Business Case – Capital Expenditure

Control Valve Positioner Replacement

Business Case Number BC225 AA23-27

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

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Cost Updated By	Prasoon Premachandran	Victorian Team Lead Project Delivery, Engineering & Planning
Reviewed By	Nicholas King	Senior Mechanical Engineer, Engineering & Planning
Approved By	Daniel Tucci	Victorian Asset Manager, Asset Management

2 Project Overview

Project resubmitted – ongoing program of work

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	A brief summary of the project: • Ageing electro/pneumatic equipment with increasing likelihood of failure. • The positioners are used to control the positioning of flow control valves, failure of the device will impact gas flow which can lead to a failure to supply • The impact varies per site with some sites having redundancies to reduce the impact of individual failures although those redundancies will involve equipment of the same vintage • Successful solution will maintain the life and maintainability of the equipment and reduce likelihood of failures resulting in loss of supply or ability to efficiently manage system linepack
Options Considered	The following options have been considered: 1. Option 1: Do Nothing Option, this will involve replacement as equipment fails, down time is longer as parts need to be sourced at the time of failure. Although the 'Do Nothing' option has no upfront cost there will be costs later as failures will result in requirement for immediate action and replacement. 2. Option 2: Replace all the older DVC5000 series positioners as a single project. 3. Option 3: Staged replacement of positioners over 5 year period.
Estimated Cost	The proposed cost of the project over the five year period is $507k
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	The stakeholders effected by this project are: • Australian Energy Market Operator • Energy Safe Victoria

3 Background and Project Need

Control Valves often require positioners to enhance the performance of the control valve. The positioners are an electro/pneumatic device and can be subject to wear of electrical components as well as the mechanical components inside, resulting in erratic performance or total failure of the positioner and loss of gas flow. APA has approximately 23 of the DVC5000 series positioners, this model is now obsolete.

The Australian Energy Market Operator (AEMO) alters the set points of pressure regulating stations and compressor stations to efficiently manage the intraday line pack and customer requirements. In one 12 month period, AEMO made over 5,000 set point changes. Control valve positioners are an integral component of pressure regulating and compressor stations to control set points.

The Pipelines Act and Regulations require APA to operate the licensed pipelines in accordance with AS2885.1 and AS2885.3. Section 6.3.1(b) of 2885.3 states: “ensure that during normal operation, the overpressure control system is in place to ensure the operating pressure, at any point in the pipeline, does not exceed the MAOP, and that transient pressure does not exceed 110% of the MAOP.” In addition, AS2885.1 Section 7.2.1.2 states: “For pipelines intended to be operated at a set point equal to MAOP, the control system shall control the maximum pressure within a tolerance of 1%.”

AEMO routinely operates the VTS pipelines with a set point at MAOP. When set points are changed up to and including MAOP by AEMO, a high performance positioner is required to maintain compliance with the above AS2885 requirement and to avoid a slam shut closing causing a loss of supply.

4 Risk Assessment

TABLE 3: RISK RATING

Risk Area	Risk Level
Health and Safety	Negligible
Environment	Negligible
Operational	Moderate
Customers	Moderate
Reputation	Low
Compliance	Low
Financial	Low
Final Untreated Risk Rating	Moderate

The aged and obsolete positioners who range in age from 5 to 25 years will suffer from increasing rate of failure in the planning period. The failure consequences will be the inability to control pressure at the performance setting required by AEMO. This will require backup systems to control pressure and cause upset conditions with possible transient overpressure or loss of flow from that regulating run outside the requirements of the standard, forcing immediate replacement. The failure to control pressures set by AEMO prevents efficient operation of the Victorian Transmission System. These positioners are expected to suffer increasing failure rates in the planning period.

5 Options Considered

5.1 Option 1 – Do Nothing

The Do Nothing is to operate until failure. The results will be to manage the failure as it occurs and operate with less redundancy whilst replacements are sought; at some sites total station capacity may be reduced until replacements are installed.

5.1.1 Assessment

The benefits to the Do Nothing option are the deferred capital; however the cost to replace after failure can be expected to be greater due to the need to expedite all aspects of replacement.

5.2 Option 2 – Replacement of all Positioners

This option is to replace all obsolete positioners in a single project to negate the risk of aged based positioner failure. In addition, during the replacement program parts and solutions are likely to be available should any older versions fail prior to replacement.

5.2.1 Assessment

- The benefits of this option are:
    - Reduced likelihood of positioner failure
    - New installation will be the latest APA design for control valves which increases reliability and controllability
    - Efficient uses of resources as synergies are gained during project management, procurement and installation when all the positioners are replaced as a single project
    - Reduced cost of procurement from purchasing a larger order than ad-hoc orders
    - This option will replace all of the positioners before failure can be expected to occur leading to some positioners replaced prematurely.

5.3 Option 3 - Phased Replacement of Positioners

The proposed solution is the phased replacement of the DVC5000 positioners at a rate of five per year for a total of five years (three in final year).

These will be prioritized by age, condition and current performance to ensure the devices most likely to fail or highest criticality of failure are replaced as priority.

5.3.1 Why are we proposing this solution?

The progressive replacement of positioners is to maintain the life of the installed equipment at the expected duration whilst balancing risk of failure. The staged approach is more manageable as many sites can only be upgraded at particular times of the year, i.e. during summer when flows are often lower.

5.3.2 Summary Assessment

TABLE 4: SUMMARY

Option	Benefits (Risk Reduction)	Costs

Option 1	Do Nothing	$ 0
Option 2	Replace all positioners	$ 507 k
Option 3	Time phased Replacement of positioners (preferred)	$ 507 k

5.3.3 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 and is of a nature that a prudent service provider would incur.
- Efficient – The replacement program will target the positioners in poorest condition and performance characteristics. The expenditure can therefore be considered consistent with the expenditure that a prudent service provider acting efficiently would incur. The expenditure will be undertaken in a manner consistent with the APA procurement policy.
- Consistent with accepted and good industry practice – Addressing the risks associated with the poor condition of control equipment and replacing assets that have reached obsolescence 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.

5.3.4 Forecast Cost Breakdown

- Unit Rate
  - The unit rate for planned replacement is anticipated approximately $22,000 total, with a hardware cost of approximately $7,000.
  - The other costs include project management, engineering, onsite installation, commissioning and documentation.
  - A replacement rate of five positioners per year is anticipated.
  - To date Lara and Dandenong city gates have been completed and other locations have been scheduled, the budget has been left unchanged due to cost increments.

TABLE 5: PROJECT COST ESTIMATE,

	Total
Internal Labour	$ 144,993
Materials	$ 194,120
Contracted Labour	$ 168,362
Other Costs	$0
Total	**$ 507,475**

Site	Tag No.	Brand	Valve S/N	Existing Positioner	New Positioner	Actuator	Status	Notes
Brooklyn	FPCV-79	Fisher	15197453	DVC5010	DVC6200 PD	657-4, Sz.70	Not started	
Brooklyn	FPCV-72	Fisher	15197455	DVC5010	DVC6200 PD	657-4, Sz.70	Not started	
Brooklyn	FPCV-65	Fisher	15197454	DVC5010	DVC6200 PD	657-4, sz.70	Not started	
Brooklyn	FPCV-58	Fisher	15197463	DVC5010	DVC6200 PD	471-16, sz.60	Not started	127mm travel
Brooklyn	FPV-62092	Fisher	15200152	DVC5010	DVC6200 PD	667, sz.45	Not started	Fisher Valve with CVS Actuator
Lara	PCV-61	Fisher	15197456	DVC5010	DVC6200 PD	657-4, sz.70	Complete	101mm travel
Lara	PCV-52	Fisher	15197459	DVC5010	DVC6200 PD	657-4, sz.70	Complete	101mm travel
Lara	PCV-43	Fisher	15197458	DVC5010	DVC6200 PD	657-4, sz.70	Complete	101mm travel
Lara	PCV-34	Fisher	15197457	DVC5010	DVC6200 PD	657-4, sz.70	Complete	101mm travel
Lara	PCV-15	Fisher	15197461	3510	3510	470-16, sz.60	Complete	Bottom Positioner Leak
Lara	FPCV-2631-16	Flowserve	51806.001	6010 HC	DVC6200 PD		Complete	Bad Leak on Positioner
Wandong	PCV-103	Fisher	15213491	DVC5010	DVC6200 PD	657, sz.45	Not started	2" travel
Wandong	PCV-105	Fisher	15213492	DVC5010	DVC6200 PD	657, sz.45	Not started	2" travel. Regulator Leaking Badly
Wandong	TCV-610122B	Mascot	1011038	YTC-1200	DVC6200 AD	sz.25	Not started	With Flowserve I/P
Wandong	TCV-610122A	Mascot	1011037	YTC-1200	DVC6200 AD	sz.25	Not started	With Flowserve I/P
Wollert	PV-104	Fisher	15215273	DVC5010	DVC6200 PD	657-4, sz.70	Not started	4" travel. Strainer upstream leaking @ the drain valve.
Wollert	PV-100	Fisher	15215272	DVC5010	DVC6200 PD	657-4, sz.70	Not started	4" Travel

6 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