Business Case – Capital Expenditure

STATION CONTROL LOGIC REVIEW & RECTIFICATION
Business Case Number BC317 AA23-27

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

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2 Project Overview

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	Throughout their years in service, the older compressor stations on the Victorian Transmission System have received numerous functionality and capacity upgrades. Generally, equipment or function changes also require station control system logic review and amendment. Historically, the functional safety review of the control logic was focused on the impact of the changes, however, a more thorough (holistic) logic review has recently been mandated by the APA process optimisation team to ensure the functional logic is failsafe and compliant. In addition, the existing control system hardware is obsolete and requires replacement to address control system hardware failure risks. The aim of this project is to ensure that Victorian Transmission System compressor station control systems are failsafe and compliant. The objective of this project to replace the station control system hardware and also conduct HAZOP and LOPA assessments to ensure the installed logic is complaint and failsafe at the following locations: CY18-CY22 — CY23-CY27 Brooklyn CS — Gooding CS Wollert CS This program is continuing from the current access arrangement period (AA5 2018-2022) to the next access arrangement period (AA6 2023-2027).
Options Considered	The following options have been considered: Option 1: Do Nothing Option 2: Replace station control system with modern equivalent and perform holistic logic review.

Estimated Cost	CY18-CY22	CY23-CY27	CY18-CY27
	$4,055,356	$2,027,678	**$6,083,034**
Relevant Standards	Replacing control system hardware that have reached the end of their technical life is accepted as good industry practice. the reduction of risk to as low as reasonably practicable in a manner that balances cost and risk is consistent with Australian Standard AS2885.		
Consistency with the National Gas Rules (NGR)	The replacement of these assets complies with the new capital expenditure criteria in Rule 79 of the NGR because: • it is necessary to maintain and improve the safety of services and maintain the integrity of services (Rules 79(2)(c)(i) and (ii)); and • it is such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services (Rule 79(1)(a)).		
Stakeholder Engagement	Stakeholders related to this project are • Australian Energy Market Operator • Energy Safe Victoria		
Benefits to Customers and Consumers	Customers and consumers will benefit from this investment in station control systems as it will improve station reliability and safety, reduce the likelihood of station control failures or related incidents.		

3 Background and Project Need

The existing station control systems are no longer supported by the original equipment manufacturer and spare parts are also not available meaning the equipment is obsolete. There is a risk that in the event of hardware failure, availability of the station will be reduced. In addition, the existing station control system logic has been revised numerous times but the HAZOP reviews were never scoped to review all logic (only the directly affected code).

In the event of hardware failure, the units connected will not be available until the unit control system has been repaired or replaced. Repairs or replacement could take in excess of six months to complete subject to solution availability.

In the event of a logic fault, the station may not fail-safe. Regardless the current system is not compliant with current control system standards or APA policy. Recovery from an incident of this nature would be beyond hardware failure and has the potential to damage equipment or harm personnel in the vicinity.

4 Risk Assessment

The two dominant risks associated with the existing equipment are recovery from failure or an explosion from a gas leak in the compressor enclosure.

TABLE 3: RISK RATING

Category	Risk
Health and Safety	**Medium**
Environment	**Low**
Operational	**Medium**
Customers	**Medium**

Reputation	Medium
Compliance	Medium
Financial	Medium
Final Untreated Risk Rating	Medium

5 Identification and Assessment of Options

1.1 Identification of Options

Option 1: Do Nothing Option

The Do Nothing option is to allow the obsolescent station control system hardware to remain and replace on failure. This option also relies on the existing logic failing safe even though this may not occur.

Option 2: Replace station control system with modern equivalent and perform holistic logic review

This option resolves all station control hardware obsolescence and functional logic compliance risks and ensures that APA operates the related assets in a safe and reliable manner.

The new control system will be very similar to other recently installed systems at APA. The design of the new APA control systems is mature with high reliability and maintainability.

1.2 Assessment of Options

Table 4 outlines the options considered.

TABLE 4: SUMMARY

Option	Benefits (Risk Reduction)	Costs
Option 1	Do Nothing	Non-compliant
Option 2	Replace station control system with modern equivalent and perform holistic logic review	Approx. $2,100,000 per site 3 upgrades required with 2 currently nearing completion.

Option 1 Do nothing would not meet ALARP requirements The detriment of this option includes the loss of availability for at least six months should a major failure of hardware occur. The risk of this approach is APA continues to operate with non-compliant control system logic that may not failsafe when required and would not meet ALARP requirements.

This option has been deemed impractical due to the associated risk and not meeting ALARP requirements

Option 2 Replace station control system with modern equivalent and perform holistic logic review is the preferred and only credible option. The benefits of this option is that it resolves all obsolescence and functional logic risks while avoiding ongoing compliance and fail-safe uncertainty risks. The works will improves station reliability and safety, reduces the likelihood of station control failures or related incidents.

The proposed solution is to the station control system with a modern equivalent and perform a holistic review of the logic (HAZOP/LOPA) to ensure the control system is compliant and has a fail-safe design. The new control system will be very similar to other recently installed systems at APA. The design of the new APA control systems is mature with high reliability and maintainability.

Option 2 provides the best balance of safety, reliability and cost so is the proposed option.

1.2.1 Why are we proposing this solution?

The benefits of this project are:

- All potential fail-safe and compliance issues with the existing control system logic will be resolved
- The availability and reliability of the station will be improved as the new control system will be fully supported
- The ability to respond to failures will be enhanced as the control system will likely to be very similar to other recently upgraded control systems at APA.

6 Consistency with the National Gas Rules

Consistent with the requirements of Rule 79 of the National Gas Rules, APA considers that the capital expenditure is:

- Prudent – The expenditure is necessary in order to maintain and improve the safety of services and maintain the integrity of services to customers and personnel. The project involves the replacement of equipment that is obsolete and not supported. Replacing the obsolete equipment is of a nature that a prudent service provider would incur.
- Efficient – The project will be undertaken consistent with the APA procurement policy. The work will be carried out by the external contractor with relevant experience and who has demonstrated specific expertise in completing the installation of control systems in a safe and cost effective manner. The design is mature with minimal development required. The expenditure can therefore be considered consistent with the expenditure that a prudent service provider acting efficiently would incur.
- Consistent with accepted and good industry practice – Addressing the risks associated with control system reliability or compliance and replacing control system hardware that have reached the end of their technical life is accepted as good industry practice. In addition the reduction of risk to as low as reasonably practicable in a manner that balances cost and risk is consistent with Australian Standard AS2885.
- To achieve the lowest sustainable cost of delivering pipeline services – The sustainable delivery of services includes reducing risks to as low as reasonably practicable and maintaining reliability of supply.

7 Forecast Cost Breakdown

The breakdown of costs is shown in table 5.

TABLE 5: PROJECT COST ESTIMATE,

	Brooklyn	Wollert	Gooding	**Cost**
Year	CY18-22		CY23-27	**CY18-27**
Internal Labour	$277,678	$277,678	$277,678	**$833,034**
Materials	$750,000	$750,000	$750,000	**$2,250,000**
Contracted Labour	$500,000	$500,000	$500,000	**$1,500,000**

Other Costs	$500,000	$500,000	$500,000	**$1,500,000**
Total	$2,027,678	$2,027,678	**$2,027,678**	**$6,083,034**

Cost breakdown is based on Brooklyn actuals and forecast of remaining scope, allowance has been included for the logic review and related costs in other costs.

8 Acronyms

Acronym	Definition/Description
AEMO	Australian Energy Market Operator
AGA	Australian gas association – Type B compliance governing body
API	American Petroleum Institute – publisher of standards
CHAZOP	Control system HAZOP – study of the control system functions to identify logic vulnerabilities
ESD	Emergency shutdown – control system-initiated shutdown designed to prevent incident escalation if operating parameters are breached
ESV	Energy Safe Victoria
HAZOP	Hazard and operability study
HMI	Human machine interface
ILI	Inline inspection – pipeline internal inspection
OEM	Original Equipment Manufacturer
RA	Risk Assessment
RBI	Risk Based Inspection – a process used to prioritise maintenance or inspection activities based on risk of failure.
SIL	Safety Integrity Level – an assessment used to rank control systems by their ability to fail safely
SMS	Safety Management Study
VTS	Victorian Transmission System