



Pluto LNG Project Five Year Performance Review Report November 2012 – October 2017

Ministerial Statement No. 757 *Pluto Liquefied Natural Gas Development (Site B Option)*
Burrup Peninsula, Shire of Roebourne

December 2017

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1. Purpose and Scope

This Performance Review Report has been prepared to meet the requirements of condition 5-1 of the Ministerial Statement 757 *Pluto Liquefied Natural Gas Development (Site B Option) Burrup Peninsula* (the Ministerial Statement).

The first Pluto LNG Five Year Performance Report was submitted to the Office of the Environmental Protection Authority in December 2012, covering the period October 2007 to October 2012. This is the second Five Year Performance Report prepared for the Pluto LNG Development and covers the period November 2012 to October 2017 (the reporting period).

This report is split into five main parts, as required by condition 5-1 of the Ministerial Statement to outline:

1. How the major environmental issues associated with implementing the project were addressed; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives;
2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;
3. some significant improvements in environmental management made over the five year period, including the use of external peer reviews;
4. stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and
5. Woodside's planned environmental objectives over the next five years, including improvements in technology and management processes.

2. Environmental Issues Associated with Implementing the Project

The development of Pluto LNG was referred to the Western Australian Environmental Protection Authority (EPA) for assessment in April 2006 and the Commonwealth Department of Environment and Heritage (DEH) in August 2006 (EPBC 2006/2968). The proposed development was determined by the DEH to be a 'controlled action' under the provisions of the EPBC Act (24 August 2006). The DEH and EPA subsequently determined that the proposed development should be assessed through a Public Environment Report and Public Environmental Review levels of assessment respectively.

The Public Environment Report (PER) (December 2006) identifies and discusses possible environmental issues associated with implementing the project. These include treated wastewater marine discharge, sea turtle and marine mammal management, air quality, greenhouse gas emissions, dredge impact management, marine quarantine and cultural heritage. These environmental issues have not changed since the PER was published, and continue to be the focus of environmental management for Pluto LNG.

Woodside has developed and maintains management plans, which detail how environmental issues are controlled, to reduce impacts and improve environmental outcomes. The management plans describe objectives and methodologies used to achieve these, as well as indicators of performance. Table 1 summarises environmental focus areas and key management objectives, methodologies for implementation and performance indicators which are detailed in these management plans. For further information relating to management of environmental issues for Pluto LNG, refer to the current version of the management plans available online at:

<http://www.woodside.com.au/Working-Sustainably/HSEQ/Pages/Compliance.aspx>

Table 1 – Pluto LNG Project environmental focus areas, objectives, methodologies and key performance indicators

Environmental Issue	Objectives	Methodologies used to achieve objectives	Key Indicators of Performance
Treated Wastewater Marine Discharge Management	<ul style="list-style-type: none"> • Treat water to a level suitable for ocean discharge; • Reduce environmental impact to as low as reasonably practicable whilst ensuring a high level of ecological protection is maintained around the ocean outfall site; • Ensure management is in accordance with objectives defined in Ministerial Statement No. 757 and Approval to Take a Controlled Action EPBC2006/2968. 	<ul style="list-style-type: none"> • Site water collection systems; • Effluent Treatment Plant and Sewerage Treatment Plant; • Tertiary Wastewater Treatment; • Final collection and analysis prior to discharge or reuse onsite; • Monitoring during start-up and commissioning and ongoing water quality monitoring; • Whole Effluent Toxicity (WET) testing program; • Internal laboratory assessment & external NATA accredited laboratory assessment; • Routine & event based performance reporting to the Department of Water and Environment Regulation (DWER); • Contingency Management Plan with wastewater management alternatives that can be implemented to ensure ecological objectives can still be achieved, even when the treatment plant is not operating as intended. 	<ul style="list-style-type: none"> • Achievement of Environmental Quality Objectives as described in the document <i>Pilbara Coastal Water Quality Outcomes: Environmental Values and Environmental Quality Objectives</i> (DoE 2006); • Compliance with discharge specifications detailed in the Pluto Treated Wastewater Marine Discharge Management Plan: <i>Waste Water Constituents, Sources, Expected and Maximum Concentrations, ANZECC Thresholds and Estimated Annual Loading</i>; • Compliance with requirements specified in Part V Licence under the <i>Environmental Protection Act 1986</i> (WA) when in place (currently L8752/2013/2).
Sea Turtle and Marine Mammal Management	<ul style="list-style-type: none"> • Detect and mitigate as necessary any impact upon marine turtles or marine mammals and their environment from Pluto LNG; • Identify and implement darkness strategies to reduce as far as practicable, lights or light glow interfering with nesting female turtles and hatchlings; • Minimise the impact of waste discharge on sea turtles and marine mammals; • Ensure management is in accordance with objectives defined in Ministerial Statement No. 757 and Approval to Take a Controlled Action EPBC2006/2968; • Minimise the impact of human presence on sea turtle activity on Holden Beach; • Minimise the impact of dredging activities on sea turtles and marine mammals. 	<ul style="list-style-type: none"> • Sea turtle monitoring at Holden Beach prior to commencing construction, during the construction phase of Pluto LNG and operations; • Implementation of the Pluto Operational Environmental Lighting Specification; • Audits of lighting during operations against the protocol; • In the event of a hydrocarbon spill, management measures contained within the Woodside Dampier Sub-basin Oil Spill Contingency Plan should be implemented; • Restrict human access to Holden Beach; • No vehicle access is permitted on Holden Beach; • Maintenance of records of sea turtle observations during any future dredging, spoil disposal, rock fill and blasting operations. • Requirements for marine mammal observation and avoidance during relevant operations 	<ul style="list-style-type: none"> • Monitoring of turtle nesting and hatchling tracks on Holden Beach identified minimal impact on hatchling orientation; • No turtle deaths associated with Woodside activities (i.e. dredging); • No unauthorized access to Holden Beach by Woodside personnel & contractors.
Air Quality Management	<ul style="list-style-type: none"> • Minimise environmental impacts associated with air emissions; • Minimise impact on Indigenous rock art on the Burrup Peninsula; • Ensure management is in accordance with objectives defined in Ministerial Statement No. 757 and Approval to Take a Controlled Action EPBC2006/2968; • Adopt best practise pollution control measures. 	<ul style="list-style-type: none"> • Dry low-NOx emissions control systems on the gas turbines; • Recovery of waste heat from several gas turbine units; • CO2 removed from feed gas in the Acid Gas Removal Unit (AGRU); • Waste gas from the AGRU treated through a Regenerative Thermal Oxidiser (RTO); • Design for 'no continuous flaring'; • Use of nitrogen to maintain the continuous purge of flare piping; • Air monitoring (ambient & point source emissions, dark smoke, nitrogen deposition) to validate expectations; • Reporting of emissions in accordance with legal and other requirements. 	<ul style="list-style-type: none"> • Achievement of air emissions targets and limits specified in Part V Licence under the <i>Environmental Protection Act 1986</i> (WA).

<p>Greenhouse Gas Abatement Program</p>	<ul style="list-style-type: none"> • Ensure the plant is designed and operated in a manner which achieves reductions in greenhouse gas emissions as far as practicable; • Provide mechanisms for identifying and evaluating emissions improvements; • Provide for ongoing greenhouse gas emissions reductions over time; • Manage greenhouse gas emissions in accordance with the Framework Convention on Climate Change 1992, and consistent with the National Greenhouse Strategy. 	<ul style="list-style-type: none"> • Design and technology choices i.e. Acid Gas Removal, Thermal Combustion Unit, Waste Heat Recovery, Tandem Dry Gas Seals, optimising nitrogen content in the fuel gas, floating roof Condensate storage tanks, nitrogen flare purging, relief valve minimisation and Main Cryogenic Heat Exchanger redesign; • Market offsets – contract with CO2 Australia to offset reservoir CO2 emissions; • Identify and implement energy efficiency and production optimisation opportunities. 	<ul style="list-style-type: none"> • Annual greenhouse gas emissions calculations and reporting as required by the <i>National Greenhouse and Energy Reporting Act 2007</i>; • Progress against energy efficiency metrics. • Energy efficiency and production optimisation opportunities implemented
<p>Dredge Impact Management</p>	<ul style="list-style-type: none"> • Ensure that dredging and dredge spoil disposal activities associated with construction are undertaken and managed in a way that reduces the environmental impacts of the works to as low as reasonably practicable (ALARP); • Address requirements of conditions in Ministerial Statement 757, Commonwealth Approvals Decision EPBC 2007/2968, and the requirements of Sea Dumping Permits; • To manage turbidity-generating activities and works associated with the proposal; • Implement Best Environmental Practice (BEP) dredging and manage impacts on water quality and coral health, including the optimum timing of works with respect to sea and meteorological conditions; and • Have contingency measures in place that will be undertaken in the event that specified threshold limits for coral condition and water quality are exceeded. 	<ul style="list-style-type: none"> • Support implementation of a Dredge Environmental Management Group; • Outline Impact Criteria Zones and threshold coral mortality and water quality limits that will be used as management and stop-work trigger levels; • Disposing of the bulk of the dredged spoil outside of Mermaid Sound so as to minimise the risk of impact of the spoil disposal activities on the proposed Dampier Archipelago Marine Park; • Baseline water quality and sedimentation studies; • Coral and non-coral benthic habitat surveys including baseline coral condition study; • Coral condition monitoring & spawning monitoring during dredging activities; • Stop-dredging procedures; • Comprehensive hydrocarbon management measures will be implemented, including prevention and response measures in place as part of an approved Oil Spill Contingency Plan. 	<ul style="list-style-type: none"> • No dredging was undertaken in the reporting period
<p>Marine Quarantine Management (Invasive Marine Species Management)</p>	<ul style="list-style-type: none"> • Minimise risk of introducing Invasive Marine Species (IMS) into Australian waters; • Comply with existing State and Commonwealth legislation in relation to management of IMS; • Reduce the risk of unplanned activity schedule delays and cost increases as a result of unanticipated IMS management response requirements imposed by Government upon entry into Australian waters; 	<ul style="list-style-type: none"> • Conduct risk assessments as required by the IMS Management Plan; • Depending on the level of risk identified, implement management options such as applying a limit of three entrances into the Invasive Marine Species Management Area, treatment of vessel internal seawater systems, inspection, vessel rejection / replacement or a risk based alternative; • Inspections following procedures outlined in the IMS Management Plan; • Notification of relevant authorities if IMS is identified; • Liaison with qualified IMS Inspector to establish management options if IMS identified. 	<ul style="list-style-type: none"> • Compliance with all legal and other requirements relating to marine quarantine management; • No introduction of Invasive Marine Species as a result of Woodside activities.
<p>Cultural Heritage Management</p>	<ul style="list-style-type: none"> • Develop a comprehensive understanding of heritage at Pluto LNG Park; • Design the footprint in a way which minimises impacts on heritage; • Relocate heritage from footprint to other areas on the Pluto LNG Park without damage; • Protect heritage located in the non-disturbance area from damage; • To comply with approval and consent conditions, commitments and legislative requirements. 	<ul style="list-style-type: none"> • Engage Traditional Custodians, Archaeologists and Anthropologists to conduct heritage surveys and provide advice on an ongoing basis; • Use heritage survey reports to inform design and footprint for Pluto LNG; • Engage with Traditional Custodians to refine design and footprint of Pluto LNG; • Engage Traditional Custodians and Archaeologists to oversee the relocation of heritage; • Install fencing and signage around the disturbance area boundary; • Ensure activities on Pluto LNG site only proceed either with the appropriate permit (containing all necessary protection measures) or within the disturbance area by providing appropriate education (i.e. inductions); • Maintain a register of heritage commitments and consent conditions. 	<ul style="list-style-type: none"> • Annual heritage surveys completed; • Heritage landscape understood; • Woodside has worked closely with Traditional Custodians since October 2005 to gain an understanding of the Indigenous heritage landscape; • The Pluto LNG Foundation Project footprint was designed in consultation with local Indigenous people to avoid 92% of rock art engravings on Pluto leases; • The 176 panels with engravings that could not be avoided were safely relocated to a nearby natural setting with the guidance of local Indigenous groups and in accordance with government approvals; • Compliance with all legal requirements.

3. Progress in achieving sound environmental performance

Industry benchmarking and the use of best available technology were a focus throughout the design of the Pluto LNG Development. This ensures that that sound environmental performance is inherent in all areas of the plant, and can be achieved as “business as usual”.

3.1. Industry Benchmarking

Benchmarking allows for comparative analysis to identify previous and current status of a certain element. Figure 1 presents results of a benchmarking study which examined the greenhouse gas emissions intensity of major operational and planned LNG plants worldwide, using the best data publicly available (see References section).

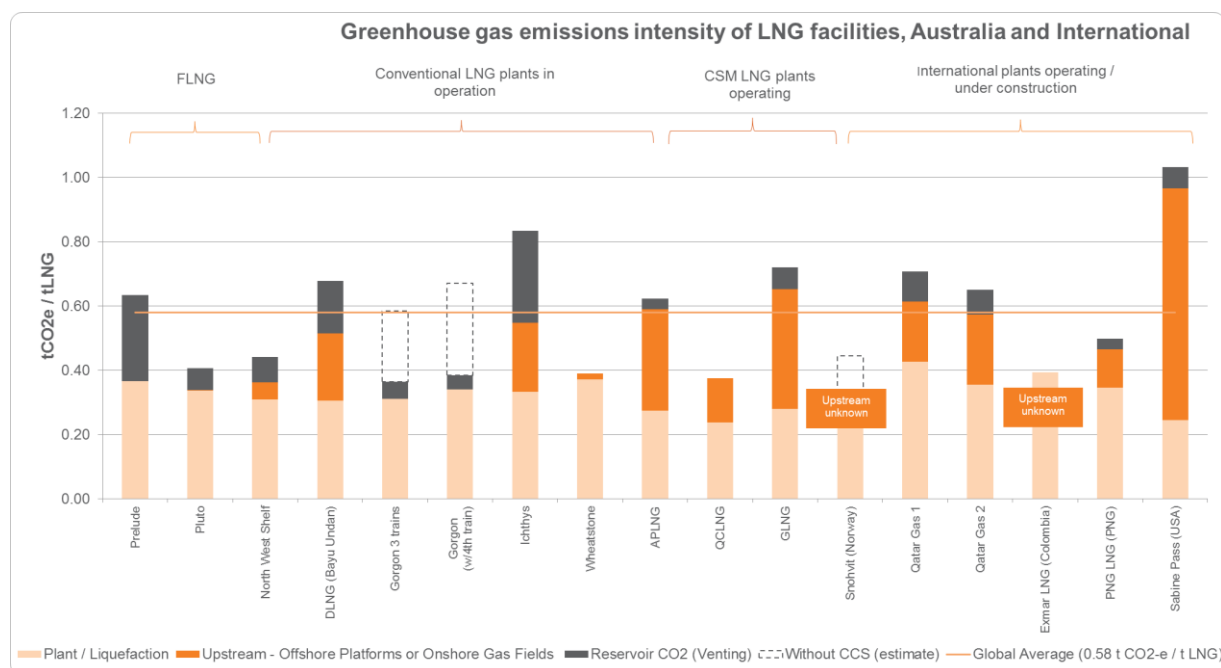


Figure 1: Greenhouse Intensity of Major LNG Plants Worldwide (Existing and Planned)

The greenhouse gas emissions intensity benchmarking study illustrates that the predicted performance of Pluto LNG plant is representative of the LNG industry’s current average greenhouse efficiency (see Figure 1). In addition to the efforts of Woodside in identifying and implementing greenhouse gas mitigation opportunities during the design and operational phases, reservoir CO2 has been offset to further lower greenhouse gas emissions.

3.2. Use of Best Available Technology

Several studies were carried out through various development stages of Pluto LNG, to identify best practice for major plant and to minimise environmental impact. Best practice is taken to mean Best Practicable Measures (BPM) as defined in the Western Australian Guidance No. 55 on the Assessment of Environmental Factors, consistent with the *Environmental Protection Act 1986*. The following measures have been in place since start-up, and continue to be optimised during the operational phase.

Air emissions

The *Assessment of Best Practice for Minimising Emissions to Air from Major Plant* (Foster Wheeler Worley, 2007) examined best practice techniques for atmospheric emission minimisation. The report reviewed options for aspects of plant design such as the flare, gas turbines and thermal oxidiser.

Conclusions made in the report included:

- Plant design to eliminate continuous operational flaring consistent with the general indications of the European Union based Best Available Technique Guidelines. This is due to the use of techniques such as high integrity multiple voting systems in the distributed control system, utilising split range flow control valves to recover gas where appropriate and balancing/recovering gas into the fuel system as far as practical;
- Gas Turbine technology selected for Pluto LNG represents a well proven design which, when combined with Dry Low NO_x based emissions control, results in low NO_x emissions guaranteed at levels below the Australian regulatory limits of the time; and
- Some waste gas streams which cannot be reincorporated into the process will be treated with a thermal oxidiser (rather than venting) to convert the hydrocarbon fractions into oxidised by-products, to minimise environmental impact and protect human health.

Operation of installed equipment to best practice standards is subject to engineering practice and ongoing improvement processes. Air emissions performance from gas turbines is tested by annual stack emissions testing for NO_x and other constituents, and regenerative thermal oxidiser availability is reported to DWER quarterly.

Power generation

Selection of power generation technology considered criteria such as reliability, stability, efficiency, capital cost and delivery timeframes. Several alternative technologies and power generating combinations were investigated, including Aero Derivative Gas Turbine generators (ADGT) and industrial gas turbines operating in combined cycle together with Heat Recovery Steam Generators (HRSG) and steam turbines. The Pluto LNG plant has carried forward the four GE Frame 6B gas turbines operating in open cycle, two with waste heat recovery (sufficient to provide site needs). The selection was made based on favourable capital costs, delivery timeframe and water consumption drivers, which significantly outweighed the benefits gained from the other evaluated power generation options.

Operation of the power generation turbines is managed to optimise reliability while considering emissions and fuel gas value. This includes efforts to keep turbines in operational modes which minimise NO_x and SO_x concentration in exhaust, and managing spinning reserve to reduce greenhouse gas emissions.

Liquefaction

The report *Pluto LNG Project Greenhouse Gas Abatement Program* (Woodside 2012) summarises technology options that were investigated for liquefaction, during the early phases of project design. Criteria used to assess the best available technology included CAPEX ranking, production per train, high heating value and schedule ranking. Qualitative analysis

was also carried out, comparing safety, operations and maintenance as well as environmental factors of the different technology options. From the options that were investigated, outcomes indicated that the Shell Foster Wheeler Worley C3MR (propane and mixed refrigerant) process was more favourable in all categories, leading to the implementation of this technology.

Wastewater

To ensure sound environmental performance relating to wastewater discharges, various water recovery studies and reuse options were assessed during project development. The key outcomes of these investigations recommended:

- Optimisation of water influent contaminant levels, to maximise the potential for on-site reuse (and, as a consequence, maximise the end quality of treated wastewater when discharged); and
- Inclusion of extensive treatment systems for all process and process area stormwater streams to meet plant service water specifications.

Water treatment systems were designed to enable extensive reuse within the plant, which in turn resulted in substantially reduced surplus volumes requiring disposal. The option for discharge to ocean was retained to provide a disposal route for excess treated effluent from both the effluent treatment plant (when supply exceeds the re-use requirements, or the re-use specification cannot be achieved) and sewage treatment plant (when on-site irrigation cannot be used).

Various options for ocean discharge were considered, including

1. discharge into water of depth greater than 30m outside the Dampier Archipelago,
2. discharge via a purpose-built diffuser located at the end of the Pluto LNG plant export jetty, and
3. discharge into the Water Corporation's existing Multi-User Brine Return Line (MUBRL) with outfall located in King Bay.

Option 2 was considered the base case in the Pluto LNG Project Public Environment Review; however following further discussion with regulators and authorities, Option 3 was also taken forward for detailed consideration. Discharge to the Water Corporation's existing MUBRL was adopted as the preferred approach and implemented in construction.

At the time of preparation of this report, hardware issues with the treated waste water reuse package are preventing reuse of water within the plant, and discharge via the MUBRL is the primary method of disposal of treated water. This is undertaken in accordance with the approved *Pluto Treated Waste Water Marine Discharge Management Plan* and achieves ecological objectives in Mermaid Sound.

4. Improvement in environmental management

Awards

Strong partnerships, sound research and transparency are key elements of Woodside's approach to environmental management. In recognition of the level of commitment, Woodside has been awarded the [2012](#) (jointly with Santos), [2015](#), [2016](#) and [2017 APPEA Environment Excellence Awards](#). Each award was underpinned by multiple initiatives to improve environmental performance, as described in the associated announcements.

Woodside was also awarded the inaugural [Excellence in Marine Biosecurity Award](#) in 2014 for our risk based approach to the management of vessel biofouling, along with willingness to share tools and protocols with industry peers and regulators.

Greenhouse Gas Abatement

A key part of Woodside's submission to the 2017 APPEA Environment Excellence Awards was an updated focus on energy efficiency and greenhouse gas abatement. This follows the release of [Woodside's Climate Change Policy](#), and public announcement of an annual 1% improvement in fuel intensity until 2020, which is in addition to the already established internal flare reduction target. Since most greenhouse gas emissions from the Pluto LNG Project come from combustion of gas as fuel for power generation and refrigerant compression, a fuel intensity target is a meaningful way to reduce the intensity of Pluto's greenhouse gas emissions.

In addition to the equipment selection described in section 3.2, there have been multiple opportunities implemented at the Pluto LNG Plant over the past five-year period to further reduce the amount of gas flared and the amount of fuel gas consumed per unit of production. These have resulted in an 80% reduction in the mass of hydrocarbon gas flared since commissioning in 2013 and 2016, contributing to a company-wide reduction of 50% since 2013 (Woodside Sustainable Development Report 2016), and an emissions intensity reduction of 33% (measured as tonnes of CO₂e per tonne of LNG produced) over the same period. The Pluto Greenhouse Gas Abatement Program and Improvement Plan set a steady state emissions intensity estimate of 0.37 tCO₂e/tLNG, and in the 2016 calendar year the average emissions intensity was 0.36 tCO₂e/tLNG. Examples of emission reduction initiatives that have been implemented at Pluto include:

- Setting of rigorous plant and system level internal reduction targets for fuel intensity and flaring, helping maintain operational focus
- Improved "spinning reserve" management in the power generation system during cool months, allowing one of the four power generation turbines to be switched off for an extended period each year
- Development of an Energy Management Framework for the company, and asset level Energy Management Plans aligned to ISO:50001

Provision of the approved greenhouse emissions abatement package continues via a contract with CO₂ Australia. Under this agreement, CO₂ Australia implements and manages biosequestration (via tree planting) of CO₂ equivalent to the quantity of reservoir CO₂ emissions released to the atmosphere, or 5.1 Mt of CO₂ over the life of the project.

LNG Fuels

Woodside is actively promoting LNG as a transport fuel, with greenhouse gas emissions up to 25% lower than diesel and 30% lower than heavy fuel oil. Additionally, LNG produces almost no sulphur or particulate emissions.

In 2016, the International Maritime Organisation decided to restrict sulphur levels in global shipping fuels from 2020 and start tracking greenhouse emissions from large ships. This represents a major opportunity for LNG to replace some traditional marine fuels that may no longer be viable when the new caps on sulphur take effect.

Woodside considers the Pilbara region in Western Australia to be an ideal location from which to drive the transition to LNG as a transport fuel, with world-class LNG production facilities close to fuel-intensive industries that rely heavily on imported diesel and heavy fuel oil. Around three billion litres of diesel are imported into the Pilbara each year, and the mining industry alone uses around five billion litres of heavy fuel oil to ship its export product. If Woodside can switch just a portion of this to LNG, the emissions reductions are considerable. Woodside is collaborating with many parties to convert these energy-intensive operations in the Pilbara to LNG. It has potential to provide an important new market for Woodside and make a significant contribution to meeting Australia's emission reduction targets.

To demonstrate the flexibility of LNG as a transport fuel, Woodside took delivery of the Siem Thiima in January 2017. This is the first LNG-fuelled supply vessel in the southern hemisphere and joins our fleet as the primary supply vessel for Woodside's offshore operations.

Advanced Process Control

Many incremental energy-efficiency gains are possible with more precise control of the processes at our facilities. To capture these, Woodside installs Advanced Process Control (APC) systems, which use computer algorithms to make extensive incremental changes. When implemented properly, these changes allow facilities to operate closer to their design limits and increase performance, which may result in higher throughput, and/or reduced energy use.

An APC installed on part of the Pluto LNG facility improved the process stability and reduced operator workload. It also reduced flaring by 10,000 tCO₂ e per year. As data science capacity within Woodside develops, more opportunities to use our existing equipment in a smarter way to reduce emissions intensity and to add value are discovered.

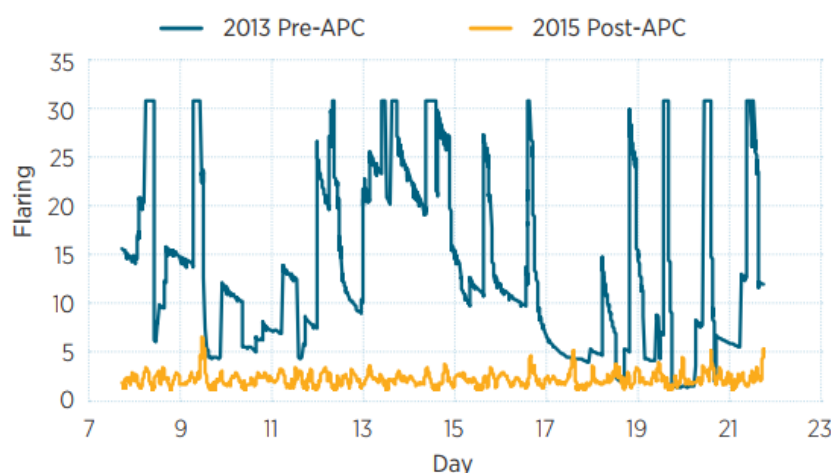


Figure 2: Flaring before and after advanced process control implementation

Air Emissions

Under the approved Pluto LNG Air Quality Management Plan, Woodside undertook two years of ambient air quality monitoring at multiple sites on the Burrup Peninsula and the wider region, followed by an independent peer review of the data and program. The peer review concluded that the measured results supported the risk assessments outlined in Project approvals

documents. The independent reviewer concluded that emissions affecting air quality from the Pluto LNG Plant should be considered low risk.

Groundwater monitoring

There have been no instances of ongoing releases to ground at the Pluto LNG Plant in the reporting period. Any minor spills have been promptly cleaned up, including excavation and remediation where not on sealed surfaces or secondary containment. Despite this, a voluntary Groundwater Monitoring Program has been put in place to proactively identify any potential groundwater contamination via a network of strategically placed groundwater bores. The bores have been sampled by biannually for hydrocarbons, hydrocarbon degradation products and heavy metals and no contamination has been recorded.

Indigenous engagement

Woodside places great value on working with Indigenous communities. A continuous improvement model frames principles and focus for effort in engagements with indigenous communities, and includes several activities:

- Developing workforce respect for culture and communities through cultural awareness training.
- Building and strengthening relationships through inclusive heritage management processes, such as the annual Pluto heritage survey which involves traditional custodians and professional archaeologists.
- Increasing economic opportunities by growing the proportion of indigenous Australians working directly for Woodside or key suppliers. An example of this is the decommissioning of the Gap Ridge Accommodation Village, where 37% of total hours were attributed to indigenous personnel. Following completion of the scope, 25% of the indigenous workforce secured long term employment and a further 50% were retained by contractors for a following decommissioning scope. Murujuga Land and Sea Unit Aboriginal Rangers were engaged to provide environmental management services onsite.
- Woodside's third [Reconciliation Action Plan](#) which was released in 2016 achieved "Elevate" status, the highest possible status awarded by Reconciliation Australia. Woodside is the first oil and gas company in Australia to achieve this status and the 17th company overall.

5. Stakeholder and community consultation

Stakeholder and community consultation

The table below outlines stakeholder and community consultation that has been carried out for Pluto LNG. Engagement with stakeholders and community is most often carried out by the locally-based community relations team, with environmental issues making up just one component of topics covered. Engagement with regulators is generally undertaken by the Environmental advisers onsite.

There have been no on-going concerns expressed

Table 2 - Stakeholder and community consultation about environmental performance at Pluto LNG during the reporting period.

Stakeholder	Location	Forum/mechanism	Topic of discussion / main messages	Outcomes/feedback
City of Karratha – CEO	Karratha	Face-to-face and phone call briefings.	<ul style="list-style-type: none"> Operational updates, including planned/unplanned outages and flaring activity, and advice on development opportunities, including Pluto LNG trucking. 	<ul style="list-style-type: none"> Information well received and appreciated; No formal feedback logged.
City of Karratha – Mayor		Face-to-face and phone call briefings.		<ul style="list-style-type: none"> Information well received and appreciated; No formal feedback logged.
City of Karratha - Councillors		Presentation to council meetings.		<ul style="list-style-type: none"> Information well received and appreciated; No formal feedback logged.
Pilbara Development Commission - CEO		Face-to-face and phone call briefings.		<ul style="list-style-type: none"> Information well received and appreciated; No formal feedback logged.
Pilbara MLA		Face-to-face and phone call briefings.		<ul style="list-style-type: none"> Information well received and appreciated; No formal feedback logged.
Karratha Community Liaison Group (includes Pilbara Ports Authority, Karratha and Dampier Community Associations)		Quarterly presentations/updates		<ul style="list-style-type: none"> No formal feedback logged.
City of Karratha community	Karratha, Roebourne, Dampier	Advice in Pilbara News and on radio about planned shutdowns	<ul style="list-style-type: none"> Proactive media about planned shutdown activity and potential for additional flaring 	<ul style="list-style-type: none"> Information well received
Traditional Custodian (TCs) Groups	Perth, Karratha, Roebourne	Individual meetings; Meetings with individual language groups; Meetings with combined language groups including quarterly updates; Roebourne office created to facilitate ongoing consultation.	<ul style="list-style-type: none"> Cultural heritage management; Footprint of LNG facility; Key milestones and developments. 	<ul style="list-style-type: none"> Feedback influenced and continues to influence heritage management; Traditional Custodians kept up to date with project developments.
	Pluto LNG site	Heritage surveys; Monitoring of activities; Site visits.	<ul style="list-style-type: none"> Cultural heritage management; Key milestones and developments. 	<ul style="list-style-type: none"> Feedback influenced and continues to influence heritage management; Traditional Custodians kept up to date with project developments.

6. Planned environmental objectives over the next five years

The environment objectives for the previous five year period (2012-2017) were based on establishing steady state operating conditions and developing baseline data for emissions and discharges, and implementing the greenhouse gas emission improvement initiatives included in the Pluto Greenhouse Gas Abatement Program. These objectives have been achieved and will be described in the next revision of the Pluto Greenhouse Gas Abatement Program.

Environmental objectives for the next five year period (2017 – 2022) which incorporate improvements in technology and management processes are:

- Annual reduction of approximately 1% in fuel intensity (defined as GJ of fuel use / tonnes of hydrocarbon production) until 2020. This is expected to be achieved through a combination of operational changes using existing equipment, and hardware modifications
- Contribution to the Woodside-wide target of flaring intensity less than 7.5 t/kt
- Identification, screening and implementation of further energy efficiency and emission reduction opportunities through ongoing reviews in accordance with the *Pluto LNG Project Greenhouse Gas Abatement Program*
- Successful start-up of the Pluto LNG Truck Loading Facility in 2018, enabling displacement of traditional fuels with cleaner burning LNG in the domestic market
- Continued implementation and update of the Woodside Management System and Pluto specific Environmental Management Plans.

Cultural heritage objectives over the next five years include the continued implementation of the Pluto Cultural Heritage Management Plan and activities seeking advice from Traditional Custodians, Archaeologists and Anthropologists as required. The purpose of these tasks is to protect heritage in the Burrup region whilst maintaining compliance with legal and other requirements. Woodside will also continue to build long term, meaningful relationships with communities in which it is active in alignment to the objectives of the [Woodside Reconciliation Action Plan](#).

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