Settlements guide to ancillary services and frequency performance payments

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Approved for distribution and use by:

Approved by:	David Tagg
Title:	Acting Group Manager Market Management
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Version	Effective date	Summary of changes
7.1	01 July 2025	Update the description and examples of the recovery of the residual regulation FCAS, to reflect the post go live FPP release defect correction of the calculation of TE and ATE. Minor updates to improve clarity.

Note: There is a full version history at the end of this document.

1. Introduction

AEMO procures ancillary services to fulfil its obligations under the Rules. Ancillary services are used to assist in maintaining or restoring a safe and secure power system.

Under the primary frequency response incentive arrangements, AEMO is required to make frequency performance payments (FPP). These payments can be positive or negative to reflect the participants impact on the frequency deviations.

This document provides a high-level understanding of the methodology used in the settlement process for payment and recovery of ancillary services and the allocation of FPP. This introduction provides a brief overview, while the subsequent chapters detail the methodology used in the settlement calculations. Worked examples and a list of useful reference documents are provided in the appendices.

1.1. Ancillary services

Ancillary service costs depend on the service prices offered by the Registered Participants who provide them, and the quantity required at any given time. They can vary substantially from period to period. AEMO recovers ancillary service costs from Cost Recovery Market Participants (CRMPs) which includes participants registered as Market Customer, Market Generator and Integrated Resource Provider. The costs of different types of service are recovered in different ways, in accordance with criteria set out in the Rules.

Ancillary services in the National Electricity Market (NEM) can be broadly grouped under one of the following three categories:

- Frequency control ancillary services (FCAS)
- Network support and control ancillary services (NSCAS)
- System restart ancillary services (SRAS)

There are ten types of FCAS, which are all market ancillary services, while NSCAS and SRAS are non-market ancillary services. For more information please see the documents available on AEMO's Systems Operations Ancillary Services website.

AEMO procures these services from Registered Participants by:

- Dispatching them via the NEM dispatch engine (NEMDE) for the market ancillary services
- Ancillary Service Contractual Agreements for the non-market ancillary services

1.2. Frequency performance payments

The FPP incentive arrangements are intended to provide economic signals to participants about the value of good frequency performance and the cost of poor performance. FPP are not an ancillary service, but a separate function inter-related with the regulation FCAS requirements.

To allocate the payment amounts to the eligible units with appropriate metering, i.e. units able to produce the required SCADA data, AEMO calculates a contribution factor (CF) every interval, against each of the binding regulation FCAS constraints. AEMO also calculates a residual contribution factor (RCF) to allocate the remaining cost or benefit of the frequency deviations across all other load and generation without the appropriate metering for individual CF calculations.

Unlike most settlement functions, FPP does not require separate payment and recovery calculations. The CF and RCF have a value between 1 and -1 where positive factors result in a payment from AEMO and negative factors in a payment to AEMO. The total of the payment amounts for each constraint, in each interval, will sum to zero. For more information on the FPP calculations please see the documents available on AEMO's Frequency contribution factors website.

As well as being used in calculating the FPP amounts, the contribution factors are also used in calculating the recovery of the regulation FCAS payments, replacing the former causer pays methodology. Default contribution factors, which are always zero or negative, are also calculated over a historic reference period in the FPP system for use in the regulation FCAS recovery calculations.

Should the FPP system not be able to perform calculations in an interval, or settlements not be able to receive the contribution factors, the default contribution factors will be used for the full regulation FCAS recovery. The settlements data will be stored in a different set of default settlement tables if this should occur.

2. Market ancillary services

FCAS are used by AEMO to maintain or rebalance the frequency on the power system, at any point in time, close to fifty cycles per second (50 Hz) as required by the NEM frequency operating standards set by the AEMC Reliability Panel. FCAS is divided into Contingency FCAS and Regulation FCAS.

2.1. Contingency FCAS

Contingency FCAS correct the supply/demand balance in response to major frequency disturbances causing frequency to move outside the normal operating frequency band, which can occur after contingency events such as the loss of a generating unit or a major load.

There are eight types of Contingency FCAS:

i)	**Very Fast Raise (1 second Raise)**	Service provided within 1 second of a contingency event
ii)	**Very Fast Lower (1 second Lower)**	
iii)	**Fast Raise (6 second Raise)**	Service provided within 6 seconds of a contingency event
iv)	**Fast Lower (6 second Lower)**	
v)	**Slow Raise (60 second Raise)**	Service provided within 60 seconds of a contingency event
vi)	**Slow Lower (60 second Lower)**	
vii)	**Delayed Raise (5 minute Raise)**	Service provided within 5 minutes of a contingency event
viii)	**Delayed Lower (5 minute Lower)**	

2.2. Regulation FCAS

Regulation FCAS provide frequency correction in response to minor deviations in the demand/supply balance. There are two types of Regulation FCAS:

i)	**Regulation Raise**	Service provided to add MW to the system to raise the frequency
ii)	**Regulation Lower**	Service provided to take MW out of the system to lower the frequency

2.3. FCAS payments

AEMO's dispatch engine (NEMDE) determines the FCAS constraints for each type of FCAS, the quantity of each FCAS to be enabled from FCAS providers based on their offers, and a market clearing price for each of the ten FCAS markets in each region.

The relevant FCAS providers will receive settlement payments for each Trading Interval (TI) calculated using the relevant ancillary service price and the amount of each ancillary service dispatched for each unit.

$$TA = the\ aggregate\ of\ \frac{EA \times ASP}{12}$$

where:

- TA = the trading amount of the FCAS payment to be determined
- EA = the amount (in MW) of the relevant market ancillary service which the ancillary service unit has been enabled to provide
- ASP = the ancillary service price for the market ancillary service for the trading interval for the region in which the ancillary service unit has been enabled

Note that the ancillary service price used in this calculation is the unrounded price stored in tables such as DISPATCHPRICE, rather than the price rounded to 2 decimal places available in tables such as TRADINGPRICE.

2.4. FCAS recovery

FCAS payments are recovered from the relevant CRMPs with the recovery method for each type of FCAS detailed in the following subsections.

FCAS payments for services enabled to meet a local requirement are recovered only from specified CRMPs in the region or regions in which the FCAS constraint was binding. FCAS payments to meet a global requirement are recovered from CRMPs across the entire NEM.

For more information on FCAS requirements and constraints please see the documents available on AEMO's Congestion information resource website.

2.4.1. Lower contingency FCAS recovery

Lower contingency FCAS costs are recovered from CRMPs with ACE values only, in the relevant requirement region(s) for each binding constraint.

$$TA = \ the\ aggregate\ of\ [\ TLCR \times \left(\frac{TCE}{RATCE}\right)\ ] \times -1$$

where:

- TA = The trading amount payable by the CRMP
- TLCR = The total lower contingency recovery amount, being the cost of meeting each global and local lower contingency requirement
- TCE = The sum of the ACE, for all connection points of the CRMP in the relevant region(s) of each requirement
- RATCE = The sum of the ACE, for all connection points in the region(s) of each requirement, of all the CRMPs

2.4.2. Raise contingency FCAS recovery

Raise contingency FCAS costs are recovered from CRMPs with ASOE values only, in the relevant requirement region(s) for each binding constraint.

$$TA = the\ aggregate\ of\ [\ TRCR\ \times \left(\frac{TSOE}{RATSOE}\right)\ ]\ \times\ -1$$

where:

- TA = The trading amount payable by the CRMP
- TRCR = The total raise contingency recovery amount, being the cost of meeting each global and local raise contingency requirement
- TSOE = The sum of the ASOE, for all connection points of the CRMP in the relevant region(s) of each requirement
- RATSOE = The sum of the ASOE, for all connection points in the region(s) of each requirement, of all the CRMPs

2.4.3. Regulation FCAS recovery

Regulation FCAS costs are recovered from CRMPs under separate calculations for the used and unused portions of the binding regulation FCAS constraints. The calculations utilise the negative contribution factors (NCFs) calculated under the FPP methodology for each interval, along with the default contribution factors (DCFs), which are calculated over a historic reference period.

The residual amount of regulation FCAS costs, which cannot be allocated to the connection points with the appropriate metering, is then shared across all other connection points based on ACE and ASOE. The residual calculations use the negative residual contribution factor (NRCF), and default residual contribution factor (DRCF) calculated by the FPP system.

Used regulation FCAS recovery

For CRMPs with connection points with individual NCFs, the Regulation FCAS is recovered from each unit with a negative contribution factor.

$$TA = the\ aggregate\ of\ (TSFCAS\ \times\ U\ \times\ NCF)$$

where:

- TA = The trading amount payable by the CRMP
- TSFCAS = The regulation service adjusted cost to be recovered
- U = The usage factor, being the portion of the dispatched service that was used in the interval for that constraint
- NCF = The negative contribution factor as calculated for the constraint and unit

The residual amount of the used regulation FCAS is then recovered from all the CRMPs with connection points without a CF.

$$TA = the\ aggregate\ of\ \left(TSFCAS\ \times\ U\ \times\ NRCF\ \times \frac{TE}{ATE}\right)$$

where additionally:

- NRCF = The negative residual contribution factor as calculated for the constraint
- TE = The sum of the absolute value of ASOE plus the absolute value of ACE (i.e. |ASOE| + |ACE|) for all connection points of the CRMP without a CF
- ATE = The sum of the absolute value of ASOE plus the absolute value of ACE (i.e. |ASOE| + |ACE|), for all connection points without a CF, of all CRMPs

Unused Regulation FCAS recovery:

For CRMPs with connection points with individual DCFs, the regulation FCAS is recovered from each unit with a negative default contribution factor.

$$TA = Aggregate\ of\ (TSFCAS\ \times (1 - U)\ \times\ DCF)$$

where:

- TA = The trading amount payable by the CRMP
- TSFCAS = The regulation service adjusted cost to be recovered
- U = The usage factor, being the portion of the dispatched service that was used in the interval for that constraint, so (1 – U) in the formula being the unused portion
- DCF = The default contribution factor as calculated for the constraint and unit

The residual amount of the unused regulation FCAS is then recovered from all the CRMPs with connection points without a CF.

$$TA = the\ aggregate\ of\ \left(TSFCAS\ \times (1 - U)\ \times\ DRCF\ \times \frac{TE}{ATE}\right)$$

where additionally:

- DRCF = The default residual contribution factor as calculated for the constraint
- TE = The sum of the absolute value of ASOE plus the absolute value of ACE (i.e. |ASOE| + |ACE|) for all connection points of the CRMP without a CF
- ATE = The sum of the absolute value of ASOE plus the absolute value of ACE (i.e. |ASOE| + |ACE|), for all connection points without a CF, of all CRMPs

2.5. Co-optimisation

AEMO may use a process of co-optimisation between Delayed Contingency (5 minute) FCAS and Regulation FCAS for the purposes of efficient dispatch of these services. Effectively, the regulation service can be used to deliver the delayed 5 minute contingency response, while the reverse is not possible.

When co-optimisation occurs AEMO implements a mechanism to allocate the constraint costs arising from the co-optimised dispatch of both services. This recovery cost split results in an adjusted cost being calculated where the sum of the adjusted costs of the regulation and 5 minute services will equal the base cost of the constraint.

When such cost splitting occurs, a single constraint base cost can be partially recovered under the relevant contingency method, while the remaining cost is recovered under the regulation method.

For more information on co-optimisation please see the *Guide to Analysing Constraint Outcomes for FCAS Cost Recovery* document on AEMO's Policy and process documentation website.

3. Non-market ancillary services

3.1. NSCAS and SRAS

NSCAS acquired by AEMO are typically used to control voltage at different points along the network to within prescribed standards and to keep power flow on the networks and interconnectors within operational limits. Generally, these services are provided by voluntary load shedding or the supply or absorption of reactive power.

SRAS enable generation to be restarted to energise the transmission system following a major supply disruption.

For more information on these NMAS services, please see the *Non-market Ancillary Services* procedure on AEMO's Power system operating procedures website. AEMO recovers NMAS costs on a regional basis, from the benefiting region(s), by applying Regional Benefit Factors (RBFs). For more information on RBFs, please see the document available on AEMO's Regional benefit ancillary services procedure website.

3.2. NSCAS payments

AEMO procures NSCAS through contracts with registered participants on agreed terms and conditions. Some payment parameters in these contracts may relate to periods or events longer than one trading interval. Where this is the case, for cost recovery purposes they are allocated across all relevant trading intervals.

Types of payments made by AEMO to NSCAS providers may include:

(a) Availability payments for each trading interval that the service is available

(b) Enabling payments for trading intervals when the service is specifically enabled

(c) Compensation or usage payments made for the amount of the NSCAS actually provided

(d) Testing payments for each successfully conducted test

3.3. NSCAS cost recovery

AEMO aggregates the relevant payments (excluding testing payments) for each trading interval and each type of NSCAS and recovers them fully from CRMPs with ACE values only from the benefiting region(s), by applying regional benefit factors.

$$TA = \ the\ aggregate\ of \left[TNSCAS \times RBF \times \left(\frac{TCE}{RATCE} \right) \right] \times -1$$

where:

- TA = The trading amount payable by the CRMP

- TNSCAS = The sum of the amounts payable for the provision of NSCAS
- RBF = The regional benefit factor (a number between 0 and 1)
- TCE = The sum of the ACE, for all connection points of the CRMP in the region
- RATCE = The sum of the ACE, for all connection points in the region, of all the CRMPs

3.4. SRAS payments

AEMO procures SRAS through contracts with registered participants on agreed terms and conditions. Some payment parameters in the existing contracts may relate to periods or events longer than one trading interval. Where this is the case, for cost recovery purposes they are allocated across all the relevant trading intervals.

Types of payments under SRAS contracts may include:

(a) Availability payments for each trading interval that the service is available

(b) Usage payments for when the service is successfully delivered in response to instructions from AEMO

(c) Testing payments for each successfully conducted test

3.5. SRAS cost recovery

AEMO aggregates the relevant payments for a SRAS event (excluding testing payments) for each trading interval and recovers the relevant costs from CRMPs on a 50/50 split basis between ACE and ASOE values from the benefiting region(s), by applying regional benefit factors.

$$TA = the\ aggregate\ of\ [\ SRP \times 0.5 \times RBF \times \left(\frac{TCE}{RATCE}\right) + SRP \times 0.5 \times RBF \times \left(\frac{TSOE}{RATSOE}\right)\ ] \times -1$$

where:

- TA = The trading amount payable by the CRMP
- SRP = The sum of the amounts payable for the provision of SRAS
- TCE = The sum of the ACE, for all connection points of the CRMP in the region
- RATCE = The sum of the ACE, for all connection points in the region, of all the CRMPs
- TSOE = The sum of the ASOE, for all connection points of the CRMP in the region
- RATSOE = The sum of the ASOE, for all connection points in the region, of all the CRMPs

3.6. Testing payment recovery

Testing payments are paid and recovered as a lump sum in the billing period in which the successful test is confirmed by AEMO. The same equations are applied to calculate testing payment recovery, as discussed above for the respective NMAS non-testing payment recovery.

However, whereas those equations refer to CRMPs and regional energy for a single trading interval, the testing payment recovery calculations will use the aggregate of the relevant energy over the entire testing recovery period.

As the testing recovery period can be up to 6 months back from the day before the test confirmation date, the NMAS test payment recovery amounts are 'locked' when the final statements including the test payment are posted. This means that when the energy volumes of the weeks covered in the recovery period are updated in later produced revision statements, the energy used in the test payment recovery calculations is not updated.

When sourcing CRMP ACE and ASOE energy data for use in a reconciliation calculation, the version of data used in the NMAS test payment recovery calculation represents the most recently posted data for each week, at the time the final statements are produced. For each settlement date in the recovery period, the settlement version used in the posted bill run of that billing week, must be selected.

4. Frequency performance payments

For participants with connection points with individual CFs, the FPP amount is calculated for each unit with a CF for every binding regulation constraint in the interval.

$$TA = the\ aggregate\ of\ \left(CF \times \frac{P_{regulation}}{12} \times RCR\right)$$

where:

- TA = The trading amount paid to, or payable by, the participant
- CF = The contribution factor (a number between -1 and 1) as calculated for the unit and constraint
- $P_{regulation}$ = The adjusted marginal value or price of the relevant constraint
- RCR = The requirement for corrective response

Residual FPP amounts are then calculated for all other connection points without a CF.

$$TA = the\ aggregate\ of\ \left(RCF \times \frac{P_{regulation}}{12} \times RCR \times \frac{TE}{ATE}\right)$$

where additionally:

- RCF = The residual contribution factor as calculated for the constraint
- TE = The sum of the absolute value of ASOE plus the absolute value of ACE (i.e. |ASOE| + |ACE|) for all connection points of the participant without a CF
- ATE = The sum of the absolute value of ASOE plus the absolute value of ACE (i.e. |ASOE| + |ACE|), for all connection points without a CF, of all participants

For more information on the calculation of these formula variables please see the *Guide to Analysing Constraint Outcomes for FCAS Cost Recovery* document on AEMO's Policy and process documentation website and also the documents available on AEMO's Frequency contribution factors website.

5. Glossary of terms

TERM	DESCRIPTION
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
Contingency FCAS	FCAS provided when power system frequency is outside the normal operating frequency band, which can occur on the occurrence of a contingency event. Types of Contingency FCAS are Very Fast, Fast, Slow and Delayed.
FCAS	Frequency control ancillary services
FPP	Frequency Performance Payments
Global Requirement	FCAS requirement for all regions in the NEM
Local Requirement	FCAS requirement for a single region or group of regions within the NEM.
NEM	National Electricity Market
NEMDE	National Electricity Market Dispatch Engine
NER	National Electricity Rules
NSCAS	Network support and control ancillary services
Regulation FCAS	FCAS provided in response to a central control system to maintain power system frequency, usually within the normal operating frequency band.
Requirement	A requirement for a particular type of FCAS established by a binding constraint represented in NEMDE, which may be a Global Requirement or a Local Requirement.
Requirement regions	The regions for which a given FCAS requirement Constraint Equation is binding are known as the Requirement Regions for that constraint.
Rules	National Electricity Rules
SCADA	Supervisory Control and Data Acquisition
SRAS	System restart ancillary services
Trading Interval	A period for which AEMO settles trading amounts in the NEM
ACE	Adjusted consumed energy, the metered consumption adjusted for DLF and UFE
ASOE	Adjusted sent out energy, the metered generation adjusted for DLF
CRMP	Cost Recovery Market Participant

Appendix A. Worked examples

Note that the first examples below continue with data developed in the example in Appendix A1.2 of the *Guide to Analysing Constraint Outcomes for FCAS Cost Recovery* document on AEMO's Policy and process documentation website.

A.1 Contingency FCAS recovery calculations

The single binding Raise 5 Minute Contingency FCAS constraint (F_I_R5) would appear in **DISPATCH_FCAS_REQ_CONSTRAINT** with the **Adjusted_Cost** values shown as below, with 5 equivalent records for each state, due to it being a global requirement.

Table 1 Example contingency raise 5 minute FCAS costs by region

Run_Datetime	ConstraintID	RegionId	Bidtype	P_Regulation	Base_Cost	Adjusted_Cost
08/06/2025 00:05	F_I_R5	NSW1	RAISE5MIN	0.26	11.16	11.16
08/06/2025 00:05	F_I_R5	QLD1	RAISE5MIN	0.26	11.16	11.16
08/06/2025 00:05	F_I_R5	SA1	RAISE5MIN	0.26	11.16	11.16
08/06/2025 00:05	F_I_R5	TAS1	RAISE5MIN	0.26	11.16	11.16
08/06/2025 00:05	F_I_R5	VIC1	RAISE5MIN	0.26	11.16	11.16

The **ASOE_MWH** energy for the CRMP required for this raise service recovery can be obtained by summing the regional totals from **SET_ENERGY_TRANSACTIONS**. The public data for the **REGION_ASOE_MWH** totals across all CRMPs is available in **SETFCASREGIONRECOVERY**. With the example ASOE data as below, this CRMP is responsible for 5% of the recovery cost.

Table 2 Example CRMP ASOE and regional total ASOE

SettlementDate	PeriodId	RegionId	ASOE_MWH	REGION_ASOE_MWH
08/06/2025	1	NSW1	40	640
08/06/2025	1	QLD1	20	530
08/06/2025	1	SA1	12	80
08/06/2025	1	TAS1	0	130
08/06/2025	1	VIC1	22	500
			94	**1,880**

The raise 5 minute recovery amount payable for this CRMP in this interval, having only a single binding constraint, would therefore be $0.56 as per the below calculation.

$$TA = TRCR \times \left(\frac{TSOE}{RATSOE}\right) \times -1 = 11.16 \times \left(\frac{94}{1{,}880}\right) \times -1 = -0.5580$$

A.2 Regulation FCAS recovery calculations

For this Raise Regulation FCAS example we have two binding regional constraints, one only applicable to Tas (F_T+RREG) and one applicable to the mainland (F_TASCAP_RREG) which would appear in **DISPATCH_FCAS_REQ_CONSTRAINT** as below.

Table 3 Example regulation raise FCAS costs by region

Run_Datetime	ConstraintID	RegionId	Bidtype	P_Regulation	Base_Cost	Adjusted_Cost
08/06/2025 00:05	F_T+RREG	TAS1	RAISEREG	83.17	346.55	346.55
08/06/2025 00:05	F_TASCAP_RREG	NSW1	RAISEREG	98.55	1,396.13	1,396.13
08/06/2025 00:05	F_TASCAP_RREG	QLD1	RAISEREG	98.55	1,396.13	1,396.13
08/06/2025 00:05	F_TASCAP_RREG	SA1	RAISEREG	98.55	1,396.13	1,396.13
08/06/2025 00:05	F_TASCAP_RREG	VIC1	RAISEREG	98.55	1,396.13	1,396.13

The example CRMP in this case is not active in Tas, so will only pay recovery relating to the single Mainland constraint. As below, for this example the CRMP has CFs being calculated for three units, with this data available from **FPP_CONTRIBUTION_FACTOR**.

Table 4 Example contribution factor data for eligible units with appropriate metering

Run_Datetime	ConstraintID	UnitId	Bidtype	CF	NCF	DCF
08/06/2025 00:05	F_TASCAP_RREG	DUID1	RAISEREG	0.08	0	0
08/06/2025 00:05	F_TASCAP_RREG	DUID2	RAISEREG	-0.02	-0.02	-0.04
08/06/2025 00:05	F_TASCAP_RREG	DUID3	RAISEREG	0.03	0	-0.01

The other variables required for the recovery calculations as below can be obtained from **SET_FCAS_REGULATION_TRK**, noting the factors are also available in the FPP schema tables.

Table 5 Example constraint level data variables, including the residual CFs

Interval_Datetime	ConstraintID	RCR	Usage	RCF	NRCF	DRCF	Residual Total_MWh
08/06/2025 00:05	F_TASCAP_RREG	90	0.40	-0.3	-0.3	-0.25	1,600

The used raise regulation recovery calculation only needs to consider DUID2, as that is the only unit with a NCF, resulting in a recovery amount of $11.17 to be paid as calculated below.

$$TA = TSFCAS \times U \times NCF = 1{,}396.13 \times 0.4 \times -0.02 = -11.1690$$

The unused raise regulation recovery calculation needs to consider both DUID2 and DUID3, as both units have a non-zero DCF, as below resulting in a recovery amount of $41.88 to be paid.

$$TA = Aggregate\ of\ (TSFCAS \times (1 - U) \times DCF)$$
$$= [1{,}396.13 \times (1 - 0.4) \times -0.04] + [1{,}396.13 \times (1 - 0.4) \times -0.01] = -41.8839$$

The residual calculations then require the CRMPs ACE and ASOE energy of all connection points excluding the three units for which a CF has been calculated. This information must be sourced from **SET_ENERGY_TRANSACTIONS** by summing the remaining connection points. With the example data as below, this CRMP is responsible for 1.25% of the residual recovery costs.

Table 6 Example CRMP regional energy for connection points without appropriate metering

SettlementDate	PeriodId	RegionId	ACE_MWH	ASOE_MWH
08/06/2025	1	NSW1	-5	3
08/06/2025	1	QLD1	-5	0
08/06/2025	1	SA1	-2	2
08/06/2025	1	TAS1	0	0
08/06/2025	1	VIC1	-3	0
			-15	**5**

The used raise regulation residual recovery amount payable for this CRMP in this interval, having the single binding mainland constraint, would therefore be $2.09 as below.

$$TA = TSFCAS \times U \times NRCF \times \frac{TE}{ATE} = 1{,}396.13 \times 0.4 \times -0.3 \times \frac{5 + |-15|}{1{,}600} = -2.0942$$

The used raise regulation residual recovery amount payable would similarly be $2.62

$$TA = TSFCAS \times (1 - U) \times DRCF \times \frac{TE}{ATE} = 1{,}396.13 \times (1 - 0.4) \times -0.25 \times \frac{5 + |-15|}{1{,}600}$$
$$= -2.6177$$

Note that the ATE value referred to in these formulas is stored in the **ResidualTotal_MWh** field of the **SET_FCAS_REGULATION_TRK** table, as available for this example in Table 5.

A.3 Frequency performance payments calculations

Continuing with the same example data as used in the previous section, this participant for FPP would be paid $66.52 for their three units with CFs.

$$TA = the\ aggregate\ of\ \left(CF \times \frac{P_{regulation}}{12} \times RCR\right)$$
$$= \left[0.08 \times \frac{98.55}{12} \times 90\right] + \left[-0.02 \times \frac{98.55}{12} \times 90\right] + \left[0.03 \times \frac{98.55}{12} \times 90\right] = 66.5213$$

Note that the $P_{regulation}$ value is stored in the **DISPATCH_FCAS_REQ_CONSTRAINT** table as available for this example in Table 3, the CFs from **FPP_CONTRIBUTION_FACTOR** provided in Table 4 and the RCR from **SET_FCAS_REGULATION_TRK** provided in Table 5.

The FPP residual calculation also requires the CRMPs ACE and ASOE energy of all connection points excluding the three for which a CF has been calculated, as repeated below.

Table 7 Example CRMP regional energy for connection points without appropriate metering

SettlementDate	PeriodId	RegionId	ACE_MWH	ASOE_MWH
08/06/2025	1	NSW1	-5	3
08/06/2025	1	QLD1	-5	0
08/06/2025	1	SA1	-2	2
08/06/2025	1	TAS1	0	0
08/06/2025	1	VIC1	-3	0
			-15	**5**

For the residual FPP amount, the participant would be required to pay $2.77.

$$TA = RCF \times \frac{P_{regulation}}{12} \times RCR \times \frac{TE}{ATE} = -0.3 \times \frac{98.55}{12} \times 90 \times \frac{5 + |-15|}{1{,}600} = -2.7717$$

Note that the ATE value referred to in these formulas is stored in the **ResidualTotal_MWh** field of the **SET_FCAS_REGULATION_TRK** table, as available for this example in Table 5.

In total, this participant in this interval would receive a FPP amount of $63.75 from AEMO.

$$TA = 66.5213 - 2.7717 = 63.7495$$

A.4 NMAS recovery calculations

This section will consider the more complicated System Restart (SRAS) contracts with new examples, unrelated to the previous section examples. Similar calculation logic applies for the Loadshed and Reactive Power NMAS contracts recovery, but with the entire recovery based on ACE, unlike SRAS which has 50% of the recovery based on ASOE.

A.4.1 SRAS interval payment recovery calculations

Below example data has been constructed to provide an example where there are two benefitting regions, with Qld receiving 70% of the benefit and NSW 30%. Note that for the most frequently required interval payments, which are SRAS availability payments, there is currently only a single benefiting region. The regional energy volumes **Region_ASOE_MWh** and **Region_ACE_MWh** can be obtained from **SET_NMAS_RECOVERY,** which also holds the CRMPs individual ACE and ASOE volumes used in this calculation.

Table 8 Example CRMP ACE/ASOE and regional total ACE/ASOE

SettlementDate	PeriodId	RegionId	RBF	ASOE_MWH	Region_ASOE_MWh	ACE_MWH	Region_ACE_MWh
01/01/2025	100	NSW1	0.3	30	500	-40	-450
01/01/2025	100	QLD1	0.7	17	440	-6	-470

If we assume the payment to be recovered is $100 then this CRMP would be required to pay $4.03 as per the below recovery calculation.

$$TA = the\ agg\ of\ \left[SRP \times 0.5 \times RBF \times \left(\frac{TCE}{RATCE}\right) + SRP \times 0.5 \times RBF \times \left(\frac{TSOE}{RATSOE}\right) \right] \times -1$$

$$= \left[100 \times 0.5 \times 0.3 \times \left(\frac{-40}{-450}\right) + 100 \times 0.5 \times 0.3 \times \left(\frac{30}{500}\right) \right] \times -1$$

$$+ \left[100 \times 0.5 \times 0.7 \times \left(\frac{-6}{-470}\right) + 100 \times 0.5 \times 0.7 \times \left(\frac{17}{440}\right) \right] \times -1$$

$$= 2.2333 \times -1 + 1.799 \times -1 = -4.0324$$

A.4.2 SRAS testing payment recovery calculations

This example will describe the steps required to reconcile a SRAS testing payment, for which the recovery calculation itself is identical to above. The relevant ACE and ASOE energy volumes over the testing payment recovery period for both the CRMP and region can be obtained directly from **BILLING_NMAS_TST_RECOVERY**. To reconcile those reported energy volumes the below logic can be used.

Considering a SRAS testing payment made in the billing week 2024Wk51 where the recovery period was 01/07/2024 to 20/12/2024. This means that the recovery period considers the energy of settlement dates within the billing weeks from 2024Wk27 to 2024Wk51. Once the FINAL statement has been posted, these energy volumes are then “locked” and do not change with further revisions of the energy data.

The data in **BILLING_NMAS_TST_RECVRY_TRK** can be used to obtain the relevant bill run number of each week in the recovery period. Below shows an example of some of the data (recovery weeks 32 to 46 excluded) stored for 2024Wk51 bill run 15, which was the billing run used for the FINAL statement.

Table 9 Example test payment recovery tracking data

CONTRACT YEAR	WEEKNO	BILLRUNNO	RECOVERY_ CONTRACTYEAR	RECOVERY _WEEKNO	RECOVERY_ BILLRUNNO
2024	51	15	2024	27	15
2024	51	15	2024	28	14
2024	51	15	2024	29	14
2024	51	15	2024	30	14
2024	51	15	2024	31	14
2024	51	15	2024	47	13
2024	51	15	2024	48	13
2024	51	15	2024	49	13
2024	51	15	2024	50	14
2024	51	15	2024	51	15

Prior to the FINAL being posted, the bill run of each recovery week can change. For example, in the posted PRELIM of week 51 (which used bill run 11), it was the posted PRELIM bill run 10 of week 50 that was used for that week's recovery energy. For all future revisions of week 51 however, the energy volumes and therefore the recovery amounts, will not change. For week 50 the energy used will be locked at the Final bill run 14, even after the revisions of that week are published.

The recovery bill run numbers of each recovery week in the recovery period can then be used to sum the energy from the relevant settlement dates, most easily from the daily total energy information in **BILLING_DAILY_ENERGY_SUMMARY**.

Appendix B. Data sources and reports

B.1.1 MMS Data Model

As well as the confidential and public data tables referenced in the earlier examples, numerous other tables are available in the Data Model for settlement reconciliation purposes. Description of the contents of these tables can be found in the MMS Data Model Report published on the AEMO website. The key Data Model packages relevant to Ancillary Services and FPP include:

- DISPATCH
- FPP
- SETTLEMENT_DATA
- BILLING_RUN

B.1.2 Settlement Report

With the publishing of the settlement statements, Market Participants receive a text document called the Settlement Report (SR). The SR contains a high-level summary of the statement line items for the billing week. The below sections relevant to Ancillary Services and FPP can be populated in the SR:

- Frequency Performance Payments (FPP)
- Residual Frequency Performance Payments (FPP)
- Market Ancillary Service Transactions – Payments
- Market Frequency Control Ancillary Services by Transmission Connection Point
- Market Ancillary Service Transactions – Recovery
- Non Market Ancillary Service Transactions – Payments
- Non Market Ancillary Service by Contract ID
- Non Market Ancillary Service Transactions – Recovery
- Non Market Ancillary Service Transactions by Region and Type - Recovery

Note that each participant will not always receive all sections as those that are not required to be populated are not displayed. For instance, participants who are not providers of ancillary services will not see the ancillary service payment sections.

An example of the SR can be found from the *Settlement Statement Layouts* link on AEMO's Settlements website.

B.1.3 Ancillary Service reports on AEMO's website

AEMO publishes Ancillary Service payment and recovery reports on AEMO's Ancillary services payments and recovery website that are available to the public. These reports contain summarised data for each billing period, with the total payment and recovery amounts for each ancillary service category, broken down by region.

The data in the current year summary files are updated to capture information in the most recent posted settlement statements (preliminary, final or revision). Market participants are also able to access and subscribe to receive these files by email, through Settlement Direct.

Historical ancillary service recovery and payment summary files are also available. These are archived reports that are only updated at the start of the year if new revision statement data is available.

Version release history

Version	Effective Date	Summary of Changes
1.0	04/03/2014	
2.0	01/07/2015	Updated 3.5, Appendix A.4 and Appendix B based on changes to the SRAS cost recovery calculations commencing on 1 July 2015 – recovering SRAS costs on the basis of the regional benefits (rule change reference ERC0168).
3.0	19/07/2019	Updated to AEMO new document template, Disclaimer and links to reference documents Updated worked examples in Appendix A to reflect changes arising from five- minute settlement rule changes Amended texts, re-arranged order of some sections to improve clarify and flow of the information
4.0	14/02/2020	Amended section 2.4.1 (Contingency FCAS recovery) and appendix A1 Contingency FCAS recovery calculations) for clarity Update links to reference documents
5.0	04/10/2023	Update for new Very Fast Contingency FCAS services Update links to reference documents Update document template for new branding
6.0	02/06/2024	Update to reflect National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021 No.13 and National Electricity Amendment (Implementing integrated energy storage systems) Rule 2023 No.2 New AEMO format
7.0	08/062025	Change document name from prior Settlements Guide to Ancillary Services Payment and Recovery. Content streamlined for clarity and conciseness. Updated to reflect Primary Frequency Response Incentives rule change, which updated the regulation FCAS recovery method and introduced Frequency Performance Payments.