Material constrained portfolio determination

Quarter 2 - 2024

29 July 2024

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Executive summary

This is the ERA's determination of material constrained portfolios in the Wholesale Electricity Market (WEM), from constraint data over the 8:00am 1 April 2024 to 7:59am 1 July 2024 three-month rolling test window.[1] This set of material constrained portfolios replaces the ERA's previously published set of material constrained portfolios on 30 April 2024.[2] The ERA's determination was made following the WEM Procedure for portfolio determinations.[3]

This determination is part of the WEM Rules' market power mitigation framework which aims to focus regulatory monitoring and surveillance effort on those entities with the greatest potential to exercise market power. The ERA monitors market participants' price offers in the real-time market to ensure that they are compliant with the general trading obligations, with particular focus on those facilities assigned to a material constrained portfolio.[4]

Material constrained portfolios contain those facilities that have the potential to exert localised market power due to network constraints.[5] Market participants whose facilities received energy uplift payments in more than 10 per cent of relevant intervals over the associated three-month rolling test window are part of a material constrained portfolio.[6] All facilities identified in the material constrained portfolios must comply with the requirements under the WEM Rules which includes record keeping obligations on offer price construction.[7]

Importantly, market participants whose facilities that are not included in these material constrained portfolios are still monitored. The ERA monitors *all* market participant bidding in *all* intervals as required by the WEM Rules. The ERA expects all market participants to comply with the offer construction guidelines as required by the WEM Rules.[8]

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[1] The ERA must make its material constrained portfolios determination within 20 business days of the end of the rolling test window as required by the Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.2, (online).

[2] Economic Regulation Authority, 30 April 2024, *Material constrained portfolio determination*, (online), and Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.2A, (online).

[3] Economic Regulation Authority, October 2023, *WEM Procedure: Portfolio Determination*, (online).

[4] Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.4(b), (online).

[5] Energy Policy Western Australia, *Market Power Mitigation Strategy: Information Paper*, 10 November 2022, p. 21, (online).

[6] Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.2, (online). A 'relevant interval' is an interval in which a constraint equation bound, and the facility received an energy uplift payment.

[7] Further information is available in Economic Regulation Authority, 2023, *Offer Construction Guideline*, Chapter 10, (online). The record keeping requirement is in Wholesale Electricity Market Rules (WA), 1 April 2024, Rule 2.16C.3, (online).

[8] Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16A.1 and Section 2.16D, (online).

1. Introduction

The market power mitigation framework requires the ERA to complete two processes to identify those facilities with the greatest potential to exercise market power in the real-time market. These processes are:

1. Identify portfolios of facilities and those which are material portfolios.[9] The ERA published its latest portfolio and material portfolio determination on 11 April 2024.[10]

2. Identify those portfolios of facilities with the potential to exercise localised market power, due to network constraints that bound which affected dispatch in the real-time market. These portfolios are called material constrained portfolios.[11]

This determination uses the portfolios published on 11 April 2024 as an input into the assessment of which network constraints bound and which facilities received uplift payments related to those binding network constraints. Those facilities that received constrained uplift payments in 10 per cent or more of relevant intervals over the three-month rolling test window (from 8:00am 1 April 2024 to 7:59am 1 July 2024) are considered material constrained portfolios.[12] All market participants with facilities that are determined to be in a material constrained portfolio must keep adequate records as per the WEM Rules to substantiate and justify their offers into the WEM.[13]

1.1 ERA's determination process

To make this determination, the ERA:

1. Identified the constrained portfolios of facilities on 11 July 2024.[14]

2. Identified each material constrained portfolio and published this determination and notified the affected market participants on 29 July 2024 of their registered facilities being classified under a material constrained portfolio.[15]

To identify the constrained portfolios, the ERA:

1. Identified each constraint equation that bound for at least one interval between 8:00am 1 April 2024 to 7:59am 1 July 2024 (the three-month rolling test window).

2. Identified each constrained portfolio of facilities for each identified constraint equation.

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[9]   Wholesale Electricity Market Rules (WA), 27 July 2024, Rules 2.16B.1 and 2.16C.1, (online).

[10] Economic Regulation Authority, 11 April 2024, *Portfolio identification and material portfolio – Determination*, (online).

[11] Energy Policy Western Australia, *Market Power Mitigation Strategy: Information Paper*, 10 November 2022, p. 11, (online).

[12] A 'relevant interval' is an interval in which a constraint equation bound, and the facility received an energy uplift payment.

[13] Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.3, (online).

[14] Ibid, 2.16B.2, (online).

[15] Ibid, 2.16C.2, (online).

To identify each material constrained portfolio, the ERA:

1. Calculated the constrained uplift payment ratio for each constrained portfolio, for both the three-month rolling test window and any relevant fixed assessment period.[16]

2. Classified those constrained portfolios with constrained uplift payments in more than 10 per cent of all relevant intervals for which the relevant network constraint bound within the three-month rolling test window as material constrained portfolios.

1.2 Record keeping obligations for facilities that are part of a material constrained portfolio

All market participants with facilities that are part of a material constrained portfolio must ensure that adequate records are kept that can be independently verified to support a market participant's price offers for those facilities made in the real-time market, within three months of receiving the notice from the ERA.

An example of the types of records that are required include:

1. Internal governance arrangements

2. Methods, assumptions and cost inputs.

This includes those documents that market participants use to develop their prices, quantities and ramp rates for each identified facility.

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[16]   This includes any Fixed Assessment Periods during the rolling test window which is a period of at least seven consecutive trading days in which a relevant constraint equation has bound continuously within a rolling test window. This is defined in Wholesale Electricity Market Rules (WA), 27 July 2024, Chapter 11, (online).

2. Assessment of constrained portfolios

The ERA has completed its assessment of constrained portfolios and identified each constraint equation for network constraints that bound within the rolling test window of 8:00am 1 April 2024 to 7:59am 1 July 2024. Constraint equations are a mathematical representation of a constraint or limitation on how electricity can be transferred over parts of the network.[17] A constraint equation is considered binding when AEMO applies a constraint to limit the risk to power system security or reliability. When a constraint equation is applied, those registered facilities that are located behind that constraint are assigned to a constrained portfolio. The constrained portfolio includes all registered facilities behind the constraint equation that are in the same portfolio.

The ERA identified 86 unique binding network constraint equations in the 8:00am 1 April 2024 to 7:59am 1 July 2024 rolling test window. This resulted in identification of 346 unique constrained portfolios. A full list of constraint equations and constrained portfolios is included in Appendix 4.

The ERA used the portfolios identified in July 2024 for this constrained portfolio identification process.[18]

2.1 Constraint equation identification

The ERA identified 86 unique binding network constraint equations over the 8:00am 1 April 2024 to 7:59am 1 July 2024 rolling test window. The ERA used AEMO's constraint equation data to identify all network constraints that bound during the rolling test window. The data was filtered to include data for binding network constraints only from within the rolling test window. AEMO publishes this data on its public data site, which is embedded in the dispatch solution files.[19]

2.2 Constrained portfolio identification

The ERA identified 346 unique constrained portfolios over this rolling test window. The constrained portfolios consist of those registered facilities identified in the ERA's portfolio determination and where the facility is located behind a binding network constraint.[20] Registered facilities can be assigned to multiple constrained portfolios.[21]

The ERA uses a combination of data provided by AEMO and information available in AEMO's public constraints library to identify the constrained portfolios.[22]

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[17]   Wholesale Electricity Market Rules (WA) 27 July 2024, Chapter 11, (online).

[18]   Economic Regulation Authority, 11 April 2024, *Portfolio Identification and Material Portfolio Determination*, p. 3, (online).

[19]   Australian Energy Market Operator, Market Data Western Australia, (online).

[20]   Economic Regulation Authority, 11 April 2024, *Portfolio Identification and Material Portfolio Determination*, p. 3, (online).

[21]   Wholesale Electricity Market Rules (WA) 27 July 2024, Rule 2.16B.3, (online).

[22]   Australian Energy Market Operator, 'Operational Constraints Library', (online).

3.   Material constrained portfolio determination

After identifying the constrained portfolios over a rolling test window, the ERA must determine the material constrained portfolios by calculating and applying the materiality threshold specified in the WEM Rules to the constrained uplift payment ratio (see section 3.1). The ratio is a percentage of the number of dispatch intervals where a network constraint bound and any registered facilities within the relevant constrained portfolio that received energy uplift payments.

A material constrained portfolio is a constrained portfolio that meets or exceeds the 10 per cent threshold in its constrained uplift payment ratio. The ERA has notified market participants that have registered facilities allocated to a material constrained portfolio. The ERA monitors any prices offered by the market participant in the real time market in line with the market power test.[23,24]

Market participants have three months from the date of receipt of a material constrained portfolio determination notice to maintain additional records to support their compliance with the general trading obligations under the WEM Rules.[25] Additional guidance regarding the record keeping obligations is available in the WEM procedure detailing portfolio determination and in the offer construction guideline.[26,27]

3.1   Constrained uplift payment ratio

The ERA identifies those constrained portfolios that have received energy uplift payments in 10 per cent or more relevant dispatch intervals within the rolling test window.[28] Where this occurs, the constrained portfolio is deemed to be a material constrained portfolio and the facilities within each material constrained portfolio are considered to have the potential to exercise market power when located behind a network constraint.

The calculation of the constrained uplift payment ratio is:[29]

$$Constrained\ Uplift\ Payment\ Ratio = \frac{CP\_UP}{NC} \times 100$$

where:

CP_UP is the number of dispatch intervals in the rolling test window or fixed assessment period (as applicable) in which:

1.   the constraint equation relevant to the identification of the constrained portfolio identified under clause 2.16B.2(a) bound; and

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23   Wholesale Electricity Market Rules (WA) 27 July 2024, Rule 2.16C.2(d), (online).

24   Ibid, Rule 2.16C.4, (online).

25   Ibid, Section 2.16A, (online).

26   Economic Regulation Authority, 2023, *WEM Procedure: Portfolio Determination*, p. 8, (online).

27   Economic Regulation Authority, 2023, *Offer Construction Guideline*, p. 56, (online).

28   This includes any Fixed Assessment Periods during the rolling test window which is a period of at least seven consecutive trading days in which a relevant constraint equation has bound continuously within a rolling test window. This is defined in Wholesale Electricity Market Rules (WA), 27 July 2024, Chapter 11, (online).

29   Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.2(a), (online).

2. a registered facility in the constrained portfolio received an energy uplift Payment; and

NC is the total number of dispatch intervals in the rolling test window or fixed assessment period (as applicable) in which the constraint equation relevant to the identification of the constrained portfolio bound.

3.2   Constrained uplift payment ratio calculation results

The constrained uplift payment ratio calculation is applied to the rolling test window and in any relevant fixed assessment periods.[30] The calculation returned 55 of 346 identified constrained portfolios with a non-zero result.

Full results of the calculation are provided in Appendix 4.

3.3   Material constrained portfolios

The constrained uplift payment ratio calculation resulted in 44 material constrained portfolios, capturing a total of 30 different facilities belonging to 8 different market participants.

Table 1 lists all material constrained portfolios. These are identified as all constrained portfolios that met or exceeded the 10 per cent threshold of the constrained uplift payment ratio calculation. In this rolling test window, one relevant fixed assessment period was identified however, no facilities classified within the fixed assessment period received uplift payments which meant that the fixed assessment period did not contain a material constrained portfolio.[31] This list of material constrained portfolios replaces the previously published list of material constrained portfolios.[32]

Differences between this material constrained portfolio determination and the previous determination are detailed in Section 3.5.

Table 1:   List of material constrained portfolios

Constrained portfolio	Constraint equation	Registered facility	Constrained uplift payment ratio (%)[33]
7	#E 1*KWINANA_GT2 + 1*KWINANA_GT3 = 0 id-621	KWINANA_GT2 KWINANA_GT3	31
8	#E 1*KWINANA_GT2 + 1*KWINANA_GT3 = 0 id-622	KWINANA_GT2 KWINANA_GT3	31
9	#E 1*KWINANA_GT2 = 51 id-623	KWINANA_GT2	46
10	#E 1*KWINANA_GT3 = 51 id-624	KWINANA_GT3	45

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[30]   Economic Regulation Authority, *WEM Procedure: Portfolio Determination*, October 2023, 4.2.1, (online).

[31]   Fixed Assessment Period is a period of at least seven consecutive Trading Days in which the Constraint Equation relevant to the identification of a Constrained Portfolio has continuously bound within a Rolling Test Window. This is defined in Wholesale Electricity Market Rules (WA), 27 July 2024, Chapter 11, (online).

[32]   Wholesale Electricity Market Rules (WA), 27 July 2024, Rule 2.16C.2A, (online).

[33]   Value rounded to the nearest percentage point.

Constrained portfolio	Constraint equation	Registered facility	Constrained uplift payment ratio (%)[33]
13	#E 1*NAMKKN_MERR_SG1 >= 6 id-640	NAMKKN_MERR_SG1	75
14	#E 1*NAMKKN_MERR_SG1 >= 6 id-687	NAMKKN_MERR_SG1	96
15	#E 1*NAMKKN_MERR_SG1 >= 6 id-691	NAMKKN_MERR_SG1	100
18	#E 1*PRK_AG >= 1 id-601	PRK_AG	77
20	#E 1*PRK_AG >= 1 id-610	PRK_AG	79
21	#E 1*PRK_AG >= 1 id-627	PRK_AG	77
23	#E 1*PRK_AG >= 1 id-644	PRK_AG	88
24	#E 1*PRK_AG >= 1 id-649	PRK_AG	100
25	#E 1*PRK_AG >= 1 id-650	PRK_AG	90
26	#E 1*PRK_AG >= 1 id-652	PRK_AG	78
27	#E 1*PRK_AG >= 1 id-653	PRK_AG	77
28	#E 1*PRK_AG >= 1 id-655	PRK_AG	98
29	#E 1*PRK_AG >= 1 id-656	PRK_AG	50
30	#E 1*PRK_AG >= 1 id-661	PRK_AG	65
31	#E 1*PRK_AG >= 1 id-676	PRK_AG	74
45	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	INVESTEC_COLLGAR_WF1	23
48	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	MERSOLAR_PV1	63
64	MRT-NOR 81 > CVP0 {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	37
91	MRT-NOR 81 > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	17
120	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	38
123	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	MERSOLAR_PV1	17
125	MRT-NOR 81 > CVP0 {WMS G501} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	37
130	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	42

Constrained portfolio	Constraint equation	Registered facility	Constrained uplift payment ratio (%)[33]
132	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	MERSOLAR_PV1	16
135	MRT-NOR 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	60
142	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	NAMKKN_MERR_SG1	95
146	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	58
149	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	MERSOLAR_PV1	26
151	MRT-NOR 81 > {WMS G501} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	81
163	MSR-KMK 81 * {NIL} [Manual(TIWEST_COG1)]	TIWEST_COG1	15
164	MSR-KMK 81 * {NIL} [RegLower(TIWEST_COG1)]	TIWEST_COG1	15
165	MSR-KMK 81 * {NIL} [RegRaise(TIWEST_COG1)]	TIWEST_COG1	15
174	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	TESLA_PICTON_G1 TESLA_KEMERTON_G1	12
241	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	10
244	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	MERSOLAR_PV1	13
272	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	INVESTEC_COLLGAR_WF1	24
275	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	MERSOLAR_PV1	29
298	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	PINJAR_GT1 PINJAR_GT10 PINJAR_GT11 PINJAR_GT2 PINJAR_GT3 PINJAR_GT4 PINJAR_GT5 PINJAR_GT7 PINJAR_GT9 MUNGARRA_GT1 MUNGARRA_GT3 WEST_KALGOORLIE_GT2 WEST_KALGOORLIE_GT3 MUJA_G6 MUJA_G7 MUJA_G8 COLLIE_G1 KEMERTON_GT11 KEMERTON_GT12	89

Constrained portfolio	Constraint equation	Registered facility	Constrained uplift payment ratio (%)[33]
		KWINANA_ESR1 COCKBURN_CCG1 KWINANA_GT2 KWINANA_GT3	
316	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	PINJAR_GT1 PINJAR_GT10 PINJAR_GT11 PINJAR_GT2 PINJAR_GT3 PINJAR_GT4 PINJAR_GT5 PINJAR_GT7 PINJAR_GT9 MUNGARRA_GT1 MUNGARRA_GT3 WEST_KALGOORLIE_GT2 WEST_KALGOORLIE_GT3 MUJA_G6 MUJA_G7 MUJA_G8 COLLIE_G1 KEMERTON_GT11 KEMERTON_GT12 KWINANA_ESR1 COCKBURN_CCG1 KWINANA_GT2 KWINANA_GT3	100
325	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	MUNGARRA_GT1 MUNGARRA_GT3 PINJAR_GT1 PINJAR_GT10 PINJAR_GT11 PINJAR_GT2 PINJAR_GT3 PINJAR_GT4 PINJAR_GT5 PINJAR_GT7 PINJAR_GT9	10

Source: ERA analysis of WEM data.

3.4 Market participants and facilities in a material constrained portfolio

Table 2 is a list of market participants with facilities that are part of a material constrained portfolio.

Table 2: **Market participants and those facilities that are part of a material constrained portfolio**

Market participant	Facility
Collgar Wind Farm	INVESTEC_COLLGAR_WF1
Goldfields Power Pty Ltd	PRK_AG
Merredin Energy	NAMKKN_MERR_SG1
Merredin Solar Farm Nominee Pty Ltd	MERSOLAR_PV1

Market participant	Facility
Tronox	TIWEST_COG1
Tesla Corporation Pty Ltd	TESLA_PICTON_G1
Tesla Kemerton	TESLA_KEMERTON_G1
Synergy	KWINANA_GT2
	KWINANA_GT3
	PINJAR_GT1
	PINJAR_GT10
	PINJAR_GT11
	PINJAR_GT2
	PINJAR_GT3
	PINJAR_GT4
	PINJAR_GT5
	PINJAR_GT7
	PINJAR_GT9
	MUNGARRA_GT1
	MUNGARRA_GT3
	WEST_KALGOORLIE_GT2
	WEST_KALGOORLIE_GT3
	MUJA_G6
	MUJA_G7
	MUJA_G8
	COLLIE_G1
	KEMERTON_GT11
	KEMERTON_GT12
	KWINANA_ESR1
	COCKBURN_CCG1

Source: ERA assessment of WEM data.

3.5   Comparison to previous determination

The differences between the most recent and previous rolling test windows are detailed below:

Table 3 is the number of constraint equations identified to have bound.

Table 4 is the number of unique constrained portfolios identified.

Table 5 is the number of unique facilities that were part of a material constrained portfolio.

Table 6 is the number of unique market participants that have facilities that are part of a material constrained portfolio.

Table 3: **Number of constraint equations identified**

Rolling test window	Number of constraint equations identified
Q2 2024	86
Q1 2024	85

Source: ERA analysis of WEM data.

Table 4: **Number of unique constrained portfolios identified**

Rolling test window	Number of unique constrained portfolios
Q2 2024	346
Q1 2024	638

Source: ERA analysis of WEM data.

Table 5: **Number of unique facilities within a material constrained portfolio**

Rolling test window	Number of unique constrained portfolios
Q2 2024	30
Q1 2024	39

Source: ERA analysis of WEM data.

Table 6: **Number of unique market participants that have facilities in a material constrained portfolio**

Rolling test window	Number of unique constrained portfolios
Q2 2024	8
Q1 2024	14

Source: ERA analysis of WEM data.

Appendix 1 List of Tables

Appendix 2 List of Figures

Appendix 3 Constrained portfolio method

The ERA developed and applied the process and method, outlined in this appendix, to identify constrained portfolios and calculate the constrained uplift payment ratio for determining material constrained portfolios. The method is outlined in **Figure 1**, with additional detail provided in the following sections.

Figure 1: **High level steps in the constrained portfolio method**
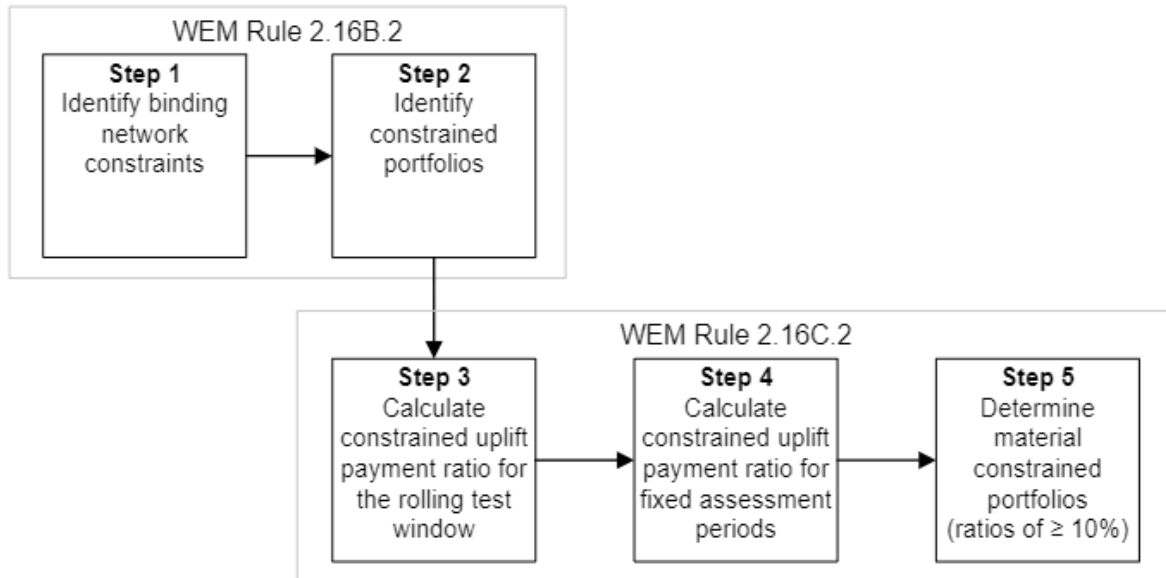
The assignment of constrained portfolios and the calculation of the constrained uplift payment ratio is completed using R within RStudio.[34]

Data sets

The following data sets were used as inputs to this process:

1.   WEMDE dispatch solution constraints.[35]

2.   'Left Hand Side' terms of network constraints, which lists all facilities located behind each network constraint.

3.   Energy uplift payment data.

4.   Portfolios identified under WEM Rule 2.16B.1.[36]

Data set 1 is available publicly via AEMO's public data site.[37] Data set 2 is partially available publicly via the Operational Constraints Library, however discretionary constraints are not included.[38] Data set 3 is not publicly available. Data set 4 is published by the ERA.[39]

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34   Libraries used were "tidyverse", "readxl" and "here".

35   WEMDE stands for the Wholesale Electricity Market Dispatch Engine.

36   Wholesale Electricity Market Rules (WA) 27 July 2024, Rule 2.16B.1, (online).

37   Australian Energy Market Operator, Market Data Wester Australia: Dispatch Solution Files, (online).

38   Australian Energy Market Operator, Operational Constraints Library, (online).

39   Economic Regulation Authority, October 2023, WEM Procedure: Portfolio Determination, (online).

Data cleansing

All data underwent cleansing processes. This included filtering the data to include only dispatch intervals falling within the rolling test window, ensuring consistent variable naming and formatting across data frames, and extracting facility names from string variable values.

Step 1 - Binding network constraint identification

The first step in the process of identifying constrained portfolios is to identify all binding network constraints within a rolling test window is. [40]

A network constraint is a limitation or requirement in a part of a network that may impact one or more registered facilities in the central dispatch process, such that it would be unacceptable to transfer electricity across that part of the network at a level or in a manner outside the limit or requirement.[41]

This step in the process requires the list of WEMDE dispatch solution constraints. This data was checked against the publicly available data. The three filters applied are date range, constraintType = "Network" and isBindingConstraint = "TRUE".

The list of unique constraint IDs are the network constraints that bound within the rolling test window.

Step 2 - Constrained portfolio identification

Following identification of all network constraints that bound during the rolling test window, the ERA then identified all constrained portfolios for each constraint equation.[42] A constrained portfolio is, for each constraint equation, a set comprising all the registered facilities within a single portfolio that are located behind the relevant network constraint.[43]

This step requires three data sets:

5. The list of unique binding network constraint resulting from part A of this process.

6. 'Left Hand Side' terms of those network constraints, which lists all the facilities located behind each network constraint.

7. Portfolios identified under WEM Rule 2.16B.1.[44]

Some network constraints have versions which applied through the rolling test window. Whilst most version changes only affect facility coefficients in the constraint equation, if a facility is commissioned or decommissioned, the terms of the equation would change. A strict interpretation of the WEM Rules definition of constrained portfolio is used, and the set comprising all the registered facilities that are located behind any version of the network constraint are considered.

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40   Wholesale Electricity Market Rules (WA) 27 July 2024, Rule 2.16B.2(a), (online).

41   Ibid, Chapter 11, p. 735, (online).

42   Ibid, Rule 2.16B.2(b), (online).

43   Ibid, Chapter 11, p. 707, (online).

44   Economic Regulation Authority, October 2023, WEM Procedure: Portfolio Determination, (online).

The three data sets are merged, the first two by network constraint ID and the last two by facility. Only those facilities which sit behind a network constraint that bound during the period are included in this process.

The data frame is arranged alphabetically by constraint ID, then numerically by portfolio and then alphabetically by facility. An exception to this ordering is where a constraint ID uses a numerical suffix, in which case those constraints are arranged numerically by their suffix.

A constrained portfolio number is assigned to each facility, row by row, according to the constraint ID and portfolio number. If either the constraint ID or the portfolio changes, then a new constrained portfolio number is assigned, see **Table 7**.

Table 7: **Example of constrained portfolio identification**

Constraint ID	Facilities	Portfolio	Constrained portfolio number
Constraint-equation-1	Facility A	1	1
Constraint-equation-1	Facility B	1	1
Constraint-equation-1	Facility C	2	2
Constraint-equation-2	Facility A	1	3
Constraint-equation-3	Facility A	1	4

Source: ERA created example based on WEM data.

Step 3 - Constrained uplift payment ratio calculation (rolling test window)

Steps 1 and 2 of the process meet the WEM Rule 2.16B.2 requirements.[45] From this point on, the steps are designed to apply the calculation required under the market power test set in market rule 2.16C.2 to determine which of the constrained portfolios meet or exceed the materiality threshold in the WEM Rules.[46] This step calculates the constrained uplift payment ratio for each of the constrained portfolios within the rolling test window.

This calculation is applied to each constrained portfolio.

$$Constrained\ Uplift\ Payment\ Ratio = \frac{CP\_UP}{NC} \times 100$$

Where:

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45   Wholesale Electricity Market Rules (WA) 27 July 2024, Rule 2.16B.2, (online).

46   Ibid, Rule 2.16C.2, (online).

CP_UP is the count of dispatch intervals within the rolling test window for a bound network constraint where uplift payments were made.

NC is the count of dispatch intervals within the rolling test window where a network constraint equation bound.

This process requires the following data sets:

1. WEMDE dispatch solution constraints.

2. 'Left Hand Side' (LHS) terms of those network constraints, which lists all the facilities located behind each network constraint.

3. Energy uplift payment data.

4. Constrained portfolios assigned in part B of this process.

The denominator (NC) is extracted for each constrained portfolio by filtering the WEMDE dispatch solution constraints by the network constraint for which the constrained portfolio was assigned. The row count is the number of dispatch intervals in the rolling test window for which the network constraint bound.

The numerator (CP_UP) is found by merging the solution constraints with the facilities from the LHS terms, and then with the facilities receiving energy uplift. The same filter for the relevant constraint is then applied as before. The data is then filtered to include intervals for which there is an energy uplift payment received by a facility within that constrained portfolio only. The number of unique dispatch intervals is counted, which forms the numerator.

For example, **Table 8** below shows a hypothetical example where all the dispatch intervals in which constraint equation 1 bound. This constraint equation resulted in identification of example constrained portfolios 1 and 2. Constrained portfolio 1 includes facilities A and B, while constrained portfolio 2 includes facility C. From this example, NC is determined to be 4 for both constrained portfolios, and CP_UP is the count of gold and blue shaded intervals for constrained portfolios 1 and 2 respectively.

Table 8: **Example of determining constrained facilities that received energy uplift payments by dispatch interval**

Dispatch interval	Constrained facilities	Energy uplift recipients
2023-10-01 11:00	A, B, C	A, B
2023-10-01 11:05	A, B, C	A
2023-10-02 17:30	A, B, C	-
2023-10-02 17:35	A, B, C	C

Source: ERA example based on WEM data.

These numbers are then input to a second table, in which the ratio is calculated according to the formula set out in the WEM Rules. **Table 9** below shows the calculation of constrained uplift payment ratios for example constrained portfolios 1 and 2.

Table 9: **Example of how the constrained uplift payment ratio is calculated**

Constrained portfolio	CP_UP	NC	Constrained uplift payment ratio (%)
1	2	4	50
2	1	4	25

Source: ERA example based on WEM data.

Step 4 - Constrained uplift payment ratio calculation (fixed assessment periods)

The process for calculating the fixed assessment period is the same used for the whole of the rolling test window period. However, instead of using the rolling test window, the calculation is applied where the constraint equation relevant to the constrained portfolio has continuously bound for a period of a least seven consecutive trading days within the rolling test window. A rolling test window may contain multiple fixed assessment periods.[47]

This process is the same as outlined in step 3 and uses the same data set, however the key difference is first filtering the network constraint data to consider only fixed assessment periods. This is done by creating a duration variable, by ordering the data by constraint ID, then by chronological order. Rows are then checked to see if they are five minutes apart, if they are then this is added to a cumulative duration, if they are not, a new count is started.

The duration variable is then filtered to only include those which exceed seven days. The numerator and denominator are then extracted as before, and the constrained uplift payment ratio is calculated. If there are multiple fixed assessment periods for the same network constraint, the highest constrained uplift payment ratio is provided.

Step 5 – Material constrained portfolios

A filter is applied to the calculation tables generated in steps 3 and 4 to only include those portfolios with a constrained uplift payment ratio greater than 10 per cent from either of steps 3 or 4.

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47   Wholesale Electricity Market Rules (WA) 27 July 2024, Chapter 11, (online).

Appendix 4 Constrained uplift payment ratio results

The ERA must publish the results of the calculations carried out for the WEM Rule clause 2.16C.2(a). This includes both the results of the constrained uplift payment ratio for all constrained portfolios for both the rolling test window and any fixed assessment periods.

Table 10: **Complete results of the calculation carried out under WEM Rule clause 2.16C.2(a)**

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
1	DCCE-WEMDEUI-Security-560	0	NA
2	DCCE-WEMDEUI-Security-561	0	NA
3	DCCE-WEMDEUI-Security-564	0	NA
4	DCCE-WEMDEUI-Security-571	0	NA
5	#E 1*ALINTA_WGP_GT <= 0 id-587	0	NA
6	#E 1*COLLIE_G1 = 0 id-692	0	NA
7	#E 1*KWINANA_GT2 + 1*KWINANA_GT3 = 0 id-621	30.72	NA
8	#E 1*KWINANA_GT2 + 1*KWINANA_GT3 = 0 id-622	30.91	NA
9	#E 1*KWINANA_GT2 = 51 id-623	45.7	NA
10	#E 1*KWINANA_GT3 = 51 id-624	45.25	NA
11	#E 1*NAMKKN_MERR_SG1 = 0 id-605	0	NA
12	#E 1*NAMKKN_MERR_SG1 = 82 id-677	0	NA
13	#E 1*NAMKKN_MERR_SG1 >= 6 id-640	75	NA
14	#E 1*NAMKKN_MERR_SG1 >= 6 id-687	96.15	NA
15	#E 1*NAMKKN_MERR_SG1 >= 6 id-691	100	NA
16	#E 1*PRK_AG >= 1 id-588	0	NA
17	#E 1*PRK_AG >= 1 id-600	0	NA
18	#E 1*PRK_AG >= 1 id-601	77.42	NA
19	#E 1*PRK_AG >= 1 id-609	0	NA
20	#E 1*PRK_AG >= 1 id-610	79.25	NA
21	#E 1*PRK_AG >= 1 id-627	77.02	NA

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[48] Values rounded to the nearest percentage point.

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
22	#E 1*PRK_AG >= 1 id-643	0	NA
23	#E 1*PRK_AG >= 1 id-644	87.8	NA
24	#E 1*PRK_AG >= 1 id-649	100	NA
25	#E 1*PRK_AG >= 1 id-650	90.41	NA
26	#E 1*PRK_AG >= 1 id-652	78	NA
27	#E 1*PRK_AG >= 1 id-653	76.6	NA
28	#E 1*PRK_AG >= 1 id-655	98.3	NA
29	#E 1*PRK_AG >= 1 id-656	50	NA
30	#E 1*PRK_AG >= 1 id-661	64.86	NA
31	#E 1*PRK_AG >= 1 id-676	74.36	NA
32	ALB522 * {NIL} [Off(GRASMERE_WF1)]	0	NA
33	BLD-WMS 81 * {NIL} [Off(STHRNCRS_EG)]	0	NA
34	CPS-SHO 91 * {NIL} [Off(COLLIE_G1)]	0	0
35	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
36	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
37	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
38	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
39	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
40	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
41	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
42	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
43	D-SVY 81 > CVP0 {NT-NOR 81} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
44	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
45	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	23.33	NA
46	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
47	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
48	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	63.33	NA
49	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
50	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
51	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
52	D-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	0	NA
53	ENT-YDT 91, SPS_MARNET * {NIL} [Off(WARRADARGE_WF1)]	0	NA
54	Island(EGF) * {NIL} [Manual(PRK_AG)]	0	NA
55	Island(EGF) * {NIL} [Manual(STHRNCRS_EG)]	0	NA
56	KW-KWB 92 * {NIL} [Off(KWINANA_ESR1)]	0	NA
57	MGA-MGS 81 * {NIL} [Off(GREENOUGH_RIVER_PV1)]	0	NA
58	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	0	NA
59	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	0	NA
60	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	0	NA
61	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
62	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	0	NA
63	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	0	NA
64	MRT-NOR 81 > CVP0 {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	36.53	NA
65	MRT-NOR 81 > CVP0 {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	0	NA
66	MRT-NOR 81 > CVP0 {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	0	NA
67	MRT-NOR 81 > CVP0 {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	0	NA
68	MRT-NOR 81 > CVP0 {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	0	NA
69	MRT-NOR 81 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
70	MRT-NOR 81 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
71	MRT-NOR 81 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
72	MRT-NOR 81 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
73	MRT-NOR 81 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
74	MRT-NOR 81 > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
75	MRT-NOR 81 > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
76	MRT-NOR 81 > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
77	MRT-NOR 81 > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
78	MRT-NOR 81 > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
79	MRT-NOR 81 > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	**Fixed assessment period**
80	MRT-NOR 81 > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
81	MRT-NOR 81 > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
82	MRT-NOR 81 > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
83	MRT-NOR 81 > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
84	MRT-NOR 81 > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
85	MRT-NOR 81 > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
86	MRT-NOR 81 > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
87	MRT-NOR 81 > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
88	MRT-NOR 81 > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
89	MRT-NOR 81 > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
90	MRT-NOR 81 > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
91	MRT-NOR 81 > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	16.98	NA
92	MRT-NOR 81 > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
93	MRT-NOR 81 > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
94	MRT-NOR 81 > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
95	MRT-NOR 81 > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
96	MRT-NOR 81 > CVP0 {NIL} [MU-NGS X1 (MU~)]	0	NA
97	MRT-NOR 81 > CVP0 {NIL} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
98	MRT-NOR 81 > CVP0 {NIL} [MU-NGS X1 (MU~)]	0	NA
99	MRT-NOR 81 > CVP0 {NIL} [MU-NGS X1 (MU~)]	0	NA
100	MRT-NOR 81 > CVP0 {NIL} [MU-NGS X1 (MU~)]	0	NA
101	MRT-NOR 81 > CVP0 {NIL} [MU-NGS X1 (MU~)]	0	NA
102	MRT-NOR 81 > CVP0 {PKS GT1} [MU-NGS X1 (MU~)]	0	NA
103	MRT-NOR 81 > CVP0 {PKS GT1} [MU-NGS X1 (MU~)]	0	NA
104	MRT-NOR 81 > CVP0 {PKS GT1} [MU-NGS X1 (MU~)]	0	NA
105	MRT-NOR 81 > CVP0 {PKS GT1} [MU-NGS X1 (MU~)]	0	NA
106	MRT-NOR 81 > CVP0 {PKS GT1} [MU-NGS X1 (MU~)]	0	NA
107	MRT-NOR 81 > CVP0 {PKS GT1} [MU-NGS X1 (MU~)]	0	NA
108	MRT-NOR 81 > CVP0 {PKS GT2} [MU-NGS X1 (MU~)]	0	NA
109	MRT-NOR 81 > CVP0 {PKS GT2} [MU-NGS X1 (MU~)]	0	NA
110	MRT-NOR 81 > CVP0 {PKS GT2} [MU-NGS X1 (MU~)]	0	NA
111	MRT-NOR 81 > CVP0 {PKS GT2} [MU-NGS X1 (MU~)]	0	NA
112	MRT-NOR 81 > CVP0 {PKS GT2} [MU-NGS X1 (MU~)]	0	NA
113	MRT-NOR 81 > CVP0 {PKS GT2} [MU-NGS X1 (MU~)]	0	NA
114	MRT-NOR 81 > CVP0 {PKS GT3} [MU-NGS X1 (MU~)]	0	NA
115	MRT-NOR 81 > CVP0 {PKS GT3} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
116	MRT-NOR 81 > CVP0 {PKS GT3} [MU-NGS X1 (MU~)]	0	NA
117	MRT-NOR 81 > CVP0 {PKS GT3} [MU-NGS X1 (MU~)]	0	NA
118	MRT-NOR 81 > CVP0 {PKS GT3} [MU-NGS X1 (MU~)]	0	NA
119	MRT-NOR 81 > CVP0 {PKS GT3} [MU-NGS X1 (MU~)]	0	NA
120	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	37.71	NA
121	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	0	NA
122	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	7.76	NA
123	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	16.82	NA
124	MRT-NOR 81 > CVP0 {WMK G501} [MU-NGS X1 (MU~)]	0	NA
125	MRT-NOR 81 > CVP0 {WMS G501} [MU-NGS X1 (MU~)]	36.73	NA
126	MRT-NOR 81 > CVP0 {WMS G501} [MU-NGS X1 (MU~)]	0	NA
127	MRT-NOR 81 > CVP0 {WMS G501} [MU-NGS X1 (MU~)]	1.77	NA
128	MRT-NOR 81 > CVP0 {WMS G501} [MU-NGS X1 (MU~)]	1.33	NA
129	MRT-NOR 81 > CVP0 {WMS G501} [MU-NGS X1 (MU~)]	0	NA
130	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	42.08	NA
131	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	0	NA
132	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	16.25	NA
133	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
134	MRT-NOR 81 > {BLD-PCY-PKS 81} [MU-NGS X1 (MU~)]	1.67	NA
135	MRT-NOR 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	60	NA
136	MRT-NOR 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
137	MRT-NOR 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
138	MRT-NOR 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
139	MRT-NOR 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
140	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	0	NA
141	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	0	NA
142	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	95.12	NA
143	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	0	NA
144	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	0	NA
145	MRT-NOR 81 > {NIL} [MU-NGS X1 (MU~)]	0	NA
146	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	57.79	NA
147	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	0	NA
148	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	6.23	NA
149	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	25.78	NA
150	MRT-NOR 81 > {WMK G501} [MU-NGS X1 (MU~)]	0	NA
151	MRT-NOR 81 > {WMS G501} [MU-NGS X1 (MU~)]	80.58	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
152	MRT-NOR 81 > {WMS G501} [MU-NGS X1 (MU~)]	0	NA
153	MRT-NOR 81 > {WMS G501} [MU-NGS X1 (MU~)]	0	NA
154	MRT-NOR 81 > {WMS G501} [MU-NGS X1 (MU~)]	2.91	NA
155	MRT-NOR 81 > {WMS G501} [MU-NGS X1 (MU~)]	0	NA
156	MRT-NOR 81, NOR-SVY 81, NOR-WUN 71 * {NIL} [Off(TESLA_NORTHAM_G1)]	0	NA
157	MRT-NOR 81, NOR-SVY 81, NOR-WUN 71 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
158	MRT-NOR 81, NOR-SVY 81, NOR-WUN 71 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
159	MRT-NOR 81, NOR-SVY 81, NOR-WUN 71 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
160	MRT-NOR 81, NOR-SVY 81, NOR-WUN 71 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
161	MRT-NOR 81, NOR-SVY 81, NOR-WUN 71 > CVP0 {BLD-WMS 81} [MU-NGS X1 (MU~)]	0	NA
162	MRT-NOR 81, NT-NOR 81, NOR-WUN 71 * {NIL} [Off(TESLA_NORTHAM_G1)]	0	NA
163	MSR-KMK 81 * {NIL} [Manual(TIWEST_COG1)]	14.72	NA
164	MSR-KMK 81 * {NIL} [RegLower(TIWEST_COG1)]	14.72	NA
165	MSR-KMK 81 * {NIL} [RegRaise(TIWEST_COG1)]	14.72	NA
166	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
167	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	**Fixed assessment period**
168	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
169	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
170	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
171	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
172	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
173	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
174	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	12.5	NA
175	MSR-WM-OFE 81 > {KW-CC-MED 81} [PNJ-APJ 81 (APJ~)]	0	NA
176	NBT-YDT 91, SPS_MARNET * {NIL} [Off(WARRADARGE_WF1)]	0	NA
177	NBT-YDT 91, SPS_MARNET * {NIL} [Off(YANDIN_WF1)]	0	NA
178	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
179	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
180	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
181	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
182	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
183	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
184	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
185	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
186	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
187	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
188	NIL > CVP0 {CGT-CGW X1} [MU-NGS X1 (MU~)]	0	NA
189	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
190	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
191	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
192	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
193	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
194	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
195	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
196	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
197	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
198	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
199	NIL > CVP0 {CGT-CGW X2} [MU-NGS X1 (MU~)]	0	NA
200	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
201	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
202	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
203	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
204	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
205	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
206	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
207	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
208	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
209	NIL > CVP0 {D-SVY 81} [MU-NGS X1 (MU~)]	0	NA
210	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
211	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
212	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
213	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
214	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
215	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
216	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
217	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
218	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
219	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
220	NIL > CVP0 {KEM-MRR 81} [KEM-MRR 82 (KEM~)]	0	NA
221	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
222	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
223	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
224	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
225	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
226	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
227	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
228	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
229	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
230	NIL > CVP0 {MDP-MRT 81} [MU-NGS X1 (MU~)]	0	NA
231	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
232	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
233	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
234	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
235	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
236	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
237	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
238	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
239	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
240	NIL > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)]	0	NA
241	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	10.48	NA
242	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
243	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	5.95	NA
244	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	12.59	NA
245	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
246	NIL > CVP0 {MRT-NOR 81} [MU-NGS X1 (MU~)]	1.16	NA
247	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
248	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
249	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
250	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
251	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
252	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
253	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
254	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
255	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
256	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
257	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
258	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
259	NIL > CVP0 {MU-NT 91} [MU-NGS X1 (MU~)]	0	NA
260	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
261	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
262	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
263	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
264	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
265	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
266	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
267	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
268	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
269	NIL > CVP0 {NOR-SVY 81} [MU-NGS X1 (MU~)]	0	NA
270	NIL > {MBR-ALB 81} [KOJ81-KAF (KOJ-)]	0	NA
271	NIL > {MBR-ALB 81} [KOJ81-KAF (KOJ-)]	0	NA
272	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	24.17	NA
273	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	0	NA
274	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	6.75	NA
275	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	29.08	NA
276	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	**Fixed assessment period**
277	NIL > {MRT-NOR 81} [MU-NGS X1 (MU~)]	2.7	NA
278	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
279	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
280	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
281	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
282	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
283	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
284	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0.57	NA
285	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
286	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
287	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
288	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
289	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
290	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
291	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
292	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
293	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
294	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
295	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
296	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
297	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
298	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	88.89	NA
299	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
300	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
301	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
302	NIL > {NT-SPK 81} [EP81-NEB (EP-)]	0	NA
303	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
304	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
305	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
306	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
307	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
308	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
309	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
310	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
311	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
312	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
313	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
314	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
315	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
316	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	100	NA
317	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
318	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
319	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
320	NIL > {NT-SPK 81} [NT81-NEB (NT~)]	0	NA
321	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
322	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
323	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
324	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
325	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	10.28	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	Fixed assessment period
326	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
327	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
328	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
329	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
330	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
331	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
332	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
333	NT-HBK 81 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
334	PJR-ENB-EMD 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
335	PJR-ENB-EMD 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
336	PJR-ENB-EMD 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
337	PJR-ENB-EMD 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
338	PJR-ENB-EMD 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
339	PJR-ENB-EMD 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	0	NA
340	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
341	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
342	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
343	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA

Constrained portfolio	Constraint equation	Constrained uplift payment ratio[48]	
		Rolling test window	**Fixed assessment period**
344	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
345	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA
346	PJR-MUC 82 > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	0	NA