21/22	FY 22/23	FY 23/24	FY 24/25
CMP	☆ Design, run and tender		☆ Tender for EC5 boundary	★ Contracts awarded for B6 boundary
LCM		☆ Registration and live trials	★ Full launch	
NZMR	☆ High level Scoping and assessment	☆ Preliminary conclusions	★ Final conclusions with Review of Electricity Market Arrangements (REMA)	
Offshore coordination	☆ Cost and benefit assessment	★ HDN and HNDFUE methodology published	☆ Progressing delivery	
OBP		☆ Skeleton for new IT	★ OBP R1 go live	☆ Capabilities enhancement

Further References:

The following ESO 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.

ESO

- 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