TRANSPOWER

Service Measures Report 2023

November 2023

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Section 1.0
Introduction

Introduction

1.1. Purpose of service measures report

This Service Measures Report (report) summarises

- our services framework which defines the services we provide to our customers
- the performance of our regulated transmission business during Disclosure Year 2023 (DY 2023; 1 July 2022 to 30 June 2023) against the current regulatory control period (RCP3) performance and asset health measures[1]
- the performance and asset health measures, quality standards, targets, and incentives the Commerce Commission (the Commission) has determined for previous years of RCP3 which are Disclosure Years 2021 and 2022 (1 July 2020 to 30 June 2022)
- the proposed service measures, quality standards, targets, and incentives for RCP4 (1 July 2025 to 30 June 2030).

This report satisfies the requirements of the Grid Outputs Report detailed in Transpower's capital expenditure input methodology (Capex IM).

1.2. Structure of this report

This report has four main sections:

1. The first is an overview of our services framework
2. The second is an overview of our RCP3 performance and asset health measures, quality standards, targets, and incentives, together with details of our performance in DY 2023
3. The third is an overview of our proposed services measures, quality standards, targets, and incentives for RCP4
4. The fourth contains the details of the evolution of the proposed RCP4 service measures.

[1] Dates in this document represent the disclosure year ending 30 June. For example, the disclosure year 1 July 2020 to 30 June 2021 is simply referred to as Disclosure Year 2021, or DY 2021.

Section 2.0
Our Services Framework

Our Services Framework

The services we provide by operation of our network and the electricity system span eight broad categories (summarised in Table 1 below). They include provision of regulated electricity transmission services, provision of the system operator service and other activities not regulated under our individual price-quality path (IPP). The first three drive cost and quality of transmission services for end-consumers and are the focus for the performance and asset health measures covered in this report for RCP3.[2] For RCP4, we are proposing to introduce new customer service measures, which relate to the 'grid access' service we provide.

Table 1 - Our services framework

Service	Brief Description
Grid reliability	Keep interruptions to a very low level and restore supply quickly when there is an interruption.
Grid availability	Keep a high level of availability to minimise the impacts of system constraints for generators and consumers, so the lowest cost generation can be offered into the market.
Event communications	Communicate with our customers when supply is interrupted so we can achieve the best outcomes for end-consumers.
Grid access	Work with customers to connect their assets to the grid, and plan and deliver changes to their connections.
Site access	Safely host customer equipment on our sites.
Information provision	Provide planning and other information to assist connected parties to make informed decisions.
Asset relocation	Assist in the identification, selection and execution of options to relocate transmission infrastructure.
System operation	Operate a competitive electricity market and deliver a secure power supply.

The performance and asset health measures help us fine-tune performance by ensuring we deliver services our customers value. They are measures that

- are meaningful and valuable to our customers
- focus on customer outcomes and service
- are challenging, but realistic and reasonably achievable

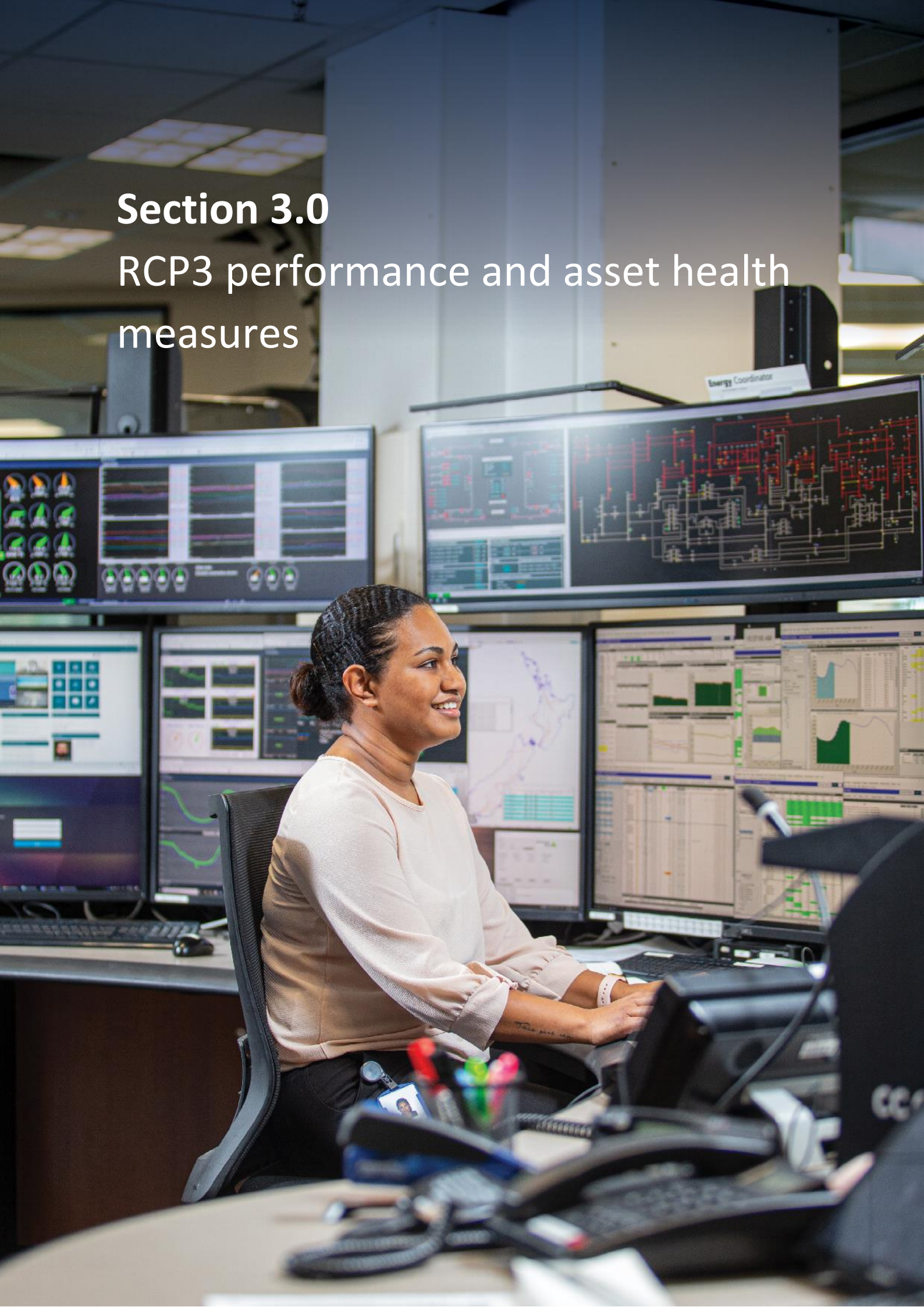
[2] We engaged with customers and stakeholders when developing our proposed RCP3 performance and asset health measures to ensure they represented the most important matters.

- drive a culture focusing on service
- provide direction to asset strategies
- improve our justification for expenditure on assets
- provide rigour to capital expenditure (capex) and grid operational expenditure (opex) substitution
- provide evidence and confidence that our spending is targeted at delivering the right performance.

We also use asset health as an indicator to understand and manage the current and future grid risk profile, as well as using it as a key input for decision-making processes. Asset health measures enable us to

- understand the condition of our grid assets and the probability of asset failure
- address potential problems caused by near end-of-life assets through asset refurbishment, replacement, or by other means[3]
- provide stakeholders and the Commission with a view of the state of our assets, highlighting potential work required to efficiently improve grid performance.

[3] There are cases where it is expedient to rely on our contingency plans to respond with a replacement from a nearby store when the asset fails or when we have determined it is about to fail.



Section 3.0

RCP3 performance and asset health measures

RCP3 performance and asset health measures

Interruptions to transmission service have been trending down since DY 2010. The unaudited results for DY 2023 saw the fifth best performance in 25 years, with 59 unplanned interruptions[4] for the RCP3 points of service (PoS).

For RCP3 our performance and asset health measures were reset. This involved consultation with our customers, interested consumer groups and the general public.[5] The measures were published in November 2019 in the final IPP determination.[6]

The RCP3 performance and asset health measures are summarised in the sections below:

- Section 3.1 describes our performance measures
- Section 3.2 describes those performance measures that are revenue linked and have quality standards
- Section 3.3 describes our asset health measures and related quality standards
- Sections 3.4 and 3.5 describe the linkages between our service measures and our planning and performanceSection 3.6 describes updates to previously published disclosuresSection 3.7 describes our DY 2023 performance, with additional commentary.

[4] Our normalisation application has been approved i.e. Cyclone Gabrielle related interruptions are excluded.
[5] Transpower Service Measures Refresh for RCP3
[6] Transpower IPP Determination 2020

3.1. RCP3 performance measures

For RCP3, we have eight performance measures. These are

- three measures of grid performance (GP)
- five measures of asset performance (AP).

Four of the eight measures are revenue linked and four are non-revenue linked.[7]

Measures of Grid Performance

Our three measures of grid performance assess grid reliability and relate to our ability to provide uninterrupted transmission service. The first two, GP1 and GP2, are revenue linked with quality standards[8] and are discussed in in Section 3.2. The grid performance measures are summarised in Table 2.

Table 2 - Measures of grid performance for RCP3

Category	RCP3 Code	Quality Standard	Revenue Linked Target	RCP3 Performance Measure
Measures of Grid Performance (Grid Reliability)	GP1	Yes	Yes	Number of unplanned interruptions greater than one minute across all six supply and generation point of service sub-categories during a disclosure year.
	GP2	Yes	Yes	Average duration of unplanned interruptions greater than one minute, across six supply and generation point of service sub-categories during a disclosure year.
	GP-M	No	No	The number of momentary unplanned interruptions, with a duration of less than one minute, in a disclosure year.

[7] Linking performance measures to revenue has the effect of financially rewarding or penalising us for out- or under-performing the grid output targets set for these measures.

[8] Quality standards set a minimum standard of quality.

Measures of Grid Performance - Point of service categorisations

Measures of grid performance GP1 and GP2 are each reported across six point of service (PoS) sub-categories. Tables 3 and 4 describe the PoS sub-categories and categories for RCP3. A list of the categories is in Schedule F of the IPP.[9]

Table 3 - Point of service sub-categories for RCP3

Sub-category	Description	Examples
High Economic Consequence	A PoS that satisfies either of the following criteria: • significantly above-average consumption • an average consumption but an above-average fraction of commercial, industrial, and/or agricultural end-use consumers.	PEN033_S1, ISL066_S1, INV033_S1, HAM033_S1
Material Economic Consequence	A PoS that typically exports electricity from the grid but does not qualify as being 'High Economic Consequence'.	APS011_S1, BAL033_S1, HAM011_S1, KUM066_S1
Generator	A PoS that typically injects electricity into the grid.	BEN220_I1, ROX220_I1, MTI220_S1, HLY220_I1

Table 4 - Point of service categories for RCP3

Category	Sub-category	PoS
N-1 security[10]	High Economic Consequence	48
	Material Economic Consequence	95
	Generator	44
	N-1 security total	**187**
N-security	High Economic Consequence	12
	Material Economic Consequence	21
	Generator	9
	N-security total	**42**
	Total	**229**

[9] Transpower IPP Determination 2020

[10] N-security is where the system is such that a single fault event can lead to a service interruption. N-1 security is where the system is built such that a service interruption will only occur if there are concurrent outages.

Asset Performance measures

Our five asset performance measures (AP1 to AP5) assess asset availability and relate to our ability to maintain availability, minimise planned and unplanned outages, and communicate changes to customers. AP1 and AP2 are both revenue linked with quality standards; they are discussed in Section 3.2. The asset performance measures for RCP3 are summarised in Table 5.

Table 5 - Asset performance measures for RCP3

Category	RCP3 Code	Quality Standard	Revenue Linked Target	RCP3 Performance Measure
Asset Performance Measures (Grid Availability)	AP1	Yes	Yes	HVDC capacity availability (%) of the inter-island high-voltage direct current (HVDC) system.
	AP2	Yes	Yes	Average percentage of time selected high voltage alternating current (HVAC) assets are available during a disclosure year.
	AP3	No	No	Return to service time – extent to which Transpower meets planned return to service times for planned outages of selected HVAC assets that are returned to service two or more hours after Transpower's planned return to service time.
	AP4	No	No	Return to service time communications - measures the extent to which Transpower communicates delays to affected parties of planned outage return to service times of selected HVAC assets: • the percentage of outages that Transpower gives 1.5 hours or less notice to market (or industry) participants in the event assets are going to be returned to service later than the original planned return to service time; or • the extended return to service time.
	AP5	No	No	N-security reporting - reports the extent that Transpower has placed customers on a reduced level of supply security due to an outage, with that reduced level being N-security of supply.

The selected assets for assessing the AP2, AP3, and AP4 measures are listed in Schedule G of the IPP.[11]

[11] Transpower IPP Determination 2020

3.2. RCP3 revenue linked performance measures

For RCP3 we have four revenue linked performance measures with associated quality standards; these are GP1, GP2, AP1, and AP2. Linking measures to revenue has the effect of financially rewarding or penalising us for over- or under-performing against the targets set for these measures. For the RCP3 period total revenue at risk is $53.7 million. The targets, quality standards, caps, collars, and revenue incentives are further explained in the following sections.

Grid Performance Targets

GP1 and GP2: Number and duration of unplanned interruptions

Our targets for the GP1 and GP2 measures of grid performance are in Table 6.

Table 6 - Measure of grid performance targets for RCP3

Category	Sub-category	PoS	GP1 Number of Interruptions (all PoS)	GP2 Average Duration (mins) of Interruptions (all PoS)
N-1 security	High Economic Consequence	48	7	92
	Material Economic Consequence	95	24	61
	Generator	44	9	174
	N-1 security total	**187**		
N-security	High Economic Consequence	12	6	103
	Material Economic Consequence	21	23	140
	Generator	9	12	93
	N-security total	**42**		
	Total	**229**		

Asset Performance Targets

AP1: Percentage capacity availability of HVDC assets

Our target for AP1 (HVDC availability) is 98.75 per cent for all five years of RCP3, excluding Pole 2 life extension work. The Pole 2 work (Project K in the IPP) has been capped at 0.7 per cent unavailability over three of the five years of RCP3, meaning all unavailability resulting from the life extension work in excess of 0.7 per cent over those three years will count towards our AP1 performance target.

AP2: Percentage availability of selected HVAC assets

Our RCP3 target is 99.0 per cent availability over selected assets. The selected assets include: 110 kV and 220 kV circuits, interconnecting transformers, and bus sections that have the most impact on the market in RCP3 when out of service. These assets are approximately 20 per cent of the circuit-kilometres in our AC network and 22 per cent of our interconnecting transformers. They are listed in Schedule G of the IPP.[12]

[12] Transpower IPP Determination 2020

Using the concept of 'normalisation' the RCP3 determination allows us to treat certain outages as excluded from the calculations made to assess our quality standard compliance, subject to approval from the Commission.

In addition, we have treated some outages (caused by exceptional circumstances that fall outside the definition of normalisation) as 'outlier' events and ones which are, effectively, normalisation events.[13]

In DY 2023 we reported one normalisation event (now approved).[14] This normalisation event relates to the impact of the Cyclone Gabrielle event. There were two outlier events: one associated with the outages for the Clutha Upper Waitaki Lines Project (CUWLP), and another associated with the Brownhill – Pakuranga (PAK-WKM) cable repair work. Neither were included in our RCP3 plan.

We reported to the Commission on outlier events for DY 2022.[15] The Commission is investigating breaches of the AP2 quality standard for DY 2021 and DY 2022, which include these events.

Performance measures caps, collars, quality standards and incentives

Tables 7 and 8 summarise the caps, collars, targets, quality standards, and incentive rates for our revenue linked performance measures in RCP3.

[13] This is not something the Commission has or is able to approve under the RCP3 determination.

[14] As noted in Section 3.2 (above), RCP3 introduced the concept of 'normalisation', allowing certain outages and interruptions to be excluded from our quality standard compliance calculations. We also noted our treatment of two exceptional events as 'outlier' events, effectively normalisation events. We expect there will be further 'outlier' events in future RCP3 years.

[15] Outlier events are included in reported numbers.

Table 7 - RCP3 grid performance measures incentive summary

Measure	Cap	Target	Collar	PoS sub-category limit	Incentive rate	$ at risk per year
GP1: number of interruptions (per annum)					$ per interruption	
N-1 Security High Economic Consequence	0	7	14	14	335,714	2,350,000
N-1 Security Material Economic Consequence	7	24	41	41	40,294	685,000
N Security High Economic Consequence	4	6	8	8	250,000	500,000
N Security Material Economic Consequence	9	23	37	37	41,786	585,000
N-1 Security Generator	5	9	13	13	62,500	250,000
N Security Generator	6	12	18	18	41,667	250,000
GP2: average duration of interruptions (mins)					$ per	
N-1 Security High Economic Consequence	30	92	154	154	37,903	2,350,000
N-1 Security Material Economic Consequence	36	61	86	86	27,400	685,000
N Security High Economic Consequence	0	103	206	206	4,854	500,000
N Security Material Economic Consequence	0	140	280	280	4,179	585,000
N-1 Security Generator	50	174	298	298	2,016	250,000
N Security Generator	11	93	175	175	3,049	250,000

Table 8 - RCP3 asset performance measures incentive summary

Measure	Cap	Target	Collar	Quality standard	Incentive rate	$ at risk per year
AP1: HVDC availability (%)					$ per 1%	
HVDC availability	99.75%	98.75%	97.75%	96.75%	500,000	500,000
AP2: HVAC availability (%)					$ per 1%	
HVAC availability (selected assets)	99.2%	99.0%	98.8%	98.6%	5,000,000	1,000,000

To determine the potential adjustment to our revenue, our actual (normalised) results will be compared against the targets. The target for each measure represents a result where there would be no financial impact, i.e. we receive no financial penalty or reward. The caps and collars set the range of performance within which we receive either a financial penalty or reward.

The strength of each financial incentive is determined by the incentive rate and differs depending on the service measure. The incentives are symmetric, meaning the incentive rate and absolute reward or penalty is the same for over or under-performance.

As noted above, we adjust the calculation of our actual performance for normalisation and exceptional outlier events. Table 9 shows how compliance with the performance measures is determined.

Table 9 - Quality standard compliance requirements for RCP3

Performance Measure	RCP Disclosure year				
	DY 2021	DY 2022	DY 2023	DY 2024	DY 2025
GP1 and GP2	Calculate values, no compliance assessment	Comply in DY 2022, or if not, then to have complied in DY 2021	Comply in disclosure year, or if not, then to have complied in the two previous disclosure years		
AP1 and AP2	Comply in current disclosure year				

Compliance for the measures of grid performance (GP1 and GP2) in a disclosure year is defined as being when four or more of the six PoS sub-category limits for each measure are not exceeded. This is referred to as pooling. There is no quality standard for GP1 and GP2 in the first RCP3 disclosure year (DY 2021).

Compliance for the asset performance measures (AP1 and AP2) is defined as a result which is higher than, or equal to, the quality standard. Note: there is a deadband zone between the collar and the quality standard for the asset performance measures.[16]

3.3. RCP3 asset health measures and quality standards

Asset health measures

Our RCP3 asset health measures are aligned with the way we manage network assets, and how we measure and report on asset condition in our business. The measures indicate the expected health of these assets at the end of the regulatory control period, accounting for the investments we make in replacing, refurbishing, and maintaining the assets.

The measures provide a leading indicator showing how we see the state of our grid assets and enable us to foresee and communicate asset health issues. We use an Asset Health Index (AHI) for each asset, compiled from asset health modelling and condition data, to reflect the current state of our grid asset fleet.

[16] A deadband refers to a part of the range where no direct financial incentives apply.

Both asset health measures have associated quality standards but are not revenue linked. Further details are provided below.

Quality standards

For the Power Transformers and Outdoor Circuit Breakers asset classes we calculate the proportion of each asset class having an AHI score of 8 or above (meaning poor to very poor health) at the end of each disclosure year in the RCP3 period. The quality standard (for each asset class) is met if the proportion does not exceed the percentages listed in Table 10 for each disclosure year.

Table 10 - Quality standards for asset classes with an AHI score of 8 or higher for RCP3

Asset Class	DY 2021 %	DY 2022 %	DY 2023 %	DY 2024 %	DY 2025 %
Power Transformers	3.22	3.68	5.37	8.65	12.03
Outdoor Circuit Breakers	2.00	2.37	5.65	7.63	8.27

3.4. Linking service measures to planning

We are taking an incremental approach to linking service measure expectations with planning which is appropriate for Transpower's business and consistent with other transmission businesses.

During RCP3 network performance will be influenced by the existing network configuration and standard of grid assets. We have only limited scope during the five years of RCP3 to alter the built configuration. The reinvestment rate is low relative to the replacement cost of the grid given the long life of grid assets.

From a planning perspective, we can influence how we:

- prioritise asset maintenance and replacements
- plan work packages and timing to minimise peaks in planned outages
- prepare for event management with contingency planning.

We use Value of Lost Load (VoLL) as a common input across frameworks, enabling us to categorise PoS, set incentive strengths and gauge end users' expectations. Additionally, we use VoLL to support network enhancement and development decisions (including as an input to the investment test) and for asset renewal planning and prioritisation through our criticality framework, where applicable.

Given the complexity and uncertainty of modelling aggregate network performance, we have frameworks that guide performance and outputs towards an optimal state over time, consistent with other transmission businesses. We consider this is more appropriate than defining a static long-term view of optimal outputs and performance, particularly in a time of significant change to

the energy and electricity sectors and customers, as outlined in our analysis of electrification pathways *Whakamana i Te Mauri Hiko*.[17]

For our revenue linked grid reliability measures, GP1 (number of unplanned interruptions) and GP2 (duration of unplanned interruptions), a proportion of interruptions are practically beyond our control. There are interruptions (such as wilful damage and extreme weather) which are difficult to predict and expensive to fully mitigate across the grid. Also, due to the interconnected nature of the grid and the built-in redundancy, equipment failures do not always lead to interruptions. These factors make it difficult to determine service improvements which arise from grid investments.

For our revenue linked asset availability measures, AP1 (HVDC availability) and AP2 (HVAC availability), the targets were calculated with reference to the expected work we will undertake. This means there is a linkage between the availability of the grid and our workplan, which in turn is linked to our base capex allowance. This linkage is complex, and challenging to predict with precision across the network at the time that targets are set. We continue to manage and update our forward workplan to ensure we deliver the right work and meet customer needs.

These same relationships between service measures and planning apply for RCP4. We have worked to better link our workplan and the proposed availability targets developed for RCP4. We are proposing to update the list of PoS that GP1 and GP2 are applied to as part of our review of services measures for RCP4. See Sections 4 and 5 for more details.

3.5. Update to previous published disclosures

Following the recent discovery of data issues in our outage planning system (IONS) we have identified information that needs to be corrected in our non-revenue linked AP3 service measure for DY 2022. The error was showing poorer performance than what occurred. We have corrected that data and updated details in our disclosure for this year.

3.6. Disclosure Year 2023 performance

The following tables show our performance for DY 2023:

- Table 11 provides an overview of our performance against our revenue linked targets
- Table 12 provides an overview of our performance against the quality standards
- Table 13 provides an overview of our performance against performance measures which do not have quality standards.

Commentary on our performance, including where we have exceeded the collar, follows these tables. GP1, GP2, and AP2 results exclude the Cyclone Gabrielle impacts as a normalisation application for these events has been approved[18].

[17] Whakamana i Te Mauri Hiko – Empowering our Energy Future

[18] Decision on the treatment of Transpower interruptions and outages caused by Cyclone Gabrielle (Transpower normalisation application)

Table 11 - Performance measures linked to revenue and for asset health for disclosure year 2023

Measure	Category	Cap	Target	Collar	PoS sub- category limit	Incentive Rate	Actual	Result ($M)
GP1 - Number of unplanned interruptions across all points of service (No.)	GP1A: N-1 high EC	0	7	14	14	$335,714	5[19]	0.671
	GP1B: N-1 material EC	7	24	41	41	$40,294	11[19]	0.524
	GP1C: N high EC	4	6	8	8	$250,000	2[19]	0.5
	GP1D: N material EC	9	23	37	37	$41,786	16	0.293
	GP1E: N-1 generator	5	9	13	13	$62,500	9[19]	0.0
	GP1F: N generator	6	12	18	18	$41,667	16[19]	-0.167
GP2 - Average duration of unplanned interruptions greater than one minute (mins.)	GP2A: N-1 high EC	30	92	154	154	$37,903	51.2[19]	1.546
	GP2B: N-1 material EC	36	61	86	86	$27,400	60.3[19]	0.017
	GP2C: N high EC	0	103	206	206	$4,854	36[19]	0.325
	GP2D: N material EC	0	140	280	280	$4,179	68.1	0.3
	GP2E: N-1 generator	50	174	298	298	$2,016	1140[19]	-0.25
	GP2F: N generator	11	93	175	175	$3,049	71.5[19]	0.065
Measure	**Category**	**Cap**	**Target**	**Collar**	**Quality Standard**	**Incentive Rate**	**Actual**	**Result ($M)**
AP1 - HVDC availability (%)		99.75	98.75	97.75	96.75	$500,000	97.89[20]	-0.43
AP2 - HVAC availability (%)	Selected assets	99.2	99.0	98.8	98.6	$5,000,000	98.69[19]	-1.00
AH: (% with Asset Health of 8 or higher)	Power transformers	N/A	N/A	5.37	5.37	N/A	3.18	N/A
	Outdoor circuit breakers	N/A	N/A	5.65	5.65	N/A	0.37	N/A

Note: these results are preliminary and may change following the final audit process.

[19] This figure excludes Cyclone Gabrielle impacts, as per the approved normalisation application.
[20] AP1 excludes 0.7% of the Pole 2 refurbishment project related hours as per IPP allowance. Without excluding the 0.7%, HVDC capacity availability for DY2023 is 97.19%

Table 12 - Our performance against the quality standards for disclosure years 2021–2023

Measure	Category	Met Quality Standard				
		DY 21	DY 22	DY 23	DY 24	DY 25
GP1 - Number of unplanned interruptions across all points of service (No.)	All	●	●	●		
GP2 - Average duration of unplanned interruptions greater than one minute (mins.)	All	●	●	●[21]		
AP1 - HVDC availability (%)		●	●	●		
AP2 - HVAC availability (%)	Selected assets	●	●	●[22]		
AH: (% with Asset Health of 8 or higher)	Power transformers	●	●	●		
	Outdoor circuit breakers	●	●	●		

Note: these results are preliminary and may change following the final audit process.

Table 13 - Our performance against measures which do not have quality standards for disclosure years 2021–2023

Measure	Units	Actual				
		DY 21	DY 22	DY 23	DY 24	DY 25
GP-M – Momentary unplanned interruptions	Count < 1 min	22	29	28		
AP3 - Return to service time[23]	% >2 hours of planned return to service	3.7	1.32	6.82		
AP4 - Return to service time - Communications	% < 1.5 hours' notice of delay	7.41	8.55	13.07		
AP5 – N security reporting	Count of PoS on N-security >20% of time	8	4	14		

Note: these results are preliminary and may change following the final audit process.

[21] GP2 did not meet >=4 out of POS subcategories in 2023 DY, however it did meet the quality standard for DY 2023 as we met >= 4 POS subcategories in the previous two years. This figure excludes Cyclone Gabrielle impacts, as per the approved normalisation application

[22] This figure excludes Cyclone Gabrielle impacts, as per the approved normalisation application

[23] We recently uncovered data issues in our outage management system, IONS, in relation to the DY 2022 results for AP3. We have included updated details in this report and in our disclosures for this year.

Commentary on overall long-term performance

Overall, there has been an improvement trend in the long-term performance with respect to the number of unplanned interruptions across all PoS sub-categories. With the exception of 2015/2016, the last 4 years are the best performing years in the last 25 years for unplanned interruptions.

Observations on the long-term improvement in service performance are

- fewer interruptions caused by equipment failures with a decrease of 43 per cent over the past decade (2014-2023) when compared to the previous decade (2004-2013)
- fewer interruptions caused by human error incidents with a decrease of 36 per cent over the last decade (2014-2023) when compared to the previous decade (2004-2013)
- environmental caused interruptions have high variability, and we are seeing an increase in variability with 2020/21 having the lowest in 25 years, with 2017/18 the highest, and 2022/23 having the fourth highest in 25 years.

Several factors lie behind the underlying long-term improvement trend on the number of unplanned interruptions:

- asset management improvements in asset health, replacement and refurbishment planning, and maintenance regimes (e.g. outdoor circuit breaker performance)
- grid security improvements with system changes (e.g. the Maraetai bus sectionalisation)
- improving risk mitigation planning for outages
- programs to reduce the number of human error events during maintenance and project activities (e.g. protection testing work method statements, test plans, reviews and approvals).

Commentary on DY 2023 performance

The RCP3 service measures for DY 2023 shows overall good performance across all PoS sub-category targets for the number (GP1) and average duration (GP2) of unplanned interruptions (excluding Cyclone Gabrielle). For DY 2023, we have met all of the quality standards including GP1, GP2, AP1, AP2 (when excluding Cyclone Gabrielle) and the Asset Health quality standards for Outdoor Circuit Breakers and Power Transformers.

DY 2023 saw the fifth best performance in 25 years with 59 unplanned interruptions (excluding approved Cyclone Gabrielle related interruptions) for the RCP3 PoS, excluding Automatic Under Frequency Load Shedding (AUFLS), customer caused, and momentary interruptions.

When including Cyclone Gabrielle related interruptions, DY 2023 had 69 unplanned interruptions with the eighth best performance in the last 25 years. When including Cyclone Gabrielle related outages and interruptions, we would have met all of the quality standards except AP2. For GP2, we would have not met the PoS sub-category limits for four out of six of the PoS sub-categories.

During DY 2023, Transpower has achieved its best period on record in relation to Protection Technician Human Error Incidents (HEIs), with only two events causing five interruptions. One event can cause multiple interruptions at different points of service.

The average unplanned interruption duration for all RCP3 points of service in DY 2023 has shown an increase compared to the previous three years. However, history has shown that it only takes a few long duration events to skew the average. In DY 2023 the PoS sub-categories were under the applicable limit for their average duration, except for the N-1 generator PoS sub-category.

The AP1 measure for DY 2023 was better than the quality standard and collar but worse than the target. The main reason for not meeting the target for this disclosure year was largely due to the extension of the Pole 2 refurbishment project.

Commentary on breaches

For DY 2023, there were no breaches of the quality standards, excluding approved Cyclone Gabrielle events.

Commentary on DY 2023 collar/PoS sub-category exceedance

The commentary below addresses those measures where we have exceeded the PoS sub-category limit or collars in DY 2023.

GP2 – Duration of unplanned interruptions

While we have met the quality standard for GP2, for GP2E N-1 generator we exceeded the PoS sub-category limit of 298 minutes by 842 minutes. This was caused by one interruption at Manapouri (24,276 minutes capped at 10,080 minutes) where the 220 kV circuit breaker (bus coupler) failed to close following the end of the planned outage.

AP2 – HVAC selected assets availability

For DY 2023, the AP2 measure met the quality standard. The main reason for not meeting the collar is due to two outlier events, CUWLP major capital project (planned), and the PAK-WKM cable repair outages (unplanned). Without either of these two outlier events, we would have been better than the collar.

Commentary on DY 2023 Asset Health

We met the Asset Health quality standards for Outdoor Circuit Breakers and Power Transformers for DY 2023.

Interventions for Outdoor Circuit Breakers include replacements and conversions to indoor switchgear. The safety driver for indoor switchgear conversions of Outdoor Circuit Breakers will see a number of interventions occur before asset health reaches a score of 8. Interventions for Power Transformers include full bank replacements but also bushing replacements and overhauls. In addition, new connections or growth may see some transformers replaced earlier than expected.

Commentary on DY 2023 AP3 and AP4

The AP3 and AP4 outages have increased for DY 2023 compared to the previous two disclosure years. We have analysed this change in performance and are working on an action plan to continue to manage return to service times and communications.

Section 4.0

Overview of proposed RCP4 service measures

Overview of proposed RCP4 service measures

This section contains an

- overview of proposed grid service measures for RCP4
- overview of targets, caps, collars, incentives, and quality standards for RCP4.

For RCP3 we undertook a substantial refresh of our service measures. This included extensive engagement with our stakeholders. Information related to the earlier RCP3 Service Measures Refresh is available on our website[24], and the RCP4 refresh builds on this work.

The Commission sets the final service measures, including targets, caps, collars, revenue incentives, and quality standards.

We consider that most of the RCP3 measures set by the Commission are achieving their intent. However, we have identified several that may not be delivering on their intent of incentivising our performance. We have also identified areas where we are keen to test new (pilot) measures.

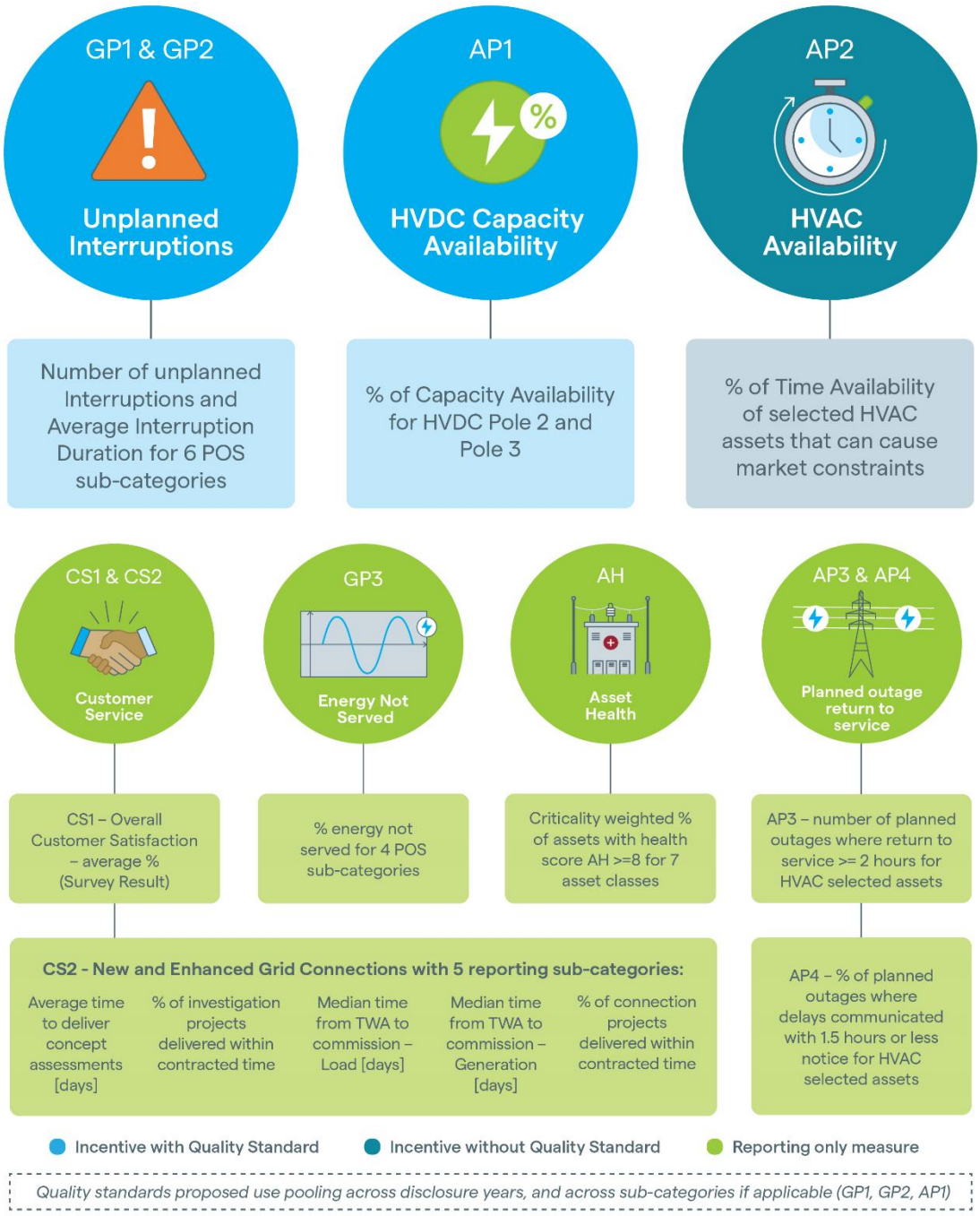
We believe that the transition between RCP3 and RCP4 represents an opportunity to fine tune the measures in most cases and to consider areas where desired service outcomes may not be appropriately incentivised. This approach was confirmed by feedback on our engagement papers (further details in Section 5).

4.1. RCP4 grid service measures refresh

For RCP4 we are proposing ten service measures, four of which are revenue linked and six of which are non-revenue linked. There are three measures of grid performance, four asset performance measures, two customer measures, and one asset health measure (with sub-categories for seven asset classes), as set out in Figure 1 and Table 14.

[24] RCP3 Service Measures Refresh

Figure 1: Overview of RCP4 proposed service measures



We propose to

- continue revenue-linking four measures – GP1, GP2, AP1, and AP2
- have quality standards for GP1, GP2, and AP1
- have reporting-only measures for AP3, AP4, GP3, CS1, CS2, and AH.

While we have sought to improve the RCP3 quality standard for AP2 and AH, our preference is to remove quality standards for these measures (refer to Sections 5.4 and 5.7 for our reasoning).

Table 14 - Overview of RCP4 proposed service measures[25]

Category	RCP4 Code	Quality Standard	Revenue Linked	RCP4 Performance Measure
Measures of Grid Performance (Grid Reliability)	GP1	Yes	Yes	Number of unplanned interruptions greater than one minute across all six supply and generation point of service sub-categories during a disclosure year.
	GP2	Yes	Yes	Average duration of unplanned interruptions greater than one minute, across six supply and generation point of service sub-categories during a disclosure year.
	GP3	No	No	Energy (MWh) not served across four supply point of service sub-categories.
Asset Performance Measures (Grid Availability)	AP1	Yes	Yes	HVDC capacity availability (%) of the inter-island high-voltage direct current (HVDC) system using monopole and bipole outages.
	AP2	No	Yes	Average percentage of time selected high voltage alternating current (HVAC) assets are available during a disclosure year.
	AP3	No	No	Return to service time – measures the extent to which Transpower meets planned return to service times for planned outages of selected HVAC assets that are returned to service two or more hours after Transpower's planned return to service time.
	AP4	No	No	Return to service time communications - measures the extent to which Transpower communicates delays to affected parties of planned outage return to service times of selected HVAC assets: • the percentage of outages that Transpower gives 1.5 hours or less notice to market (or industry) participants in the event assets are going to be returned to service later than the original planned return to service time; or • the extended return to service time.
Asset Health Measure	AH	No	No	A measure of the percentage of assets that are defined as being in 'poor' health (an asset health index of 8 or more). There are sub-categories for seven asset classes and some asset classes use a weighted criticality approach.
Customer Service Measures	CS1	No	No	A measure of overall customer satisfaction, based on a question in our annual customer survey (average percentage).
	CS2	No	No	Reporting on how we are delivering new or enhanced grid connections across five sub-categories representing different elements of the connection process.

[25] Note, for the purposes of the Capex Input Methodology Determination 2012, we are only proposing GP1, GP2, AP1, AP2, and AH as **grid output measures.**

We engaged with stakeholders to develop grid service measures that reflect the level of service that is important for our customers and stakeholders for RCP4. Our consultation activities included

- **Published the May 2022 engagement paper:**[26] This paper sought feedback on the engagement approach and the measures we propose to retain, modify, discontinue, or introduce. It also provided supporting material for those **new** to this subject area.
- **Held a stakeholder webinar:**[27] All stakeholders were invited to attend this webinar in May 2022. This webinar provided the opportunity to discuss and provide feedback on the service measures and the proposed evolution for RCP4.
- **Published a summary of feedback:**[28] A summary of the five submissions received from the May 2022 engagement paper has been published.
- **Published the second engagement paper in September 2022:**[29] This paper provided more detail on the proposed RCP4 service measures, and the proposed methodologies by which the measures will be calculated. It also formed part of our wider RCP4 consultation.
- **Published a second summary of feedback:**[30] A summary of the eight submissions received from the wider RCP4 consultation, including the September 2022 engagement paper, has been published.
- **Met with interested stakeholders between March and November 2022:** including our customer representative panel, the Major Electricity Users' Group (MUEG), Electricity Networks Association (ENA), Electricity Retailers' Association of New Zealand (ERANZ), along with our Consumer Advisory Panel.
- **Targeted engagement with submitters:** We reached out to stakeholders who provided feedback on our engagement papers to ensure we understood their views.

Overall, the submissions indicated there was general satisfaction with the current level of performance that Transpower provides. Stakeholders also indicated they were satisfied with the consultation on service measures, and that they did not want us to consult on specific targets before we submit our RCP4 proposal.

[26] Grid Service Engagement Paper published in May 2022
[27] Slides for the Grid Service Measures Engagement webinar held in May 2022
[28] Submission Summary – Grid Service Engagement Paper
[29] RCP4 Consultation document
[30] Submission Summary – RCP4 Consultation document

4.2. Key changes to grid service measures for RCP4

The proposed changes to the service measures for RCP4 are summarised in Table 15.

Table 15 - Summary of proposed changes to grid service measures for RCP4

Code	Grid service measure	Summary of changes
Retained measures		
GP1	Number of unplanned interruptions	**Retain measure**, and update POS list and categorisation based on forecast load, rather than historic load.
GP2	Average duration of unplanned interruptions	**Retain measure**, and update POS list and categorisation based on forecast load, rather than historic load.
AP3	Return to service	**Retain measure**, and align with updated AP2 selected assets
AP4	Return to service communications	**Retain measure**, and align with updated AP2 selected assets
Modified measures		
AP1	HVDC capacity availability (%) of the HVDC inter-island bipole link	**Modify measure.** Exclude major capex projects, listed projects, and HVDC resilience workstreams proposed under a new uncertainty mechanism. Cap the impact of individual unplanned events to 0.5%. Introduce pooling across disclosure years for the quality standard, similar to settings for GP1 and GP2.
AP2	Average percentage of time selected HVAC assets are available	**Modify measure.** Exclude major capex projects, listed projects, customer-funded work, and base capex enhancement and development work. Update the list of selected assets to 62 assets that can cause market constraints. Cap the impact of individual unplanned events to 150 hours. Remove the quality standard for AP2 for RCP4. Introduce pooling across disclosure years for the quality standard (if retained), similar to settings for GP1 and GP2.
AH	Proportion of assets in poor health for selected asset classes	**Modify measure.** Expand to seven asset classes. Introduce weighting by criticality for some asset classes. Remove the quality standard for AH for RCP4. If quality standard retained, introduce annual quality limits with pooling across asset classes and disclosure years, similar to settings for GP1 and GP2.
New pilot measures		
GP3	Energy not served	**Trial new pilot measure** (reporting-only) for energy not served, reporting against the same four supply PoS sub-categories as GP1 and GP2 (Note: we consulted on this as 'NR – Network Risk').

Code	Grid service measure	Summary of changes
CS1	Overall customer satisfaction	**Trial new pilot measure** (reporting-only) for overall customer satisfaction, based on our customer survey.
CS2	New and enhanced grid connections	**Trial a new pilot measure** (reporting-only) for new and enhanced grid connections, with five reporting sub-categories: • Average time to deliver concept assessments (days) • % of investigation projects delivered within contracted time • Median time from TWA[31] to commission – Load (days) • Median time from TWA to commission – Generation (days) • % of connection projects delivered within contracted time
Discontinued measures		
AP5	N-Security reporting	**Discontinue measure** and continue with existing business processes related to N-security and outage planning.
GP-M	Number of momentary unplanned interruptions, with a duration < 1min	**Discontinue measure** and include customer-specific information about momentary interruptions in Customer Engagement Plans.

Our customers have told us that the most important areas for Transpower to focus on are reducing the number of interruptions and their duration, network availability and how we manage delays during planned outages. Customers were also clear that measures should be simple, meaningful, and reflect outcomes that are valued by customers and consumers. This feedback has influenced how we have set up our service measures, revenue incentives and quality standards for RCP4.

4.3. Overview of revenue incentives

We have developed proposed revenue incentives based on regulatory requirements and the approach we consulted on during 2022.

For each revenue linked measure, we must propose a target, cap, collar, and incentive rate to meet the requirements of the grid output mechanism set out in our Capex Input Methodology. Those parameters enable the link between our performance and the revenue at risk (described below) and are referred to as “settings” in this document.

The target for each measure represents a result where there would be no financial impact, i.e. we receive no financial penalty or reward. The caps and collars set the range of performance within which we are penalised or rewarded.

The caps and collars are symmetric, meaning that the incentive rate is the same for rewards and penalties, and the maximum reward is equal to the maximum penalty. The strength of each

[31] Transpower Works Agreement

revenue incentive is determined by the incentive rate and is different depending on the measure. This is the same approach that was used in RCP3.

Our aim is to link the strength of the incentive rate to the economic consequence of the related measure. The rate is then applied to the difference between actual and target performance, within the defined limits (caps and collars), which then determines any adjustments to our revenue during RCP4.

Total revenue at risk

Our total revenue at risk under the four revenue linked measures proposed for RCP4 is 1.4 per cent of our total forecast revenue. Based on the financial forecast in our RCP4 proposal, the revenue at risk is forecast to be $18 million per year during RCP4. The revenue at risk figure will be updated to align with the Commission's final determination.

The forecast revenue at risk compares to 1.4 per cent for RCP3, as set by the Commission, and 1.8 per cent for RCP2 (shown in Table 16) and is within the 1-4 per cent typically seen internationally. We consulted on setting revenue at risk at 1.4 per cent as part of our wider RCP4 consultation in September 2022, however no respondents provided an opinion on the level of revenue at risk.

Table 16 - Revenue at risk summary

Revenue incentives[32]	RCP2	RCP3	RCP4
Annual revenue at risk		$11m	$18m
5-year revenue at risk	$89m	$54m	$90m
Percentage of revenue	1.8%	1.4%	1.4%

Our proposed allocation of total revenue at risk to the measures that have a revenue incentive (GP1, GP2, AP1 and AP2) is set out in Table 17. We have allocated more of the incentive pool to the reliability measures (GP1 and GP2) than the availability measures, reflecting the higher economic impact of interruptions and the importance of grid reliability for connected customers and end-consumers.

Table 17 - Allocation of total revenue at risk for revenue-incentive measures for RCP3 and RCP4

Code	Grid service measure	Percentage of revenue at risk	
		RCP3	RCP4
GP1	Number of unplanned interruptions	~43	~45
GP2	Average duration of unplanned interruptions	~43	~45
AP1	HVDC capacity availability (%) of the HVDC inter-island system	~5	~3
AP2	Average percentage of time selected HVAC assets are available	~9	~6
	Total	100	100

[32] Revenue at risk figures are in nominal dollar terms in this table: RCP2 and RCP3 revenue at risk figures are extracted from the IPP determinations; and the RCP4 figures are presented in nominal $s

4.4. Overview of quality standards settings

Our view is that quality standards should be an indicator of systemic service issues that require investigation, and the design of quality standard settings should seek to minimise false positives.

We consider that the pooled quality standards in place for GP1 and GP2 in RCP3 are working well, and this approach should be expanded to all quality standards for RCP4. Pooled quality standards use 'quality limits' and are discussed later in this report.

We also note that the number of quality standards in place affects the probability of breaching a quality standard during a RCP, and the suite of service measures should be considered in totality to ensure the overall quality standard settings are balanced and focused.

4.5. Proposed revenue incentive and quality standard settings

Table 18 (below) shows a summary of the targets, caps, collars, incentive rates, revenue at risk, quality limits, and quality standards for the relevant RCP4 service measures. We consider that the proposed incentive settings are appropriately designed, and ensure we are under the right incentives to perform against measures that matter to our customers and stakeholders.

See full details in Section 5 for each service measure, such as the exclusion of some work types for AP1 and AP2.

While our preference is to remove the quality standard for AP2 for RCP4, we have also prepared alternative quality limits and standards for AP2 – both are shown in Table 18 (below). Similarly, while we are also keen to explore removing quality standards for asset health (AH) for RCP4, we have also prepared alternative quality limits and standards for AH. The details are summarised in Table 18 and Table 26 (below). These quality limits are not an indication of forecast asset health.

As mentioned, we are also proposing to apply 'pooling' for all quality standards, similar to the design of GP1 and GP2 for RCP3. Pooling is described further for relevant measures in Section 5. Using a pooled approach recognises that a quality standard should be looking for a clear trend of poor performance across reporting sub-categories and years and can help to manage volatility associated with these measures.

Table 18 - Incentive and quality standard summary

Measure and sub-category	POS/ asset count	Cap	Target	Collar	Incentive rate	$ at risk	Quality limit	Quality std
GP1: Number of unplanned interruptions					$ per event			
N-1 Security High Economic Consequence	37	0	5	10	725,003	3,625,017	10	Pooling
N-1 Security Material Economic Consequence	105	5	24	43	157,717	2,996,627	43	
N-Security High Economic Consequence	9	0	2	4	170,394	340,789	4	
N-Security Material Economic Consequence	26	6	22	38	53,241	851,862	38	
N-1 Security Generator	41	5	10	15	50,000	250,000	15	
N-Security Generator	10	7	12	17	50,000	250,000	17	
GP2: Average duration of unplanned interruptions (mins)					$ per min			
N-1 Security High Economic Consequence	37	23	73	123	72,500	3,625,017	123	Pooling
N-1 Security Material Economic Consequence	105	27	74	121	63,758	2,996,627	121	
N-Security High Economic Consequence	9	15	66	117	6,682	340,789	117	
N-Security Material Economic Consequence	26	0	104	208	8,191	851,862	208	
N-1 Security Generator	41	30	225	420	1,282	250,000	420	
N-Security Generator	10	0	123	246	2,033	250,000	246	
AP1: HVDC capacity availability (%)					$ per 1%			
AP1: HVDC capacity availability (%), excl. project allowances	-	99.00	98.00	97.00	500,000	500,000	96.00	Pooling
Project allowances: • Project K – Pole 2 refurbishment project • Combined TCU (Thyristor control unit) and HMI software upgrade • HVDC cable maintenance	-						-	-
AP2: HVAC availability (%)					$ per 1%			
Option 1 **(preferred)**: AP2: HVAC availability (%) – no quality standard	62	98.63	98.25	97.87	2,658,537	1,000,000	None	None
Option 2: AP2: HVAC availability (%) – with quality standard	62	98.63	98.25	97.87	2,658,537	1,000,000	97.45	Pooling
AH: Asset health (see Table 26)	-	-	-	-	N/A			None or pooling

4.6. Changes since our RCP4 consultation in 2022

Since consulting on our proposal in September-November 2022, we have developed proposed targets, caps, collars, incentives, and quality standard settings, and have taken on board feedback from stakeholders and the Independent Verifier (IV) to finalise our proposed service measures for RCP4. The key outcomes are listed below:

- developed draft view of targets, caps, collars, incentives, quality limits, and quality standards for review by the IV
- renamed 'Network Risk' measure as GP3 – Energy Not Served
- increased the proposed threshold limit for AP1 from 0.125 per cent to 0.5 per cent, and confirmed project-specific allowances for RCP4
- finalised AP2 selected asset list, reverting to including the Manapouri bus sections rather than the Manapouri – North Makarewa circuits
- re-ran analysis to calculate targets, caps, collars, incentives, and quality limits aligned with our final RCP4 proposal (forecast workplan, expenditure, asset health models)
- considered the overall probability of exceedance for quality standards, for individual service measures and for the overall set of service measures.

Section 5.0
Proposed service measures for RCP4

Proposed grid service measures for RCP4

This section contains

- further detail on proposed grid service measures for RCP4
- proposed methodologies and refinements for the grid service measures, targets, caps, collars, incentives, and quality standards for RCP4
- our consideration of the main areas of feedback from the engagement submissions and Independent Verification. **GP1 and GP2 – unplanned interruptions**

The grid performance measures, GP1 and GP2, assess grid reliability and aim to incentivise Transpower to provide a reliable grid service by minimising the number of interruptions and restoring service quickly. A full definition of "interruptions" is set out in Appendix A.

GP1 and GP2 measure and report the yearly number of unplanned interruptions (GP1), and the yearly average duration of unplanned interruptions greater than one minute (GP2), across all PoS in a sub-category.

5.1.1. What we are proposing

We propose to retain GP1 and GP2, with minor modifications.

PoS categorisations

The measures are each reported across six PoS sub-categories for RCP3 as set out in Table 3 and Table 4 (above). The PoS categorisations are based on the level of security, whether it is a generation or supply PoS, and whether the supply connection is of material or high economic consequence. We propose to retain the same PoS sub-categories for RCP4.

We have updated the list of PoS that these measures are applied to in order to reflect changes that have occurred since RCP3, and upcoming changes related to committed works. Changes to the PoS list and categorisation are set out in Appendix B.

Proposed method for categorising PoS into sub-categories

Supply PoS are categorised according to

- their level of security, i.e. N-1 (or better) and N-security categories, with sub-categories based on levels of demand; and
- a qualitative evaluation of economic consequence from an unplanned interruption, i.e. 'High' and 'Material' economic consequence.

Generator PoS are separated into sites with N-1 security and those with N-security.

To update the categorisation of PoS into sub-categories for RCP4 we are using a similar approach to RCP3, modified to use forecast load rather than historical load data. We have reviewed the level of security assigned to each PoS and calculated economic consequence using value of lost load and forecast load based on our 2023 Transmission Planning Report. In defining the boundaries of 'High' and 'Material' we have used a clustering algorithm.

The reason we are proposing to use forecast load is based on the rapid pace of change within the electricity industry. The demand forecasts indicate significant quantities of new load and

generation are now imminent, so it is necessary to tailor our grid performance measures to the future period they will apply to, rather than basing them on historical conditions. Stakeholder submissions supported this approach.

This modification and updated data results in some PoS shifting from their current (RCP3) sub-category. The proposed allocation of each PoS to a sub-category can be viewed in Appendix B, and the changes to the number of PoS per sub-category are outlined in Table 19.

Table 19 - Number of PoS per sub-category in RCP3 and proposed for RCP4

Level of service	Sub-category	RCP3	RCP4
N-1 security	High Economic Consequence	48	37
	Material Economic Consequence	95	105
	Generator	44	41
	N-1 security total	**187**	**183**
N-security	High Economic Consequence	12	9
	Material Economic Consequence	21	26
	Generator	9	10
	N-security total	**42**	**45**
	Total	**229**	**228**

5.1.2. Targets, caps, collars, incentives, and quality standard

GP1 and GP2 targets

The proposed RCP4 targets for the GP1 (number of unplanned interruptions) and GP2 (duration of unplanned interruptions) service measures are outlined in Table 18 (see Section 4.5 above).

For RCP4 we propose a similar approach to RCP3, with targets based on historical data:

- GP1 to use the 5-year average for equipment-related unplanned interruptions as equipment failures have reduced in recent years, and to use the 25-year average for non-equipment related causes
- GP2 to use the 25-year average for all causes of unplanned interruptions
- For new PoS, where we do not have historical data, we will use the average of the other PoS in the sub-category for determining the GP1 and GP2 targets
- For both GP1 and GP2, the historical data we used excluded events due to automatic under-frequency load shedding (AUFLS), as well as events that did not originate in Transpower's system. This includes a seven-day cap on the duration of the interruption (to reduce the effect of extreme events), similar to RCP3.

Our customers have told us that they are satisfied with the current level of service in the network. We have planned our RCP4 expenditure to maintain, at an organisational level, a similar risk level as we have for RCP3, this means our RCP4 GP1 and GP2 targets are similar to our RCP3 targets.

Figure 2 and Figure 3 below show our historical performance for GP1 and GP2 since 1999, and our aggregated targets for the rest of RCP3 and RCP4 (forecast). We consider that the targets developed provide an indication of forecast performance at the start and end of RCP4.

Figure 2: Historical performance for GP1 and our forecast targets for RCP4

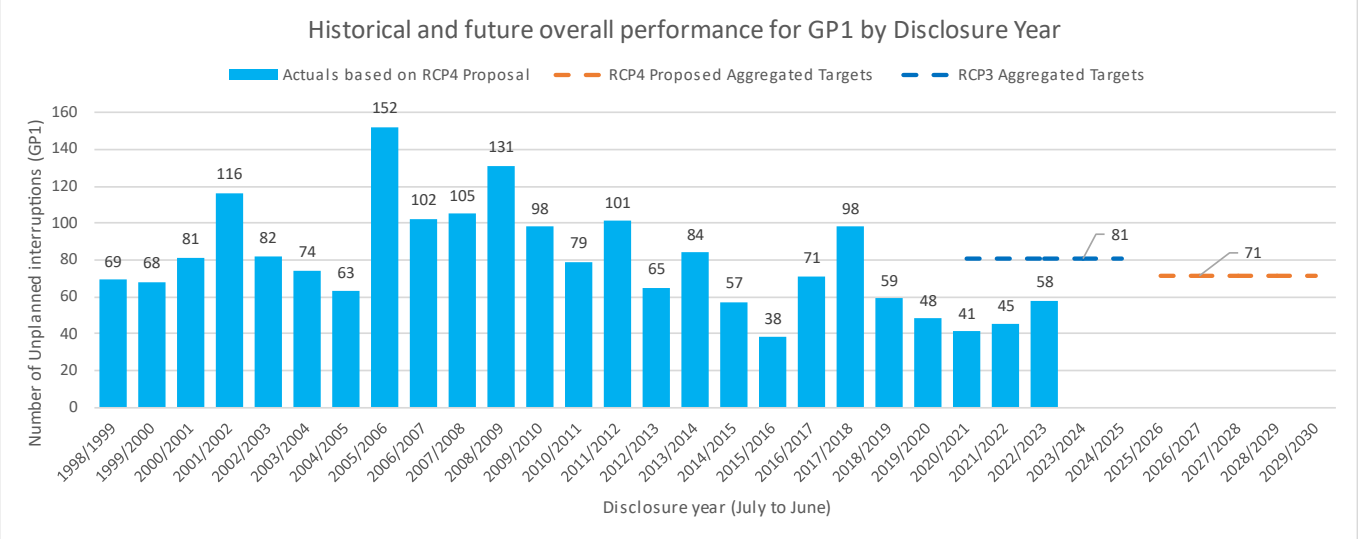
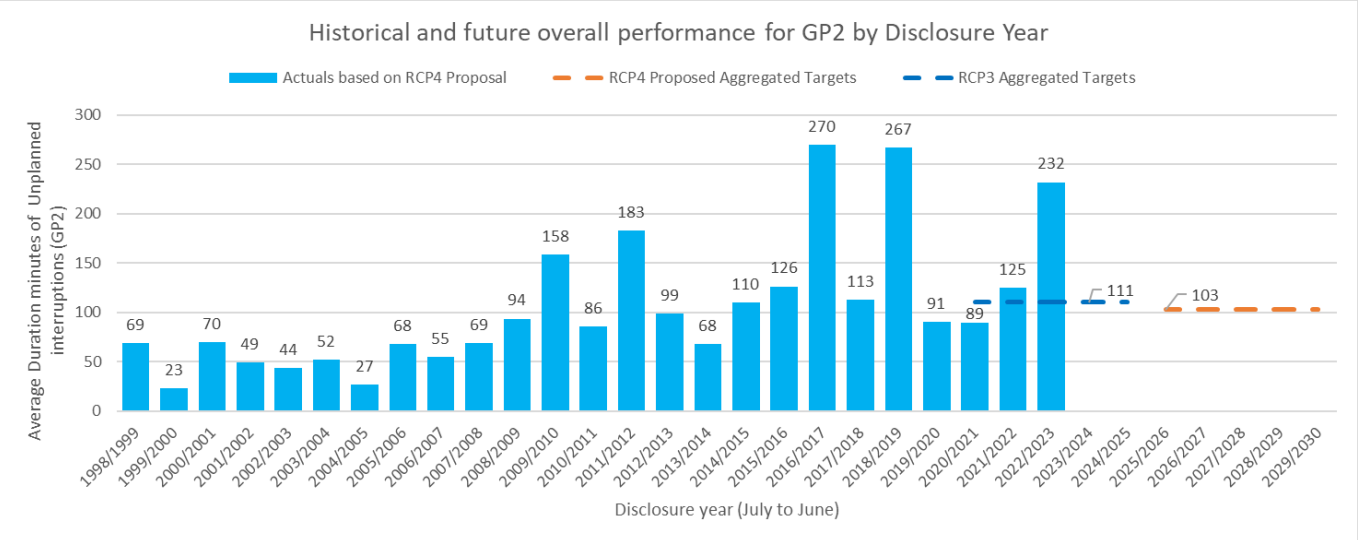


Figure 3: Historical performance for GP2 and our forecast targets for RCP4



GP1 and GP2 caps, collars, and incentives

The caps and collars for each GP1 and GP2 sub-category are based on historical interruption data. Caps and collars for each sub-category are set at +/- one standard deviation from the target based on the data for the relevant PoS, except for the 'Material Economic Consequences' sub-categories where a 1.5 standard deviation was applied as greater variation was observed in the data.

The proposed incentive rates are based on the economic value and the spread (how far the cap/collar is from the target) for each sub-category. We have checked the incentive rates, and they are in line with value of lost load.

The proposed values are set out in Table 18 (see Section 4.5 above).

GP1 and GP2 quality standards

We propose to retain the current approach for setting the quality standards for GP1 and GP2. This includes pooling across disclosure years and sub-categories, which are assessed against annual quality limits[33]. The approach to pooling is outlined in Table 20. Annual quality limits proposed for GP1 and GP2 for RCP4 align with the collar values (unlike the quality limits proposed for other measures). The proposed quality limits are set out in Table 18 (see Section 4.5 above).

Table 20 - Pooled approach to quality standards for GP1 and GP2 in RCP4

	DY 2026	DY 2027	DY 2028 – 2030
Measure of grid performance for the disclosure year *(pooling across sub-categories)*	Four or more of the six PoS sub-category quality limits for each measure are not exceeded for the disclosure year (DY)		
Quality standard *(pooling across disclosure years)*	Calculate values, no compliance assessment	Comply with the measure of grid performance in disclosure year, or if not, then to have complied in DY 2026	Comply with the measure of grid performance in disclosure year, or if not, then to have complied in the previous two disclosure years

We would like to retain normalisation criteria, similar to RCP3 settings, for GP1, GP2, GP3, AP1, and AP2 and capping of unplanned interruption duration for the purposes of GP2 to seven days.

5.1.3. How we addressed feedback from stakeholders and the IV

Contact Energy and Meridian Energy supported retaining the grid performance measures (GP1 and GP2), using the same PoS categories, the proposed method for updating the list of PoS, and using future load forecasts when categorising the PoS.

Meridian gave feedback on our first engagement paper that it wanted more information on the methodology that we proposed to use to update the list of PoS. We provided that information in our second engagement paper.

Mercury suggested the sub-categories be updated to recognise that certain generator connections may be of particular importance. We considered but do not recommend further sub-categorisation of generator PoS by economic consequence or generator size for the following reasons:

- we do not have Value of Lost Generation data for generator PoS, and the marginal price of electricity is typically at least an order of magnitude lower than VoLL
- separating generator PoS by size could be a market distortion, potentially providing differentiated reliability of supply to different generators

[33] Referred to as 'Point of service sub-category limits' in RCP3.

- further subcategorising by generator size would increase the number of sub-categories and increase volatility in performance due to the reduced number of PoS in each generator sub-category. Pooling for the quality standards would need to be reviewed and updated
- this feedback and approach is consistent with the RCP3 service measures refresh.

The IV supports retaining both measures and categorising the PoS using load forecast rather than historic actual loads. The IV has suggested in the future we should consider setting targets that are not linked to historical averages as there is a risk that this method can result in deteriorating targets over time. They suggested that, when exploring quality standards for the future, we explore the merit in setting defined minimum performance levels acceptable to stakeholders as an alternative. Given our customers have told us that they are satisfied with the current level of reliability in the network, we are satisfied that the settings are appropriate for RCP4.

5.2. GP3 – Energy not served

The proposed pilot service measure (GP3) is intended to indicate the impact to supply customers of events on the grid that Transpower can influence to improve grid reliability.

GP3 will measure energy not served, which is the amount of energy demand that is not supplied due to a transmission interruption to supply (Energy Not Served).

We will report against the same four supply PoS sub-categories applied to GP1 and GP2, i.e. N-1 high economic consequence; N-1 material economic consequence; N high economic consequence and N material economic consequence.

Note: We consulted on this measure in 2022 as ‘NR – Network Risk’.

5.2.1. What we are proposing

We are proposing GP3 as a pilot reporting-only measure as our capability to forecast Energy Not Served is still maturing. The measure would:

- be the percentage of Energy Not Served (MWh), i.e. the yearly percentage of MWh not served due to interruption divided by total energy demand MWh for that disclosure year. For the purpose of this measure, energy demand equals energy not served, plus energy served
- be reported on within the same four supply PoS sub-categories as those applied to GP1 and GP2, as set out in Table 4
- include all interruptions, except those caused by customers as they are outside of our control.

Our reasons for the introduction of this measure are

- the measure would incentivise Transpower to make investment and operational decisions that minimise the risk of high impact service interruptions, based on both potential interruption length and the size of load interrupted, such as those that would impact cities and major energy users
- the Energy Not Served calculation (or similar variants of that calculation) is used in other regulatory jurisdictions, e.g. UK and Australia, that are similar to Aotearoa New Zealand’s power system
- an Energy Not Served measure fully describes network performance for supply customers. All factors that lead to an interruption should be managed as part of our network management,

recognising that there are economic trade-offs as to whether all risks are pre-emptively managed by us.

We recognise that a measure using Energy Not Served does not quantify the impact of interruptions on generation customers. We propose that this is still an acceptable measure to use, and that performance of our service to generation customers is supported through other measures such as GP1, GP2, AP1 and AP2.

5.2.2. Targets, caps, collars, incentive, and quality standards

We are not proposing to introduce a target, incentive, or quality standard to GP3.

We note that there is a relationship between GP3 and GP1 / GP2. Any potential future targets, incentives, or quality standards would need to ensure there is no double counting between these measures and consider the impact on the overall probability of meeting all quality standards during a regulatory control period.

As this is a new trial reporting-only measure for RCP4 and we do not currently model or predict this performance at an aggregate level, we have not forecast an outturn level of energy not served.

5.2.3. How we addressed feedback from stakeholders and the IV

Contact Energy, Meridian Energy, and Electra were supportive of the GP3 measure proposed and offered the following specific suggestions:

- that this measure include all events of energy not served, not only those related to asset health (Meridian Energy). We have clarified that this measure will include all interruptions, except those caused by customers as they are outside of Transpower's control
- that total energy not served be used as the measure, instead of a percentage (Meridian Energy). We have considered this feedback and propose to continue with a percentage as total energy not served would make the comparison between different PoS categories more difficult. Also, using the percentage of total energy demand removes the influence of changes in demand
- the exclusive use of the suggested PoS categories, as this measure may lead to further insight resulting in other risk categorisations coming to light (Electra). We agree with this feedback and will monitor this measure internally to see if future changes are required to risk categories
- a new measure was suggested to feed into the energy not served measure, relating to the extent to which any grid event causes consumers to resort to alternative energy sources, such as coal or petroleum fuels (Energy Trusts of New Zealand Inc (ETNZ)). We do not agree that the alternative measure suggested provides a meaningful or practicable measure of the quality of service we provide to end-consumers. This detailed information is not readily available to Transpower for reporting purposes.

The IV supported our proposal to introduce this measure, however they suggested the title be changed as it does not assess risk, rather the network impact after incidents occur. Based on this feedback we renamed this measure to 'GP3 – Energy Not Served' and grouped it with GP1 and GP2 as it has similar sub-categories.

5.3. AP1 – HVDC capacity availability

The AP1 service measure aims to incentivise Transpower to minimise the impact on the electricity market from capacity reduction of the HVDC Pole 2 and Pole 3 due to outages on the HVDC itself.

AP1 measures the HVDC capacity availability (%) of the inter-island HVDC system.

Note this capacity availability is due to unavailability of the monopole or bipole outages on the HVDC link. It does not consider any HVAC assets or reactive support assets that can impact HVDC transfer capacity.

5.3.1. What we are proposing

We propose that AP1 is modified for RCP4 in the following ways:

- excludes the impact of associated outages from all major capex projects and listed projects involving the HVDC Pole 2 and Pole 3. There are several major interventions planned on the HVDC Pole 2 and Pole 3 in RCP4 and RCP5, including replacement or upgrade of the HVDC Cook Strait cables. We consult with customers on major capex projects and listed projects, and these are approved by the Commission separately. These projects can have significant outage requirements, and there is often uncertainty about scope and timing until they are approved
- excludes the impact of new resilience workstreams proposed to harden HVDC towers against wind and flood damage. These workstreams are proposed for RCP4 under a new 'uncertainty mechanism' and have significant outage requirements and uncertainty (similar to major capex projects and listed projects). The scope of work may change after the RCP4 proposal as investigations and business cases are prepared
- develops targets for the measure based on our workplan
- mitigates the impact of major unplanned outages by including a threshold limit for major unplanned outage hours to ensure that no single unplanned event can have a disproportionate impact on the overall performance against the measure in a year. This concept has been introduced in other jurisdictions and a similar threshold exists for duration in GP2. The threshold limit is proposed to be set at a relatively large value, 0.5 per cent of the total annual capacity availability. If a single event caused an outage(s) that exceeded this threshold, its impact on AP1 would be capped at 0.5 per cent.[34] We would continue to have a significant incentive to avoid unplanned outages, and the revenue incentive to meet the measure would not be extinguished by a single event[35]
- introduces annual quality limits that are pooled across several disclosure years for the quality standard.

[34] There have only been three events in the previous 25 years above this threshold limit – Insulator attachment point failure at Weka Pass in 2022; 2013 storm damage to T10 converter transformer housing, and 2011 P2 capacity reduction.

[35] The Commission made a similar point for the distribution networks when they experience a major event and allows those networks to normalise for major events to ensure "that particularly large interruptions are unlikely to contribute to a contravention unless the assessed unplanned SAIDI [System Average Interruption Duration Index] or SAIFI [System Average Interruption Frequency Index] is high enough for other reasons."

5.3.2. Targets, caps, collars, incentives, and quality standards

AP1 target

For setting the target for RCP4, we propose a similar method to RCP3, as follows:

- deduct estimated planned outages to maintain HVDC assets
- deduct reasonably expected unplanned outages based on our historic performance and the percentage approved in RCP3
- apply project-specific allowances to recognise work that will require much longer outage times than what would normally be required for routine maintenance.

We applied this method to develop the proposed target (our customers told us they did not want us to consult on the targets). In calculating the planned outages for the target, and the actual figures for RCP4, we propose to exclude the impact of associated outages from all major capex projects, all listed projects, and the HVDC resilience workstreams[36] involving the HVDC Pole 2 and Pole 3.

Proposed deductions and allowances, together with the target, are set out in Table 21. We consider that the targets developed provide an indication of forecast performance at the start and end of RCP4.

Table 21 - Summary of HVDC capacity availability target for RCP4

AP1 Target Summary	RCP4 (%)	Notes
Annual target		
Planned outages	1.75%	Includes 1.25% for yearly maintenance typically undertaken on the HVDC stations and cables; and 0.5% for tower painting and attachment point replacements
Unplanned outages	0.25%	Based on historical performance and the percentage approved in RCP3
Overall availability target	**98.00%**	
Project-specific allowances to be excluded from the above proposed target		
Project K - Pole 2 refurbishment project	1.26%	Allows for 11-day Pole 2 outage (in addition to yearly shut down) across one or two disclosure years (in total)
Combined TCU (Thyristor control unit) and HMI software upgrade	3.84%	Allows for 2-week bipole outage (in addition to yearly shut down) during one disclosure year
HVDC cable maintenance	0.80% yearly	Allows for up to 0.8% each year of RCP4 to reflect testing and issues discovered from testing due to ageing subsea cables.

[36] The exclusion of the HVDC resilience workstreams was identified as part of the development of targets, caps, collars, and quality standards, which was undertaken after the 2022 consultation.

We considered a range of scenarios for target development (best, prudent, and worst cases). Our proposed target is based on the prudent outage estimates and assumptions, and project-specific allowances based on the worst-case outage estimates. The worst-case outage estimates are also used as a high-level check for the suitability of the proposed quality limit and quality standard.

AP1 cap, collar and incentives

We propose to retain the same 1 per cent availability offset from the target for caps and collars, and the same annual revenue at risk, i.e. $0.5 million per year, $2.5 million across RCP4, which reflects the economic value of HVDC unavailability.[37] This results in the same incentive rate for RCP4 ($500,000 per %).

The proposed values are set out in Table 18 (see Section 4.5 above). These values differ from RCP3, as the proposed target has shifted.

AP1 quality standard

We propose that the AP1 quality standard is modified to introduce pooling across disclosure years, assessed against annual quality limits.

Using a pooled approach would mitigate the risks of false negatives from annual breaches and reduce the risk of breaching the quality standard even when our practices follow Good Electricity Industry Practice (GEIP). This approach would also improve consistency across service measures as GP1 and GP2 already use a pooling mechanism in RCP3.

The proposed method for pooling is to comply with the AP1 quality limit in the current disclosure year or, if not, then to have complied in the previous two disclosure years, as set out in Table 22.

We propose a 1 per cent availability offset from the collar for the quality limit. The proposed quality limit is set out in Table 18 (see Section 4.5 above).

Table 22 - Proposed method for pooling across disclosure years for AP1

DY 2026	DY 2027	DY 2028 – 2030
Calculate values, no compliance assessment	Comply with the quality limit in the disclosure year, or if not, then to have complied in DY2026	Comply with the quality limit in the disclosure year, or if not, then to have complied in the previous two disclosure years

5.3.3. How we addressed feedback from stakeholders and the IV

There was mixed support from submitters for what we are proposing. Both Contact Energy and Meridian Energy supported excluding impacts from major capex projects. However, Meridian Energy did not support excluding listed projects unless there is a process in place to ensure that those projects are treated in a similar way to major capex projects. We clarified in our second engagement paper that we are already required to consult on listed projects under the Input Methodology prescribed by the Commission, and noted that we consider that this consultation requirement, and the engagement with industry stakeholders in developing the annual outage plan, address the concern that there would not be enough scrutiny on Transpower to ensure

[37] Based on asset criticality modelling.

accountability for listed projects outside of the AP1 measure. Submitters did not raise further concerns on this point.

Contact Energy and Meridian Energy commented that the measure needs to take account of the uniqueness of the Aotearoa New Zealand power system with respect to the reliance that is placed on the HVDC link. We considered this feedback and are no longer proposing to use the international comparison on HVDC availability to adjust the target; instead, we are providing this information as a benchmark in our RCP4 proposal (see Appendix C). Neither Contact Energy nor Meridian Energy supported the modification of the measure to mitigate the impact of major unplanned outages by either introducing a threshold limit or by excluding all unplanned outages.

We listened to this feedback and have amended our proposal so the measure continues to include all unplanned outages. However, we still consider there are merits to a threshold limit for outages relating to a single event and disagree this would negate the incentive to uphold the availability of the HVDC. Rather, we would continue to have a significant incentive to avoid unplanned outages, and the revenue incentive to meet the measure would not be extinguished by a single event.

Meridian Energy considered that the combination of an allowance for unplanned outages, the threshold limit for major unplanned outages related to a single event, and the ability to pool across disclosure years, does not provide a meaningful indication of performance for HVDC capacity availability. We disagree with this view and note that the design of GP2 for RCP3 includes these three features and continues to be an effective measure. We do not agree that pooling of the quality standard 'hides' poor performance in any given year, as the performance for each year is visible in reporting and no pooling is applied to the revenue incentive targets. Pooling applied to the quality standard focuses any investigations on a trend of poor performance, rather than poor performance in a single year.

The IV supports all proposed changes, except for mitigating the impact of major unplanned outages.

The subsequent change from the RCP4 consultation and IV review was to propose an increased threshold limit from 0.125 per cent (half of the annual deduction for unplanned outages) to 0.5 per cent (twice the annual deduction for unplanned outages). This higher limit seeks to address the concerns raised by both customers and the IV about managing the impact of rare events on the AP1 quality standard. Only three events in the last 25 years have been above this increased limit.

We have also included another project-specific allowance for HVDC cable maintenance in our RCP4 proposal, based on updated information received after the RCP4 consultation and IV review.

5.4. AP2 – HVAC selected assets availability

The AP2 service measure is aimed at minimising the impact of the electricity market on consumers due to system constraints in the transmission system from HVAC assets being unavailable.

AP2 measures the average percentage of time selected HVAC assets are available.

5.4.1. What we are proposing

We propose that AP2 is modified for RCP4 in the following ways:

- limit the scope of planned outages included in the measure to unavailability caused by Transpower's maintenance and base replacement and refurbishment works (excluding listed projects) that are funded from the RCP4 allowance
- exclude planned outages to availability caused by the following work types (as described in Transpower's Capex Input Methodology): customer-funded work; listed projects; enhancement and development projects and major capex projects. The scope and timing of the excluded work types is subject to greater uncertainty and largely driven by factors beyond our control due to the dependencies on external factors. Additional customer consultation is also undertaken for these works, and projects are largely funded outside of our RCP4 proposal. These exclusions are discussed further below
- mitigate the impact of major unplanned outages on the measure by including a threshold limit for major unplanned outages to ensure that no single unplanned event can have a disproportionate impact on the overall performance against the measure in a year. This concept has been introduced in other jurisdictions and a similar threshold exists for duration in GP2. While each major unplanned outage would still count towards AP2, up to the defined limit (150 hours), any outage hours beyond the limit would not be counted. This would help to ensure the revenue incentive remains throughout the year to efficiently manage other planned works and avoid the situation where the target for AP2 is continually beyond reach.
- update the list of selected HVAC assets based on our latest System Security Forecast[38] and upcoming enhancement and development work to ensure that the list appropriately reflects anticipated constraints on the electricity market during RCP4
- remove the quality standard (preferred option) or introduce annual quality limits that are pooled across several disclosure years. The measure remains revenue linked. Key considerations for removal of the quality standard are set out in Section 5.4.2 (AP2 quality standard).

The modifications we are proposing seek to achieve greater alignment with the intent of the measure, while avoiding disincentives to deliver the higher levels of work required in RCP4 to support electrification, maintain existing assets, and ensure we deliver a resilient service. We believe that retaining a modified availability-based measure creates appropriate incentives, while balancing the efforts of Transpower's workforce and regulatory stability.

Additional discussion about focusing AP2 on maintenance and base replacement and refurbishment works, and excluding unavailability caused by major capex projects, listed projects, customer-funded work, and base capex enhancement and development projects is set out below.

With the rapid pace of change within the electricity industry, we have experienced a significant increase in requests for new connections, and an increasing need to enhance the grid to meet the changing supply and demand dynamic. At the same time, there is also an increasing need to maintain ageing assets to continue to deliver a safe and reliable service.

The scope and timing of new customer-funded projects, listed projects, major capex projects, and our base capex enhancement and development work, is subject to greater uncertainty and largely driven by factors beyond our control. This is due to the dependencies on external factors ranging from commercial investment decisions, land and consenting rights, demand growth and other third-party developments. As a result of the inherent uncertainty associated with these works, accurately predicting the timing and scope of outages on AP2 assets is extremely difficult, and our ability to plan these works to coincide with our RCP4 funded works is limited.

[38] System Security Forecast and related documents

Additional customer consultation is also undertaken for these works, and projects are largely funded outside of our RCP4 proposal.

An example is the Clutha Upper Waitaki line reconductoring project that was approved under a major capital proposal with consultation from our customers. At the time of the RCP3 proposal, the project timing was identified to be in RCP4. Due to external factors, the project was advanced from RCP4 to RCP3. The change in timing had an unintended impact on Transpower's ability to meet the AP2 targets in RCP3.

In its current form, AP2 can create unintended situations. For example, projects previously not planned for RCP3 can make it impossible for Transpower to meet the quality standard for AP2, even though those projects are creating long-term benefits for consumers and are, in some cases, approved by the Commission. Where customer or grid enhancement projects impact the measure, we are incentivised to consider whether maintenance, replacement, and refurbishment work should be deferred to manage unavailability – such deferrals can reduce the reliability of the grid and impact other measures and our supply to customers over time.

More than ever, we should be seeking to ensure that both grid enhancements and Transpower's maintenance and replacement and refurbishment works are being carried out in a timely manner.

Our maintenance and replacement and refurbishment works have greater certainty based on more defined schedules and asset management plans. As a result, we have a greater ability to anticipate the impact of these works and to schedule them efficiently to mitigate market impacts.

The proposed changes would incentivise Transpower to optimise its outage planning for known works within its control, while not disincentivising Transpower from carrying out necessary enhancements and new customer connections.

Proposed method for updating asset list

We have updated the list of HVAC assets for this measure using the following key considerations:

- observed system constraints with electricity market impact from historical binding constraints data and operational knowledge
- system constraints expected to be likely to have reduced electricity market impact from completed or planned system upgrades in RCP3
- area wide customer load curtailment requests during planned outages
- removal of circuit breaker assets on circuit assets (to avoid double counting)
- removal of assets with system losses impact (to align with the objectives for this measure on electricity market impact)
- replacement of decommissioned assets with new assets performing an equivalent function (to ensure relevance of the AP2 measure).

The proposed asset list has 62 assets, which represents a small reduction from 71 assets in RCP3. The proposed list is set out in Appendix D and includes those assets that would have the most market impact when out of service in RCP4.

The selected asset list has been updated since our 2022 consultation to include the three Manapouri bus sections (consistent with the RCP3 selected assets), rather than the three Manapouri–North Makarewa circuits we initially considered for RCP4.

5.4.2. Targets, caps, collars, incentives, and quality standards

AP2 target

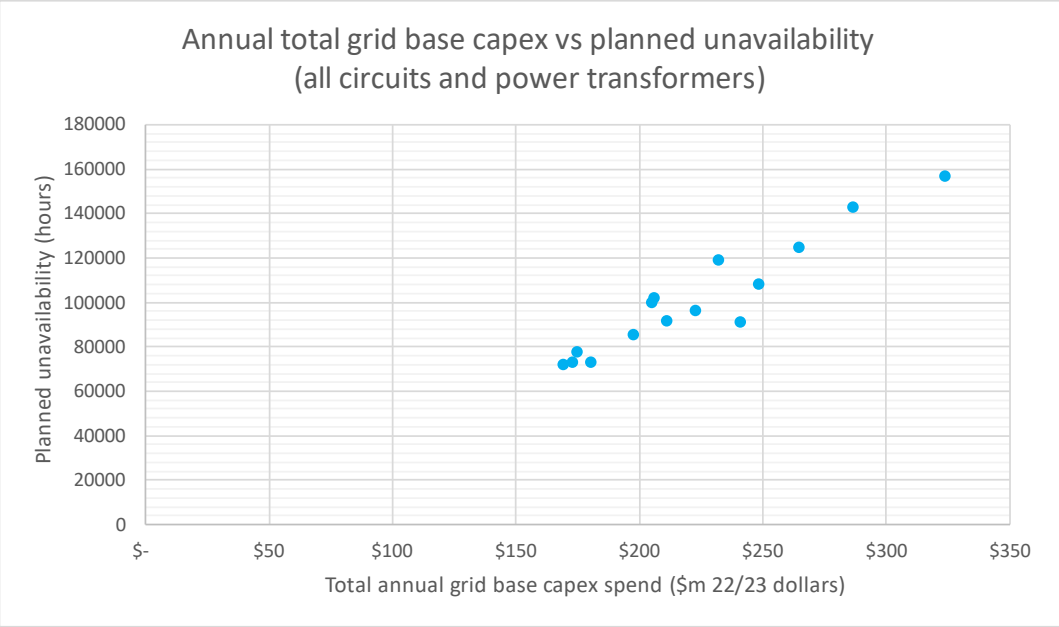
For setting the target for RCP4 we propose an updated method to RCP3 as follows:

- deduct the estimated planned outages for maintenance and projects based on our historic and forecast spend and historic performance
- deduct reasonably expected unplanned outages based on our historic performance
- consider other variables in our future workplan.

We have updated our proposed methodology for setting the target for AP2 to use a linear regression model to forecast unavailability due to planned outages and forecast expenditure for RCP4. This model is fitted based on historic expenditure (in 2022/23 dollars) and historic planned unavailability data (2011–2023 data). This relationship between planned unavailability and grid base capex was identified during our work since the September 2022 engagement paper and is illustrated by Figure 4 (below) for all circuits and power transformers. While the relationship for the proposed RCP4 selected assets is more variable due to the smaller subset of assets, the general relationship between spend and unavailability still holds.

We consider that this approach is an improvement on our approach to setting the target for RCP3, which was based on the judgement of subject matter experts, a more qualitative assessment of RCP2 targets and performance, and the RCP3 workplan.

Figure 4: Relationship between total grid base capex and total planned unavailability (hours) for circuits and power transformers



We are proposing to include an annual deduction of 300 hours for unplanned unavailability (this is consistent with the allowance for RCP3) and a threshold limit of 150 hours for individual events causing significant unplanned outages.

For simplicity, we propose a flat target based on the average predicted planned unavailability for each year in RCP4, and the annual deduction of 300 hours for unplanned unavailability. We consider that the targets developed provide an indication of forecast performance at the start and end of RCP4.

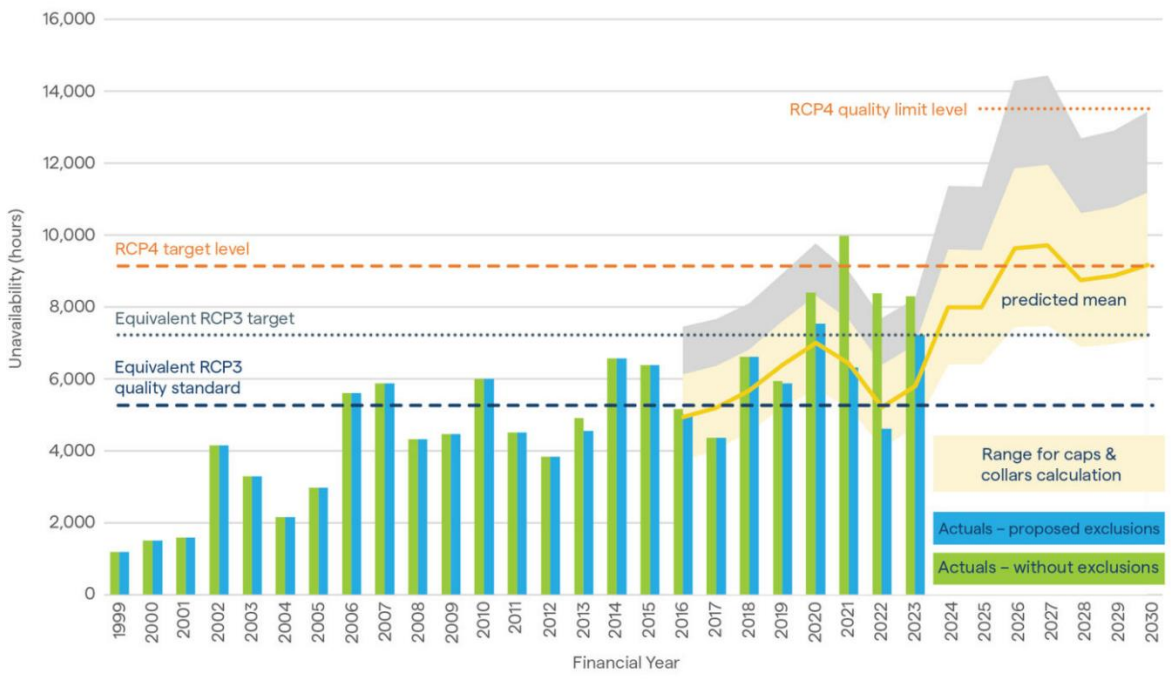
We also use the linear regression model to develop the cap, collar, and quality limit (if retained), using prediction intervals (similar to confidence intervals, but for inferential statistics). These details are discussed in the sections below. Due to the proposed cap on single unplanned outages and given that unplanned outages typically make up a small proportion of overall unavailability, the caps, collars, and quality limits do not factor in the variability of unplanned outages.

The proposed RCP4 methodology is simple and repeatable and linked to forecast spend, however a notable limitation is that it does not include changes to the mix of work or outages required, such as an increase in tower Minimum Approach Distances (MAD) painting.

Figure 5 below shows a view of both historic and forecast planned unavailability for RCP4 selected assets. The forecast is based on linear regression model predictions and aligns with the proposed exclusions for major capex and listed projects, customer-funded projects, and base capex enhancement and development projects. This graph contains the following features:

- historical actual unplanned unavailability for RCP4 selected assets with proposed project exclusions (blue bars) and without project exclusions (green bars)
- mean prediction (thick yellow line) used to calculate RCP4 target (dashed orange line)
- upper and lower 68 per cent prediction interval (yellow band) used to calculate cap and collar
- upper 95 per cent prediction interval (grey band) used to calculate possible RCP4 quality limit (dotted orange line)
- equivalent RCP3 target (dashed blue line) and equivalent RCP3 quality standard (dotted blue line).

Figure 5: Planned HVAC unavailability (hours) for RCP4 selected assets – historic and forecast



AP2 cap, collar and incentives

We propose to set caps and collars for AP2, with offsets based on:

- the 68 per cent prediction interval associated with the linear regression model for planned unavailability (this is equivalent to a confidence interval band of one standard deviation), and
- a 300-hour deduction for unplanned unavailability.

For simplicity, we propose flat caps and collars based on the annual averages. We also propose to retain the same annual revenue at risk for AP2, i.e. $1 million per year, with a total of $5 million across RCP4.

The proposed values are set out in Table 18 (see Section 4.5 above).

The caps and collars for AP2 should be considered with reference to Figure 5, rather than assessed by simple comparison to the historic unavailability, due to the increase in work and outages required in the future.

AP2 quality standard

Proposed approach – remove quality standard for AP2 (preferred)

We are proposing to remove the quality standard for AP2, retaining this as a revenue incentive measure only for RCP4.

Our key reasons for removing the quality standard include

- increasing workload and electrification may see more outages on the selected assets, and more variability in future outage plans
- we work with customers on outage planning and our regulatory outage protocols are in place to minimise market constraints. AP2 is a proxy for impact on the electricity market and most outages on these assets are planned for times that do not lead to market constraints
- managing a quality standard for AP2 may lead to perverse outcomes, i.e. not undertaking work that is GEIP and providing long term benefits for consumers. HVAC availability may be impacted by prioritisation or phasing of replacement and refurbishment work, customer-funded work, and enhancement and development work during RCP4
- managing a quality standard for AP2 has increased the regulatory burden for both the Commission and Transpower.

Additionally, the Commission has the ability to investigate concerns without defined quality standard triggers.

This proposed approach is different to the details we consulted with customers and wider stakeholders on during 2022. However, customers will have an opportunity to share their views on this approach during the Commission's consultation.

Alternative approach – apply pooling to quality standard for AP2 (not preferred)

If the Commission wishes to retain the quality standard for AP2, we propose the following alternative approach and method for setting the quality standard:

- introduce pooling across disclosure years, assessed against annual quality limits

- set quality limits based on the 95 per cent prediction interval associated with the linear regression model for planned unavailability (this is equivalent to approximately two standard deviations), plus the 300-hour deduction for unplanned unavailability.

Using a pooled approach would not necessarily mitigate all the risks of false negatives from annual breaches and the risk of breaching the quality standard even when our practices follow GEIP. The pooling mechanism is similar to that already used in RCP3 for GP1 and GP2, however the measures are different with AP2 being vulnerable to changes in workplan.

The alternative method for pooling for AP2 is set out in Table 23. The associated quality limits are set out in Table 18 (see Section 4.5 above).

Table 23 - Alternative approach – method for pooling for AP2

DY 2026	DY 2027	DY 2028 - 2030
Calculate values, no compliance assessment	Comply with the quality limit in disclosure year, or if not, then to have complied in DY2026	Comply with the quality limit in disclosure year, or if not, then to have complied in the previous two disclosure years

5.4.3. How we addressed feedback from stakeholders and the IV

There was mixed support from submitters for what we are proposing.

Both Contact Energy and Meridian Energy supported excluding major capex projects. However, Meridian Energy did not support excluding listed projects unless we continue to consult on these projects and our annual outage plan process continues to seek engagement from industry stakeholders. There were no objections to excluding enhancement and development projects and customer-funded work.

Neither Contact Energy nor Meridian Energy supported modifications to mitigate the impact of major unplanned outages. We amended our proposal so that the measure includes all unplanned outages. However, we still consider there are merits to a threshold limit for outages relating to a single event as the limit will provide incentives to manage availability through the year rather than performance being dominated by a single major unplanned outage event.

Meridian considered that the combination of an allowance for unplanned outages, the threshold limit for major unplanned outages related to a single event, and the ability to pool across disclosure years does not provide a meaningful indication of performance for HVAC capacity availability. We disagree with this view and note that the design of GP2 for RCP3 includes these three features and continues to be an effective measure.

We also do not agree that pooling of the quality standard 'hides' poor performance in any given year, as the performance for each year is still visible in the annual reporting and no pooling is applied to the revenue incentive targets. Pooling applied to the quality standard focuses any investigations on a trend of poor performance, rather than poor performance in a single year.

Both Contact Energy and Meridian Energy disagreed with the use of the System Security Forecast, however no alternative was suggested. We note that the System Security Forecast continues to provide strong relevance to updating the list of selected HVAC assets.

The IV supported all proposed changes for AP2 apart from the removal of the quality standard from AP2. This included the proposed threshold limit of 150 hours for major unplanned outages for AP2.

5.5. AP3 – return to service

The AP3 service measure was proposed as a new trial non-incentivised measure in RCP3. The measure aims to reduce the impact of the electricity market on consumers by improving certainty around the return to service of certain transmission assets. Delays on returning these assets to service can cause increases in spot prices.

AP3 measures the number of planned outages of selected HVAC assets that are returned to service two or more hours after the original planned return to service time.

5.5.1. What we are proposing

We propose that AP3 is retained in its current form.

The reasons for our recommendation are

- AP3 continues to be useful. By returning transmission assets to service at the original planned return to service time or within the two-hour buffer period, our customers and other stakeholders are given confidence that they can plan in a way that allows them to reliably operate their systems or assets
- the measure provides an effective and proportionate incentive for Transpower to remain focused on return to service times for planned outages. Our analysis of data for 2020-21 showed minimal impact for affected parties in the form of reduced security and transfer limits for the extended outage time
- there has been no evidence that AP3 has adversely impacted human error incidents or caused pressure or unreasonable demands on our operations and delivery teams that are executing the planned outages or executing the switching of assets to restore service.

Contact Energy, Meridian Energy, Electra, and the IV supported the retention of this measure in its current form.

5.5.2. Targets, caps, collars, incentives, and quality standards

We are not proposing to introduce a target, incentive, or quality standard to AP3.

5.6. AP4 – return to service communications

The AP4 service measure is a non-incentivised measure for RCP3. The measure aims to reduce the impact of the electricity market on consumers through timely communication to market (or industry) participants about delays to certain transmission assets being returned to service.

AP4 measures the number of outages where a delay to the planned, or extended, return to service time was communicated with 90 minutes or less notice, against the total number of planned outages. The measure counts an outage once, even if there are multiple communications of 90

minutes or less related to that outage.[39] This measure applies to the same HVAC assets selected for the AP2 measure.

5.6.1. What we are proposing

We propose AP4 is retained in its current form.

The reasons for our recommendation are as follows

- AP4 continues to be useful. By delivering timely communications, our customers and other stakeholders are given the opportunity to make informed decisions that are in their best interests.
- While performance has been largely positive for this measure there are still a small number of planned outages where delays were not advised within the measured notice period. Therefore, it is important that we remain focused on improving our timely communication.
- AP4 has not caused pressure or unreasonable demands on our operations and delivery teams.

Contact Energy, Meridian Energy, Electra, and the IV supported the retention of this measure in its current form.

5.6.2. Targets, caps, collars, incentives, and quality standards

We are not proposing to introduce a target, incentive, or quality standard to AP4.

5.7. AH – Asset health

Asset health (AH) measures indicate the health of selected assets throughout a regulatory control period. We use asset health modelling to understand and manage the current and future grid risk profile, and asset health is a key input for our decision-making processes. Our asset health forecasts include consideration of degradation processes and the investments we will make in replacing, refurbishing, and maintaining the assets.

The intent of the asset health (AH) measure is to ensure we take appropriate asset management decisions during an RCP to protect the reliability and availability of transmission assets in the long term, while maintaining a sustainable investment profile.

The proposed AH measure reports on the proportion of assets in poor health, i.e. those which have an asset health index (AHI) score of eight or above. This measure provides a leading indicator to show how we see the state of our transmission assets and enables us to foresee and communicate any issues in terms of asset health. In RCP3, we had two AH measures: power transformers and outdoor circuit breakers.

[39] Please note the Grid Service Engagement Paper published in May 2022 referred to the number of times a delay was communicated. The wording has been revised in this document to clarify what is included in this measure.

5.7.1. What we are proposing

We propose that the asset health measures are modified for RCP4 in the following ways:

- expand the asset classes from two to seven, including tower protective coatings, tower grillage foundations, insulators, conductors, and protection relays, as well as the existing asset classes of power transformers and outdoor circuit breakers. All of the asset classes proposed have a material impact on the reliability of the grid and/or a material impact on future investment, and we have improved the capability of our asset health modelling for these assets
- combine the asset classes into one overall AH measure with sub-categories
- based on stakeholder feedback, weight the measure by criticality where suitable for the asset class, as set out in Table 24 (below). Criticality weighting can reflect risk-based strategies, e.g. we may have a different appetite for the number of assets in poor health where their criticality is low compared to where criticality is high
- remove the quality standards (preferred option) or introduce annual quality limits that are pooled across asset classes and across a number of years to create a single quality standard for AH. The measure remains non-incentivised.

Table 24 - Expanded asset classes and criticality weighting

Asset Class	Weighted by criticality
Conductors	Yes
Insulators	Yes
Outdoor Circuit Breakers	Yes
Power Transformers	Yes
Protection Relays	No. We have limited criticality coverage of this asset class.
Tower Grillage Foundations	No. We plan for economic intervention[40] in this asset class, therefore criticality has minimal relevance.
Tower Protective Coatings	No. We plan for economic intervention in this asset class, therefore criticality has minimal relevance.

[40] Economic intervention means we intervene at the point that leads to the lowest overall cost of intervention (rather than based on risk of asset failure), i.e. repainting a tower before the point that the pre-painting preparation becomes overly expensive.

5.7.2. Targets, caps, collars, incentives and quality standards

Proposed targets and incentives

We are not proposing to introduce a target or incentive to AH.

We do not recommend revenue linking AH because

- asset health is a leading measure for grid reliability based on asset health model predictions and we already have a revenue-incentive in place for GP1 and GP2 which measure actual performance. Including a revenue-incentive for AH may result in double counting
- ongoing improvements to asset health models are required to better forecast investment, including new condition techniques, forensic assessments and degradation analytics to recalibrate models. Setting a revenue-incentive based on these predictions is not likely to be appropriate due to the complexity required to allow for ongoing model improvement without requiring an overly complex reconciliation process.
- AH may also be impacted by prioritisation or phasing of replacement and refurbishment work, customer-funded work, and enhancement and development work during RCP4.

Proposed quality standards

Proposed approach – remove quality standards for asset health (preferred)

We are proposing to remove quality standards for AH for RCP4, retaining this as a single reporting-only measure covering the seven asset classes.

Asset health is a leading indicator for reliability, which is captured under the GP1 and GP2 quality standards.

The RCP5 proposal will occur mid-period RCP4 and provides a meaningful opportunity for the Commission to interrogate our AH performance and practices and reflect any findings in the RCP5 Independent Price-Quality Path. Our AH performance and practices could be considered in more detail by an IV, and by the Commission when considering our proposal and making their determination.

Similar to AP2, performance against our AH measure may also be impacted by prioritisation or phasing of replacement and refurbishment work, customer-funded work, and enhancement and development work during RCP4.

Additionally, the Commission has the ability to investigate concerns without defined quality standard triggers.

This proposed approach is different to the details we consulted with customers and wider stakeholders on during 2022. However, customers will have an opportunity to share their views on this approach during the Commission's consultation on our final RCP4 proposal.

Alternative approach – apply pooling to quality standards for asset health (not preferred)

If the Commission wishes to retain quality standards for AH, we propose an alternative approach of introducing a pooling method for the quality standard that factors in the number of AH quality limits that were exceeded in a year, this result would then be pooled across disclosure years. This would allow for some variance to our delivery plan due to unforeseen changes, reprioritisation, or optimisation of our workplan for delivery within RCP4.

Using a pooled approach would not necessarily mitigate all the risks of false negatives from annual breaches and the risk of breaching the quality standard even when our practices follow GEIP. The pooling may not mitigate impacts that go over multiple years such as the uncertainty of supply chain issues, that new customer and connection works may need to be prioritised, and that optimising our workplan for delivery may be required due to changing requirements.

The preferred approach is to remove the quality standard but the alternative method for pooling is for four out of the seven asset classes to meet their respective quality limits in the current disclosure year, or if not, then for four out of the seven asset classes to have met their respective quality limits in the previous two disclosure years, as set out in Table 25. We have adjusted this detail from five out of seven asset classes to four out of seven asset classes since the September 2022 engagement paper, after developing a view of the likelihood of meeting the quality standards during RCP4 across the suite of measures. This pooling method is similar to the method used for the grid performance measures, however AH measures have stronger links to the workplan.

Table 25 - Alternative approach – method for pooling for Asset Health

DY 2026	DY 2027	DY 2028	DY 2029	DY 2030
Calculate quality limits, no compliance assessment.	At least 4 of 7 asset classes met their respective quality limits in DY 2027, or if not, then at least 4 of 7 to have been met in DY 2026.	At least 4 of 7 asset classes met their respective quality limits in the disclosure year, or if not, then at least 4 of 7 to have been met in each of the two previous disclosure years.		

To develop the annual quality limits for each asset class we use the forecasted AHI score for each asset, in all seven asset classes, with and without intervention based on the proposed investment plan for RCP4. Quality limits relating to the proportion of assets in poor health (i.e. those which have an AHI score of eight or above) are calculated assuming a 25 per cent benefit from the 'with intervention' improvement, as is the approach for the RCP3 quality standards set by the Commission.

For criticality weighted asset classes, the assets will be grouped into criticality quartiles. The AH will be weighted using the median value for the quartile and the sum of quartile medians.

The annual quality limits for each asset class are set out in Table 26. These quality limits are not an indication of forecast asset health. These limits have been updated to align with our RCP4 submission, based on our most recent asset health data and workplan as at 15 August 2023 (except conductors as of 11 July 2023 and protection relays as of 23 August 2023). While the specific values have been updated since those provided to the IV, these limits have been recalculated using the same methodology reviewed by the IV.

Table 26 - Alternative approach – quality limits and quality standard developed for Asset Health

Asset Classes - Quality limits (% Assets AHI>=8)	25/26	26/27	27/28	28/29	29/30	Quality std
Asset classes weighted by criticality						Pooled
Conductors[41]	1.78	2.01	2.23	2.42	2.67	
Insulators	3.44	4.47	5.89	7.64	9.76	
Outdoor Circuit Breakers	1.40	1.77	3.08	4.01	5.25	
Power Transformers	5.76	10.10	12.62	13.79	16.09	
Asset classes not weighted by criticality						
Protection Relays	11.81	13.00	14.08	16.24	18.02	
Tower Grillage Foundations	5.21	5.60	6.96	8.09	9.16	
Tower Protective Coatings	14.79	17.50	20.20	23.39	26.52	

The AH forecast scenario shown in Table 27 (below) is equivalent to a 100 per cent intervention level, using current asset health model forecasts and asset criticality values. This scenario is an interim step in the calculation of the quality limits shown above. It should not be considered a P50 AH forecast overall and it is likely more optimistic than a P50 forecast as it reflects 100 per cent of the planned investments at a point in time, but does not account for any future variation such as changes to the workplan, changes to strategies or asset health and criticality models, and updated asset information. This 100 per cent intervention scenario would not be suitable for use as a quality standard and would be highly likely to result in a breach.

[41] Quality limits proposed for conductors are based on 'needs intervention' from ICON long term forecast model rather than AHI>=8 from the Asset Health model.

Table 27 - AH forecast scenario, including criticality weightings where applicable

Asset Classes – 100% benefit scenario (% Assets AHI>=8)	25/26	26/27	27/28	28/29	29/30
Asset classes weighted by criticality					
Conductors[42]	1.76	1.96	2.17	2.36	2.60
Insulators	2.55	2.65	3.11	3.71	4.60
Outdoor Circuit Breakers	1.19	1.34	2.24	2.89	3.91
Power Transformers	4.96	8.81	11.13	11.59	12.35
Asset classes not weighted by criticality					
Protection Relays	6.02	4.71	3.56	5.17	5.19
Tower Grillage Foundations	3.92	2.75	2.79	2.57	2.11
Tower Protective Coatings	13.68	15.30	16.92	18.80	20.48

Our *Asset Management Plan* provides more information about the investment plan for RCP4 for each asset class, and the relationship to asset health and grid risk.

5.7.3. How we addressed feedback from stakeholders and the IV

Contact Energy, Meridian Energy and Electra agree with the selection of the seven asset classes. There was a mixed response from the submitters in relation to a pooled approach across asset classes and categories for the purpose of a quality standard. Electra supported the approach; Contact Energy somewhat supported the approach and Meridian Energy did not support the approach.

Meridian considered that a better option would be to pool by criticality. Contact proposed that a weighting is assigned to the criticality of certain assets within these classes/categories. We took this feedback into account and modified the measure as set out in Section 5.7.1, which aligned with Contact's suggestion.

The IV supported the proposed AH measure apart from removal of the quality standard. For the reasons we set out above, we are proposing to remove the quality standard to eliminate the risk against our AH measure being impacted by prioritisation or phasing of replacement and refurbishment work, customer-funded work, and enhancement and development work during RCP4.

[42] Quality limits proposed for conductors are based on 'needs intervention' from ICON long term forecast model rather than AHI>=8 from the Asset Health model.

5.8. CS1 – Overall customer satisfaction

The proposed pilot customer service measure (CS1) aims to continually improve the experience of our customers.

CS1 will measure the average level of overall customer satisfaction (%) based on responses to a direct question in our annual customer engagement survey.

5.8.1. What we are proposing

We are proposing to introduce a pilot reporting-only measure (CS1) based on a single question relating to overall customer satisfaction from our annual customer engagement survey.

Our approach is based on advice from Rangahau Aotearoa Research New Zealand (Research NZ) and improvements to our previous survey to improve statistical validity. Research NZ provide support for our annual customer surveys.

5.8.2. Targets, caps, collars, incentive, and quality standards

We are not proposing to introduce a target, incentive, or quality standard to CS1.

We believe that a reporting-only measure will provide sufficient incentive for us to manage the level of service we deliver to customers, similar to AP3 and AP4. We also do not anticipate the need to introduce a revenue incentive or quality standard for this measure in future RCPs, as we do not have sufficient historical data to determine a robust target.

5.8.3. How we addressed feedback from stakeholders and the IV

While there was support from Contact Energy, Meridian Energy, and Electra for measures relating to customer service, they expressed a desire for more information which we address beyond this service measure:

- we engage with our customers throughout the year, as appropriate, and as set out in our annual individual engagement plans developed with each customer. We also conduct post-interruption surveys with customers after significant unplanned interruptions. From 2023 onwards, we will include a more granular breakdown of summary results from the annual customer engagement survey in these engagement plans
- based on stakeholder feedback, we are also proposing a second customer service measure (CS2) relating to new and enhanced grid connections (see Section 5.9).

The IV supported the CS1 customer service measure we are proposing. They noted that while customer satisfaction is not a traditional measure of network performance it was, in their opinion, an important indicator on whether Transpower is performing well as an organisation.

5.9. CS2 – New and enhanced grid connections

The proposed pilot measure for new and enhanced grid connections (CS2) aims to incentivise fair allocation of resource to customer-driven projects which add energy demand and energy supply capacity and to incentivise continual improvement of our connection process.

5.9.1. What we are proposing

We are proposing to introduce a pilot reporting-only measure (CS2) for new and enhanced grid connections as this is an increasing area of focus for our customers and for us. We consider that reporting on this measure is more relevant now that we have formal queueing processes for new generator connections.

The measure would include annual reporting on our performance in five sub-categories:

1. **Average time to deliver concept assessments [days]** measures and reports average turnaround time for the initial feasibility assessment of new connection concepts in calendar days. Supporting efficient early triage of connection concepts helps our customers prioritise resource to their most viable projects

2. **Percentage of investigation projects delivered within contracted time** measures and reports the percentage of connection investigations completed within the timeframe agreed in the associated Transpower Services Agreement

3. **Median time from TWA to commission – Load [days]** measures and reports on the median time from the start date of the associated Transpower Works Agreement (TWA) to commissioning for all load connection projects commissioned within the reporting period

4. **Median time from TWA to commission – Generation [days]** measures and reports on the median time from the start date of the associated TWA to commissioning for all generation connection projects commissioned within the reporting period

5. **Percentage of connection projects delivered within contracted time** measures and reports the percentage of connection projects commissioned within the timeframe agreed in the associated TWA.

We consider simple measures of our progress against connection delivery stages are more effective than measures of end-to-end connection time due to the bespoke nature of connection projects and significant external influences, including customers' decision timeframes on total project duration.

5.9.2. Targets, caps, collars, and quality standards

We are not proposing to introduce a target, incentive, or quality standard to CS2.

We believe that a reporting-only measure will provide sufficient incentive for us to manage the level of service we deliver to customers, similar to AP3 and AP4. We also do not have sufficient historical data to determine a robust target and would like to understand the pilot measure before determining whether a revenue incentive or quality standard would be appropriate beyond 2030.

We are establishing internal tracking and reporting for this measure in RCP3 to enable reporting in RCP4.

5.9.3. How we addressed feedback from stakeholders and the IV

We introduced this measure based on requests from Contact Energy and Meridian Energy in response to our May 2022 engagement paper. Meridian indicated strong support for what we proposed in our September 2022 engagement paper.

The IV supported the CS2 customer service measure we are proposing. They noted that while measuring service related to delivery of new and enhanced connections is not a traditional measure of network performance it was, in their opinion, an important indicator on whether Transpower is performing well as an organisation.

5.10. Discontinued measures

5.10.1. AP5 – N-Security reporting

The AP5 service measure is a non-incentivised measure for RCP3.

AP5 measures and reports the occasions that, and the extent to which, Transpower has placed customers on a reduced level of supply security due to an outage (referred to as N-security), including

- when this has occurred
- how much notice Transpower provided to the customers before it occurred
- how long the customers were reduced to N-security of supply; and
- the PoS affected by the reduced level of supply security.

N-security is typically when a connection to the grid is served by a single circuit or a single transformer.[43] In that instance, a single fault event can lead to a service interruption. Most of our customers have N-1 security, which means they will only experience a service interruption at their PoS if there are concurrent equipment outages. This can happen when there are multiple faults, or a single fault at a time when other equipment is out of service for maintenance.

What we are proposing

We propose that the AP5 measure is discontinued for RCP4.

Why are we proposing to discontinue AP5?

We do not consider that this measure provides a leading indicator of grid deterioration nor assists in mitigating risks associated with an outage, as was intended when introduced by the Commission in RCP2.

AP5 was introduced by the Commission in RCP2 as it considered that time on N-security could be a leading indicator of deterioration of the grid. The Commission also noted there is the potential for significant impact on customers if they are placed on N-security without adequate warning to prepare.

We submitted to the Commission during the RCP3 proposal and consultation process that the measure was resource-intensive to collect, not a strong driver in our business, and that the impact

[43] Customers that are typically on N-Security are not included in AP5.

of unplanned outages is captured in other grid performance measures. However, the Commission retained AP5 as a measure for RCP3.

As part of developing our RCP4 proposal, we analysed AP5 data from RCP3 and then consulted on the value of this measure for Transpower and our customers.

Our key reasons for discontinuing AP5 are discussed in more detail below.

We do not consider this measure provides a leading indicator of grid deterioration because the reasons for being on N-security are varied, e.g. planned maintenance of a transmission asset or managing overloading of transmission assets. Often customers would prefer to be on N-security, and have Transpower invest in the grid, rather than providing that investment themselves. Therefore, there is a trade-off between time on N-security and customers paying more to guarantee supply security.

AP5 records historic information and does not assist in mitigating risks associated with an outage. Where major outages are planned that will result in N-security, we prepare risk mitigation plans to identify all risks and mitigate them where possible. In these instances, we aim to minimise time on N-security and prevent loss of supply as much as practicable. This requirement helps safeguard and improve service delivery to our customers.

Better outage information is provided to customers. We consider our outage notification protocols ensure our customers receive sufficient warning when their security is reduced to N-security, allowing them to assess and understand the level of risk. We also provide an annual outage plan (which includes the results of discussion with various customers about planned outages for the year), a planned loss of supply and N-security outage report (published fortnightly), up-to-date outage information shared as part of the planned outage co-ordination process, and notifications of planned outages (including estimated recall times) that are not in the annual outage plan. We do not consider that reporting on the reasons for N-security outages and the lead times for notifications is adding any further value to our customers.

AP5 reporting is not useful for our customers or for Transpower. Our customers have told us that our reporting of AP5 does not provide valuable information for them. This information does not drive or support internal Transpower business decisions and can be limited or misleading. Contact Energy, Meridian Energy, and Electra submitted on our proposed change, and all now support discontinuation of AP5.

AP5 reporting is time-consuming for us to compile (approximately 0.25 FTE, or 40 hours per month), which would be reasonable if the value to our customers outweighed this burden, but we consider it does not as Contact Energy and Meridian Energy have told us they do not use the reports. We also considered an option to produce a simplified report on N-security hours and PoS locations only (without reporting on reasons for N-security and lead time for notifications), however this would only reduce the resource requirements by approximately 1 hour per month.

While the IV supports the removal of AP5, they also noted in their evaluation that AP5 generally meets the terms of reference evaluation criteria for grid outputs. However, they noted customers have provided feedback that the AP5 measure is not used to manage their risk of loss of supply and support its removal, and other relevant customer reporting exists. On this basis, the IV supported discontinuing the AP5 service measure.

For these reasons we do not consider there is sufficient value in retaining AP5 as another measure for unplanned outages (with or without modification).

5.10.2. GP-M – momentary interruptions reporting

The GP-M service measure provides a view of momentary interruptions over time. Momentary interruptions are brief disruptions to service that are due to temporary faults in the system, such as those caused by lightning strikes. They are not included in GP1 and GP2, and for most customers and end-consumers have a much lower impact.

GP-M measures the yearly number of momentary unplanned interruptions, with a duration of less than one minute.

What we are proposing

We propose GP-M is discontinued for RCP4.

Why are we proposing to discontinue GP-M?

We do not consider that this measure provides a useful indication of our service performance at an aggregate level.

An increase in the number of momentary interruptions does not necessarily indicate a poor, or deteriorating, level of service. In fact, an increase can indicate an improvement in performance. As we replace our existing protection assets[44], the replacement assets will inevitably provide greater functionality than the old assets, often including auto-reclose that allows for fast restoration of temporary faults. Auto-reclose will help prevent longer interruptions and minimise the service interruption time that determines the impact of an interruption.

Neither Contact Energy nor Meridian Energy use the GP-M reports but could see the benefit of specific data being available in their annual individual engagement plans. In RCP4 we intend to provide information relating to momentary interruptions in those plans. We are starting to incorporate this customer-specific information from 2023.

The IV also considers that it is reasonable to discontinue GP-M on the basis that this service measure does not meet the evaluation criteria for service measures (as set out in the IV terms of reference), in terms of the relationship to expenditure or alignment with business processes for electricity transmission services, and considering customer feedback and that more specific information will be provided to customers in their individual engagement plans. They also noted the following points in their evaluation:

- “Momentary interruptions do not necessarily indicate poor performance or investment focus, they may indicate the network correctly responding to an external disturbance”
- “Transpower systems are both designed to avoid interruptions of supply and in some situations to interrupt supply through the design of its protection systems to avoid damage to equipment, safety of people and wider network interruptions.”

[44] Protection assets detect a fault and then isolate the part of the system with that fault.

Appendix A: Definitions for GP1 and GP2

'Interruptions'[45] for the purpose of the GP1 and GP2 measures means:

- any supply interruption of greater than one minute in duration caused by a Transpower unplanned outage; or
- any generator interruption of greater than one minute in duration caused by a Transpower unplanned outage; or
- any unplanned interruption internal to a customer's system that resulted from an incident on the Transpower system.

This excludes:

- any momentary interruption (i.e. interruption to service for less than one minute) caused by Transpower, e.g. caused by a circuit tripping and auto-reclosing or the operation of a supply change-over system; and
- interruption to a Transpower customer, caused by another customer, e.g. a generator customer may cause under-frequency load shedding in a distribution customer's system, or a distribution customer may cause trippings that affect a second distribution customer supplied from the same site; and
- interruption to a Transpower customer, caused by the customer themselves, that resulted in Transpower equipment being removed from service.

  Note: This does not include the correct operation of a 'boundary' (i.e. feeder or generator) circuit breaker, which does not remove any other Transpower equipment from service; and
- restrictions to supply, such as interruptible load shedding or water-heating cuts; and
- events where there has been Automatic Under Frequency Load Shedding; and
- interruptions to generator auxiliary supply; and
- interruptions to embedded generation based on reconciliation manager's connection type.

An unplanned interruption ends on the date and time of 'Restoration' to a customer, which means the earliest of:

- for generators:
  - when the generator circuit breaker is closed; or
  - the generator is notified that Transpower equipment has been returned to service and is available for generation to be reconnected; or
  - operational control for connecting the Transpower assets is returned to the generator.
- for customers other than generators:
  - when the first feeder is closed, if feeder circuit breakers have been opened; or
  - when the supply bus is re-livened, if feeder circuit breakers have remained closed after the interruption; or
  - when 75 per cent of the load is returned to service by way of a backfeed within the customer's system or by generators; or
  - when Transpower has readied all its equipment and has made reasonable efforts to advise the customer that the equipment can be returned to service.

[45] For the purposes of interruptions in the event recording and reporting system, a planned interruption results from an outage for which 24 hours' notice has been given. If less notice or no notice is given, the interruption is considered unplanned.

Appendix B: Proposed PoS categories for RCP4 (GP1 and GP2)

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
ABY011_S1	Alpine Energy Ltd	N Security Material	N Security Material	Existing PoS from RCP3
ALB033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
ALB110_S1	Vector Ltd	N-1 Security High	N Security High	Existing PoS from RCP3
APS011_S1	Orion New Zealand Ltd	N Security Material	N Security Material	Existing PoS from RCP3
ARA220_I1	Mercury NZ Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3
ARG110_I1	Manawa Energy Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3
ARI110_I1	Mercury NZ Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
ARI110_S2	Powerco Ltd		N Security High	New PoS commissioned since RCP3 proposal
ASB066_S1_S2	EA Networks Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
ASY011_S1	MainPower NZ Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
AVI220_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
BAL033_S1	OtagoNet Joint Venture	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
BDE011_S1	Daiken Southland Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
BDE011_S2	Resolution Development Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
BEN220_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
BLN033_S1	Marlborough Lines Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
BOB110_S1	Counties Power Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
BPD110_S1	Alpine Energy Ltd	N Security Material	N Security High	Existing PoS from RCP3
BPE033_S1	Powerco Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
BPE055_S1_S2	KiwiRail Holdings	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
BPT110_S1	Network Waitaki Ltd	N Security Material	N Security Material	Existing PoS from RCP3
BRB033_S1	Northpower Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
BRK033_S1	Powerco Ltd	N Security Material	N Security High	Existing PoS from RCP3
BRY066_S1_S2_S3	Orion New Zealand Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
BWK110_I1	Manawa Energy Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3
CBG011_S1	Waipa Networks Ltd	N-1 Security Material	N-1 Security High	Existing PoS from RCP3
CLH011_S1	Orion New Zealand Ltd	N Security Material	N Security Material	Existing PoS from RCP3
CML033_S1	Aurora Energy Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
COL011_S1	Orion New Zealand Ltd	N Security Material	N Security Material	Existing PoS from RCP3
COL066_I1	Manawa Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
CPK011_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
CPK033_S1	Wellington Electricity Lines	N-1 Security High	N-1 Security High	Existing PoS from RCP3
CST033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
CUL033_S1	MainPower NZ Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
CUL066_S1	MainPower NZ Ltd	N Security Material	N Security Material	Existing PoS from RCP3
CYD033_S1	Aurora Energy Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
CYD220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
DOB033_S1	Westpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
DVK011_S1	Scanpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
EDG033_I2	Helios Energy Ltd		N-1 Security Generator	New PoS not yet commissioned
EDG033_S1	Horizon Energy Distribution	N-1 Security High	N-1 Security Material	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
EDN033_S1	PowerNet Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
FHL033_S1	Unison Networks Ltd	N-1 Security Material	N-1 Security High	Existing PoS from RCP3
FKN033_S1	Aurora Energy Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
FKN033_S2	PowerNet Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
GFD033_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
GLN033_S1_S2	New Zealand Steel Ltd	N Security High	N-1 Security High	Existing PoS from RCP3
GLN033_S3	Counties Power Ltd	N-1 Security High	N Security High	Existing PoS from RCP3
GOR033_S1	PowerNet Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
GYM066_S1	Westpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
GYT033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HAM011_S1	WEL Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HAM033_S1	WEL Networks Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
HAM055_S1_S2	KiwiRail Holdings	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HAY011_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HAY033_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HEN033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
HEP033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
HIN033_S1	Powerco Ltd	N Security High	N Security High	Existing PoS from RCP3
HKK066_S1	Westpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HLY033_S1_S2	WEL Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HLY220_I1	Genesis Power Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
HOB110_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
HOR033_S1	Orion New Zealand Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HOR066_S1	Orion New Zealand Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HRP220_I1	Meridian Energy Ltd		N-1 Security Generator	New PoS commissioned since RCP3 proposal
HTI033_S1	The Lines Company Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HTI110_S1	The Lines Company Ltd		N-1 Security Material	New PoS commissioned since RCP3 proposal
HUI033_S1	Powerco Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
HWA033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
HWA033_S2	Beach Energy Ltd	N-1 Security Material	N Security Material	Existing PoS from RCP3
HWA110_I1	Fonterra Todd Cogen JV	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
HWA110_I2	Manawa Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
HWB033_S1	Aurora Energy Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
HWB033_S2	OtagoNet Joint Venture	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
INV033_S1	PowerNet Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
ISL033_S1	Orion New Zealand Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
ISL066_S1	Orion New Zealand Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
JRD110_I1	Todd Generation Taranaki Ltd		N Security Generator	New PoS commissioned since RCP3 proposal
KAI011_S1	MainPower NZ Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
KAW011_S1	Horizon Energy Distribution	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
KAW011_S2	OJI Fibre Solutions (NZ) Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
KAW110_I1	KAWERAU GEOTHERMAL LTD	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
KBY066_S1_S2	Orion New Zealand Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
KIK011_S1	Network Tasman Ltd	N Security Material	N Security Material	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
KIN011_S1_S2	Powerco Ltd	N-1 Security Material	N-1 Security High	Existing PoS from RCP3
KIN033_S1	Powerco Ltd	N Security Material	N Security High	Existing PoS from RCP3
KMO033_S1	Powerco Ltd	N-1 Security Material	N Security High	Existing PoS from RCP3
KOE110_S1	Top Energy Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
KPO110_I1	Mercury NZ Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
KPU066_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
KUM066_S1	Westpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
KWA011_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
LFD110_S1	Vector Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
LTN033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
LTN220_I1	Mercury SPV Ltd		N-1 Security Generator	New PoS commissioned since RCP3 proposal
MAN220_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
MAT110_I2	Manawa Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
MCH011_S1	Network Tasman Ltd	N Security Material	N Security Material	Existing PoS from RCP3
MGM033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MHO033_S1	Electra Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MKE110_I1	Todd Generation Taranaki Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3
MLG011_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MLG033_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MNG033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
MNG110_S1	Vector Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MNI011_S1_S2	Methanex NZ Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
MNI011_S3	OMV NZ Production Ltd		N-1 Security Material	New PoS commissioned since RCP3 proposal
MPE110_S1	Northpower Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
MST033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MTI220_I1	Mercury NZ Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
MTM033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MTN033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MTO033_S1	Northpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
MTR033_S1	Powerco Ltd	N Security Material	N Security Material	Existing PoS from RCP3
NAP220_I1	Nga Awa Purua JV Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
NAP220_I2	Ngatamariki Geothermal Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
NMA033_S1	PowerNet Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
NPK033_S1	The Lines Company Ltd	N Security Material	N Security Material	Existing PoS from RCP3
NSY033_S1	OtagoNet Joint Venture	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
NWD066_S1	Orion New Zealand Ltd		N-1 Security Material	New PoS not yet commissioned
OAM033_S1	Network Waitaki Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
OHA220_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
OHB220_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
OHC220_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
OHK220_I1	Mercury NZ Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
OKI220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
OKN011_S1	Powerco Ltd	N Security High	N Security Material	Existing PoS from RCP3
OKN011_S2	The Lines Company Ltd	N Security High	N Security Material	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
ONG033_S1	The Lines Company Ltd	N Security Material	N Security Material	Existing PoS from RCP3
OPK033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
ORO110_S1	Buller Electricity Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
OTA022_S1	Vector Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
OTI011_S1	Westpower Ltd	N Security Material	N Security Material	Existing PoS from RCP3
OWH011_S1	Unison Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
PAK033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
PAO110_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
PEN022_S1	Vector Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
PEN025_S1	KiwiRail Holdings	N Security High	N Security Material	Existing PoS from RCP3
PEN033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
PEN033_S2	Southpark Utilities Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
PEN110_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
PNI033_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
PPI220_I1	Contact Energy Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3
PRM033_S1	Electra Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
RDF033_S1	Unison Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
RFN110_S1_S2	Westpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
ROS022_S1	Vector Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
ROS110_S1	Vector Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
ROT011_S1	Unison Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
ROT033_S1	Unison Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
ROT110_I1	Unison Networks Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
ROX110_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
ROX220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
RPO220_I1	Genesis Power Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
SBK066_S1	MainPower NZ Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
SDN033_S1	Aurora Energy Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
SFD033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
SFD220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
STK033_S1	Network Tasman Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
STK033_S2	Nelson Electricity Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
STK066_S1	Network Tasman Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
STU011_S1	Alpine Energy Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
SVL033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
SWN025_S1	KiwiRail Holdings	N-1 Security Material	N Security Material	Existing PoS from RCP3
TAB033_S1	Unison Networks Ltd		N-1 Security Material	New PoS not yet commissioned
TAB220_I1	Contact Energy Ltd		N-1 Security Generator	New PoS commissioned since RCP3 proposal
TAK033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
TGA011_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
TGA033_S1	Powerco Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
THI220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
TIM011_S1	Alpine Energy Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
TKA011_I1	Genesis Power Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
TKA033_S1	Alpine Energy Ltd	N Security Material	N Security Material	Existing PoS from RCP3
TKB220_I1	Genesis Power Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
TKR033_S1	Wellington Electricity Lines	N-1 Security High	N-1 Security High	Existing PoS from RCP3
TKU033_S1	The Lines Company Ltd	N-1 Security Material	N Security Material	Existing PoS from RCP3
TKU220_I1	Genesis Power Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
TMI033_S1	Powerco Ltd	N-1 Security Material	N-1 Security High	Existing PoS from RCP3
TMK033_S1	Alpine Energy Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
TMN055_S1_S2	KiwiRail Holdings	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
TMU011_S1_S2	Waipa Networks Ltd	N Security High	N-1 Security Material	Existing PoS from RCP3
TNG011_S1	Winston Pulp Int'l Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
TNG055_S1_S2	KiwiRail Holdings	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
TRK011_S1	Unison Networks Ltd	N Security Material	N Security Material	Existing PoS from RCP3
TUI110_I1	Genesis Power Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
TUI110_S2	Eastland Network Ltd	N-1 Security High	N-1 Security Material	Existing PoS from RCP3
TWH033_S1	WEL Networks Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
TWI220_S1	NZ Aluminium Smelters Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
TWZ033_S1	Alpine Energy Ltd	N Security High	N-1 Security Material	Existing PoS from RCP3
TWZ033_S3	Network Waitaki Ltd	N Security High	N-1 Security Material	Existing PoS from RCP3
UHT033_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WAI011_S1	Horizon Energy Distribution	N Security Material	N Security Material	Existing PoS from RCP3
WAI033_I1	Lodestone Energy Ltd		N Security Generator	New PoS not yet commissioned
WAI033_I2	Far North Solar farm		N Security Generator	New PoS not yet commissioned

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
WAI050_S1	Horizon Energy Distribution		N Security Material	New PoS commissioned since RCP3 proposal
WDV011_S1	Scanpower Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WDV110_I1	MEL (Te Apiti) Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
WEL033_S1	Vector Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WGN033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WHI011_S1_S2	Pan Pac Forest Products Ltd	N Security High	N-1 Security Material	Existing PoS from RCP3
WHI220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
WHU033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WIL033_S1	Wellington Electricity Lines	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WIR033_S1	Vector Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
WKM220_I1	Mercury NZ Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
WKO033_S1	Powerco Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WPA220_I1	Mercury NZ Ltd	N Security Generator	N Security Generator	Existing PoS from RCP3
WPR033_S1	MainPower NZ Ltd	N Security Material	N Security Material	Existing PoS from RCP3
WPR066_S1	MainPower NZ Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WPW011_S1	Centralines Ltd	N Security Material	N Security High	Existing PoS from RCP3
WPW033_S1	Centralines Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WRD033_S1	Vector Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WRK033_S1	Unison Networks Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WRK220_I1	Contact Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
WTK011_I1	Meridian Energy Ltd	N-1 Security Generator	N-1 Security Generator	Existing PoS from RCP3
WTK011_S2	Network Waitaki Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3

Point of Service (PoS)	Customer Name	RCP3 Category	RCP4 Category (Proposed)	Point of Service Status
WTK033_S1	Network Waitaki Ltd	N-1 Security Material	N-1 Security Material	Existing PoS from RCP3
WTU033_S1	Unison Networks Ltd	N-1 Security High	N-1 Security High	Existing PoS from RCP3
WVY011_S1	Powerco Ltd	N Security High	N Security Material	Existing PoS from RCP3
WVY110_I1	Waverley Wind Farm Ltd	-	N-1 Security Generator	New PoS commissioned since RCP3 proposal
WWD110_I1	MEL (West Wind)	N Security Generator	N-1 Security Generator	Existing PoS from RCP3
TRU220_I1	Nova Energy Ltd (Te Rahui)	-	N-1 Security Generator	New PoS not yet commissioned
KPA110_S1	Nova Energy Ltd	N Security Generator	N Security Material	Existing PoS from RCP3*
ATI220_S1	Mercury NZ Ltd	N-1 Security Generator	N-1 Security Material	Existing PoS from RCP3*
MAT110_S1	Southern Generation Ltd	N-1 Security Generator	N-1 Security Material	Existing PoS from RCP3*
TWC220_S1	Tilt Renewables Ltd	N Security Generator	N Security Material	Existing PoS from RCP3*
HAM033_S2	Tainui Group Holdings Ltd	-	N-1 Security Material	New PoS not yet commissioned

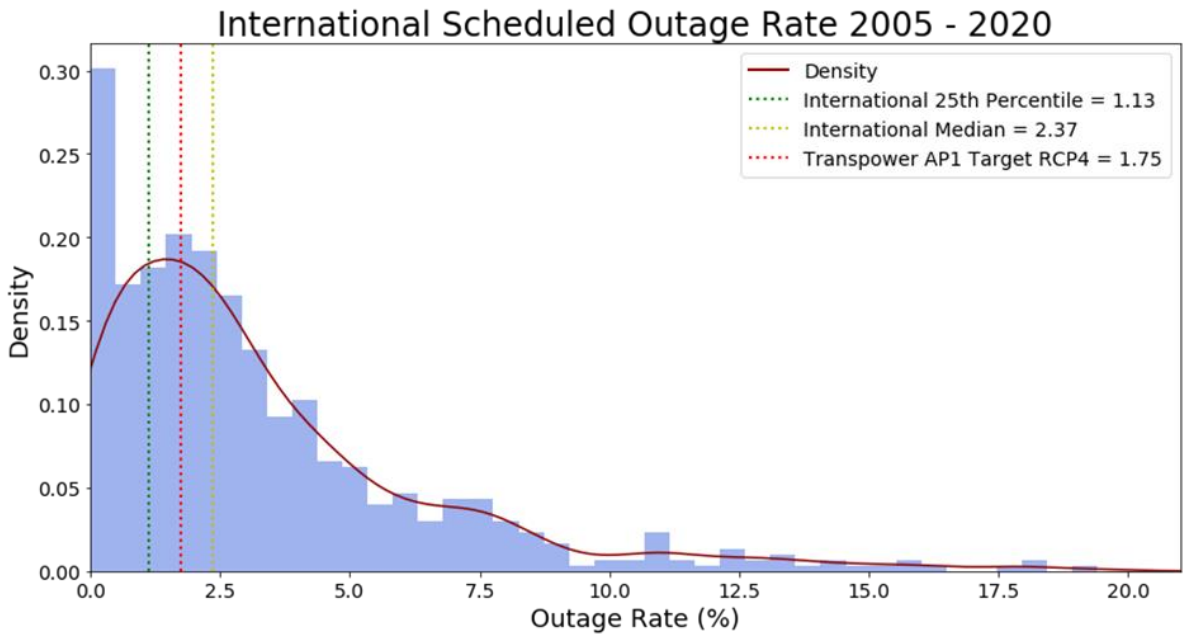
* Note – These Points of Service were part of RCP3 Generator PoS sub-category, but now have been moved to Material (supply/load) PoS sub-category for RCP4 as the generation at these Points of Service are treated as Embedded Generation

Appendix C: International HVDC outage rates

Many international HVDC link owners (including Transpower) report HVDC availability to Cigre.[46]

Figure 6 provides a comparison between international scheduled outage rates for comparable[47] HVDC links from 2005 to 2020, and the proposed allowance for planned outages (1.75%) included within the proposed annual RCP4 targets for AP1 – HVDC capacity availability.

Figure 6: International HVDC scheduled outage rate (2005-2020)



[46] Data from CIGRE Advisory Group B4.04

[47] Comparable HVDC links to the New Zealand scheme, i.e. Thyristor based schemes

Appendix D: Proposed asset list RCP4 (AP2)

The assets we propose to measure HVAC availability against in RCP4 are listed in Table 28 and shown on the map in Figure 7 (below). We have included these assets because of observed current and determined future market constraints for RCP4. For comparison, a map showing the current selected assets for RCP3 for HVAC availability is shown in Figure 8 (below). Selected assets are defined using outage blocks for the purposes of measuring performance for AP2. These selected assets are also used for AP3 and AP4.

Table 28 - Proposed assets for RCP4 (AP2)

Asset Name (Outage Blocks)	Asset (Outage Block) Description
ARI_KIN_1	Arapuni–Kinleith Circuit 1
ARI_KIN_2	Arapuni–Kinleith Circuit 2
ASB_ISL_1	Ashburton–Islington 220 kV Circuit 1
ASB_TIM_TWZ_1	Ashburton–Timaru–Twizel 220 kV Circuit 1
ASB_TIM_TWZ_2	Ashburton–Timaru–Twizel 220 kV Circuit 2
ASB_BRY_1	Ashburton–Bromley 220kV Circuit 1
ATI_TRK_1	Atiamuri–Tarukenga 220 kV Circuit 1
ATI_TRK_2	Atiamuri–Tarukenga 220 kV Circuit 2
ATI_WKM_1	Atiamuri–Whakamaru 220 kV Circuit 1
AVI_BEN_1	Aviemore–Benmore 220kV Circuit 1
AVI_BEN_2	Aviemore–Benmore 220kV Circuit 2
AVI_WTK_1	Aviemore–Waitaki 220 kV Circuit 1
BPE_BRK_1	Bunnythorpe–Brunswick 220 kV Circuit 1
BPE_BRK_2	Bunnythorpe–Brunswick 220 kV Circuit 2
BPE_TKU_1	Bunnythorpe–Tokaanu 220 kV Circuit 1
BPE_TKU_2	Bunnythorpe–Tokaanu 220 kV Circuit 2
BPE_TWC_LTN_1	Bunnythorpe–Tararua Wind Centre–Linton 220kV Circuit 1
CYD_ROX_1	Clyde–Roxburgh 220 kV Circuit 1
CYD_ROX_2	Clyde–Roxburgh 220 kV Circuit 2
EDG_KAW_3	Edgecumbe–Kawerau 220kV Circuit 3
FHL_RDF 1	Fernhill–Redclyffe 110kV Circuit 1
FHL_RDF 2	Fernhill–Redclyffe 110kV Circuit 2

Asset Name (Outage Blocks)	Asset (Outage Block) Description
HAM_KPO_1	Hamilton–Karapiro 110 kV Circuit 1
HAM_KPO_2	Hamilton–Karapiro 110 kV Circuit 2
HAM_OHW_1	Hamilton–Ohinewai 220 kV Circuit 1
HAM_T6	Hamilton 220/110 kV Transformer T6
HAM_T9	Hamilton 220/110 kV Transformer T9
HAM_WKM_1	Hamilton–Whakamaru 220 kV Circuit 1
HAY_T1	Haywards 220/110/11 kV Transformer T1
HAY_T2	Haywards 220/110/11 kV Transformer T2
HAY_T5	Haywards 220/110/11 kV Transformer T5
HLY_SFD_1	Huntly–Stratford 220 kV Circuit 1
HLY_TWH_1	Huntly–Te Kowhai 220 kV Circuit 1
HWA_SFD_1	Hawera–Stratford 110 kV Circuit 1
ISL_KIK_1	Islington–Kikiwa 220 kV Circuit 1
ISL_NWD_1	Islington–Norwood 220kV Circuit 1
ISL_TKB_1	Islington–Tekapo B 220 kV Circuit 1
ISL_WPR_CUL_KIK_2	Islington–Waipara–Culverden Kikiwa 220 kV Circuit 2
ISL_WPR_CUL_KIK_3	Islington–Waipara–Culverden Kikiwa 220 kV Circuit 3
KIN_TRK_1	Kinleith–Taurakenga 110 kV Circuit 1
KIN_TRK_2	Kinleith–Taurakenga 110 kV Circuit 2
LIV_NSY_1	Livingstone–Naseby 220 kV Circuit 1
LIV_NWD_1	Livingstone–Norwood 220kV Circuit 1
LIV_WTK_1	Livingstone–Waitaki 220 kV Circuit 1
MAN_220BS_A	Manapouri 220 kV Bus A
MAN_220BS_B	Manapouri 220 kV Bus B
MAN_220BS_C	Manapouri 220 kV Bus C
NSY_ROX_1	Naseby–Roxburgh 220 kV Circuit 1
OHK_WRK_1	Ohakuri–Wairakei 220 kV Circuit 1
OHW_WKM_1	Ohinewai–Whakamaru 220 kV Circuit 1
RPO_TNG_1	Rangipo–Tangiwai 220 kV Circuit 1
RPO_WRK_1	Rangipo–Wairakei 220 kV Circuit 1

Asset Name (Outage Blocks)	Asset (Outage Block) Description
SFD_T9	Stratford 220 / 110 kV Interconnecting Transformer T9
SFD_T10	Stratford 220 / 110 kV Interconnecting Transformer T10
SFD_TMN_1	Stratford–Taumaranui 220 kV Circuit 1
THI_WKM_1	Te Mihi–Whakamaru 220 kV Circuit 1
THI_WRK_1	Te Mihi–Wairakei 220 kV Circuit 1
TKB_TWZ_1	Tekapo B–Twizel 220 kV Circuit 1
TKU_WKM_1	Tokaanu–Whakamaru 220 kV Circuit 1
TKU_WKM_2	Tokaanu–Whakamaru 220 kV Circuit 2
TMN_TWH_1	Taumaranui–Te Kowhai 220 kV Circuit 1
WKM_WRK_1	Whakamaru–Wairakei 220 kV Circuit 1

Note: Any other associated outage blocks are excluded. For example, an outage on a single section of a circuit asset listed above does not constitute an outage for the purposes of AP2 if the single circuit section is not separately listed.

Figure 7: The selected assets we propose to measure HVAC availability against in RCP4

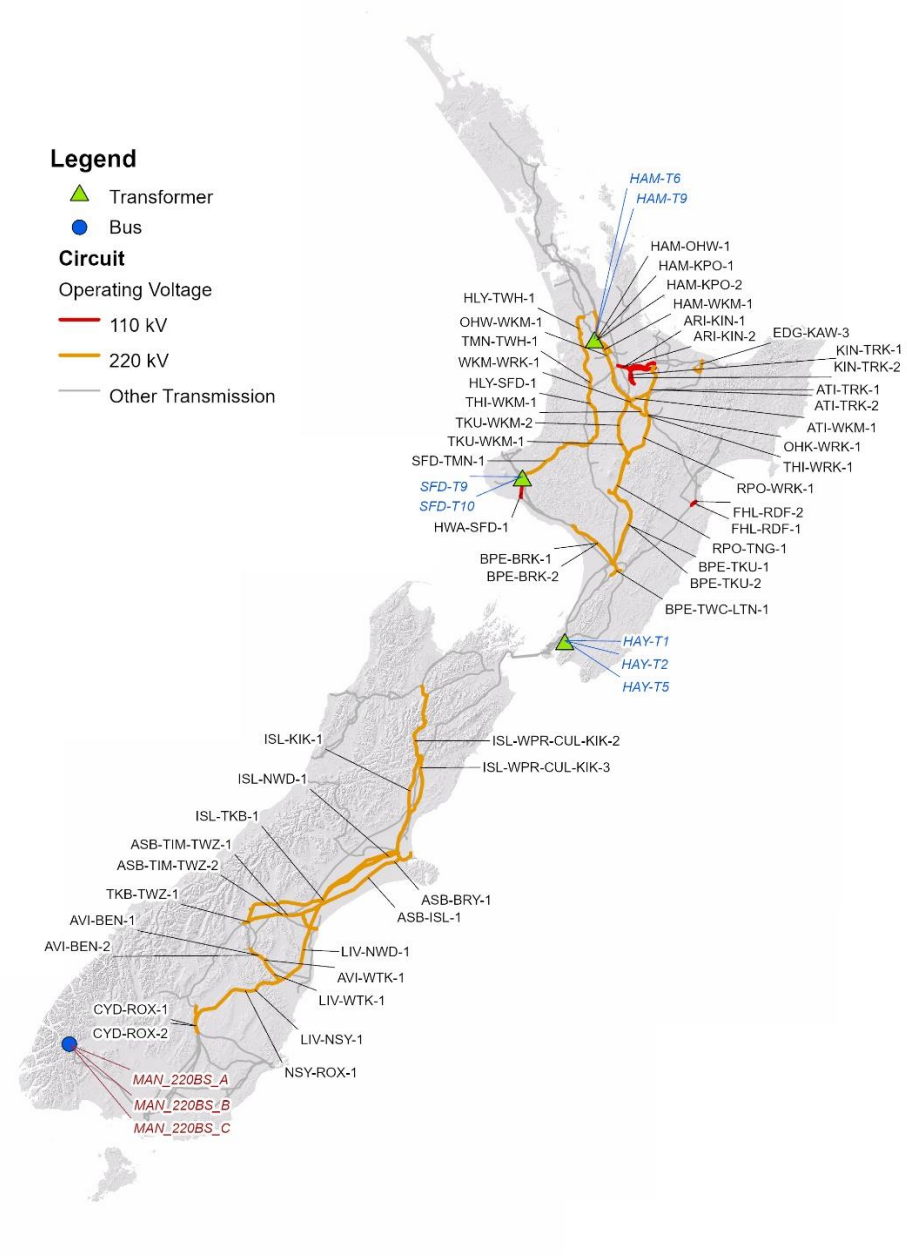


Figure 8: The selected assets for our current (RCP3) HVAC availability measure