

FACTSHEET

MONDARRA

GAS STORAGE FACILITY

15PJ
STORAGE CAPACITY

70TJ/day
INJECTION CAPABILITY

150TJ/day
WITHDRAWAL CAPABILITY

APA Group (APA) is Australia's largest natural gas infrastructure business, owning and/or operating \$12 billion of energy assets which deliver approximately half the nation's gas usage.

One of APA's most significant gas infrastructure development projects is the expansion of the Mondarra Gas Storage Facility (MGSF). The facility is strategically located near Dongara in Western Australia, at the intersection of the Dampier to Bunbury Natural Gas Pipeline and APA's Parmelia Gas Pipeline, both of which service Perth and the south west of Western Australia.

BACKGROUND

MGSF has been expanded by APA to assist customers to manage their gas supply portfolio. Importantly, the facility also mitigates any short term supply risks such as experienced in 2008 with the Varanus Island incident. The resultant loss of gas supply caused an energy supply crisis in Perth which lasted several months. The new expanded facility increases flexibility in the Western Australia gas market, giving both buyers and sellers more options in managing gas production and consumption. Mondarra is the only commercial gas storage facility in Western Australia.

MGSF makes use of a depleted gas reservoir to store gas. The reservoir comprises porous rock at a depth of approximately 2,800 metres in which the natural gas is stored in the sandstone. Above this lies an impermeable layer, in Mondarra's case shale caprock, which prevents the natural gas from escaping through the rock strata. In 2009, APA committed to expanding the facility to 15PJ of useable gas storage capacity. These works commenced in 2010 and completed in 2013.

MGSF contains three wells which access the reservoir through the use of two compressors driven by gas engines. This delivers the capability to inject gas at 70TJ/day and withdraw gas at 150TJ/day. The facility has been designed and constructed in such a way that allows for easy expansion by tying-in additional wells, compressors and gas processing equipment. A slug catcher, production separator and a silica gel gas conditioning package ensures gas supplied ex-Mondarra meets all pipeline specifications.

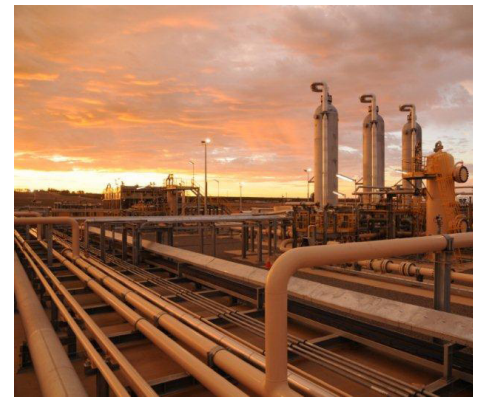
STORAGE CAPABILITIES

MGSF's strategic location, with access to both the Dampier to Bunbury and Parmelia Pipelines, gives customers choice in managing gas transmission to their facilities. This new competition between the two pipelines both strengthens security of supply and creates cost-effective options for customers.

Large scale gas storage is more cost effective than pipeline park and loan facilities, and has the potential to make a major contribution to the development of a more flexible, dynamic gas market for Perth and the south-west of WA. While its development was underpinned by a long term storage contract with a foundation customer, Verve Energy, limited additional storage capacity remains available to market on terms that match the needs of each customer.

MGSF provides customers with flexibility to manage their gas supply and demand portfolios such as;

- Minimising gas costs by taking advantage of spot price opportunities
- Minimising exposure to high-priced gas during periods of peak consumption
- For peak power producers, taking advantage of peak electricity prices to generate for longer periods than is currently possible with existing pipeline storage
- Managing commissioning, ramp up and maintenance phases of gas production
- Improving security of supply by enhancing the ability to maintain operations in the face of energy outages and reducing costly requirements to store diesel in case of emergency
- Facilitating separate marketing by large joint venture domestic gas producers by assisting with gas balancing



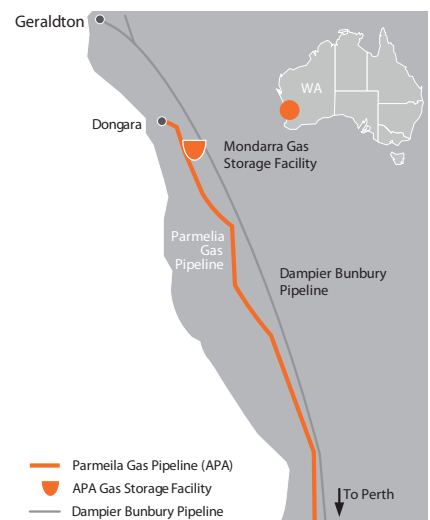
Inlet point:

Dampier to Bunbury Natural Gas Pipeline

Outlet points:

Parmelia Gas Pipeline

Dampier to Bunbury Natural Gas Pipeline



HISTORY

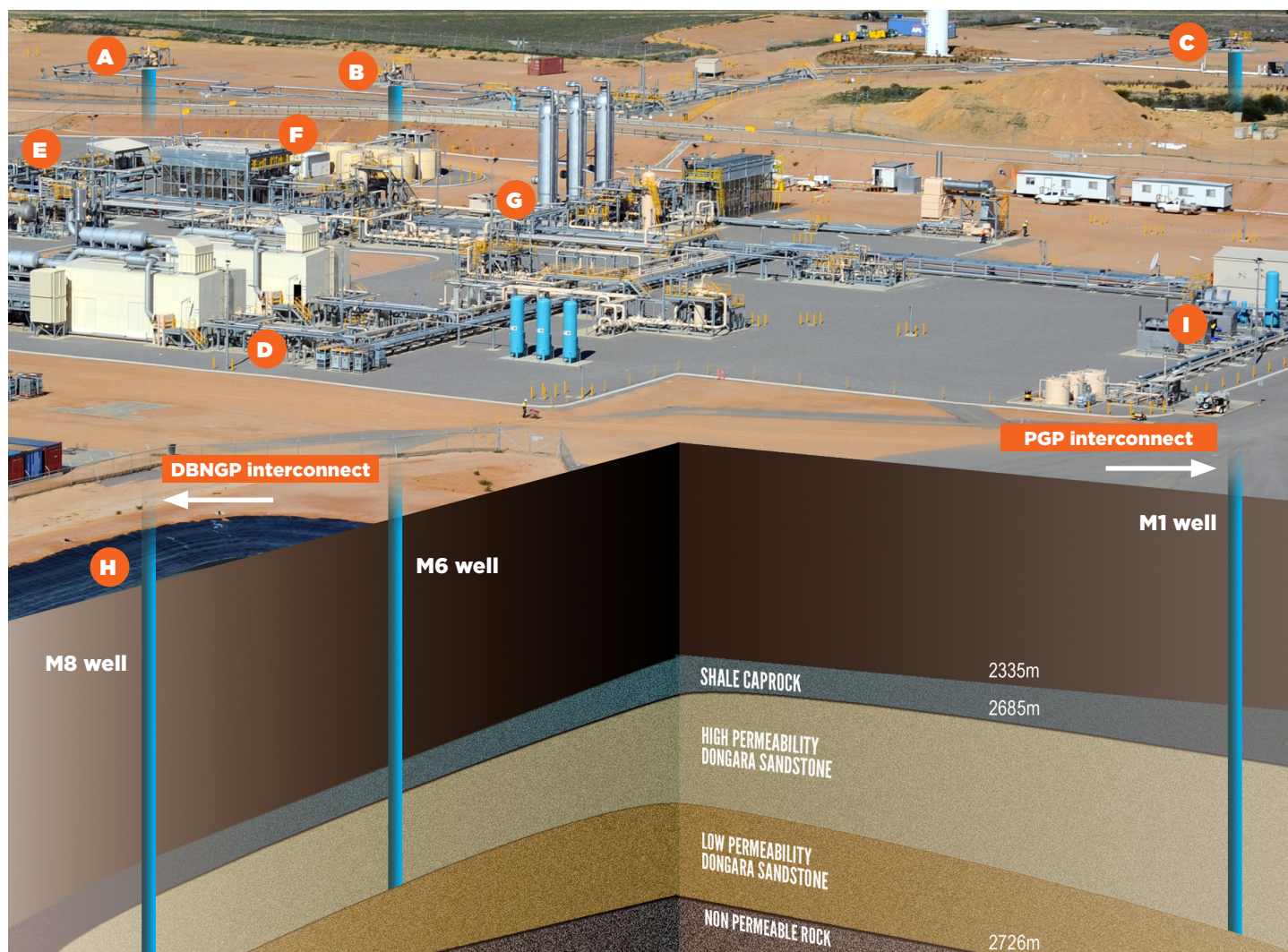
- 1968** Mondarra gas field discovered by West Australian Petroleum Trust
- 1972-94** Mondarra produced 25 PJ of gas
- 1994** Mondarra was converted into a gas storage facility
- 2004** APA acquires the MGSF
- 2008** Perth energy crises following the Varanus Island explosion and North West Shelf Group Dampier Dmgas outage
- 2010** APA sub surface appraisal to underpin expansion
- 2011** APA committed to construction of surface works
- 2013** Facility expansion completed by APA

FURTHER INFORMATION

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HOW MGSF WORKS

The Dampier to Bunbury Natural Gas Pipeline (DBNGP) and APA's Parmelia Gas Pipeline (PGP) which are connected to MGSF flow in a north to south direction. Gas supply for the storage facility can only be injected from the DBNGP, however gas withdrawn from the MGSF can be sent south to Perth using either the DBNGP or PGP depending on the customer's preference/transport arrangement.

To inject gas into the underground reservoir, the gas must be raised to a higher pressure than the reservoir pressure. This is done using the compressors that deliver the compressed gas via injection pipelines through to any of the three high pressure wellheads (A, B, C) for injection into the reservoir. Gas can be injected up to rates of 70 TJ/day (2.92 TJ/hour).

Gas can be repeatedly injected and withdrawn from the storage facility and can also stay in the storage reservoir indefinitely without leakage or deterioration in quality.

Gas can be withdrawn either by free flow or using the compressors at rates up to 150 TJ/day (6.25 TJ/ hour). The gas goes through a series of processing and conditioning procedures to ensure it meets pipeline specifications before being delivered into either the DBNGP or PGP for transport south to Perth.

MGSF components:

- A M8 well** } All 3 wells can be used for both injection and/or withdrawal
- B M6 well** } Each well is approximately 2.7 kilometers in depth
- C M1 well** }
- D** 2 x **Aerial reciprocating compressors** driven by Caterpillar 3612 gas engines including filtration facilities used for both injection and withdrawal. The reservoir is operated at a higher pressure than gas in pipelines.
- E** **Raw Gas Processing** ("slug catcher") removes any free liquid that is produced in the wells during withdrawal as part of the gas stream.
- F** **Production Cooler and Separator** – gas being withdrawn from the reservoir can be up to 100°C. The production cooler cools the hot gas to pipeline temperature specification. The separator captures any liquid that is knocked out of the gas stream when it is cooled by the production cooler.
- G** **Silica Gel Gas Conditioning Package Unit** – this package dries and conditions the gas to ensure it meets pipeline specifications. Gas is streamed through the compressors and production filter before entering into either the DBNGP or PGP.
- H** All water and impurities captured in the slug catcher and production separator are sent to the **evaporation pond** where disposal is via natural evaporation.
- I** **Gas Engine Alternators** – gas engines that generate all the electrical power to the site.