## Business Case – Capital Expenditure

# Iona CS Aftercooler Upgrade

Business Case Number BC211 AA23-27

## 1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

| | | |
|---|---|---|
| **Updated By** | Adam Newbury<br>Adam Clegg | Asset Lifecycle Specialist, Asset Management<br>Rotating Engineer, Engineering & Planning |
| **Cost Updated By** | Prasoon Premachandran | Victorian Team Lead Project Delivery, Engineering & Planning |
| **Reviewed By** | Adam Clegg | Rotating Engineer, Engineering & Planning |
| **Approved By** | Daniel Tucci | Victorian Asset Manager, Asset Management |

## 2 Project Overview

Project resubmitted - deferred to fund unpiggable pipeline conversions.

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

| | |
|---|---|
| **Description of Issue/Project** | The Iona Compressor Station has a power output constraint due to insufficient cooling of process gas during the summer months.<br><br>This project is for the installation of a larger, more capable gas aftercooler to ensure the full capacity of the station can be realised.<br><br>Project resubmitted. This project was due to be undertaken in the current access arrangement period but was deferred to address other priorities that emerged. |
| **Options Considered** | The following options have been considered:<br><br>Option 1: Do Nothing Option<br>Option 2: Augmentation of existing cooling<br>Option 3: Replacement of existing cooler with larger model (Preferred option) |
| **Estimated Cost** | $3,200,000 |
| **Relevant Standards** | APA VTS has a Service Agreement Envelope with Australian Energy Market Operator which includes requirements for compressor stations to meet certain operational requirements. |
| **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:<br>• it is necessary to maintain the safety of services to the public and improve the integrity of services (Rules 79(2)(c)(i) and (ii)); and<br>• 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)). |

| | |
|---|---|
| | The stakeholders effected by this project are:<br><br>• Australian Energy Market Operator<br>• Lochard Iona Storage Facility |
| **Benefits to customers and consumers** | The project will result in greater reliability and security of supply for customers and consumers during hot days in summer. |

# 3 Background

The Iona Compressor Station (ICS) is located south-west of Melbourne and compresses gas into the Iona-Paaratte Pipeline that supplies western Victoria. The station comprises two package gas compressors each with engine-driven coolers for gas, oil and jacket water cooling.

Gas aftercoolers are used to ensure the gas temperature remains below what the downstream pipeline system is designed for and are generally sized for anticipated operating conditions. Iona compressor station was originally designed for low ambient (winter) operation so the gas aftercoolers installed on the outlet of each gas compressor were sized accordingly. The current design sends compressed process gas through the gas aftercoolers which feature an automated bypass control valve to maintain acceptable blended downstream gas temperature whilst limiting pressure loss.

This design worked well during low ambient conditions (winter), however station capacity is constrained in the warmer months. However, due to seasonal demand changes, the Iona Compressor Station can be required for summer compression.

High ambient (summer) compression requires non-bypassed gas aftercooling, but the aftergas coolers are not sized for full flow. The insufficient size causes gas aftercooler flow restrictions and pressure losses which dramatically limit station throughput. Due to the limited heat capacity of the existing coolers temperature related shutdowns are also common in summer.

In addition, the existing aftergas coolers also include sections for oil cooling and jacket water cooling which were again only designed for low ambient (winter) operation. To improve engine and compressor reliability during high ambient (summer) operation, additional radiators have been installed connected in parallel with flexible hosing. These were only intended as a temporary measure and as such present an environmental spill risk that would ideally be resolved with the selected upgrade option.

APA has Service Envelope Agreement with AEMO for operation of the VTS. AEMO has expressed concern with the current summer limitations for summer operations during high ambient air temperatures.

# 4 Risk Assessment

**TABLE 3:** RISK RATING

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

Iona Compressor Station aftercoolers are adequate under the original low ambient (winter) operating conditions but the current arrangement of an auto-bypass valve around an undersized gas cooler is not suitable for reliable high ambient (summer) operation.

The bypass system control system will redirect all compressed gas to the aftercooler in high ambient conditions which limits throughput, but the compressor will also be shut down by the control system protections when the acceptable downstream gas temperature is exceeded translating to an availability/reliability problem and a loss of system capacity when required. This situation creates an operational issue for the running of the Iona Compressor Station units as a shutdown will trigger an incident that needs to be managed. In addition, the capacity that is clearly required for the western system is not available so there is potential for supply outages to occur.

# 5 Identification and Assessment of Options

**Option 1 – Do Nothing**

The Do Nothing option will continue the suboptimal operation of the Iona Compressor Station. This limits the capacity and reliability of supply to the western system.

## Option 2 – Augment existing cooling capacity

Option 2 involves construction of secondary cooling in series with the existing aftercooler. The additional aftercooler will increase gas cooling capacity but will add another pressure drop to the cooling system that is already too high.

This is not a technically acceptable solution and is not considered a credible option

**Option 3 - Proposed Solution - Upgrade Existing Aftercooler**

The proposed solution is to construct a new aftercooler similar to the recently installed aftercoolers at Winchelsea, Brooklyn and Euroa. Additional process coils for oil and jacket water cooling will remove the need for hoses and reduce controls complexity. These are appropriately sized for ambient temperature in summer and for minimum pressure drop.

## 1.1 Assessment of Options

**LE 4:** SUMMARY

| Option | Description | Costs |
|---|---|---|
| Option 1 | Do Nothing | Does not meet AEMO obligations |
| Option 2 | Augment existing cooling | Not credible option |
| Option 3 | Construction of new, larger aftercooler | $3,200,000 |

The benefit of the Do Nothing option is the deferred capital expenditure. The detriment is that there is an increased possibility of outages during days experiencing high ambient temperatures in summer. This could affect APA VTS service agreement with AEMO.

The detriment of the Do Nothing option is to accept a system capacity shortfall should the ambient air temperature be too high for the aftercooler to cool the gas sufficiently. AEMO have expressed their concerns with the current summer limitations for summer operations during high ambient air temperatures.

Option 2 is not technically feasible as it will be detrimental to operations of the cooling system and is not a credible option.

Option 3 is the preferred option as it will allow provide a more reliable service to customers and consumers during summer months.

#### 1.1.1 Why are we proposing this solution?

Option 3 will alleviate the temperature, pressure and reliability problems associated with the Iona Compressor Station and increase the capacity of the station to meet the western system requirements.

This Option provides contingency for AEMO during summer and provide for better security of supply.

# 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 integrity of services to ensure security of supply and is of a nature that a prudent service provider would incur.
- Efficient – The project will be contracted to external contractors in line with APA procurement policy. The design will be conducted by an external contractor experience in delivering aftercooling solutions to APA. 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 security of supply is accepted as good industry practice.
- 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 cost of this solution is well established given the recent delivery and installation of after coolers for Euroa and Winchelsea. Whilst these compressors required a higher duty from the larger power plant, they were also installed in a Greenfield environment which has less cost and risk associated with the brownfield environment at Iona.

**TABLE 5:** PROJECT COST ESTIMATE,

| | Total/unit | **Total** |
|---|---|---|
| Internal Labour | $200,000 | **$400,000** |
| Materials | $1,300,000 | **$2,600,000** |
| Contracted Labour | $100000 | **$200,000** |
| Other Costs | $0 | **$0** |
| **Total** | **$1,600,000** | **$3,200,000** |

Project cost estimate amounts were based upon similar aftercooler upgrades performed recently at the Brooklyn compressor station for units 10 and 11.

# 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 |