APA
Australia's energy infrastructure partner

Instruments and Control Business Case

Roma to Brisbane Gas Pipeline Access Arrangement 2028–32

28 July 2026

Contents

document control

Printed versions of this document are only valid on the date of print. For the latest version, please refer to the electronic version stored on the AP&L SharePoint site.

Table 1.1: Revision Record

Version	Changes Made
0.1	*Initial draft*
0.2	*Feedback received from document review*
0.3	*Additional detail requested*

Table 1.2: Review and Distribution

Name	Role	Action	Sections
[redacted]	*Specialist – Asset Lifecycle*	*Initial draft*	*All*
[redacted]	*Measurement Specialist*	*Review and Input*	*3-5*
[redacted]	*Senior Engineer – Electrical & Instrumentation*	*Review and Input*	*6*
[redacted]	*Manager Capacity & Long Term Planning*	*Review and Input*	*All*
[redacted]	*Team Lead Asset Engineering - Qld*	*Review and Input*	*All*
[redacted]	*Team Lead – Optimisation and Control Systems*	*Review and Input*	*3-5*

This document requires the following approvals. Approvals are inserted as an object in the table below (preferred) or stored with the approved document in electronic version on the Project Site in Project Server.

Table 1.3: Approvals

Name	Role	Approval	Date Approved
[redacted]	*Head of Asset Operations Qld*	*Approval*	
[redacted]	*General Manager – Gas Operations East*	*Approval*	

Other project specific approvers can be added if required.

Delegation Policy

1. Overview

Number/ identifier	A-4_Gas Instruments
Description of Issue/ Project	This business case covers the replacement and upgrade of metering and instrumentation assets across the Roma to Brisbane Pipeline (RBP) above-ground facilities. These assets provide essential measurement, gas quality analysis, and operational control functions required to ensure the safe, reliable and compliant operation of the pipeline. The program encompasses the renewal of Gas Chromatographs (GCs), Moisture Analysers, Turbine Meters, and Flow Computers, which have reached or are approaching obsolescence and increasing failure risk.
Options considered	**Option 1 – Do Nothing** Under this option, obsolete or failing instrumentation is left in service until end-of-life failure occurs. This approach increases the risk of inaccurate gas quality measurement, non-compliance with gas specification and energy measurement obligations, unplanned outages, higher maintenance costs, and increased operational inefficiencies. **Option 2 – Replace Obsolete Metering & Instrumentation Components (Preferred)** This option involves planned and proactive replacement of ageing and unsupported equipment. It ensures ongoing measurement accuracy, maintains compliance with regulatory and contractual requirements, and minimises the risk of operational disruption. **Note:** For the ControlWave Micro RTU & Flow Computers upgrade, a third option — Maintain Current Fleet with Stockpiled Spares — was also considered. This option provides only short-term risk mitigation, does not address cybersecurity and long-term support risks (post-2030), and was not preferred.
Proposed Solution	The preferred solution (Option 2) includes: • Replacement of Gas Chromatographs and Moisture Analysers at Scotia and Woodroyd sites • Replacement of Gas Chromatographs only at Ellengrove and Brightview • Replacement of Turbine Meters at Toowoomba and Redbank Plains, upgrading to Coriolis meters for improved reliability and diagnostic capability • Progressive upgrades of RTUs & Flow Computers across multiple sites as existing ControlWave MRTUs & Flow Computers as units approach obsolescence This program of coordinated replacements will reduce operational risk, improve reliability of metering systems, and maintain compliance with measurement and gas quality obligations.
Estimated Cost	$3.872 million

Relevant standards	• AS 2885.3 Pipelines: Gas and Liquid Petroleum Operations and Maintenance. • RBP Pipeline Licence
Stakeholder Engagement	• Scope discussed during RBP Access Arrangement Stakeholder Meetings #3 (25/11/2025); #4 (10/02/2026); and #5 (31/03/2026)
Consistency with National Gas Rules (NGR)	As it replaces obsolete equipment that cannot guarantee security and risks malfunction the proposed expenditure meets the capital expenditure criteria in NGR 79, because it: • Is necessary to maintain the accuracy, safety and integrity of pipeline services (NGR 79(2)(c)(i)–(ii)) • Is prudent and efficient, avoiding the higher costs and operational impacts associated with reactive replacement of critical measurement equipment (NGR 79(1)(a)) • Reflects good industry practice, addressing foreseeable obsolescence and reliability risks before they cause service disruption • Ensures ongoing compliance with gas quality and energy measurement requirements under the RBP Pipeline Licence and associated regulations

2. Program details

2.1. Background

Accurate gas measurement is fundamental to the safe, reliable, and compliant operation of the Roma to Brisbane Pipeline (RBP). Metering and analytical instruments—including Gas Chromatographs, Moisture Analysers, turbine meters, and flow computers—provide the data required to determine gas composition, heating value, and energy quantities for custody transfer and billing purposes.

For customers connected to the RBP, these instruments directly underpin:

- the accurate calculation of energy delivered;
- billing and settlement under contractual arrangements; and
- confidence that gas quality specifications are being met at all times.

If critical measurement or analytical instruments fail or degrade beyond acceptable accuracy, APA's ability to determine gas energy content and moisture compliance is compromised. In such circumstances, energy quantities may need to be estimated or substituted, increasing the risk of billing inaccuracies, customer disputes, and loss of confidence in measurement outcomes.

Many of the instruments currently installed on the RBP are more than 20 years old, are obsolete and/or approaching end of manufacturer support. OEMs have withdrawn spare part supply, firmware updates, and technical support, increasing the likelihood of failure and extending restoration times when faults occur. Lead times for replacement equipment now commonly exceed 30–42 weeks, making reactive replacement impractical for assets that perform continuous billing-critical functions.

From a customer perspective, failure of these instruments can result in:

- delays or disputes in billing and settlement;
- increased reliance on estimated energy values;
- potential non-compliance with contractual measurement and gas quality requirements; and
- reduced transparency and confidence in pipeline operations.

These risks are particularly significant at custody-transfer and receipt/ delivery points, where measurement accuracy is essential to accurate, fair and equitable customer outcomes.

The Gas Instruments program addresses these risks by proactively replacing ageing and unsupported equipment before failure occurs. This ensures measurement integrity is maintained, customer billing remains accurate and transparent, and APA continues to meet its regulatory, contractual, and licence obligations. Proactive renewal of these assets supports both customer confidence and the lowest sustainable cost of service provision, by avoiding prolonged outages, emergency works, and inefficient reactive expenditure.

2.2. Assessment of options

Two high-level options were considered for the Gas Instruments program:

Option 1 – Do Nothing (Run to Failure)

Under this option, obsolete instruments would remain in service until they fail. This approach results in:

- Increasing risk of extended outages due to long equipment lead times (30–42 weeks typical for Gas Chromatographs and Moisture Analysers)
- Reduced accuracy of gas quality and energy measurement
- Higher operational costs from frequent troubleshooting, ad-hoc repairs, and sourcing obsolete spare parts from second hand suppliers and web markets such as Ebay.
- Increased likelihood of regulatory and contractual non-compliance

- Inefficient expenditure due to emergency mobilisation and unplanned corrective work

Option 1 exposes APA and customers to material operational, compliance, and financial risks and is not consistent with prudent asset management. Additionally, given the age profile of the equipment much of the equipment would likely be replaced at failure over the next one-two regulatory periods anyway in a reactive manor.

Option 2 – Planned and Proactive Replacement (Preferred)

Option 2 involves replacement of obsolete meters and analysers at planned intervals based on equipment criticality, asset condition, and operational performance.

This approach:

- Ensures continued compliance with energy measurement and gas specification requirements
- Reduces the likelihood of in-service failure and associated service disruptions
- Allows efficient planning, resource allocation, and coordination with other site works
- Enables standardisation of equipment fleets and more efficient spare-parts management
- Reduces lifecycle costs by avoiding high-cost reactive repairs

The option delivers predictable expenditure profiles and lowers overall system risk.

Inherent Risk assessment

If no action is taken under Option 1, the risk of measurement errors, specification non-compliance, extended outages, and operational disruption increases significantly as equipment ages. The inherent risk assessment undertaken across all gas instrument asset classes shows **High** untreated risk in safety, operational, compliance, reputation, and financial categories.

Under Option 2, risks are reduced to **Low or Negligible**, as proactive replacement removes obsolescence driven failure modes and ensures equipment remains accurate, reliable, and supported by manufacturers.

This demonstrates that Option 2 represents the prudent and efficient risk mitigating approach consistent with AS 2885 expectations and APA's Enterprise Risk Framework.

Table 2–1: Inherent risk rating of the Gas Instruments business case

Risk Area	Potential Impact	Option 1 :		Option 2:	
		Likelihood / Impact	Inherent risk rating	Likelihood / Impact	Risk rating
Health & Safety	n/a		n/a	n/a	n/a
Environment	n/a		n/a	n/a	n/a
Operational	Disruption 1-3 months	Frequent / Significant	High	Remote / Significant	Low
People	n/a		n/a	n/a	n/a
Compliance	Regulatory breach	Frequent / Minor	Moderate	Remote / Minor	Negligible
Reputation & Customer	n/a		n/a	n/a	n/a

Financial	Revenue <$1M	Impact	Frequent / Minimal	/ Low	Remote / Minimal	/ Negligible
Untreated risk			**HIGH**		**LOW**	

Financial assessment

As the timing and extent of failures under a run-to-failure approach cannot be forecast with sufficient certainty, a meaningful Net Present Value comparison is not feasible for Option 1. However, the industry practice clearly demonstrates that reactive failure driven replacement leads to materially higher lifecycle costs, increased volatility in expenditure, and heightened exposure to regulatory and commercial risks.

Conversely, the preferred option—planned and proactive replacement—provides a stable and efficient expenditure profile, reduces the need for costly emergency mobilisation, and avoids the premium pricing associated with procuring obsolete equipment and undertaking unplanned works. This option reflects prudent asset management and is consistent with good industry practice and the capital expenditure criteria in NGR 79.

Table 2-2 provides a summary of the financial implications of each option.

Table 2–2: Options assessment of the Gas Instruments business case for proposed replacement Gas Chromatographs, Moisture Analysers, Turbine Meters and Flow Control Computers.

	Commentary
Option 1: Do Nothing (Run to Failure)	• Unplanned, reactive replacements lead to inefficient costs, including higher labour, contractor standby, and mobilisation expenses. • Expenditure becomes increasingly lumpy and unpredictable as asset failures cluster with advancing age and obsolescence. • Increased risk of emergency works during periods of high operational demand, with limited ability to schedule efficient resource utilisation. • Premium pricing for obsolete assets and components, as OEM support diminishes and spare parts become scarce. • Heightened risk of regulatory or contractual non-compliance, potentially leading to material financial penalties and customer disputes. • Significant indirect financial impacts, including increased operational disruption, prolonged outages due to long supply lead times (30–42 weeks), and reputational damage arising from measurement inaccuracies. • Any short-term deferral of capital outlay is fully offset—and exceeded—by higher reactive repair costs and risk-related financial exposure.
Option 2: Planned and Proactive Replacement (Preferred)	• Coordinated replacement with other scheduled site works enables efficient bundling of labour, mobilisation, and commissioning activities. • Stable, predictable expenditure profile over the 2028–32 period, supporting prudent capital planning and smoothing the investment cycle. • Avoids the elevated costs of emergency mobilisation, overtime labour, and premium-priced legacy components. • Optimises lifecycle cost outcomes, reducing overall asset stewardship cost by replacing equipment before failure modes escalate. • Enables standardisation across metering and instrumentation assets, improving long-term maintainability and reducing inventory and training costs.

	• Supports compliance with measurement, gas quality and licence obligations, effectively avoiding the financial and non-financial risks inherent in the run-to-failure approach. • Ensures continuity of accurate billing and gas specification monitoring, reducing the likelihood of commercial disputes or customer impacts.

The risk and financial assessments above support the preferred option (option 2) as appropriately balancing costs and risks.

2.3. Consistency with the National Gas Rules and other regulations

The Gas Instruments program complies with the capital expenditure criteria in **NGR 79**, as the prevention of failure of the gas instruments:

- Is necessary to maintain the safety, integrity, and reliability of pipeline services;
- avoid foreseeable non-compliance with gas quality and measurement obligations;
- would be incurred by a prudent operator, given the equipment's age, obsolescence, and criticality;
- represent the lowest sustainable lifecycle cost, avoiding inefficient reactive expenditure;
- align with good industry practice, including proactive management of obsolescence and standardisation of metering systems;
- Support compliance with the RBP Pipeline Licence, relevant gas measurement requirements, and AS 2885.3.

2.4. Proposed costs for FY28-FY32

The total capital cost for the Gas Instruments program is **$3.87 million (Real $2026)** across FY28–FY32.

Costs include the planned replacement of:

- Gas Chromatographs and Moisture Analysers at Woodroyd and Scotia
- Gas Chromatographs at Ellengrove and Brightview
- Turbine Meters (upgraded to Coriolis meters) at Toowoomba & Redbank Plains
- Flow Computer upgrades across multiple sites
- Detailed annual expenditure by asset group is set out in Sections 3–6.

The proposed costs reflect efficient planning, bundling of works, and use of APA resources supported by specialist vendors where required.

Table 2–3 Total cost for Gas Instruments business cases ($'000s Real 30 June 2026)

Description	FY28	FY29	FY30	FY31	FY32	Total
Woodroyd - GC & Moisture Analyser	461	-	-	-	-	461
Scotia - GC & Moisture Analyser	-	462	-	-	-	462
Ellengrove GC Upgrade	-	-	290	-	-	290
Brightview GC Upgrade	-	-	-	233	-	233
Redbank - Turbine Meter Upgrade	-	-	-	-	163	163
Toowoomba - Turbine Meter Upgrade	-	-	-	-	233	233
Flow computers upgrade (each site where we have obsolete Flow Computers Controlwave Micro)	404	404	406	407	408	2,029
FY Total	865	750	600	550	690	3,872

3. Gas Chromatograph & Moisture Analyser replacements

3.1. Project objective and scope

The objective of this project is to ensure the continued accurate measurement of gas composition and moisture content at critical Roma to Brisbane Pipeline (RBP) metering stations through the proactive replacement of obsolete Gas Chromatographs (GCs) and Moisture Analysers.

Gas Chromatographs provide the gas composition and heating value data used to calculate energy quantities for billing, custody transfer, and contractual settlement. Moisture Analysers confirm compliance with gas quality specifications and support the validity of Gas Chromatograph calculations. Together, these instruments form the primary basis for determining the billable energy delivered to customers.

If the Gas Chromatograph or associated analytical instruments fail, it is no longer possible to reliably determine gas composition or heating value. In such circumstances:

- energy quantities cannot be calculated with the required accuracy;
- customer billing would be based on estimates or substituted data; and
- APA would be exposed to increased risk of billing inaccuracies, commercial disputes, and non-compliance with measurement and licence obligations.

Given the critical role these instruments play in energy calculation and revenue settlement, their failure represents not only an operational risk, but a material commercial and regulatory risk to both APA and pipeline users.

The project scope includes the planned replacement of obsolete Gas Chromatographs and Moisture Analysers at identified sites, including procurement, installation, configuration, commissioning, and integration with existing metering, SCADA, and flow computer systems. Works will be delivered in a coordinated manner to minimise outage duration and ensure continuity of compliant gas measurement and billing capability.

3.2. Background

Gas Chromatographs and Moisture Analysers across the RBP were installed more than 20 years ago and have continued to operate with OEM support until recently. With advancements in technology, manufacturers have released new instrument models and progressively discontinued maintenance of older generations.

As a result:

- OEM support has ceased, including spare parts and firmware updates
- Operational spares are increasingly difficult to obtain and command premium prices
- Existing units are suffering measurement drift, increased faults, and higher maintenance demand
- Lead times for replacement analysers now extend to 30–42 weeks, making reactive replacement impractical

These factors increase the risk of:

- Failure to measure gas energy content accurately
- Non-compliance with gas quality and energy measurement requirements
- Commercial disputes arising from inaccurate billing
- Prolonged outages if a unit fails unexpectedly

Given the importance of accurate metering and the critical energy measurement function Gas Chromatographs provide, proactive replacement is required to maintain safe and reliable pipeline operation.

3.3. Assessment of options

The options considered for the access arrangement period are:

— Option 1: Do nothing

— Option 2: Replace obsolete Gas Chromatographs & Moisture Analyser with new model

Risk assessment

The potential risks of both options are shown below.

Table 3–1: Risk assessment – Gas Chromatographs & Moisture Analyser replacements

Risk Area	Potential Impact	Option 1 :		Option 2:	
		Likelihood / Impact	Inherent risk rating	Likelihood / Impact	Risk rating
Health & Safety	n/a		n/a	n/a	n/a
Environment	n/a		n/a	n/a	n/a
Operational	Disruption 1-3 months	Frequent / Significant	High	Remote / Significant	Low
People	n/a		n/a	n/a	n/a
Compliance	Regulatory breach	Frequent / Minor	Moderate	Remote / Minor	Negligible
Reputation & Customer	n/a		n/a	n/a	n/a
Financial	Revenue Impact <$1M	Frequent / Minimal	Low	Remote / Minimal	Negligible
Untreated risk			**HIGH**		**LOW**

Option 1 – Do Nothing (Reactive Replacement)

Under this option, obsolete analysers are operated until failure. This approach:

- Fails to meet AS 2885.3 requirements for managing foreseeable integrity risks
- Risks loss of energy measurement capability, impacting billing and contractual compliance
- Introduces significant risk of **extended outages** because of long equipment lead times
- Increases Opex due to frequent troubleshooting and procurement of high-cost legacy spares
- Creates unpredictable expenditure profiles and increases the likelihood of regulatory or customer concerns
- Is likely to still incur a significant percentage, or more, of the planned capital expenditure of option 2 as terminal failures force upgrades under premium rush pricing on as available equipment.

Option 1 is neither prudent nor technically acceptable.

Option 2 – Proactive Replacement of Obsolete Gas Chromatographs & Moisture Analysers (Preferred)

Option 2 involves replacing ageing Gas Chromatographs and Moisture Analysers before failure, based on criticality and asset condition.

Benefits include:

- Maintains accurate gas quality and energy-measurement capability
- Ensures compliance with contractual and regulatory requirements
- Reduces unplanned outages and associated customer impacts
- Provides a supply of spare parts for remaining legacy units
- Allows efficient resource allocation by aligning replacements with other site works
- Stabilises expenditure by avoiding costly reactive replacement
- Facilitates continued fleet wide vendor and model optimisation and standardisation

Given their criticality to metering accuracy and the known obsolescence issues, this option aligns with good industry practice and is strongly supported by APA's risk and performance data.

Financial assessment

Table 3–2: Option assessment – replace Gas Chromatographs & Moisture Analysers ($ Real 30 June 2026)

Option	Estimated cost	Treated residual risk rating	Benefit / Disbenefit
Option 1	>$923k	High	Does not mitigate Operational, Compliance or Financial risk.
Option 2	$923k	Low	Efficiently mitigates Operational, Compliance and Financial risk.

In the near term, Option 1 appears to defer capital expenditure. However:

- Unplanned failures cost significantly more due to emergency mobilisation
- Outages may persist for months given long OEM lead times
- Customer and regulatory penalties far exceed planned replacement costs
- Predictability of expenditure is lost

Option 2:

- Enables coordinated work planning
- Allows efficient bundling of analyser replacements with other maintenance activities
- Delivers predictable, staged capital expenditure across the period
- Minimises lifecycle cost by avoiding emergency work and high-priced obsolete spares

Option 2 is therefore the prudent and efficient investment option.

Table 3–3: Financial assessment – Replace Gas Chromatographs & Moisture Analysers

	Commentary
Option 1: Replace GCs & Moisture Analysers when they fail	• Initial capital expenditure is lower than option 2 as expenditure is pushed out until failure occurs. However, replacements are more expensive given the efficiency losses (costs and staff/contractor resources) of unplanned works. • The expenditure is unpredictable and grows significantly once the level of failures exceeds the capacity of staff resources.
Option 2: Proactive replacement of GCs & Moisture Analysers	• Where possible, replacements take place with other works at the site, improving cost and resource efficiency. • Steady replacement rate over the coming years gives predictability in expenditure.

The preferred option that appropriately balances costs and risks is the Proactive replacement of Gas Chromatographs & Moisture Analysers

3.4. Proposed costs for FY28-FY32

The total capital expenditure for Gas Chromatographs and Moisture Analyser replacements is set out in the table below.

This estimate is based on replacing one Gas Chromatograph and one Moisture Analyser at Woodroyd and one Gas Chromatograph and one Moisture Analyser at Scotia.

These replacements will be delivered using APA resources supported by specialist vendors for configuration and commissioning. All procurement will be conducted in accordance with APA's Procurement Policy.

Table 3–4: Estimated annual cost Gas Chromatograph & Moisture Analyser sites ($'000s Real 30 June 2026)

ALMPID	Description	FY28	FY29	FY30	FY31	FY32	Total
11592	Woodroyd - GC & Moisture Analyser	461					**461**
11591	Scotia - GC & Moisture Analyser		462				**462**
	FY Total	**461**	**462**	**0**	**0**	**0**	**923**

The cost estimate is derived from current project: Kogan North – Gas Chromatographs & Moisture Analyser replacement, with similar scope on adjacent non-regulated asset. This is then adjusted for inflation and labour cost escalation.

Table 3–5: Cost breakdown for Gas Chromatographs & Moisture Analyser sites ($'000s Real 30 June 2026)

Item	Description	Total
Materials	GC & Moisture Analyser	544,775
Labour - Contractor	Contractor Pre-FAT / FAT / SAT Costs	59,293
Labour - Internal	Commissioning, Project Engineering, Operations, Document Control & Drafting	319,352
	Total	923,420

4. Gas Chromatograph only replacement

4.1. Project objective and scope

The objective of this project is to proactively replace obsolete **Gas Chromatographs** at the **Brightview** and **Ellengrove** stations to ensure the continued accuracy of gas quality measurement and compliance with contractual and regulatory requirements.

The existing Emerson Model 500 Gas Chromatographs installed at these locations are now obsolete, with extremely limited OEM support and spare-parts availability. As Gas Chromatographs provide the heating value and compositional data used for energy billing, custody transfer, and compliance with gas specification limits, maintaining their reliability is essential.

Replacements will be planned and delivered based on station criticality, operational performance, and equipment condition, using APA resources supported by specialist vendors for configuration and commissioning.

4.2. Background

The Gas Chromatographs installed at the Brightview and Ellengrove stations are more than 20 years old and are based on legacy platforms that are no longer supported by the original equipment manufacturer (OEM).

All Gas Chromatographs proposed for replacement under this business case are off support assets, with OEM support having ceased prior to preparation of this proposal. This includes:

- No manufacturer support or service agreements
- No firmware, software, or cybersecurity updates
- No OEM technical assistance
- No ongoing manufacture of critical spare parts

As a result, APA is reliant on diminishing stores of legacy components, third party repairs, or cannibalised parts from decommissioned units to maintain operability. This support arrangement is not sustainable and is inconsistent with prudent asset management practices.

The continued operation of unsupported Gas Chromatographs materially increases the likelihood of failure and the duration of outages, as many critical components have lead times of 30 to 42 weeks or are no longer available at all. The risk profile of these assets will continue to elevate? over time as remaining parts inventories reduce further.

Gas Chromatographs provide gas composition and heating value data used to determine billable energy quantities, support custody transfer, and demonstrate compliance with gas specification obligations. Failure or degraded performance of these instruments can result in:

- Inaccurate or estimated energy quantities
- Increased reliance on substituted data
- Commercial disputes with customers
- Potential non compliance with contractual, licence, and regulatory obligations

Given that OEM support has already ceased, future failures are foreseeable rather than unexpected. Continued operation of these assets would expose users to increasing operational and commercial risk and does not represent the prudent management of pipeline assets as required under the National Gas Rules.

Accordingly, proactive replacement of the Brightview and Ellengrove Gas Chromatographs is required to restore full vendor support, ensure reliable and auditable gas quality measurement, and minimise the risk of customer and regulatory impacts. The proposed replacements represent the lowest risk and most efficient means of maintaining measurement integrity across the Roma to Brisbane Pipeline.

4.3. Assessment of options

The options considered for the access arrangement period are:

- Option 1: Do nothing
- Option 2: Replace obsolete Gas Chromatograph with new model

Risk assessment

The potential risks of both options are shown below.

Table 4–1: Risk assessment – Gas Chromatograph replacements

Risk Area	Potential Impact	Option 1 :		Option 2:	
		Likelihood / Impact	Inherent risk rating	Likelihood / Impact	Risk rating
Health & Safety	n/a		n/a	n/a	n/a
Environment	n/a		n/a	n/a	n/a
Operational	Disruption 1-3 months	Frequent / Significant	High	Remote / Significant	Low
People	n/a		n/a	n/a	n/a
Compliance	Regulatory breach	Frequent / Minor	Moderate	Remote / Minor	Negligible
Reputation & Customer	n/a		n/a	n/a	n/a
Financial	Revenue Impact <$1M	Frequent / Minimal	Low	Remote / Minimal	Negligible
Untreated risk			**HIGH**		**LOW**

Option 1 – Do Nothing (Reactive Replacement)

Under this option, Gas Chromatographs would only be replaced upon failure. This creates a range of foreseeable risks:

- Inability to measure gas composition and heating value accurately
- Non-compliance with gas specification requirements
- Technical and commercial risks associated with inaccurate billing
- Inability to source spares due to discontinued OEM support
- Outages lasting several months because of long replacement lead times

- Increased maintenance effort and unplanned expenditure

The do-nothing approach is not technically or operationally acceptable and fails to meet AS 2885 requirements for managing foreseeable integrity risks.

Option 2 – Proactive Gas Chromatograph Replacement (Preferred)

Option 2 involves replacing the obsolete Gas Chromatographs at Ellengrove and Brightview before failure occurs.

Benefits include:

- Maintains accurate gas quality and energy-measurement capability
- Ensures compliance with gas specification and contractual measurement requirements
- Avoids prolonged outages associated with long OEM lead times
- Provides salvageable parts that can support other remaining legacy Gas Chromatographs
- Enables efficient resource planning and alignment with other maintenance activities
- Significantly improves measurement reliability for customers and APA operations

This approach reflects good industry practice for managing critical measurement assets and is strongly supported by APA's asset condition and risk assessments.

Financial assessment

Table 4–2: Option assessment – Gas Chromatograph upgrades ($ Real 30 June 2026)

Option	Estimated cost	Treated residual risk rating	Benefit / Disbenefit
Option 1	>$522k	High	Does not mitigate Operational, Compliance or Financial risk.
Option 2	$522k	Low	Efficiently mitigates Operational, Compliance and Financial risk.

While Option 1 may appear to defer capital costs, it leads to significantly higher lifecycle expenditure due to:

- Inefficient, unplanned field mobilisation
- Emergency procurement of scarce legacy components
- Potential financial exposure from measurement inaccuracies
- Regulatory and customer consequences associated with gas-quality non-compliance

Option 2 provides predictable, efficient, and planned expenditure, reducing long-term costs and risk. Given the clear operational, commercial, and compliance benefits, **Option 2 is the prudent and efficient investment option**.

Table 4–3: Financial assessment – CP unit upgrades ($ Real 30 June 2026)

	Commentary
Option 1: Replace Gas Chromatographs when they fail	• Initial capital expenditure is lower than option 2 as expenditure is pushed out until failure occurs. However, replacements are more expensive given the efficiency losses (costs and staff/contractor resources) of unplanned works.

	• The expenditure is unpredictable and grows significantly once the level of failures exceeds the capacity of staff resources. • Avoided costs in the near-term are more than offset by regulatory fines and the financial costs and penalties arising from reputational damage and the potential loss of the AGP operating licence.
Option 2: Proactive replacement of Gas Chromatographs	• Where possible, replacements take place with other works at the site, improving cost and resource efficiency. • Steady replacement rate over the coming years gives predictability in expenditure.

The preferred option that appropriately balances costs and risks is the Proactive replacement of Gas Chromatographs

4.4. Proposed costs for FY28-FY32

Proposed expenditure for GC-only replacements is set out in the table below:

This estimate is based on replacing one Gas Chromatograph at Ellengrove and one Gas Chromatograph at Brightview.

These works will be delivered using APA resources, with specialist vendors engaged for configuration and commissioning in accordance with APA's Procurement Policy.

Costs derived from current project: Ballera Gas Chromatograph replacement, on adjacent non-regulated asset and a quote for a Gas Chromatograph.

Table 4–4: Estimated annual cost of Gas Chromatograph upgrades ($'000s Real 30 June 2026)

Description	FY28	FY29	FY30	FY31	FY32	Total
Ellengrove GC Upgrade			290			**290**
Brightview GC Upgrade				233		**233**
FY Total	**0**	**0**	**290**	**233**	**0**	**522**

Table 4–5: Cost breakdown for Gas Chromatograph replacement ($'000s Real 30 June 2026)

Item	Description	Total
Materials	Rosemount 770XA Natural Gas Chromatograph	218,246
Labour - Contractor	Contractor Pre-FAT / FAT / SAT Costs	45,025
Labour - Internal	Commissioning, Project Engineering, Operations, Document Control & Drafting	259,152
	Total	522,422

5. Turbine Meter replacements

5.1. Project objective and scope

The objective of this project is to proactively replace ageing **Turbine Meters** at the **Redbank Plains** and **Toowoomba** metering stations to ensure continued accuracy, reliability, and compliance with gas measurement and contractual requirements.

The existing 4" Turbine Meters have limited diagnostic capability, are increasingly difficult to calibrate or support and will reach the end of their useful life (20 years) during the access arrangement period. Replacing these units with modern **Coriolis Meters** will significantly improve measurement accuracy, reduce operational risks, and provide enhanced diagnostics to support APA's Accuracy Verification Testing (AVT) processes.

The project scope includes procurement, installation, commissioning and integration of Coriolis meters, including all necessary mechanical and electrical modifications, to ensure seamless replacement of existing equipment.

5.2. Background

The Turbine Meters at Redbank Plains and Toowoomba are reaching the end of their functional and supportable life. Current issues include:

- Outdated diagnostics that limit the ability to perform AVT
- Lack of availability of high-pressure gas calibration facilities in Australia
- Difficulty sourcing spare parts for ageing turbine meters
- Increasing maintenance and operational effort to maintain acceptable performance

By contrast, **Coriolis Meters** provide several advantages:

- No rotating components, significantly improving reliability
- Rich diagnostic capability supporting AVT and integrity programs
- Ability to be calibrated using water by Australian facilities, reducing cost and complexity
- Lower lifecycle costs and reduced measurement uncertainty

These improvements support APA's long-term measurement integrity strategy and provide customers with more consistent and accurate metering outcomes.

5.3. Assessment of options

The options considered for the access arrangement period are:

- Option 1: Do nothing
- Option 2: Replace obsolete Turbine meters with industry standard Coriolis meter.

Risk assessment

The potential risks of both options are shown below.

Table 5–1: Risk assessment – Turbine Meter replacements

Risk Area	Potential Impact	Option 1 :		Option 2:	
		Likelihood / Impact	Inherent risk rating	Likelihood / Impact	Risk rating
Health & Safety	n/a		n/a	n/a	n/a
Environment	n/a		n/a	n/a	n/a
Operational	Disruption 1-3 months	Frequent / Significant	High	Remote / Significant	Low
People	n/a		n/a	n/a	n/a
Compliance	Regulatory breach	Frequent / Minor	Moderate	Rare / Minor	Negligible
Reputation & Customer	n/a		n/a	n/a	n/a
Financial	Revenue Impact <$1M	Frequent / Minimal	Low	Rare / Minimal	Negligible
Untreated risk			**HIGH**		**LOW**

Option 1 – Do Nothing (Reactive Replacement)

Under this option, existing Turbine Meters would remain in service until failure or unacceptable performance is observed. This approach:

- Increases the risk of measurement inaccuracies
- Elevates operational costs due to troubleshooting and spares procurement
- Creates potential non-compliance risks with contractual measurement requirements
- Keeps APA reliant on obsolete equipment with limited support
- May result in extended outages due to procurement lead times

Option 1 is not technically acceptable and is inconsistent with prudent operation under the RBP Pipeline Licence.

Option 2 – Proactive Turbine Meter Replacement (Preferred)

Option 2 involves replacing ageing Turbine Meters with modern Coriolis Meters before failure occurs.

Key benefits include:

- Improved measurement accuracy and reduced uncertainty
- Enhanced diagnostic capabilities for AVT
- No rotating parts, improving long-term reliability
- Compatibility with Australian calibration facilities

- Efficient resource planning by aligning replacement with other site works
- Reduced probability of unplanned outages and associated customer impacts

This approach is strongly aligned with good industry practice and meets the expectations of stakeholders regarding accuracy and reliability of metering equipment.

Financial assessment

Table 5–2: Option assessment – Replace Turbine Meters ($ Real 30 June 2026)

Option	Estimated cost	Treated residual risk rating	Benefit / Disbenefit
Option 1	>$393k	High	Does not mitigate Operational, Compliance or Financial risk.
Option 2	$393k	Low	Efficiently mitigates Operational, Compliance and Financial risk.

While Option 1 may appear to delay expenditure, it results in higher total lifecycle costs, including:

- Emergency field mobilisation
- Premium pricing for obsolete spares
- Higher maintenance hours due to aging components
- Increased risk of inaccurate measurement and related commercial consequences

Option 2 provides predictable expenditure, facilitates efficient installation planning, and materially reduces whole-of-life cost.

Given the significant operational and compliance benefits, **Option 2 is the prudent and efficient investment choice**.

Table 5–3: Financial assessment – Replace Turbine Meters ($ Real 30 June 2026)

Description	
Option 1: Replace Turbine Meters when they fail	• Initial capital expenditure is lower than option 2 as expenditure is pushed out until failure occurs. However, replacements are more expensive given the efficiency losses (costs and staff/contractor resources) of unplanned works. • The expenditure is unpredictable and grows significantly once the level of failures exceeds the capacity of staff resources.
Option 2: Replace Turbine Meters proactively	• Where possible, replacements take place with other works at the site, improving cost and resource efficiency. • Steady replacement rate over the coming years gives predictability in expenditure.

The preferred option that appropriately balances costs and risks is Option 2, Proactive replacement of Turbine Meters.

5.4. Proposed cost for FY28-FY32

The estimated expenditure for Turbine Meter replacements is set out in the table below:

This estimate is based on replacing 1 Turbine Meter at Redbank Plains and 2 Turbine Meters at Toowoomba.

The replacement program will use APA resources supported by specialist vendors for configuration and commissioning, under APA Procurement Policy requirements. Cost estimate is based on cost estimated provided by Measurement Specialist and a quotes provided by vendors.

Table 5–4: Estimated yearly cost of Turbine meter replacements ($'000s Real 30 June 2026)

Description	FY28	FY29	FY30	FY31	FY32	Total
Redbank Plains - Turbine Meter Upgrade					163	**163**
Toowoomba - Turbine Meter Upgrade					233	**233**
FY Total	**0**	**0**	**0**	**0**	**397**	**397**

Table 5–5: Cost breakdown for Turbine Meter replacement ($'000s Real 30 June 2026)

Item	Description	Total
Materials	MICRO MOTION ELITE CMF300M CORIOLIS METER	120,232
Contractor - Fabrication	Fabricate replacement spools	54,495
Labour - Internal	Commissioning, Project Engineering, Operations, Document Control & Drafting	221,863
	Total	396,591

6. Controlwave Micro RTU & Flow Computers upgrade

6.1. Project objective and scope

The objective of this project is to progressively upgrade the ControlWave Micro (CWu) flow computers and RTU platform installed across approximately 50 sites on the RBP. Emerson has announced that the CWu platform will be supported to at least January 2030, after which firmware updates, spare parts, and technical assistance may no longer be available

To ensure continued operational capability, cybersecurity resilience, and reliability of metering and control functions, APA proposes a multiyear replacement program across the next 2 regulatory periods.

Scope includes:

- Replacement of obsolete CWu flow computers/station controllers at affected sites
- Selection and deployment of a modern, APA-endorsed RTU/flow computer platform
- Configuration, testing, commissioning, and integration of new units
- Alignment of replacements with other scheduled site works to maximise efficiency

This ensures sustained SCADA communication, reliable metering, and safe pipeline control operations.

6.2. Background

The ControlWave Micro platform is widely deployed across the RBP for flow computation, metering, and remote control functions. There are currently 110 CWu in use across the RBP, 57 of which are installed in a Station Controller or Flow Computer capacity and a further 53 installed in the management of CP sites.

As the platform approaches end-of-support:

- Spare parts will become scarce or unavailable
- Firmware and security updates will cease
- Age-related hardware reliability issues will increase
- Cybersecurity vulnerabilities may emerge without vendor patching
- Outages may be prolonged if failures occur post-2030

Although current performance is acceptable, the withdrawal of vendor support presents a **foreseeable and material risk** to operational reliability if the units remain in service beyond 2030.

This transition period presents an opportunity for APA to migrate to a modern, standardised RTU/flow computer platform with:

- Improved long-term support
- Enhanced cybersecurity features
- Improved performance and diagnostics
- Better lifecycle integration with APA's current control systems

6.3. Assessment of options

Three options were considered for the Access Arrangement period..

— Option 1: Do Nothing / Reactive Replacement (Run to Failure)

— Option 2: Planned Replacement Program (Preferred)

— Option 3: Maintain the Current Fleet Using Stockpiled Spares (Short-Term Mitigation)

Risk assessment

If no action is taken prior to vendor support ending in 2030, the large installed base of CWu devices poses increasing risks:

- Higher likelihood of extended outages
- Maintenance difficulties due to unavailable spares
- Elevated cybersecurity exposure
- Impacts to operational efficiency, metering accuracy, and SCADA reliability

A staged replacement program (Option 1) reduces all major risks to **Low**, providing a stable and well-managed transition.

Table 6–1: Risk assessment – Controlwave Micro RTUs & Flow Computers replacement

Risk Area	Potential Impact	Option 1		Option 2	
		Likelihood / Impact	Inherent risk rating	Likelihood / Impact	Risk rating
Health & Safety	Fatality or injury	Occasional / Major	High	Rare / Major	Low
Environment	n/a	n/a	n/a	n/a	n/a
Operational	Disruption 1-3 months	n/a	n/a	n/a	n/a
Compliance	Regulatory breach	n/a	n/a	/a	n/a
Reputation & Customers	Adverse media, negative feedback	Occasional / Major	High	Rare / Major	Low
Financial	Repair costs	Occasional / Major	High	Rare / Major	Low
Untreated risk			**HIGH**		**LOW**

Option 1 – Do Nothing / Reactive Replacement (Run to Failure)

Under this approach, APA would continue operating the CWu fleet until individual devices fail and all spare parts for decommissioned units are consumed and then replace them reactively.

This option exposes APA to significant, foreseeable, and escalating risks:

Operational risks

- Failures become more likely as units age beyond 2030.
- Loss of SCADA visibility or control may lead to operational incidents.
- Outages may be prolonged due to unavailability of spares.

Cybersecurity risks

- No vendor security updates, patches, or firmware support after 2030.
- Increased vulnerability to cyber-attack or control-system compromise.

Compliance and safety risks

- Potential breaches of RBP Pipeline Licence obligations relating to control system reliability.
- Reduced ability to maintain metering accuracy and safe operational control.

Financial and resourcing risks

- Reactive mobilisations are inefficient and expensive.
- Failure clustering may overwhelm APA's field resources.
- Emergency sourcing of obsolete equipment commands premium costs.

Conclusion:
Option 1 is **not prudent, not efficient, and inconsistent with NGR 79**, as it exposes APA to avoidable operational, safety, cybersecurity, and financial risks

Option 2 – Planned Replacement Program (Preferred)

Under this option, APA implements a staged replacement program for all CWu units before 2030.

Benefits include:

- sustained metering, SCADA reliability and operational control
- modern cybersecurity protections and patching
- predictable and efficient expenditure
- efficient bundling with other site works
- full alignment with APA's future control-system architecture

This option provides the lowest lifecycle cost, lowest risk profile, and highest operational reliability.

Option 3 – Maintain the Current Fleet Using Stockpiled Spares (Short-Term Mitigation)

This option involves procuring additional CWu spare parts before they become unavailable.

Limitations include:

- does not resolve cybersecurity vulnerabilities post-2030
- spare-parts inventory will eventually be exhausted
- failures will still increase with age, resulting in operational disruptions
- creates long-term uncertainty and does not represent a complete solution

Option 2 offers short-term risk mitigation but is not a viable long-term approach given the large fleet size in operation across the RBP.

Financial assessment

Table 6–2: Option assessment – Controlwave Micro RTUs & Flow Computers replacement ($ Real 30 June 2026)

Option	Estimated cost	Treated residual risk rating	Benefit / Disbenefit
Option 1	>$2.029M	High	Does not mitigate Health & Safety, Reputation or Financial risk. Does not resolve cybersecurity vulnerabilities post-2030
Option 2	$2.029M	Low	Efficiently mitigates Health & Safety, Reputation and Financial risk. Resolves cybersecurity vulnerabilities post-2030
Option 3	N/A	N/A	Does not resolve cybersecurity vulnerabilities post-2030

Table 6–3: Financial assessment – Controlwave Micro RTUs & Flow Computers replacement ($ Real 30 June 2026)

Description	
Option 1: Do Nothing	• Unpredictable, volatile expenditure • High emergency mobilisation costs • Premium pricing for obsolete equipment • Long outage durations • Does not meet NGR 79 prudency or efficiency requirements
Option 2: Planned Replacement (Preferred)	• Smooths expenditure over multiple years • Efficient bundling of work • Avoids emergency costs and operational disruptions • Represents lowest sustainable lifecycle cost
Option 3: Spares-Only Approach	• Defers rather than avoids expenditure • Increasing reactive costs over time • Does not address cybersecurity or long-term support risk

The preferred option that appropriately balances costs and risks is Option 2, Planned Replacement Program

6.4. Proposed cost for FY28-FY32

Planned expenditure for Flow Computer upgrades across the access-arrangement period is set out int the table below, this is based on a unit cost of $80,400 per site.

These works will be completed by APA resources, with specialist support engaged where site-specific configuration is required. All procurement will comply with APA's Procurement Policy.

Costs based on previous SCADAPack procurement and on similar work on non-regulated APA assets. This estimate is based on a replacement rate of 5 per year which means a campaign over 10 years to replace the 50 sites on the RBP. Expected life of SCADA pack is approximately 10 years. (Includes Station Controllers, CP & Flow Computers).

Table 6–4: Annual estimated cost of Flow Computer upgrades ($'000s Real 30 June 2026)

Description	FY28	FY29	FY30	FY31	FY32	Total
Controlwave Micro RTUs & Flow Computer end of Life replacement	404	404	406	407	408	**2,029**
FY Total	**404**	**404**	**406**	**407**	**408**	**2,029**

Table 6–5: Cost breakdown for Flow Computer upgrades ($'000s Real 30 June 2026)

Item	Description	Total
Materials	SCADAPack RTU	378,624
Labour – Site Based	Site works to replace RTU, conduct SAT	563,135
Labour - Internal	Project Engineering, Operations, Document Control & Drafting	1,087,331
	Total	2,029,089