Article 13 Clean Energy Package Redispatching Annual Report - 2021

26th September 2022

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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 Nationalgrid Electricity System Operator(NGESO) level of the compliance for redispatching in Great Britain for 2020 as agreed with Ofgem, based on the Clean Energy Package Article 13 (4) and (5).

2. Reporting Requirements

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

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 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. 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 key innovative projects implemented in NGESO in May 2020 was Power Available (PA) project.

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

- NGESO integrated the PA signal from over 90 renewable generators into our control systems and processes, providing greater visibility to our control room engineers as they balance the system on a second by second basis. Phase 2 was delivered in March 2021. Phase 2 of the project has built on this initial success, further optimizing our systems to make better use of wind power for response services when it is economic to do so. There are now nearly 120 generators providing the PA signal.

- The live data feed highlights what the potential maximum power output of a wind generator is at a given time and in given conditions. Our control systems can then accurately calculate the response and reserve capability held on each generator, enabling them to compete with other generation technologies to provide real time response and reserve services.

- Phase 2 sees use of the signal going beyond real time, with engineers able to see availability of variable generators to provide frequency response for future time periods.

4. Great Britain Generation Redispatching – 2021 Data and Analysis

NGESO 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 2021, Great Britain's (GB) 27% of energy requirement was met by renewable generation and High Efficiency Co-generation (HEC). Downwards redispatching required 3.2%[4] of renewable generation , which is below 5% limit as defined in Article 13, paragraph 5 (a).

Data Set	1st Jan -31st Dec 2021	Notes
Total Generation Output	284.5 TWh	All Tranmission connected generation, Interconnectors Import and best estimate of embedded PV and wind
Renewable Generation (Inc CHP & Biomass)	103.8 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass and CHP
Bids on Renewable Generation (Inc CHP & Biomass)	3.09 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass and CHP
Renewable Generation (Exc CHP & Inc Biomass)	95.8 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass
Bids on Renewable Generation (Exc CHP & Inc Biomass)	2.7 TWh	Embedded PV and Wind, Transmission connected wind, hydro, biomass
Renewable Generation (Exc CHP & Biomass)	76.8 TWh	Embedded PV and Wind, Transmission connected wind, hydro
Bids on Renewable Generation (Exc CHP & Biomass)	2.43 TWh	Embedded PV and Wind, Transmission connected wind, hydro
Renewable output (Including CHP & Biomass) vs Total generation output		**36.5%**
Bid volume of renewables(Exc CHP & Inc Biomass) against Total Renewable generation output (Exc CHP & Inc Biomass)		**2.8%**
Renewable output (Excluding CHP & Biomass) vs Total generation output		**27.0%**
Bid volume of renewables(Exc CHP & Biomass) against Total Renewable generation output (Exc CHP & Biomass)		**3.2%**

[4] This calculation includes embedded generation

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.

Constraint Type	Generation resource	Downward Redispatching (MWh)
ROCOF	BIOMASS	0
	CCGT	232415
	CHP	373498
	COAL	26
	GAS	847182
	HYDRO	0
	Interconnnector	2021747
	NPSHYD	0
	OTHER	968
	WIND	14234
Thermal	BIOMASS	2035
	CCGT	19962
	COAL	571
	GAS	663703
	HYDRO	266330
	Interconnnector	129349
	NPSHYD	46228
	OCGT	0
	OTHER	1092
	PUMP STORAGE	118813
	WIND	2175504
Voltage	BIOMASS	175
	CCGT	1432
	COAL	36
	GAS	7472
	HYDRO	39
	Interconnnector	101388
	NPSHYD	0
	OTHER	0
	PUMP STORAGE	0

Data set assumptions:

- NGESO 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 redispatch doesn't include energy actions for balancing purposes, this data isn't included.

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

- NOA Constraint Management pathfinder (CMP)

  The CMP service was designed to remove power flow (MW) from the system almost instantaneously following a circuit fault on the SP Transmission to NGET (shared by SP Transmission and National Grid Electricity Transmission) boundary. This service design allows for additional power to flow across the boundary pre-fault, therefore reducing the volume of pre-fault actions required to curtail renewable generation. CMP tender is closed and contracts have been awarded.

- Dynamic Containment

  Dynamic Containment (DC) is designed to operate post-fault, i.e. for deployment after a significant frequency deviation in order to meet our most immediate need for faster-acting frequency response.

  Currently, the electricity system is experiencing lower inertia and larger, more numerous losses than ever before. Faster acting frequency response products are needed because system frequency is moving away from 50Hz more rapidly as a consequence of imbalances.

  Over the next few years, the ESO aims to deliver a new suite of faster-acting frequency response services to support our operations as the electricity system is decarbonised and to ensure that these new services enable a level playing field for all technologies. Dynamic Containment is the first of our new end-state services that we will be releasing to mitigate this risk.

- Balancing Transformation

  A major programme of work dedicated to transform the tools and process how the ENCC balance the network. It will replace System Operation - Real Time (SORT), Energy Balancing System (EBS) & platform for ancillary service (PAS) with a modern set of optimiser and console capability. The programme is in the Blueprint phase we are defining our requirements and designing the conceptual solutions.

- Modern Dispatch Instructor (MDI)

  Within Balancing Transformation NGESO have pushed forward on one new Optimiser in particular. The optimiser can be used for Energy Balancing and with some minor enhancements can solve for MW Constraints. The distinguishing factor is that this optimiser gives instructable advice which is a key enabler for Balancing Transformation to make their Control Room operation scaleable – one our strategic themes.

Further References:

The following NGESO 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 2022 scenarios
- ETYS 2021
- NOA methodology report
- NGESO 5-point plan for network constraint management
- Frequency Risk and Control Report (FRCR)
- Holistic Network Design (HND)
- Future Energy Projects