Frequency Performance Payments



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SA

Settlements Change Summary

7 April 2025

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FPP Change Overview



There are two major changes introduced with this rule change:

- New Frequency Performance Payments (FPP) to reward good primary frequency response and penalise responses that worsen frequency
- New method of recovering the regulation FCAS service costs

FPP required the implementation of a new system that has been live in PROD since Dec 2024 for the non-financial operation (NFO) period, with a new data model v5.4 released to provide that data.

Regulation FCAS services recovery is changing to utilise the FPP calculated Contribution Factors (CFs) and will now be split into Used and Unused portions, with a different recovery method for each.

The rule goes live with FPP financial operation (FO) commencing on Sunday June 8 for the billing week 2025Wk24, the data model v5.5 is being released on 29 April in PROD to support this.

Participant high level impacts





Before FPP: Causer Pays and REG FCAS recovery

Causer Pays

- Contribution Factors (MPF) are calculated every 28 days
- MPFs for participant level not DUID level
- Applied for a future 28 days
- Global set only
- Renormalised for local recovery
 - Simple division of residual MPF based on demand

Regulation FCAS recovery

- Applied for constraints and then summed for participants
- For Binding REG constraints invoked to meet REG requirement
- For Binding co-optimised 5min constraints invoked to meet 5min requirement
 - Only when a cost is allocated to REG services
 - Non-zero adjusted cost for regulation

FPP recovery equations



Trading Amounts	Eligible unit	TSFCAS	 Adjusted cost of the constraints for the regulation services
FPPs Recovery of Used Regulation FCAS	NER 3.15.6AA(b)(1) $TA = CF \times \frac{P_{regulation}}{12} \times RCR$ NER 3.15.6AA(c)(1)	RCR	 Requirement for Corrective Response Measure of actual frequency response
Recovery of Unused Regulation FCAS	$TA = TSFCAS \times U \times NCF$ NER 3.15.6AA(d)(1)	Usage	 Amount of response by enabled Regulation FCAS service providers
	$TA = TSFCAS \times (1 - U) \times DCF$	P _{regulation}	 Marginal cost of regulation services = 12 * BaseCost / EnabledFCAS

FPP calculations

AEMO

Repeated for every binding requirement (ie binding constraints with regional regulation terms on LHS)

	For eligible units	For the residual
FPP Amount	$CF \times \frac{P_{regulation}}{12} \times RCR$	$RCF \times \frac{P_{regulation}}{12} \times RCR \times \frac{TE}{ATE}$
Used Regulation Recovery	$TSFCAS \times U \times NCF$	$TSFCAS \times U \times NRCF \times \frac{TE}{ATE}$
Unused Regulation Recovery	$TSFCAS \times (1 - U) \times DCF$	$TSFCAS \times (1 - U) \times DRCF \times \frac{TE}{ATE}$

CF =	For any requirements	Term	Common definition	Detail			
Contribution factor	Sum(<i>CF</i>) + <i>RCF</i> = 0	$P_{regulation}$	Marginal cost of the constraint	Stored in P_REGULATION field of DISPATCH_FCAS_REQ_CONSTRAINT table			
NCF = Negative	NCF = Min(0, CF)	TSFCAS	Regulation cost to be recovered (after any cost splitting with 5min)	Stored in ADJUSTED_COST field of DISPATCH_FCAS_REQ_CONSTRAINT table			
contribution factor	Sum(<i>NCF</i>) + <i>NRCF</i> = -1	RCR	Req for corrective response	Stored in FPP_RCR or SET_FCAS_REGULATION_TRK			
DCF = Default contribution	Historical average of NCFs Sum(DCF) + DRCF = -1	U	Usage	Stored in FPP_UASAGE or SET_FCAS_REGULATION_TRK			
factor	One value for a week	TE, ATE	Energy for residual, sum energy for share	abs(ACE) + ASOE for FPP; just ACE for Reg			

FPP settlements data





FPP settlements main new tables

New Table	Description
DISPATCH_FCAS_REQ_CONSTRAINT	Replaces DISPATCH_FCAS_REQ , this constraint outcome data includes P_Regulation and Adjusted_Cost
SET_FCAS_REG_AMOUNT	The constraint level FPP Amounts and Used/Unused Regulation Recovery for each unit with a Contribution Factor
SET_FCAS_REG_RESIDAMT	The constraint level FPP Residual Amounts and Used/Unused Regulation Residual Recovery for each participants energy share per region
SET_FCAS_REG_DEF_AMT	This table only populated when FPP Factors are not available, the constraint level Unused Regulation Recovery (only) for each unit with a Default Contribution Factor
SET_FCAS_REG_DEF_RESIDAMT	This table only populated when FPP Factors are not available, the constraint level Unused Regulation Residual Recovery (only) for each participants energy share per region
SET_FPP	The summary of FPP Amounts across all constraints in the interval for each Participant ID in each region
BILLING_FCAS_REG_AMT	The weekly sum by constraint of the FPP Amounts and Used/Unused Regulation Recovery
BILLING_FCAS_REG_RESIDAMT	The weekly sum by constraint of the FPP Residual Amounts and Used/Unused Regulation Residual Recovery
BILLING_FPP	The weekly sum of FPP Amounts across all constraints for each Participant ID in each region

Note: The new settlements tables are populated by a new data model report called SETTLEMENTS_EXTN which may require manual subscription.



FPP settlements modified tables

Modified Table	Description
SET_FCAS_REGULATION_TRK	Additional fields included for all the constraint level key FPP calculation variables, along with the total FPP and Regulation Recovery amounts. The new field ResidualTotal_MWh holds the sum[abs(ACE_MWh) + ASOE_MWh] energy used to determine each participants share of the FPP residual, while the existing RequirementDemand field holds the sum[ACE_MWh] energy used to determine each participants share of the Regulation Residual Recovery.
SET_FCAS_RECOVERY	Extra fields for the summary of Regulation Recovery Amounts across all constraints in the interval for each Participant ID in each region, noting that the same amount appears in multiple fields due to different summary methods
BILLINGASRECOVERY	Similar extra fields to above summing the values across the billing week

Example data from SET_FCAS_REGULATION_TRK:

SETTLEME NTDATE	VERS ION NO	INTERVAL_ DATETIME	CONSTRAINTID	CMPF	CRMPF	RECOVERY _FACTOR_ CMPF	RECOVERY _FACTOR_ CRMPF	LAST CHANGED	UseSubstitute Demand	Requirem ent Demand	FPP_ Amount	FPP_Residu al_Amount	Used_ Amount	Used_Resid ual_Amount	Unused_ Amount	Unused_Resi dual_Amount	P_Regu lation	TSFCAS	RCR	Usage	RCF	NRCF	DRCF	Residual Total_ MWh
2/04/2025	1	2/04/2025 0:05	F_I+LREG_0210	NULL	NULL	NULL	NULL	3/04/2025	NULL	-1694.96	9470.4	-9470.4	-77.9	-187.1	-253.5	-17.2	30.61	535.68	5257.4	0.495	-0.706	-0.71	-0.064	1759.49
2/04/2025	1	2/04/2025 0:05	F_I+RREG_0220	NULL	NULL	NULL	NULL	3/04/2025	NULL	-1694.96	-31044.8	31044.8	-1701.7	0.0	-115.9	-8.6	99.61	1826.2	5249.4	0.932	0.712	0	-0.069	1759.49

Notes:

- FPP Amounts and the Residual Amounts sum to zero
- The Sum of the used and unused values for the recovery of the regulation services equals the TSFCAS adjusted cost values
- The Used_Residual_Amount is zero in the second constraint due to the RCF being positive, which results in a zero NRCF

Data is for visualisation purposes only and does not reflect actual data

Example: Part 1



This example considers the regulation raise service only of the first interval of 2 Feb 2025. Below data from DISPATCH_FCAS_REQ_CONSTRAINT shows there is a binding regional constraint for Tas, along with one for the Mainland.

Run_DateTime	Run No	Interval_ DateTime	ConstraintId	Region Id	BidType	LHS	RHS	Marginal Value	RRP	Regional_ Enablement	Constraint_ Enablement	Region_Base _Cost	Base_ Cost	Adjusted_ Cost	P_Regul ation
2/02/2025 0:05	1	2/02/2025 0:05	F_T+RREG_0050	TAS1	RAISEREG	50	50	6.17	6.32	50	50	25.71	25.71	25.71	6.17
2/02/2025 0:05	1	2/02/2025 0:05	F_TASCAP_RREG_0220	NSW1	RAISEREG	170	170	7.84	7.99	23	170	15.03	111.07	111.07	7.84
2/02/2025 0:05	1	2/02/2025 0:05	F_TASCAP_RREG_0220	QLD1	RAISEREG	170	170	7.84	7.99	106	170	69.25	111.07	111.07	7.84
2/02/2025 0:05	1	2/02/2025 0:05	F_TASCAP_RREG_0220	SA1	RAISEREG	170	170	7.84	7.99	0	170	0.00	111.07	111.07	7.84
2/02/2025 0:05	1	2/02/2025 0:05	F_TASCAP_RREG_0220	VIC1	RAISEREG	170	170	7.84	7.99	41	170	26.79	111.07	111.07	7.84

Below extract from SET_FCAS_REGULATION_TRK shows in green the data fields taken from the above table, with the other FPP inputs used shown in blue and the market wide energy volumes required for the residual calculations in yellow. These fields are all required for the reconciliation of the FPP amounts and/or the regulation recovery calculated by settlements.

SETTLEME NTDATE	VERS ION NO	INTERVAL_ DATETIME	CONSTRAINTID	Requirem ent Demand	FPP_ Amount	FPP_Residu al_Amount	Used_ Amount	Used_Resid ual_Amount	Unused_ Amount	Unused_Resi dual_Amount	P_Regu lation	TSFCAS	RCR	Usage	RCF	NRCF	DRCF	Residual Total_ MWh
2/02/2025	9	2/02/2025 0:05	F_T+RREG_0050	-84.7118	6.8	-6.8	-1.5	-0.8	-18.0	-5.4	6.17	25.708	38.211	0.090	-0.344	-0.34	-0.232	85.99
2/02/2025	9	2/02/2025 0:05	F_TASCAP_RREG_0220	-1497.17	38.3	-38.3	-34.6	-12.9	-48.7	-14.9	7.84	111.07	214.01	0.427	-0.274	-0.27	-0.234	1550.37

Because the Requirement for Corrective Response (RCR) is considerably smaller for the Tas constraint, the total FPP amounts are small. The usage factor is also much smaller for the Tas constraint, leading to the small "Used" total Regulation Recovery values, with most of the recovery being for the "Unused" part of this regulation raise service requirement.

Example: Part 2

rading amounts	Eligible unit	Residual deviation
PPs	$TA = CF \times \frac{P_{regulation}}{12} \times RCR$	$TA = RCF \times \frac{P_{regulation}}{12} \times RCR \times \frac{TE}{ATE}$
Recovery of Used Regulation FCAS	$TA = TSFCAS \times U \times NCF$	$TA = TSFCAS \times U \times NRCF \times \frac{TE}{ATE}$
Recovery of Unused Regulation FCAS	$TA = TSFCAS \times (1 - U) \times DCF$	$TA = TSFCAS \times (1 - U) \times DRCF \times \frac{TE}{ATE}$



The example now considers a participant only active in SA, so only the single mainland constraint impacts them, in this interval.

SETTLEME NTDATE	VERS ION NO	INTERVAL_ DATETIME	CONSTRAINTID	Requirem ent Demand	FPP_ Amount	FPP_Residu al_Amount	Used_ Amount	Used_Resid ual_Amount	Unused_ Amount	Unused_Resi dual_Amount	P_Regu lation	TSFCAS	RCR	Usage	RCF	NRCF	DRCF	Residual Total_ MWh
2/02/2025	9	2/02/2025 0:05	F_TASCAP_RREG_0220	-1497.17	38.3	-38.3	-34.6	-12.9	-48.7	-14.9	7.84	111.07	214.01	0.427	-0.274	-0.27	-0.234	1550.37

Their 3 Units with a contribution factor appear in SET_FCAS_REG_AMOUNT as below.

Settlement	Versi	Participant	UnitId	ConstraintId	Period	BidType	Connection	Region	CE	NCE	DCE	FPP_	Used_	Unused_
Date	onNo	ld	Unitu	Constraintiu	ld	Didiype	PointId	ld	CF	INCE	DCF	Amount	Amount	Amount
2/02/2025	9	MAINPID	DUID1	F_TASCAP_RREG_0220	1	RAISEREG	CPID1	SA1	0.003	0	-0.001	0.4195	0.0000	-0.0636
2/02/2025	9	MAINPID	DUID2	F_TASCAP_RREG_0220	1	RAISEREG	CPID2	SA1	0.008	0	0	1.1186	0.0000	0.0000
2/02/2025	9	MAINPID	DUID3	F_TASCAP_RREG_0220	1	RAISEREG	CPID3	SA1	-0.002	-0.002	-0.004	-0.2796	-0.0950	-0.2544
											Totals	1.2584	-0.0950	-0.3179

Residual share amounts appear in SET_FCAS_REG_RESIDAMT as below, the highlighted ACE and ASOE value reconciliation is on the next slide. The FPP residual energy share is calculated by the **Residual_MWh** divided by **ResidualTotal_MWh** while the Regulation Recovery residual energy share is calculated by the **RequirementDemand**.

Settlement Date	Versi onNo	Participant Id	ConstraintId	Peri odld	Regi onld	BidType	ACE_ MWh	ASOE_ MWh	Residual _MWh	FPP_ACE _Amount	FPP_ASOE _Amount	FPP_Residu al_Amount	Used_ACE _Amount	Used_ASOE _Amount	Used_Resid ual_Amount	Unused_ACE _Amount	Unused_ASOE _Amount	Unused_Resi dual_Amount
2/02/2025	9	MAINPID	F_TASCAP_RREG_0220	1	SA1	RAISEREG	-4.88	0.98	5.86	-0.1204	-0.0242	-0.1446	-0.0419	0.0000	-0.0419	-0.0485	0.0000	-0.0485

The FPP amounts are then summarised in SET_FPP as below, with the Regulation recovery similarly summarised in SET_FCAS_RECOVERY.

Settlement	Versi	Participant	Regio	Peri	LowerReg	LowerReg_ACE	LowerReg_ASOE	LowerReg_Resi	RaiseReg	RaiseReg_ACE	RaiseReg_ASOE	RaiseReg_Res
Date	onNo	Id	nld	odld	_Amount	_Amount	_Amount	dual_Amount	_Amount	_Amount	_Amount	idual_Amount
2/02/2025	9	SAWCML	SA1	1	0.004	-0.0005	-0.00001	-0.0004	1.2584	-0.1204	-0.0242	

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Example: Part 3



The ACE and ASOE energy volumes used in the residual calculations can be reconciled against the data in SET_ENERGY_TRANSACTIONS.

Settlement Date	Versi onNo	Participant Id	ConstraintId	Peri odld	Regi onld	BidType	ACE_ MWh	ASOE_ MWh	Residual _MWh	FPP_ACE _Amount	FPP_ASOE _Amount	FPP_Residu al_Amount	Used_ACE _Amount	Used_ASOE _Amount	Used_Resid ual_Amount	Unused_ACE _Amount	Unused_ASOE _Amount	Unused_Resi dual_Amount
2/02/2025	9	MAINPID	F_TASCAP_RREG_0220	1	SA1	RAISEREG	-4.88	0.98	5.86	-0.1204	-0.0242	-0.1446	-0.0419	0.0000	-0.0419	-0.0485	0.0000	-0.0485

The energy of the Connection Point IDs relating to the Units that have received a Contribution Factor, must be excluded when summing the total energy of the region for the participant.

Settlement Date	Version No	Period Id	Participant Id	Connection PointId	Meter_Type	TNI_Code	RegionId	CE_ MWh	UFEA_ MWh	ACE_ MWh	ASOE_ MWh
2/02/2025	9	1	MAINPID	CPID1	GENERATOR	SAA1	SA1	-0.074	0	-0.07	6.23
2/02/2025	9	1	MAINPID	CPID2	BDU	SAA2	SA1	-4.102	0	-4.10	1.20
2/02/2025	9	1	MAINPID	CPID3	GENERATOR	SAA3	SA1	-0.002	0	0.00	0
2/02/2025	9	1	MAINPID	SAA4	CUSTOMER	SAA4	SA1	-0.199	-0.001	-0.20	0
2/02/2025	9	1	MAINPID	SAA4	NREG	SAA4	SA1	0.000	0.000	0	0.90
2/02/2025	9	1	MAINPID	SAA5	CUSTOMER	SAA5	SA1	-1.020	0.000	-1.02	0
2/02/2025	9	1	MAINPID	SAA6	CUSTOMER	SAA6	SA1	-0.217	-0.003	-0.22	0.08
2/02/2025	9	1	MAINPID	SAA7	CUSTOMER	SAA7	SA1	-1.400	0.000	-1.40	0
2/02/2025	9	1	MAINPID	SAA8	CUSTOMER	SAA8	SA1	0.000	0.000	0	0
2/02/2025	9	1	MAINPID	SAA9	CUSTOMER	SAA9	SA1	-2.038	-0.002	-2.04	0
					Total	Energy Inc	luded for R	esidual Cal	culations	-4.88	0.98

Data is for visualisation purposes only and does not reflect actual data

Default Calculations

- The two new default tables SET_FCAS_REG_DEF_AMT and SET_FCAS_REG_DEF_RESIDAMT will only be populated in any intervals where the settlements system does not receive the FPP system calculated data
- Most commonly this will result from the FPP system being unable to perform the calculations due to an outage
- This can be identified from the FPP schema data, such as the FPP_Run table, from the earlier NFO data model release v5.4
- If settlements is delayed receiving the FPP outputs, some settlement runs of that day could be calculated using the default tables, before later versions use the standard approach
- As with all settlement data, the single VersionNo of interest must be selected for each settlement date consistently across all tables
- With no contribution factors available, there are no FPP amounts calculated and the full regulation recovery is calculated under the unused methodology, using the default contribution factors last received for that billing week





Settlement Report (SR) changes

Ancillary Service Transactions

Market Ancillary Service Transactions - Recovery

Service Provided	Used Amount (\$)	Unused Amount (\$)	Used Residual Amount (\$)	Unused Residual Amount (\$)	ACE Amount (\$)	ASOE Amount (\$)	Total Amount (\$)
Very Fast raise	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	-\$481.95	-\$481.95
Very Fast lower	\$0.00	\$0.00	\$0.00	\$0.00	-\$0.02	\$0.00	-\$0.02
Fast raise	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	-\$507.37	-\$507.37
Fast lower	\$0.00	\$0.00	\$0.00	\$0.00	-\$25.18	\$0.00	-\$25.18
Slow raise	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	-\$149.33	-\$149.33
Slow lower	\$0.00	\$0.00	\$0.00	\$0.00	-\$150.84	\$0.00	-\$150.84
Delayed raise	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	-\$170.63	-\$170.63
Delayed lower	\$0.00	\$0.00	\$0.00	\$0.00	-\$21.94	\$0.00	-\$21.94
Regulation raise	-\$487.56	-\$1,227.96	-\$36.03	-\$93.55	-	-	-\$1,845.09
Regulation lower	-\$90.22	-\$666.03	-\$9.00	-\$16.78	-	-	-\$782.03
Total Recovery(Payment to AEMO)	-\$577.78	-\$1,893.98	-\$45.03	-\$110.33	-\$393.34	-\$1,309.28	-\$4,454.39

Frequency Performance Payments (FPP)

Unit ID	Reg Raise	Reg Lower	Total
DUID1	\$598.59	\$310.00	\$908.59
DUID2	\$747.80	-\$487.28	\$260.53

Residual Frequency Performance Payments (FPP)

Region	Reg Raise	Reg Lower	Total
NSW1	-\$368.34	-\$18.77	-\$387.11
SA1	-\$0.01	\$2.02	\$2.01
VIC1	-\$6.22	-\$0.78	-\$6.99

- The existing AS Recovery section has been changed to show the Used/Unused amounts both for CF and Residual calculations
- While the Regulation Residual Recovery is also calculated according to the share of ACE, it was decided to not include this in the Ace Amount column of the SR, to avoid double reporting
- The new FPP section shows the CF based unit level calculated values for the eligible units with appropriate metering and the residual amounts by region, if required



Invoice Change and GST Impacts

Summary of NEM Transactions for Week 52: 22 Dec 2024 - 28 Dec 2024

Description	S
Energy	ň í
Ancillary Services	
Settlement Residue Auction	
Wholesale Demand Response	
Standalone Power Systems	
Market Fees	
TNSP Residue	
Security Deposits	
Reallocation	
Revision Adjustment	
Revision Interest	
Early Payment Interest	
Frequency Performance Payment	454.18
Other	
GST	
Reassignment	
Total	

- A new line item has been added to the invoice for the total FPP amount for the week
- GST treatment is still to be confirmed by the ATO, currently assumed the ruling will be that GST is payable on FPP amounts
- Where the sum of all the FPP amounts over a settlement date are positive, that daily total amount will be allocated to the FPP_AMOUNT_PAID transaction type and invoiced as "Supplies made to AEMO"
- When the sum of all the FPP amounts over a settlement date are negative, that daily total amount will be allocated to the FPP_AMOUNT_ PAYABLE transaction type and invoiced as "Supplies made by AEMO"

SettlementDate **Total FPP Amounts** 22/12/2024 -\$123.60 23/12/2024 \$50.02 24/12/2024 \$186.02 25/12/2024 \$74.55 26/12/2024 \$124.25 27/12/2024 -\$35.75 28/12/2024 \$178.69 FPP AMOUNT PAYABLE -\$159.35 FPP AMOUNT PAID \$613.54 Total FPP Amount \$454.18

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Taxable Supplies GST Exclusive (\$) GST (S) Description Sub Total (\$) Energy Wholesale Demand Response Standalone Power Systems 0 MWh Ancillary Service Compensation Early Payment Interest Manual Adjustment Frequency Performance 613.54 61.35 674.89 Payment Total

Supplies made to AEMO

Supplies made by AEMO Taxable Supplies



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Further information

Visit the <u>FPP project webpage</u> for further detail and resources, and for the FPP calculations in particular, please see the below links:

fpp-frequently-asked-questions-faqs-for-publication.pdf

aemo-nem-fpp-factor-calculation-guide.pdf

More information about the Data Model v5.5 can be found at the below link:

https://visualisations.aemo.com.au/aemo/web-techspecportal/EMMSDM55_Apr2025/