

**Submission to the
Economics & Industry
Standing Committee**

**Inquiry into the Implications
of Floating LNG**

August 2013



**THE CHAMBER OF
MINERALS AND ENERGY OF
WESTERN AUSTRALIA**

30 August 2013

Mr Ian Blayney MLA
Chairman
Legislative Assembly Economics & Industry Standing Committee
Parliament House
Perth WA 6000

Dear Mr Blayney

Inquiry into the Implications of Floating Liquefied Natural Gas Operations

CME is pleased to provide a submission to the *Inquiry into the Economic Implications of Floating Liquefied Natural Gas Operations*, being undertaken by the Legislative Assembly Economics and Industry Standing Committee.

CME is the peak resources sector representative body in Western Australia. CME is funded by its member companies, which generate 95 percent of the value of all mineral and energy production and employ 80 percent of the resources sector workforce in the state.

The Western Australian resources sector is diverse and complex, covering exploration, processing, downstream value adding and refining of over 50 different mineral and energy resources. In 2011-12, resources production accounted for over 90 percent of Western Australia's total merchandise exports and royalty payments to the State Government totalled \$5.3 billion.

Energy resources, particularly natural gas reserves, are one of the state's key economic drivers. Petroleum products were worth around \$24.4 billion to the state in 2012 and almost half of that value was attributable to liquefied natural gas (LNG) production. The prospects for the future of the state's energy sector are strong, with several offshore gas projects committed or proposed and the state's substantial shale and tight gas reserves currently being explored.

CME's submission focuses on policy and economic considerations for continuing to develop the state's energy resources, particularly the LNG sector including floating LNG operations. Floating LNG facilities are expected to allow the development of difficult or remote gas fields, which may not otherwise be economically competitive.

LNG project proponents and associated service companies will be best placed to provide details on specific matters such as technologies employed and workforce requirements.

CME thanks the Standing Committee for the invitation to present and comment on the inquiry and looks forward to ongoing engagement in the process.

Should you wish to discuss this matter further, please arrange for the Standing Committee's staff to contact Mr Benjamin Hammer, Policy Adviser – Infrastructure, on 08 9220 8527 or b.hammer@cmewa.com.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Reg Howard-Smith'.

Reg Howard-Smith
Chief Executive

Table of Contents

1.	Executive Summary	2
2.	CME	4
3.	The Western Australian Resources Sector	5
3.1	The Western Australian Petroleum Sector.....	6
3.2	Australian LNG in the Global Context	6
4.	Government Energy Policy	8
4.1	Commonwealth Government.....	8
4.1.1	Energy White Paper.....	8
4.1.2	Domestic Gas Market Study	9
4.2	Western Australian Government	9
4.2.1	Strategic Energy Initiative	9
4.2.2	Domestic Gas Reservation Policy	9
4.2.3	Gas Information Services Project	10
4.3	Floating LNG in the Energy Policy Context.....	11
5.	Natural Gas Forecasts	12
5.1	Demand	12
5.2	Supply.....	12
6.	Costs of Doing Business	14
6.1	Drivers of Increasing Costs	14
6.2	Productivity Challenges	14
6.3	Implications for the LNG Sector	16
7.	Local Industry Participation	19
7.1	Local Content Policy.....	19
7.2	Local Content in the LNG Sector	20
7.3	Barriers and Opportunities for Local Content.....	20
7.4	Innovation in Western Australian LNG	22
8.	Environment and Safety	23
9.	Conclusions	24
	Appendix I – Acronyms Used	25

1. Executive Summary

The resources sector has provided substantial benefits to the Western Australian economy, contributing over 40 percent of gross state product in 2011-12. Petroleum production, including natural gas and liquefied natural gas (LNG), is one of the state's most important industries, with a value of around \$24.4 billion in 2012.¹ Three new LNG processing facilities are currently under development, including one floating LNG facility, which is expected to be the first of this kind in operation in the world.

The state's substantial gas reserves position Australia to become the world's leading producer of LNG by the end of the decade. However, global LNG supply is forecast to exceed demand, with several new LNG processing facilities already committed or proposed in the United States, Canada and Mozambique.² Western Australia must therefore remain attractive and competitive as an investment destination for LNG projects.

Energy policy

Divergent government energy policy perspectives regarding the extent of intervention in domestic gas markets and support for floating LNG facilities can add uncertainty and risk to project development, making the state less attractive for foreign investment.

Some policy commonalities are also apparent, with both the State and Commonwealth Government undertaking initiatives to further develop domestic gas markets. In Western Australia, the State Government has recently implemented the Gas Information Services Project, which aims to improve transparency in the domestic gas market.

CME considers evidence from the first 12 months of the Gas Information Services Project and a subsequent independent review of the gas bulletin board should be considered prior to any proposed policy changes regarding the domestic gas market.

Domestic gas supply and demand

Security in domestic gas supply is important as a key input for many of the state's production processes. Some stakeholders have expressed concern floating LNG facilities could impact domestic gas supply, as projects outside state waters would not be subject to the domestic gas reservation obligation. However, while some forecasts indicated the domestic supply and demand dynamic could be tight in the near term, recent forecasts by the Independent Market Operator suggest supply will be sufficient into the foreseeable future.

Western Australia is currently moving to seven domestic gas processing facilities and has abundant shale and tight gas reserves. While shale and tight gas development is currently at the exploration and appraisal stage, it has significant potential for energy diversification and security, and could provide substantial benefits for the state's economy.

CME considers rigorous and transparent approvals and management of the shale and tight gas industry will safeguard the community and environment, secure new natural gas supplies to meet demand, and create jobs and business opportunities.

¹ Department of Mines & Petroleum (DMP), 2013. *Western Australian Mineral & Petroleum Statistics Digest 2012*. Perth.

² McKinsey & Company, 2013. *Extending the LNG boom: Improving Australian LNG productivity and competitiveness, May 2013*. Perth.

Cost of doing business

Western Australia has become a high cost environment for companies to do business and is now among the most expensive locations in the world to develop LNG projects. Key cost drivers include complex approvals processes, the taxation and royalty regime, difficulty attracting appropriately skilled labour, and logistics challenges due to the remote locations of projects.

Floating LNG facilities may address cost pressures by bringing forward revenue streams and making projects more competitive, particularly for remote gas fields. Decisions regarding the use of floating LNG technology should be made by project proponents on a case by case basis and within stable policy settings.

Improvements in infrastructure will help to address the productivity challenge. A coordinated, long term approach is required, including consideration of innovative investment models across the public and private sectors. Common use infrastructure, including transport infrastructure and supply bases, could be well suited to partnership approaches.

CME considers it critical for a renewed, cooperative focus between governments and industry to arrest growing costs and declining productivity.

CME considers a transparent process should be established for planning and prioritisation of infrastructure, including common use infrastructure, with funding committed by the State and Commonwealth Government and industry.

Local industry participation

Global supply chains are important for LNG project development and local companies can struggle to compete in the construction phase, particularly on scale, schedule and price. However, overall local participation in the LNG sector has been strong, as the opportunities for local content during the long operational life of LNG projects are substantial. In particular, there are significant professional and technical employment opportunities, especially for maintenance and research staff. Floating LNG projects are expected to further support these opportunities.

Western Australia is also well positioned to be at the forefront of innovation in the LNG sector, which is likely to provide opportunities for future local participation, including for supporting industries such as research and education.

CME does not consider it necessary to implement policies imposing greater local content requirements because these increase regulatory complexity and costs for proponents. The focus should instead be on supporting local industry competitiveness and better coordination of initiatives across the State and Commonwealth Government.

CME considers government and industry collaborative support for research and development in the LNG sector, through initiatives such as centres of excellence, will assist local industry participation and build capacity in the research sector.

Environment and safety

As with the development of many new technologies, some stakeholder groups have expressed concern over the development of floating LNG facilities. While the scale of these facilities is new, the technology is developed from floating production, storage and offloading vessels, which began operating in the 1970s.

Duplicative and inefficient environmental approvals processes can significantly impact the cost and risk in developing LNG projects.

CME considers the State and Commonwealth Government must work cooperatively to immediately progress the development of streamlined environmental assessment and approvals processes, particularly focusing on reforming duplicative and inefficient processes.

2. CME

The Chamber of Minerals and Energy of Western Australia (CME) is the peak resources sector representative body in Western Australia.

Having been in operation since 1901, the role of CME is to champion the Western Australian resources sector and assist it in achieving its vision to lead the world in sustainable practice through innovation and to underpin Australia's position in the global economy.

CME strives to be a persuasive industry voice, adding value to our member companies in a dynamic and increasingly complex operating environment.

In order to achieve this, CME strives to:

- lead policy development on issues impacting on the resources sector;
- promote the value of the sector to the community;
- represent the views and advocate the needs of our members; and
- provide an avenue through which members and stakeholders are able to collaborate.

With policy expertise spanning industry and research activities, occupational safety and health, education and training, the environment, exploration, indigenous affairs, workforce development, infrastructure, economics and tax, CME provides stakeholders and members with an avenue for undertaking extensive collaboration on all industry matters.

The Western Australian resources sector is diverse and complex covering exploration, processing, downstream value adding and refining of over 50 different types of mineral and energy resources. Besides being the largest private employer in regional and remote Western Australia, the sector is also the largest private sector employer of indigenous Australians.

CME represents companies directly involved in the resources sector (including mining, oil and gas) or those providing services to it. CME's member companies generate 95 percent of all mineral and energy production by value and employ more than 80 percent of the resources sector workforce in the state.

CME's member companies are the foundation of its operation with their valuable contributions helping to build and prioritise the organisation's agenda. Their efforts and expertise enables CME to lead policy development on issues impacting on the resources sector and promote the sector's value to Western Australian and national communities.

3. The Western Australian Resources Sector

The Western Australian and Australian economies have been substantial beneficiaries of the state's resources sector over the last decade. Despite volatile commodity markets, global economic uncertainty and high materials and labour costs over recent times, the state's economy continues to grow and investment in resources sector projects will continue.

CME's study into the economic reach of the resources sector indicates the sector contributed over 40 percent of Western Australia's gross state product in 2011-12, or approximately \$89 billion. Over 90 percent of this value was directly attributable to resources extraction and services, while the remainder was from resources related manufacturing and resources related construction. In the same period, Western Australia contributed 53 percent of the nation's resources sector value added contribution.³

Department of Mines and Petroleum (DMP) figures indicate, in 2011-12, iron ore comprised around 56 percent of the state's resources sector sales value, followed by petroleum products (20 percent), gold (14 percent), and smaller contributions from nickel, alumina, base metals and mineral sands. Across the same period, the resources sector provided approximately \$5.3 billion in state royalties.⁴

Resources sector activity also contributes substantial flow on benefits for the Western Australian and Australian economies. Modelling for CME's economic reach study indicates a 10 percent increase in export demand for resources commodities could increase Australia's annual gross domestic product by \$4.3 billion and Western Australia's annual gross state product by \$3.8 billion (in 2011-12 dollars) in the long run.⁵

The resources sector was also a substantial employer in Western Australia in 2011-12, contributing 11 percent of the state's total employment. While there has been a slight decline in employment levels, recent Australian Bureau of Statistics data indicated the employment trend was steady, with an increase of around 0.02 percent on 2011-12 levels through to May 2013.⁶

Around 44 percent of the state's resources sector employees are based in Perth. The remaining 56 percent are based in the state's regional communities, including 25 percent in the Pilbara, demonstrating the vital importance of the sector to regional employment.

While there have been signs of slowing investment in resources sector projects over the last 12 months, the Bureau of Resources and Energy Economics indicated the value of committed projects in Western Australia at the end of April 2013 was \$141.7 billion, across 28 projects. In addition, an estimated further \$80 billion worth of proposed projects are also in the pipeline, awaiting final investment decision.⁷

³ CME & KPMG, 2013. *Economic Reach of the Western Australian Resources Sector, July 2013*. Perth (for publication in October 2013).

⁴ DMP, *loc. cit.*

⁵ 'Economic long run' defined as the time the sector takes to make structural adjustments to respond to increases in demand, estimated to be 3-10 years.

⁶ Australian Bureau of Statistics (ABS), 2013. *Labour Force, Australia, Detailed, Quarterly, May 2013*. Cat No. 6291.0.55.003. Canberra.

⁷ Bureau of Resources & Energy Economics (BREE), 2013. *Major Projects, April 2013*. Canberra.

3.1 The Western Australian Petroleum Sector

According to DMP, Western Australia contributed around 64 percent of the nation's natural gas production in 2012. Petroleum products, including natural gas, liquefied natural gas (LNG), liquefied petroleum gas (LPG), crude oil and condensate, were worth approximately \$24.4 billion to the state in 2012. Almost half of that value, at around \$11.3 billion, was attributable to LNG production, making it the state's second most valuable industry, behind iron ore.⁸

CME's economic reach study indicates the petroleum sector projects account for a substantial amount of future investment potential for Western Australia, with around 74 percent of the \$141.7 billion worth of committed projects and 33 percent of the estimated \$80 billion worth of proposed projects in the pipeline being petroleum projects.⁹

As with the broader resources sector, the petroleum sector will soon be shifting from the current construction phase into an operational phase, resulting in a reduction in capital intensive investment, but an increase in petroleum output. According to Deloitte Access Economics, the majority of this change is expected to occur around 2017, and in the period to 2025, gross domestic product is forecast to increase by over \$260 billion (in net present value terms at a discount rate of 7 percent). Western Australia is expected to account for over half of these gains in gross domestic product, with an increase of around \$135 billion.¹⁰

3.2 Australian LNG in the Global Context

Australia currently has three operating LNG projects: the North West Shelf Project and Pluto LNG in Western Australia, and Darwin LNG in the Northern Territory. This made Australia the world's third largest LNG producer in 2012, up from fourth in 2011, with 20.8 million tonnes or 8.6 percent of global production, behind only Qatar (32.2 percent) and Malaysia (9.7 percent), as shown in Figure 1.¹¹

Australian LNG sales are forecast to continue to rise dramatically in the coming years, with new developments coming online from 2014 in response to an estimated doubling of demand in Asia between 2010 and 2025. The impact of this growth will be evident in the contribution of LNG to Australia's economy. LNG production accounted for approximately 2.1 percent of the nation's gross domestic product in 2011, and this figure is forecast to grow to around 3.5 percent by 2020.¹² Australia is positioned to become the world's largest LNG producer by this time and could potentially account for a quarter of global LNG production by 2030.¹³

Seven new LNG projects are currently under construction in Australia, which will bring the nation's LNG export capacity to around 85 million tonnes per annum (mtpa) by 2017.¹⁴ Three of the committed projects are in Western Australia: Gorgon and Wheatstone, which will see gas processed onshore in the state's north west, and Prelude, which is expected to be the world's first operational floating LNG production facility.

Woodside Petroleum has recently resolved to recommend the Browse project joint venture participants use floating LNG technology as the development concept. ExxonMobil is currently assessing development concepts for the Scarborough project, with floating LNG technology considered the most viable option.

⁸ DMP, *loc. cit.*

⁹ BREE, *loc. cit.*

¹⁰ Deloitte Access Economics & Australian Petroleum Production & Exploration Association (APPEA), 2012. *Advancing Australia, Harnessing our Comparative Energy Advantage*, June 2012. Canberra.

¹¹ BP, 2013. *Statistical Review of World Energy*, June 2013. London.

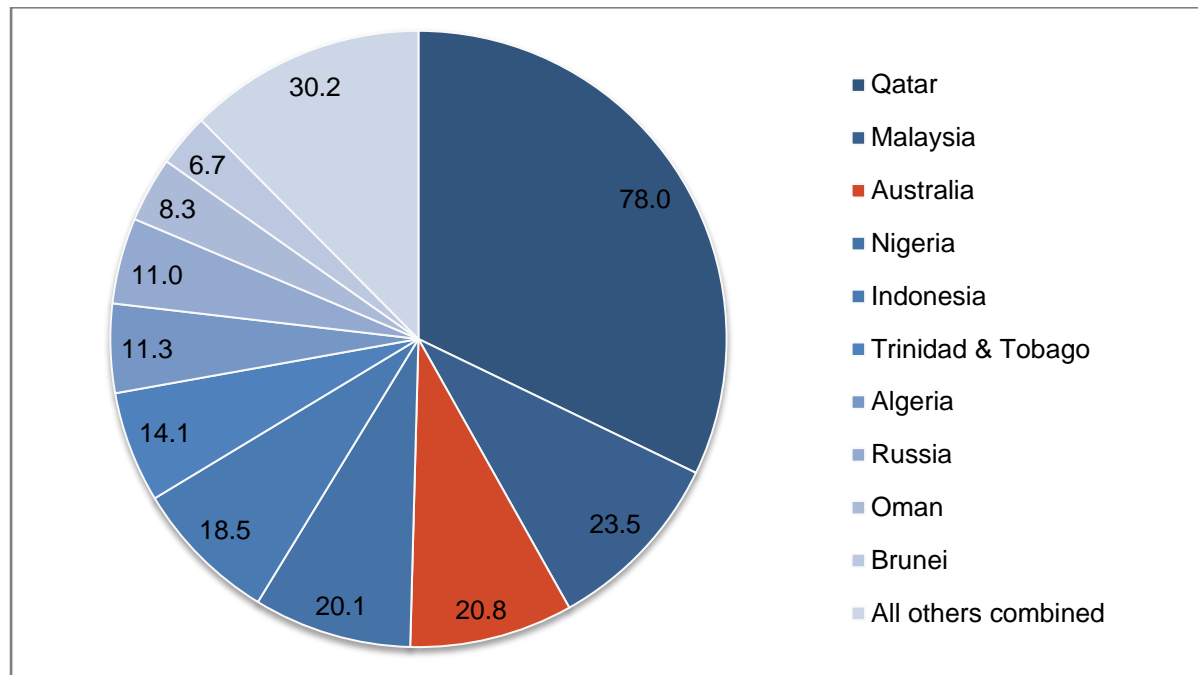
¹² Deloitte Access Economics & APPEA, *loc. cit.*

¹³ BP, 2013. *Energy Outlook 2030*, January 2013. London.

¹⁴ APPEA, 2013. *Oil & Gas Explained: Economic Benefits*. Canberra.

Floating LNG facilities will liquefy gas on board a vessel located offshore, near the gas field, rather than piping gas to shore for onshore processing. Floating LNG also is expected to allow the development of gas fields that may not otherwise be economically competitive. However, floating LNG production is expected to comprise a relatively small proportion of the overall growth, with around three to five trains from Australia's committed and proposed LNG projects potentially employing floating LNG facilities, and around 20 trains from committed and proposed projects using onshore processing.

Figure 1: World LNG production in 2012 (million tonnes)



Source: BP Statistical Review of World Energy, 2013.

These project developments demonstrate substantial opportunities for the Western Australian and Australian economies. However, global competition to supply LNG is increasing.

For example, shale gas developments over the last decade have positioned the United States to become a net exporter of energy. The United States Government is currently considering its energy export policy and has recently granted approval for the conversion of three LNG import terminals into export terminals and more than 20 further applications are awaiting consideration. LNG export facilities are also under development on the west coast of Canada and substantial gas reserves have been discovered in East Africa, offshore from Mozambique and Tanzania.

McKinsey and Company suggests planned and speculative LNG export capacity could potentially be as high as 95 mtpa from the United States, 51 mtpa from Nigeria, 50 mtpa from Russia, 33 mtpa from East Africa and 19 mtpa from Canada.¹⁵

At these volumes, supply would exceed forecast global demand and not all projects would proceed. Unfortunately, Australia has become a high cost LNG producer, making it less likely for Australian projects to be competitive and proceed, particularly in an environment of oversupply.

Further discussion on domestic supply and demand forecasts, including on domestic gas production projects, is provided in Section 5, and further discussion on the growing cost of doing business in Western Australia is provided in Section 6.

¹⁵ McKinsey & Company, *loc. cit.*

4. Government Energy Policy

4.1 Commonwealth Government

4.1.1 Energy White Paper

In November 2012, the Commonwealth Government released its *Energy White Paper*, which outlines the government's objectives for developing Australia's energy future. The white paper identifies the cornerstone aim of delivering Australia's energy needs through competitive and well regulated markets, operating in the long term interests of consumers and the nation.

The white paper also outlines a vision for Australia's energy future, comprising:

- developing a national approach to energy markets;
- Australia becoming the number one investment destination for resources development;
- developing Australia's natural gas reserves to become one of the world's largest LNG exporters, while effectively servicing the domestic market; and
- an Australia that transitions to cleaner forms of energy over time in a way that does not impede economic competitiveness.

The white paper reiterates the government's commitment to open and transparent market mechanisms, competitive pricing, efficient resource allocation and innovation. It is critical of using interventions to force non-commercial supply outcomes in energy markets, suggesting interventions are more likely to constrain than increase the incentive for exploration and developing new supplies. The government therefore states interventions should only be used in situations where market failure can be demonstrated. In the case of Australia's domestic gas markets, the government considers there is no clear evidence of market failure or that domestic markets will be unable to deliver the required supply without interventions.

The white paper highlights the convergence in domestic and export prices as an important factor in bringing about the substantial capital investments required to develop Australia's LNG projects, and the resultant economic benefits for the nation. However, the white paper also acknowledges this transformation is placing cost pressures on domestic markets, where long term, competitively priced, secure energy supplies are critical, particularly for industrial users.

For Western Australia, the white paper suggests consumers will benefit from further developing the gas market by increasing market liquidity, improving transparency and trading mechanisms, increasing customer numbers, adding injection points and storage facilities, and removing impediments to the development of new, onshore gas reserves.

The government tasked the Council of Australian Governments' Standing Council on Energy and Resources (SCER) with leading the energy policy reforms outlined in the white paper. In December 2012, SCER ministers agreed to the Australian Gas Market Development Plan. The key initiatives under this plan are developing an upstream gas trading exchange, improving the reporting of onshore gas production data, and drafting frameworks for multiple land use and the harmonisation of coal seam gas regulations.

The Australian Energy Market Operator is leading the development of the gas trading exchange, which will build on the existing gas market bulletin board to also include a short term trading market. The gas trading exchange is expected to improve transparency in trading, strengthen participants' ability to allocate price and gas in the short term, and support efficient gas trade. These benefits have been apparent from spot gas exchanges that have been developed in Europe and North America. The trading exchange is expected to be operational in early 2014.

4.1.2 Domestic Gas Market Study

In May 2013, the Minister for Resources and Energy announced the government would undertake a domestic gas market study to provide better transparency on gas demand and supply. The government highlights the potential for a period of tight supply in the eastern states gas market after LNG projects in Queensland come on line. The study therefore aims to investigate market activity and trends for the period from 2013 to 2023, with a particular emphasis on 2015 to 2020, the forecast tight supply period.

The study also aims to identify potential constraints on domestic supply availability, such as pipeline constraints or regulatory barriers and the implications of competition with international gas supply and demand. While the study will be eastern states focused, it will also consider the Western Australian market and may provide context for future policy development in the state. The study is expected to be completed by the end of 2013.

4.2 Western Australian Government

4.2.1 Strategic Energy Initiative

In August 2012, the Western Australian Government released its vision for the state's energy sector through to 2031, the *Strategic Energy Initiative* (SEI). The SEI outlines the government's strategies to deliver the goals of affordable, secure, reliable and cleaner energy supplies for the state.

The SEI also sets out five pathways to address the challenges faced by the energy industry:

- diverse and secure energy supply;
- proactive energy planning;
- effective and efficient energy delivery;
- informed and responsible energy use; and
- capacity building.

Natural gas can play an important role in addressing these challenges and delivering on the government's energy policy goals.

The SEI promotes markets with efficient regulatory frameworks as the preferred mechanism for the supply of energy, stating the government will only intervene in energy markets to the extent necessary to ensure public safety or to address social and environmental concerns.

The SEI identifies uncertainty over the ability of forecast gas supply to meet future demand, posing particular risks for domestic industrial and mineral processing users. As a result, the SEI reaffirms the government's commitment to a policy requiring LNG producers to make available from state based LNG projects the equivalent of 15 percent of production for domestic use, and developing the necessary infrastructure to provide this gas to the domestic market.

The SEI reiterates a flexible approach to the domestic gas reservation policy, whereby LNG producers can meet their domestic gas commitment by providing gas from another of their LNG projects, or by providing the equivalent energy from an alternate source. It also allows the government to assess a producer's domestic gas commitment by considering a project's commercial viability on a case by case basis. The government has committed to reviewing the policy in 2014-15.

4.2.2 Domestic Gas Reservation Policy

Western Australia is the only Australian jurisdiction with an active domestic gas reservation policy and substantial debate exists between proponents and opponents of the policy.

The government's domestic gas reservation position began in the 1980s with the *North West Gas Development (Woodside) Agreement Act 1979*, the state agreement for the development of the North West Shelf Project, containing provisions to secure a share of the gas reserves for domestic use.

At the time of the agreement, the government and project proponents negotiated risk and reward sharing from developing the domestic gas processing facilities. This included agreeing to terms for the exploration, development and production of domestic gas, the development of pipeline infrastructure and the domestic gas supply contract for the government energy utility at the time. The agreement established the basis for consideration of the case by case implementation of the reservation policy, with issues such as land access considered in negotiations over subsequent state agreements, which enforce the domestic gas reservation policy.

Proponents of the policy suggest the state's gas market is dominated by LNG exports, with relatively few domestic suppliers and limited competition due to joint marketing arrangements. These conditions make it challenging for the market to operate efficiently and fail to deliver users competitive domestic gas prices. Proponents also contest the reservation policy allows users, particularly large industrial users, to more easily make long term investment decisions with the knowledge one of the key inputs to the business will be available for the life of the investment. The Australian Competition and Consumer Commission is scheduled to review the authorised joint marketing arrangements in 2014.

Opponents of the policy suggest the new domestic market entrants are evidence of the market efficiently responding to price signals as domestic consumers approach the end of existing contracts. These price signals also provide the incentive for the exploration and development of new fields, including the state's shale and tight gas reserves. Opponents propose the government use other policy mechanisms to improve market efficiency and consequently deliver competitively priced energy to the domestic market.

Floating LNG facilities are a potential concern to proponents of the reservation policy as gas from fields in Commonwealth Government waters does not have to be brought ashore for liquefaction, unlike for onshore production facilities in Western Australia. Therefore, these reserves are not subject to the domestic reservation obligation. Without floating LNG as an option, proponents consider gas reserves would be processed onshore and contribute to domestic supplies, and that floating LNG facilities are being developed to increase project rates of return compared to onshore processing.

Conversely, opponents suggest the fields likely to be targeted for production with floating LNG facilities are unlikely to have commercially viable opportunities for domestic gas production and these reserves would therefore not contribute supplies to the domestic gas market in any event.

4.2.3 Gas Information Services Project

In August 2012, the government launched the Gas Information Services Project to improve transparency in the domestic gas market. The Independent Market Operator (IMO) administers the project, which includes a gas bulletin board and gas statement of opportunities. The bulletin board publishes short term gas supply, demand, transmission and storage information on a website. It also provides an emergency management function to assist in the management of supply disruptions. The IMO indicated the bulletin board has the functionality to allow it to act as a trading platform in the future, which could provide additional market liquidity.

The gas statement of opportunities is a planning document providing assessments of medium and long term gas supply and demand, and transmission and storage capacity in the state. The first gas statement of opportunities was released in July 2013 and provides forecasts for the period to 2022. The second publication is proposed to be released in December 2013 to allow the IMO to improve the accuracy of its forecasts by using data collected in the first five months of bulletin board operation. After this time, the gas statement of opportunities will be released annually.

4.3 Floating LNG in the Energy Policy Context

Divergent perspectives regarding the extent of, and mechanisms by which, intervention in domestic gas markets occurs can add substantial uncertainty and risk to project development. This uncertainty and risk is particularly challenging in an environment of high costs and increasing competition in Australia and around the world.

Some commonalities between State and Commonwealth Government policy positions are apparent. Both the State and Commonwealth Government are undertaking initiatives to foster greater transparency and liquidity in domestic gas markets and CME is broadly supportive of efforts to further develop the state's gas market.

While CME remains concerned about the current cost recovery model of the bulletin board, an independent review after its first 12 months of operation would assist in determining whether or not the proposed benefit of improved market transparency has been realised.

CME considers evidence from the first 12 months of the Gas Information Services Project and a subsequent independent review of the gas bulletin board should be considered prior to any proposed policy changes regarding the domestic gas market.

5. Natural Gas Forecasts

5.1 Demand

CME's *State Growth Outlook 2013* is the third iteration of a biennial report into expected growth in the resources sector. It identifies implications for the state's international competitiveness, investment, planning and liveability through to 2023, by assessing demand for key economic enablers: energy, people, water, roads, rail, ports and airports. Demand forecasts for these enablers are modelled from data provided by CME members and also include consideration of government policy settings.¹⁶

Analysis into energy requirements found electricity consumption in Western Australia is forecast to increase approximately 52 percent on 2012 levels by 2018, driven primarily by resources sector projects, for which demand is projected to increase by the equivalent of 2.7 gigawatts of generation capacity.

The majority of this demand growth is forecast to occur in the Pilbara (70 percent) and Mid West (15 percent) regions, and new generation capacity to power these projects is forecast to be met through self-generation (95 percent) and fuelled by natural gas (94 percent).

The State Growth Outlook forecasts an increase in domestic gas demand of around 63 percent on 2012 levels by 2023, from an estimated 430 petajoules in 2012 to 700 petajoules in 2023. Resources sector demand for gas is forecast to increase around 47 percent on current estimated consumption over this period, predominantly to fuel electricity generation for projects in the Pilbara.

5.2 Supply

Security in domestic gas supply is important as a key input for many of the state's production processes. The state is moving to seven domestic gas processing facilities. In addition to the operational North West Shelf, Varanus Island and Devil Creek projects, and the recently commissioned Red Gully project, the state will soon also see supply from the Macedon, Gorgon and Wheatstone projects. The capacity from these new developments will be important for meeting the state's forecast domestic gas demand.

There have been concerns domestic gas supply may not meet demand in the near term. In 2011, DMP forecasts suggested domestic supply could be tight from 2014 in its worst case scenario 'low supply' case, compared to the State Growth Outlook demand forecast. Gas supply is sufficient to meet demand in the DMP 'high supply' case.¹⁷ CME will be releasing the next iteration of the State Growth Outlook, which will provide updated forecasts, in 2014.

More recently, the IMO's first gas statement of opportunities forecasts the state's domestic gas supply will annually grow by 3.7 percent and demand by 1.1 percent to 2022, suggesting domestic gas supplies will be adequate to meet demand. The report also forecasts the state's proved gas reserves will be sufficient to meet total gas demand, including demand for LNG production, through to 2022 and into the foreseeable future beyond that time.¹⁸ As with all forecasting, some caution should be exercised, with the IMO forecasts dependent on projected domestic gas prices to 2022. The future domestic gas supply from all projects will ultimately be dependent on commercial negotiations.

¹⁶ CME & PwC, 2012. *WA State Growth Outlook 2013*. Perth.

¹⁷ DMP, 2011. 'Western Australia's potential domestic gas demand and supply outlook', *Petroleum WA, April 2011*. Perth.

¹⁸ IMO & National Institute of Economic and Industry Research, 2013. *Gas Statement of Opportunities, July 2013*. Perth.

The DMP and IMO gas supply forecasts do not include significant supply contributions from shale and tight gas. DMP's high supply forecast includes limited shale and tight gas supply and the IMO's high supply forecast excludes shale and tight gas completely due to the uncertainty over the timing of its development. The shale and tight gas industry in Western Australia will require long lead times and significant capital investment.

However, shale and tight gas reserves could provide substantial additional supplies to meet future demand, and further diversify and secure the state's energy future. Shale and tight gas also has the potential to create jobs and open up new commercial opportunities, driving economic growth.

The United States Energy Information Administration ranked Australia seventh in the world in its updated assessment of estimated shale gas reserves. Its research estimates Western Australia has around 7.5 billion cubic metres¹⁹ (Bcm) of shale gas reserves across the Canning Basin (approximately 6.6 Bcm) and Perth Basin (approximately 0.9 Bcm), which is almost double the volume of the state's offshore gas reserves.²⁰

While the report focuses on technically recoverable shale gas resources, which are unlikely to be economically recoverable in their entirety, the estimates demonstrate the significant potential for shale gas development in Western Australia.

The onshore location of the state's key shale and tight gas reserves will mean proponents are well placed to serve the domestic gas market. The Canning Basin contains substantial gas reserves close to resources project loads in the Pilbara and Kimberley and the Perth basin is in close proximity to industrial users in the state's south west and generation assets in the South West Interconnected System.

For example, the *Natural Gas (Canning Basin Joint Venture) Agreement Act 2013*, the state agreement for the development of the joint venture project between Buru Energy and Mitsubishi Corporation, requires at least 15 percent of gas produced be provided to the domestic market in accordance with the state's reservation policy.

There has recently been public debate and concern in some communities about the methods of extracting shale and tight gas reserves, particularly through hydraulic fracturing. While this concern has been most apparent in the eastern states for activities relating to coal seam gas extraction, rather than shale and tight gas extraction, CME notes the Legislative Council Environment and Public Affairs Committee recently resolved to undertake an inquiry into the implications for Western Australia of hydraulic fracturing. CME supports approaches to inform the public and provide information on hydraulic fracturing processes required for developing the shale and tight gas industry in Western Australia, and plans to provide a submission to the inquiry in due course.

CME considers rigorous and transparent approvals and management of the shale and tight gas industry will safeguard the community and environment, secure new natural gas supplies to meet demand, and create jobs and business opportunities.

¹⁹ 267 trillion cubic feet with conversion factor of 1 billion cubic foot = 0.028 billion cubic metres.

²⁰ Energy Information Administration, 2013. *Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States, June 2013*. Washington.

6. Costs of Doing Business

6.1 Drivers of Increasing Costs

The historically strong competitiveness of existing resources operations and proposed projects in Western Australia, and Australia more broadly, is being challenged by increasing costs impacting the sector. The increases can be attributed to a number of imposed costs and external factors.

CME research into the escalating costs of doing business in the resources sector, which investigated cost drivers in iron ore, gold and LNG projects, identified the following as imposed costs significantly impacting on resources sector projects:

- delays and failures in long approvals processes, ongoing compliance requirements, and increasing levels of duplication in approvals processes across the different levels of government (or 'red tape');
- the move towards cost recovery for government provided services; and
- changes to the taxation regime including the minerals and petroleum resource rent taxes, the carbon pricing mechanism and royalty payments.

Other cost drivers identified in CME's research include:

- challenges in attracting and retaining specific expertise and labour, and managing business systems;
- greater distances to infrastructure, given the remote locations of projects;
- higher fuel, transport, logistics and materials costs;
- the historically high terms of trade and the impact of the high Australian dollar; and
- increasing pressure on social and community infrastructure to support the growing resources sector workforce in both Perth and regional population centres.

The resources sector is heavily reliant on foreign investment and issues such as rising costs and regulation can significantly affect potential rates of return and therefore impacting business confidence. International investment and confidence in our policy settings and laws are critical if our resources sector is to continue to grow. Constant changes to resources regulation and policy undermine this confidence and will send a clear, negative signal to foreign investment.

Western Australia's ability to continue to attract new foreign investment will be increasingly challenged when considered against investment options in emerging, resource-rich jurisdictions around the world.

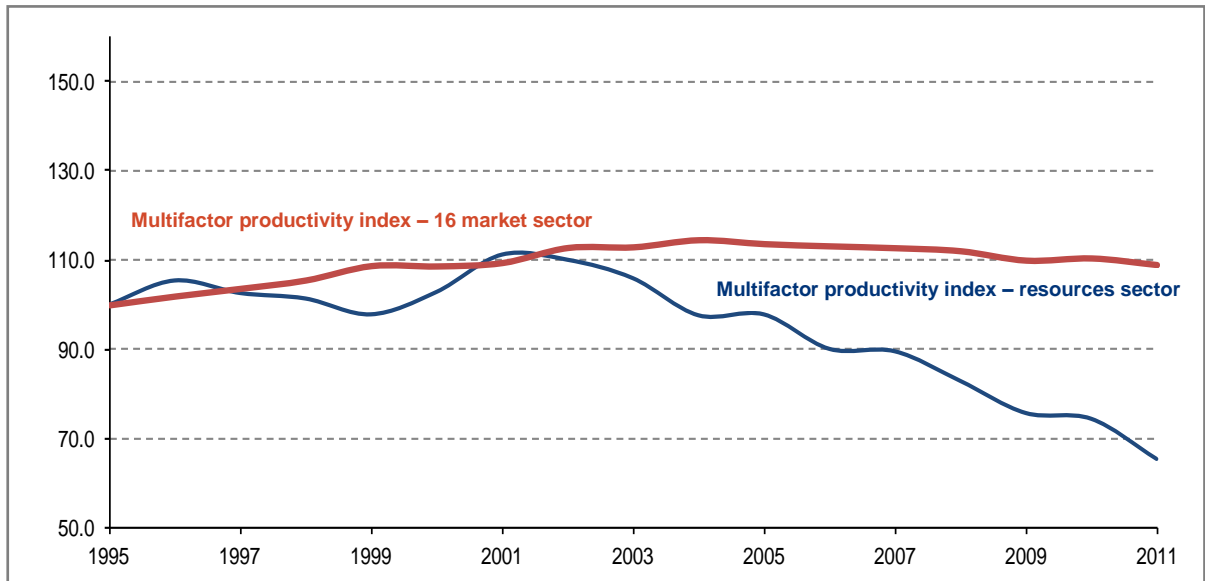
Decreasing costs and improving productivity have therefore emerged as critical challenges to ensure the state's resources sector can continue to compete against its global rivals.

6.2 Productivity Challenges

Addressing the causes of declining productivity, particularly labour productivity, is crucial to ensuring the state's resources sector continues to be attractive to international investment.

Multifactor productivity (MFP) is a comprehensive assessment of productivity measuring the amount of output for a given amount of labour and capital input. In the resources sector, MFP has fallen by an average annual rate of five percent since 2001. Over the same period, MFP across all sectors has remained relatively stable, as shown in Figure 2.

Figure 2: Comparison of multifactor productivity indices



Source: CME cost of doing business research.

The Productivity Commission confirmed MFP in the resources sector contracted by 40 percent in the eight years since 2003-04.²¹ This equates to businesses using 67 percent more inputs to produce each individual unit of output in 2011-12 than eight years ago.

It is worth noting the background and context of the sector when commenting on productivity. The large capital investments currently being made in the Australian resources sector will inevitably create a lag before the benefits of the expansion are realised. However, decreasing productivity of this magnitude is concerning, particularly as the sector will be producing more outputs relative to inputs as projects transition from construction to operational phases.

High commodity prices and rapid output growth over the past decade has contributed to the sector's productivity challenges though:

- large capital investments being made ahead of time as new capacity is constructed, leading to a lag before the benefits of the expansion are realised;
- rapid employment growth placing a strain on the skills of the workforce, with new workers entering the industry with lower experience and training, and therefore reducing average labour productivity; and
- specific to mining, higher prices lead to more marginal mines being pursued, which have higher strip ratios and lower ore grades, requiring more labour hours per tonne of output.

The productivity of the state's resources sector is central to continuing to attract international capital. The Business Council of Australia recently found the workforce in Australia, compared with the United States Gulf Coast, was generally 35 percent less productive for resources sector projects in major cities and 60 percent less productive for projects in remote locations.²² This will remain a key challenge for the Western Australian resources sector and will continue to damage the sector's international reputation relating to costs and project management.

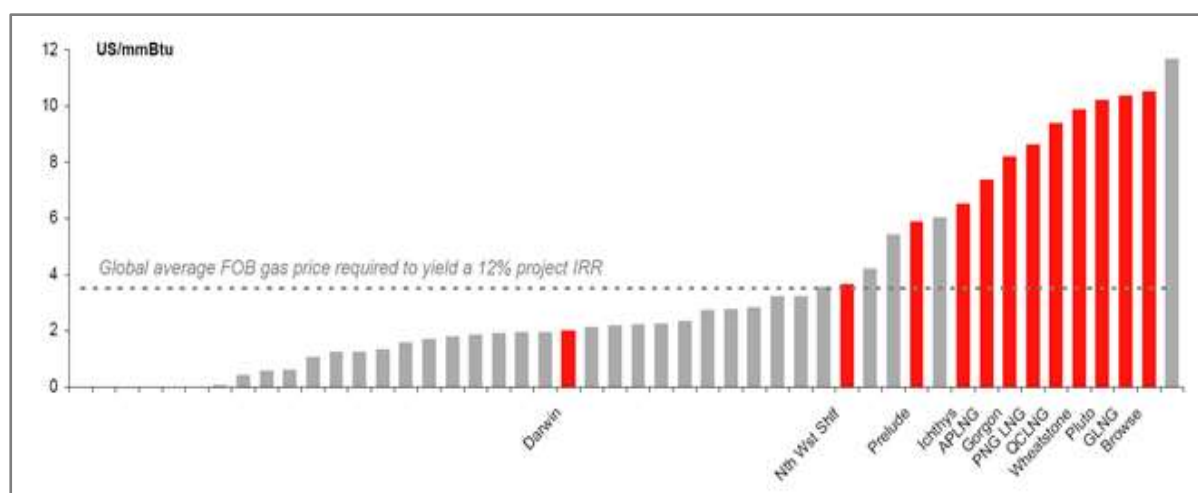
²¹ Productivity Commission, 2013. *Productivity Update, May 2013*. Melbourne.

²² Business Council of Australia, 2012. *Pipeline or Pipe Dream: Securing Australia's Investment Future, June 2012*. Melbourne.

6.3 Implications for the LNG Sector

In line with the trends across the broader resources sector, LNG projects are also becoming significantly less competitive in Western Australia, with the costs of building and operating LNG facilities continuing to increase above our competitors. Several of Western Australia's LNG project developments have been estimated to be among the most costly to deliver the required rates of return on capital invested.²³ These include the committed Gorgon, Wheatstone, and Pluto projects and the previously proposed Browse project (using onshore processing), as shown in Figure 3.

Figure 3: Estimated gas price to yield required rate of return across comparison projects²⁴



Source: Macquarie Equities Research & Wood Mackenzie, 2011.

McKinsey and Company's recent report into the productivity and competitiveness of the LNG sector found projects in Australia were now around 20 to 30 percent more expensive than competitors in emerging regions such as North America and East Africa.²⁵

The report considers the breakeven price for LNG landed in Japan²⁶ for future Australian LNG projects (using both traditional offshore LNG production and onshore coal seam gas to LNG production cases) compared to a generic future Canadian project (onshore coal seam gas to LNG) and Mozambican project (traditional offshore LNG). The report identifies the project cost drivers within and beyond the control of governments and project proponents to highlight where efforts should be focused to ensure Australian projects remain competitive.

When comparing the Australian and Canadian projects, the key uncontrollable cost drivers (termed 'incompressible') were reservoir characteristics (accounting for around 24 to 36 percent of the overall cost difference); inflation rates (12 percent); plant efficiency, as Australian turbines are generally less efficient due to higher temperatures (8 percent); and shipping distance (-4 percent²⁷).

²³ APPEA, Wood Mackenzie & Macquarie Equity Research (2012). *Submission to the Business Tax Working Group, Discussion Paper, September 2012*. Canberra.

²⁴ 'FOB' (free on board) refers to gas price net of shipping costs, which are payable by the buyer.

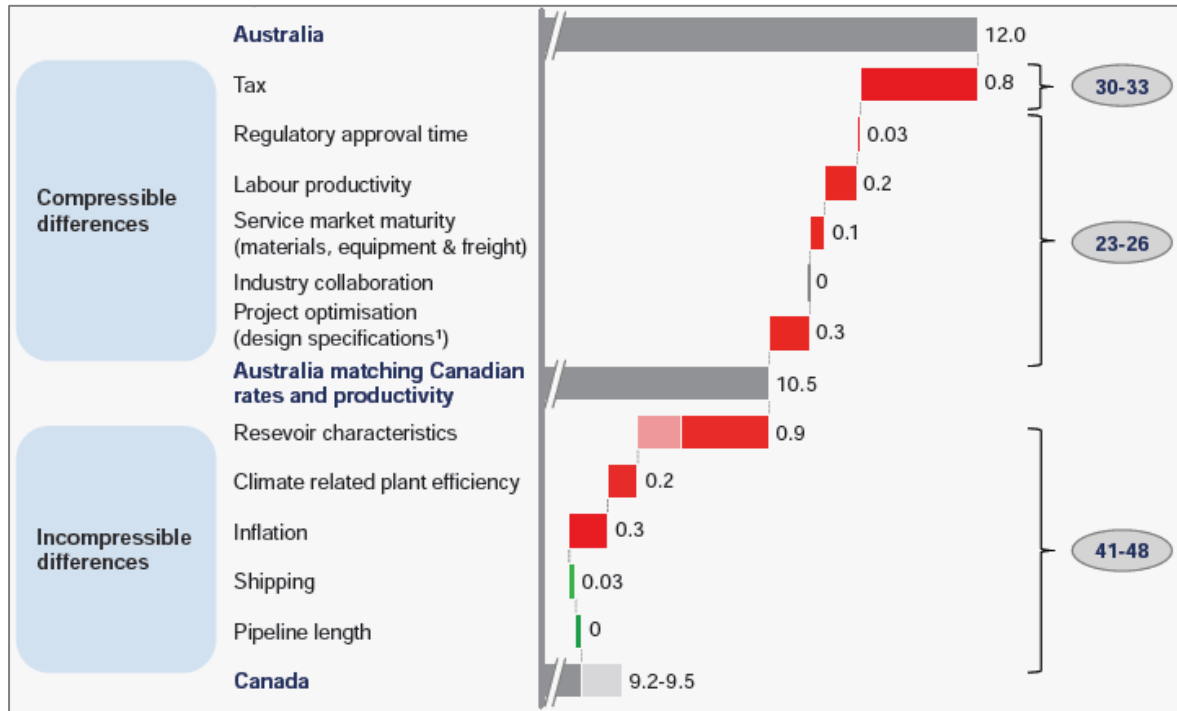
²⁵ McKinsey & Company, *loc. cit.*

²⁶ Gas price in Japan, in 2012 US dollars, per million British thermal units, required to deliver a rate of return of 8%; estimated to be US\$12.00 for Australian versus US\$9.20-9.50 for Canadian projects.

²⁷ Australian projects have an advantage in shipping due to their comparative proximity to Asian demand.

The key cost drivers within the control of governments and proponents (termed 'compressible') were the tax regime and royalty payments (32 percent); project management practices (12 percent); labour productivity (8 percent); supply chains, logistics and infrastructure (4 percent); and regulatory approvals efficiency and delays (1.2 percent). A breakdown of all cost drivers is shown in Figure 4.

Figure 4: Comparison of project cost drivers between the Australian and Canadian project²⁸



Source: McKinsey and Company, 2013.

The overall cost difference, including controllable and uncontrollable cost drivers, was similar in the comparison between the Australian and the Mozambican projects. The report also notes United States LNG projects are likely to be substantially less costly again due to higher labour productivity and the potential for brownfield developments of former LNG import terminals.

Even if all the controllable factors were eliminated, the report highlights Australian projects would still be at least 10 to 15 percent more expensive than a Canadian project, and 18 percent more expensive than a Mozambican project, due to the uncontrollable cost drivers.

In addition to addressing the controllable cost drivers, it is also important to improve productivity to offset Australia's inherent disadvantage from the uncontrollable cost drivers.

CME considers it critical for a renewed, cooperative focus between governments and industry to arrest growing costs and declining productivity.

²⁸ Breakeven cost for LNG landed in Japan (US\$/mmBtu), with percentage of total difference to the right.

Floating LNG facilities provide project proponents another development option, which has the potential, in certain circumstances, to address these growing costs in Western Australia. This option may be especially useful in the case of remote or difficult to access gas fields, which may not be viable to develop with onshore processing facilities. McKinsey and Company's report estimates floating LNG facilities could be around 10 to 12 percent cheaper than the Australian base case projects assessed. Delivering lower capital costs is important for ensuring Western Australia remains globally competitive, given the forecast excess LNG supply discussed in Section 3.2.

However, it is important to note floating LNG facilities are capital intensive in their own right and will also have higher operating costs than onshore processing. Therefore, the option a proponent chooses to employ for a project will need to be considered on a case by case basis, with consideration also given to gas reserve size and quality.

Improvements in infrastructure will also help to address the productivity challenge and investment in economic infrastructure such as airports, roads, rail and ports, and supporting social infrastructure. CME recognises the state bears substantial upfront costs to provide this infrastructure for LNG projects and supports the state negotiating with the Commonwealth Government for upfront receipt of royalty revenues in recognition of this cost.

CME also acknowledges the state's overall infrastructure requirements will exceed the ability of the government to fund the required infrastructure and therefore a coordinated, proactive and long term approach is required.

For several years CME has called on the State Government to develop an infrastructure plan to ensure efficient frameworks are in place to encourage infrastructure investment. CME is currently undertaking a project to identify potential infrastructure investment models for use with governments, financiers and industry. The project aims to facilitate greater consideration of the public and private sectors delivering infrastructure requirements in partnership. The report will be released in September 2013.

Common use infrastructure, for example, could be delivered in partnership by the public and private sectors through innovative financing models. In the LNG sector, common use infrastructure to improve productivity could include transport infrastructure, and local service markets and supply bases in the state's north west.

CME considers a transparent process should be established for planning and prioritisation of infrastructure, including common use infrastructure, with funding committed by the State and Commonwealth Government and industry.

7. Local Industry Participation

7.1 Local Content Policy

There continues to be a high level of local content in the resources sector and the development of high quality, competitive local industries is vitally important. Local industries have capitalised on many construction opportunities. As the majority of the sector now moves from a construction to an operational phase, local industry participation opportunities in operations and maintenance spending will also be more apparent. Experience from projects already in the operational phase has shown a strong record of substantial and long lived opportunities, providing stable and sustainable local industry participation rather than construction phase peaks, which can strain infrastructure. Operational phase local content is often also in areas where local suppliers have comparative advantage.

Resources sector companies have made considerable efforts to promote local participation and the state has established numerous successful state agreements to encourage local content in resources projects.

CME considers the measures in place to support local content are functioning effectively, as reflected in the Department of Commerce's most recent report into local content.²⁹ The report estimates over 108,000 local jobs have been created and \$43 billion in resources sector supply contracts have been awarded since July 2011. This equates to an average of 77 percent local content on resources sector projects.

However, there are several key factors that influence how contracts are awarded and local firms can be uncompetitive at a range of levels. Proponents consistently list scale, schedule and price as key differentiators between local and international suppliers.

To foster greater levels of local industry participation, policy development should focus on identifying ways to assist local industries to address these key differentiators and capitalise on emerging opportunities to compete globally. Mandating local content levels, or using other protectionist policies, will further burden resources companies with greater complexities and higher costs in project development, and will ultimately lead to less competitive local industries.

While CME is supportive of initiatives to foster local content, aligning initiatives between the State and Commonwealth Government is also critical for reducing duplication. For example, much of the recently passed *Australian Jobs Act 2013* duplicates initiatives and obligations already adopted by the State Government and will add considerable costs, and little or no local content benefits, for project development.

Local content policy development should therefore focus on:

- supporting collaboration between the government, opposition and resources sector, regarding opportunities, competitiveness and outcomes;
- guiding government investment in common user infrastructure and highlighting the critical role infrastructure plays in sustaining and developing the ability of Australian industries to support the resources sector in construction and operational phases;
- getting into higher value areas in supply chains by building research and development capacity; and
- aligning State and Commonwealth Government initiatives.

CME does not consider it necessary to implement policies imposing greater local content requirements because these increase regulatory complexity and costs for proponents. The focus should instead be on supporting local industry competitiveness and better coordination of initiatives across the State and Commonwealth Government.

²⁹ Department of Commerce, 2013. *Local Content Report, May 2013*. Perth.

CME is developing a compliance and engagement guide for project proponents, suppliers and contractors with the aim of assisting all parties involved in the procurement process as they navigate the new *Australian Jobs Act 2013*. To remove some apprehension and uncertainty, the guide will clearly explain the requirements under the legislation by providing timetables, definitions, thresholds, trigger dates, exemptions, and industry participation plan templates and examples. It will also include lodgement information accompanied by a list of government contacts and support available for refused plans and injunction avoidance. The guide will be released later in 2013.

7.2 Local Content in the LNG Sector

Opportunities for local industry participation in the state's LNG sector are fundamentally different to mining projects due to their complexity. Western Australia is an isolated market with significant procurement challenges. Without scale to create a sizeable market for LNG project construction, much of the equipment must be imported. There are a limited number of companies around the world able to compete in the market for some of the components required for LNG projects. As with the broader resources sector, scale, schedule and price are cited as key differentiators.

The impacts of global supply chains are therefore widely evident in the LNG sector, with project components built around the globe, particularly in Asia, and assembled in Western Australia. These specialised and globalised supply chains are important for making projects economically viable and floating LNG facilities are unlikely to be different in that regard.

Despite the challenges, local content has been strong in the LNG sector and substantial opportunities for local content exist, particularly in the operational phase of projects. CME and Australian Petroleum Production and Exploration Association (APPEA) research indicates around 56 percent of expenditure in the construction phase of LNG projects is on local content.³⁰ This figure rises to around 83 percent local content for the operational phase of projects.³¹

It is therefore important to consider the local content contribution of LNG projects over the entire project life rather than focusing solely on the construction phase. The operational phase for LNG projects, including for floating LNG projects, can be 30 to 50 years in duration and the ongoing local content contributions and royalty stream over this long project life will be substantial. The projects will also create professional employment opportunities, including for operations and maintenance, and research and development staff. Many multinational energy companies have invested in establishing head offices in Perth to support these ongoing workforce requirements.

7.3 Barriers and Opportunities for Local Content

The Department of Commerce commissioned a report to investigate the barriers and opportunities for local content in designing and engineering projects in Western Australia's petroleum sector, with a particular focus on LNG.³² While the report identified local industry participation potential at the concept design and front end engineering and design (FEED) phases, these phases typically account for only two to three percent of the total project spend and require around 200 to 300 jobs. Opportunities in the subsequent detailed design phase were found to be significantly more limited.

³⁰ CME & APPEA, 2011. *Local Content Report, June 2011*. Perth.

³¹ There has been substantially higher local content data reporting since this report was completed in 2011 so CME expects this percentage amount would be higher if evaluating projects today.

³² West, M. & Department of Commerce, 2011. *Assessment of the Engineering Design Capability and Capacity in the Oil and Gas Sector in Western Australia, September 2011*. Perth.

The report highlighted several key barriers to further developing Western Australia's design and development capacity, including:

- the state lacking the scale to develop detailed design centres;
- time and cost overruns in some recent LNG projects contributing to negative perceptions about the state's capabilities;
- the tax regime being considered comparatively high against other nations;
- difficulties in recruiting appropriately skilled engineers;
- the trend for detailed design to be increasingly undertaken in specialised, low cost centres; and
- project proponents using engineering, procurement and contracting management companies with which they have well established, trusted relationships.

The report therefore suggests any focus on local content in design and engineering should be in the pre-FEED or FEED phases of project development. While the proportion of project spending is comparatively small, substantial flow on effects can be apparent.

Some opportunities for local participation are also apparent in the subsequent fabrication phase of project development. However, local fabricators and manufacturers face similar challenges such as the emergence of competition and excess capacity in Asian fabrication centres, the increasingly modular development of LNG components, and high costs to transport components from the primary industrial areas in the state's south west to remote project locations in the north.

To remain competitive and capitalise on opportunities despite these challenges, feedback from local companies has suggested fabricators and manufacturers should:

- further develop relationships with companies in global (particularly Asian) supply chains;
- focus on core competencies and collaborating with other companies to improve scale;
- foster project delivery excellence to improve productivity;
- work with governments to promote Western Australian capabilities abroad; and
- develop complementary services such as ongoing maintenance provision.

CME's LNG production members have indicated in the operational phase of LNG projects the vast majority of operations and maintenance staff are locally based and are also expected to be locally based for floating LNG projects. This presents a substantial opportunity for local industry participation, particularly through the development of supply bases from which to service both traditional and floating LNG projects.

The competitive advantage for supply bases would allow project operators to more quickly respond to the need for maintenance or components (rather than transporting them from the state's south west or Asia), reduce component transport time and cost, and result in less downtime for unscheduled maintenance.

CME is a member of a steering committee overseeing a study, commissioned by the Department of Commerce for the Technology and Industry Advisory Council, investigating the barriers for small to medium sized enterprises in the supply chain for resources sector projects. The study will also recommend ways to increase involvement by small to medium sized enterprises, with a particular focus on the role of technology and innovation for attaining greater involvement. While the final report is not available at the time of writing, it is expected to be published in the near future and could provide insight for the inquiry regarding the opportunities for increased local industry participation.

7.4 Innovation in Western Australian LNG

Innovating to stay at the forefront of technological change is extremely important in the LNG sector. Western Australia's substantial natural gas reserves position the state to be at the forefront of this innovation in LNG project development and operations. The report to the Department of Commerce recommended the government considers the development, as a matter of priority, of a floating LNG global centre of excellence in Western Australia to capitalise on this opportunity for innovation.³³

Petroleum centres of excellence have been used to stimulate and coordinate petroleum research, development and production in places such as Norway and the United Kingdom. For example, in Norway, the government has provided proponents with research and development tax incentives and an award points scheme to reward transferral of knowledge and capacity to local Norwegian companies. The award points are considered in future applications for exploration permits.³⁴

In Western Australia, Woodside Petroleum is leading an application for seed funding under the Commonwealth Government's *Industry Innovation Precincts* initiative to support the proposed Oil and Gas Industry Innovation Partnership. The partnership will be a cooperative network aimed at making the local supply chain more competitive through targeted research and development, creating opportunities through information sharing, leveraging greater investment and creating scale in local industries.

The partnership will initially focus on collaboration in several key areas:

- developing design, operations and maintenance capacity for emerging technologies, such as floating LNG, and emerging resources, such as shale gas;
- improving supply chain productivity through streamlining in construction processes;
- standardising and cooperating in safety practices, business systems and contracting, and investigating shared infrastructure opportunities;
- leveraging local supercomputing capacity to improve geoscience data processing;
- developing automation technology and capacity in remote facility operations;
- developing local skills and capacity in subsea production technologies; and
- continuing to research and understand the social impacts of the petroleum sector.

The partnership will be based in Perth with supporting nodes in other Australian cities.

If re-elected, the federal Labor party has indicated it will support the funding application for the partnership. It will also provide funding to establish the National Floating Systems Research Centre, which will be led by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Institute of Marine Research.

These research and development opportunities are expected to provide substantial opportunities for local industry participation and will have flow on effects to other sectors, such as the state's education sector. For example, Woodside Petroleum received expressions of support from over 250 small to medium sized businesses and research organisations and 35 key partners for its funding application.

CME considers government and industry collaborative support for research and development in the LNG sector, through initiatives such as centres of excellence, will assist local industry participation and build capacity in the research sector.

³³ West, M. *loc. cit.*

³⁴ McKinsey & Company, *loc. cit.*

8. Environment and Safety

Efficient and effective environmental approvals processes are vital to the continued international competitiveness of the resources sector in Western Australia.

The most significant ways of maintaining an efficient process are to:

- minimise duplication between State and Commonwealth Government environmental assessment and approvals processes in the resources sector, including for shale and tight gas projects; and
- streamline the handling of approvals processes between different Commonwealth Government agencies for offshore petroleum projects.

APPEA research into environmental approvals processes found significant inconsistency between key Commonwealth Acts and duplicative environmental approval requirements between several different Commonwealth Government agencies.³⁵

These inconsistencies and inefficiencies add significant uncertainty around approvals processes. They can also have a substantial impact upon project economics through project delays, production delays and ongoing compliance costs.

Floating LNG facilities will have a substantially smaller footprint than traditional onshore processing, as they will not require the construction of an onshore processing plant nor gas pipelines to shore.

As with any new technological development, concern in some stakeholder groups is to be expected for floating LNG facilities. Concerns have been cited over perceived safety risks and negative environmental impacts in the event of seasonal, cyclonic weather conditions. However, while the scale of floating LNG facilities is new, the technology behind the facilities has been used since the 1970s in floating production, storage and offloading vessels (FPSOs), which have been operating in Australia's waters for many years.

More broadly, safety remains the top priority for resources sector companies, which operate in accordance with established industry standards of risk management, and CME members indicated the introduction in January 2012 of the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has resulted in a consistent regulatory approach to safety and environment regimes in offshore operations.

CME considers the State and Commonwealth Government must work cooperatively to immediately progress the development of streamlined environmental assessment and approvals processes, particularly focusing on reforming duplicative and inefficient processes.

³⁵ APPEA, 2013. *Cutting Green Tape, Streamlining Major Oil and Gas Project Environmental Approvals Processes in Australia*, February 2013. Canberra.

9. Conclusions

The LNG sector is a significant driver of the Western Australian and Australian economies. The contribution of LNG to the economy is expected to continue with the nation well positioned to become the world's leading producer of LNG.

The sector is heavily dependent on foreign investment for project development and the state must therefore remain attractive and competitive as an investment destination or risk projects not proceeding, given forecast global excess LNG supply in the future.

There are several factors to consider when assessing the state's competitiveness for developing LNG projects.

- Divergent energy policy perspectives between the State and Commonwealth Government can add risk and uncertainty to project development, making Western Australia less attractive for foreign investment.
- While there has been concern domestic gas supply would be tight, recent forecasts by the IMO suggest domestic supply will be adequate to meet demand. Shale and tight gas may provide additional security of supply and economic benefits in the longer term.
- Australia is a high cost place to do business and addressing cost drivers and improving productivity are critical to ensuring projects can proceed in a timely manner and remain competitive with alternative investment destinations around the world. Floating LNG facilities can address cost pressures, although the best development option for a project will be considered on a case by case basis.
- Opportunities for local industry participation in floating LNG facilities are expected to be substantial over the long operational phase of projects, with opportunities particularly apparent for maintenance staff. These opportunities have been widely evident for LNG projects already in the operational phase. Western Australia is also well positioned to become a world leader in floating LNG research and innovation.
- A streamlined and efficient environmental approval process will ensure all resources projects meet necessary and appropriate approvals in a timely manner. Floating LNG projects may be well placed due to their smaller environmental footprint. Safety remains the key focus for resources sector companies and floating LNG facilities are an innovation derived from safe, long serving technology.

The State and Commonwealth Government and industry must work collaboratively to consider and address these factors and ensure the state's LNG sector remains competitive in terms of attracting international capital and the cost to supply LNG to global markets. LNG project proponents have several technology options available for project development. Floating LNG technology is one option that can play a role in addressing the challenges facing Western Australia's LNG sector, while delivering stable, long term benefits to the state.

Appendix I – Acronyms Used

APPEA	Australian Petroleum Production and Exploration Association
Bcm	billion cubic metres
DMP	Department of Mines and Petroleum
FEED	front end engineering and design
FPSO	floating production, storage and offloading vessel
IMO	Independent Market Operator
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MFP	multifactor productivity
mmBtu	million British thermal units
mtpa	million tonnes (metric) per annum
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
SCER	Standing Council on Energy and Resources
SEI	Strategic Energy Initiative: Energy2031