



Woodside submission: Inquiry into the policy, regulatory, taxation, administrative and funding priorities for Australian shipping

August 2019

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1. Introduction

Marine infrastructure and maritime skills underpin a safe and competitive oil and gas industry. Highly trained and skilled maritime professionals are engaged across Woodside’s business in the exploration, development, extraction and transportation of our products to market.

Woodside supports reforms that will stimulate a competitive and efficient Australian shipping industry, including the development of professional maritime skills. We will elaborate further on this in the submission.

To better inform any future policy development, this paper sets about explaining the nature of maritime activities as they relate to Woodside’s business. As Woodside prepares to enter a growth and construction phase our marine infrastructure and maritime skills remain crucial to safe and competitive operations.

We explain the network of maritime infrastructure and how it supports business activities. Woodside, with some exceptions, is a “user” of shipping and marine services under contract. In this context, future policy considerations should focus on promoting and sustaining a viable shipping and maritime sector that will continue to support the users, like Woodside, of these services. We speak to current coastal trading policy, pose some suggestions specific to the transportation of LNG within Australia, and outline a case study that serves to demonstrate the restrictions created by the current licencing regime for coastal trade.

Maritime professionals are required across our business and we explain where they are deployed across activities offshore and onshore. We identify where maritime professionals will be required in our future growth projects including LNG fuelled vessels, and LNG bunkering.

We will also touch on policy settings and incentives in other jurisdictions beyond Australia that have been successful in accelerating new maritime-related business activities.

We point to potential opportunities for Australia and our natural advantages in respect to vessels fuelled by LNG, and LNG bunkering.



2. About Woodside

Woodside is the pioneer of the LNG industry in Australia and the largest Australian natural gas producer. We have a global portfolio and are recognised for our world-class capabilities as an integrated upstream supplier of energy. For the purposes of this Inquiry, the focus will remain on our Australian maritime operations off the Northwest coast.

In addition to liquefied natural gas (LNG), Woodside produces and supplies crude oil, condensate, liquefied petroleum gas (LPG) and pipeline natural gas. We have been reliably supplying pipeline (domestic) gas to Western Australia since 1984.

Most importantly, Woodside is on the cusp of a major opportunity to deliver additional LNG into the global market. By the early 2020's global LNG demand is forecast to exceed supply. For this reason, any future regulatory or policy changes in the maritime regime should be geared to creating a sustainable shipping fleet and ensure Australian business remains globally competitive.

In broad terms Woodside is working to create an integrated regional LNG production centre on the Pilbara's Burrup Peninsula through major investments to upgrade and connect existing facilities and bring new gas resources through them. This is provided in more detail below.

2.1 Woodside Business

- **North West Shelf (NWS) Project**, our foundation project has been in operation for 35 years and supplies oil and gas to Australian and international markets. This Project accounts for more than one third of Australia's oil and gas production and is a joint venture between six major international companies.

The NWS Project's Karratha Gas Plant (KGP) produces LNG, condensate, LPG, and pipeline gas. The KGP has an export capacity of 16.9 Mtpa, and includes five LNG processing trains; two domestic gas trains; six condensate stabilization units and three LPG fractionation units.

The KGP receives and processes product transported via subsea pipeline from its three offshore platforms namely the North Rankin Complex, Goodwyn A Platform and Angel Platform. Since 1989, there have been over 5,000 LNG cargoes delivered from the NWS Project.

The Okha floating production storage and offloading (FPSO) vessel processes oil that is offloaded via a flexible line to bulk tankers. Its LPG-rich gas is also transferred via pipeline through North Rankin to the Karratha Gas Plant for processing.

The KGP is central to Woodside's growth objective, to toll third party gas through the existing KGP infrastructure. This will extend the operating life of the KGP and will support ongoing economic activity and secure new and ongoing employment for decades to come.

- **Pluto LNG** is also a part of the Burrup Hub vision. In production since 2012, it operates a single onshore LNG-processing train. Pluto LNG processes gas from offshore fields via 180 km subsea pipeline from the Pluto-A Platform and was underpinned by 15-year sales agreements with Kansai Electric and Tokyo Gas, which each hold a 5% interest in the project.

In December 2018, Woodside entered front-end engineering and design (FEED) to develop a second train at Pluto LNG, with the objective of processing gas from the Scarborough gas field, via a 430km pipeline. Expanding Pluto onshore has the potential to accelerate future developments of other offshore gas reserves.

Studies are also well underway to develop a five kilometre interconnector pipeline to transport gas from Pluto LNG to the KGP, with the potential to fill short-term spare

capacity at the KGP and accelerate future developments of other offshore Pluto gas reserves, and third-party resources.

- **Burrup Hub Vision.** The Burrup Hub involves the proposed development of some 20 to 25 trillion cubic feet (Tcf) of dry gas resources from the Scarborough and Browse offshore fields, through the above infrastructure. As outlined above we propose to link the KGP and Pluto LNG through an interconnector that will create a regional LNG production centre to supply domestic and export markets.

The Burrup Hub has three aspects:

- Browse¹ to North West Shelf (Karratha Gas Plant). Long term processing of third-party gas, such as Browse in the Kimberley, will extend the life of the KGP facility for decades. The Browse development concept is based predominantly on two permanently moored floating production storage and offloading (FPSO) facilities, and will deliver gas through an approximate 900 km pipeline to the KGP. Condensate will be exported offshore at the FPSO, and operations are anticipated for up to 50 years.
 - Scarborough gas to Pluto LNG.
 - Pluto-NWS Interconnector.
- **Australia Oil** Our Australia oil developments are located offshore 50 km north/north west of Exmouth, where the Ngujima -Yin FPSO is located. Woodside also operates the Okha FPSO, approximately 135 km north-west of Karratha.

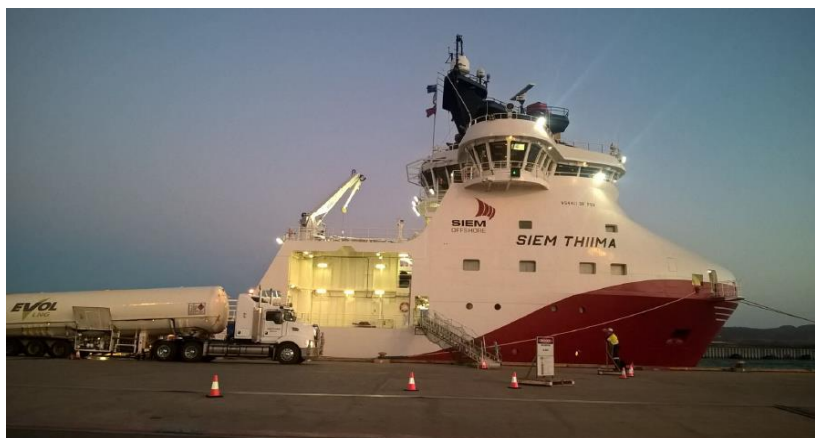
1 The Browse fields are 425 km north of Broome in the offshore Browse Basin

3. Marine Logistics and Infrastructure

3.1 Integrated Fleet

An integrated fleet of twelve chartered vessels, with Australian crews, support Woodside's safe and efficient operations.

The integrated fleet includes one production support vessel (PSV), namely the LNG dual-fuelled Siem Thiima²; and two offtake support vessels (OSVs); a utility boat that provides logistical support to offshore platforms and two FPSOs (refer 3.1.1).



Woodside also charters six tug boats³ (through an integrated agreement with Pluto LNG and NWS Project) and two pilot boats located in Dampier and Exmouth. These vessels are Australian crewed, and operated by the charter party.

Woodside intends to transition the integrated fleet to dual-fueled vessels, using LNG as its primary fuel.



² The vessel commenced operations with Woodside in January 2017, with LNG truck-to-ship bunkering (refuelling). Siem Thiima is the first LNG-fuelled platform support vessel active in the Southern Hemisphere.

³ Tug boats owned operated and crewed by RiverWijs

3.1.1 Floating Production Storage and Offtake Facilities (FPSOs)

Woodside operates two disconnectable FPSOs, being the Ngujima-Yin off Exmouth and the Okha off the Karratha coast. These facilities are all Australian crewed.

3.1.2 Subsea Support

On average, Woodside charts subsea inspection maintenance and repair vessels (IMR) for two thirds of the year. Additional subsea construction vessels will be contracted to support the upcoming growth projects associated with the Burrup Hub.

3.1.3 Drilling and Exploration

Additional PSVs outside of Woodside's integrated fleet are chartered as required to support drilling and exploration activities. These are generally Australian crewed, subject to market conditions and availability.

Woodside needs ongoing access to safe, efficient marine and shipping services. Any regulatory changes in the maritime sector should retain ready access to these specialist services, whilst stimulating a sustainable Australian shipping sector.

3.2 Woodside Marine Terminals

Our port operations provide for safe and efficient pilotage, loadmaster services, tug operations, loading operations and ship to shore interface for LNG, LPG, oil and condensate tankers at Woodside operated marine terminals.

Woodside operates three wharfs at the Karratha Gas Plant, including two jetties for LNG and one for condensate. Pluto LNG operates one jetty for both LNG and condensate.

The King Bay Supply base is used for supply vessels and the Burrup Material Facility (BMF) is used for supply and construction vessels. The maritime professionals operating these facilities are direct employees of Woodside.



4. Marketing and Shipping

4.1 Global LNG Shipping

LNG projects that market on a Delivered-Ex-Ship (DES)⁴ basis manage their shipping requirements through one, or a combination of:

- Project ownership of the ships, generally through a shipping affiliate;
- Partial ownership of the ships, through ownership of shares in the LNG ship with a third-party ship owner; or
- Chartering ships on a long-term basis, currently considered to be between ten and fifteen years.

Dedicated project shipping was the norm in the industry until the late 2000s, but there has been a recent and significant swing away from dedicated shipping. According to ship broker, Poten and Partners, in the period 2016-2019 only 13% of the total LNG fleet was dedicated, compared to 63% in the period 1991-1995. This shift has occurred in parallel with increased demand from buyers for flexibility in the LNG market, with a greater proportion of LNG sales on a Free-On-Board basis (FOB)⁵.

Buyers were historically motivated by security of LNG supply, but as the LNG market has matured and grown with multiple supply sources, other considerations such as cost and flexibility, whilst they had always been important, have now risen to the fore. This has led to a greater focus on shipping flexibility and a trend towards greater FOB sales. This has been evident for some time but is most obvious in the current period (2015-2019).

For example, at a global level, there were 89 MMt of new FOB contacts in that period (out of a total of 130 MMt). This represents well over half (68%) of new contracts for this period compared to an average of just over one third (38%) across all periods considered.

Even if a Project decides to retain some dedicated shipping the trend is against ownership and towards chartering ships from a third-party owner. Chartering allows the Project to retain strategic control over shipping without having to directly manage day to day operational and technical risk and reduces exposure to obsolete technology.

4.1.1 Global Shipping Fleet

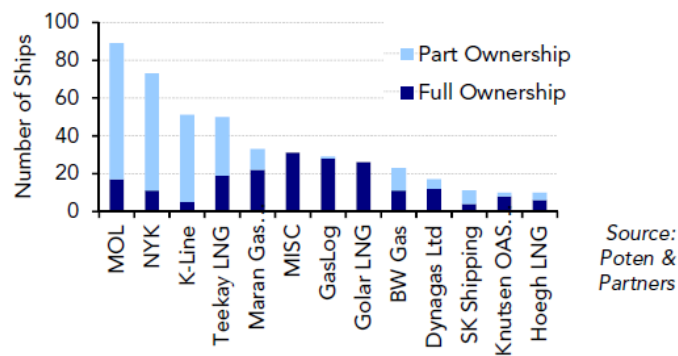
The trend towards greater FOB sales has been facilitated by growth in the number of LNG ships that are owned by independent ship owners. LNG ships are expensive to build and complex to operate and maintain. Most independent ship owners employ their own seafarers as a means of protecting their investment.

The global LNG shipping fleet (refer to chart below) grew from 19 ships in 1990 to around 550 ships at the end of 2018. Global shipowners own around two thirds (67%) of the existing global fleet and represent 91% of the new-build order book. They are mainly from Japan, Greece, and Norway and have gained considerable experience over decades of LNG shipping.

⁴ DES is where title and risk transfers to the buyer at the discharge terminal.

⁵ FOB is where title and risk transfers to the buyer at the loading terminal.

Independent Shipowners by LNG Fleet Size (10+ ships)



4.2 Woodside LNG Carriers

Woodside prefers to market its LNG on a DES basis. We maintain a fleet of five LNG carriers, which are owned, operated and crewed by third-party ship owners⁶, on long-term charter party contracts. Maintaining control over shipping allows Woodside to mitigate availability risk, manage production and weather interruptions, and manage scheduling changes.

In addition to delivering cargoes into our traditional Asian markets, we have loaded and discharged a number of third-party cargoes into other regions including Africa, India, Egypt, Kuwait, Belgium and the U.S. Gulf Coast.

As a “user” of shipping services Woodside supports policy and regulatory settings that provide for ongoing commercial viability and global competitiveness.



Woodside Rees Withers

174,000m³ LNG Carrier

Operator: Maran Gas

Constructed by Daewoo Shipping and Marine Engineering (delivered 2016)

⁶ Teekay owns, operates and crews the Woodside Donaldson
Maran Gas owns, operates and crews the Woodside Chaney, Woodside Goode, Woodside Rogers, Woodside Rees Withers

4.3 North West Shelf Project Shipping

The NWS Project has, until recently, maintained a fleet of nine ships, of which seven are owned by the Project participants (four are Australian flagged and crewed) and there are two additional time chartered vessels. The North West Shelf Shipping Services Company (NWSSSC) manages the ships on behalf of the Project. The Australian crew (~230) operating the four Australian vessels is employed by Shell Trident (STAPL).

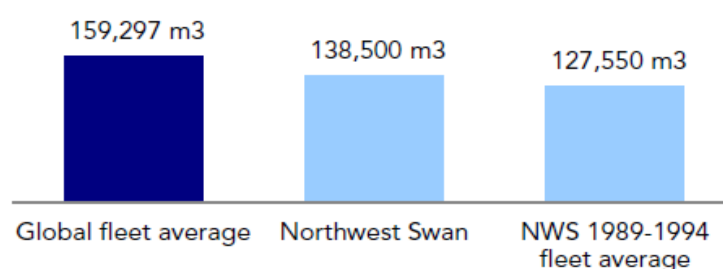
At the start of LNG exports in 1989 all the NWS Project contracts were “DES” contracts, which meant the NWS Project took care of shipping on behalf of its long-term customers in Japan, South Korea and China, and occasionally other destinations. Over time a number of customers have declared a preference for FOB terms (refer 4.1).

The NWS Project faces the expiry of its DES contracts which means that the fleet will progressively reduce from 2019 and cease in 2024. The first vessel in the fleet to be retired was completed in March 2019.

4.3.1 NWS Project Ships

The first-generation ships owned by the NWS Project⁷ are smaller, and have less cargo capacity than the current global fleet. There has been significant improvements in efficiency since the NWS Project’s LNG carriers were delivered in 1989. Outside of the NWS Project dedicated trades (see chart below), these vessels would struggle to compete today. The unit transportation costs are higher for smaller ships, while larger ships can achieve economies of scale. Their age and less efficient propulsion systems also impact their competitiveness.

Ship capacity, global fleet vs NWS fleet (July 2017)



4.4 Australian Ships and Competitive Fiscal Settings

Current fiscal and regulatory measures make it difficult for Australia to compete with other countries like the UK, Singapore, and Norway. These countries have had in place a range of fiscal incentives for years that have served to maintain a national fleet and a national maritime workforce. These include:

- Zero corporate tax arrangements (UK, Netherlands, Norway, Germany, Denmark and Singapore).
- Tax exemptions for owners or operators of a state registered ship; Shipping enterprise Incentive Scheme that supports management and control of ships; (Singapore).

⁷ The Northwest Sandpiper, Northwest Sanderling, Northwest Snipe, Northwest Shearwater, Northwest Stormpetrel, Northwest Seagle, (Northwest Swan retired)

- In the UK, seafarers are entitled to 100% deduction on their tax if they work on a ship for 182 days in a year. Most of the EU countries which have significant maritime industries provide some similar support.
- Norway implemented a tonnage tax regime in 2007 that provided full tax exemption on shipping income. It's tonnage tax regime is open to a range of offshore vessels, including tax exemption on dividends received by investors.

In Australia, a refundable tax offset is available to Australians engaged in international trades (where the seafarer spends more than 90 days on international voyages on qualifying vessels in an income year). The NWSSSC has benefitted from this offset for its four Australian vessels, and in its absence, the operating costs of the four Australian ships would be significantly higher.

Woodside supports the introduction of fiscal measures that would encourage growth in the ownership of Australian ships.

Woodside supports personal income tax concessions for seafarers that would encourage and promote seafaring as a long-term career.

5. Coastal Trading

5.1 The Coastal Trading Act 2012

The *Coastal Trading (Revitalising Australian Shipping) Act 2012* ("the CTA") regulates coastal trade through the granting of licences which authorise vessels to carry passengers or cargo between ports in Australia. The Act provides for three licence types;

- A general licence, available to an Australian flagged ship or Australian crewed ship;
- A temporary licence, available to a foreign flagged ship engaged in coastal trading; and
- An emergency licence.

Broadly speaking, coastal trading includes a vessel that is carrying cargo from one state or territory port to be discharged in another state or territory port, in connection with a commercial activity. This would include, for example, LNG transported on one of our LNG carriers from our Western Australian operations to an east-coast discharge terminal.

Under the current regime, the owner of the foreign vessel, charterer of the vessel, a master or an agent can apply for a temporary licence to engage in coastal trading, over a 12-month period, using the voyages that are specifically authorised in the licence. An application must be in writing and specify:

- At least five voyages within the 12-month period;
- Predict the voyages and include specifics as to the loading dates, locations and cargo quantities;
- Provide as much additional detail as required by the Act, associated regulations that are known at the time of the application; and
- Must be accompanied by the appropriate fee

On application, holders of a general licence and other interested parties (including maritime unions), will be notified of the application. A general licence holder can choose to contest the application for a temporary licence, on grounds that it has capacity to meet one, some or all voyages nominated in the temporary licence.

Where an application is contested, the applicant must meet with the general licence holder claiming capacity to perform one, some or all voyages, and begin negotiations as to whether they can carry the cargo. The applicant must advise the Minister of the outcome, who has 15 days to decide, subject to further information requests and negotiation outcomes.

If a specific voyage changes post the grant of a temporary licence, there is capacity to vary a temporary licence however it is subject to contestability. There are some operational tolerances, for example a voyage that is taken within five days (either side) of the nominated voyage date does not require a new licence.

The Fair Work Act Regulations 2009 extend the operation of certain parts of the Fair Work Act 2009 to a vessel operating under a temporary licence and has undertaken two or more voyages within the previous two months. Specifically, terms and conditions specified under Part B of the Seagoing Industry Modern Award 2010, will apply to foreign crew engaged on a temporary licenced vessel undertaking its third voyage within the previous 12 months. This adds cost and complexity, without contributing to developing Australian seafaring capacity on a sustainable basis.

Woodside supports continued access to coastal trading by foreign flagged ships.

Woodside supports a contestability regime, only where there is Australian capacity.

Woodside supports a simplified licencing system for foreign vessels when there is no Australian capacity.

5.1.1 Coastal LNG trading

The proposed development of LNG import terminals on the east coast could give rise to coastal LNG trading for the first time, creating new Australian markets for Australian LNG. There are currently no available Australian LNG carriers with sufficient capacity to service this trade. This new Australian trade will have limited volumes and therefore limited ship movements. The minimum five-voyage licencing regime, outlined above, is likely to impede this trade.

Woodside advocates creating a specific licence that would facilitate the transportation of Australian LNG from one state or territory to another on a foreign LNG carrier. Such a regime recognises the lack of suitable Australian capacity. The proposed licence should include the following characteristics:

- Reflect common LNG supply contracts that specify an annual quantity, rather than number of cargoes. The licence should not specify the number of voyages.
- Reflect common operational, technical and commercial considerations in the liquefaction and transportation of LNG. The licence should not specify the load and delivery dates.
- A recognition that there is currently no general licence holder with Australian capacity. The licence does not include a contestability component when there is no Australian capacity.

Woodside supports a class of licence for LNG carriers that would facilitate the transportation of Australian LNG to Australian customers.

5.2 Other matters – Customs Act 1901

The current regulatory regime has created an impediment which has served to discourage Australian oil producers, ie Woodside, from supplying Australian refineries from its Australian FPSOs.

The following issues remain unresolved:

- Temporary licencing regime – a licence cannot be issued under the CTA for a single voyage offtake from an FPSO to an Australian port using a foreign flagged vessel because the FPSO is not deemed a port under the CTA; a
- Temporary licences can only be issued with a minimum of 5 voyages (to be notified in advance); and
- “Importation”. In the absence of a temporary licence, a foreign vessel can be deemed “imported” under the Customs Act, and if so deemed, the owner of the vessel must enter it into home consumption. This has the implication of making the ship and its

equipment subject to a range of domestic legislation⁸ including liability for GST and excise duties.

The following case study serves as a practical example of these matters. This case study formed part Woodside's response to the 2014 Options Paper to the Department of Infrastructure and Regional Development.

The net effect of this experience has been to impede the future transportation and supply of Australian produced crude oil being transported by foreign vessels, as a single voyage, from an Australian FPSO to an Australian refinery.

Case Study – The MV Paramount Hydra

The MT Paramount Hydra, a Greek owned vessel, was chartered by Woodside on 15 March 2013 for the purpose of undertaking a single voyage – its purpose to carry crude oil from the Okha Floating Production Storage and Offloading vessel (**FPSO**), off WA's Pilbara coast to Lytton, Queensland and then depart Australian waters. The Paramount Hydra voyage was the first crude oil cargo that Woodside had chartered since the introduction of the new CTA, the last cargo having occurred approximately 18 months prior. On the advice provided at the time of this charter, there was no Australian registered vessel with sufficient carrying capacity to undertake this voyage.

In order to engage lawfully in coastal trading between Australian ports under the CTA, it is mandatory for a vessel to operate under one of three kinds of licence, being either a general licence, temporary licence or an emergency licence. In the case of a foreign flagged vessel, a temporary licence would be applied. In order for a temporary licence to be issued, the vessel is required to nominate a minimum of five voyages in advance.

No licence could be issued to the MT Paramount Hydra because an FPSO is not deemed a "port" under the meaning of the CTA. Even if the FPSO did constitute a port for the purposes of the CTA, the 'five-voyage' licence regime would **still preclude** the MT Paramount Hydra from gaining a temporary licence as the voyage was a single voyage intending to depart Australian waters after the discharge of cargo in Queensland.

In the absence of a licence, the charter vessel then fell within the jurisdiction of the then Department of Customs (**now ACBPS**) and the Customs Act. Both Woodside and the vessel owner became increasingly alarmed at the advice from the ACBPS, that indicated the ship, on reaching the Queensland Port could be served with a "show cause" notice (Section 49A of the Customs Act) as to why the ship should not be treated as having been "imported". Should the ship be subject to importation then the MT Paramount Hydra would have been deemed to be an Australian ship and this would have brought into play a range of other legislation under Part II of the Navigation Act 1912. Woodside and the vessel owner deemed this impractical and unreasonable in light of the nature of the single voyage proposed.

Woodside attempted to argue that there was **no intent** to import for those reasons outlined previously – it was a single voyage departing Australian waters upon discharge of a cargo.

Woodside, and the vessel owner, after eventually being satisfied that there was no breach of law, and the ship would not be prevented from loading and unloading its cargo in Australia, and more importantly, from leaving Australia, the MT Paramount Hydra commenced loading on the 15 March, and arrived at Lytton on the 26 March. The ship was served with a Section 49A notice on the 27 March 2013, and having completed the offloading, departed the Queensland port the following day.

⁸ Part II of the Navigation Act 1912.

6. Maritime professionals in the oil and gas industry

6.1 Our maritime skills base

Woodside directly employs⁹ 180 people with maritime skills to work across a variety of roles onshore (refer 3.2) and offshore. These figures do not include those employed by our contractors i.e. tug boats, integrated fleet, LNG carriers, or the NWSSSC.

A significant majority of direct employees who hold maritime skills occupy highly specialised shore- based roles in a technical or managerial capacity.

Type of Marine Skill	Numbers
Master Mariner	47
Marine Engineer (Seafaring)	25
Rating	59
Integrated Ratings	15
Naval Architect	15
Marine Engineer (Other)	18

In addition to our directly employed maritime professionals, the business relies on specialist services that are not required on an ongoing basis. For example, a specialist offshore drilling contractor was contracted for the Greater Enfield project where the drill rig was in Australian waters for 20 months.

Maritime skills are deployed broadly across our business and supply chain, and Woodside supports reforms that facilitate attainment of these skills in Australia.

6.2 Our workforce demographics

A review in February 2019 of Woodside’s direct maritime professional employees revealed the following statistics:

- 60% of the combined maritime professional workforce are between the ages of 50-70 years.
- 14% of the combined maritime professional workforce are women.
- 50% of Marine pilots are between 50-60 years.
- 50% of Designated Masters are between 50-60 years.
- 46% percent of Designated Chief Engineers are between 50-60 years.

This review is consistent with the Census recently undertaken by MIAL¹⁰ which forecast a shortfall of maritime professionals.

⁹ As at January 2019

¹⁰ Maritime Industry Australia Ltd

Woodside supports reforms that incentivises Australians to choose a career in the marine and shipping sectors.

Policy settings should recognise the cyclical nature of the maritime services sector and allow for access to overseas maritime professionals to supplement any shortfalls.

6.3 Future maritime job skills: LNG-fuelled vessels

Woodside is engaged in the development of new markets, exploring the use of LNG as a low-emissions and cost-effective alternative marine fuel (refer Section 7 below). We currently have in operation one LNG-fuelled support vessel that has resulted in new training and competency requirements. We intend to transition our integrated fleet (refer 3.1) to dual-fueled vessels, using LNG as its primary fuel.

There is another opportunity for international ships trading in Australia to be fuelled by LNG provided in Australia. For example, if all the iron-ore carriers in the Pilbara were eventually to use LNG as a fuel provided from LNG production facilities in the Pilbara, this would require a fleet of around fifteen bunkering (refuelling) vessels, creating an estimated 400 additional maritime jobs (refer 7.2).

With the emergence of more LNG-fuelled vessels, crews on those ships will need to meet competency requirements for the 2014 International Gas Carrier (IGC) code, requiring upskilling of current capabilities across entire crews.

Potential opportunities exist to establish training centres to meet upskilling requirements emerging from growth in LNG-fuelled vessels. Training opportunities at present are limited, and located in the Northern Hemisphere, however, the Australian Maritime University in Launceston, Tasmania has recently added two LNG specific training courses to its curriculum. These are AMSA recognised and certified training courses for the handling and loading of LNG.

Woodside supports policy that would encourage growth in industry-led training initiatives.

7. LNG as a fuel

7.1 The Green Corridor - LNG fuelled bulk carriers

LNG-fuelled bulk carriers are a growing reality and it is more certain that Australia will have dual-fuelled bulk carriers arriving in ports from 2021 (refer 7.3.1). In July 2019 BHP released the world's first bulk carrier tender for LNG-fuelled transport for up to 27 million tonnes of its iron ore.

The use of LNG bulk carriers in the Pilbara, provides the potential for new LNG bunkering opportunities and Woodside is currently investigating providing a service from its existing operations in the Pilbara.

When the International Maritime Organisation (IMO) confirmed 2020 as the date for implementation of 0.5 per cent global sulphur cap, Woodside joined a Joint Industry Project (JIP) that examined the commercial potential and technical feasibility of LNG fuelled bulk carriers in a "green corridor" iron ore and coal trade between Australia and China.

The JIP¹¹ included ship owners and a designer, major Australian miners, a classification society and LNG suppliers. The outcome of this collaboration delivered an LNG-fuelled "Newcastlemax" class design during the first phase and then a very large ore carrier (VLOC) class in the second phase, pictured below. This design is expected to be capable of making two round trips from the Pilbara to China before bunkering is required.



Very Large Ore Carrier (VLOC)

LNG offers the shipping industry an option to meet the new International Maritime Organisation (IMO) standards on sulphur emissions. LNG fuel has negligible sulphur or particulate emissions and fewer carbon emissions than diesel and heavy fuel oil.

There are currently 144 ships around the world using LNG, according to ship classification society DNV GL, with another 138 on order. Although this is still a small fraction of the world fleet of more than 60,000 commercial ships, orders for LNG-fuelled ships are increasing for large ocean-going ships, including 32 large cruise ships, 20 container ships and 2 bulk carriers for iron ore.

A move to LNG-fuelling for international shipping could see Australia become a world leader in providing LNG as a shipping fuel, leveraging its status as one of the world's largest LNG producers (refer 7.2).

7.1.1 IMO standards and Emission Control Areas (ECAs)

LNG can reduce pollutant emissions substantially. LNG produces almost no sulphur or particulate emissions, and provides a >80% reduction in nitrogen oxide emissions.

¹¹ JIP included miners : BHP, Fortescue Metals Group, Rio Tinto; ship owners: Mitsui O.S.K. Lines (MOL), U-Ming and China Merchants; ship designers: SDARI, classification society : DNV GL; LNG suppliers: Woodside and Shell.

LNG can also provide a reduction in greenhouse emissions of 20 to 30% on a lifecycle basis compared to fuel oils, making a significant step-change in greenhouse emissions, whilst also supporting Australia's climate change commitments and the IMO targets for greenhouse emissions reduction.

Public health experts¹² indicate that when the IMO regulations come into force in 2020 there will be a sharp reduction in air pollution, with improvements to human health near port areas, including a reduction in premature mortality and the prevention of millions of cases of childhood asthma and other respiratory ailments.

Other countries have already moved to improve their air quality ahead of the new IMO regulations. China has implemented a 0.5% sulphur limit in its territorial waters from January 2019. An even tighter standard of 0.1% is in force in IMO-designated Emission Control Areas (ECAs) along North American coastlines, as well as in the Baltic Sea, the North Sea and in the Caribbean.

Both these emission standards can be met by the installation of emissions cleaning equipment; converting to more expensive low and ultra-low sulphur fuels, or converting to LNG.

As LNG maintains the lowest environmental footprint of the above options, LNG provides a new market opportunity for Australia's LNG resources as a clean fuel for international shipping.

In November 2018, Woodside wrote to the Federal Minister for Infrastructure, Transport and Regional Development Hon Michael McCormack, urging him to consider measures that would support LNG as a marine fuel, including the implementation of an ECA by means of an AMSA application to the IMO.

7.2 LNG Bunkering (refuelling)

In response to the emergence of LNG-fuelled bulk carriers to the North West, Woodside has sought expressions of interest for a bunkering vessel, on a long-term charter basis. The vessel would be owned and operated by a third party ship owner, and facilitate ship-to-ship bunkering along the Pilbara coast for the iron ore trade. We are continuing to progress this new business in parallel with the arrival of LNG-fuelled bulk carriers to the region.

Approximately 4,500 bulk carrier ship voyages carrying iron ore originate from the ports of the Pilbara region. These vessels burn around 5 billion litres of heavy fuel oil each year, all of which is purchased overseas. If all the ships transporting iron ore from the Pilbara were refuelled by Australian LNG, this is estimated to require approximately fifteen LNG bunkering vessels. This represents approximately 400 offshore maritime professionals directly employed, and additional jobs onshore.

There are six LNG bunker vessels already committed in the Asian region (China, Singapore, Japan and Korea), with more LNG bunker vessels likely to follow. Should these countries secure the LNG bunkering business it would be increasingly difficult for Australia to enter the market. Customers would have large enough tanks not to require LNG refuelling in Australia.

Taking a 'first mover' position has its challenges, and Woodside has been actively investigating opportunities that may support Australia becoming a competitive LNG bunkering hub. There are tax measures available to ship owners under the Shipping Reform (Tax Incentives) Act 2012 which were introduced to improve Australia's competitiveness with other jurisdictions. This provides the potential for an eligible ship owner to gain access to income tax exemption on a year-by-year basis, subject to suitable management and seafarer training plans. However, while a ship owner would not pay income tax if they meet the criteria, any dividends repatriated are subject to taxation which may serve as a disincentive for ship owners.

¹² Nature Communications, 6 February 2018, Article 406 'Cleaner fuels for ships provide public health benefits with climate tradeoffs' Sofiev et al.

Woodside has also been engaging with the Western Australian government to support the LNG bunkering initiative, including the potential establishment of incentives that could accelerate LNG bunkering, support the competitiveness of LNG bunkering, and provide support for customers choosing to bunker in Australia. Singapore already provides port fee reductions for LNG-fuelled vessels bunkering in their ports, and in Australia both Port Botany and Port Kembla in NSW have announced discounts for vessels outperforming IMO emissions standards (e.g. by being LNG-fuelled).

Woodside recommends the introduction of measures that accelerate the growth in LNG bunkering for Australian LNG and support competitiveness vs other bunkering locations in Asia. This may include support for ECAs, shipping tax measures, port incentive programmes and regulatory arrangements that facilitate this potential new market.

7.3 Fuel security

The shipping industry has a range of options (refer 7.1.1) in response to the IMO requirement for low sulphur fuels that commences in 2020. The use of LNG has the potential to reduce pollutant emissions substantially. This paper has previously outlined Woodside's objective to establish ship-to-ship LNG bunkering in the Pilbara to support the iron ore trade, and we have since sought expressions of interest for a bunkering vessel.

With Woodside's proposed LNG bunkering infrastructure in place, utilising LNG as an alternative fuel could improve Australia's fuel security and go some way to addressing the shortfall in IEA stockholdings. Using LNG produced and supplied in Australia will also enhance Australia's revenue security through the ongoing delivery of some of Australia's key export products.

7.4 Other jurisdictions are promoting LNG-fuelled ships

7.4.1 South Korea

The South Korean government announced in October 2018 that it was providing funding worth 9.6 billion won (AUD\$12 million) to support procurement of two 180,000 tonne bulk carriers powered by LNG.

H-Line Shipping Co., a mid-sized South Korean shipping company, placed an order with Hyundai for the two bulk carriers. The South Korean Ministry of Oceans and Fisheries said the vessel would be used to carry iron ore on the route between South Korea and Australia, starting from 2021.

7.4.2 Singapore

Singapore remains a key competitor that is seeking to dominate the LNG bunkering business in the region. Should other ports capture the refuelling market, they could strand the need for Australia to enter the market as the vessels will carry enough LNG to not need to refuel in Australia. The Singapore Maritime and Port Authority has introduced a range of incentives to attract the LNG bunkering business which includes:

- 25% port fee reductions to all LNG fuelled vessels.

- An additional 10% port fee reduction to LNG-fuelled vessels, if they use LNG-fuelled tugs.
- Awarding a S\$6 million grant to co-fund two LNG bunker vessels.
- Awarding S\$12 million to fund the construction of harbourcraft that use LNG.

7.4.3 Europe

In December 2018 a series of projects were awarded EU financial assistance¹³ totalling in excess of 75 million Euro (AU\$120 million) to facilitate new LNG bunkering projects across Europe. These included:

- Venice LNG alternative fuel facility
- EG LNG bunker vessel
- 'LNGHIVE2' LNG Infrastructure and Logistics for Enagas
- BlueHUBS LNG supply chain (Eastern Mediterranean)
- LNG bunkering for the Swinoujscie – Ystad maritime link

Woodside supports fiscal and policy settings that would accelerate new investment in the development of an LNG bunkering fleet in Australia.

¹³ Connecting Europe Facility (CEF) - Transport

Woodside submission: Inquiry into the policy, regulatory, taxation, administrative and funding priorities for Australian shipping

Head Office

Woodside Energy Ltd
Mia Yellagonga
11 Mount Street
Perth WA 6000

Postal address:

GPO Box D188
Perth WA 6840
Australia

T: +61 8 9348 4000

F: +61 8 9214 2777

E: companyinfo@woodside.com.au

