# Material constrained portfolio determination method paper

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We acknowledge their continuing connection to culture and community, their traditions and stories. We commit to listening, continuously improving our performance and building a brighter future together.

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# Contents

# 1.    Introduction

This is the Economic Regulation Authority's method paper setting out the processes used to determine which facilities comprise material constrained portfolios.

Material constrained portfolios contain those facilities that have the potential to exert localised market power due to network constraints.[1] Market participants whose facilities receive energy uplift payments in 10 per cent or more of relevant intervals over the associated three-month rolling test window, or fixed assessment period, are part of a material constrained portfolio.[2]

This method paper accompanies the ERA's report on our determination of material constrained portfolios. For completeness, this paper is to be read in conjunction with the ERA's material constrained portfolios determination report. The ERA's determination of material constrained portfolios is made following the Wholesale Electricity Market Procedure (WEM Procedure) for portfolio determinations.[3]

In general, the ERA is required to complete two processes to identify those facilities with the greatest potential to exercise market power in the Real-Time Market due to network constraints. These processes are:

1.    Identify portfolios of facilities and those which are material portfolios.[4] The ERA publishes the portfolio and material portfolio determination on our [website](.)[5]

2.    Identify material constrained portfolios, which are 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.[6]

Our processes and method for determining material constrained portfolios are set out below.

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

[2]    Electricity System and Market Rules (WA), (formerly Wholesale Electricity Market Rules (WA)), 4 June 2025, Rule 2.16C.2, ([online](.)). A 'relevant interval' is an interval in which the network constraint equation, for which the constrained portfolio was assigned, bound.

[3]    Economic Regulation Authority, 27 November 2024, *WEM Procedure: Portfolio Determination*, ([online](.)).

[4]    Electricity System and Market Rules (WA), 4 June 2025, Rules 2.16B.1 and 2.16C.1, ([online](.)).

[5]    Economic Regulation Authority, *Portfolio Assessment*, ([online](.)).

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

# 2.    Constrained portfolio method

The ERA developed and applied the following processes and method to:

- identify constrained portfolios
- calculate the constrained uplift payment ratio of the said portfolios
- determine which of these are *material constrained portfolios*.

The outputs and primary formula required to undertake the constrained portfolio determination are specified in the Electricity System and Market (ESM) Rules.[7] The full process for doing so is outlined in **Error! Reference source not found.**, with details provided below.

**Figure 1:      High-level steps in the constrained portfolio method**
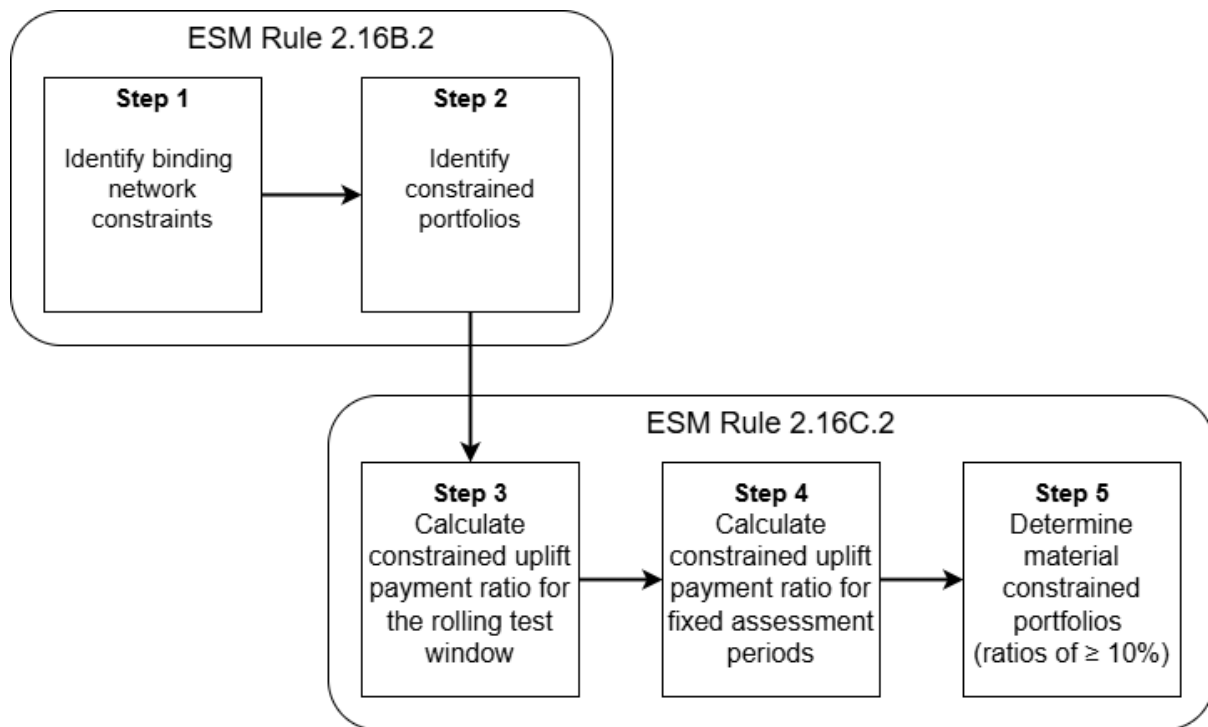


The ERA uses four data inputs, which are listed along with their source below:

- Constraint data (Market Surveillance Data Catalogue)
- Energy uplift payments (Market Surveillance Data Catalogue)
- Facility registration (Market Surveillance Data Catalogue)
- Portfolio assignment (ERA portfolio determination).[8]

## 2.1    Step 1 - Binding network constraint identification

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 that limit

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7    Electricity System and Market Rules (WA), 4 June 2025, Rule 2.16C.1, (online).

8    Ibid, Rule 2.16B.1, (online).

or requirement.[9] When a network constraint 'binds', it means that the limitation came into effect when the Wholesale Electricity Market Dispatch Engine (WEMDE) determined an optimised solution. When these limitations are active, this can give facilities behind the constraint market power and affect Real-Time Market outcomes.

The first step in the process of identifying constrained portfolios is to identify all network constraints that bound within the rolling test window.[10] Data pulled from the Market Surveillance Data Catalogue are filtered to include only network constraints that bound.[11] This data is then organised by dispatch interval, and the facilities that were affected by those constraints are then included.

**Table 1:** **Example of network constraint data**

| Dispatch Interval | Constraint ID | Facilities |
|---|---|---|
| 2023-10-01 11:00 | Constraint-equation-1 | Facility A, Facility C |
| 2023-10-01 11:00 | Constraint-equation-2 | Facility B |
| 2023-10-01 11:05 | Constraint-equation-1 | Facility A, Facility C |

*Source: ERA created example.*

## 2.2    Step 2 - Constrained portfolio identification

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.[12]

The data frame used for this step includes the identified constraint equations, facilities affected by each constraint and the portfolios they were assigned to in the ERA's annual portfolio determination.[13] The data is ordered alphabetically by constraint equation, and then in ascending numerical order by portfolio.

Against each constraint equation, facilities are grouped by their portfolios and then assigned a constrained portfolio number. Each combination of constraint equation and set of facilities within a portfolio are assigned a constrained portfolio number, shown as an example in Table 2.

**Table 2**: **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 |

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9    Electricity System and Market Rules (WA), 4 June 2025, Chapter 11, (online).

10   Ibid, Rule 2.16B.2(a), (online).

11   The Market Surveillance Data Catalogue is published by the Australian Energy Market Operator (AEMO) to monitor the effectiveness of the market and investigate market behaviour that results in the market not functioning effectively. The data includes market generators, customers, prices, offers and capacity.

12   Electricity System and Market Rules (WA), 4 June 2025, Chapter 11, (online).

13   Ibid, Rules 2.16B and 2.16C, (online).

| Constraint ID | Facilities | Portfolio | Constrained portfolio number |
|---|---|---:|---:|
| Constraint-equation-2 | Facility A | 1 | 3 |
| Constraint-equation-3 | Facility A | 1 | 4 |

*Source: ERA created example.*

Network constraints undergo updates that apply through the rolling test window. While most version changes are minor, if a facility is commissioned or decommissioned, the list of facilities changes. The widest set comprising all registered facilities that are located behind any version of the network constraint occurring within the rolling test window are considered. However, if a facility has been commissioned, but not yet included in a portfolio determination process, then that facility is not considered as part of the constrained portfolio determination.

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

Steps 1 and 2 of the process meet the ESM Rule 2.16B.2 requirements.[14] Calculation of the constrained uplift payment ratio is then undertaken against each constrained portfolio, which is then compared against the materiality threshold specified in the ESM Rules.[15]

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

Where:

*CP_UP* is the count of dispatch intervals within the rolling test window where two conditions are both true:

1. The relevant constraint equation bound, and; [16]

2. Any facility within the constrained portfolio received an energy uplift payment.

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

For example, Tables 3 and 4 show a hypothetical example where all the dispatch intervals in which constraint equation 1 bound. This constraint equation resulted in identification of constrained portfolios 1 and 2. Constrained portfolio 1 includes facilities A and B, while constrained portfolio 2 includes facility C only.

**Table 3: 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 |

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14  Electricity System and Market Rules, 4 June 2025, Rule 2.16B.2, (online).

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

16  The 'relevant' constraint equation is the equation against which the constrained portfolio was originally identified.

| Dispatch interval | Constrained facilities | Energy uplift recipients |
|---|---|---|
| 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.*

These numbers are then used to calculate the constrained uplift payment ratio according to the formula set out in the ESM Rules. Table 4 below shows the calculation of constrained uplift payment ratios. From this example, NC is determined to be 4 for both constrained portfolios, and CP_UP is the count of the orange and green shaded intervals for constrained portfolios 1 and 2 respectively.

**Table 4: 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.*

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

The process for calculating the constrained uplift payment ratio for fixed assessment periods is the same as the calculations for the current rolling test window but applied to a specified subset of the data only.

The calculation for fixed assessment periods is applied where the relevant network constraint equation 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.[17]

Fixed assessment periods that occur in the data are flagged, and separate CP_UP and NC values are taken within that subset of data. Those values are then used to calculate constrained uplift payment ratios specific to the fixed assessment period. If there are multiple fixed assessment periods for the same network constraint, the highest constrained uplift payment ratio is provided.

## 2.5    Step 5 – Material constrained portfolios

Those constrained portfolios with a constrained uplift payment ratio equal to or greater than 10 per cent, in either the rolling test window or fixed assessment period, are determined to be material constrained portfolios.[18]

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[17]    Electricity System and Market Rules (WA), 4 June 2025, Chapter 11 ([online](#)).

[18]    Ibid, Rule 2.16C, ([online](#)).

# 3. Constrained uplift payment ratio results

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

The latest determination's results have been published as an Excel workbook file, available on the ERA's Portfolio Assessment page.