



Economics and Industry Standing Committee

The economic impact of floating LNG on Western Australia

Volume 2

Report No. 2
May 2014

Legislative Assembly
Parliament of Western Australia

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Volume 2

Report No. 2

Presented by

Mr I.C. Blayney, MLA

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Contents—Volume 2

Ministerial Response	i
Findings and Recommendations	iii
11 Introduction to Volume 2	271
<hr/>	
Structure of the report	271
12 Western Australia and natural gas	273
<hr/>	
Western Australia and natural gas	273
History of LNG development	273
Current LNG projects	276
13 The international LNG market	279
<hr/>	
Supply and demand	279
The question of price	281
A moment of uncertainty	284
Exports of US shale gas?	284
Chinese demand?	286
The question of cost	287
14 FLNG in Australia: A reasonable response?	289
<hr/>	
The trend toward FLNG	289
Drivers for FLNG developments off Australia's coast	293
FLNG as an industry response	296
Higher wage costs and lower productivity	297
Productivity in the Australian resources industry	300
Australia is a high wages country, but...	302
Project management's impact on productivity	307

Scarcity of labour	309
Duplication in approval processes in various levels of government	311
Federal government approval process	311
Western Australian approval process	312
Local government processes	316
Assessment of resource project approval processes	316
Sovereign risk	328
Increasing global competition in the gas market	333
Commercial viability versus profitability versus acceptable rates of return	336
 Appendices	 339
Appendix One: Inquiry Terms of Reference	339
Appendix Two: Submissions received	341
Appendix Three: Hearings	345
Appendix Four: Briefings	349
Acronyms and terms of convenience	353
Appendix Six: Glossary	359
Appendix Seven: Conversions	363
Appendix Eight: Table of LNG projects	365
Appendix Nine: Map of major prospective offshore areas	369
Appendix Ten: Map of Ichthys and Prelude project petroleum titles	373
Appendix Eleven: Map of Browse project petroleum titles	375
Appendix Twelve: Letter from Hon Gary Gray, MP, former Federal Minister for Resources and Energy	377
Appendix Thirteen: Map series of WA industrial development	381
Appendix Fourteen: Committee's functions and powers	385

Contents—Volume 1

Executive Summary	i
Ministerial Response	ix
Findings and Recommendations	xi
1 Introduction	1
<hr/>	
A significant resource	1
Current (un)conventional natural gas reserves	5
Current Australian LNG projects	6
Liquefied natural gas	7
Floating LNG	8
Stranded gas	10
Property rights	18
The Committee	21
Conduct of the Inquiry	21
A note on the terms of reference	24
The importance of this Inquiry	25
Structure of the report	26
2 Public administration of Australian offshore oil and gas activities	29
<hr/>	
Introduction	29
History of the regulation of offshore oil and gas activities	29
Current regulatory framework	31
In the best interests of...?	36
The Commonwealth's unilateral decision on Browse retention leases	37
Western Australia's royalties	42
Western Australia's domestic reservation obligations	42

3	Local content policy	45
	Introduction	45
	Commonwealth local content policy	48
	Australian Industry Participation Plans	49
	Full, fair and reasonable opportunity	52
	Formalisation of Australian Industry Participation Plans	54
	Western Australian local content initiatives	58
	Local Industry Participation Framework	58
	State Agreements	60
	State Agreement with the Goolarabooloo Jabirr Jabirr Peoples	65
	Industry Capability Network of WA	67
	ProjectConnect	69
	Effectiveness of Western Australian local content initiatives	69
	Local content for Western Australian LNG projects to date	73
	Interpreting local content data	78
	Local content reporting in Western Australia	80
	Importance of local content for LNG developments in Western Australia	84
	Relevance of initiatives for local content for FLNG facilities	85
	Approaches taken by other countries	88
	Canada—Newfoundland and Labrador province	89
	Norway	89
	Russia	90
	Nigeria	91
	United Kingdom	92
	Are we hungry enough?	95
4	The impact of FLNG on Western Australia's engineering and design sector	97
	Introduction	97
	A massive undertaking	98
	The design process and the shift to EPCMs	99

The decline of engineering design in Australia	101
The impact of the decline of engineering design in Western Australia	104
Importance of local design-phase engineering	107
Subsea engineering and design opportunities	111
FLNG engineering	112
An engineering centre of excellence?	115
 5 The impact of FLNG on Western Australia's fabrication and manufacturing sector	 121
<hr/>	
Introduction	121
An important contribution	122
A difficult moment	125
Prelude	128
FLNG hulls	129
FLNG topsides	130
FLNG turrets	133
Relative to onshore	135
Rework	138
Petrochemicals	140
Opportunities	142
FLNG—a paradigm shift?	146
 6 The impact of FLNG on Western Australia's construction and ancillary services sectors	 149
<hr/>	
An obvious impact	149
Megaprojects	150
Recent projects	152
Pluto	152
Gorgon	153
Wheatstone	156
Ichthys	158

Curtis Island	158
Browse	159
Flow-on benefits?	161
Operational requirements	164
Opportunities for Australian residents?	166
Good business sense	170
Beyond Prelude?	171
Supply base construction	171
The construction conundrum	174
 7 Opportunities arising from FLNG technology	 179
What is a centre of excellence?	180
Western Australia was/is/could be a centre of excellence	181
Western Australian Energy Research Alliance	182
Australian Marine Complex	183
National Floating Systems Research Centre	185
Oil and Gas Industry Innovation Partnership	186
Centre for Offshore Foundation Systems	187
Australian Centre for Energy and Process Training	187
Global Centre for FLNG Learning and Research	188
Benefits of centres of excellence	189
Creating critical mass	190
Will multiple centres of excellence in Perth turn Western Australia into an LNG hub?	192
Workforce training and development opportunities	196
Scarcity of skilled, work-ready labour	196
Loss of opportunity to develop and maintain Western Australia's skills base	197
Potential for FLNG workforce training and development	198
State Agreement conditions	198
Registration of engineers	199
Centre of excellence in workforce training and development	200

ACCEPT as a workforce training and development centre of excellence	200
ACCEPT as an FLNG centre of excellence	204
8 The impact of FLNG on Western Australia's domestic gas supply	207
<hr/>	
Weighing the interests	207
A vital resource	209
An enabling industry	214
Gas reservation	215
LNG	228
Floating LNG	231
Opportunity cost	234
9 The impact of FLNG on revenue to the Western Australian Government	239
<hr/>	
Nobody knows...	239
Types of direct revenue generated by resources	240
Petroleum Resource Rent Tax	241
Western Australian Government royalties	245
Browse gas reserves in Western Australia's jurisdiction	249
Unitisation	250
Unitisation of the Torosa field	252
PRRT v royalties	252
Recovery of gas and condensate using FLNG technology	254
Payroll tax	257
Company data	259
Government reliance on company data	260
10 Concluding remarks on the impact of FLNG on Western Australia	267
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Ministerial Response

In accordance with Standing Order 277(1) of the Standing Orders of the Legislative Assembly, the Economics and Industry Standing Committee directs that the Minister for State Development, the Department of Mines and Petroleum, the Minister for Commerce, the Minister for Energy and the Minister for Training and Workforce Development report to the Assembly as to the action, if any, proposed to be taken by the Government with respect to the recommendations of the Committee.

Findings and Recommendations

Finding 1

Page 10

While the Commonwealth Government has approved the variation to the five Browse Retention Leases in Commonwealth waters, the Western Australian Government has not approved the variation to the two Browse Retention Leases in state waters.

Finding 2

Page 15

‘Stranded gas’ no longer refers to only small and isolated deposits. Proponents of FLNG technology use ‘stranded gas’ to refer to gas that, for a variety of reasons, they do not consider economically viable to develop at a particular period of time.

Finding 3

Page 18

The *Offshore Petroleum Greenhouse Gas Storage Act 2006* (Cth) does not provide for consideration of alternative development proposals in relation to reviewing the renewal of Retention Leases or granting of production licences.

Finding 4

Page 18

Renewing Retention Leases may not be in the best interests of the economic development of Western Australia.

Recommendation 1

Page 18

The Western Australian Government negotiate with the Commonwealth Government to amend the *Offshore Petroleum Greenhouse Gas Storage Act 2006* (Cth) to change the assessment of Retention Leases to include providing:

- the Joint Authority with the ability to invite competitive development proposals for the resource being considered; and
- the title holder with the opportunity to match any alternative development proposal or else surrender the title.

Recommendation 2

Page 33

The Minister for Mines and Petroleum and the Minister for State Development urge the Commonwealth Government to specify the criteria for assessing that Retention Leases granted under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) are held for a legitimate need to secure gas for long-lived production projects and not to obtain a competitive commercial advantage.

Finding 5

Page 35

The development of FLNG technology has clear implications for the granting of Retention Leases and renewals, particularly in relation to the requirement that development is not commercially viable at the time of application.

Recommendation 3**Page 35**

The Western Australian Government urge the Commonwealth Government to review the *Offshore Petroleum Greenhouse Gas Storage Act 2006* (Cth) to reflect the need for more robust assessment of commercial viability, and as more thorough assessment of applications will be required, appropriate staff resources should be made available.

Finding 6**Page 40**

The Commonwealth Government's 2013 decision to approve variations to the Commonwealth Browse gas field Retention Leases:

- removed from the Commonwealth leases the requirement for the Browse Joint Venture to develop James Price Point; and
- allowed the Browse Joint Venture to consider other development concepts, including FLNG.

Finding 7**Page 41**

The process by which the Commonwealth Government approved the variations to the Commonwealth Browse gas field Retention Leases did not follow established working arrangements.

Finding 8**Page 41**

In solely relying on information, analysis and conclusions provided by project proponents to assess Retention Lease applications, the Commonwealth Government is abrogating its responsibility as a decision-maker on behalf of Australian citizens.

Finding 9**Page 41**

The Commonwealth Government's 2013 unilateral decision to approve variations to the Commonwealth Browse gas field Retention Leases is unprecedented and was made without fair and reasonable consideration of Western Australia's position on the leases and the impact on the development of the Retention Leases for State titles.

Finding 10**Page 41**

The Commonwealth Government's 2013 approval of variations to the Commonwealth Browse gas field Retention Leases does not amend the leases for State titles.

Finding 11**Page 41**

The Western Australian Government is yet to complete its assessment of the applications to vary the Browse gas field leases for State titles.

Recommendation 4**Page 41**

The Minister for State Development takes whatever action is appropriate to ensure the Commonwealth Government complies not only with the *Offshore Petroleum Greenhouse Gas Storage Act 2006* (Cth) and the Joint Authority Guidelines, but with the established working arrangements between Joint Authority members. This may include, but not be limited to:

- referring the matter to the Ministerial Council;
- developing changes to the Joint Authority Guidelines so that they better reflect established working arrangements; and/or
- seeking legal advice as to the lawfulness of the Commonwealth Minister's unilateral decision relating to the Browse Retention Leases.

Finding 12**Page 41**

Unilateral Commonwealth decisions relating to petroleum Retention Leases potentially have a major negative impact on the Western Australian economy.

Finding 13**Page 42**

The current Joint Authority provisions in the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) put at risk the fundamental basis for which Joint Authorities were established.

Recommendation 5**Page 42**

Given the unilateral decision made on the Commonwealth Browse Retention Leases, and the risk this poses for Western Australia, the Minister for Mines and Petroleum takes the necessary steps to effect the amendment of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) to ensure greater transparency of, and adequate consultation time in, the Joint Authority process.

Finding 14**Page 57**

There is a lack of certainty about the implementation of the *Australian Jobs Act 2013* (Cth) which will add to the perceived risk of doing business in Australia. In particular, the lack of Australian Industry Participation Plan (AIPP) templates and an Australian Industry Participation authority and mandate, together with a lack of clarity about the meaning of full, fair and reasonable opportunity for local companies, render the *Australian Jobs Act 2013* (Cth) obsolete for current and future major projects.

Finding 15**Page 58**

Certainty about the implementation of the *Australian Jobs Act 2013* (Cth) is just as important as the substance of the Act.

Recommendation 6 **Page 58**

The Western Australian Government encourage and work with the Commonwealth Government to provide certainty for project proponents in relation to the *Australian Jobs Act 2013* (Cth) and its implementation.

Finding 16 **Page 64**

It is not clear what criteria the Department of State Development applies in its assessment of whether a resource project should be developed through a State Agreement.

Finding 17 **Page 64**

It is not clear what progress has been made on the implementation of the Auditor General's 2004 recommendations in relation to developing a structured approach to evaluating State Agreement performance.

Finding 18 **Page 64**

It is not clear whether State Agreements are the most effective or efficient means of achieving government policy objectives.

Finding 19 **Page 65**

Despite improvements in the implementation and monitoring of State Agreement local content provisions, the reported data only provides information about major project tenders and contracts after the decisions have been made.

Recommendation 7 **Page 65**

The Department of State Development advises Parliament of its approach to evaluating State Agreement performance and its efforts to improve reporting on State Agreement performance and status.

Recommendation 8 **Page 65**

The Department of State Development undertake an assessment of the effectiveness of State Agreements in achieving the government's stated aims and objectives, and report the results to Parliament.

Recommendation 9 **Page 65**

State Agreement local content reporting requirements include project proponents providing further relevant detail about decisions impacting local content, with this information being made in a transparent manner and subject to greater public scrutiny, including the tabling of information in Parliament.

Finding 20**Page 66**

Aboriginal communities in the Kimberley have diminished economic opportunity as a result of the adoption of FLNG instead of onshore processing at James Price Point.

Recommendation 10**Page 67**

The Western Australian Government work with all project proponents, including Woodside, to ensure that Aboriginal communities benefit from resource developments in the state.

Finding 21**Page 87**

Western Australian local content policies may not provide maximum opportunities for local businesses to participate in FLNG projects.

Recommendation 11**Page 87**

As a matter of priority, the Minister for Commerce review and amend Western Australia's local content policies to ensure their relevance to FLNG developments in coastal waters.

Finding 22**Page 87**

Despite government implementation and monitoring of local content provisions in State Agreements, local businesses still do not have full, fair and reasonable opportunity to participate in these major projects.

Recommendation 12**Page 87**

The Western Australian Government clarify and detail the reporting requirements for State Agreements, and ensure that reporting is through a transparent process to Parliament.

Recommendation 13**Page 87**

The Western Australian Government ensure that through its Lead Agency Framework one agency, from a project's earliest concept development through to its implementation, works to maximise the opportunities for the state. This would include coordination with the Commonwealth Government.

Finding 23**Page 107**

The use of global engineering, procurement and construction management (EPCM) contracting for LNG production projects has had a significant and deleterious effect upon the Australian and, in particular the Western Australian, engineering sector.

Finding 24**Page 107**

Establishing Perth as a global design centre potentially would have substantial benefits for multiple sectors of the economy.

Recommendation 14	Page 107
The Western Australian Government work with the engineering representative organisations to develop strategies that will broaden, promote and retain the engineering skills base in Western Australia.	
Finding 25	Page 110
First-hand knowledge of suppliers' capacity and capability is an important aspect of design engineering.	
Finding 26	Page 110
Engagement of local manufacturing and fabrication businesses largely depends on local engineering in the design phase.	
Finding 27	Page 111
Several factors conspire to exclude the Australian engineering sector from the FLNG design process. These include:	
<ul style="list-style-type: none"> • the use of global engineering, procurement and construction management (EPCM) contracting and consequent tendering to overseas companies; • the exodus of skilled engineers from Perth following the decision to design and engineer the North West Shelf train 5 overseas; and • the design one, build many concept of FLNG project design and detail engineering being done totally overseas. 	
Finding 28	Page 112
FLNG technology potentially will generate opportunities for subsea engineering and design that would not have eventuated from otherwise stranded gas.	
Finding 29	Page 115
The operations phase of FLNG projects has the potential to generate engineering opportunities in Western Australia, in particular subsea engineering.	
Finding 30	Page 138
While Australian manufacturers can still win fabrication work for onshore LNG plants, FLNG technology places them at a geographic disadvantage relative to the construction location and their disconnection from global supply chains.	
Finding 31	Page 140
Liquefied natural gas (LNG) is simply a method of transporting natural gas over long distances.	

Finding 32 **Page 146**

The complex and sophisticated subsea componentry for Australian and international FLNG projects provides an opportunity for the Australian metal fabrication industry.

Finding 33 **Page 148**

As part of a Centre of Excellence, Western Australia can be a successful fabricator of high quality, high value manufacturing for the oil and gas sector.

Finding 34 **Page 160**

The construction of an onshore gas processing and liquefaction plant at James Price Point would create thousands of construction jobs lasting several years. If the Brecknock, Calliance and Torosa gas fields are developed using FLNG technology, these jobs will not eventuate.

Finding 35 **Page 174**

James Price Point provides an opportunity for a supply base, emergency response facility, helicopter support facilities, and fabrication and maintenance support. Such a facility would increase the offshore operations efficiency of projects in Commonwealth waters and, ultimately, increase revenue flow back to the federal government.

Recommendation 15 **Page 174**

The Western Australian Government establish James Price Point as the site for a regional supply base and approach the Commonwealth Government for infrastructure funding.

Finding 36 **Page 178**

Historically, onshore gas processing plants have been a significant driver of economic growth in Western Australia.

Finding 37 **Page 178**

The use of FLNG technology to develop gas fields in Australian waters will significantly reduce construction opportunities for Western Australian businesses and the related flow-on opportunities.

Finding 38 **Page 181**

There is no commonly agreed definition of what constitutes a centre of excellence.

Finding 39 **Page 184**

The Australia Marine Complex provides capacity and capability to enable the fabrication, construction and load out of modular equipment for the oil, gas and mining sectors. It is also a hub for the subsea sector and associated companies, and the defence industry.

Finding 40**Page 187**

The future of the National Floating Systems Research Centre and the Oil and Gas Industry Innovation Partnership is uncertain due to a lack of clarity in relation to Commonwealth Government funding.

Recommendation 16**Page 187**

The Western Australian Government urge the Commonwealth Government to recommit to the previously promised funding for the National Floating Systems Research Centre and the Oil and Gas Industry Innovation Partnership.

Finding 41**Page 194**

The establishment of Western Australia as a global Centre of Excellence for FLNG will require a greater contribution of Commonwealth research funding to achieve long term strategic development for Australia in the offshore petroleum industry.

Recommendation 17**Page 195**

The Western Australian Government pursue a greater contribution of research funding from the Commonwealth, particularly as PRRT revenue from offshore Western Australia flows to the Commonwealth.

Finding 42**Page 199**

The Western Australian Government has yet to respond to The Association of Professional Engineers, Scientists and Managers, Australia's report titled, *Report to the Western Australian Government on local engineering issues and policy*.

Recommendation 18**Page 199**

As part of his response to this Economics and Industry Standing Committee report, the Minister for State Development include a government response to the report titled, *Report to the Western Australian Government on local engineering issues and policy*.

Finding 43**Page 200**

Representative bodies such as Professionals Australia and Engineers Australia support the registration of engineers.

Recommendation 19**Page 200**

The Western Australian Government work with the relevant engineering representative bodies to investigate the merits of a registration system for engineers—similar to that operating in Queensland—and the amendments to the Australian and Western Australian standards required for such registration to be recognised.

Finding 44**Page 205**

The Australian Centre for Energy and Process Training is well placed to take advantage of the opportunity for workforce training and development for FLNG technology.

Finding 45**Page 205**

Without the necessary government funding, the Australian Centre for Energy and Process Training will not be able to maximise its potential to become a world-recognised centre for FLNG training.

Recommendation 20**Page 205**

As a matter of priority, the state government should approve the Australian Centre for Energy and Process Training's funding application for \$14 million to allow it to proceed to Phase 2 of its development.

Finding 46**Page 211**

In Western Australia 97 per cent of natural gas is consumed by industry and in electricity generation, with direct residential and commercial consumption making up the remaining 3 per cent.

Finding 47**Page 219**

Domestic gas processing capacity is not the same as the amount of domestic gas that is produced for supply to the domestic gas market.

Finding 48**Page 220**

There is significant demand for domestic gas in Western Australia. Without certainty of supply, economic development in the state will be negatively impacted.

Finding 49**Page 221**

Without Commonwealth and Western Australian Government policy to ensure supply of natural gas to the domestic market, the future supply to domestic gas consumers is at risk.

Recommendation 21**Page 221**

Given the emergence of FLNG, the Western Australian Government work with the Commonwealth Government to develop an energy policy that secures domestic gas supply.

Finding 50**Page 222**

The success of the United States' expansion of its shale gas production is attributable to the convergence of a number of factors, including:

- a long term and thorough understanding of the subterranean geography;
- technological development;
- the widespread availability of drilling equipment;
- an existing sophisticated gas pipeline infrastructure; and
- the size of the natural gas market in the US.

Finding 51**Page 225**

The Policy on Securing Domestic Gas Supplies (the Reservation Policy) is an essential policy instrument for ensuring that an appropriate level of gas is supplied into the local market.

Recommendation 22**Page 225**

The Western Australian Government retain its Policy on Securing Domestic Gas Supplies (the Reservation Policy).

Finding 52**Page 227**

There is a need for greater transparency of the Commonwealth Government's Retention Lease renewal process.

Recommendation 23**Page 227**

The Western Australian Government urge the Commonwealth Government to increase the transparency of the Retention Lease renewal process through measures including, but not limited to:

- developing specific criteria for the assessment of future compliance with Retention Lease obligations;
- clarifying the specific meaning of the term 'commercially viable' in section 142 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth);
- acknowledging the commercial viability of the development of gas fields for supply into the domestic market rather than for LNG exports;
- allowing third-party submissions in the process of determining an application to renew a Retention Lease; and
- requiring the Commonwealth to undertake due diligence on the proposal.

Finding 53**Page 231**

The delivery of natural gas into the Western Australian domestic gas market via LNG tankers and regasification terminals would not be cost effective or competitive in comparison with transporting gas by pipeline.

Finding 54 **Page 234**

Where it is used to develop Australian natural gas fields, FLNG is quite clearly an export-only technology.

Finding 55 **Page 237**

A secure supply of domestic gas for industry is essential to the economic development of Western Australia.

Finding 56 **Page 237**

Gas fields in Australian waters developed using FLNG technology will provide no domestic gas.

Finding 57 **Page 238**

Developing Australian gas fields with FLNG technology will restrict the overall supply of gas to Western Australian industry and households.

Finding 58 **Page 238**

A restricted supply of domestic gas will severely impact on economic development and energy demand in Western Australia.

Recommendation 24 **Page 238**

The Western Australian Government urgently review its energy policies to reflect the existence of commercially viable FLNG technology.

Recommendation 25 **Page 238**

The Western Australian Government continue to play an active role in energy regulation in Western Australia.

Finding 59 **Page 245**

The Petroleum Resource Rent Tax was designed and implemented prior to the development of FLNG technology.

Recommendation 26 **Page 245**

The Western Australian Government urge the Commonwealth Government to re-examine the tax treatment of the development costs of FLNG and the valuation of the vessel.

Finding 60 **Page 250**

Western Australia has a direct interest in the Browse gas resources through its ownership of a portion of the Torosa gas field.

Finding 61**Page 250**

There is a lack of agreement between the Department of Mines and Petroleum, the Commonwealth Government and Woodside Energy in relation to the proportion of the Torosa field resources that resides in Western Australian waters.

Finding 62**Page 250**

The Department of Mines and Petroleum is yet to define the Western Australian share of the Torosa gas field with Woodside Energy.

Recommendation 27**Page 250**

The Department of Mines and Petroleum provide their minister with a technically robust assessment of the proportion of the Torosa field resources that reside in Western Australian waters.

Recommendation 28**Page 254**

In the event that a single project proponent develops the seven Browse Retention Leases, the Western Australian Government negotiate a unitisation agreement with the Commonwealth Government.

Finding 63**Page 257**

While FLNG units can accommodate field compression equipment, optimum resource recovery is not guaranteed. The absence of compression equipment on FLNG vessels in fields where condensate is present could significantly diminish Commonwealth and state revenue.

Recommendation 29**Page 257**

The Western Australian Minister for Resources advocate the installation of compression equipment as part of the field development plans during the appraisal by the Joint Authority where appropriate. This would oblige project proponents proposing to utilise FLNG technology, and in particular for Browse resources, to demonstrate in their project proposals and field development plan that the technology will optimise resource recovery.

Finding 64**Page 263**

Western Australian Government agencies were not able to produce cogent sets of information necessary to facilitate effective government decision-making on resource value and return to the State.

Recommendation 30**Page 263**

Western Australian Government agencies amend their model of advice to government to ensure the responsible ministers are fully aware of the economic implications before the State enters into any agreements.

Finding 65**Page 265**

Where FLNG technology is used:

- the potential benefits of construction activity, local taxes and downstream activity are lost; and
- a serious loss of revenue to the State will result.

Recommendation 31**Page 265**

The Western Australian Government, as a matter of priority, undertakes economic modelling of the loss of petroleum industry revenue to the State resulting from the introduction of FLNG, including, but not limited to, payroll taxes.

Finding 66**Page 291 (Volume 2)**

Enhanced cooperation between project proponents, such as sharing gas pipelines, processing trains and other gas field infrastructure, could be a viable alternative to FLNG technology for some reserves.

Recommendation 32**Page 291 (Volume 2)**

The Western Australian and Commonwealth Governments examine, as a matter of priority, the sharing of offshore gas field infrastructure to maximise the efficiency of resource development returns to Australia.

Finding 67**Page 311 (Volume 2)**

Statements that Australia is a high cost, low productivity country are simplistic and do not adequately reflect the following:

- reservoir characteristics and climate related plant efficiency;
- the remote and environmentally sensitive nature of development areas;
- the high cost of project engineering and management;
- the lack of supporting infrastructure;
- labour scarcity created by multiple projects being developed at the same time; and
- the recent relatively high level of the Australian dollar.

Finding 68**Page 327 (Volume 2)**

Considerable industry concern exists in relation to the complexity and apparent inefficiency of Australia's regulatory regime for resource projects.

Recommendation 33**Page 327 (Volume 2)**

The Minister for State Development, as a matter of priority, work with the Commonwealth Government to expedite the reduction in the regulatory burden on resource projects, including the establishment of a single approval body.

Chapter 11

Introduction to Volume 2

Structure of the report

- 11.1* This is Volume 2 of the Committee's report into the economic impact of FLNG technology on various sectors of the Western Australian economy.
- 11.2* Volume 1 of the report addressed the specific sectors of the economy referred to in the Inquiry terms of reference. It also included discussion of the impact of FLNG developments on the state's domestic gas supply and on State revenue. Volume 1 then contained a discussion of the potential opportunities arising from FLNG technology for Western Australian local content providers, including workforce training and development.
- 11.3* This Volume provides the context to the Committee's overall report. It provides further background information on the oil and gas industry, and the global market for these commodities. It also focuses on the evidence provided to the Committee on why oil and gas companies have signalled FLNG to be their concept of choice for the development of gas fields off the Western Australian coast.

Chapter 12

Western Australia and natural gas

The North West Shelf development—this is what Australia is all about... this country of ours has wealth for the taking—if we have the guts and the get-up-and-go to take it...

'The giant stride for Australia,' The Australian, 25 August 1977¹

Western Australia and natural gas

- 12.1 This chapter briefly traces the development of Western Australia's oil and gas industry from the first applications to explore areas off the north west coast of Western Australia (WA) through to the development of the North West Shelf project, the Darwin LNG plant and the Pluto LNG project. It also outlines LNG projects currently being constructed or under consideration.

History of LNG development

- 12.2 The state's offshore petroleum industry began in October 1962 when Woodside Petroleum lodged formal applications to explore a vast area off the coast of North Western Australia, 'from Monte Bello Island in the south to offshore Darwin in the north to the edge of the Timor Trough.'²
- 12.3 In 1971 a significant discovery was made at Scott Reef in the Browse Basin, prompting the then WA Minister for Mines, Hon Don May, MLA, to announce the historic first discovery of natural gas in these waters. Just two days after the Scott Reef drilling had begun, another successful drilling campaign was initiated further south at North Rankin, within the Carnarvon Basin.³
- 12.4 Further exploration in the North West Shelf area confirmed the potential of the area. Their significance notwithstanding, these discoveries were difficult to commercialise as

1 Cited in Harman, Liz, 'History and politics of the North West Shelf project', *Issues in energy policy in Western Australia—discussion paper 5/83*, January 1983, p 35.

2 Murray, Robert, *From the edge of a timeless land: A history of the North West Shelf gas project*, Allen and Unwin, Sydney, 1991, p 4. Australia's first oil discovery was made in 1953 at Rough Range near Exmouth, but proved too small to exploit. See: Petroleum Exploration Society of Australia, *The Rough Range oil discovery – 50 years on*, December/January 2003/2004. Available at: http://www.pesa.com.au/publications/pesa_news/dec_03/history2.htm. Accessed on 5 November 2013.

3 Hon Reginald Swartz, MP, Minister for National Development, Commonwealth Parliament, House of Representatives, *Media Statement*, 16 July 1971. Cited in Murray, Robert, *From the edge of a timeless land: A history of the North West Shelf gas project*, Allen and Unwin, Sydney, 1991, p 39. The first offshore drilling off the Western Australia coast began in May 1968.

Chapter 12

they would require significant capital investment. Despite the strong will to develop the North Rankin gas discovery, the project wavered through the course of the 1970s amid a multitude of political and business negotiations as to how best to proceed.

- 12.5 In November 1977, supported by promised demand for the product both from the Western Australian energy utility (SECWA) and Japanese interests, Woodside announced its decision to proceed to a project planning and definition stage. The government of then Premier Sir Charles Court negotiated an arrangement with the North West Shelf joint venture partners wherein SECWA committed to purchase a significant quantity of the gas—an amount that at the time was far in excess of local demand—for a period of at least 20 years.⁴ This was subsequently ratified by the *North West Gas Development (Woodside) Agreement Act 1979 (WA)*.
- 12.6 In September 1980 a series of contracts were entered into by various joint venture partners, their financiers and SECWA, and the decision to proceed with the domestic gas (domgas) component of the North West Shelf project was officially announced.⁵ In effect, SECWA, a government owned utility, underwrote Woodside's development of the North West Shelf.
- 12.7 Construction of the onshore domgas production facility occurred simultaneously with the construction of the North Rankin A platform, the first offshore facility commissioned for the North West Shelf venture. In 1984, the domgas facility delivered its first gas ahead of schedule, making the North Rankin A platform the largest gas production platform in the world. By this time, and in large part due to the state government's commitment to the project, negotiations in relation to the LNG export facility were well advanced. On 4 July 1985 the Western Australian Parliament passed the *North West Gas Development (Woodside) Act 1985 (WA)*. This Act formally ratified the export agreement and confirmed the construction of an LNG plant adjacent to the domgas facility for exporting gas from the North West Shelf to Japanese customers.
- 12.8 The major infrastructure and first two liquefaction trains for what was then the tenth major LNG plant on earth was, for the most part, constructed between 1986 and 1988.⁶ The construction phase peaked in 1987. At that point there were about 4,000 workers on-site, with thousands more employed off-site by various contractors, including 2,000

4 Economics and Industry Standing Committee, *Inquiry into domestic gas prices*, State Law Publisher, Western Australia, 24 March 2011, p 5.

5 Harman, Liz, 'History and politics of the North West Shelf project,' *Issues in Energy Policy in Western Australia (Discussion paper series)*, Murdoch University, 1983, pp 43-44.

6 Murray, Robert, *From the edge of a timeless land: A history of the North West Shelf gas project*, Allen and Unwin, Sydney, 1991, p 139.

directly employed by either Woodside or the KJK consortium, which had won the contract to build the LNG plant.⁷

- 12.9 At the completion of the first two liquefaction trains, it was estimated that 72 per cent of the \$8,850 million—or \$6,372 million—spent to that point on developing the field and the LNG plant had been spent in Australia on Australian goods and services.⁸ In particular, the vast majority of welding and fabricating for the LNG plant was done either in Perth or on the site. It was further estimated that about 90 per cent of that \$6.4 billion had been spent in WA—a significant boost to the state economy at a time when the annual Gross State Product (GSP) was around \$90 billion. Local industry also derived tremendous benefit from the opportunity to work on such a massive engineering project, the scale of which had never before been undertaken in Australia.
- 12.10 In the almost 30 years since gas production by the North West Shelf plant began in 1984, gas production for both domestic and export markets has increased markedly. At the same time, estimates of discovered and as yet unproduced gas resources in waters off the WA coastline have steadily increased. Indeed, these estimates are now more than double those recorded in 1985.⁹ Furthermore, as global demand for energy has continued to expand since work on the North West Shelf project first began, a number of other projects aimed at increasing WA's LNG export capacity have been undertaken, beginning with the construction of a third liquefaction train—with the same 2.5 million tonnes per annum production capacity as the first two—at the North West Shelf plant in 1992.
- 12.11 In 1995 a second offshore production platform—Goodwyn A—was commissioned, and later that year the first floating production, storage and offloading (FPSO) vessel—the Cossack Pioneer—was set in place to enhance the oil production capacity of the North West Shelf venture. A fourth liquefaction train—this time with a production capacity of 4.4 million tonnes of LNG per annum—was added to the plant in 2004. A largely identical fifth train was added in 2008. By this stage, the annual export production capacity of the North West Shelf plant was 16.3 million tonnes of LNG.¹⁰ In 2009 the unmanned Angel platform was added as a fourth offshore element in the North West Shelf project. In 2011 the Cossack Pioneer, installed in 1992, was replaced with the

7 *ibid*, pp 142-146. KJK was a consortium consisting of the M.W. Kellogg Company of Houston, Texas ('K'), the JGC Corporation of Tokyo ('J') and Australian firm Kaiser Engineering ('K'). Kellogg oversaw the project, which was designed by JGC; Kaiser put its local expertise to use in procuring and subcontracting goods and services, and in managing industrial and governmental relations.

8 Murray, Robert, *From the edge of a timeless land: A history of the North West Shelf gas project*, Allen and Unwin, Sydney, 1991, p 154.

9 Submission No. 12 from the Australian Petroleum Production and Exploration Association (APPEA), 30 August 2013, p 10.

10 Woodside Energy Ltd, *North West Shelf project*. Available at: <http://www.woodside.com.au/Our-Business/North-West-Shelf/Documents/NWSV%20Corporate%20Brochure.PDF>. Accessed on 8 November 2013.

Chapter 12

Okha FPSO. October 2013 saw the start-up of the North Rankin redevelopment project consisting of a modification and refurbishment of the North Rankin A platform, and the installation of an adjacent North Rankin B platform.¹¹

12.12 Enhancements to the North West Shelf project were not the only projects aimed at boosting the production of offshore natural gas for export. In 2003 construction began on what would be Australia's second LNG plant, the ConocoPhillips Darwin LNG facility, which began operations in 2006.¹² The ConocoPhillips plant, which produces gas from the Bayu-Undan field in the Timor Sea, has capacity to produce 3.6 million tonnes of LNG per annum. In 2007 Woodside began constructing a second LNG plant in WA, adjacent to the North West Shelf plant. This plant, the Pluto LNG plant, which has a single liquefaction train capable of producing 4.3 million tonnes of LNG per annum, began operations in 2012, producing gas from the Pluto and Xena offshore fields for export.

Current LNG projects

12.13 As noted in Volume 1, in addition to Australia's three operational LNG plants, a further seven are currently under construction, six of which are onshore plants. In WA, Chevron is constructing two major LNG export facilities, the Gorgon plant on Barrow Island and the Wheatstone plant near Onslow. In Darwin, INPEX is constructing a plant that will process gas from the Ichthys field.¹³ In Queensland, three adjacent LNG plants are currently under simultaneous construction on Curtis Island. Each of these plants will process 'unconventional' coal seam gas for export as LNG. The seventh and final LNG project currently under construction is Shell's Prelude FLNG vessel, which is being primarily built in the Samsung Heavy Industries shipbuilding facility in Geoje, South Korea.¹⁴

12.14 A further six potential Australian gas export projects are currently under consideration. Two of these—Arrow and Fisherman's Landing—are Queensland coal seam gas projects. The remaining four—Browse, Bonaparte, Scarborough and Cash Maple—are projects based upon conventional resource deposits in waters off the Western Australian coastline. While PTTEP's Cash Maple project is still in its infancy, the

11 Australian Associated Press, 'Woodside starts \$5b North Rankin project,' *The Australian*, 7 October 2013. Available at: <http://www.theaustralian.com.au/business/latest-news/woodside-starts-5b-north-rankin-project/story-e6frg90f-1226734117804>. Accessed on 7 November 2013.

12 ConocoPhillips Australia, *Darwin LNG*. Available at: <http://www.conocophillips.com.au/EN/business/OurProjects/Pages/DarwinLNG.aspx>. Accessed on 7 November 2013.

13 Mr Bill Townsend, General Manager, External Affairs and Joint Venture, INPEX, *Letter*, 7 November 2013.

14 Submission No. 15 from Shell in Australia, 30 August 2013, p 8.

leaseholders of the Browse,¹⁵ Bonaparte¹⁶ and Scarborough¹⁷ fields have all proclaimed FLNG technology to be the preferred development method.

15 Submission No. 24 from Woodside Petroleum, 3 September 2013, p 6.

16 Submission No. 29 from Santos, 16 October 2013, p 3.

17 Mr Luke Musgrave, Vice President, LNG, ExxonMobil (Australia), *Transcript of Evidence*, 21 October 2013, p 2.

Chapter 13

The international LNG market

A massive amount of LNG capacity has been proposed—as much as 350 million (metric) tonnes per year (mtpa)—which, if all were built, would more than double current capacity (of less than 300 mtpa) by 2025. Even with reasonably strong demand growth, this implies growing supply-side competition and upward pressures on development costs and downward pressures on natural gas prices.

*EY report Global LNG: Will new demand and new supply mean new pricing? 2013*¹⁸

Supply and demand

- 13.1 In recent times, and for various reasons, natural gas has steadily risen in prominence as a component of the global energy mix. Since 2000, total global demand for natural gas is estimated to have increased by about 2.7 per cent per year.¹⁹ Furthermore, the International Energy Agency forecasts a steady continuation in this trend. By 2035, natural gas is expected to account for 24 per cent of the world's energy mix, up from 22 per cent in 2010.²⁰
- 13.2 Forecasts for growth in demand for liquefied natural gas (LNG) are even more bullish. EY, a multinational professional services firm, has commented that 'a broad consensus of industry analysts/observers sees average annual [LNG demand] growth of around 5 per cent to 6 per cent per year.'²¹ Growth of this magnitude would, in fact, represent a *decline* in the observed 7.6 per cent annual demand growth since 2000. Past 2020, demand growth is forecast to slow to around two to three per cent per year, but even with this conservative forecasting, by 2030 global LNG demand 'could... be almost double that of the estimated 2012 level of about 250 million metric tonnes.'²²
- 13.3 Economic theory would ordinarily predict that this growth in demand will be reflected in higher prices, and this may eventuate. Price, however, is as much a function of supply as demand, and it is the supply side that complicates forecasting future trends in

18 EY, *Global LNG: Will new demand and new supply mean new pricing?*, 2013, p 3. Available at: [http://www.ey.com/Publication/vwLUAssets/Global_LNG_New_pricing_ahead/\\$FILE/Global_LNG_New_pricing_ahead_DW0240.pdf](http://www.ey.com/Publication/vwLUAssets/Global_LNG_New_pricing_ahead/$FILE/Global_LNG_New_pricing_ahead_DW0240.pdf). Accessed on 12 December 2013. Note: EY was formerly Ernst & Young.

19 From 2000-2008 the annual growth rate was 2.8 per cent, but in 2009 there was a 2 per cent decline in global demand, owing to the global financial crisis. Demand recovered significantly in 2010, increasing by 7.5 per cent. See International Energy Agency, *World energy outlook 2012*, 2012, p 127.

20 International Energy Agency, *World energy outlook 2012*, 2012, p 53.

21 EY, *Global LNG: Will new demand and new supply mean new pricing?*, 2013, p 4.

22 *ibid*, p 5.

Chapter 13

the global LNG market. Between 2009 and 2012, positive final investment decisions were made in relation to a total of seven greenfield LNG projects in Australia alone. Between January 2014 and April 2018, it is expected that a total of 24 newly-built LNG production trains will be brought online worldwide, increasing global production capacity by more than 60 million tonnes per annum (mtpa)—an amount equivalent to about 25 per cent of current global LNG demand.²³

13.4 Prior to the LNG ‘boom’ in Australia, a similar expansion in productive capacity occurred in Qatar between 2004 and 2011. As a result, LNG from Qatar and Australia is estimated to provide about 50 per cent of global supply by 2020, up from about 20 per cent in 2000. The expansion in LNG production by Australia and Qatar since 2000 is generally referred to as the ‘second wave’ of global LNG supply expansion, following an initial ‘wave’ between 1970 and 2000 that was dominated by Algeria, Malaysia and Indonesia.

13.5 In the medium term, and in addition to the sanctioned Australian projects, a third ‘wave’ of supply from projects across the globe is also proposed, albeit not yet sanctioned. Though much of this proposed supply would come from countries that have little or no current LNG production capacity, it is estimated that these countries could supply as much as 30 per cent of the world’s LNG by 2020.²⁴

13.6 It is, however, highly unlikely that all of the currently proposed LNG projects, including a number of Australian projects, will meet with investment approval in the short to medium term. This is primarily because bringing a discovered reserve of natural gas to market as LNG has always been an expensive and financially risky undertaking. Consequently, LNG export projects have traditionally been underwritten by secure off-take commitments from gas consumers. It has been observed that ‘LNG projects need customers in order to secure finance for building the liquefaction and regas terminals and the specialist tankers to shuttle between them.’²⁵ In the past, these commitments have taken the form of supply contracts in which an agreed quantity of LNG has been supplied over a significant period of time (generally in excess of 20 years), at a price indexed against the price of oil.²⁶

23 EY, *Global LNG: Will new demand and new supply mean new pricing?*, 2013, p 8.

24 *ibid.*

25 ‘LNG: A liquid market’, *The Economist*, 14 July 2012. Available at: <http://www.economist.com/node/21558456>. Accessed on 12 December 2013.

26 Johnson, Brian, ‘How are today’s LNG market dynamics challenging its historic conventions?’, *PricewaterhouseCoopers*, 2010, p 7.

The question of price

- 13.7 Though natural gas is a global commodity, the method of its pricing and sale varies dramatically between countries, based mainly upon the method of delivery. In many cases, particularly throughout much of Europe, the United States and Australia, natural gas is delivered in gaseous form via pipeline. Where physical pipelines are impractical or impossible, LNG allows gas to be transported via what is often described as a 'virtual pipeline.'²⁷ With natural gas becoming an increasingly important global fuel source, it is important to appreciate that pricing natural gas depends upon a range of complex factors.
- 13.8 Common measures for units of natural gas are the British Thermal Unit (BTU),²⁸ or the joule. In Australia, the common unit is the gigajoule (GJ), which is one billion joules.²⁹ LNG contracts are based on these units.
- 13.9 Crude oil has very high market liquidity, with oil generally sold directly or indirectly through global markets at competitive prices. There are numerous global oil price reference benchmarks, including the West Texas Intermediate price, the Brent Crude price and the Dubai Crude price, each of which refers to a specific type of crude oil at a specific delivery location. The West Texas Intermediate price, for example, refers to the price for a type of oil that has a specific set of characteristics,³⁰ sold at the trading hub in Cushing, Oklahoma. All oil traded in the United States of America (US) is 'benchmarked' against this value.
- 13.10 Because natural gas is more difficult to transport than oil, natural gas prices are determined by prevailing local factors, with gas transportation infrastructure and the pricing of alternative fuels such as diesel or coal perhaps being the most important of these.³¹
- 13.11 Australian LNG has historically been sold to Asian countries under long-term sales contracts. Here, the price calculation is determined by a formula combining the

27 The term 'virtual pipeline' was used by Mr Peter Wyse, Plant and Transport Manager of the Energy Developments Limited LNG plant just outside Karratha, to describe the way that road-conveyed LNG is used to fuel the various power stations in the West Kimberley Power Project. In essence, LNG is used to create a 'virtual pipeline' link between consumer and producer where physical pipeline infrastructure is either impossible or infeasible.

28 1 BTU is the amount of energy needed to heat (or cool) one pound of water by one degree Fahrenheit. Specifically, 1 BTU is equal to 1,055 joules. Typically, a single unit is one million BTUs (1 MMBTU).

29 1 GJ is also ever so slightly less than 1 MMBTU: 1 MMBTU = 1.054615 GJ.

30 WTI is referred to as a 'light crude oil,' with an American Petroleum Institute gravity of around 39.6, and a specific gravity of about 0.827; it contains about 0.24 per cent sulphur and is thus rated as a 'sweet crude oil.'

31 Natgas.info, *Gas pricing & contracts*. Available at: <http://www.natgas.info/html/gascontracts.html>. Accessed on 12 December 2013.

Chapter 13

prevailing crude oil prices, a negotiated price gradient and a fixed price element.³² This price calculation has been a central element of LNG project investment decisions. In its September 2012 commentary on Chevron's Gorgon project, Deutsche Bank observed:

*There remain major challenges [with the Gorgon project], but the first and foremost has been met, that of gas contracts. Up-front capital expenditure is so enormous for these developments that gas must be sold first, in huge quantities. That has been the biggest challenge [for Chevron]. The project is well contracted based on long-term oil-indexed [prices], to high quality North Asian offtakers.*³³

13.12 The historic importance of oil price indexation notwithstanding, it has been suggested that this pricing methodology may be threatened in the medium term, with the expansion in LNG supply tipped to generate increased competition among sellers.³⁴ This view, however, is not universal. It has also been argued that there is a 'good reason' to believe that oil-indexation will remain, primarily because 'risk aversion [among LNG buyers, who seek security of supply] drives oil price linkage.'³⁵ Nevertheless, Deutsche Bank Market Research suggests it is clear that any shift in the dynamics of LNG pricing would have significant implications.³⁶

13.13 Given this, it is useful to look at the historic pricing mechanism of the oil price reference benchmark known as the Japan Crude Cocktail (JCC). The JCC is the average price of all customs-cleared crude oil imports into Japan, and is calculated and published by the Japanese government every month. It is typically quoted in yen per kilolitre, and is generally in line with the \$US per barrel figure for other benchmarks. It is a variable element in the LNG price equation.³⁷

13.14 The 'negotiated factor' is the second element of the traditional LNG price calculation and is sometimes known as the 'price slope' of the oil/LNG derivation. The gradient of the agreed relationship between the price of oil and that of gas is based upon the fact that one standard unit of natural gas—1,000 cubic feet—contains about one sixth of the energy of one standard unit—one barrel—of crude oil.³⁸ The 'price slope' is typically expressed in percentage terms, so if heat-equivalent parity is used, the slope would be 16.67 per cent. In general, however, the slope is generally slightly below

32 EY, *Global LNG: Will new demand and new supply mean new pricing?*, 2013, p 14.

33 Deutsche Bank Markets Research, *Gorgon & the global LNG monster*, 17 September 2012, p 4.

34 'LNG: A liquid market', *The Economist*, 14 July 2012.

35 Deutsche Bank Markets Research, *Gorgon & the global LNG monster*, 17 September 2012, p 11.

36 *ibid.*

37 Petroleum Association of Japan, *Petroleum industry in Japan*, September 2013. Available at: <http://www.paj.gr.jp/english/data/paj2013.pdf>. Accessed on 28 January 2014.

38 Investopedia, *Barrel of oil equivalent*. Available at: <http://www.investopedia.com/terms/b/barrelofoilequivalent.asp>. Accessed on 20 December 2013.

parity to provide an incentive for customers to enter into long-term gas supply contracts as a substitute for oil. If, however, a buyer was willing to pay a premium for gas over oil, the negotiated factor could be set above heat-equivalent parity. Between 1970 and 2000, the slope was in the 14 per cent range. In more recent times it has moved up into the 15–16 per cent range.³⁹ In determining the price of a unit of gas based upon the benchmark price for oil, the chosen benchmark is multiplied by the negotiated factor.

- 13.15 The third component of the conventional LNG price formula is a constant term—a fixed price element, generally related to shipping costs, which is independent of movements in the price of oil. Bringing the benchmark price, negotiated factor and constant term together gives a formula for calculating LNG price.
- 13.16 In addition, many LNG sales contracts protect both buyers and sellers against significant oil price volatility by maintaining LNG prices through varying the oil price coefficient above a high oil price and below a low oil price. In effect, and owing largely to the history of LNG, this means that most conventional LNG supply contracts function to maintain LNG prices within a certain pre-defined band.
- 13.17 As the Asian LNG pricing mechanism reduces uncertainty around returns on the significant investment required for LNG projects, it has been an important feature of bringing reserves of natural gas to market as LNG. Some argue, however, that the historic Asian LNG pricing mechanism might become less prevalent in future LNG supply negotiations, as market competition between LNG producers increases, and buyers become more price-sensitive and less inclined to enter into long-term off-take agreements.⁴⁰
- 13.18 In addition, in 2014 there are three specific and unique factors bearing upon global LNG markets, which make it very difficult to forecast future market trends. First and foremost, the shale drilling boom in the US represents a paradigm shift in world gas markets, owing both to the imminent entry into global LNG markets by US-produced LNG and the technology that has made the viable recovery of natural gas from shale formations possible. In addition, while it is highly likely that China will become a significant natural gas consumer into the medium and long-term, it is currently extremely difficult to forecast potential Chinese LNG demand. Finally, in response to the April 2011 Fukushima Daiichi nuclear disaster, on 15 September 2013 Japan completed the process of shutting down each of the country's 50 nuclear reactors. Each reactor will have to pass new safety standards before being restarted. Prior to the

39 Natgas.info, *Gas pricing & contracts*. Available at: <http://www.natgas.info/html/gascontracts.html>. Accessed on 12 December 2013.

40 Graham, Chris, 'Shaping Australia's gas future', and Goswami, Rajnish, 'Asian gas markets: The opportunity for Australian producers', Papers presented at the Wood Mackenzie Perth Energy Forum 2013, Perth, 25 November 2013.

Fukushima disaster, about 30 per cent of Japanese electricity came from nuclear power. Since the disaster, LNG has been increasingly relied upon to fill the void.⁴¹

A moment of uncertainty

Exports of US shale gas?

13.19 Perhaps the most profound example of the changes in US gas business that have occurred over the past five years is the transformation of Sabine Pass LNG terminal in Cameron Parish, Louisiana. Designed and constructed between 2005 and 2009, the terminal was originally envisaged as ‘one of the world’s largest facilities for receiving and regasifying liquefied natural gas,’⁴² and was intended for when US domestic gas production declined to the point importing LNG would be necessary. In June 2008 the Henry Hub natural gas spot price—the central price index for natural gas in the US—reached US\$12.69 per million BTUs. Within 10 months the ‘shale gas revolution’ occurred and the price fell to US\$3.50 per million BTUs. Since then, the Henry Hub spot price has stayed roughly between US\$3 and US\$5.

13.20 The resulting abundance of cheap energy resulted in a resurgence in numerous sectors of the US economy in the past five years, including the manufacture of textiles⁴³ and the production of industrial chemicals.⁴⁴ In June 2012 the US Department of Energy permitted exports of LNG from the Sabine Pass facility, which was followed by a further three export permits being issued through the course of 2013.⁴⁵ In total, these permits will allow the export of about 50 million tonnes of LNG per annum from the US—a figure representing approximately 9 per cent of the country’s current annual natural gas production.⁴⁶

41 Matsuyama, Kanoko, ‘Shutdown of Japan’s last nuclear reactor raises power concerns’, *Bloomberg News*, 16 September 2013. Available at: <http://www.bloomberg.com/news/2013-09-16/shutdown-of-japan-s-last-nuclear-reactor-raises-power-concerns.html>. Accessed on 28 January 2014.

42 ‘LNG: A liquid market’, *The Economist*, 14 July 2012.

43 Clifford, Stephanie, ‘U.S. textile plants return, with floors largely empty of people’, *The New York Times*, 19 September 2013, Available at: http://www.nytimes.com/2013/09/20/business/us-textile-factories-return.html?_r=0&adxnnl=1&adxnnlx=1380082470-6SYFAiarWLNA41mgmt4Bsg. Accessed on 20 September 2013.

44 Crooks, Ed, ‘Shale gas boom helps US chemicals exports’, *The Financial Times*, 9 December 2013. Available at: <http://www.ft.com/cms/s/0/2b1753c4-6024-11e3-b360-00144feabdc0.html#axzz2ncDRxf00>. Accessed on 15 December 2013.

45 The process of assessing applications to export natural gas to countries for which the United States does not have a free trade agreement is particularly stringent. Of the 20 countries with whom the United States has a free trade agreement in force, only the Republic of Korea, Chile and Mexico offer material export potential.

46 Crooks, Ed, ‘US rivals brace for battle over LNG permits’, *The Financial Times*, 15 September 2013. Available at: <http://www.ft.com/intl/cms/s/0/9e2d4a48-1e08-11e3-85e0-00144feab7de.html#axzz2ncDRxf00>. Accessed on 15 December 2013.

- 13.21 The Sabine Pass facility is scheduled to begin production of LNG for export by the beginning of 2016, and some argue that the prospect of purchasing LNG at a price determined by reference to the Henry Hub spot price, rather than by oil-indexation, will alter the dynamics of the LNG market.⁴⁷ The first export deal involving Sabine Pass is instructive: the facility operator, Cheniere Energy, has agreed to sell gas to multinational companies including BG Group and Unión Fenosa at the Henry Hub price, with a 15 per cent mark-up and a liquefaction fee of US\$2.15 per million BTUs.⁴⁸ It is expected that LNG produced by the Sabine Pass facility will be sold to customers in Asia. According to some forecasts, if Henry Hub prices remain at around US\$4, the final price for this gas, including transport and regasification costs,⁴⁹ could be as low as US\$10, which would represent a significant discount on the current figure of about US\$16 for oil-indexed gas.⁵⁰
- 13.22 Predictions of the price that Asian customers may pay for US-produced LNG, however, are currently based upon a series of unproven assumptions. There are, for example, 25 applications for gas export permits presently being assessed by the US government.⁵¹ In May 2013 it was observed that approving all of the then-current applications would allow the equivalent of 41 per cent of the country's total 2013 production of natural gas to be exported.⁵² Although seven permits have been issued, it is unlikely that increased exports will be sanctioned at the expense of domestic gas requirements in

47 Graham, Chris, 'Shaping Australia's gas future', and Goswami, Rajnish, 'Asian gas markets: The opportunity for Australian producers', Papers presented at the Wood Mackenzie Perth Energy Forum 2013, Perth, 25 November 2013.

48 'LNG: A liquid market', *The Economist*, 14 July 2012.

49 At present, exports of LNG from Sabine Pass would take about 41 days to reach Japan, because LNG tankers are not able to pass through the Panama Canal and would instead need to travel around Cape Horn in South America. The capacity of the Panama Canal, however, will be significantly enhanced in 2015 with the completion of the Panama Canal expansion project. Though it is not clear whether the current largest LNG shipping vessels—known as Q-Max vessels—will be able to fit through the new, wider third set of locks, the expansion project will facilitate the shipment of LNG from the US Gulf Coast through the Panama Canal, enabling exports of LNG from Sabine Pass to reach Japan in about 25 days. Absent from this equation at the present time, however, is the tariff that the Panama Canal Authority will levy on shipments of LNG through the expanded Canal. Deutsche Bank analysts have estimated that shipping via Cape Horn would cost about US\$2.50 per unit of gas, and that shipping through the upgraded Panama Canal would reduce this to about US\$1.50 per unit of gas—with the saving likely offset by the Canal tariff. See Macdonald-Smith, 'Panama Canal expansion to draw US gas to Asia', *The Australian Financial Review*, 8 October 2013. Available at: http://www.afr.com/p/australia2-0/panama_canal_expansion_to_draw_us_gas_to_asia. Accessed on 15 December 2013.

50 'LNG: A liquid market', *The Economist*, 14 July 2012.

51 US Office of Fossil Energy, *Summary of LNG export applications*, 24 March 2014. Available at: <http://energy.gov/sites/prod/files/2014/03/f13/Summary%20of%20LNG%20Export%20Applications.pdf>. Accessed on 10 April 2014.

52 Efstathiou, Jim and Snyder, Jim, 'Obama seen expanding natural gas exports on production records', *Bloomberg.com*, 13 May 2013. Available at: <http://www.bloomberg.com/news/2013-05-13/obama-seen-expanding-natural-gas-exports-on-production-records.html>. Accessed on 15 December 2013.

Chapter 13

the US.⁵³ Furthermore, just as the effect of Henry Hub-priced LNG upon the global LNG market is unknown, so too is the effect that exports of LNG from the US may have upon the Henry Hub price itself. As such, the actual impact of US shale gas exports upon world LNG markets, other than the current atmosphere of uncertainty that prospect has produced, will not be known until these exports begin.

Chinese demand?

13.23 China holds approximately 13 per cent of proven global coal reserves and has long been the world's number one producer and consumer of coal. Nevertheless, owing largely to growing domestic concern with air quality, China is widely regarded as an emerging market for natural gas.⁵⁴ It has been reported that the Chinese Government's 'stated aim is to gasify the economy and carry gas' share of the energy mix from [about] 4% in 2010 to 10% by 2020.⁵⁵ The extent to which an increase in Chinese natural gas demand will impact upon the global LNG market is difficult to determine due to two specific factors.

13.24 First, China and Russia have been in negotiations over the construction of the proposed Altai gas pipeline which would facilitate a supply of gas into China from Western Siberia for more than 15 years.⁵⁶ China already imports significant quantities of natural gas via pipeline: the proposed Altai pipeline would complement existing pipelines from Turkmenistan (which opened in 2009) and Myanmar (which opened in 2013).⁵⁷ Increasing Chinese demand for natural gas will likely provide the final impetus for completing the deal with Russia. This will impact upon the amount of gas China will buy from other sources in liquefied form.

13.25 Second, there is significant shale gas potential in China. Some analysts have suggested that China could become a net exporter of natural gas, mirroring the shale gas experience in the US.⁵⁸ The mere existence of shale gas, however, does not guarantee that it can be successfully produced. For China to exploit its shale gas potential, significant sums of money will need to be devoted to exploration. As yet there has been little indication of an appetite to do so.⁵⁹ Furthermore, shale gas wells need in the

53 Deutsche Bank Markets Research, *Gorgon & the global LNG monster*, 17 September 2012, p 36.

54 Goswami, Rajnish, 'Asian gas markets: The opportunity for Australian producers', Paper presented at the Wood Mackenzie Energy Forum, Perth, 25 November 2013.

55 Deutsche Bank Markets Research, *Gorgon & the global LNG monster*, 17 September 2012, p 27.

56 Gazprom, *Altai project*. Available at: <http://www.gazprom.com/about/production/projects/pipelines/altai/>. Accessed on 28 January 2014.

57 Gronholt-Pedersen, Jacob, 'Myanmar pipelines to benefit China', *The Wall Street Journal*, 12 May 2013. Available at: <http://online.wsj.com/news/articles/SB10001424127887324326504578466951558644848>. Accessed on 28 January 2014.

58 Deutsche Bank Markets Research, *Gorgon & the global LNG monster*, 17 September 2012, p 27.

59 Goswami, Rajnish, 'Asian gas markets: The opportunity for Australian producers', Paper presented at the Wood Mackenzie Energy Forum, Perth, 25 November 2013.

vicinity of 15,000 tonnes of water per year to run—and water is an increasingly precious resource in China, which has 20 per cent of the world's population, but only 7 per cent of its fresh water.⁶⁰

The question of cost

- 13.26 It is difficult to forecast whether there will be upward or downward pressure on global LNG prices in the medium term. This heightens the risk associated with proposed, but as yet unsanctioned, LNG production projects because uncertainty as to the prevailing price of LNG effectively makes it impossible to forecast a project's rate of return. Furthermore, the scale of these projects—in December 2013 Woodside Petroleum, which has a market capitalisation of about \$32 billion, revealed that the Browse project would require in the region of \$80 billion of capital expenditure—means that a decision to proceed in the wrong circumstances could easily prove fatal for a petroleum producer.⁶¹
- 13.27 Nevertheless, growth in global demand for LNG is unlikely to wane. Once the effect of the imminent growth in global supply capacity is known, it is likely that long-term decisions regarding LNG production projects could be made with confidence. EY has summarised the present situation as follows: 'over the medium to longer term, there will most likely be a gradual but partial migration away from oil-linked pricing to more spot or hub-based pricing.'⁶² LNG prices, however, will almost certainly remain strong, because 'LNG is a very expensive game, and prices—however they are formed—must reflect this reality.'⁶³
- 13.28 Any move toward a more price-sensitive market will put pressure on LNG production costs. For the numerous proposed, but as yet unsanctioned, LNG production projects in Australia, this represents a significant challenge: for environmental, regulatory and social reasons, developing an Australian natural gas reservoir is seen as a relatively expensive undertaking.
- 13.29 The Committee received submissions from upstream petroleum companies echoing the sentiment that 'Australian LNG projects are now among the highest cost developments

60 'All dried up' and 'Desperate measures', *The Economist*, 12 October 2013.

61 There are a total of 823,910,657 shares in Woodside Petroleum listed on the Australian Stock Exchange. Since August 2013 these shares have fluctuated between a low price of about \$37 and a high price of just over \$39, with a six-month average price of \$38.36, at which price the company would have a market capitalisation of \$31.6 billion. In a letter to the Editor published in *The West Australian* newspaper on 18 December 2013, Woodside Vice-President of Corporate Affairs, Mr Roger Martin, revealed that the calculated capital expenditure for the James Price Point project was 'more than \$80 billion.' See Martin, Roger, 'No hidden agenda in floating gas technology', *The West Australian*, 18 December 2013, p 20.

62 EY, *Global LNG: Will new demand and new supply mean new pricing?*, 2013, p 3.

63 *ibid.*

Chapter 13

worldwide.’⁶⁴ According to Shell in Australia, ‘the cost disadvantages that Australian LNG projects have experienced in [the recent] investment peak have been exacerbated by multifactor productivity issues intrinsic to Australia, including remote locations and limited existing infrastructure, along with significantly higher labour costs than those of other LNG exporting countries.’⁶⁵

13.30 Mr Rob Cole, an Executive Director of Woodside Petroleum, advised the Committee that:

*in a globally competitive environment, managing the cost of supply to customers is of critical importance. It has become clear to us that the existing model of large onshore LNG plants needs to be revised... In our view, we need to focus on commoditising technologies, on innovation rather than opting for conventional bespoke solutions each time.*⁶⁶

13.31 According to Mr Cole, Woodside’s belief in the value of FLNG technology within the Australian petroleum industry is based on the fact that:

*FLNG comprises longstanding proven technology on a floating facility, and carries strong economic appeal as it allows companies to phase capital expenditure on large, very capital-intensive developments.*⁶⁷

13.32 This argument was re-iterated by the Country Chair of Shell in Australia, Mr Andrew Smith, who said that the ‘industry is facing more competition than ever with new sources of low-cost supply competing in our traditional Asia–Pacific markets, particularly from Africa and North America. FLNG is a direct technology response to those market conditions.’⁶⁸ Ultimately Mr Smith informed the Committee that ‘in some cases it will be floating LNG or the gas will remain in place.’⁶⁹

13.33 In essence, these sentiments echoed Deutsche Bank’s September 2012 assessment that ‘Australia is slowly pricing itself out of the market.’⁷⁰ Over the course of its 25-year history, the Australian LNG industry has developed a strong track record providing security of supply to its customers, and this will remain an attractive element of Australian LNG into the future. For proposed but as yet unsanctioned Australian LNG projects, however, the perception of Australia as a high-cost country represents a particular challenge in this moment of uncertainty.

64 Submission No. 15 from Shell in Australia, 30 August 2013, p 5.

65 Submission No. 15 from Shell in Australia, 30 August 2013, p 6.

66 Mr Robert Cole, Executive Director, Woodside Petroleum, *Transcript of Evidence*, 16 October 2013, p 2.

67 *ibid.*

68 Mr Andrew Smith, Country Chair, Shell in Australia, *Transcript of Evidence*, 23 October 2013, p 2.

69 *ibid.*, p 4.

70 Deutsche Bank Markets Research, *Gorgon & the global LNG monster*, 17 September 2012, p 38.

Chapter 14

FLNG in Australia: A reasonable response?

As the energy seeking nations push farther and farther out onto the continental shelf of the world in their quest for hydrocarbon reserves to fulfill the requirements of an industrialized world, the inherent problems associated with the production of this energy become more complex. Water depths are greater, sea-states more severe, distances to shore longer, and in general a more hostile environment exists.

Mr M.C. Terry, paper presented at the Seventh Annual Offshore Technology Conference
Houston, Texas, 1975⁷¹

14.1 The intention of companies such as Shell, Woodside and GDF SUEZ Bonaparte to develop natural gas fields using FLNG technology represents a clear shift from traditional land-based processing. Companies who are either developing or considering developing gas fields using FLNG technology have explained their decision in terms of the challenges of doing business in Australia, or what is termed the 'drivers' for FLNG. In evidence to this Inquiry, the most notable drivers are the perception of Australia as a high-cost, low-productivity country, increasing sovereign risk and increasing competition for supply and for investment capital.

14.2 This chapter briefly describes the shift to FLNG as a means to develop economically and/or geographically stranded gas, noting that FLNG does not have universal acceptance in the oil and gas industry. Following this, each of the main drivers for FLNG is discussed in detail.

The trend toward FLNG

14.3 As noted previously, LNG production facilities have traditionally been built onshore. For the Australian Petroleum Production and Exploration Association (APPEA), the development of LNG technologies was an innovative solution to make 'natural gas available to more distant markets that were not previously able to be reached by pipeline.'⁷²

14.4 Similarly, the development of floating production, storage and offloading vessels (FPSOs) was a technological solution to the challenge presented by marginal or uncommercial fields, especially in remote or deep water locations. They were able to

71 Terry, M C, 'Floating offshore LNG liquefaction facility –a cost effective alternative', paper presented at the seventh annual offshore technology conference held in Houston, Texas, 5-8 May 1975. Mr Terry was then an engineer working for Global Marine Development Inc.

72 Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, p 5.

Chapter 14

produce large quantities of high pressure oil and associated gas, and were suitable for operating in areas subject to cyclones.⁷³

14.5 The Committee received considerable evidence to the effect that FLNG are being designed and built from existing FPSO technologies and that it represented the continuing evolution of LNG technology.⁷⁴

14.6 For APPEA, FLNG will provide operators:

*with a means of potentially commercialising deepwater or greenfield gas resources that would otherwise be too small, expensive or technically difficult to extract.*⁷⁵

14.7 FLNG is a means of developing gas fields that were previously not viable largely due to their remote and challenging locations. For GDF SUEZ Bonaparte Pty Ltd, FLNG is the latest innovative offshore technology.⁷⁶ In June 2013, Shell advised that FLNG was:

*another response to that environment [the position of the Australian LNG industry] and to remain competitive. It has evolved in recent years to a solution to smaller gas resources or more remote and is now being considered by people in Australia and in other countries as a solution for cost competitiveness and to be competitive in that market we have been talking about.*⁷⁷

14.8 According to Shell, 'FLNG has become widely recognised as a viable (or possibly the only viable) development option for smaller and/or more remote gas resources, as is the case for Prelude. In many cases, the choice is to develop a gas field with FLNG technology or not develop at all.'⁷⁸ The issue of stranded gas is discussed further in Chapter 1 (Volume 1).

14.9 The Committee accepts that there may be gas fields where FLNG is the only development option. However, the Committee does not accept the argument that it is

73 *ibid*; and Standing Committee on Industry, Science and Resources, *A sea of indifference—Australian industry participation in the North West Shelf project*, Parliament of Australia, Canberra, 30 March 1998, p 68.

74 See, for example, Submission No. 27 from Department of State Development, 2 October 2013, pp 2–3; Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, p 5; Mr Luke Musgrave, Vice president, LNG, ExxonMobil (Australia), *Transcript of Evidence*, 21 October 2013, pp 2–3.

75 Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, p 13.

76 Mr Jean-François Letellier, General Manager, GDF SUEZ Bonaparte Pty Ltd, *Transcript of Evidence*, 21 October 2013, p 2.

77 Mr Steven Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 4.

78 Submission No. 15 from Shell in Australia, 30 August 2013, p 8. The concept of 'economically viable' is discussed later in this chapter.

FLNG or no development at all for offshore gas fields such as Browse. For example, the resources being developed by the Prelude FLNG facility could have been developed as a satellite to the Ichthys field, given the proximity of these resources.⁷⁹ This is demonstrated in the maps provided at Appendix Nine and Ten.

14.10 These types of arrangements ‘would require enhanced cooperation between resource companies.’⁸⁰ The Department of Mines and Petroleum (DMP) agreed that the Prelude fields could have been developed through the Ichthys field and that ‘this would be a commercial matter driven by beneficial mutual interest between Shell and Inpex/Total.’⁸¹

14.11 Nevertheless, there are a number of other possibilities open to project proponents and government, including the:

- deferral of development until the field becomes economically viable;
- surrender or transfer of the retention lease;
- undertaking of further evaluation, including possible joint development with other fields; or
- non-renewal of the lease by government.

Finding 66

Enhanced cooperation between project proponents, such as sharing gas pipelines, processing trains and other gas field infrastructure, could be a viable alternative to FLNG technology for some reserves.

Recommendation 32

The Western Australian and Commonwealth Governments examine, as a matter of priority, the sharing of offshore gas field infrastructure to maximise the efficiency of resource development returns to Australia.

14.12 While FLNG is expected to allow development of fields previously considered economically unviable, evidence to the Committee suggested that this did not mean that FLNG would be used for all fields. Rather, development options would be considered on a case by case basis. For example, Mr Jean-François Letellier, General Manager of GDF SUEZ Bonaparte Pty Ltd argued that ‘FLNG was not a religion’ for the company; what is important is how they ‘can best monetise the gas fields.’⁸²

79 Submission No. 51, Department of State Development, 27 February 2014, p 2.

80 Submission No. 51, Department of State Development, 27 February 2014, p 2; and Submission No. 52, Department of Mines and Petroleum, 28 February 2014, p 3.

81 Submission No. 52, Department of Mines and Petroleum, 28 February 2014, p 3.

82 Mr Jean-François Letellier, General Manager, GDF SUEZ Bonaparte Pty Ltd, *Transcript of Evidence*, 21 October 2013, p 8.

Chapter 14

- 14.13 Shell also stated that, while FLNG ‘adds to the diversity of options’ it would not be ‘the only solution.’⁸³
- 14.14 Similarly, Mr John Anderson, Vice President, WA and NT, Santos Ltd, stated that different concepts would be screened for a project and that while he liked to think that ‘the land-based scenario would come through most economically, [but] it genuinely is horses for courses, and your concept selection process will quickly determine the merit order of development.’⁸⁴
- 14.15 Woodside advised that the complexity of the offshore field, that is, the nature of the gas and the field’s location, is the driver for an FLNG development. Woodside’s decision to develop Browse using FLNG technology:
- is not something that would necessarily apply to every project going forward. It depends on the location of the reserves compared with land and other infrastructure and the complexity of the reservoir and the hydrocarbons within the reservoir. It is that which drives the final solution.*⁸⁵
- 14.16 The Chamber of Minerals and Energy of Western Australia (Inc) (CMEWA) submitted that while FLNG would allow the development of previously unviable gas fields, it was ‘expected to comprise a relatively small proportion of the overall growth.’⁸⁶
- 14.17 Nevertheless, Shell, Woodside, Santos and Exxon are all either developing with FLNG technology or considering it as their development concept of choice. Furthermore, Mr Letellier advised that he was not aware of a gas composition that would make the field unsuitable for FLNG, with the possible exception of a carbon dioxide content that was too high.⁸⁷
- 14.18 Promotional material on Shell Global’s website states that the company ‘expect[s] Prelude FLNG to be the first of many FLNG projects. This approach makes it possible to unlock new natural gas resources, including smaller, remote fields as well as large fields supported by several facilities.’⁸⁸

83 Mr Andrew Smith, Country Chair, Shell in Australia, *Transcript of Evidence*, 23 October 2013, p 3.

84 Mr John Anderson, Vice President, WA and NT, Santos Ltd, *Transcript of Evidence*, 21 October 2013, p 2.

85 Mr Stephen Rogers, Senior Vice President, Woodside Petroleum, *Transcript of Evidence*, 16 October 2013, p 12–13.

86 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 7.

87 Mr Jean-François Letellier, General Manager, GDF SUEZ Bonaparte Pty Ltd, *Transcript of Evidence*, 21 October 2013, p 8.

88 Shell Global, *Future of energy. Natural gas. Floating liquefied natural gas (FLNG)*. Available at: <http://www.shell.com/global/future-energy/natural-gas/flng.html>. Accessed on 13 January 2013.

- 14.19 In addition to allowing access to economically and geographically stranded gas, companies argue that FLNG is an attractive option because it ‘simplif[ies] a number of matters and it does allow you to phase in and control spend in the capital phase’,⁸⁹ and ‘at its core FLNG now offers greater flexibility in the development of resources in a more efficient and cost effective manner.’⁹⁰
- 14.20 APPEA also argues that the reduced need to consider geographical differences and on-shore restrictions means that ‘the industry expects to achieve a higher level of repeatability in the design of FLNG facilities than achieved in onshore plants.’⁹¹
- 14.21 According to the Department of State Development (DSD), companies claim FLNG will allow them:

*to keep better control of capital costs through the use of shipyards to construct their vessels, the potential to re-use FLNG vessels and a reduction in construction costs over time as construction in the more controlled environment becomes increasingly standardised.*⁹²

- 14.22 Furthermore, as the development occurs wholly offshore, FLNG removes the requirement to deal with three levels of government. As DSD states, ‘in the absence of the requirement to access land for onshore gas processing, FLNG projects are unlikely to incur the costs typically associated with securing land such as native title, environmental and other approvals.’⁹³

Drivers for FLNG developments off Australia’s coast

- 14.23 In addition to showing why FLNG was an attractive gas field development option, witnesses also gave evidence as to why they thought FLNG was a *more* attractive option than onshore development for Australian gas fields. This was typically discussed in terms of the key drivers for the move to FLNG developments or, in other words, the key challenges faced by the proponents of oil and gas developments in Australia. Ultimately, these were all seen as impacting on the development cost and, thus, the rate of return of LNG projects in Australia.

89 Mr Steven Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 4.

90 Submission No. 19 from INPEX Operations Australia Pty Ltd, 30 August 2013, p 7. Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, pp 14–16 sets out data from McKinsey and Company, *Extending the LNG boom: Improving Australian LNG productivity and competitiveness*, May 2013, that details the possible cost differential between an FLNG and a traditional onshore LNG project.

91 Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, p 14.

92 Submission No. 27 from Department of State Development, 2 October 2013, p 1.

93 *ibid.*

Chapter 14

14.24 The following list provided in CMEWA's submission is representative of the factors generally seen by project proponents as a challenge to project development in Australia:

- *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.*
[...]
- *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.*⁹⁴

14.25 Oil and gas companies and business advocacy organisations advised the Committee that Australia was now considered a high cost location in which to operate. This is demonstrated by statements such as the following:

*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.*⁹⁵

*Combined with pressure from the global expansion of the industry Australia has become one of [the] most expensive countries in the world for constructing LNG projects.*⁹⁶

94 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 14. See also: Submission No. 10 from Chamber of Commerce and Industry of Western Australia (Inc), 30 August, 2013, p 7; Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, pp 9–10; and Mrs Shannon Burdeu, Manager, Economics and Tax, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Evidence*, 1 November 2013, p 2.

95 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 3.

*Australian LNG projects are now amongst the highest cost developments worldwide.*⁹⁷

*[R]esearch has identified that the cost of doing business in Western Australia has put us at the wrong end of the cost curve, with us being at the more expensive end. Unfortunately, LNG projects in Western Australia are becoming less competitive in a significant manner, with the costs of building and operating LNG facilities continuing to increase over and above that of our competitors.*⁹⁸

*Australia has a relative disadvantage in costs.*⁹⁹

14.26 Much of the evidence presented cited the May 2013 McKinsey and Company report, which found that ‘the cost of building new LNG projects has increased tremendously in the past decade and is now about 20–30 percent [*sic*] higher than that of the competition in North America and East Africa.’¹⁰⁰

14.27 It is unfortunate that, for commercial confidentiality reasons, companies did not feel able to provide the Committee with evidence of their own costs of doing business in Australia. This has made it difficult for the Committee to make detailed assessments of statements relating to the cost drivers affecting development decisions.

14.28 Based on McKinsey and Company data on global planned and speculative LNG export capacity, the CMEWA suggests that the cost of producing LNG in Australia will make it ‘less likely for Australian projects to be competitive and proceed.’¹⁰¹

14.29 Also citing McKinsey and Company, APPEA argues that Australia’s ‘cost competitiveness is very important as “higher costs jeopardise the chance of potential projects being built in Australia”.’¹⁰² Similarly, ConocoPhillips states that in global terms ‘Australia’s competitiveness is challenged. Australia is already a higher cost LNG producer, by

96 Submission No. 24 from Woodside Energy Ltd, 4 September 2013, p 9.

97 Submission No. 15 from Shell in Australia, 30 August 2013, p 5.

98 Ms Nicole Roocke, Director, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Briefing*, 26 June 2013, p 5.

99 Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association Limited, *Transcript of Evidence*, 26 June 2013, p 7.

100 Ellis, Michael, Heyning, Christiaan, and Legrand, Olivier, *Extending the LNG boom: Improving Australian LNG productivity and competitiveness*, McKinsey & Company, Australia, May 2013, p 1, p 11 and p 15.

101 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 7.

102 Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, p 8.

Chapter 14

global standards, which makes Australia less attractive for future projects developed in the conventional way.¹⁰³

FLNG as an industry response

14.30 For some, FLNG is seen as the industry response to the cost pressures associated with oil and gas developments in Australia. The CMEWA advised that:

*floating LNG facilities provide project proponents another development option, which has the potential, in certain circumstances, to address these growing costs in Western Australia... McKinsey and Company's report estimates floating LNG facilities could be around 10 to 12 percent cheaper than the Australian base case projects assessed.*¹⁰⁴

14.31 This view was supported by oil and gas companies. For example, Chevron's Mr Roy Krzywosinski believes that 'it is clear that floating LNG... is an industry response to Australia's high cost environment.'¹⁰⁵ Santos also sees FLNG as a lower cost option that will afford Australia 'the opportunity to meet the growing demand for gas from Asia.'¹⁰⁶

14.32 Shell views FLNG in Australia as:

*a direct response to market conditions, allowing the Australian LNG sector to remain cost-competitive and capture Asia-Pacific LNG market opportunities. The same is true in a number of other LNG supply countries globally, where FLNG is also being actively considered.*¹⁰⁷

14.33 Shell further argues that 'the LNG industry has now also recognised the broader potential that FLNG technology has to address cost competitiveness. In Australia, significant cost pressures have seen material increases in announced capital expenditures for major onshore LNG projects.'¹⁰⁸

14.34 Woodside submitted that it had 'identified the cost challenges associated with operating in Australia' and was examining FLNG as a development model whose benefits would 'deliver improvements and competitive advantage.'¹⁰⁹

14.35 While the Committee accepts that oil and gas development is a high cost industry and that there are particular cost pressures on Western Australia (WA), statements that

103 Submission No. 17 from ConocoPhillips Australia Pty Ltd, 30 August 2013, p 3.

104 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 18.

105 Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 4.

106 Submission No. 29 from Santos Limited, 17 October 2013, p 3.

107 Submission No. 15 from Shell in Australia, 30 August 2013, p 1.

108 Submission No. 15 from Shell in Australia, 30 August 2013, p 8.

109 Submission No. 24 from Woodside Energy Ltd, 4 September 2013, p 15.

‘Australia is a high cost country’ do not in themselves reveal the complexity of the situation. General statements such as these need to be considered in the context of what it means to develop an oil and gas project in WA.

14.36 The following sections examine in more detail the main challenges industry suggests it faces in relation to doing business in Australia, namely higher wage costs and lower productivity; the duplication in approval processes in various levels of government; sovereign risk; and increasing global competition in the gas market. While these are clearly inter-related, they have been separated for ease of discussion.

Higher wage costs and lower productivity

14.37 As noted, Australia has a reputation for being a high cost, lower productivity country, with a large part of this attributed to high wage costs. The Committee heard considerable evidence based on McKinsey and Company research that stated that Australian projects are now 20 to 30 per cent more expensive to develop than others.¹¹⁰ The Committee also heard that it requires 35 per cent more labour to deliver a project in Australia than in the United States of America (US).¹¹¹

14.38 It would be reasonable to expect that project proponents would argue that wages were too high and that unions would argue the opposite, one in the name of maximum return to shareholders, the other for improved wages and conditions for workers. As will be demonstrated below, it is true that wages in Australia are relatively high and that Australian projects may require more labour to complete than others. However, the statistics quoted above do not tell the whole story and, thus, may lead to inaccurate perceptions of Australian industry.

14.39 To better understand the productivity levels of Australian projects it is necessary to examine a number of underlying factors. Only then can a clearer picture of Australia’s productivity challenge be revealed.

14.40 McKinsey and Company divide key cost drivers into those which are compressible, that is, ‘within the technical or managerial control of the operator or of policy makers’ and incompressible, which are fixed and/or non-controllable factors.¹¹²

14.41 In comparing Australian and Canadian projects, all with an onshore LNG facility, McKinsey and Company determined that Australian projects were between 20 and 30

110 Evidence referring to the McKinsey and Company report includes that from APPEA, CMEWA, CCIWA, Woodside, Chevron and Santos.

111 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 15; and Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 2.

112 Ellis, Michael, Heyning, Christiaan, and Legrand, Olivier, *Extending the LNG boom: Improving Australian LNG productivity and competitiveness*, McKinsey & Company, Australia, May 2013, p 13.

per cent more costly than Canadian. The proportion of this overall cost difference for individual major key incompressible and compressible cost drivers are set out in Table 14.1. It is important to note that comparison is between a coal seam gas project in Eastern Australia and an unconventional gas project in Canada. It is also based on the breakeven landed cost in Japan in US\$ per million British Thermal Units (BTU). In McKinsey and Company's comparison, the breakeven landed cost for the Canadian project was approximately 9.2 versus 12.0 for the Australian project.¹¹³

Table 14.1 Percentage of cost difference of Australian LNG projects compared to Canadian projects (for unconventional gas)¹¹⁴

Cost driver	Percentage higher (lower)
Incompressible/Uncontrollable	
Reservoir characteristics	24–36
Inflation rates	12
Climate related plant efficiency	8
Shipping distance	(4)
Compressible/Controllable	
Tax regime and royalty payments	32
Project optimisation—project management practices*	12
Labour productivity	8
Service market maturity, including supply chains, logistics and infrastructure	4
Regulatory approvals efficiency and delays	1.2

* via lean design engineering and production, best-in-class contract management and best-in-class claims management.

14.42 As Table 14.1 shows, reservoir characteristics account for a very significant proportion of the overall cost difference between Australian and Canadian projects (24 to 36 per cent). This is based on the assumption that 20 to 30 per cent more wells per million tonnes of annual production (mtpa) will be required for the Australian project than for the Canadian. Because turbines are less efficient in Australia's higher air temperatures, Australian climate-related efficiency accounts for eight per cent of the gap. Australia's relatively close proximity to Japan results in a cost advantage over Canada, while its higher inflation rate accounts for 12 per cent of the cost gap.¹¹⁵

14.43 As well as the reservoir characteristics of various fields, it is important to note the location of WA's gas fields; that is, they are off the north west coast in what is generally

113 *ibid*, p 15.

114 *ibid*, pp 13–15.

115 *ibid*, p 15.

acknowledged as remote locations with little supporting infrastructure. The remote location of WA's gas fields also adds to the cost of development, as demonstrated by the following:

*[T]he intrinsic cost and scope of undertaking projects in remote and environmentally sensitive regions, this has made Australia one of the most expensive places in the world to build LNG plants onshore.*¹¹⁶

*Australia is already a higher cost LNG producer, by global standards, which makes Australia less attractive for future projects developed in the conventional way. The underlying field reservoir qualities, size and remoteness have a major impact on a project's competitiveness, with many of the undeveloped discoveries in Australia having much lower liquid yields than developed projects and/or are located further from shore or supporting infrastructure.*¹¹⁷

*The cost disadvantages that Australian LNG projects have experienced in this investment peak have been exacerbated by multi-factor productivity issues intrinsic to Australia, including remote locations and limited existing infrastructure, along with significantly higher labour costs than those of other LNG exporting countries.*¹¹⁸

14.44 As noted in Table 14.1, the negative impact of climate on plant efficiency in Australia is significant. The location of WA's natural resources means that weather is a critical factor in their construction and operation. As Mr Krzywosinski acknowledged, weather delays have been a factor in the costs overruns in the Gorgon project.¹¹⁹

14.45 In discussing labour productivity, Mr Stephen Price, Secretary of the Australian Workers' Union (AWU) stated that:

*there have been quite a number of significant weather events that have impacted on the island [Barrow Island]. You have got procedures in place for cyclones and bad weather over there, where you have to either remove people or lock it down. That causes a significant delay in the productivity that goes on during that period.*¹²⁰

116 Submission No. 13 from BP, 30 August 2013, p 2.

117 Submission No. 17 from ConocoPhillips, 30 August 2013, p 3.

118 Submission No. 15 from Shell in Australia, 30 August 2013, p 6.

119 Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 2.

120 Mr Stephen Price, Secretary, Australian Worker's Union, *Transcript of Evidence*, 1 November 2013, p 5.

Chapter 14

14.46 Mr Krzywosinski agreed that the environment was a significant challenge:

*Now, there is no doubting the fact that being on not just a class A nature reserve but an island resulted in some challenges because you are limited in your supply chains and marine vessels and boats and things of that nature to deliver materials.*¹²¹

Productivity in the Australian resources industry

14.47 Australian Bureau of Statistics (ABS) 12 industry market sector data for the period 1989–1990 to 2011–2012 shows an *increase in labour productivity* in Australia, while capital productivity has declined. This is clearly demonstrated in Figure 14.1.¹²²

14.48 ABS calculates multifactor productivity (MFP) as the output per unit of combined labour and capital inputs.¹²³ This means that it is based on volume rather than dollar value.

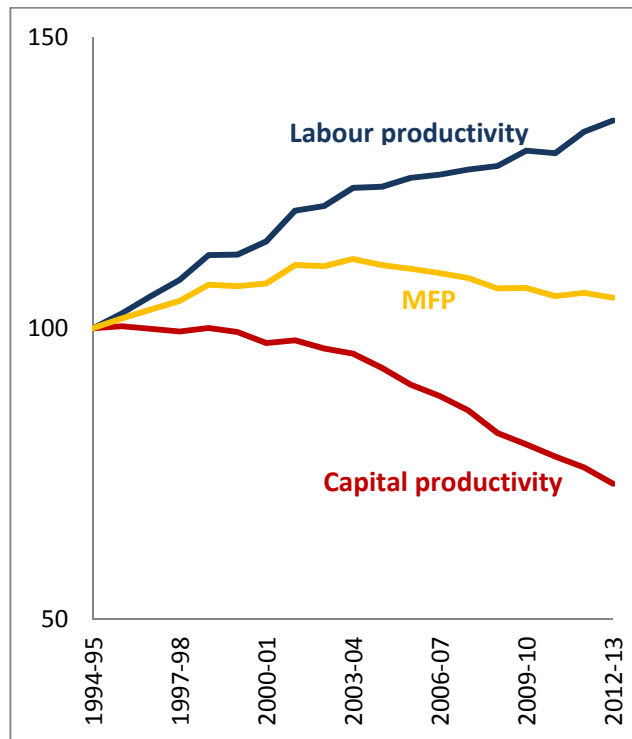
14.49 In relation to the mining sector, the Productivity Commission notes that ABS data shows that MFP in the mining sector ‘has declined by 40 per cent in the eight years since 2003–04’ and that on average, mining industry businesses ‘used 67 per cent more inputs (capital and labour) to produce each unit of output in 2011–12 than they did eight years ago.’¹²⁴

121 Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 5.

122 Productivity Commission, *Productivity update*, Australian Government, Canberra, May 2013, p 25 and p 3.

123 *ibid.*

124 *ibid.*, p 25 and p 26.

Figure 14.1: ABS productivity estimates, 1994-1995 to 2012-2013¹²⁵

14.50 According to the Productivity Commission there are two main influences in resource sector MFP. The first relates to the 'average quality of resource deposits being exploited.'¹²⁶ The Productivity Commission also notes that the high commodity prices of the last eight years had a negative impact on MFP, adding to its decline.¹²⁷ Declining resource quality has resulted in approximately 2.5 per cent per annum higher input requirements over the same eight year period.

14.51 The second influence has been the 'temporary mismatch between measured input growth and measured output growth' caused by the lengthy construction phase of major projects and the time taken to enter full production.¹²⁸ Production lags account for approximately 33 per cent of the reduction in mining MFP up to 2006-07 and remain 'an important source of negative MFP growth up to 2009-10'.¹²⁹

125 Source data obtained from the Australian Bureau of Statistics, *Estimates of industry multifactor productivity*, December 2013, Cat. No. 5260.0.55.002. Available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/A834424832179D03CA25739B00158F99?opendocument>. Accessed on 24 March 2014. Data adjusted to make 1994-1995 the index with a value of 100.

126 Productivity Commission, *Productivity update*, Australian Government, Canberra, May 2013, p 25 and p 26.

127 *ibid*, p 25 and p 27.

128 *ibid*.

129 *ibid*.

Chapter 14

- 14.52 The Productivity Commission's analysis of the drivers of negative productivity growth in mining does not attribute this to labour productivity. As noted above, labour productivity is based on volume, that is, hours per unit rather than price per unit. In effect, the price of labour is abstracted from ABS calculations. While productivity impacts profitability, when discussing project productivity it is important not to confuse it with the project's profitability.

Australia is a high wages country, but...

- 14.53 The Chamber of Commerce and Industry of Western Australia (Inc) (CCIWA) advised that wage costs had increased significantly over the past ten years:

*There has been an overall increase of around 85 per cent over the past decade, from around \$887 to \$1645. That is on an average weekly earnings basis. In terms of a wage cost index basis, overall, the increase over the same time period is 52.8 per cent in Western Australia.*¹³⁰

- 14.54 According to CCIWA, 'while these figures reflect the wider economy, wage costs have clearly increased as demand from resources projects has increased, diminishing labour productivity.'¹³¹ The issue of labour demand will be discussed further below. What is clear is that wages in Australia are relatively high, which means, generally speaking, that Australians enjoy a relatively high standard of living.¹³²
- 14.55 According to the Organisation for Economic Co-operation and Development (OECD), which publishes and maintains a global *Better Life Index*, 'Australia performs exceptionally well in measures of well-being.'¹³³ Acknowledging that money 'is an important means to achieving higher living standards', the *Better Life Index* determines that Australia's 'average household net-adjusted disposable income is 28 884 USD a year, more than the OECD average of 23 047 USD a year.'¹³⁴ Australia has topped the OECD rankings for the 34 OECD countries for the past three years.¹³⁵

130 Mr John Nicolaou, Chief Officer, Member Services and Advocacy; Chief Economist, The Chamber of Commerce and Industry of Western Australia (Inc), *Transcript of Evidence*, 1 November 2013, p 8.

131 Submission No. 10 from The Chamber of Commerce and Industry of Western Australia (Inc), 30 August, 2013, p 6.

132 The Committee acknowledges that there are people living in Australia who experience economic hardship.

133 Organisation for Economic Co-operation and Development, *Better life index*, 2013. Available at: <http://www.oecdbetterlifeindex.org/countries/australia/>. Accessed on 20 January 2014.

134 *ibid*.

135 Australian Trade Commission, *Investor updates. Data alert: Australia tops OECD better life index*, 6 June 2013. Available at: <http://www.austrade.gov.au/Invest/Investor-Updates/2013/0606-Data-Alert-Australia-tops-OECD-Better-Life-Index>. Accessed on 20 January 2014.

- 14.56 Reporting on resources projects, particularly on budget overruns, often draws attention to the high cost of labour in Australia. For example:

*Australian oil and gas workers earn \$163,600 a year on average, 35 percent more than employees in the U.S. and almost double the global average.*¹³⁶

*Paid like surgeons: 240k a year Rio Tinto train drivers to be replaced by robots*¹³⁷

- 14.57 Again the Committee suggests that such general statements, even when factually accurate, are potentially misleading.
- 14.58 As noted previously, evidence to the Committee suggested that the high cost of doing business in Australia was partly attributable to the high cost of wages. For example, as well as many references to the McKinsey and Company report of the 30–40 per cent higher cost of Australian projects, the Committee’s attention was drawn to reports from the Business Council of Australia (BCA) and Hays recruiting agents for the oil and gas sector.¹³⁸
- 14.59 The BCA draws attention to research that ‘found resources projects are over 40 per cent more expensive to deliver in Australia than in the US Gulf Coast, a common benchmark used in the industry to reflect best practice.’¹³⁹ Furthermore, ‘Australian resource projects are generally costed on the basis of labour productivity being 35 per cent less than in the US Gulf Coast.’¹⁴⁰
- 14.60 The Committee is not surprised that the cost of Australian projects is higher than those of the US Gulf Coast, given the vast knowledge that exists in relation to those resources

136 Paton, James, ‘Highest-paid workers driving Shell off Australian shores’, *Bloomberg*, 26 April 2013, p 1. Available at: <http://www.bloomberg.com/news/2013-04-25/highest-paid-workers-driving-shell-gas-terminal-offshore.html>. Accessed on 16 January 2014.

137 *Paid like surgeons: 240k a year Rio Tinto train drivers to be replaced by robots*, Media Statement, *Sydney Morning Herald*, Business Day, 3 October 2013. Available at: <http://www.smh.com.au/business/mining-and-resources/paid-like-surgeons-240k-a-year-rio-tinto-train-drivers-to-be-replaced-by-robots-20131003-2utlw.html#ixzz2qtWJL3NH>. Accessed on 20 January 2014. ABC Fact Check stated: ‘It’s likely these drivers are among the highest paid in the world, given the unique conditions in the Pilbara and Australia’s high salary ranking in the resources and mining industry, but it is impossible to know for sure’. See: <http://www.abc.net.au/news/2013-10-30/are-train-drivers-in-the-pilbara-the-highest-paid-in-the-world/5029012>.

138 See, for example, Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 4; Mrs Shannon Burdeu, Manager, Economics and Tax, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Evidence*, 1 November 2013, p 3; Submission No. 12 from Australian Petroleum Production and Exploration Association Limited, 30 August 2013, p 9.

139 Business Council of Australia, *Securing investment in Australia’s future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013, p 22.

140 *ibid*.

Chapter 14

and the different terrain in which the resource is located. Comparisons such as this are not comparing like with like, and risk producing statistics that are easily translated into headlines rather than improving understanding of the oil and gas sector in Australia.

14.61 Hays' *Oil & Gas Global Salary Guide 2013* publishes salary data generated from 25,000 survey respondents. Table 14.2 shows the average annual salary in the oil and gas sector in a selection of countries. Clearly, annual salaries are much higher in Australia, both for local and imported labour.

Table 14.2 Local base average annual salary in the oil and gas sector 2012 (US\$)¹⁴¹

Country	Local	Imported
Australia	163,600	171,000
Canada	123,000	122,500
China	68,300	161,400
Indonesia	45,200	146,000
Norway	152,600	128,600
Russia	57,900	151,100
USA	121,400	123,800

14.62 These base salaries do not include employee benefits such as bonuses, health benefits, tax assistance, housing and other allowances. Globally, those who do not receive benefits on top of their salary range from 25 per cent in South America to 49 per cent in Europe, with 43 per cent of Australian employees not receiving further benefits.¹⁴²

14.63 It is also clear that contractor day rates are higher in the Australasian region than elsewhere. As Table 14.3 shows, day rates range from US\$690 for an operator/technician to US\$1,590 for a vice president/director.

141 Hays Oil and Gas, *Oil & Gas Global Salary Guide 2013*, Hays Plc, United Kingdom, 2013, p 6.

142 *ibid*, pp 14–15.

Table 14.3: Contractor Day Rates by Region 2012 (USD)¹⁴³

Region	Operator / Technician	Intermediate	Senior	Manager Lead / Principal	VP/Director
Northern Europe	430	490	720	850	1,130
Western Europe	390	360	550	770	940
Australasia	690	700	940	1,330	1,590
North America	420	490	760	840	1,110

14.64 In discussing hourly charge out rates for construction trades in Australia, the United Kingdom and the USA, BCA states that ‘a large part of the differential... can be explained by the appreciation of the Australian dollar—which makes Australia rates appear higher when US and UK rates are expressed in Australian dollars.’¹⁴⁴ It is reasonable to assume that the same would apply to charge out rates and salaries in the oil and gas sector generally.

14.65 According to the BCA, one of the key drivers of labour costs and unsatisfactory productivity is the workplace relations system. The BCA reports that the current system:

- *Enables unions to use the agreement negotiating process to ramp up high terms and conditions as project proponents are having to meet deadlines at critical stages in the project start-up and delivery*
- *Limits the capacity to achieve productivity offsets to balance wage levels*
- *Enables unions to prevent project proponents from using contractors and other arrangements to manage workforce numbers and deployment through the different stages of a project in line with workforce demands.*¹⁴⁵

143 *ibid*, p 9.

144 Business Council of Australia, *Securing investment in Australia's future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013, p 26. This does not mean, though, that if the Australian dollar were not so high that rates would be equal; Australian rates would still be higher.

145 *ibid*, p 23.

Chapter 14

- 14.66 The BCA argues that the industrial relations system in Australia has ‘exacerbated the challenges of operating in remote environments.’¹⁴⁶ While noting that ‘Australia delivers a consistent—and essentially unchanged—performance across the board’, *The Global Competitiveness Report 2013–2014* states that ‘Australia ranks 137th [out of 148] for the rigidity of the hiring and firing practices and 135th for the rigidity of wage setting.’¹⁴⁷
- 14.67 The AWU agrees that with projects such as Gorgon that experience a cost blowout, a lot of attention is ‘directed back towards the costs associated with wages on the project.’¹⁴⁸ However, for the AWU, this does not reflect the reality of the situation. Furthermore, for Mr Price, there is a certain ‘irony’ in statements that ‘labour is too expensive’:

*These major projects are constructed in Western Australia with set wage rates for the project. There are no surprises or unexpected increases in wages during the projects. Gorgon is a classic example. We set the agreement for the project at the beginning, two years ago... What that does is it gives certainty about labour costs. If they stick to their predicted labour requirements then they know exactly how much it is going to cost.*¹⁴⁹

- 14.68 Mr Price also confirmed that when companies talk about labour blowout they are referring to the number of people employed, rather than the cost of employing them; that is, they are referring to an increase in the number of people above the predicted workforce to achieve the required outcome.¹⁵⁰

146 *ibid*, p 25.

147 Schwab, Klaus (ed), *The global competitiveness report 2013–2014*, World Economic Forum, Geneva, 2013, p 31. This data was generated through the analysis of responses from 13,000 business leaders in 148 economies. Aggregated country data are sector-weighted to account for a country’s economic structure. The structure is defined by the estimated contributions to a country’s GDP of each of the four main economic sectors: agriculture, manufacturing industry, non-manufacturing industry, and services. Australia is one of 37 countries categorised as a Stage 3—Innovation Driven economy.

148 Mr Stephen Price, Secretary, Australian Worker’s Union, *Transcript of Evidence*, 1 November 2013, p 4.

149 *ibid*, p 5.

150 *ibid*.

14.69 GE Oil and Gas Australia Pty Ltd advised the committee that they have a different approach to the issue of wage costs. This company has increased its in-country staffing from 64 in 2010 to more than 500 in 2013, and forecast that number to rise to 1,000.¹⁵¹ Mr David Leslie, the company's General Manager, advised that they approach the wage cost issue:

*from the perspective of how we can be the most productive and have a highly productive and highly efficient workforce. By way of example, when we design our facilities, traditionally we design the facility as a one-line production line process where a part comes in at one end and exits at the other after getting repaired. We looked at the design of that facility and said to ourselves that that is not the most efficient way to do it; let us redesign it around cell-based repair, which is far more efficient. Rather than having a hierarchical workforce we have hired what we call a self-directed workforce. We can argue about the cost of wages et cetera in Australia which are generally higher than some other countries; we are definitely not what we would call a low cost region, but we attack the problem in different ways. We look at how to make the workforce way more productive as an example.*¹⁵²

14.70 When asked if he would consider the company's workforce productive, Mr Leslie agreed that they were and stated that he was happy with what had been achieved.¹⁵³

Project management's impact on productivity

14.71 Table 14.1 showed that project optimisation or project management practices account for 12 per cent of the cost gap between Australian and Canadian unconventional gas developments. The BCA found that planning, design, scheduling and procurement problems constituted a key driver of labour costs and unsatisfactory productivity for Australian projects.¹⁵⁴ According to the BCA, this 'was partially caused by overly optimistic project scheduling, scarcity of suitably qualified and experienced project managers and engineers and other key occupations, which at times led to inadequate project execution.'¹⁵⁵

151 Submission No. 25 from GE Oil and Gas Australia Pty Ltd, 5 September 2013, p 1.

152 Mr David Leslie, General Manager, GE Oil and Gas Australia Pty Ltd, *Transcript of Evidence*, 15 November 2013, p 7.

153 *ibid.*

154 Business Council of Australia, *Securing investment in Australia's future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013, p 23.

155 *ibid.*

Chapter 14

14.72 Table 14.4 shows the Hays survey data on annual salaries by company type:

Table 14.4: Annual salaries by company type 2013 (USD)¹⁵⁶

Company Type	Operator/ Technician	Graduate	Intermediate	Senior	Manager Lead/ Principal	VP/ Director
Consultancy	56,100	36,100	50,600	82,600	119,300	162,500
Contractor	68,800	40,800	53,100	72,000	107,300	181,700
EPCM	57,000	48,400	54,800	82,000	126,300	172,000
Equipment Manufacture & Supply	50,400	30,700	50,600	61,700	85,500	166,200
Global Super Major	76,800	55,200	71,900	103,900	131,700	252,100
Oil Field Services	53,400	37,900	49,300	70,700	98,300	166,500
Operator	58,000	48,800	75,000	105,900	153,800	244,000

14.73 The BCA states that data made available to it show that ‘a lead engineer hired for a mega project under a 457 visa would cost a company \$523,192 per year’ including overheads, whereas the local hire, if available, would cost \$349,312.¹⁵⁷ Note that the issue of cost pressures associated with scarcity of labour is discussed in the next section.

14.74 BCA’s report also states that Australian oil and gas companies ‘had to employ more engineering and project management people to correct for early mistakes.’¹⁵⁸ One consequence of this was ‘more reworks in the construction phase, which partly explains why construction costs have been higher in Australia than elsewhere.’¹⁵⁹ BCA gave the following example:

[D]ata from a company involved in an onshore gas development seems to confirm that inadequate project management practices are partly to blame for higher indirect costs (and subsequent escalation in construction costs). This company estimates that Australia uses many more engineers to plan and execute the same scope of work compared

156 Hays Oil and Gas, *Oil & gas global salary guide 2013*, Hays Plc, United Kingdom, 2013, p 8.

157 Business Council of Australia, *Securing investment in Australia’s future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013, p 23.

158 *ibid*, p 24.

159 *ibid*.

to the US. They estimate that it would typically take six total Drilling & Completions (D&C) engineers and managers to support six onshore drilling rigs that drill and complete 100 wells per year on multiple-well pads with simultaneous operations (complex planning and operations) in the US. In Australia, it takes close to 30 total D&C managers and engineers to support six drilling rigs that drill and complete 95 wells per year, most of them being operated in less complex environments.¹⁶⁰

14.75 Using the Pluto project as an example, the Australian Manufacturing Workers' Union (AMWU) explained how labour figures can blow out and negatively impact on productivity. Mr Steve McCartney, the union's State Secretary, stated:

Pluto was supposed to be built with 4 000 men and due to some poor fabrication outcomes from the modularisation in Asia, the project was extended out for nearly a year. It was nearly a year behind and there was nearly 9 000 men used on that particular project. If you look at the history of that job, I think you can quite clearly see that it was not through industrial action or it was not through an agreement that did not support the project. I think it was more along the lines of the lack of logistical expertise and project management that put that project where it was. When we hear some of the previous people coming making public statements in and around productivity, I thought it was worthwhile us making sure that we made that quite clear. I suppose you only have to look at the Gorgon project to see what a logistical nightmare that is and how that is impacting on the amount of labour used and, I suppose, the potential blow-out for the particular job. Other factors, of course, played in that period of time, which was, if you remember correctly, in and around that time we had a steel shortage as well, which played a role, but predominantly it was rework and poor manufacturing that set that project back.¹⁶¹

Scarcity of labour

14.76 It is a fundamental economic principal that supply and demand are market price determinants. For example, when demand for a commodity such as labour is high and supply is not able to meet demand, the price of labour increases. This has been the situation in relation to labour in the oil and gas sector. Noting that Australia and Norway were at the top of the annual salary table (as per Table 14.4) Hays reported

160 Business Council of Australia, *Securing Investment in Australia's Future. Managing the Economic Transition*, Business Council of Australia, Melbourne, August 2013, p 24.

161 Mr Steve McCartney, State Secretary, Australian Manufacturing Workers Union, *Transcript of Evidence*, 1 November 2013, p 1.

Chapter 14

that 'both countries have limited skilled labour pools and significant workloads, the result is very high pay rates.'¹⁶²

14.77 The supply of labour willing to work in dangerous, difficult and remote environments also impacts on the price of labour. Hays demonstrates this with reference to Russia's arctic exploration activities and the premium this attracts for its imported labour.¹⁶³ While not as difficult or dangerous an environment as that in Russia, working in and offshore to the remote north west coast would reasonably attract a level of premium.

14.78 The BCA also acknowledges that scarcity of engineering and project management professionals 'contributed to driving unit labour costs on resource projects to very high levels and strained the execution of project management.'¹⁶⁴ According to BCA, engineers in WA have charge out rates of between \$160 to \$220 per hour on major projects such as Gorgon, Ichthys and Wheatstone.¹⁶⁵ As noted above, lead engineers on a 457 visa would cost \$523,192 per year.

14.79 As noted in the introduction to this chapter, there are seven LNG plants currently being constructed in Australia, with a number also under consideration, including the Browse LNG, Scarborough, Gorgon expansion, Wheatstone expansion and Bonaparte FLNG projects.

14.80 The CMEWA acknowledge that high commodity prices and rapid growth in output over the past 10 years has negatively impacted on productivity, partly through '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.'¹⁶⁶ Workforce development is a serious issue for WA and is discussed in detail in Chapter 7 (Volume 1).

14.81 BP also recognised the impact of labour shortages on productivity:

Costs have increased substantially for onshore LNG plants in Australia, perhaps understandably given the pressure on scarce capital and labour resources that has arisen during the long resources boom of the early twenty first century. Had it been sanctioned, James Price Point would have been the ninth major Australian LNG greenfield development in the current resources investment phase, after Pluto, Gorgon, Wheatstone, Ichthys [sic], Prelude and three coal seam gas

162 Hays Oil and Gas, *Oil & gas global salary guide 2013*, Hays Plc, United Kingdom, 2013, p 6.

163 *ibid.*

164 Business Council of Australia, *Securing investment in Australia's future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013, p 23.

165 *ibid.*

166 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 15.

*based LNG projects in Queensland. These projects are competing for contracts, construction yards, steel and workers with the inevitable impact on prices and availability. Coupled with the high Australian dollar (which increases Australian costs to foreign investors) and the intrinsic cost and scope of undertaking projects in remote and environmentally sensitive regions, this has made Australia one of the most expensive places in the world to build LNG plants onshore.*¹⁶⁷

14.82 It is clear to the Committee that while the Western Australian oil and gas industry does face some productivity challenges, these are not solely attributable to the relatively high cost of labour in WA. The high capital cost of projects, the high Australian dollar, and labour scarcity due to the high number of projects under development at once have all impacted on the multifactor productivity of the sector.

Finding 67

Statements that Australia is a high cost, low productivity country are simplistic and do not adequately reflect the following:

- reservoir characteristics and climate related plant efficiency;
- the remote and environmentally sensitive nature of development areas;
- the high cost of project engineering and management;
- the lack of supporting infrastructure;
- labour scarcity created by multiple projects being developed at the same time; and
- the recent relatively high level of the Australian dollar.

Duplication in approval processes in various levels of government

14.83 Major projects in Australia, including oil and gas projects, are subject to government development assessment and approval (DAA) regulations.¹⁶⁸ The purpose of these DAA regulations is to 'promote safe and orderly developments' and to 'mitigate and manage impacts on environmental and heritage values, amenity and other aspects that bear on community wellbeing.'¹⁶⁹ The powers to approve a major project are divided between the federal, state and local governments and all three levels of government in Australia have a role in major project development.

Federal government approval process

14.84 The federal government 'regulates matters of national environmental significance, certain heritage matters, developments on Commonwealth land (such as some airports and defence facilities) and waters beyond the three nautical mile limit.'¹⁷⁰ This means

167 Submission No. 13 from BP, 30 August 2013, p 2.

168 Productivity Commission, *Major project development assessment processes*, Commonwealth of Australia, Canberra, 2013, p 63 and p 66.

169 *ibid.*

170 *ibid.*, p 66.

Chapter 14

that the federal government is ‘responsible for assessing and approving actions’ in relation to such matters.¹⁷¹

14.85 The Productivity Commission lists 19 pieces of Commonwealth legislation that affects major projects. Of these, six relate to the environment; five to heritage; four to petroleum and pipelines; two to native title and land rights; one to airports and one to fisheries management. These laws are administered by a total of six federal agencies or authorities. These laws, agencies and areas of responsibility are listed within the Productivity Commission’s 2013 report *Major Project Development Assessment Processes*.¹⁷²

Western Australian approval process

14.86 State and Territory governments are also able to legislate on matters such as the environment, and cultural and natural heritage.¹⁷³ It is this level of government that has the ‘the primary role in DAA processes for major projects’ in their respective jurisdictions.¹⁷⁴

14.87 In WA, a major project requires approval and regulation from a number of agencies in addition to both DMP and DSD, including the Environmental Protection Authority, Department of Environmental Regulation, Department of Indigenous Affairs, Department of Water, Department of Planning, Western Australian Planning Commission, Department of Transport, Department of Lands, and Department of Health and, in some cases, local government.¹⁷⁵

14.88 WA also has a Lead Agency Framework to facilitate the approval of major projects in the state. Under this framework, each major project has a lead agency whose responsibility is to ‘work[s] with project proponents to manage all Government interactions and statutory approvals; helping to improve efficiency and reduce the time taken to deliver projects, while fully considering the public interest.’¹⁷⁶

171 *ibid*, p 63.

172 *ibid*, pp 416–418.

173 *ibid*, p 66.

174 *ibid*, p 63.

175 Department of Premier and Cabinet, *Lead agency framework. A guidance note for implementation*, Government of Western Australia, Perth, nd, p 29.

176 Department of State Development, *Lead agency framework. Leading the way in state development*. Available at: <http://www.dsd.wa.gov.au/7633.aspx>. Accessed on 22 January 2014.

14.89 The Department of Premier and Cabinet's Lead Agency Framework guidance notes set out the roles and responsibilities of lead agencies. The Productivity Commission summarises these as:

- *providing proponents with information on statutory requirements through agency guidelines and referrals*
- *case-managing and coordinating approvals applications across government for proposals, where appropriate*
- *assisting proponents to identify the potential impacts of the proposal on matters such as infrastructure, the environment and regional communities, as well as the social considerations that arise from the proposal.*¹⁷⁷

14.90 While there are five lead agencies, the two of most relevance to this Inquiry are DSD and DMP.¹⁷⁸ The areas of responsibility for DSD and DMP are shown in Table 14.5.

177 Productivity Commission, *Major project development assessment processes*, Commonwealth of Australia, Canberra, 2013, p 429.

178 The other lead agencies are Department of Planning, Department of Transport, Department of Regional Development and Lands. While not formally recognised in the Lead Agency Framework, the Department of Commerce is accepted as the lead agency on local content issues. See: Mr Stephen Grocott, General Manager, Industry Participation Branch, Department of Commerce, 19 February 2014, p 12.

Chapter 14

Table 14.5: Department of State Development and Department of Mines and Petroleum Lead agency responsibilities¹⁷⁹

Department of State Development	Lead agency for major resource and industry infrastructure projects	<ul style="list-style-type: none"> • Lead project proponent role for identified major industry infrastructure projects (State Initiatives) • Lead project facilitation role for: <ul style="list-style-type: none"> ▪ new projects or expansions of existing projects where the proposed investment is significant or of strategic importance, including expansions under existing State Agreements ▪ very large and/or complex projects with particular strategic importance to the Government ▪ project selection based on listed criteria • Contact point for Infrastructure Australia across government
Department of Mines and Petroleum	Lead agency for regulation of the resources sector	<ul style="list-style-type: none"> • Lead agency for the regulation of: mining; petroleum; geothermal; and carbon capture and storage • Lead agency for exploration promotion: pre-competitive geoscience and the Exploration Incentive Scheme • Lead agency for prospecting; exploration; and development applications for projects not of State or strategic significance

14.91 As resource proposals could be the responsibility of DSD or DMP, the Department of Premier and Cabinet guidelines state that these agencies ‘have a mechanism in place to enable ongoing discussion and agreement on which resource proposals fall under the jurisdiction of DSD.’¹⁸⁰

14.92 Mr Stephen Wood, Director General, DSD, though, advised that ‘in simple terms... lead agency on Gorgon and Browse is effectively given to us by the minister [who is also the Premier]. We pick up that project under his direct guidance.’¹⁸¹

14.93 Mr Wood further advised that projects of great complexity, such as Gorgon or Browse, ‘require[s] a fair bit of cooperation and coordination. The more you can save on that

179 Department of Premier and Cabinet, *Lead agency framework. A guidance note for implementation*, Government of Western Australia, Perth, nd, p 9.

180 *ibid*, p 10.

181 Mr Stephen Wood, Director General, Department of State Development, *Transcript of Evidence*, 19 February 2014, p 6.

and deliver certainty on time frames the better the project in terms of cost and delivery. In a simple sense, that is what the lead agency's framework seeks to deliver.¹⁸²

14.94 In WA at any one time there are many projects under consideration by proponents, some of which will come to fruition while others will not.¹⁸³ DSD stated that such projects need to be sifted through to determine 'whether a project is likely and is beneficial and try to spend your time and effort on those that are more likely and more beneficial.'¹⁸⁴ This process determines which project requires 'the DSD lead agency treatment' or which 'are not of a size that would come through that filter' and could be 'dealt with by another agency.'¹⁸⁵

14.95 In relation to the work of a lead agency in assessing a project, Mr Wood used the Browse project as an example:

*[a] lot of the activity in relation to the Browse project was around the issue of land and environmental approvals. A lot of that work was distilling out which was the best site for the Browse development. That was part of the work of the lead agency. ... it is not just a question of saying, 'Here is your project, come along, plug it in', because a project of that size, in fact any project, does not work that way. It is a question of distilling what is capable, what the capabilities components are and where the best site and result would be, along with any other issues to do with screening for each feature of the project. A project of that size obviously brings in all the environmental clearances, land clearances, Department of Lands, DMP, Transport, ports—the whole box and dice and more. You have to go through those features as you are building your project.'*¹⁸⁶

14.96 DSD reassured the Committee that the lead agency undertook more than simply a facilitating role and actually assessed what was beneficial to the state and advised the Premier accordingly.¹⁸⁷ Notwithstanding the fact that lead agencies rely on information provided by project proponents and that project factors can change as they develop, the Committee is not convinced that the analysis of the benefits and impacts of major projects is adequate. This issue is returned to in Chapter 9 on the impact of FLNG on State revenue.

182 *ibid.*

183 *ibid.*

184 *ibid.*

185 *ibid.*, p 7.

186 *ibid.*, pp 6–7.

187 *ibid.*, p 7.

Local government processes

- 14.97 While the DAA processes generally occur at the state government level, because local governments are responsible for implementing and enforcing State legislation, they also have a role in the planning and secondary approvals or permits for major projects in their jurisdictions.¹⁸⁸

Assessment of resource project approval processes

- 14.98 The Committee received considerable evidence in relation to Australia's DAA processes, with most oil and gas companies, and their representative bodies, referring to what they see as the overly complex, inefficient, unpredictable and duplicative nature of these processes. While this evidence will be discussed in more detail below, at this stage CMEWA's submission clearly demonstrates general industry concerns:

*CME's study into the escalating costs of doing business in the resources sector, which considered cost drivers across iron ore, gold and LNG projects, identified regulatory burden and approval inefficiency to be one of the key drivers of the high cost to do business in Western Australia. In particular, costs were incurred through delays in approvals processes, ongoing compliance requirements, lack of parallel processing and increasing levels of duplication in approvals processes across the different levels of government.*¹⁸⁹

- 14.99 There has been considerable research into the approval and regulation of the Australian resources sector. For example, the Productivity Commission has undertaken extensive work on the regulation of the resources sector. In April 2009 it published a report titled *Review of the regulatory burden on the upstream petroleum (oil and gas) sector*. This report covered 'the regulation of conventional upstream petroleum projects that involve more than one jurisdiction.'¹⁹⁰ In November 2013, the Productivity Commission's report titled *Major project development assessment processes* was published. That report focussed on 'how the design and implementation of major project [DAA] processes can be improved so that regulatory goals are achieved at a lower cost to proponents and the community.'¹⁹¹

188 Productivity Commission, *Major project development assessment processes*, Commonwealth of Australia, Canberra, 2013, p 63 and p 66.

189 Submission No. 40 from The Chamber of Minerals and Energy of Western Australia (Inc), 27 November 2013, p 5.

190 Productivity Commission, *Review of the regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 1.

191 Productivity Commission, *Major project development assessment processes*, Commonwealth of Australia, Canberra, 2013, p 1.

14.100 APPEA has also investigated what it refers to as the ‘regulation challenge’ for oil and gas companies in Australia.¹⁹² The BCA has also produced reports that include an assessment of the government regulatory processes in Australia.¹⁹³

14.101 Such work provides valuable context for the evidence provided to this Inquiry.

14.102 The Productivity Commission’s 2013 report outlines the main areas of policy concerns for the resource project approval processes in Australia. These are shown in Table 14.6.

Table 14.6: Summary of the areas of policy concern relating to resource project approval processes¹⁹⁴

Stage	Areas of Policy Concern
Application	<ul style="list-style-type: none"> • a lack of upfront clarity and guidance on processes and requirements • excessive Ministerial discretion to declare a project into a regulatory pathway • limited early stakeholder participation in setting the scope of assessments
Assessment	<ul style="list-style-type: none"> • duplication between assessment processes • uncoordinated administration of processes • concerns about the quality and independence of assessment analysis • assessment requirements that are disproportionate to project risks and impacts
Approval	<ul style="list-style-type: none"> • unnecessary duplication of processes between levels of government • the length of time it takes to make decisions • inappropriate allocation of responsibilities for making primary approval decisions • the quality of the process that decision makers are required to follow
Conditions and Offsets	<ul style="list-style-type: none"> • not targeted at project impacts • impractical to comply with or unenforceable • excessively prescriptive • duplicative, overlapping and inconsistent

192 Australian Petroleum Production and Exploration Association Limited, *Cutting green tape. Streamlining major oil and gas project environmental approvals processes in Australia*, February 2013, p 1.

193 Business Council of Australia, *Securing investment in Australia’s future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013; and Business Council of Australia, *Securing investment in Australia’s future. Report of the project costs task force*, Business Council of Australia, Melbourne, August 2013.

194 Productivity Commission, *Major project development assessment processes*, Commonwealth of Australia, Canberra, 2013, p 101, p 131, p 179 and p 213.

Chapter 14

14.103 APPEA's *Cutting green tape* report provides a series of case studies from oil and gas projects undergoing environmental approval in Australia. For example, Case Study 9 relates to Chevron's Gorgon project. APPEA states that:

*common to many large projects that require State and Commonwealth environmental approvals, there are a range of challenges that arise from the complex interplay between State and Commonwealth processes. These challenges include overlapping processes and a resulting duplication of conditions and associated requirements. As experienced by the Gorgon Project, there is a difference between the State and Commonwealth approvals processes when a project requires change (i.e. a variations and or expansion of its scope) and or its management plans.*¹⁹⁵

14.104 APPEA's Case Study 1 relates to Shell's Prelude project and reveals inconsistencies in Commonwealth legislation, specifically the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) (OPGGs Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The Case Study also highlights duplication of requirements in licence conditions required under different pieces of legislation, and administered by different agencies, including the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the Department of the Environment (formerly DSEWPC), the Department of Agriculture, Fisheries and Forestry (DAFF) and the Australian Maritime Safety Authority (AMSA). The approval processes for oil spill plans were also found to be confusing.

Case study 1 Offshore LNG Project — Prelude, Shell Australia¹⁹⁶

The Prelude project case study demonstrates significant inconsistency between two pieces of key Commonwealth legislation: the OPGGS Act (administered by NOPSEMA) and the EPBC Act (administered by DSEWPC).

It demonstrates how licence conditions approved by the responsible Environment Minister (under the EPBC Act) significantly duplicate the stringent requirements of the Environment Plan regime under the OPGGS Act.

Duplication and inconsistency also occur as additional agencies become involved in approval processes, such as:

- *the Department of Agriculture, Forestry and Fisheries (DAFF) for ballast water management*
- *the Australian Maritime Safety Authority (AMSA) for oil spill planning.*

The case study highlights particularly confusing processes for approval of oil spill plans, with separate approvals required by three bodies — NOPSEMA, DSEWPC and AMSA.

195 Australian Petroleum Production and Exploration Association Limited, *Cutting green tape. Streamlining major oil and gas project environmental approvals processes in Australia*, February 2013, p 26.

196 *ibid*, p 4.

- 14.105 The BCA also found that ‘unpredictable and unnecessarily complex and prolonged government regulatory processes and decisions’ were a key driver of unsatisfactory productivity performance on resource projects.¹⁹⁷ It provided a further example, as reproduced below.

An additional example can be drawn from an oil and gas operator, who in 2012 was required to obtain approvals to undertake a seismic survey of a gas field in the north west of Western Australia. This activity potentially triggered compliance with four separate pieces of legislation administered by four different government agencies at both the state (WA Department of Mines and Petroleum and the WA Environmental Protection Agency) and Commonwealth level (NOPSEMA and the Department of Sustainability Environment Water Population and Communities (SEWPaC)). The Department of Mines and Petroleum (DMP) referred the activity to the Environmental Protection Agency, who deemed that no assessment under the Environmental Protection Act (WA) was required. Three separate submissions were prepared, which, while covering similar information, required different formats and assessment processes. Approval conditions and reporting and compliance measures for the activity were applied by both SEWPaC and DMP. The operator has successfully conducted a number of seismic surveys over the last two decades, and the activity was eventually approved by all authorities.

Business Council of Australia¹⁹⁸

- 14.106 These findings in the Productivity Commission and APPEA reports were echoed in evidence to the Committee from organisations such as APPEA, CCIWA and CMEWA, which pointed to issues relating to legislation overlaps, timeliness, complexity and lack of clarity.¹⁹⁹ Much of this evidence also pointed to the work of the Productivity Commission and APPEA.
- 14.107 Oil and gas companies also provided evidence on Australian approval processes. For example, ConocoPhillips stated that ‘regulations and getting approvals is a very large

197 Business Council of Australia, *Securing investment in Australia’s future. Managing the economic transition*, Business Council of Australia, Melbourne, August 2013, p 23.

198 *ibid*, p 25.

199 See, for example: Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 14; Submission No. 26 from The Association of Professional Engineers, Scientists and Managers, 12 June 2013, p 8; Submission No. 38 from Chamber of Commerce and Industry of Western Australia (Inc), 25 November 2013; Submission No. 47 from Australian Petroleum Production and Exploration Association Limited, 23 December 2013, p 3 and p 7; Mr Stedman Ellis, Chief Operating Officer, Western Region, Australian Petroleum Production and Exploration Association Limited, *Transcript of Evidence*, 1 November 2013, p 3; Ms Nicole Rooke, Director, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Briefing*, 26 June 2013, p 7; and Mrs Shannon Burdeu, Manager, Economics and Tax, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Evidence*, 1 November 2013, p 2.

Chapter 14

and expensive process in itself.²⁰⁰ Chevron suggested that Australia's approval processes are 'very unpredictable' and that 'we could probably spend all day talking about how long it took to get Gorgon approved. They are very unpredictable and long approval processes.'²⁰¹

14.108 INPEX, however, took a different approach to regulation. Mr William Townsend, General Manager, External Affairs and JV, stated that while the company's consultation with its stakeholders revealed that most said 'oil and gas is the most highly regulated industry in terms of health and safety', INPEX is 'satisfied with the amount of regulation that is in that space, and we believe that INPEX by complying with existing regulations will meet their expectations.'²⁰²

14.109 Mr Townsend explained that he expected the environment approvals for FLNG to be:

*easier than a more conventional one, which has frequently sensitive coastal environments to deal with due to its nature and the footprint you have onshore. So in that sense, I would expect the floating LNG to have an easier, in some case, environmental approval process.*²⁰³

14.110 Mr Townsend also observed that with safety, 'any time that you are the first of anything the regulators are going to be keen to understand what that technology is, and they will be right to take the time.'²⁰⁴ He was 'sure that companies appreciate that governments have a role to play in regulating oil and gas and making sure that we are meeting the expectation of the government in terms of safety.'²⁰⁵

14.111 The Maritime Union of Australia (MUA) expressed concern in relation to the uncertainty surrounding safety regulations in relation to FLNG technology.²⁰⁶ Mr Ian Bray, MUA's Assistant National Secretary, advised that:

this is an untested technology; it has not been used anywhere in the world as yet. There are no regulations that cover it. So, there is a degree of uncertainty about the safety and the regulatory requirements, whether it be AMSA or NOPSEMA. There does not appear to be any certainty and we do not believe that anything around at the moment would cover this type of operation given the high

200 Ms Kayleen Ewin, Vice-President, Sustainable Development, Communications and External Relations, ConocoPhillips Australia Pty Ltd, *Transcript of Evidence*, 21 October 2013, p 7.

201 Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 9.

202 Mr William Townsend, General Manager, External Affairs and JV, *Transcript of Evidence*, 23 October 2013, p 12.

203 *ibid*, p 11.

204 *ibid*.

205 *ibid*, p 12.

206 Mr Ian Bray, Assistant National Secretary, Maritime Union of Australia, *Transcript of Evidence*, 1 November 2013, p 2.

*technology, high demand, isolation of work et cetera. A whole host of other questions have not been answered in terms of the guarantee or the minimising of risk to workers on these FLNG plants.*²⁰⁷

14.112 For the MUA, industry and government thinking in relation to safety had been focussed on 'economics, not about the safety consequences around the industry and what we need to think about.'²⁰⁸ Mr Bray particularly expressed concern about safety regulation via company prepared safety cases and the lack of an inspectorate within NOPSEMA to ensure compliance.²⁰⁹

14.113 The AWU also expressed concern in relation to FLNG as an 'untested operating model for refining and exporting LNG.'²¹⁰ For the AWU the key risks related to medical evacuations, the close proximity of the FLNG facility to the Browse gas asset, cyclone and extreme weather and the repercussions of a critical incident on the FLNG facility. The AWU also stated that because the operation model has not been tested it is 'highly likely that new risks will emerge.'²¹¹

14.114 Similarly, the DMP expressed concern in relation to FLNG safety:

*DMP has some concerns around safety, particularly in regards to the close proximity of process machinery, LNG storage and offloading facilities to living quarters. It may take significant time, major reconstruction and, as a result, additional tax deductions to ensure all safety environmental hazard[s] are properly managed once the FLNG starts full operation.*²¹²

14.115 However, Shell advised that:

*in designing FLNG, Shell's objectives were that it be safe, robust, cost efficient, and with a high availability to enable continuous and stable LNG supply. Safety was the primary focus, with multiple quantitative risk assessments at various stages of the design confirming that the FLNG facility would be at least equally as safe as modern FPSOs and offshore production facilities currently in operation.*²¹³

14.116 In discussing the merging of the existing LNG and the new FLNG technologies, Mr Shaun Gregory, Senior Vice President, Health, Safety, Environment and Technology, Woodside, stated 'a lot of that comes down to safety and operation, and that is where

207 *ibid.*

208 *ibid.*, p 5.

209 *ibid.*, p 8.

210 Submission No. 14 from The Australian Workers' Union, 30 August 2013, p 10.

211 *ibid.*

212 Submission No. 18 from Department of Mines and Petroleum, 30 August 2013, p 9.

213 Submission No. 15 from Shell in Australia, 30 August 2013, p 6.

Chapter 14

a lot of the modelling has been done and that is the part that is being de-risked by Shell'.²¹⁴

- 14.117 Not all oil and gas companies are totally reassured about FLNG at this time. Mr Roy Krzywosinski expressed Chevron's concern as follows:

*Chevron continues to work its qualification process to understand the merits of floating LNG. For us, there are still some unanswered questions, including the safety case for extreme weather locations—those locations, for example, including high or frequent cyclone areas—and questions such as: how is the vessel and the people on the vessel managed during these extreme weather events, and how are annual plant maintenance turnarounds conducted, considering the large number of people required to effectively carry out a turnaround program? With this in mind, it is unclear to us how these issues impact on the continuity of operations on a day-to-day basis—specifically, the availability and reliability of these facilities when compared with land-based plant facilities.*²¹⁵

- 14.118 While companies such as Shell have expressed confidence in FLNG safety, given the fact that FLNG technology is new technology that will be operating in often extreme weather conditions, and in light of the concerns expressed in relation to safety, the Committee intends to undertake further investigations in relation to FLNG safety. Therefore, the evidence presented in relation to this issue will not be outlined here. Rather, it will be the subject of a separate Inquiry and report to Parliament.

- 14.119 The Global Competitiveness Index shows that 13.4 per cent of respondents saw 'inefficient government bureaucracy' as a problematic factor for doing business in Australia.²¹⁶ For the Burden of Government Regulation indicator, Australia ranks a low 128 out of 148 countries.²¹⁷

- 14.120 The Fraser Institute's Global Petroleum Survey 2013 ranks jurisdictions in relation to the *perceived* barriers to investment, with survey respondents being 864 managers and executives in the upstream petroleum industry across 157 provinces, states and other geographical areas. The higher the score, the lower the ranking, and the greater the *perceived* investment barriers.²¹⁸ For the overall policy perception index, WA ranked 49

214 Mr Shaun Gregory, Senior Vice President, Health, Safety, Environment and Technology, Woodside Petroleum, *Transcript of Evidence*, 16 October 2013, p 4.

215 Mr Roy Krzywosinski, Managing Director, Chevron, *Transcript of Evidence*, 24 October 2013, p 4.

216 Schwab, Klaus (ed), *The global competitiveness report 2013–2014*, World Economic Forum, Geneva, 2013, p 110.

217 *ibid*, p 111.

218 Wilson, Alana, Angevine, Gerry and Cervantes, Miguel, *Global petroleum survey 2013*, Fraser Institute, Vancouver, 2013, p 5.

and Australia Offshore ranked 54. These represent a significant fall from the results for 2012, which were 40 and 33 respectively. For the environmental regulations index, WA ranked 109 and Australia Offshore ranked 119.²¹⁹

- 14.121 However, for the index relating to the ‘uncertainty concerning the administration, interpretation and enforcement of regulations’, WA rated favourably at 14 and Australia Offshore at 41.²²⁰
- 14.122 It is important to note, as the Productivity Commission does, that while there are reports that rank Australia or its states and Territories’ DAA processes against other jurisdictions, ‘most of the reports do not directly measure the efficiency and effectiveness of DAA processes.’²²¹
- 14.123 As Table 14.3 showed, regulatory approvals efficiency and delays were responsible for 1.2 per cent of the gap between an Australian and a Canadian LNG project. In relation to perceptions of the cost of regulatory compliance as a deterrent to investment, the Fraser Institute 2013 perceptions survey places WA at 80 out of 157 jurisdictions and Australia Offshore at 83. The ranking of Canadian provinces ranged from Saskatchewan at 8 (a low deterrent) through to Quebec at 157 (a high deterrent).²²²
- 14.124 Evidence to the Committee demonstrated concern at the impact of Australia’s regulatory processes. For example, CMEWA stated that inconsistency and inefficiencies in environmental approval requirements ‘add significant uncertainty around approval processes, and it can also have a significant impact on project economics through project delays, production delays and ongoing compliance costs.’²²³ Shell submitted that ‘Australia’s complex and overlapping regulatory systems multiply project risks and complexities, increasing costs for large scale projects without improving regulatory outcomes.’²²⁴ Mr Trevor Caldwell, Project General Manager for BP, argued that ‘there was no guarantee that James Price Point could have progressed this year because of the lack of environmental and land approvals.’²²⁵

219 *ibid*, p 89. As the Fraser Institute notes at page 15, the survey does not weight the data for jurisdictions’ proved reserves. This means that a jurisdiction with small or no reserves may score more highly on evaluations of some of the 16 factors surveyed than jurisdictions with larger reserves.

220 *ibid*, p 90.

221 Productivity Commission, *Major project development assessment processes*, Commonwealth of Australia, Canberra, 2013, p 485.

222 Wilson, Alana, Angevine, Gerry and Cervantes, Miguel, *Global petroleum survey 2013*, Fraser Institute, Vancouver, 2013, p 91.

223 Ms Nicole Roocke, Director, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Briefing*, 26 June 2013, p 7. See also: Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 14.

224 Submission No. 15 from Shell in Australia, 30 August 2013, p 6.

225 Mr Trevor Caldwell, Project General Manager, BP, *Transcript of Evidence*, 21 October 2013, p 6.

Chapter 14

14.125 While companies expressed concern about the cost of regulation, they generally were unable to provide specific cost data. Some, such as Shell, pointed to APPEA research that ‘found that Australia’s complicated, overlapping regulatory approval processes could significantly increase project capital expenditure costs and add to schedule delays.’²²⁶

14.126 APPEA, referring to the 2013 Productivity Commission report, stated that:

*estimates that the indicative cost of a one-year delay to a major offshore LNG project is in the order of \$500 million to \$2 billion, depending on assumptions made. The central estimate of \$1.1 billion represents a reduction in the net present value (NPV) of the investment by about 9 per cent.*²²⁷

14.127 Note, though, that these figures would depend on the assumptions made. The Productivity Commission report advises that its ‘cost estimate essentially reflects a one-year delay of the entire cash flow, based on a 10 per cent discount rate that was applied in the model to measure the opportunity cost of capital for the upstream petroleum sector.’²²⁸ Furthermore, the Productivity Commission states that, while it has kept the approach ‘relatively simple, several data and design issues arguably limit the scope and amount of detail.’²²⁹

14.128 The BCA offers an example of an inefficient approvals process, namely NOPSEMA’s approach to assessments:

Advice from members is that NOPSEMA’s use of a ‘sampling’ approach to conducting assessments—where a proponent’s environmental plan is sampled to determine its efficacy—is not sufficiently supported by guidance on what information is required in environmental plans. The lack of adequate guidance means that the sampling process becomes iterative, which increases the costs of finalising an environmental plan. Advice from members indicates that, since NOPSEMA has been established (replacing state based regulators) the cost to prepare an environmental plan and supporting documents has increased from less than \$100,000 per well prior to NOPSEMA to \$450,000–\$750,000,

226 Submission No. 15 from Shell in Australia, 30 August 2013, p 6.

227 Submission No. 47 from Australian Petroleum Production and Exploration Association Limited, 23 December 2013, p 11.

228 Productivity Commission, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 217.

229 *ibid*, p 341.

*depending on the complexity and risk of the individual project proposal.*²³⁰

- 14.129 ConocoPhillips stated that while they could ‘say with confidence that regulatory costs in Australia are significant and have increased over time, we have not performed a cost analysis that would allow us to provide the percentage figure’ of a project cost attributable to regulatory requirements.²³¹
- 14.130 When asked to provide an approximate value for the costs of red and green tape, Shell advised that ‘any assessment of the economic impact of inefficient or duplicative regulatory burdens upon specific projects or on a whole of industry basis is complex and requires significant research and analysis.’²³²
- 14.131 CMEWA acknowledged that it was difficult to quantify cost drivers such as ‘approvals processes, issues around red and green tape, [and] duplications that apply both at a state and a federal level.’²³³
- 14.132 The Productivity Commission reported that ‘it is impossible to quantify precisely the aggregate cost impact of *unnecessary* regulatory burdens delaying and discouraging investment in the upstream petroleum sector. Principally, judgment is required about which procedures are necessary and which are not.’²³⁴
- 14.133 Nevertheless, the Committee was disappointed that oil and gas companies who express concern about Australia’s regulatory processes are not able to provide accurate data as to the cost of what they see as unnecessary delays caused by meeting regulatory requirements.
- 14.134 As noted above, regulations are required to help ensure safe developments and to mitigate impacts on the environment and community wellbeing. It seems, however, that the processes that currently exist, and the industry’s perception of Australia’s regulatory regime, risks having a negative impact on investment in the industry. According to CMEWA, 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.²³⁵ APPEA submitted that ‘in addition to cost challenges, the increased regulatory burden facing Australian business

230 Business Council of Australia, *Securing investment in Australia’s future. Report of the project costs task force*, Business Council of Australia, Melbourne, August 2013, pp 19-20.

231 Submission No. 41 from ConocoPhillips Australia Pty Ltd, 27 November 2013, p 3.

232 Submission No. 34 from Shell Development (Australia) Pty Ltd, 18 November 2013, p 4.

233 Mrs Shannon Burdeu, Manager, Economics and Tax, The Chamber of Minerals and Energy of Western Australia (Inc), Transcript of Evidence, 1 November 2013, p 2.

234 Productivity Commission, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 217.

235 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 14.

Chapter 14

is hampering our ability to quickly react to changing global conditions and remain competitive.’²³⁶

14.135 Similarly, CCIWA stated that ‘overlaps and duplication put at risk our competitiveness, especially as similar jurisdictions like Canada embark on cooperative approaches across their federation.’²³⁷

14.136 The Committee understands that the current federal government has committed to a ‘one-stop shop’ for environmental approvals, something that is generally welcomed by industry.²³⁸ This initiative is seen as a ‘very important avenue to reduce some of that duplication that projects experience.’²³⁹

14.137 The federal government’s primary environmental legislation is the EPBC Act. Other Australian jurisdictions also have environmental protection legislation and the EPBC Act provides for matters of national environmental significance to be dealt with through state and Territory processes.²⁴⁰

14.138 The process of accrediting other jurisdictions to deal with such matters results in a Bilateral Agreement, which ‘can reduce duplication of environmental assessment and approval processes between the Commonwealth and states/territories.’²⁴¹

14.139 While it is clear that regulation is necessary and that some are complex due to the number of jurisdictions involved and to other factors such as the nature of the environment in which projects are located—for example, the Gorgon project’s located on an A Class nature reserve—it is equally clear that more collaborative work needs to be done by industry and governments to improve the regulatory regime for Australian resources projects.

14.140 WA currently has a bilateral agreement for the assessments under Part IV of the *Environmental Protection Act 1986* (WA) and is currently negotiating an expansion of this agreement to accredit a wider range of assessment and approval processes. On 13 December 2013, the state and federal governments signed a memorandum of

236 Submission No. 47 from Australian Petroleum Production and Exploration Association Limited, 23 December 2013, p 3.

237 Submission No. 38 from The Chamber of Commerce and Industry of Western Australia (Inc), 25 November 2013, p 13.

238 Mr Stedman Ellis, Chief Operating Officer, Western Region, Australian Petroleum Production and Exploration Association Limited, *Transcript of Evidence*, 1 November 2013, p 3; and Submission No. 40 from The Chamber of Minerals and Energy of Western Australia (Inc), 27 November 2013, p 4.

239 Mr Stedman Ellis, Chief Operating Officer, Western Region, Australian Petroleum Production and Exploration Association Limited, *Transcript of Evidence*, 1 November 2013, p 2.

240 Submission No. 52, Department of Mines and Petroleum, 28 February 2014, p 4.

241 *ibid*.

understanding as a first step in negotiating this process.²⁴² These negotiations are led by the Department of Premier and Cabinet.

Finding 68

Considerable industry concern exists in relation to the complexity and apparent inefficiency of Australia's regulatory regime for resource projects.

14.141 While companies were not able to provide project costs for regulatory requirements, the Committee accepts that Australia's regulatory regime may be an impediment to investment in resource development. However, as the McKinsey and Company report, *Extending the LNG boom: Improving Australian LNG productivity and competitiveness*, indicates, there are several 'compressible' factors where Australia could move towards the same cost levels as competing countries.²⁴³ None of the potential improvement areas on its own is sufficient to close the cost gap. At the maximum, improvements to Australia's regulatory regime were estimated to reduce LNG costs by \$0.30 per million BTUs while other factors could potentially have a much greater effect: tax regime (\$1.00), labour productivity (\$1.60), industry collaboration (\$1.80) and further project optimization (\$2.20).²⁴⁴ Working together and sharing the burden across sectors—industry, project operators, contractors, service and equipment providers, governments and communities—will be needed to make full improvements possible.

14.142 The Commonwealth Government has already acted to reduce duplication in environmental regulation in the Commonwealth offshore waters by making NOPSEMA the sole assessor for petroleum and greenhouse gas environment regulation.²⁴⁵ This is estimated to lead to savings of \$120 million per year.

Recommendation 33

The Minister for State Development, as a matter of priority, work with the Commonwealth Government to expedite the reduction in the regulatory burden on resource projects, including the establishment of a single approval body.

242 *ibid*; and Submission No. 51, Department of State Development, 28 February 2014, p 3.

243 McKinsey and Company, *Extending the LNG boom: Improving Australian productivity and competitiveness*, May 2013, Executive Summary.

244 *ibid*, Exhibit 10.

245 Hon Ian Macfarlane MP, Minister for Industry, and Hon Greg Hunt MP, Minister for Environment, Joint Press Release, 28 February 2014.

Sovereign risk

- 14.143 As indicated above, most industry concern about investing in Australia focussed on project budgets and completion times. This is exemplified by the following statement from BP:

*Risk is also a concern in Australia, where on the whole projects take longer and cost more to complete than expected at the time of investment. For example in December 2012, Chevron announced that the cost of Gorgon had increased from US\$43 [billion] to US\$52 [billion], citing labour costs, low productivity, weather and the strength of the Australian dollar as amongst the reasons.*²⁴⁶

- 14.144 However, in assessing the viability of a project, another factor companies consider is sovereign or country risk.²⁴⁷

- 14.145 Sovereign risk relates to a country's stability and credibility in relation to its legal system—particularly in relation to protection of property rights—political stability, resource nationalism, industrial relations and the risk of terrorism activities.²⁴⁸

- 14.146 The importance of sovereign risk is clearly demonstrated by Woodside's 2007 statement to shareholders in relation to the company's portfolio strategy:

*We are conscious of the increased fiscal and political risk of many of the world's regions. We believe risky places are getting riskier in the oil and gas industry... We have been closely assessing these risks and will continue to do so. You can expect your company to make appropriate changes in its asset portfolio in recognition of worldwide risk trends.*²⁴⁹

- 14.147 Shell submitted that political risk was one of those identified for the Prelude project:

Under this category, consideration is given to socio-political risks and opportunities. Long term fiscal and regulatory certainty is a critical

246 Submission No. 13 from BP, 30 August 2013, p 2.

247 Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association, *Transcript of Briefing*, 26 June 2013, p 7.

248 Productivity Commission, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 221-222.

249 Goode, Charles, Chairman, and Voelte, Don, Managing Director and Chief Executive Officer, Woodside Petroleum Ltd, Address to the 36th Annual General Meeting, 19 April 2007, p 9. Available at: <http://www.woodside.com.au/Investors-Media/Annual-Meetings/Documents/2007ChairmanAndManagingDirectorCEOAddress.pdf>. Accessed on 24 January 2014.

*element in this consideration, but so are the broader social or environmental impacts or opportunities each project brings.*²⁵⁰

14.148 In relation to the importance of sovereign risk to the final investment decision (FID) for a project, Shell stated that:

*as for all major investors in Australia, so called sovereign or country risk is an important consideration in very large, long term investment decisions. Shell takes into account country risk when establishing its global investment portfolio and the specific countries and projects to be included in that portfolio. Stability and predictability in fiscal and regulatory environments are important for companies such as Shell to make multi-billion dollar investment decisions that will be sustained for many decades.*²⁵¹

14.149 In its submission to the Productivity Commission, APPEA stated that ‘to date Australia has been an attractive petroleum investment environment and developed a reputation as being a sound place to do business.’²⁵² The Productivity Commission also held that ‘Australia has a stable legal system and a liberal approach to foreign investment’ and that Australia is ‘rightly seen as [a] place of low sovereign risk.’²⁵³

*For example, investors in Australia have not been subject to resource nationalism or the expropriation of private developments by host countries. As the Productivity Commission noted ‘many asset expropriations occurred between 1959 and 1985, with the majority taking place in Middle-East countries. ... Recently, there has been a re-emergence of resource nationalism in some countries. A number of petroleum businesses in Venezuela, Bolivia and Ecuador were nationalised in 2006 and 2007. Forced nationalisation also occurred in Russia in the mid-2000s.*²⁵⁴

14.150 Nevertheless, the Productivity Commission sounded a note of caution in relation to Australia’s sovereign risk:

While Australia is rightly seen as place of low sovereign risk, were stricter ‘use it or lose it’ approaches introduced for retention leases where regulators considered that resource extraction was commercial,

250 Submission No. 34 from Shell in Australia, 18 November 2013, p 2.

251 *ibid.*, p 5. Shell also states that ‘sudden changes in taxation arrangements have clouded this perception, creating uncertainty for a number of major investors’.

252 Productivity Commission, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 222.

253 *ibid.*

254 *ibid.*

Chapter 14

*there would be important sovereign risk issues to consider when implementing such changes (especially where leaseholders had previously spent considerable sums on exploration).*²⁵⁵

14.151 Shell advised that it ‘sees Australia as a good place to do business [as it] represents low political risk,’ but warns that ‘sudden changes in taxation arrangements’ have clouded the perception of Australia as a good place for investment.²⁵⁶ APPEA argued that investment in LNG projects in Australia ‘is at risk today because we are perceived to be, and are ranked across most surveys as being, one of the least attractive destinations in which to invest.’²⁵⁷

14.152 Respondents to the global competitiveness index survey were ‘asked to select the five most problematic [factors] for doing business in their country.’²⁵⁸ For Australia, government instability/coups was a ‘top five’ factor for 3 per cent and corruption for just 0.5 per cent. Table 14.7 shows Australia’s ranking for selected individual aspects of its institutions.

255 *ibid.*

256 Submission No. 34 from Shell in Australia, 18 November 2013, p 5.

257 Mr Stedman Ellis, Chief Operating Officer, Western Region, Australian Petroleum Production and Exploration Association Limited, *Transcript of Evidence*, 1 November 2013, p 8.

258 Schwab, Klaus (ed), *The Global competitiveness report 2013–2014*, World Economic Forum, Geneva, 2013, p 110.

Table 14.7: Global Competitiveness Index rankings for some Australia's institutions²⁵⁹

Institution	2013 Ranking (out of 148)	2012 Ranking (out of 144)
Property rights	30	25
Public trust in politicians	36	27
Judicial independence	16	14
Efficiency of legal framework in settling disputes	30	18
Efficiency of legal framework in challenging regulations	30	19
Business costs of terrorism	46	47
Business costs of crime and violence	37	25
Organised crime	27	19

14.153 Notwithstanding the need to use such data with caution, and while acknowledging the shift between the 2012 and 2013 rankings, the Committee does not accept that such data demonstrate that Australia is generally perceived as one of the *least attractive* places to invest.

14.154 In addition, as Table 14.8 demonstrates, the Fraser Institute's 2013 survey shows a different industry perception of doing business in Australia.

Table 14.8: Global Petroleum Survey 2013—sovereign risk factors²⁶⁰

Factor/Index	Western Australia (out of 157)	Australia—Offshore (out of 157)
Geopolitical risk	14	36
Political stability	22	37
Security—physical safety of personnel and assets	7	35

14.155 The Fraser Institute Geopolitical Risk Index represents the level to which jurisdictions' political stability and security are perceived as a barrier to investment. A high geopolitical risk score is a sign of relatively unattractive investment.²⁶¹

²⁵⁹ *ibid*, p 111.

²⁶⁰ Wilson, Alana, Angevine, Gerry and Cervantes, Miguel, *Global Petroleum Survey 2013*, Fraser Institute, Vancouver, 2013, p 39 and pp 99–101.

Chapter 14

- 14.156 The Committee accepts that major project proponents need certainty over the long term, and particularly for upstream petroleum developments which are often located in remote areas with complex land tenure arrangements.²⁶²
- 14.157 The Committee also accepts that there is ‘the *perception* of an increased Australian risk,’ that ‘an uncertain investment environment has emerged, and this has increased Australia’s risk profile.’²⁶³ Again, however, the Committee does not agree that Australia is, *in reality*, one of the least attractive places to invest in major projects. The sheer volume of current and prospective investment referred to throughout this Inquiry is evidence that Australia remains a relatively low risk, highly attractive place in which to do business.
- 14.158 The Committee’s position was confirmed by the Fraser Institute’s 2013 Survey of Mining Companies which found that ‘Western Australia is the top-rated jurisdiction for investment attractiveness this year with a score of 85.3.’²⁶⁴ This survey also found that WA ranked in the top 10 jurisdictions in the Policy Perception Index.²⁶⁵
- 14.159 It is essential that Australia continues to provide long term certainty and a stable environment for project proponents. Given the increasing competition in the world gas market, there is no room for complacency. For example, the recent change in the federal government has created uncertainty in relation to parts of the existing regulatory regime, such as the implementation of the *Australian Jobs Act 2013* (Cth) and changes to the Petroleum Resources Rent Tax (PRRT). Uncertainty such as this will further damage perceptions of Australia’s sovereign risk.
- 14.160 There are at least two mechanisms in place in WA that work to provide certainty for investors. First, as discussed in Volume 1, WA enters into State Agreements as a means of maximising local content participation for major projects. As well as fulfilling this function, State Agreements are a means of ensuring long term certainty for a project. As the Productivity Commission found:

the ratification of the Agreement through legislation, and the fact that provisions can only be changed by mutual consent, potentially provides

261 Wilson, Alana, Angevine, Gerry and Cervantes, Miguel, *Global petroleum survey 2013*, Fraser Institute, Vancouver, 2013, p 14.

262 Productivity Commission, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 239.

263 Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association, *Transcript of Briefing*, 26 June 2013, p 7. Emphasis added.

264 Wilson, Alana and Cervantes, Miguel, Fraser Institute, 2013 *Survey of mining companies*, Vancouver, March 2014, p15.

265 *ibid*, p5. The Committee notes that this is a survey of the mining sector as a whole rather than the petroleum industry alone.

*greater certainty, security of tenure and reduction of sovereign risk for such projects.*²⁶⁶

- 14.161 Second, also as discussed in Volume 1, WA has a formal domestic gas Reservation Policy which provides that each LNG project reserves up to 15 per cent of its LNG production to supply the domestic gas market, taking commercial viability into consideration.²⁶⁷
- 14.162 Woodside's Pluto LNG project was the first to be subject to the Reservation Policy. Under its agreement with the State, Woodside 'has agreed to supply the equivalent of 15 per cent of LNG production as domgas within five years of the first Pluto LNG shipment, or after the 30 millionth tonne of the LNG has been exported.'²⁶⁸

Increasing global competition in the gas market

- 14.163 As noted previously, it is difficult to forecast LNG market trends due to three main factors. First is the exponential growth in shale gas drilling in the US; second is the difficulty in assessing future Chinese demand for LNG; and third is the significant increase in LNG demand in Japan following the Fukushima Daiichi nuclear disaster.
- 14.164 Despite this uncertainty, global LNG demand is expected to almost double, rising from 250 mtpa at present to approximately 450 mtpa by 2030. Half of this growth is expected to be in the Asian-Pacific gas market.²⁶⁹ Also as noted previously, Australia's LNG has traditionally been supplied to the Asian market. For example, LNG produced from the North West Shelf project is exported to Japan under a long-term sales agreement, and approximately 70 per cent of Ichthys LNG will be exported to the Japanese market. Ichthys gas will also be supplied to Taiwan.²⁷⁰
- 14.165 Australia is well placed to supply LNG to meet the forecast increased demand for LNG. Evidence in this report shows that Australia could potentially supply 125 mtpa into the world LNG market, consisting of approximately 25 mtpa of current production, approximately 60 mtpa from the seven projects currently under construction and a

266 Productivity Commission, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Commonwealth of Australia, Canberra, 2009, p 239.

267 Economics and Industry Standing Committee, 38th Parliament, *Inquiry into domestic gas prices*, Legislative Assembly, Parliament of Western Australia, Perth, 2011, pp 97-100.

268 *ibid*, p 79.

269 Mr Stephen Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 3 and Submission No. 12 from Australian Petroleum Production and Exploration Association Ltd, 30 August 2013, p 7.

270 INPEX, *Ichthys project. Fact sheet*, p 6. Available at: <http://www.inpex.com.au/media/34891/ichthys%20project%20fact%20sheet%20-%20september%202012%20final.pdf>. Accessed on 30 January 2014.

Chapter 14

possible 40 mtpa from projects such as Scarborough, Browse and expansions to projects such as Gorgon, Wheatstone and Pluto.²⁷¹

14.166 With 8.6 per cent of global production in 2011, Australia was the world's third largest exporter of LNG, behind Malaysia with 9.7 per cent and Qatar with 32 per cent.²⁷² According to CCIWA, Australia could potentially become the number one LNG producer in the world by 2020 and be producing 25 per cent of the world's LNG by 2030.²⁷³

14.167 However, according to Shell, customers in Australia's traditional Asian markets are 'actively seeking for supply diversification and they are actively seeking to lower the cost of their gas that they import.'²⁷⁴

14.168 Alongside the uncertainty in forecasting demand and changes to the dynamics of Australia's traditional markets, Australian LNG exports are being challenged by increasing competition to supply LNG into the global gas market. Considerable evidence was presented that the main competition for Australia's current markets comes from the potential export of shale gas from North America and potential supplies from East Africa.²⁷⁵ For example, 76 trillion cubic feet (tcf) of gas has been discovered in East Africa in the past five years, with projects totalling 33 mtpa 'on the drawing board already in those countries, potentially Mozambique and Tanzania, where five years ago there was none.'²⁷⁶ Increased competition for supply is also expected to come from Canada, Russia, the Gulf of Mexico and China.²⁷⁷

271 Mr Stephen Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 4.

272 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 6; Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association Ltd, *Transcript of Briefing*, 16 June 2013, p 4.

273 Submission No. 11 from The Chamber of Minerals and Energy of Western Australia (Inc), 30 August 2013, p 6; Submission No. 24 from Woodside Energy Ltd, 4 September 2013, p 9; and Submission No. 12 from Australian Petroleum Production and Exploration Association Ltd, 30 August 2013, p 29.

274 Mr Stephen Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 4.

275 For example, see: Submission No. 4, Western Australian Energy Research Alliance, 27 August 2013, p 1; Submission No 10 from Chamber of Commerce and Industry Western Australia (Inc), 30 August 2013, p 7; Submission No. 17 from ConocoPhillips, 30 August 2013, p 3; Mr Stephen Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 4; Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association Ltd, *Transcript of Briefing*, 16 June 2013, p 7; and Ms Nicole Roocke, Director, The Chamber of Minerals and Energy of Western Australia (Inc), *Transcript of Briefing*, 26 June 2013, p 3.

276 Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association Ltd, *Transcript of Briefing*, 16 June 2013, p 7.

277 Submission No 10 from Chamber of Commerce and Industry Western Australia (Inc), 30 August 2013, p 7; Submission No. 17 from ConocoPhillips, 30 August 2013, p 3; Mr Stephen Phimister, General Manager, Shell Australia, *Transcript of Briefing*, 26 June 2013, p 4; and Mr Damian Dwyer, Director, Economics, Australian Petroleum Production and Exploration Association Ltd, *Transcript of Briefing*, 16 June 2013, p 7.

- 14.169 McKinsey and Company data show that LNG export capacity ‘could potentially be as high as 95 mtpa from the US, 51 mtpa from Nigeria, 50 mtpa from Russia, 33 mtpa from East Africa and 19 mtpa from Canada.’²⁷⁸
- 14.170 Importantly for Australia, much of this this represents a significant challenge to supply into the Asian markets, particularly as that market is seeking diversification of supply.
- 14.171 Added to this already complex situation is the possibility that world LNG supply may exceed demand. Global LNG demand is expected to be approximately 470 mtpa by 2030, creating an unmet need of 220 mtpa. If the 60 projects currently under consideration around the world were to proceed, supply would exceed the unmet demand by approximately 60 per cent.²⁷⁹
- 14.172 This potential oversupply means that, first, not all projects will proceed and, second, there will be intense competition for oil and gas investment capital. While Australia is predicted to become the second largest exporter of LNG, this will depend on the investment attracted to potential Australian LNG developments.²⁸⁰
- 14.173 The ability to attract capital investment is obviously connected to the other factors such as project cost, sovereign risk, taxation regime, regulations and the like. For companies such as Shell, Woodside and ConocoPhillips, FLNG represents a means of addressing such challenges, particularly in relation to the cost of developments. For example, ConocoPhillips argues that ‘Australia has the advantage of being an early mover in that [FLNG] technology and therefore it has the ability to pick up a competitive advantage in what is an international market in terms of competition for investment capital.’²⁸¹
- 14.174 For Shell, ‘the cost and schedule benefits of FLNG will enhance the LNG industry’s ability to continue to develop Australia’s gas resources.’²⁸² Similarly, Woodside sees FLNG as an attractive alternative to land-based processing as it has determined that processing Browse Basin gas onshore at James Price Point was not economically viable.²⁸³

278 Submission No. 11 from the Chamber of Minerals and Energy of WA, 30 August 2013, p 7.

279 Submission No. 12 from the Australian Petroleum Production and Exploration Association (APPEA), 30 August 2013, p 7.

280 Submission No. 12 from the Australian Petroleum Production and Exploration Association (APPEA), 30 August 2013, p 7; and Submission No. 14 from The Australian Workers’ Union, 30 August 2013, p 9.

281 Ms Kayleen Ewin, Vice-President, Sustainable Development, Communications and External Relations, ConocoPhillips Australia Pty Ltd, *Transcript of Evidence*, 21 October 2013, p 8.

282 Submission No. 15 from Shell in Australia, 30 August 2013, p 8.

283 Mr Robert Cole, Executive Director, Woodside Petroleum, *Transcript of Evidence*, 16 October 2013, p 2.

Commercial viability versus profitability versus acceptable rates of return

- 14.175 Oil and gas companies refer to FLNG technology as a means of developing otherwise unviable fields. For example, Shell submits that:

*more remote fields face a much higher cost of development, making land-based LNG solutions more difficult—both technically and economically. FLNG has become widely recognised as a viable (or possibly the only viable) development option for smaller and/or more remote gas resources... In many cases, the choice is to develop a gas field with FLNG technology or not develop at all.*²⁸⁴

- 14.176 Shell further submits that the proposed onshore LNG project for Browse would ‘not have met generally accepted return rates for the very large sums of capital required... and would [probably have] destroyed value for shareholders.’²⁸⁵
- 14.177 ConocoPhillips, while agreeing that FLNG would not suit all developments, sees ‘the potential for floating LNG to deliver lower capital costs to projects that may otherwise not be economically viable, or may not compete globally.’²⁸⁶
- 14.178 In discussing the decision not to proceed with the James Price Point onshore processing plant, Woodside’s Executive Director, Mr Robert Cole, stated that the FLNG option had a ‘materially lower’ estimated capital cost and was ‘the only viable option for commercialisation of the Browse resource.’²⁸⁷
- 14.179 The Committee is aware of the ‘FLNG or nothing’ argument, which was articulated most succinctly by Mr Andrew Smith, Shell in Australia, who stated that ‘if the Browse development had had to be James Price Point... there would have been no project.’²⁸⁸
- 14.180 Woodside’s conclusion that FLNG was the only viable commercial way to develop the Browse fields was raised during a hearing. Mr Robert Cole, Woodside’s Executive Director, explained the company’s position as follows:

We would look at the capital intensity of the project, the rate of return that we get on that and whether or not, based on a prudent case, our base case would create or destroy value for us. We referred to those

284 Submission No. 15 from Shell in Australia, 30 August 2013, p 8.

285 *ibid*, p 5.

286 Submission No. 17 from ConocoPhillips Australia Pty Ltd, 30 August 2013, p 3.

287 Mr Robert Cole, Executive Director, Woodside Petroleum, *Transcript of Evidence*, 16 October 2013, p 3.

288 Mr Andrew Smith, Country Chair, Shell in Australia, *Transcript of Evidence*, 23 October 2013, p 8.

*[in assessing James Price Point] and we made an assessment against that and decided it was not commercially viable.*²⁸⁹

14.181 Such comments raised the issue of the difference between commercial viability, which seems to mean an acceptable rate of return, and profitability, and whether a project that was not commercially viable could be profitable.

14.182 Because of Woodside's decision to not proceed with its initial concept for the Browse project, which was to develop onshore processing facilities at James Price Point, and to endorse FLNG as their favoured development option, Woodside provides an informative case study on this issue.

14.183 When asked how Woodside defines commercial viability, the company responded as follows:

Woodside's objective is to make quality investments where we have a high degree of confidence of adding shareholder value. This is a business judgment, commensurate with the risk involved, weighing up all of risks and ramifications against all of the value and upside Economically we pay particular attention to downside risk. If our projects do not provide us with a positive net present value and create value for our shareholders, we do not invest shareholder funds in those projects.

*This approach is in-line with industry practice.*²⁹⁰

14.184 In response to a question as to whether the originally proposed James Price Point development, while deemed not to be commercially viable, would have been profitable, Woodside responded:

Woodside's objective is to make quality investments where we have a high degree of confidence of adding shareholder value and managing any risk of eroding value

*This approach is in-line with industry practice.*²⁹¹

289 Mr Robert Cole, Executive Director, Woodside Petroleum, *Transcript of Evidence*, 16 October 2013, p 10.

290 Closed Evidence, Closed Submission No. 32 from Woodside Energy Limited, 12 November 2013, p 3.

291 *ibid.*

Chapter 14

14.185 Similarly, when asked what would be a ‘generally accepted’ rate of return on investment for the company and its shareholders, Shell submitted that:

*for investments of this scale (tens of billions of dollars), this cannot simply be ‘boiled-down’ to a single metric. Shell, like all major investors, assesses specific investments based on a wide range of factors that influence the rate of return of the investment and its sensitivity or robustness to changes in the project and the external market, especially downside risk. This includes an analysis of the technical and non-technical profile of the investment (e.g. cost and schedule risk, fiscal stability, product prices, foreign exchange rates).*²⁹²

14.186 Shell also stated that an acceptable return rate is ‘highly dependent on the company’s individual investment profile and strategic intent’ and that Shell needed ‘to be confident that the specific investments will create shareholder value, not erode it.’²⁹³ Shell also referred the Committee to the *Offshore Petroleum Guideline for Grant and Administration of a Retention Lease* statement that ‘The Joint Authority will usually consider projects which have an IRR of 12% or more as commercially viable.’²⁹⁴

14.187 When asked to address the fluid nature of commercial viability, BP’s Mr Trevor Caldwell agreed that there was no definitive formula for defining commercial viability. Rather, ‘it is a combination of an assessment of risks, costs and revenue, which is inherently a judgement.’²⁹⁵

14.188 The Committee appreciates that resource companies operate to make a return on shareholder investment. However, the Committee’s position is that there needs to be a reasonable return to the communities in which such companies operate and a reasonable return to the people of Australia who are the owners of the mineral wealth of the country. As this report demonstrates, the shift toward FLNG represents a significant loss to local communities in which onshore facilities might otherwise have been constructed.



Ian Blayney, MLA
Chairman

292 Submission No. 34 from Shell Development (Australia) Pty Ltd, 18 November 2013, p 3.

293 *ibid.*

294 *ibid.* The reference is to NOPTA guidelines, p 14.

295 Mr Trevor Caldwell, Project General Manager, BP, *Transcript of Evidence*, 21 October 2013, p 11.

Appendix One

Inquiry Terms of Reference

On 22 May 2013 the Economics and Industry Standing Committee resolved to conduct an Inquiry with the following terms of reference:

The Committee will identify the manner in which the use of floating liquefied natural gas operations will impact upon the following sectors of the Western Australian economy:

- Engineering and design;
- Fabrication and manufacturing;
- Construction and ancillary services; and
- Domestic gas supply and industrial gas users.

The Committee will also identify the extent to which the use of floating liquefied natural gas operations will impact upon State revenue in Western Australia.

Appendix Two

Submissions received

No.	Name	Position	Organisation
1	Mr David Ryan	Principal Consultant	David Ryan Consulting
2	Ms Liz Harris	Chief Executive Officer	Challenger Institute of Technology
3	Mr Nick Wells	Operations Director	Atkins Australasia Pty Ltd
4	Mr Kym Bills	CEO	Western Australian Energy Research Alliance
5	Mr Chris Hicks and Mr Ken Owen		
6	Mr Craig Arnold	Managing Director	Dow Australia & New Zealand
7	Mr Tim Shanahan	Director	Energy and Minerals Institute, University of Western Australia
8	Mr Steve McCartney	State Secretary	Australian Manufacturing Workers' Union WA Branch
9			Domgas Alliance
10	Mr John Nicolaou	Chief Officer, Member Services and Advocacy, Chief Economist	Chamber of Commerce and Industry of Western Australia (Inc)
11	Mr Reg Howard-Smith	Chief Executive	The Chamber of Minerals and Energy of Western Australia (Inc)
12	Mr Stedman Ellis	Chief Operating Officer–Western Region	Australian Petroleum Production & Exploration Association Ltd
13	Mr Peter Metcalfe	External Affairs Manager	BP Australia
14	Mr Stephen Price	Branch Secretary, Australian Workers' Union, West Australian Branch	Australian Workers' Union

Appendix Two

No.	Name	Position	Organisation
15	Mr Andrew Smith	Country Chair	Shell in Australia
16	Mr David Tovey	General Manager, Corporate Affairs	Horizon Power
17	Mr Todd Creeger	President – Australia West	ConocoPhillips Australia Pty Ltd
18	Mr Tim Griffin	A/Director General	Department of Mines and Petroleum
19	Mr Brad Williams	Manager External Affairs	INPEX Operations Australia Pty Ltd
20	Closed Submission		
21	Mr Leo Burke		
22	Mr Paddy Crumlin	National Secretary	Maritime Union of Australia
23	Mr Stephen Grocott	Industry Participation Branch	Department of Commerce
24	Mr Roger Martin	Vice President Corporate Affairs	Woodside Energy Ltd
25	Mr David Leslie	General Manager Australia Region	GE Oil & Gas Australia Pty Ltd
26	Mr Chris Walton	CEO	Professionals Australia
27	Mr Stephen Wood	Director General	Department of State Development
28	Ms Leanne Hardwicke	General manager, Western Australia	Engineers Australia
29	Mr John Anderson	Vice President, WA and NT	Santos Ltd
30	Mr Jean-François Letellier	General Manager	GDF SUEZ Bonaparte Pty Ltd
31	Mr Paddy Crumlin	National Secretary	Maritime Union of Australia
32	Closed Submission		
33	Ms Paula Hickey	Senior Government Affairs Adviser	Woodside Energy Limited
34	Mr Paul Ryan	Senior communications Adviser	Shell Development (Australia) Pty Ltd
35	Mr Nenad Ninkov	Director	DomGas Alliance

No.	Name	Position	Organisation
36	Ms Jane Cutler	Chief Executive Officer	National Offshore Petroleum Safety and Environmental Management Authority
37	Mr Gary Martin	Acting Chief Executive Officer	Shire of Derby/West Kimberley
38	Mr John Nicolaou	Chief Officer, Member Services and Advocacy	Chamber of Commerce and Industry of Western Australia (Inc)
39	Ms Leanne Hardwicke	General Manager, Western Australia	Engineers Australia, Western Australian Division
40	Mr Reg Howard-Smith	Chief Executive	Chamber of Minerals & Energy of Western Australia
41	Mr Jack Griffin	Vice President Legal, Corporate Affairs	ConocoPhillips Australia Pty Ltd
42	Mr Peter Fairclough	Policy, Government and Public Affairs General Manager	Chevron Australia Pty Ltd
43	Mr Greg Guppy	Director, Applied Engineering and Australian Centre for Energy Process Training	Challenger Institute of Technology
44	Closed Submission		
45	Closed Submission		
46	Mr David Meager	Principal	DRMeager Consulting
47	Mr Adam Welch	Senior Policy Advisor, Western Region	APPEA
48	Closed Submission		
49	Ms Laura Kjellgren	Woodside Energy Ltd	Government Affairs Advisor
50	Closed Submission		
51	Mr Stephen Wood	Director General	Department of State Development
52	Mr Richard Sellers	Director General	Department of Mines and Petroleum

Appendix Two

No.	Name	Position	Organisation
53	Mr Brian Bradley	Director General	Department of Commerce
54	Mr Richard Sellers	Director General	Department of Mines and Petroleum
55	Mr Richard Sellers	Director General	Department of Mines and Petroleum
56	Closed Submission		
57	Closed Submission		
58	Ms Beverley Bower	Acting Executive Director, Petroleum, Approvals	Department of Mines and Petroleum
59	Closed Submission		
60	Closed Submission		
61	Closed Submission		

Appendix Three

Hearings

Date	Name	Position	Organisation
16 October 2013	Mr Robert Cole	Executive Director	Woodside Petroleum
	Mr Stephen Rogers	Senior Vice President	
	Mr Shaun Gregory	Senior Vice President, Health, Safety, Environment and Technology	
21 October 2013	Mr Trevor Caldwell	Project General Manager	BP
	Mr Peter Metcalfe	External Affairs Manager	
21 October 2013	Ms Kayleen Ewin	Vice-President, Sustainable Development, Communications and External Relations	ConocoPhillips Australia Pty Ltd
21 October 2013	Mr Jean-François Letellier	General Manager	GDF SUEZ Bonaparte Pty Ltd
	Mr Peter Rumball	Project Services Manager	
	Mr Tom Baddeley	Government and Community Relations Manager	
21 October 2013	Ms Natalie Wallace	Manager, Commercial WA and NT	Santos Ltd
	Mr John Anderson	Vice-President, WA and NT	
	Mrs Joanne Flowerdew	Project Services Team Leader	
21 October 2013	Mr Luke Musgrave	Vice President, LNG	ExxonMobil (Australia)

Appendix Three

Date	Name	Position	Organisation
23 October 2013	Mr William Townsend	General Manager, External Affairs and JV	INPEX
	Mr Nigel Wilson	Adviser	
23 October 2013	Mr Andrew Smith	Country Chair	Shell in Australia
	Mr Steven Phimister	General Manager	
	Mr Ian Grose	Commercial Manager, East Browse	
24 October 2013	Mr Roy Krzywosinski	Managing Director	Chevron
30 October 2013	Closed Hearing		
1 November 2013	Mr Stedman Ellis	Chief Operating Officer, Western Region	Australian Petroleum Production and Exploration Association
	Mr Adam Welch	Senior Policy Adviser, Western Region	
1 November 2013	Mrs Shannon Burdeu	Manager, Economics and Tax	Chamber of Minerals and Energy
	Ms Nicole Roocke	Representative	
	Mr Benjamin Hammer	Policy Adviser, Infrastructure	
	Mr Andrew Winter	Manager, Infrastructure	
1 November 2013	Mr John Nicolaou	Chief Officer, Member Services and Advocacy, Chief Economist	Chamber of Commerce and Industry
	Mrs Dana Hyland	Manager, Economics and Policy	
1 November 2013	Mr Steve McCartney	State Secretary	Australian Manufacturing Workers' Union
	Mr Thomas Palmer	Research Officer	

Date	Name	Position	Organisation
1 November 2013	Mr Stephen Price	Secretary	Australian Workers' Union
1 November 2013	Mr Ian Bray	Assistant National Secretary	Maritime Union of Australia
13 November 2013	Closed Hearing		
13 November 2013	Ms Leanne Hardwicke	General Manager, WA Division	Engineers Australia
	Mrs Helen Pedersen	President, WA Division	
	Mr Francis Norman	Engineer, WA Division	
15 November 2013	Mr David Leslie	Director	GE Oil & Gas Australia Pty Ltd
	Mr Stuart McLagan	Communications Manager ANZ	
15 November 2013	Mr Greg Guppy	Director, Applied Engineering and Australian Centre for Energy Process Training	Challenger Institute of Technology
	Ms Melanie Sorensen	General Manager, Training Services	
15 November 2013	Closed Hearing		
15 November 2013	Dr Michael Shaw	Member	DomGas Alliance
	Mr Matthew Brown	Executive Director	
	Mr Nenad Ninkov	Director	
20 November 2013	Closed Hearing		
21 November 2013	Hon Wilson Tuckey		Retired Member of Parliament
27 November 2013	Closed Hearing		
5 December 2013	Closed Hearing		

Appendix Three

Date	Name	Position	Organisation
10 February 2014	Mr Eric Locke	Director Communications	Professionals Australia
	Ms Karene Walton	Director Western Australia	
19 February 2014	Mr Brian Bradley	Director General	Department of Commerce
	Mr Stephen Grocott	General Manager, Industry Participation Branch	
	Mr John O'Hare	General Manager, Marine and Defence, Oil and Gas, Australian Marine Complex	
19 February 2014	Mr Stephen Wood	Director General	Department of State Development
	Ms Gail McGowan	Deputy Director General	
	Mr Richard Sellers	Director General	Department of Mines and Petroleum
	Mr Jeffrey Haworth	Executive Director Petroleum	
26 February 2014	Closed Hearing		
19 March 2014	Closed Hearing		

Appendix Four

Briefings

Date	Name	Position	Organisation
19 June 2013	Mr William Tinapple	Executive Director Petroleum	Department of Mines and Petroleum
19 June 2013	Ms Gail McGowan	Deputy Director General	Department of State Development
	Ms Nicola Cusworth	Deputy Director General	
26 June 2013	Mr Damian Dwyer	Director, Economics	Australian Petroleum Production and Exploration Association
	Mr Adam Welch	Senior Analyst	
26 June 2013	Ms Nicole Roocke	Director	Chamber of Minerals and Energy
	Mr Benjamin Hammer	Policy Adviser	
26 June 2013	Mr Steven Phimister	General Manager	Shell Australia
	Mr Ian Grose	Commercial Manager, East Browse	
	Mr Steven Kauffman	Engineering Manager	
28 June 2013	Mr Nenad Ninkov	Member	DomGas Alliance
	Mr Michael Shaw	Member	
28 June 2013	Mr James England	State Manager	Australian Steel Institute
28 June 2013	Mr Steven McCartney	State Secretary	Australian Manufacturing Workers Union
1 July 2013	Mr Chris Doyle		Horizon Power
	Mr Roman Raudonikis		

Appendix Four

Date	Name	Position	Organisation
1 July 2013	Mr Peter Wyse	LNG Plant and Transport Manager	Energy Developments Limited
2 July 2013	Ms Michelle Grady	Senior Government Affairs Adviser	Woodside Petroleum
	Ms Alisha Stearne	Community Relations Adviser	
	Mr Tony Aleckson	Training Coordinator	
2 July 2013	Mr Roy Zylstra	General Manager, Operations	ATCO Australia
	Mr Roger Doyle	Karratha Power Station Manager	
3 July 2013	Prof Barney Glover	Vice-Chancellor	Charles Darwin University
	Dr Daria Surovtseva	Deputy Director, North Australian Centre for Oil and Gas	
	Assoc Prof Steve Shanahan	Chair, Academic Board	
3 July 2013	Mr Brian O’Gallagher	Executive Director, Investment, Trade & Facilitation	Northern Territory Department of Business
3 July 2013	Ms Jett Street	External Relations Advisor	ConocoPhillips Australia
	Mr Jason Fior	Senior Process Engineer	
4 July 2013	Mr Alan Holland	Director of Energy	Northern Territory Department of Mines and Energy

Date	Name	Position	Organisation
28 August 2013	Prof Paul Johnson	Vice-Chancellor	University of Western Australia
	Mr Tim Shanahan	Director, Energy and Minerals Institute	
	Assoc Prof Paul Stanwix	School of Mechanical and Chemical Engineering	
	W/Prof Mark Cassidy	Oceans Institute	
	W/Prof Liang Cheng	Civil, Environmental and Mining Engineering	
	Mr David Harrison	Chief Adviser, Corporate and Government Affairs	
28 February 2014	Mr Greg Guppy	Director	Australian Centre for Energy Process Training, Challenger Institute of Technology
	Ms Terry Durant	General Manager, Client Services and Communications	

Appendix Five

Acronyms and terms of convenience

ABS	Australian Bureau of Statistics
ACEPT	Australian Centre for Energy Process Training
AIMS	Australian Institute of Marine Science
AIP National Framework	Australian Industry Participation National Framework
AIPP	Australian Industry Participation Plan
AMC	Australian Marine Complex
AMSA	Australian Maritime Safety Authority (Cth)
AMWU	Australian Manufacturing Workers' Union
APESMA	The Association of Professional Engineers, Scientists & Managers, Australia (now Professionals Australia)
APPEA	Australian Petroleum Production and Exploration Association
ASI	Australian Steel Institute
AWU	The Australian Workers' Union
BCA	The Business Council of Australia
BOD	Basis of design
BTU	British thermal units
CCIWA	Chamber of Commerce and Industry of Western Australia (Inc)
CDU	Charles Darwin University
CMEWA	The Chamber of Minerals and Energy of Western Australia (Inc)
COFS	Centre for Offshore Foundation Systems

Appendix Five

CPU	Compression platform unit
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CUF	Common User Facility (within the Australian Marine Complex)
DAA	Development assessment and approval
DAFF	Department of Agriculture, Fisheries and Forestry (Cth)
DBP	Dampier to Bunbury natural gas pipeline
DCom	Department of Commerce
DMP	Department of Mines and Petroleum
DSD	Department of State Development
domgas	domestic gas
EEZ	Exclusive Economic Zone
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EPC	Engineering, procurement and construction
EPCM	Engineering, procurement and construction management
FDP	Field Development Plan
FEED	Front-end engineering design
FID	Final investment decision
FLNG	Floating liquefied natural gas
FPSO	Floating production, storage and offloading
FW Act	<i>Fair Work Act 2009</i> (Cth)
GDP	Gross domestic product

GJ	Gigajoule (one billion joules)
GSOO	Gas Statement of Opportunities
GSP	Gross state product
GTC	[Chevron Australia's] Global Technology Centre
ICN	Industry Capability Network
ICNWA	Industry Capability Network of Western Australia
IFSP	Industry Facilitation and Support Program
IiP	Initially-in-place
IMO	Independent Market Operator
IPP	Industry Participation Plan
ISX	Indigenous Stock Exchange
IUA	International Unitisation Agreement
JA Guidelines	<i>Guidelines for offshore petroleum Joint Authority decision-making procedures</i> , prepared by the Department of Resources, Energy and Tourism (Cth)
JCC	Japan Crude Cocktail
KJV	Kellogg Joint Venture
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MARIN	Maritime Research Institute Netherlands
Migration Act	<i>Migration Act 1958</i> (Cth)
MLA	Member of the Legislative Assembly of the Parliament of Western Australia
MLC	Member of the Legislative Council of the Parliament of Western Australia

Appendix Five

MFP	Multifactor productivity
MP	Member of Parliament
mtpa	Million tonnes per annum
MUA	Maritime Union of Australia
NACOG	North Australian Centre for Oil and Gas
NFSRC	National Floating Systems Research Centre
NOPSA	National Offshore Petroleum Safety Authority (superseded by NOPSEMA)
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority (Cth)
NOPTA	National Offshore Petroleum Titles Administrator (Cth)
OECD	Organisation for Economic Co-operation and Development
NT	Northern Territory
OGIIP	Oil and Gas Industry Innovation Partnership
OPGGs Act	<i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i> (Cth)
PRRT	Petroleum Resource Rent Tax
PRRT Act	<i>Petroleum Resources Rent Tax Assessment Act 1987</i> (Cth)
Reservation Policy	WA Government Policy on Securing Domestic Gas Supplies
SBM	Single buoy mooring
SDI	Scottish Development International
SECWA	State Energy Commission of Western Australia
SPM	Single point mooring
Tcf / tcf	Trillion cubic feet

The 2011 Report	Report by the Economics and Industry Standing Committee, entitled <i>Inquiry into Domestic Gas Prices</i> , tabled 24 March 2011
The Framework	The Western Australian Government's Local Industry Participation Framework
TJ	Terrajoule (one trillion joules)
Treasury	Department of Treasury Western Australia
US	United States of America
UWA	The University of Western Australia
WA	Western Australia
WA:ERA	Western Australian Energy Research Alliance
WKPP	West Kimberley Power Project
WTO	World Trade Organization

Appendix Six

Glossary

Acreage	An area of land in which minerals may be explored for and/or produced under the conditions of a relevant petroleum title.
Basin	A large-scale structural formation of rock strata formed in association with plate tectonic activity.
BTU	British Thermal Unit—A unit of energy measurement, equal to approximately 1055 joules. One BTU is the amount of heat energy needed to cool or heat one pound of water by one degree Fahrenheit.
Carbon sequestration	The process of capturing and storing carbon dioxide in underground reservoirs.
Christmas tree	An assembly of valves, spools, pressure gauges and chokes fitted to the wellhead used to control the flow of fluid—usually oil or gas, but also possibly water—out from (or even back into) a well.
Coal seam gas	Natural gas that is extracted from coal beds.
Coastal waters	A belt of water between the Australian coastline and a line that is generally three nautical miles out from the coastline. Jurisdiction over this belt of water is vested in the adjacent State or Territory, as if it were part of that State or Territory.
Condensate	High energy content hydrocarbon liquids which are present as gaseous components in raw natural gas streams.
Conventional gas	Natural gas that has been trapped in porous and permeable rock structures, caused by folding and/or faulting of sedimentary layers.
Cryogenics	The study of the production and behaviour of materials at temperatures below -150 degrees Celsius.
Downstream	A term used to refer to all petroleum operations occurring after delivery of crude oil or gas from an initial processing facility.

Appendix Six

Exclusive Economic Zone	A belt of water between the Australian coastline and a line that is not more than 200 nautical miles out from the coastline. Australia has sovereign rights in the Exclusive Economic Zone for the purpose of exploring and exploiting, conserving and managing all natural resources in the waters and seabed in this area.
Exploration Permit	A petroleum title allowing the exploration for petroleum resources within specific acreage. Exploration Permits are granted through a competitive process to applicants who will undertake the fullest assessment of an area's petroleum potential. The initial term of a Commonwealth offshore Exploration Permit is six years (the initial term of a state Exploration Permit is five years). An Exploration Permit can be renewed for two further periods of five years, with 50 per cent relinquishment of the area at the end of each term.
Flowline	A pipeline that connects the wellhead to a manifold or to processing facilities and carries hydrocarbons.
Hydrocarbon	An organic compound consisting entirely of hydrogen and carbon. Hydrocarbons are the principle constituents of petroleum and natural gas.
Joint venture	A business agreement in which parties agree to develop, for a finite time, a new entity and new assets by contributing equity.
Joule	A unit of energy. Used in Australia for measuring gas volumes.
Liquefaction	The process of condensing refined natural gas into LNG.
Local content	A measure of local participation in large-scale domestic projects undertaken by multinational corporations.
LNG	Liquefied Natural Gas—natural gas that has been refined to remove all inert components, and then chilled to -162 degrees Celsius, at which point it condenses into an odourless, colourless non-toxic and non-corrosive liquid.
LNG train	The liquefaction facility at an LNG plant. Many plants have multiple LNG trains.
Manifold	A structure designed to commingle and direct produced fluids from multiple wells into one or more flowlines or pipelines.
Modular construction	A construction project in which pre-fabricated modules are conveyed to site for in-situ assembly.

Natural gas	A fossil fuel, hydrocarbon gas mixture consisting primarily of methane. Natural gas is conventionally found in underground rock formations. Higher alkanes, such as ethane and propane, as well as inert gases such as carbon dioxide and nitrogen, may also be present in raw natural gas. Natural gas is generally refined to remove inert components.
Reservation Policy	A formal policy of the WA Government, adopted in 2006, by which proponents of WA-based LNG projects are broadly required to supply the equivalent of 15 per cent of LNG project production as natural gas into the WA domestic market.
Reserves	Natural mineral deposits that are valuable and legally, technically and economically feasible to extract.
Reservoir	A rock or formation that holds hydrocarbons.
Resource rent	Above normal profits that are earned on the sale of mineral resources, owing to their relative scarcity.
Resources	Natural mineral deposits that are potentially valuable, and for which reasonable prospects exist for eventual economic extraction.
Retention Lease	A petroleum title covering an area of land in which a non-commercial petroleum discovery has been made. The holder of an Exploration Permit for a particular block of acreage may apply for a Retention Lease. To be granted a Retention lease, the holder of the Exploration Permit must demonstrate that the resource is not currently commercially viable, but is likely to become viable within the next 15 years. When the discovery is deemed commercial, the Retention Lease must be converted into a Production License.
Petroleum royalty	A state tax levied on the production of petroleum production occurring under state jurisdiction.
Petroleum title	The method of dividing and administering land in Australia for the purpose of exploration and production of petroleum resources. In WA, the state is divided into graticular blocks, each five minutes of latitude by five minutes of longitude in area; all petroleum titles are constituted from these blocks. A petroleum title begins as an Exploration Permit, and may be converted into either a production license or a retention lease.
Production Licence	A petroleum title permitting the production of a discovered petroleum resource within specific acreage.

Appendix Six

Unconventional gas	Natural gas that is trapped in impermeable rock. Includes shale gas, tight gas and coal seam gas.
Shale gas	Natural gas that is found trapped within shale formations.
State Agreement	A contract between the WA Government and proponents of major resources projects which has been ratified by an Act of the WA Parliament. State Agreements specify the rights, obligations, terms and conditions for development of the project and establish a framework for ongoing relations and cooperation between the State and the project proponent.
Stick-built	A construction project that takes place entirely or predominantly on-site.
Subsea	An oil and gas industry description for the processes that occur, and the componentry that is installed, in underwater locations.
Territorial sea	A belt of water between the Australian coastline and a line that is generally twelve nautical miles out from the coastine. Australia's sovereignty extends out into the territorial sea.
Tight gas	Natural gas that is found trapped within reservoir rocks of extremely low permeability.
Topsides	Infrastructure required for oil and gas processing (and, in the case of FLNG technology, liquefaction) as well as vessel operation, which is installed into and on top of offshore oil and gas production facilities.
Turret	A fixed column mooring system for floating oil and gas production facilities, about which the vessel in question can freely weathervane.
Upstream	A term used to refer to all petroleum operations occurring before delivery of crude oil or gas to a secondary processing facility.
Well	A hole drilled to test an unknown reservoir or to produce from a known reservoir.
Wellhead	The surface termination point of a drilled well, which incorporates facilities for hanging the production tubing and installing the Christmas tree and surface flow-control facilities.

Appendix Seven

Conversions

There are numerous ways to measure quantities of natural gas, with the preferred measure varying from country to country.

In Australia natural gas is measured and priced in terms of energy content in joules, which is a derived unit of energy, work or amount of heat in the International System of Units.

One joule is equal to the amount of energy expended in applying a force of one newton through a distance of one metre. That is approximately the amount of energy required to lift a small apple to one's mouth.

One joule is also the amount of energy required to produce one watt of power for one second, or the amount of energy required to raise the temperature of one gram of water by one degree Celsius.

1 Gigajoule (GJ) = 1 000 000 000 Joules (J)

1 Terajoule (TJ) = 1000 GJ = 1 000 000 000 000 J

1 Petajoule (PJ) = 1000 TJ = 1 000 000 GJ = 1 000 000 000 000 000 J

In the United States, natural gas is measured and priced either in terms of cubic feet or British Thermal Units (BTUs). As the energy content of gas varies in accordance with natural gas composition, it is difficult to specifically convert between natural gas that is measured in cubic feet (a unit of volume) and natural gas that is measured in joules or BTUs (measures of energy content). It is, however, more or less the case that 1 000 cubic feet of natural gas contains approximately 1 GJ of energy, which is in turn more or less equal to 1 million BTUs.

The energy content of LNG is also very difficult to specify with precision, as this again is heavily dependent upon the composition of the liquefied natural gas in question. It is, however, more or less the case that one tonne of LNG contains approximately 55 GJ of energy.

Appendix Eight

Table of LNG projects

The following table of LNG projects was produced with the assistance of the Department of Mines and Petroleum.

Appendix Eight

Project	Basin	Field/s	Leasehold equity	Reserves / resources
Prelude	Browse	Prelude and Concerto	Shell – 72.5% INPEX – 17.5% KOGAS – 10%	3 Tcf “liquids-rich gas”
Ichthys	Browse	Ichthys	INPEX – 63.45% Total – 30% <i>Remainder split between CPC, Tokyo Gas, Osaka Gas, Chubu Electric and Toho Gas</i>	12.8 Tcf gas, 527 million barrels /condensate
Browse	Browse	Brecknock, Calliance and Torosa	Woodside – 34% Shell – 25% MiMi – 16% PetroChina – 8.3% BP – 16.7%	15.9 Tcf gas, 417 million barrels /condensate
Gorgon	Carnarvon	Gorgon and Jansz-lo	Chevron – 47.3% ExxonMobil – 25% Shell – 25% <i>Remainder split between Osaka Gas, Tokyo Gas and Chubu Electric</i>	40 Tcf
Scarborough	Carnarvon	Scarborough	ExxonMobil – 50% BHP – 50%	8-10 Tcf
Bonaparte	Bonaparte	Frigate, Petrel and Tern	GDF SUEZ – 50% Santos – 50%	9.6 Tcf
Wheatstone	Carnarvon	Brunello, Iago, Julimar, and Wheatstone	Chevron – 64.4% Apache – 13% KUFPEC – 7% Shell – 6.4% TEPCO – 8%	10 Tcf
Pluto	Carnarvon	Pluto and Xena	Woodside – 90% Kansai Electric – 5% Tokyo Gas – 5%	5 Tcf
North West Shelf	Carnarvon	Angel, Echo Yodel, Goodwyn, North Rankin, and Perseus	Woodside – 16.7% BHP – 16.7% BP – 16.7% Chevron – 16.7% MiMi – 16.7% Shell – 16.7%	33 Tcf

Appendix Eight

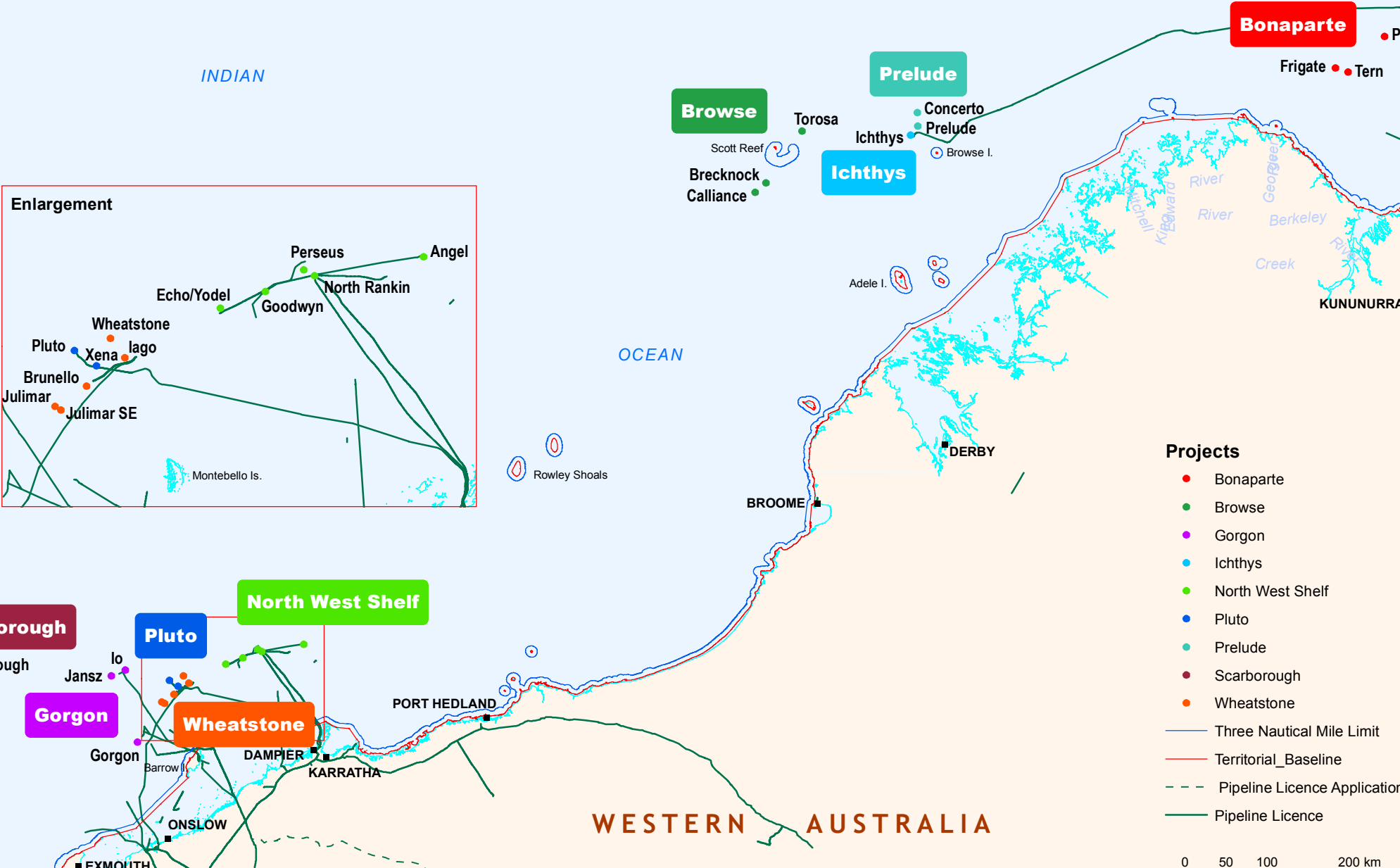
Plant LNG production capacity	Number of subsea wells	Subsea drill depth	Depth of water	Distance from shore/plant
3.6 mtpa	8 (initially)	4000-4500m	250m	200km
8.4 mtpa	24 (initially)	4000-4500m	280m	220km (889km pipeline to Darwin)
12 mtpa	58 (initially)	4300-4500m	750m	350km to James Price Point
15.6 mtpa	18 (initially)	3500-4600m	200-1300m	130km
7 mtpa	6-12 (initially)	2000m	900m	275km
2 mtpa	22 (initially)	3100-3600m	50-100m	250km from Darwin
8.9 mtpa	11 (initially)	3000-4000m	100-260m	225km pipeline to plant
4.3 mtpa	9 (to date)	3100-3500m	180m (Xena) 1000m (Pluto)	180km pipeline to plant
16.3 mtpa	90 (to date)	3000-3200m	125-130m	135km to Karratha

Appendix Nine

Map of major prospective offshore areas

The following map of major prospective offshore areas was produced with the assistance of the Department of Mines and Petroleum.

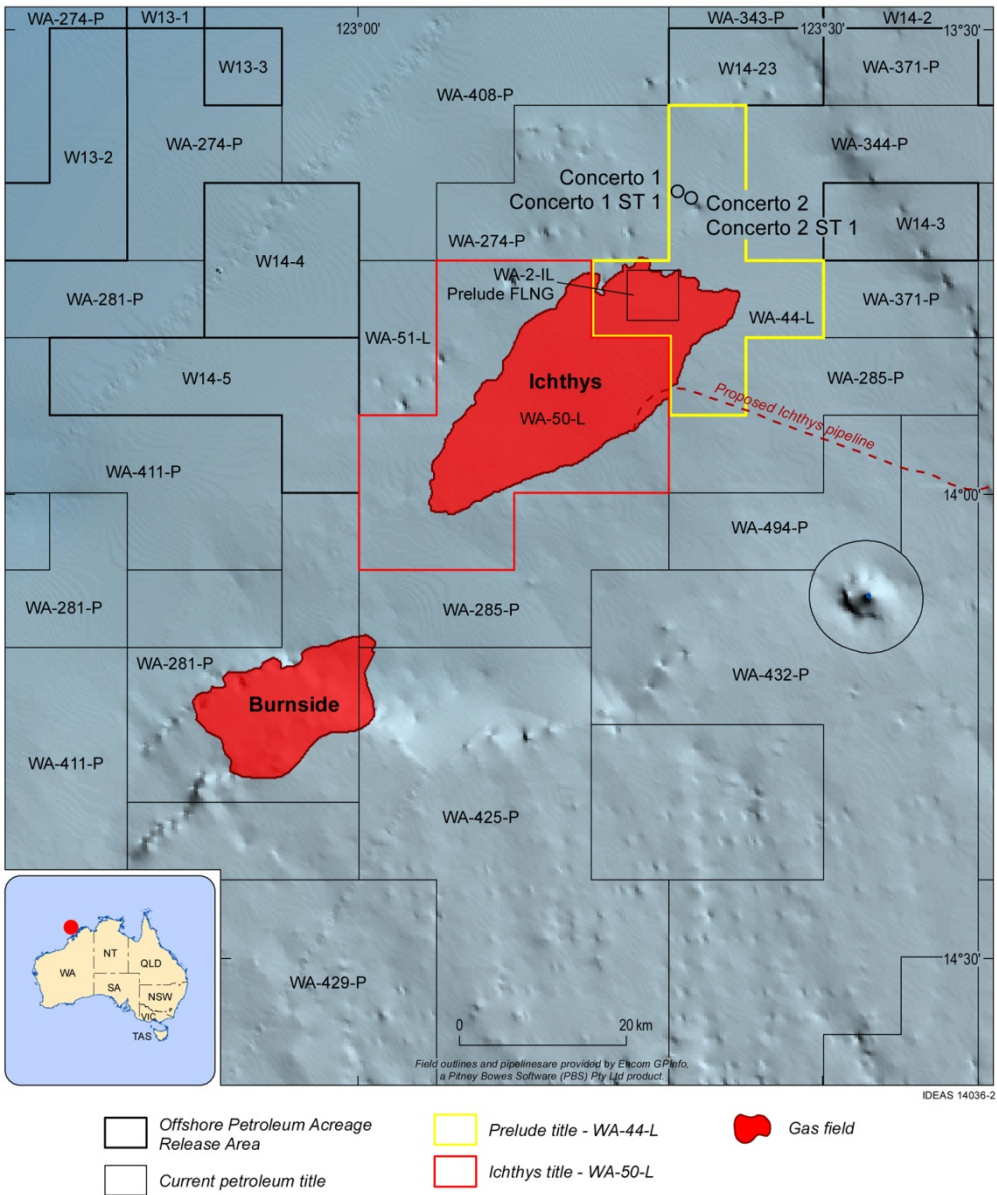
MAJOR PROSPECTIVE OFFSHORE AREAS



Appendix Ten

Map of Ichthys and Prelude project petroleum titles

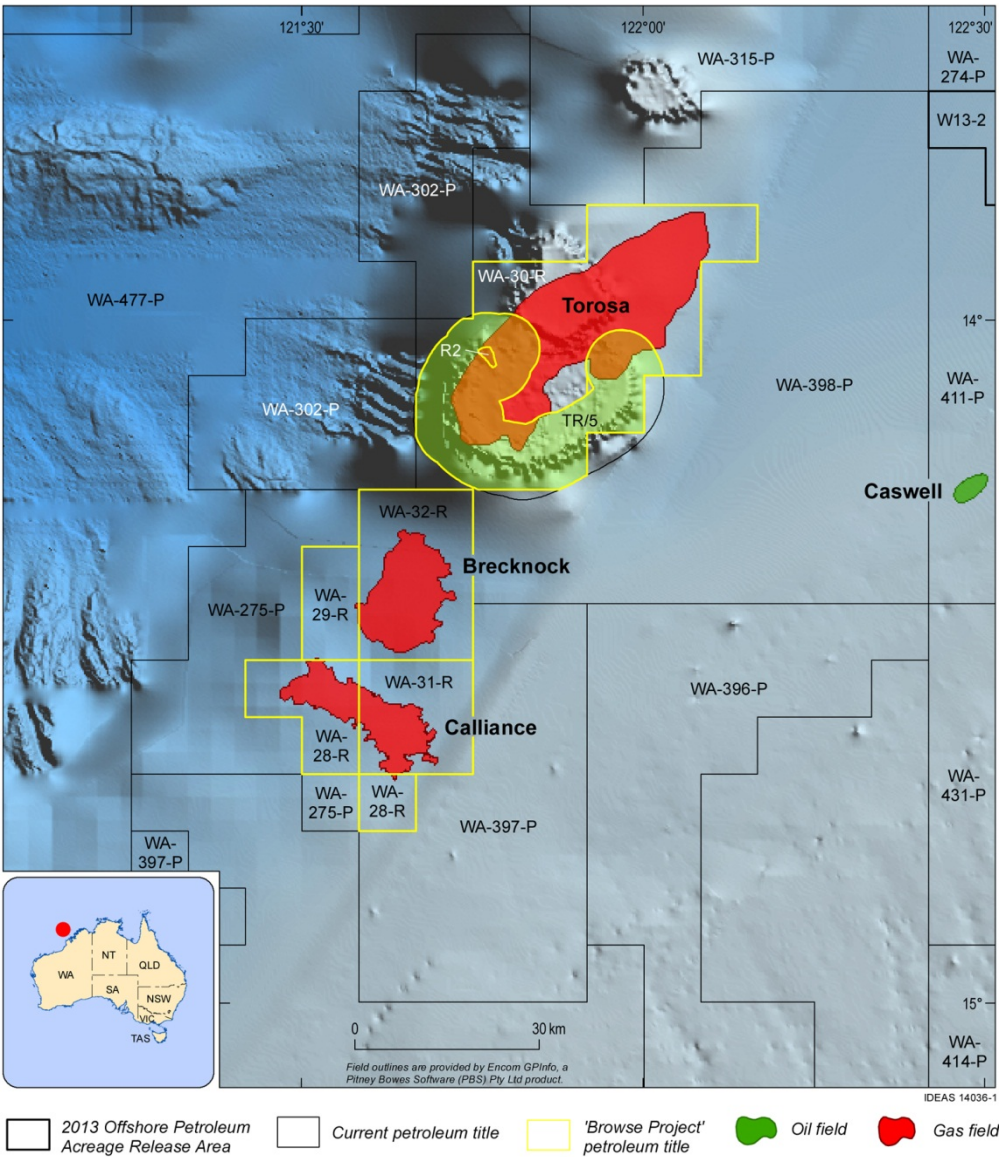
The following map of Ichthys and Prelude project petroleum titles was produced with the assistance of Geoscience Australia.



Appendix Eleven

Map of Browse project petroleum titles

The following map of Browse project petroleum titles, in which the state titles are highlighted, was produced with the assistance of Geoscience Australia.



Appendix Twelve

Letter from Hon Gary Gray, MP, former Federal Minister for
Resources and Energy



THE HON GARY GRAY AO MP

**MINISTER FOR RESOURCES AND ENERGY
MINISTER FOR SMALL BUSINESS
MINISTER FOR TOURISM**

PO BOX 6022
PARLIAMENT HOUSE
CANBERRA ACT 2600

B13/656

The Hon. Bill Marmion MLA
Minister for Mines and Petroleum
Level 29, 77 St Georges Terrace
PERTH WA 6000

27 JUN 2013

Dear Minister

I write to you in your capacity as the Western Australian member of the Commonwealth-WA Offshore Petroleum Joint Authority (Joint Authority) under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGs Act) regarding the Browse retention leases WA-28-R; WA-29-R; WA-30-R; WA-31-R; and WA-32-R.

On 7 June 2013, the Browse Joint Venture formally notified the National Offshore Petroleum Titles Administrator (NOPTA) that the James Price Point LNG development concept was not economic and requested a variation of the Browse retention lease conditions.

The Joint Authority is required to make a decision in relation to the application for variation.

NOPTA's assessment is that the Joint Venture has demonstrated that the James Price Point development option is not commercially viable and that the Joint Venture's application for variation of the Browse retention leases should be approved.

Having reviewed NOPTA's advice and the Browse Joint Venture's application, I consider that no further information is required in order for a decision to be made by the Joint Authority.

I am committed to the early and successful commercialisation of the Browse resources and as such wish to see this matter resolved as soon as possible. I therefore give you notice under section 59(3)(a) of the OPGGS Act that I think the decision of the Joint Authority should be to vary the retention lease conditions as set out in NOPTA's advice. Consistent with my position I propose to accept the instrument for variation to the conditions, including the work program, as provided by NOPTA, which I have attached to this letter.

In accordance with section 59 of the OPGGS Act, if you do not, within 30 days, provide me in writing with your view of what the Joint Authority decision should be, I will decide the matter.

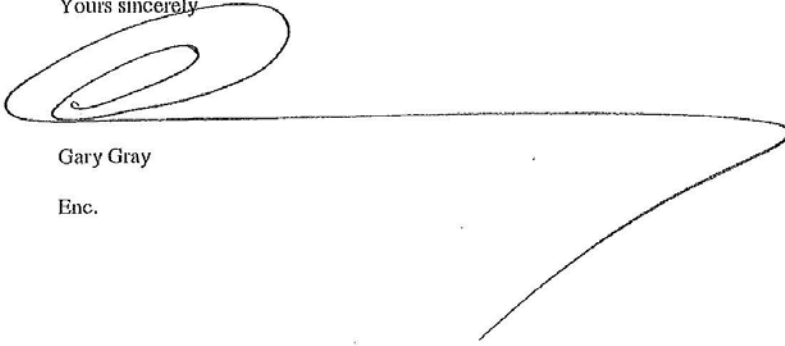
Telephone: (02) 6277 7930 Facsimile: (02) 6273 0434

2

Should we disagree on the decision that is to be made, my decision as responsible Commonwealth Minister will prevail.

I look forward to receiving your decision.

Yours sincerely

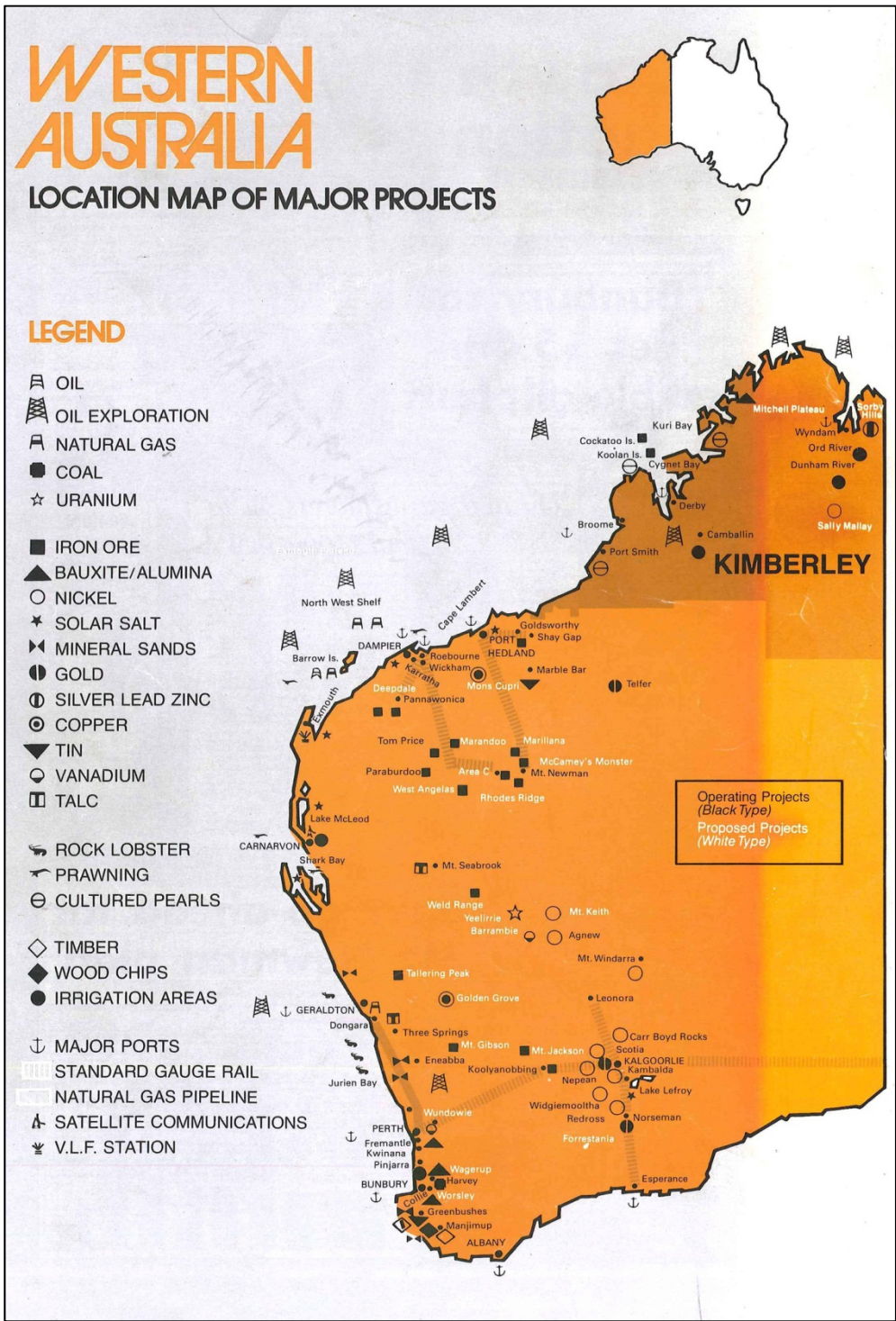
A large, stylized handwritten signature in black ink. It begins with a series of loops on the left, followed by a long horizontal stroke that extends to the right, and then curves downwards and to the right.

Gary Gray

Enc.

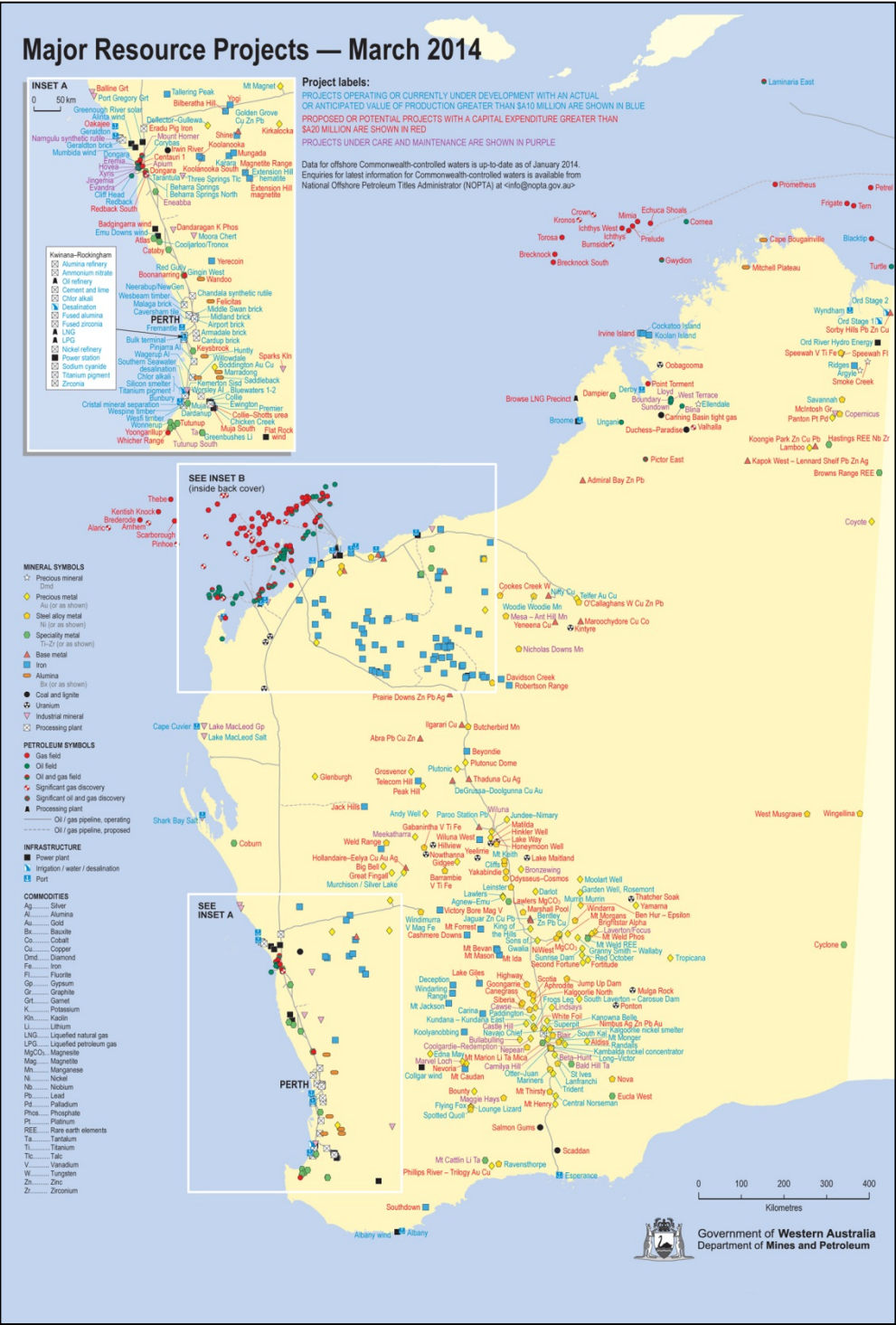
Appendix Thirteen

Map series of WA industrial development



1978

This map was obtained with the assistance of the Department of Mines and Petroleum.



2014

This map is updated and published quarterly in the DMP publication *Prospect*. The March 2014 edition of *Prospect* is available at: http://www.dmp.wa.gov.au/documents/Prospect_March_2014_web.pdf.

Appendix Fourteen

Committee's functions and powers

The functions of the Committee are to review and report to the Assembly on: -

- a) the outcomes and administration of the departments within the Committee's portfolio responsibilities;
- b) annual reports of government departments laid on the Table of the House;
- c) the adequacy of legislation and regulations within its jurisdiction; and
- d) any matters referred to it by the Assembly including a bill, motion, petition, vote or expenditure, other financial matter, report or paper.

At the commencement of each Parliament and as often thereafter as the Speaker considers necessary, the Speaker will determine and table a schedule showing the portfolio responsibilities for each committee. Annual reports of government departments and authorities tabled in the Assembly will stand referred to the relevant committee for any inquiry the committee may make.

Whenever a committee receives or determines for itself fresh or amended terms of reference, the committee will forward them to each standing and select committee of the Assembly and Joint Committee of the Assembly and Council. The Speaker will announce them to the Assembly at the next opportunity and arrange for them to be placed on the notice boards of the Assembly.