Forecasting Payment Amounts for Constrained Payments

November 2018

Context

AEMO was asked during the September 2018 MAC Meeting to:

1. Provide clarification to the MAC on what information AEMO is permitted to publish regarding constrained on and constrained off payment amounts under the Market Rules; and

2. Investigate and report back to the MAC on what information could be provided to Market Participants early to allow them to predict the size of, and budget for, their constraint payment obligations

Background
Constrained Payment Calculation

- Constrained payments are calculated when Facilities operate outside of the dispatch order in the BMO.

- Constrained payments are either Constrained On or Constrained Off.

- The Constrained Payment calculation is defined in the WEM Rules and summarised as follows:

Rule Reference	Description
Clauses 6.15.1 - 6.15.4	Describes the calculation for **Maximum and Minimum Theoretical Energy Schedule (TES)** for a Trading Interval. • AEMO provides a guideline to calculating TES on its public website: <u>Guideline to Theoretical Energy Schedule</u>
Clauses 6.16A - 6.16B	Describes the calculation of the **Upwards or Downwards Out of Merit Generation quantity** for a Trading Interval. • In general, the TES value is compared with the interval meter schedule to determine the quantity. • Consideration is given to various other information that may negate any constrained payment.
Clauses 6.17.3 - 6.17.5C	Describes how to **determine the Constrained On or Off Payment** using • the **Constrained On or Off Out of Merit generation quantity** which uses the **Upwards or Downwards Out of Merit Generation quantity;** and • the **Constrained On or Off Compensation Price** which is calculated based on bids and the Balancing Price

- Constrained On or Off Payment compensation is paid for by Market Customers based on their proportion of total metered consumption in the Trade Month.

Estimating Constrained Payment

- The Constrained Payment calculation is extremely complex and determining an accurate estimate is not simple.
- However an approximation can be determined by simplifying the formula and making some simple assumptions.
- In its simplified form the Constrained Payment formula is:

$$Constrained\ On\ Payment\ =\ (Meter\ Scheduled\ Quantity\ -\ Max\ Tes) \times (Bid\ Price\ -\ Balancing\ Price)$$

$$Constrained\ Off\ Payment\ =\ (Min\ TES\ -\ Meter\ Scheduled\ Quantity\ ) \times (Balancing\ Price\ -\ Bid\ Price)$$

With assumptions:

- Bid price is the highest price at which the Meter Schedule Quantity matches against the Balancing Submissions for that facility in the interval.
- Any facility on Commissioning Test will not receive any Constrained Payments. *(from AEMO WA Data Website)*
- Non-Scheduled Generation Constrained Payments cannot be determined without additional information from AEMO

Constrained On Payment Estimation

- Constrained On Payments are only applicable to Scheduled Generators.

- One way of estimating Constrained On Payments using information published by AEMO is summarised as follows:

$$Constrained\ On\ Payment = (Meter\ Scheduled\ Quantity - Max\ Tes) \times (Bid\ Price - Balancing\ Price)$$

Component	Approximate Data	Data Source
Meter Schedule Qty	SCADA	Public Data (D+1)
Max TES	BMO Price/Quantity Pairs	Public Data (D+7)
	Resource EOI	Public Data (D+1)
	Ramp Rate	Public Data (D+7)
	BMO Quantity	Public Data (D+7)
	Outages	Public Data (up to D+20)
Bid Price	BMO Bids	Public Data (D+7)
Balancing Price	Balancing Price	Public Data (D+4)

Constrained Off Payment Estimation

- Constrained Off Payments are applicable to Scheduled Generators and Non-Scheduled Generators.

- One way of estimating Constrained Off Payments using information published by AEMO is summarised as follows:

$$Constrained\ Off\ Payment\ =\ (Min\ TES\ -\ Meter\ Scheduled\ Quantity\ )\ \times\ (Balancing\ Price\ -\ Bid\ Price)$$

For Scheduled Generators:

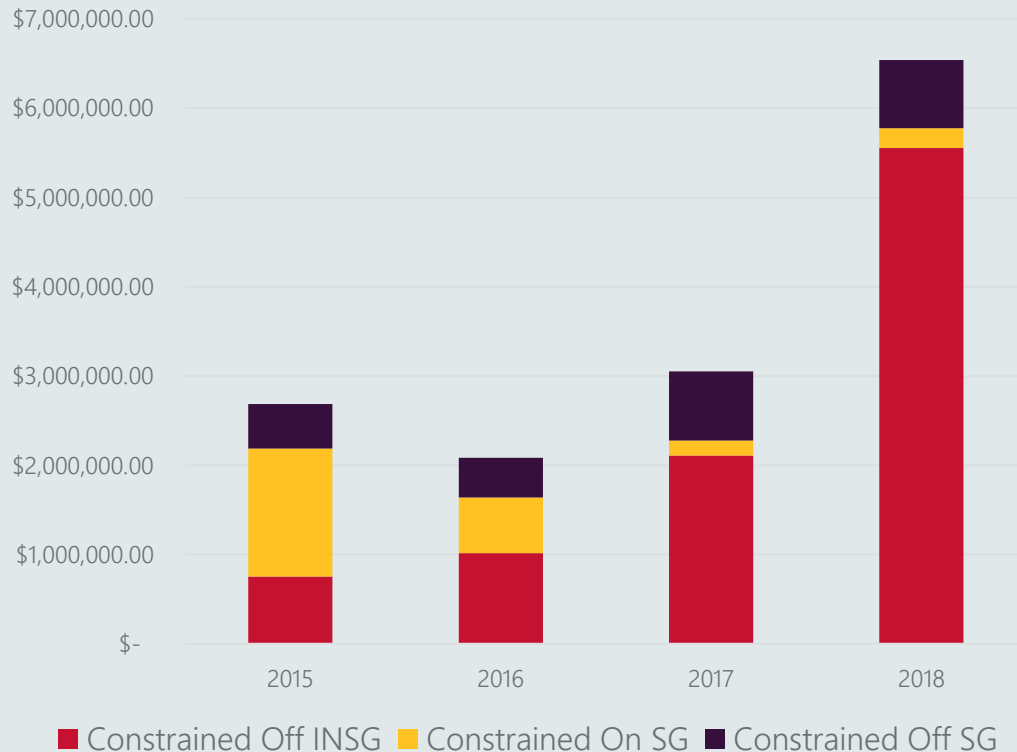| Component	Approximate Data	Data Source
Meter Schedule Qty	SCADA	Public Data (D+1)
Min TES	BMO Price/Quantity Pairs	Public Data (D+7)
	Resource EOI	Public Data (D+1)
	Ramp Rate	Public Data (D+7)
	BMO Quantity	Public Data (D+7)
	Outages	Public Data (up to D+20)
Bid Price	BMO Bids	Public Data (D+7)
Balancing Price	Balancing Price	Public Data (D+4)

For Non- Scheduled Generators:

Component	Approximate Data	Data Source
Meter Schedule Qty	SCADA	Public Data (D+1)
Min TES	SCADA	Public Data (D+7)
	Estimate of Constrained Energy	See below.
Bid Price	BMO Price/Quantity Pairs	Public Data (D+7)
Balancing Price	Balancing Price	Public Data (D+4)

The Estimate of Constrained Energy is determined by AEMO in accordance with the PSOP. Market Participants would struggle to determine (1) intervals where this value applies and (2) the quantity determined.

Market Participants can monitor Dispatch Advisories for an indication of intervals where NSG's may have been constrained off by System Management and could estimate amounts based on their own methodology.

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Estimation?

Constrained Payments by Facility Type

Legend: ■ Constrained Off INSG ■ Constrained On SG ■ Constrained Off SG

(X-axis: 2015, 2016, 2017, 2018; Y-axis: $- to $7,000,000.00)

- Over the past few years the Constrained Payments for Non-Scheduled Generation has significantly outweighed the Constrained Payments for Scheduled Generation.

- Constrained Payment amounts can be estimated with a "reasonable" degree of accuracy for Scheduled Generators.

- However Non-Scheduled Generation facilities require an estimate of the constrained energy; this uses information about the intermittent fuel source, facility layout, dispatch instructions, and outage information.

- Estimation of Constrained Payments in the month would require some level of sophistication in order to obtain data and determine amounts based on complex formula.

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Way forward (short term)…

Recommended: AEMO published TES to the Public Website

- AEMO could publish the Maximum and Minimum Theoretical Energy Schedule (TES) for every facility to its WA Public Data website in line with the Balancing Price/Quantity Pairs (D +7).
- AEMO would need to set the confidentiality status of the TES values to **Public** under clause 10.2.1.
- In doing so, AEMO must have regard to the principles in clause 10.2.3. This includes (b) which states

  "Rule Participants are to have access to information pertaining to current or future expected conditions of the power system that may impact on their ability to trade, deliver or consume energy."

- AEMO must consult with and obtain the consent of the ERA prior to changing the confidentiality status of a type of market related information. (clause 10.2.3A)
  - AEMO should also consult with Market Generators to gauge their acceptance to AEMO publicising this information.

AEMO Impacts

- The proposed changes will require system and documentation changes.
- AEMO would look to prioritise these changes as part of business as usual WEMS releases.
- Changes required:

	Effort
System	S
Public Documents	XS
Internal Processes	XS

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Way forward (long term)…

AEMO determines an estimate of Constrained Payments as part of improved Outstanding Amount

- The complexity of the Constrained Payment calculations are a barrier for many participants to perform their own estimate.
- As part of the Reduction of Prudential Exposure (RoPE) phase 2 AEMO proposes to implement a dynamic and reactive Outstanding Amount Calculation.
- This will include a system to calculate each Market Customer's estimate of Constrained Payments and/or share of Constrained Payment Recovery.
- If Market Participants support, AEMO could publish the estimate of Constrained Payments **publicly** on the WA Public Data website by following a similar approach to TES.

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