

Chapter 1 — Background

General overview of the North West Shelf

1.1 The North West Shelf (NWS) and North West Shelf Petroleum Province are names given to a gas-rich area of the continental shelf off the Western Australian coast (see map). This is a large scale gas extraction and processing project by world standards in terms of engineering, design expertise and cost. In expenditure terms, it is the largest project ever undertaken in Australia. At the project's inception, the cost was commonly estimated at \$12 billion, a level of investment unprecedented in Australian resource development. It should be noted that if shipping, exploration and appraisal costs are included that figure would be closer to \$15 billion.¹

1.2 It has often been predicted that the project would have a major impact on the Australian economy. Similarly it is stated that the initial stages of the project had the potential to provide significant opportunities for sustainable growth in Australian industry, particularly in terms of project management, design, fabrication, manufacture and installation.

1.3 One of the more comprehensive reports on the North West Shelf gas project claimed 'in full production, the project will be the largest single contributor to Australian exports. In a typical production year it has been estimated that the project will boost exports by around 3.5%, real GDP by 1.24% and employment by 80 000 jobs'.² These estimates may well have been affected by the significant technological change which has occurred in the project since the report was published in 1994. Woodside's NWS internet page (as at September 1997) quotes an employment figure of 60 000. The minerals and petroleum production sector, including services, employs 88 000 people directly with a further 338 000 manufacturing jobs generated by the industry.³

1.4 It may be assumed that significant overseas sourced borrowings have been involved. The extent to which an increase in the national debt is offset by income from the project cannot be assessed since financing details, the cost of imported equipment and royalties on imported technology are not available.

1.5 The NWS project evolved from a 1963 hydrocarbon exploration joint venture. Drilling commenced in 1967 with the first significant (but considered

1 Woodside: submission 23.01, pp 1 – 2. All amounts of money in this report are expressed in 'money of the day' terms.

2 Clements, K & Greig R, *Modelling Large Resource Development Projects in an Open Economy: The Case of Australia's North West Shelf Gas Project*, Blackstone, 1994, (exhibit 10), pp 1 and 69. One of the assumptions used was that export revenue would be \$2.3 billion (1989 prices). The Australian Bureau of Agricultural and Resource Economics stated that in 1995–96, LNG exports were valued at \$1.4 billion. (Source: *Net economic benefits from Australia's oil and gas resources*, ABARE, (exhibit 33), p 43)

3 *Resources policy statement*, February 1998, p 3

uneconomic) discovery of gas and condensate occurring in 1971 at Scott Reef.⁴ Major discoveries soon followed at North Rankin, Goodwyn and Angel fields. With the sharp rise in world crude oil prices between 1972 and 1980, exploration efforts in Australia increased and many countries looked to gas as an alternative fuel.

1.6 Significant commercial risk was attached to the decision to develop the project due to the distance from shore of the fields, the depth of water, cyclonic conditions and infrastructure and capital requirements. These factors, together with remoteness from gas markets and the lack of an extensive pipeline delivery network differentiate the project from those offshore from the United Kingdom and North America. Care therefore needs to be taken when comparing this project with overseas experiences.

1.7 In a regulatory sense, the NWS project is subject to approval processes and legal requirements from all three levels of government. Although the NWS natural gas fields lie in Federal waters, much of the associated infrastructure is located onshore. For example, exploration permits are issued by the Federal Government, port facilities approval by the State Government and company housing and site approvals by the local government.

1.8 Woodside has estimated the recoverable gas reserves of the province to be 2.8 trillion cubic metres, of which 10.6 billion cubic metres (over 8 million tonnes) are exported or used in the WA domestic market annually.⁵ The fields from which gas was extracted earliest, North Rankin and Goodwyn, have total reserves of 200 billion cubic metres (150 million tonnes) of gas and 290 million barrels of condensate. In 1995–96 the NWS project accounted for almost 90% of WA's total gas production.⁶ Gas and oil prospects likely to be developed by the turn of the century are briefly discussed on page 6.

1.9 Approval to export gas from the fields was granted in 1977, together with several tax concessions designed to reduce the cost of the project to the consortium. Approval was also obtained from the State and Federal governments for an integrated domestic gas (Domgas) and export liquid natural gas (LNG) proposal. The North West Shelf project was implemented through the *North West Gas Development (Woodside) Agreement Act 1979–85* which ratified an agreement between the joint venture partners and the Western Australian Government.

1.10 Ownership of the NWS project has varied. The following organisations each currently hold one-sixth of the shares:

- BHP Petroleum (NWS) Pty Ltd;

4 The Scott Reef and Brecknock fields are located in deep water in the Browse Basin.

5 Agostini, D, General Manager, North West Shelf Operations, Woodside: *Transcript of evidence*, p 73

6 *Western Australian Oil and Gas Review*, Department of Resources Development, November 1996, (DRD 1996), p 12

- BP Developments Australia Ltd;
- Chevron Asiatic Ltd;
- Japan Australia LNG (MIMI) Pty Ltd;
- Shell Development (Australia) Pty Ltd; and
- Woodside Petroleum Pty Ltd.

1.11 Woodside's major shareholder is Shell Australia with 34.3% of shares. Woodside Offshore Petroleum Pty Ltd (Woodside), as the designated project operator, is responsible for the design, construction and operation of all offshore and onshore facilities.

1.12 For the purposes of this report, the NWS gas fields consist of the offshore Carnarvon Basin fields which are operated for the joint venture by Woodside.

Phases of the project

1.13 The NWS project may be divided into three phases:

- Phase I — Domgas (ie domestic gas) phase;
- Phase II — initial LNG export phase; and
- Phase III — expansion of capacity to process and export LNG.

1.14 Phase I infrastructure development included the construction, transport and siting of the North Rankin A platform, laying of a subsea pipeline from North Rankin to the Burrup Peninsula and building of an onshore domestic gas plant. The development cost for phase I, the bulk of which was spent between 1981 and 1983, was \$1.9 billion.⁷ In addition the State Energy Commission of WA (SECWA) constructed a gas pipeline between Burrup and southwest WA.⁸ The pipeline cost, met by the WA Government, was approximately the same.

1.15 Phases II and III of the project involved the production and sale of liquefied natural gas (LNG) to overseas markets. Shipments of gas to eight Japanese electricity and gas utilities commenced in 1989. Seven million tonnes per annum has been contracted for export to Japan over a 19 year period. This represents 17.1% of projected LNG imports by Japan.⁹ The LNG is transported by a fleet of eight Japanese – built LNG carrier ships.

1.16 Much of the infrastructure built for phase I was also used during phase II. Additional construction for this phase included two liquefaction trains (used to convert natural gas into LNG), gas turbine power generators, four cryogenic LNG

7 Exhibit 10, p 3

8 Exhibit 10, p 40

9 Exhibit 10, p 41

storage tanks, a loading jetty and ancillary works. The total cost of construction for phase II was \$2.9 billion.¹⁰

1.17 Phase III of the NWS project involved the expansion of production with the Goodwyn A platform coming on stream. The construction stage for phase III involved fabrication and placement of the Goodwyn A platform, completion of a subsea pipeline between the two platforms and construction of a third LNG train. The total construction cost for phase III was \$2.5 billion.¹¹

1.18 Clements estimated that during a 'typical' construction year, 6 000 jobs would be created. Employment peaked with the creation of 4 000 directly employed on the project and an additional 3 000 regional jobs.¹² Comments on employment, particularly in relation to the recently announced expansion of the NWS project, are to be found in Chapter 4.

1.19 It is widely acknowledged that the NWS project had a positive impact directly and indirectly on the local community, and Karratha in particular, since 1980. For example, Woodside has provided or contributed to community and other infrastructure such as a hospital, community centre and schools, water and power supplies, road and airport extensions, estimated to be worth about \$72 million.¹³

1.20 The North West Shelf joint venture participants have now largely completed investment in the construction of the project's initially planned essential facilities and are planning the next expansion phase.¹⁴

1989 parliamentary committee report

1.21 The House of Representatives Standing Committee on Industry, Science and Technology inquired into the NWS project in 1989. At that time the construction stage for phase III was beginning. The Committee reviewed local industry participation in phases I and II with a view to making recommendations aimed at maximising opportunities for local industry development from phase III, and future major resource development projects.

1.22 *The North West Shelf: a sea of lost opportunities* was tabled in November 1989. In that report the Committee identified determining the scope of potential benefits to Australian industry and the economy as a whole through greater Australian industry participation in the offshore oil and gas industry was a major concern.

1.23 The Committee believed that major natural resource projects which exploit a non-renewable national resource should contribute to the economy in more ways

10 Woodside: submission 23, p 13

11 Woodside: submission 23, p 13

12 Exhibit 10, pp xvii and 69

13 Exhibit 10, p 82

14 Agostini, D, Woodside: *Transcript of evidence*, pp 60 and 73

than simply through direct revenue, royalties and taxes.¹⁵ The report identified industry, infrastructure and skills development as areas which these projects must develop. Government was seen as having a responsibility to ensure that both the direct and indirect benefits of these projects to the nation are maximised.

Government response

1.24 The Government's response, tabled in September 1990, agreed with the report's stated aims but disagreed with the emphasis on Government intervention. The Government stated that it was:

... firmly committed to the view that primary responsibility for ensuring industry participation in resource development projects rests with the business sector. Our general approach to industry policy is to encourage an internationally competitive and outward looking industrial sector. This is being pursued through broadly based reductions in industry assistance and the removal of impediments to the efficient functioning of markets, as part of the Government's program of microeconomic reform.¹⁶

1.25 The roles of Federal and WA governments are discussed in Chapter 3.

Developments since 1989

1.26 There is general consensus that resource developments in the north west will expand considerably in the coming decades. Major oil and gas finds continue to occur and the market forecast for these commodities is favourable.

1.27 Deregulation of the domestic gas supply industry has caused gas prices to become more competitive. This factor has made viable the development of value adding industries based on the raw materials in the region. Large scale gas-using projects being proposed or developed in the Pilbara include, for example: a petrochemical plant; more than one direct reduction iron plant; and a methanol plant. The Australian Bureau of Agricultural and Resource Economics (ABARE) expects that by 2010 natural gas will account for 52% of WA energy consumption (compared to 11% in 1975 and 44% in 1995).¹⁷

15 In 1994–95, the petroleum industry paid in excess of \$1 billion in resource taxes to governments, while the mining industries payments slightly exceeded \$500 million. (Source: Australian Petroleum Production & Exploration Association, paper presented at a parliamentary seminar by D Wells, 16.9.96, p 2)

16 Government response to the report, *The North West Shelf: a sea of lost opportunities?*

17 ABARE: *Outlook for Western Australia natural gas — developments and issues*, Institute for International Research conference, Perth, 24 – 25 June 1996, pp 2 and 4

1.28 It is anticipated that innovations in technology will continue in order to retain or increase market share. In the short term, use will be made of technology recently applied to fields such as Wanaea/ Cossack. Wanaea and neighbouring fields are being developed using a floating production storage and offloading (FPSO) facility which is moored over the field to handle petroleum products from subsea extraction wells. Oil and gas are brought to the FPSO via flexible flowlines and a disconnectable riser turret mooring system. After the resources are separated in the deck processing facilities they are export quality. A large vessel is moored to the disconnectable riser, with a series of chain anchors to hold it in place. Oil is offloaded to a shuttle tanker and exported immediately. The processed gas flows via North Rankin A platform to the Burrup Peninsula plant, where it is exported. At the end of the fields' lives, the FPSO may then be used to extract petroleum from another set of fields.

1.29 The use of newer technologies, does not augur well for local content and employment. However, without the use of innovative technology, some fields would not be developed.

1.30 It has been claimed by the Department of Industry, Science and Tourism that local industry participation levels for the first three phases of the NWS project were around 70% of total project cost.¹⁸ The level of local industry participation fell to 35% for the FPSO, *Cossack Pioneer*. However, this level is expected to fall even further for the next Woodside FPSO. Further detail on the measurement of local content is contained in Chapter 2 and major trends affecting the participation of the domestic industry are discussed in Chapter 5.

Oil and gas prospects

1.31 In 1996, 25 fields offshore from WA were in production with more oil and gas fields being considered by developers.¹⁹ Published remaining reserve figures from the WA Department of Resources and Development have detailed probable gas reserves in the region at over 1 400 billion cubic metres. The North West Shelf partnership holds permits over areas with 840 billion cubic metres or 60% of the total reserves.²⁰ Details of each State and the Northern Territory's projects are published annually in the *Review of potential future petroleum developments* by the Australian Petroleum Production and Exploration Association (APPEA).

1.32 Australia's LNG exports can be expected to grow over time with the expansion of Asian economies, particularly the Japanese economy. ABARE predicts that gas exports from WA will reach 20 million tonnes per year by 2010,

18 Australian Manufacturing Council, *Optimising Australian industry involvement in major projects*, 1990, as quoted by DIST: submission 37, p 9

19 *Western Australian Oil and Gas Review*, Department of Resources Development, June 1997, (DRD 1997), p 10

20 Maxwell, D, General Manager, North West Shelf Gas Pty Ltd: *Iron Ore processing in Western Australia: the challenges and opportunities from a gas producer's perspective*, paper delivered at the Iron Ore and its markets conference, Perth, 26 May to 28 May 1996.

requiring significant expenditure for plant expansion.²¹ Such an increase would add \$1.5 billion to \$3 billion a year to Australia's export earnings.

1.33 Negotiations with existing Japanese clients to purchase additional LNG continued in 1997. The NWS consortium is seeking contracts which would mean increasing the project's LNG production to 14.5 million tonnes per year by 2003.²² The cost of the expansion is expected to be \$6 billion, which includes two new LNG trains and more ships.

1.34 Further investment in the NWS project's plant and equipment will result from expansion of the existing fields and development of new fields described below. Woodside's expansion plans include construction of a second trunkline to supply gas to the NWS onshore processing facilities on the Burrup Peninsula.

1.35 The existing 134 km subsea trunkline is reaching capacity with existing sales commitments. A second trunkline would meet Domgas demand in the short term and LNG growth during the next decade. Commissioning of the trunkline is expected by mid-2000. Construction of the fourth and fifth trains is also included.

1.36 For fields in deeper water and further from shore, the likely method of development uses satellite technology, that is, subsea wells tied back to existing infrastructure. These fields include Perseus and Keast (see below). Developments planned for the late 1990s include Yodel/ Echo (to be developed in association with Keast's infrastructure or Goodwyn A); Angel and Lynx (in association with North Rankin A).

1.37 Keast will be developed first to use the cash flow provided by sale of its condensate.²³ Gas reserves from Keast have been taken into consideration for planned LNG expansion.²⁴ The vast Perseus field, located adjacent to North Rankin, is believed to contain up to 0.2 trillion cubic metres of gas and 6.4 million barrels of condensate.²⁵ These reserves make the above mentioned expansion possible.²⁶ Woodside is currently extracting gas from one Perseus well through North Rankin A (NRA).

1.38 Other developers' plans for petroleum finds are given below.

1.39 The discovery of Apache Energy's Wonnich oil and gas field means a significant increase in gas reserves close to the Harriet oil and gas processing facilities on Varanus Island. It is expected that Apache will commence production in the first half of 1998.

21 ABARE: *Outlook for Western Australia natural gas — developments and issues*, p 5

22 Woodside: press release on its internet business and finance news page, dated 17.9.97

23 Gas is often reinjected into subsurface reservoirs so that condensate may be extracted first. It is the intention to recover such gas at a later time.

24 *The Australian*, 30.1.97, p 23.

25 APPEA, *Review of potential future petroleum developments*, draft dated April 1997, (exhibit 50), p 10

26 Wedgwood, G, Corporate Affairs Manager, Woodside, quoted in the *Financial Review*, 18.10.96, p 34

1.40 The Western Australian Petroleum Pty Limited (WAPET) joint venture has a membership which includes Shell and Chevron (also members of the NWS project joint venture). WAPET's fields in the North West Shelf include Gorgon and associated discoveries (West Tryal Rocks, Spar and Chryasor fields), which are estimated to have double the reserves of the North Rankin field. Development of this project would rival the NWS project in both scale and cost. Options for development of this project have been the subject of a lot of jockeying conducted through the media. One option would involve a 6 million tonne a year concrete offshore LNG plant.²⁷ Another is said to involve access to the existing onshore plant.

1.41 Since Woodside's current expansion plans (and constraints caused by the size of the land the plant occupies) preclude joint use of (Woodside's) Burrup Peninsula facilities, the Gorgon project would require construction of dedicated infrastructure such as a platform, pipeline, two initial LNG trains and processing plant. Reserves may be sufficient to warrant expansion of the facility to four trains. Subject to satisfactory environmental, royalty, et cetera arrangements, it is anticipated that the project will be on stream by 2003.²⁸ The construction of the gas treatment and LNG facilities will require a site workforce over four years peaking at 4 000 people.²⁹ A decision on development is expected to be made by the end of 1998.

1.42 A variety of companies have projects worth in excess of \$10 billion queued for development off Western Australia over the next few years to almost double the existing investment in WA's oil and gas infrastructure.³⁰

1.43 The Browse Basin is also a proven petroleum area containing the giant Scott Reef gas and condensate field. The area closer to Darwin is largely unexplored, however discoveries such as the Gwydion and Cornea fields suggest potential.

1.44 There is also considerable activity surrounding oil and gas fields in the Timor Sea. Oil from the producing fields which are located adjacent to the Ashmore and Cartier Islands in the Timor Sea (Jabiru and Challis/ Cassini) is being recovered via FPSO technology. Two of the discoveries in the Australia-Indonesia Zone of Cooperation, Undan/ Bayu, have combined reserves of up to 0.2 trillion cubic metres of gas and 400 million barrels of condensate. Production is expected to commence in 2002.

1.45 Woodside and Shell are conducting a feasibility study on exploration options and establishment of a processing plant in Darwin. Gas would be processed from significant gas discoveries in the Sunrise, Troubadour, Loxton Shoals and Evans Shoal gas fields, which are expected to contain at least

27 *Financial Review*, 25.7.97, p 35

28 *Financial Review*, 19.2.97, pp 1 and 19

29 DRD 1997, p 73

30 *Financial Review*, 25.9.96, p 37

0.14 trillion cubic metres of recoverable gas. The Darwin plant would be designed for two trains to supply gas for export and domestic use.³¹

1.46 The following involve new concepts in the Australian industry. Woodside and Shell have announced the commencement of a joint feasibility study involving their existing permits in Australian waters. The proposed \$10 billion development relates to facilities for domestic gas and LNG processing and shipping. Supply of gas by a third party is also being canvassed. BHP has also considered miniaturisation of LNG processing systems on a large offshore facility in relation to development of its Timor Sea Zone of Cooperation permit.³²

1.47 Like the first phases of the North West Shelf project, development of these new fields presents significant opportunities for sustained expansion of Australian industry. To convert these opportunities into business, Australia's design, engineering and manufacturing sectors need to be technically competent and internationally competitive in terms of cost, quality, supply capacity and timeliness. Exploiting these opportunities will require additional skilled employees. Further comments on employment issues are to be found in Chapter 4, see recommendations 4.7, 4.8, 4.9 and 4.10 in particular.

General recommendation

1.48 In the following chapters there are a number of recommendations the Committee has made. The Committee believes that timeliness is an important issue with respect to the changes it has recommended in this report.

1.49 Recommendation 1.1

The Committee recommends that the Government's response to this report indicate when the Government intends to implement the Committee's recommendations.

31 Woodside: stock exchange release on its internet business and finance news page, dated 21.5.97

32 The *Australian*, 2.7.97, p 26 and *Australia's mining monthly*, May 1997, p 34