

Settlement Enhancements Project – Participant Impacts

Presented to WA Electricity Consultative Forum
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Background

Settlements Work Program

The Settlements Enhancements project is a key step in AEMO's Settlements work program.

RoPE Phase 1 – RC_2017_06

Implementation of **rule change** RC_2017_06 which amends the Individual Reserve Capacity Requirement (IRCR) calculation, Capacity Credit Allocation and associated settlement and prudential processes.



July 2018 – May 2019

RoPE Phase 2 – Outstanding Amount Improvements

Implementation of **market procedure changes** that delivered more accurate OA based on daily estimated settlements and provided the foundation for settlement system replacement.



June 2019 – August 2020

Settlement Enhancements

Extend prudential calculation engine delivered under RoPE Phase 2 to decommission the POMAX Settlement application which is end of life and transition to an in-house support model.



2020 – 2021

Meter Data Warehouse Upgrade

As part of software asset lifecycle management upgrade product to ensure the currency of software.



WEM Reform

Improved settlement and prudential outcomes that will be delivered by ETIU and AEMO through the WEM Reform program.

2021 – 2022

Background

Settlements Enhancements

Problem / Opportunity	<p>AEMO currently uses several, disparate solutions to deliver a settlements and prudential capability in the WEM:</p> <ul style="list-style-type: none">• POMAX settlements, an end of life third party application which performs non-RCM settlement calculations and generates Statements.• RCM settlements, which performs the RCM settlement calculations and generates Statements.• SPARTA which integrates Statements and data from two systems to generate Invoices. SPARTA is fit for purpose.• Prudentials, recently delivered by the Reduction of Prudential Exposure (RoPE) project, which has an in house certified settlements calculation engine in line with the formulation document. <p>The current setup increases support costs for Market Participants and presents operational risks for AEMO.</p>
Key objectives	<p>To consolidate and simplify WA's Settlements capabilities to ensure that AEMO remains compliant and cease the reliance on the end of life POMAX Settlements.</p>
Solution	<p>Decommission the POMAX Settlements and RCM Settlements systems and extend the prudential system to an in-house prudential and settlements calculation engine.</p>
Timeline	<p>AEMO is targeting a go-live in Q2 2021.</p>

Project Benefits



Reduced Operational Risk

- IT support to AEMO's critical settlement functions will be provided by through existing in-house support model.
- AEMO will be able to more efficiently and effectively resolve technical issues with settlements.



More efficient system operability

- Automated jobs in a single system replaces several manual tasks across multiple systems.
- Single certified calculation engine that will replace two calculation systems.



Lower support and maintenance costs

- Moves AEMO from a third party owned and supported settlement system to a fully in-house settlement system.
- Allows AEMO to update settlement system (e.g. rule changes) at lower cost.



Improved clarity for Participants

- Publishes reports to Participants that allow them to reconcile calculations to a more detailed level than ever before.
- Aligns calculation formulation across prudentials and settlements.



Foundation reform work

- Consolidates AEMO's settlement capabilities to reduce risk for implementation of WEM Reform settlements.
- Provides framework for implementation of WEM Reform settlements.



Calculation Formulation

The Prudential system is built on the basis of the independently certified WEM Metering, Settlement and Prudential Calculation formulation document.

This document creates a mathematically accurate representation of the WEM Rules, including:

- Representation of Sets for use within the document
- Mathematical equation representation of the WEM Rules
- Specification for Variables used by the Prudential system
- Trading Margin calculation for Participants on a given day
- Monthly (NSTEM) and Weekly (STEM) settlement
- Input estimation methodology for Prudentials.

This document will be the foundation for the Settlement system.



4.4.1 STEM Payments and Charges

These equations are based on the equations stated in 9.6.1. They have been modified to aggregate to a Trading Day and to separate quantities into supply and demand.

$$STEMSAS_P_D(p, d) = \sum_{i \in I(d)} STEMSAS_P_I(p, i) \tag{102}$$

$$STEMSAD_P_D(p, d) = \sum_{i \in I(d)} STEMSAD_P_I(p, i) \tag{103}$$

$$STEMSAS_P_I(p, i) = \begin{cases} STEMP_G_I(i) \times STEMSQ_P_I(p, i) & SSF_G_D(i) = 1 \\ 0 & SSF_G_D(i) = 0 \end{cases} \tag{104}$$

$$STEMSAD_P_I(p, i) = \begin{cases} STEMP_G_I(i) \times STEMDQ_P_I(p, i) & SSF_G_D(i) = 1 \\ 0 & SSF_G_D(i) = 0 \end{cases} \tag{105}$$

$$STEMSQ_P_I(p, i) = \max(0, STEMQ_P_I(p, i) \times SSF_G_D(i)) \tag{106}$$

$$STEMDQ_P_I(p, i) = -\min(0, STEMQ_P_I(p, i) \times SSF_G_D(i)) \tag{107}$$

Variable	Units	SC	GR	Rule	Description	Ref
STEMSAS_P_D(p, d)	\$	P	D	9.6.1	Settlement amount for energy sold in STEM for Market Participant p in Trading Day d	(102)
STEMSAD_P_D(p, d)	\$	P	D	9.6.1	Settlement amount for energy purchased in STEM for Market Participant p in Trading Day d	(103)
STEMSAS_P_I(p, i)	\$	P	I	9.6.1	Settlement amount for energy sold in STEM for Market Participant p in Trading Interval i	(104)
STEMSAD_P_I(p, i)	\$	P	I	9.6.1	Settlement amount for energy purchased in STEM for Market Participant p in Trading Interval i	(105)
STEMSQ_P_I(p, i)	MWh	P	I		Energy sold in STEM by Market Participant p in Trading Interval i	(106)
STEMDQ_P_I(p, i)	MWh	P	I		Energy bought in STEM by Market Participant p in Trading Interval i	(107)
STEMQ_P_I(p, i)	MWh	P	I	6.9.13(b), 6.9.13(c), 6.10.2	Energy purchased (sold) in STEM by Market Participant p in Trading Interval i	I
SSF_G_D(d)	Flag	G	D		0 if STEM was suspended in Trading Day d, and 1 otherwise	I
STEMP_G_I(i)	\$/MWh	G	I	6.9.7, 6.10.2	STEM Clearing Price declared for Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

Participant Impacts

Changes to Statements and Invoices

Statement Summary and Statement Detail (PIR)

- Current Statements and PIRs will be retired. New Statement Summary and Detail will be provided.
- New Statement Summary and Detail will align with current Prudential artefacts:
 - Variables will be aligned with the **WEM Metering, Settlement and Prudential Calculation Formulation** document.
 - File (i.e. CSV and JSON) and API formats will align with those produced by the Prudential system.
- Variables will be different to current PIRs. The current PCS will be retired.

Invoices

- Invoices will remain in the current format (i.e. PDF and JSON).
- Line items on Invoices will be different to the current Settlement artefacts due to alignment with **WEM Metering, Settlement and Prudential Calculation Formulation** document.
- The current Prudential Statement Summary CSV file in WEMS MPI provides the line items to be used for Settlements, with some minor additions.

Adjustment Invoices

- Adjustments will be done in the new system from the go-live date.
- Adjustment Invoices display the difference from the previous run for each line item.
 - The first run in the new system will not be able to compare the old line items to the new line items. It will be displayed as per the following example.

Participant Impacts

Adjustment Invoice Example

Run performed in old settlement system

NSTEM Initial

Description	
Reconciliation Settlement - Supply	-31,500
Reconciliation Settlement - Demand	25,100
Ancillary Service - Demand	18,000
Balancing Market - Supply	0
Balancing Market - Demand	148,000
System Operation Fee *	1,900
Market Operator Fee *	1,350
Market Regulator Fee *	550
Tranche 2 DSM Dispatch Payments	0
Reserve Capacity LFR Market Customer Rebate	-1,850
Reserve Capacity Rebate for a Market Participant	0
Reserve Capacity Refund Settlement Amount for Demand	0
Reserve Capacity Settlement Amount for Demand	125,000
Reserve Capacity Settlement Amount for Supply	0
Goods and Service Tax - Supplies Made by AEMO *	31,610
Goods and Service Tax - Supplies Made to AEMO *	-3,335
Goods and Service Tax Free - Supplies Made by AEMO *	0
Interest Rate *	0
Total Amount	314,825
<i>Items marked with * are GST free</i>	
Prepayment applied to this Payment Summary	0
Payable Amount	314,825

Run performed in old settlement system

NSTEM Adjustment 1

Description	
Reconciliation Settlement - Supply	215
Reconciliation Settlement - Demand	190
Ancillary Service - Demand	0
Balancing Market - Supply	0
Balancing Market - Demand	0
System Operation Fee *	0
Market Operator Fee *	0
Market Regulator Fee *	0
Tranche 2 DSM Dispatch Payments	0
Reserve Capacity LFR Market Customer Rebate	0
Reserve Capacity Rebate for a Market Participant	0
Reserve Capacity Refund Settlement Amount for Demand	0
Reserve Capacity Settlement Amount for Demand	0
Reserve Capacity Settlement Amount for Supply	0
Goods and Service Tax - Supplies Made by AEMO *	19
Goods and Service Tax - Supplies Made to AEMO *	22
Goods and Service Tax Free - Supplies Made by AEMO *	0
Interest Rate *	1
Total Amount	446
<i>Items marked with * are GST free</i>	
Prepayment applied to this Payment Summary	0
Payable Amount	446

Run performed in new settlement system

NSTEM Adjustment 2

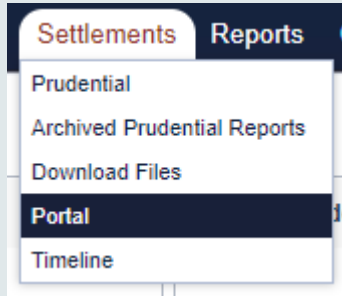
Description	
Reconciliation Settlement - Supply	31,285
Reconciliation Settlement - Demand	-25,290
Ancillary Service - Demand	-18,000
Balancing Market - Supply	0
Balancing Market - Demand	-148,000
System Operation Fee *	-1,900
Market Operator Fee *	-1,350
Market Regulator Fee *	-550
Tranche 2 DSM Dispatch Payments	0
Reserve Capacity LFR Market Customer Rebate	1,850
Reserve Capacity Rebate for a Market Participant	0
Reserve Capacity Refund Settlement Amount for Demand	0
Reserve Capacity Settlement Amount for Demand	-125,000
Reserve Capacity Settlement Amount for Supply	0
Goods and Service Tax - Supplies Made by AEMO *	-31,629
Goods and Service Tax - Supplies Made to AEMO *	3,314
Goods and Service Tax Free - Supplies Made by AEMO *	0
Interest Rate *	-1
Balancing Market payments	0
Balancing Market charges	148,000
Constrained On Compensation payments	0
Constrained Off Compensation payments	0
Tranche 3 DSM Dispatch payments	0
Shortfall in Load Rejection and System Restart charges	0
Constrained Compensation and Tranche 3 DSM Dispatch charges	-5,995
Outage compensation payments	0
Outage compensation charges	0
Synergy's uncontracted Spinning Reserve Services payments	0
Synergy's uncontracted Load Rejection and System Restart Services payments	0
Contracted Spinning Reserve Services payments	0
Contracted Load Rejection Services payments	0
Contracted System Restart Services payments	0
Load Following payments	0
Load Following charges	10,000
Capacity associated with Load Following charges	0
Load Rejection Service and System Restart Service charges	5,950
Dispatch Support Services charges	150
Non-allocated Capacity Credits (excluding DSM and SPA) payments	0
DSM Capacity Credits payments	0
SPA Capacity Credits payments	0
Capacity Credit Allocation over-allocation payments	0
Supplementary Capacity Contracts payments	0
Tranche 2 DSM Dispatch payments	0
Targeted Reserve Capacity Cost charges	112,500
Shared Reserve Capacity Cost charges	12,500
Capacity Cost Refund charges	0
Intermittent Load Refunds charges	0
Capacity associated with Load Following payments	0
Market Fee charges *	1,900
System Management Fee charges *	1,350
Regulator Fee charges *	550
Service Fee paid to AEMO *	0
Service Fee paid to System Management *	0
Service Fee paid to Regulator *	0
Goods and Service Tax on charges *	28,311
Goods and Service Tax on payments *	0
Interest *	-1.1
Total Amount	-57
<i>Items marked with * are GST free</i>	
Prepayment applied to this Payment Summary	0
Payable Amount	-57

- This example is also provided separately as a PDF for readability.
- Refer to Section 4.12.3 of the [WEM Metering, Settlement and Prudential Calculation](#) document for a list of Statement variables.
- Invoice line items will be aggregates of the trading interval/trading day Statement variables.
- Values are for illustration purposes only. Values do not represent actual data or actual settlement results.

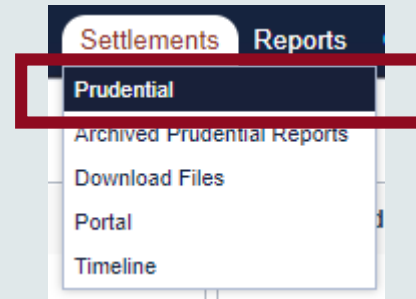
Participant Impacts New Settlement Portal

The current Settlements Portal in WEMS MPI will be archived.

The Prudentials area of the WEMS MPI will be renamed to include Settlements.

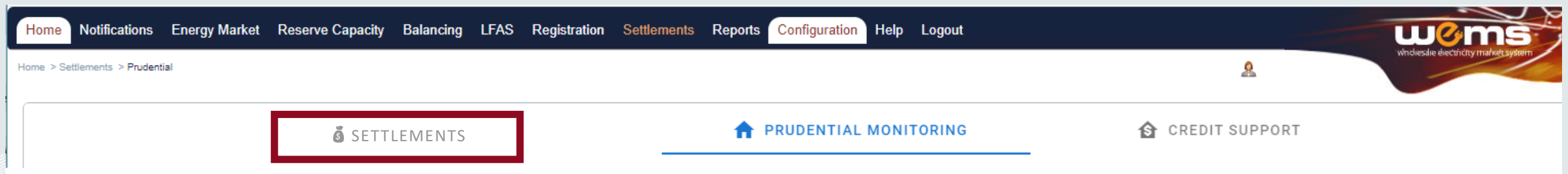


Menu item will be archived



Menu item will expanded to "Settlements and Prudentials"

A new menu will be added to the current Prudentials screen to replace the current Settlement Portal. This is where Participants will view and download Statements, Statement Details and Invoices (for STEM and Non-STEM).




New menu item


Participant Impacts APIs

- AEMO will provide APIs that replace current webservice.
- API calls and results will be the same format as current Prudential API calls.
- Some additional information and minor changes will be included (e.g. RunId, Initial/Adjustment).

Sample of Current Prudential API

 **swagger**

<https://wems.aemo.com.au/prudential/api/docs/v1/swagger.json>

AEMO Prudential API v1 

Example of Potential Settlements API Calls

- NSTEM June 2020 Initial
`/api/v1/settlements/NSTEM/summary/2020-06-01/Initial?participantId=IMOWA`
- STEM Trading Week 26/20
`/api/v1/settlements/STEM/summary/2020-06-25/Initial?participantId=IMOWA`

Participant Impacts APIs

- AEMO will provide APIs that replace current webservice.
- API calls and results will be the same format as current Prudential API calls.
- Some additional information and minor changes will be included (e.g. RunId, Initial/Adjustment).

Example of Potential Settlements API Results in JSON

```
"data": {
  "runId": 55,
  "marketType": "NSTEM",
  "designation": "INITIAL",
  "period": "Jun 2020",
  "periodFrom": "2020-06-01T00:00:00",
  "periodTo": "2020-06-30T00:00:00",
  "participantId": "IMOWA",
  "tradingDays": [
    {
      "tradingDay": "2020-06-01T00:00:00",
      "variables": [
        {
          "variable": "COCP_P_D",
          "pOrC": "Payment",
          "gstApplicable": "Y",
          "value": 0.00000000
        },
        {
          "variable": "GCCSA_P_D",
          "pOrC": "Payment",
          "gstApplicable": "Y",
          "value": 10055.00110025
        }
      ]
    }
  ]
},
```

Participant Testing

- The new Settlement artefacts will align with the [WEM Metering Settlement and Prudentials Calculation](#) formulation document.
- AEMO encourages Participants to:
 - Familiarise themselves with the WEM Metering Settlement and Prudentials Calculation formulation document
 - Consider any necessary system changes
 - Consider testing and integration with the current Prudential artefacts and APIs in advance of Market Trial
 - Advise AEMO of any concerns as early as possible.
- AEMO will engage with Participants on this project through the WEM Reform Implementation Groups (WRIG / WRIG-IT) at appropriate points in the project cycle.
- The project is targeting a 1 July 2021 go-live date.

Questions and Feedback

Market Operations

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