Business Case – Capital Expenditure

Buffer Air shutoff system

Business Case Number 202

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

Prepared By	Anthony Jones, *Pipeline and Asset Management Engineer, APA Group*
Reviewed By	Paul Lorini, *Regional Manager Gippsland, APA Group*
Approved By	Craig Bonar, *Manager East Coast Grid Engineering, APA Group*

2 Project Overview

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	Installation of buffer air shutoff system on dry seal compressors to increase efficiency at: • Gooding Units 1, 2, 3, 4.
Options Considered	The following options have been considered: 1. Option 1: Do Nothing Option 2. Option 2: No alternative identified 3. Option 3: Install buffer air shutoff system to dry seal compressors
Estimated Cost	$572,596
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 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	A couple of sentences detailing how our engagement with stakeholders relates to this project. • Australian Energy Market Operator • Original Equipment Manufacturer

3 Background

The compressors used by APA are usually of rotating type, rather than reciprocating type. Of these type the seal to prevent gas leakage is supplied by instrument air or in some older models; lubrication oil.

The compressors need to be pressurized prior to starting. To prevent unnecessary pressurization and depressurization (cycling) by the operator (Australian Energy Market Operator) an integrated function into the control system is to hold the gas pressure in the compressor for 24 hours after normal shutdown of the turbine engine. This functionality increases the life of the compressor housing by reducing the number of pressurization cycles and thus decreasing the fatigue of the compressor. To maintain the seal of the compressor during this hold time, the buffer air needs to be supplied by the instrument air package. This requires the instrument air compressors to operate unnecessarily.

The buffer air seal is a segmented split carbon ring seal that separates the bearing assembly from the dry seal assembly. The buffer air (instrument air) at a preset pressure of approximately 175 kPa above secondary vent

pressure is injected between the carbon seals. The inner diameter of the segmented carbon ring seals forms a very close gap with the compressor shaft. This controlled gap permits some of the buffer air to leak in an inward direction towards the dry seal assembly. This portion of the leaked buffer air is expelled via the secondary seal vent. The remaining buffer air leaks in an outward direction across the outer carbon ring seal, where it forms a barrier against the lube oil exiting the compressor venting assembly. This portion of the buffer air exists the compressor end cap via the lube oil drain line.

When the compressor is not running, the compressor shaft lowers in position, this increases the flow rate of the buffer air. This creates a higher usage of instrument air for buffer purposes when the compressor is not running as opposed to when it is running. Thus the air compressors run more when the gas turbines are not running. For some VTS compressors, their operation is intermittent and during off peak (summer) barely run at all. The instrument air compressors run unnecessarily during these long periods of shutdown.

Buffer air shut off is a standard option on all new dry seal compressors installed at APA.

To reduce the working time of the instrument air compressors some logic changes, valve and pressure regulator replacements are required.

4 Risk Assessment

TABLE 3: RISK RATING

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

The unnecessary use of the instrument air compressors reduces the life and increases the electricity consumption that could otherwise be avoided.

The cost of an instrument air compressor breakdown can reasonably estimate as a call out from an external service provider for two days, plus parts and supervision.

The breakdown of instrument air can occur during peak winter. If so, this would cause a security of supply problem as the entire Gooding Compressor Station will be unable to operate.

5 Options Considered

5.1 Option 1 – Do Nothing

The Do Nothing option is to continue the current practise of unnecessary energy consumption and life reduction of the instrument air compressors.

5.1.1 Cost/Benefit Analysis

The benefits of the Do Nothing option are deferred capital. The costs are reduced life of the compressors and earlier replacement. Other costs are higher operating costs from electricity from running the compressors longer than necessary. Air compressors are maintained by run hours, thus the buffer air bleed is causing more frequent maintenance of the air compressors than what would be performed if buffer air shut off was installed.

The increased likelihood of failure of the instrument air system, could occur during winter and therefore create a security of supply problem until the failure is recitified.

5.2 Summary of Cost/Benefit Analysis

TABLE 4: SUMMARY OF COST/BENEFIT ANALYSIS

Option	Benefits (Risk Reduction)	Costs
Option 1	Do Nothing	Not quantifiable
Option 2	No alternative identified	
Option 3	Buffer air shutoff system installation	$572,596

5.3 Proposed Solution

5.3.1 Installation of Buffer Air Shutoff System

The installation of a buffer air shutoff system on all dry seal gas compressors within the VTS is recommended to enable the longer operating life and reduced operating cost of the instrument air compressors.

The installation is required at the following compressor units:

- Gooding Units 1, 2, 3, 4.

5.3.2 Why are we proposing this solution?

The benefits of this solution are the reduction in electrical consumption after each normal shutdown of a gas compressor at the effected stations. This occurs regularly in all typical gas demand scenarios within the VTS.

The other benefit is the reduced working time of the instrument air compressors leading to longer life and less risk of breakdown.

There are benefits to indicators of seal failure where buffer air shutoff is installed.

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:

- Efficient – The field work will be carried out by the external contractor (the original equipment manufacturer) that has been used to date, who has demonstrated specific expertise in completing the installation of the facilities in a safe and cost effective manner. 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 unnecessary energy consumption and wear on rotating equipment is to increase efficiency and is accepted good industry practise.

- To achieve the lowest sustainable cost of delivering pipeline services – The sustainable delivery of services includes reducing operational costs to as low as reasonably practicable and maintaining reliability of supply.

5.3.4 Forecast Cost Breakdown

The unit rate for each compressor is expected to be the same and at a price of approximately USD$75,000 from the Original Equipment Manufacturer, Solar Turbines.

A small cost to supervise the work is also anticipated. There are a total of 4 units to be replaced.

TABLE 5: PROJECT COST ESTIMATE,

	Total
Internal Labour	**$135,500**
Materials	**$425,597**
Other Costs	**$11,499**
Total	**$572,596**