



# Gorgon Project:

## Gorgon Carbon Dioxide Injection Report

Low Emissions Technology Demonstration Fund, Grant Number 03954

Reporting Period: Sept 14, 2009 – June 30, 2010

|                |                    |           |   |
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## Gorgon Carbon Dioxide Injection Report

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## Table of Contents

|     |   |    |
|-----|---|----|
| 1.0 | Executive Summary .....                           | 5  |
| 2.0 | Project Progress .....                            | 6  |
| 2.1 | Development Progress .....                        | 6  |
| 2.2 | Project Plan .....                                | 6  |
| 2.3 | Project Milestones .....                          | 6  |
| 2.4 | Changes in Joint Venture Structure .....          | 7  |
| 2.5 | Authorisations .....                              | 8  |
| 2.6 | Key Personnel .....                               | 8  |
| 2.7 | Approved Subcontractors .....                     | 9  |
| 2.8 | Project Branding .....                            | 9  |
| 3.0 | Commercialisation and Intellectual Property ..... | 10 |
| 3.1 | Commercialisation Pathway Plan .....              | 10 |
| 3.2 | Intellectual Property Plan .....                  | 10 |
| 4.0 | Eligible Expenditure and Project Budget .....     | 12 |
| 4.1 | Additional Funding .....                          | 12 |
| 5.0 | Certification .....                               | 13 |
| 5.1 | 31  |    |

## List of Tables

|          |   |    |
|----------|---|----|
| Table 1: | Project Milestones and Progress .....   | 7  |
| Table 2: | Key Personnel .....                     | 9  |
| Table 3: | Gorgon Joint Venture Participants ..... | 23 |



## 1.0 Executive Summary

This is the first annual report to be submitted to the Department of Resources Energy and Tourism in accordance with Section 14 of the Low Emissions Technology Demonstration Fund, Funding Agreement of October 15, 2008.

This report covers activities related to the Gorgon Carbon Dioxide Injection Project following the Final Investment Decision on the Project on September 14, 2009 until June 30, 2010. During this reporting period, project activities have primarily involved the procurement of the carbon dioxide injection compressors and the preliminary construction work on Barrow Island for the larger Gorgon Project. Work has continued on progressing subsurface studies and in particular the processing and interpretation of the CO<sub>2</sub> Baseline Seismic Survey.

No significant changes are anticipated to the Project Plan, Commercialisation Pathway Plan or the Intellectual Property Plan. Minor changes to these plans have been made to better reflect advances in the Project over the last 12 months.

The Project currently remains on budget and on schedule for a commencement of injection operations in 2014.

## 2.0 Project Progress

### 2.1 Development Progress

During the reporting period to June 30, 2010, there has been a focus on detailed design and engineering of the carbon dioxide injection wells, pipeline and compressors and on site construction works for the wider Gorgon Project on Barrow Island. Continuing subsurface evaluation has resulted in the further optimisation of the location of the injection wells and drill centre locations. These locations may change pending the outcome of continuing studies.

Field acquisition of data comprising the 3D Seismic Base Line Survey for the Carbon Dioxide Injection Project was concluded in November 2009. Processing and the interpretation of data from this survey will be undertaken during 2010 and 2011.

Attachment 1 includes photographs showing construction activities on Barrow Island<sup>1</sup>, and several photographs taken during the acquisition of the Carbon Dioxide Seismic Baseline Survey during 2009.

On October 21, 2009 a contract was signed with GE Oil & Gas for the design, manufacture, delivery and installation of the six compression trains for the Carbon Dioxide Injection Project.

An environmental field survey of the carbon dioxide pipeline route and injection well centres was completed to ensure no significant flora or fauna would be adversely impacted by the proposed location of these facilities. The survey resulted in the pipeline route being adjusted slightly to avoid an identified Boodie (*Bettongia lesueur*) warren.

Chevron Australia with the support of the University of Western Australia is continuing to work on the design and pilot studies of a carbon dioxide soil gas flux monitoring program. This component of the Project's monitoring program is being developed with the objective of verifying that the injected carbon dioxide has not migrated to the surface.

### 2.2 Project Plan

Chevron Australia anticipates only one significant change to the Project Plan included in the update provided to the Department on November 4, 2009.

In order to ensure the pressure increase in the Dupuy Formation remains within acceptable levels, it is proposed to implement an active pressure management regime whereby water, at some distance from the anticipated carbon dioxide plume, will be extracted and disposed into the overlying Barrow Group. The final location of the pressure management wells is yet to be determined and is subject to ongoing studies.

A copy of the Project Plan reflecting this change is provided in Attachment 2.

### 2.3 Project Milestones

Chevron Australia does not anticipate any changes to the Project Milestones from the update provided to the Department on November 4, 2009 and the timing of progress payments under the terms of the Funding Agreement. Table 1 summarises the identified milestones for the Project.

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<sup>1</sup> These photographs show construction of the Gorgon Project of which the Carbon Dioxide Injection Project is a small component. These photographs should not be interpreted as showing construction of the Carbon Dioxide Injection Project.

**Table 1: Project Milestones and Progress**

| Milestone Description   | % Complete at End of Reporting Period | Agreed Achievement Date | Date Milestone Achieved | Reasons for Delay, Impact on Project, and Way Forward |
|---|---------------------------------------|-------------------------|-------------------------|---|
| Place order for the carbon dioxide injection compressors  | 100                                   | s 47(1)(b)              |                         |   |
| Commence drilling of injection project wells  | 0                                     |                         |                         |   |
| Carbon dioxide pipeline installation complete   | 0                                     |                         |                         |   |
| <b>Progress Payment 1 -</b><br>Delivery on Barrow Island of first carbon dioxide injection compressor | 0                                     |                         |                         |   |
| Nine injection wells complete and ready for tie in  | 0                                     |                         |                         |   |
| <b>Progress Payment 2 -</b><br>LNG Train 2 ready for start up   | 0                                     |                         |                         |   |
| <b>Progress Payment 3 -</b><br>Commencement of carbon dioxide injection                               | 0                                     |                         |                         |   |
| LNG Train 3 operational and injection project running at design capacity                              | 0                                     |                         |                         |   |

## 2.4 Changes in Joint Venture Structure

Following the Project's Final Investment Decision on September 14, 2009, a number of changes have occurred to the ownership structure of the Gorgon Joint Venture. The current ownership structure<sup>2</sup> is provided in Attachment 3.

<sup>2</sup> As of September 30, 2010



Coincident with the Gorgon Project Final Investment Decision a revised governance structure was put in place dealing with all aspects of the Gorgon Project. Under this revised governance structure activities related to the Gorgon Carbon Dioxide Injection Project fall under the Barrow Island Gas Processing Agreement (BGPA). Under these changes the participants will continue to be referred to as the Gorgon Joint Venture.

## 2.5 Authorisations

In addition to the Project authorisations identified in the update provided to the Department on November 4, 2009<sup>3</sup> the following additional authorisations or plans to obtain further authorisations have been obtained/identified during the reporting period:

- A licence to access certain land in the area of the proposed carbon dioxide pipeline and drill centres was granted on June 3, 2010 under Section 91 of the *Western Australian Land Administration Act 1997 (WA)*. This licence is required to allow near surface geotechnical site investigation surveys to be acquired to assist in the detailed design of these facilities. The geotechnical surveys were commenced in late June and are scheduled to be completed during the third quarter of 2010.
- Previously obtained approvals for the Project had assumed the carbon dioxide pipeline would be installed above ground. Ongoing design of the carbon dioxide pipeline has indicated that fracture propagation could be more effectively mitigated if the pipeline was below ground. Chevron Australia is currently preparing the appropriate variations to the approvals for the carbon dioxide pipeline to be installed below ground.

## 2.6 Key Personnel

There have been no significant changes to the composition of key Project personnel since the update provided to the Department on November 4, 2009. For completeness <sup>s 22</sup> who leads the subsurface team of earth scientists and engineers working on the Gorgon Carbon Dioxide Injection Project has been added to the list.

Table 2 lists the key personnel engaged in the Project.

Please note that all Notices under Clause 26 of the Funding Agreement should continue to be forwarded to:

<sup>s 22</sup> Commercial Manager Gorgon  
Chevron Australia  
GPO Box S1580  
Perth WA 6845

Please continue to address all day to day enquiries regarding the Funding Deed to <sup>s 22</sup>  
<sup>s 22</sup> (Senior Advisor - Climate Change Policy) on <sup>s 22</sup>

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<sup>3</sup> Refer Chevron letter G1-CO-LTR-CVXPH-DORCH-0000010

**Table 2: Key Personnel**

| Name of Key Personnel | Description of work/role/responsibility            | Other comments                             |
|-----------------------|--|--|
| s 22                  | General Manager – Greater Gorgon                   | Chevron Australia -<br>Gorgon Project Team |
|                       | Development Director                               | Chevron Australia -<br>Gorgon Project Team |
|                       | Upstream Development Manager                       | Chevron Australia -<br>Gorgon Project Team |
|                       | CO <sub>2</sub> Injection Project Manager          | Chevron Australia -<br>Gorgon Project Team |
|                       | Subsurface Team Leader – CO <sub>2</sub> Injection | Chevron Australia -<br>Gorgon Project Team |
|                       | Senior Advisor - Climate Change Policy             | Chevron Australia                          |

## 2.7 Approved Subcontractors

There have been no changes to the list of approved subcontractors since the update provided to the Department on November 4, 2009.

## 2.8 Project Branding

During the reporting period, Chevron and the Department of Resources, Energy and Tourism worked to develop a Joint Branding Protocol as required by Clause 26.1(b) of the Funding Agreement. In June 2010 the Parties informally agreed on the form and manner of the Joint Branding Protocol. It was proposed to formalise the Joint Branding Protocol via an exchange of letters<sup>4</sup> over following months.

<sup>4</sup> The Department of Energy, Resources and Tourism formally agreed to the Joint Branding Protocol via letter dated August 30, 2010.



## 3.0 Commercialisation and Intellectual Property

Chevron Australia does not anticipate any significant changes to the Commercialisation Pathway Plan or the Intellectual Property Plan included in the update provided to the Department on November 4, 2009.

### 3.1 Commercialisation Pathway Plan

The Commercialisation Pathway Plan has been updated to incorporate some small amendments primarily to reflect the development of a Data Retention Plan required as a condition of the Project approvals. The revised Commercialisation Pathway Plan is included in Attachment 4.

During the reporting period the following technical papers or presentations have been published or have been prepared for publication in relation to the project<sup>5</sup>:

- Gorgon CO<sub>2</sub> Injection Project Monitoring and Verification Plans – International Energy Agency Greenhouse Gas Program, 6<sup>th</sup> Monitoring and Verification Meeting – May 2010
- Setting New Environmental, Regulatory and Safety Boundaries: The 2009 Gorgon CO<sub>2</sub> 3D seismic Baseline Survey, Barrow Island, Western Australia – Society of Petroleum Engineers Paper Number 132931. To be presented in October of 2010.

In addition to the above publications, Chevron Australia staff attended the China-Australia Greenhouse Storage Conference in January 2010 at the invitation of Geoscience Australia.

A number of the participants of the Gorgon Joint Venture are members of the Cooperative Research Centre for Greenhouse Gas Technologies and the Global CCS Institute and continue to support the work of those organisations.

At the time of writing this report Chevron Australia was in the process of negotiating a framework knowledge sharing agreement with the Global CCS Institute with respect to the Gorgon Carbon Dioxide Injection Project.

While undertaken prior to the reporting period, the Western Australian Government commissioned a series of 'due diligence' reviews into the technical aspects of the Carbon Dioxide Injection Project. These reviews were designed to provide the Government with independent technical advice about the Project. Copies of the executive summaries are available from the Western Australian Department of Mines and Petroleum<sup>6</sup>. These reviews will assist in building an understanding within regulatory agencies of the technical issues to be considered in undertaking the underground injection of carbon dioxide.

### 3.2 Intellectual Property Plan

A copy of the Intellectual Property Plan is included in Attachment 5.

No specific technologies had been developed by the Gorgon Joint Venturers which might constitute intellectual property that could be protected by patent.

Chevron's Energy Technology Company continues to study new laboratory techniques and equipment designs for undertaking core studies using super critical carbon dioxide.

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<sup>5</sup> Only publications or participation in conferences of significance are listed here. In addition Chevron Australia routinely provides background briefings for stakeholders who have expressed an interest in the Project.

<sup>6</sup> <http://www.dmp.wa.gov.au/8514.aspx>, accessed on August 26, 2010.



At the time of writing, it is premature to speculate on whether this work will result in any new intellectual property.

During 2009 and early 2010, ExxonMobil and Chevron Australia represented the Australian oil and gas industry on the National Carbon Storage Taskforce where publically released information on the Gorgon Carbon Dioxide Injection Project was discussed with other members of the Taskforce. The final report from this Taskforce is awaiting release by the Australian Government. Amongst other matters, the final report is anticipated to assist other greenhouse gas storage proponents in Australia to understand the effort and resources required to explore for and appraise a greenhouse gas storage opportunity.

## 4.0 Eligible Expenditure and Project Budget

Chevron Australia does not currently anticipate any change to the post Final Investment Decision, Project Capital Budget since the update provide to the Department on November 4, 2009.

Attachment 6 to this report provides a Financial Report of expenditure for the period 14<sup>th</sup> September 2009 to 30<sup>th</sup> June 2010 against budgeted capital expenditure for the Project. Importantly the Notes to the Financial Report outline the basis of the report and represent an integral component of the report.

Some additional expenditure has been incurred during the reporting period for Project related activities that were commenced prior to the Final Investment Decision Date. These expenditures are included in the Financial Report, even though not budgeted for.

As the Carbon Dioxide Injection Project is an integral component of the much larger Gorgon Project several items in the Capital Budget require an allocation to be made based on a proportion of overall project expenditure. For example the electrical power generation facilities required to power the carbon dioxide injection compressors is a component of the overall power generation facilities being constructed for the Gorgon Project. Expenditure in relation to these items is currently not separately identifiable within the Gorgon Project's financial report's breakdown structure. Accordingly no expenditure has been reported against these items during the reporting period. Chevron intends to report expenditure against these items in future reports once changes have been made to the finance reporting structure.

Chevron's financial systems do not allow the differentiation of expenditure items as either 'eligible' or 'non-eligible' as defined in the Low Emissions Technology Demonstration Fund – Guide to Managing Your Grant. As per advice received for the Department of Resources Energy and Tourism, the Financial Report identifies those expenditures clearly identifiable as 'eligible expenditure' and separately groups expenditure which cannot be readily differentiated as either 'eligible' or 'non-eligible' expenditure.

Attachment 7 to this report contains a statement from Chevron Australia's financial auditors with respect to the expenditure data included in Attachment 6.

### 4.1 Additional Funding

Since the commencement date of the Low Emissions Technology Demonstration Fund, Funding Deed for the Gorgon Carbon Dioxide Injection Project, no additional funding has been invested in the Project over and above that provided by the BGPA Joint Venture participants and the LETDF grant funds.

## 5.0 Certification

I <sup>s 22</sup> being a person duly authorised by Chevron Australia hereby certify that the information listed in this report is correct.

I further certify that the expenditure data included in this report as 'eligible expenditure' is understood by Chevron Australia to include only expenditure eligible for the grant in accordance with Project No **03954**.

Signed: <sup>s 22</sup> \_\_\_\_\_

Date: 30/9/2010



## ATTACHMENT 1: Progress Photographs

### Gorgon Construction Photographs



Construction Village



WAPET Landing Lay-Down Area



Marine Berth Earthworks



Communications Infrastructure



LNG Plant Site At Town Point



LNG Plant Site



Airport Terminal Building Upgrade



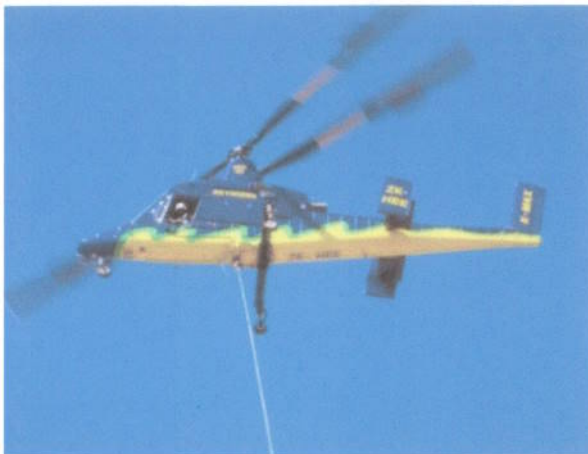
Accommodation Construction



## Seismic Baseline Survey Photographs



K-MAX at Barrow Island Airport Used to Air Lift  
Survey Equipment



K-MAX with Long Line



Seismic Shot Hole Rig Being Heli-Lifted



Heli-Lifting Diesel Fuel Tank





Aerial View of Shot Hole Drill Rig



Typical Disturbance From Drilling a Shot Hole



Heli-Lifting Equipment



Heli-Lifting Equipment

## ATTACHMENT 2: Project Plan

### Project Aims

The primary aim for the Gorgon Carbon Dioxide Injection Project is the successful compression, transportation and underground injection of reservoir carbon dioxide extracted from the feed gas during gas processing operations on Barrow Island and the permanent containment of the injected reservoir carbon dioxide in the Dupuy Formation. The annual volume of reservoir carbon dioxide injected will vary over the operational life of the facility due to the natural variability of the carbon dioxide content and the production profiles of the Gorgon and Jansz fields supplying the gas processing facility on Barrow Island.

As documented in the Project's environmental impact assessment documentation, the anticipated volumes of reservoir carbon dioxide that are proposed to be injected along with the volumes anticipated to be vented are shown in the following table.

### Volumes of Reservoir CO<sub>2</sub> Anticipated to be Vented and Injected<sup>7</sup>

| Percentage of Reservoir CO <sub>2</sub>   | Year 1                     | Year 2–5                   | Year 6+                    | Long Run Performance Target |
|---|----------------------------|----------------------------|----------------------------|-----------------------------|
| Percentage of Reservoir CO <sub>2</sub> injected into the Dupuy Formation   | 60–90%<br>(2.52–3.78 MTPA) | 70–95%<br>(2.94–3.99 MTPA) | 80–95%<br>(3.36–3.99 MTPA) | 95%<br>(3.99 MTPA)          |
| Vented due to scheduled maintenance and unplanned facilities downtime   | 5–15%<br>(0.21–0.63 MTPA)  | 5–10%<br>(0.21–0.42 MTPA)  | 3–5%<br>(0.13–0.21 MTPA)   | 3%<br>(0.13 MTPA)           |
| Vented due to unforeseen reservoir constraints (including well injectivity failure)   | 0–25%<br>(0–1.05 MTPA)     | 0–20%<br>(0–0.84 MTPA)     | 0–15%<br>(0–0.63 MTPA)     | 2%<br>(0.08 MTPA)           |
| The percentages referred to in this table are relative to the total volume of reservoir carbon dioxide anticipated to be available for injection. |                            |                            |                            |                             |

<sup>7</sup> As documented in the Gorgon Gas Development Revised and Expanded Proposal – Public Environmental Review, EPBC Referral 2008/4178 and WA EPA Assessment No 1727, Chevron, September 2008



### ***Gorgon Project description***

The Gorgon Joint Venturers propose to develop a 15 million tonne per annum (MTPA) Liquefied Natural Gas (LNG) plant and a domestic gas plant with 300 TJ/day capacity on Barrow Island, which will be supplied with gas from both the Gorgon and Jansz gas fields.

The Gorgon Project will consist of a subsea development for the production and transport of gas from the offshore gas fields to Barrow Island; and a gas processing facility located at Town Point on Barrow Island. LNG and condensate produced at the gas processing facility will be shipped directly to buyers from Barrow Island. Domestic gas will be supplied via a dedicated pipeline to the existing Western Australian natural gas pipeline grid.

It is proposed that reservoir carbon dioxide, which occurs naturally in the gas contained in the gas fields and is removed during a normal part of gas processing operations, will be compressed and transported via pipeline to three injection drill centres where it will be injected into the Dupuy Formation over 2km beneath Barrow Island. In addition, a range of associated infrastructure will be required on the Island to assist in reservoir management and in order to monitor the performance of the injected reservoir carbon dioxide.

The main components of the Gorgon Project are:

- the Jansz and Gorgon gas field wells and subsea facilities
- a feed gas pipeline from each of the Gorgon and Jansz fields to the gas processing facility on Barrow Island
- utility pipelines and umbilicals from Barrow Island to the Gorgon and Jansz gas fields required to operate the subsea production system
- a gas processing facility on Barrow Island (including three LNG processing trains, a domestic gas plant and condensate stabilisation facilities)
- port/marine facilities at Barrow Island
- water supply and disposal
- construction village and associated facilities
- facilities to compress, transport, and inject the reservoir carbon dioxide into the Dupuy Formation
- monitoring of injected reservoir carbon dioxide
- a mainland supply base
- other associated infrastructure such as upgrades to the airport, roads
- associated utilities.

### ***Gorgon Carbon Dioxide Injection Project description***

The Gorgon Carbon Dioxide Injection Project is a commercial-scale demonstration project with four main components:

- Compression and dewatering of the reservoir carbon dioxide and transportation by pipeline to the injection well sites;
- Injection into the Dupuy Formation reservoir;
- Active reservoir pressure management of the Dupuy Formation; and
- Monitoring of the injected reservoir carbon dioxide.

The Gorgon Joint Venturers have undertaken a detailed study to identify the optimum location for the injection of reservoir carbon dioxide. These studies commenced in 1998 and considered possible injection locations within 300km of the Greater Gorgon area. These studies identified the Dupuy Formation below Barrow Island as the preferred injection location. A detailed site appraisal program was then undertaken which considered seven different injection scenarios associated with the Dupuy Formation before the final injection location was selected.

Issues considered in the selection of the preferred location include:



- maximising the distance of the injection wells from the major faults thereby reducing the risk of unpredicted migration
- minimising the area of land disturbance required for the facilities on Barrow Island and ensuring any areas to be cleared are of lower environmental sensitivity when compared to other proposed locations on Barrow Island
- identifying sites where the Dupuy Formation reservoir is at, or near, its maximum thickness
- minimising the number of existing wells that will be intersected by the migrating carbon dioxide plume
- a preference for areas of better seismic data quality so as to assist in the monitoring of the carbon dioxide plume.

The reservoir carbon dioxide (containing minor quantities of hydrogen sulphide, methane and other hydrocarbons and traces of benzene, toluene, ethylbenzene, and xylene) will be sourced from the regeneration column in the acid gas removal plant and piped to the carbon dioxide injection compressors. Six electrical driven multi stage compressors will compress the carbon dioxide stream from approximately atmospheric pressure to the required injection pressure.

Dewatering of the reservoir carbon dioxide gas stream will be accomplished through the compressor interstage liquid knock-out facilities. After the reservoir carbon dioxide is compressed it will be transported via a buried pipeline to the injection wellheads.

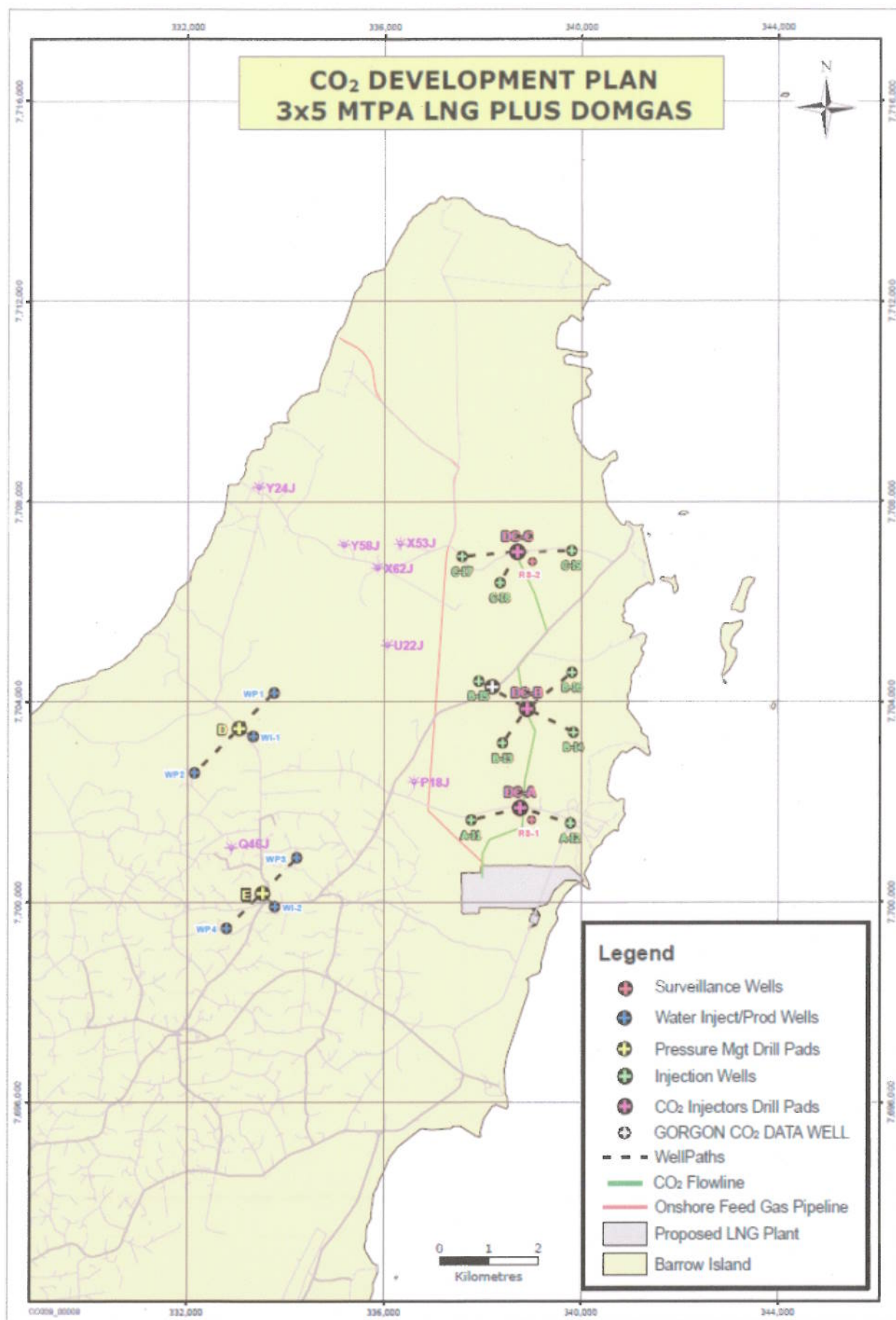
It is anticipated that nine injection wells will be required and it is planned to drill these from three surface locations using directional drilling technology. The use of directional or deviated drilling from a limited number of surface locations has been chosen so as to minimize the environmental impact by limiting land use disturbance.

The following figure shows the anticipated layout of the injection wells. Note the well locations will continue to be refined based on the results of ongoing technical work. Hence this figure should be considered diagrammatic only.

The reference case development concept also includes the drilling of four pressure management wells outside the limits of the carbon dioxide plume. These wells will be used to extract water from the Dupuy Formation during the injection period, reducing pressure within the formation and ensuring reservoir pressure limits are not exceeded. The formation water produced from these pressure management wells will be injected via two wells into the overlying Barrow Group which shows regional pressure depletion due to the oil production operations surrounding Barrow Island. The indicative location of the pressure management wells is shown on the following figure. The final locations are yet to be determined and will be based on ongoing subsurface studies.

Service utilities such as electrical power, inert gas, instrument air, fuel gas system, freshwater system, fire water, accommodation and other supporting infrastructure will be required to support the Carbon Dioxide Injection Project. The majority of the utilities will be shared with the gas processing facility.

The Gorgon Carbon Dioxide Injection Project incorporates the monitoring of injected carbon dioxide. The data obtained from the monitoring program will provide invaluable information to researchers and other proponents of greenhouse gas storage.





## Proposed Reservoir Carbon Dioxide Injection System Concept

The movement of carbon dioxide within the Dupuy Formation will be monitored to determine if it is behaving as predicted. The monitoring program will continue to be developed in line with improvements in monitoring technologies. As such, the following description should be considered as the reference case.

The reference case monitoring program involves a combination of surveillance wells and repeat seismic data acquisition. The Gorgon Project incorporates extensive management and monitoring of environmental factors. Included in this program is groundwater monitoring and the measurement of carbon dioxide flux rates in the surface which will be used to verify any surface leakage of the injected carbon dioxide.

Injection operations will be regulated in accordance with the approved Carbon Dioxide Disposal Management Plan<sup>8</sup>. The primary objective of the Disposal Management Plan is to maximise the volume of reservoir carbon dioxide injected whilst ensuring that the injection does not pose a health or safety risk to people, an environmental risk to the conservation values of Barrow Island, or a risk to other assets such as oil or gas field operations around Barrow Island. The Disposal Management Plan will be regularly updated for the purpose of ensuring it remains up-to-date and consistent with current industry best practice for carbon dioxide injection and management of injected carbon dioxide.

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<sup>8</sup> The Carbon Dioxide Disposal Management Plan forms part of the project authorizations granted on September 14, 2009 in accordance with Section 13 of the *Barrow Island Act 2003 (WA)*.



## ATTACHMENT 3: Joint Venture Structure

Coincident with the Gorgon Project final investment decision on September 14, 2009, a revised governance structure was put in place dealing with all aspects of the Gorgon Project. Under this revised governance structure activities related to the Gorgon Carbon Dioxide Injection Project will fall under the Barrow Island Gas Processing Agreement. The changes to the governance arrangements do not alter the Joint Venture relationships shown in Schedule 2 of the Funding Deed and the participants will continue to be referred to as the Gorgon Joint Venture.

Following the Gorgon Project final investment decision on September 14, 2010 there have been a number of changes to the equity participation in the Project. These changes have been advised to the Department on November 14, 2009 and December 21, 2009.

For information only the Gorgon Joint Venture participants with an interest in the Gorgon Carbon Dioxide Injection Project are shown in Table 3.

**Table 3: Gorgon Joint Venture Participants<sup>9</sup>**

| Participant  | Contribution / Role of Participants |
|--|-------------------------------------|
| Chevron Australia Pty Ltd<br>(ABN 29 086 189 757)                    | s 47(1)(b)                          |
| Chevron (TAPL) Pty Ltd<br>(ABN 18 081 647 047)                       |                                     |
| Mobil Australia Resources<br>Company Pty Ltd<br>(ABN 38 000 113 217) |                                     |
| Shell Development<br>(Australia) Pty Ltd<br>(ABN 14 009 663 576)     |                                     |
| Osaka Gas Gorgon Pty Ltd<br>(ABN 13 139 074 847)                     |                                     |
| Tokyo Gas Gorgon Pty Ltd<br>(ABN 16 138 592 042)                     |                                     |
| Chubu Electric Power<br>Gorgon Pty Ltd (ABN 94 140<br>107 464)       |                                     |

Both Chevron Australia Pty Ltd (ABN 29 086 189 757) and Chevron (TAPL) Pty Ltd (ABN 18 081 647 047) are wholly owned subsidiaries of Chevron Australia Holdings Pty Ltd (ABN 60 098 079 344) which is in turn a wholly owned subsidiary of Chevron Corporation of the USA.

Mobil Australia Resources Company Pty Ltd (ABN 38 000 113 217) is a wholly owned subsidiary of Mobil Exploration & Producing Australia Pty Ltd (ABN 81 004 588 827) which is a wholly owned subsidiary of ExxonMobil Australia Pty Ltd (ABN 48 091 561 198) which is in turn a wholly owned subsidiary of ExxonMobil Corporation of the USA.

<sup>9</sup> Joint Venture participants under the Barrow Island Gas Processing Agreement.

Shell Development (Australia) Pty Ltd (ABN 14 009 663 576) is a wholly owned subsidiary of Shell Energy Holdings Australia Limited (ABN 69 054 260 776) which is in turn a wholly owned subsidiary of Royal Dutch Shell PLC of England.

Osaka Gas Gorgon Pty Ltd (ABN 13 139 074 847) is a wholly owned subsidiary of Osaka Gas Australia Pty Ltd (ABN 49 093 246 381) which in turn is a wholly owned subsidiary of Osaka Gas Co Ltd of Japan.

Tokyo Gas Gorgon Pty Ltd (ABN 16 138 592 042) is a wholly owned subsidiary of Tokyo Gas Co Ltd of Japan.

Chubu Electric Power Gorgon Pty Ltd (ABN 94 140 107 464) is a wholly owned subsidiary of Chubu Electric Power Australia Pty Ltd (ABN 68 140 147 048) which in turn is a wholly owned subsidiary of Chubu Electric Power Co Ltd of Japan.

## ATTACHMENT 4: Commercialisation Pathway Plan

The aim of the Gorgon Carbon Dioxide Injection Project Commercialisation Pathway Plan is to contribute to the knowledge of carbon dioxide injection technology and manage the release of this knowledge to the market place. This Plan is not intended to outline a path for the commercialisation of greenhouse gas storage technology across a range of industry applications.

The aim of the Gorgon Joint Venturers is to:

- Provide ongoing release of data to the public regarding the monitoring of carbon dioxide injection,
- Collaborate on an ongoing basis with research institutions and other interested proponents of this technology
- Provide ongoing information to the market place regarding the benefits of carbon dioxide injection.

In accordance with conditions placed on the project authorisations, a Data Retention Plan is currently being developed which in part will outline the time lines for the release of data to the Government regulatory agencies.

The objective of sharing the Intellectual Property regarding carbon dioxide injection and monitoring technology is to contribute significantly to the information base available to the community, government, researchers and other proponents of this technology and to keep the market place informed of carbon dioxide monitoring activities at the Gorgon Carbon Dioxide Injection Project on Barrow Island.

The availability of such information should facilitate Australia emerging as a centre of excellence in greenhouse gas storage technology and application.

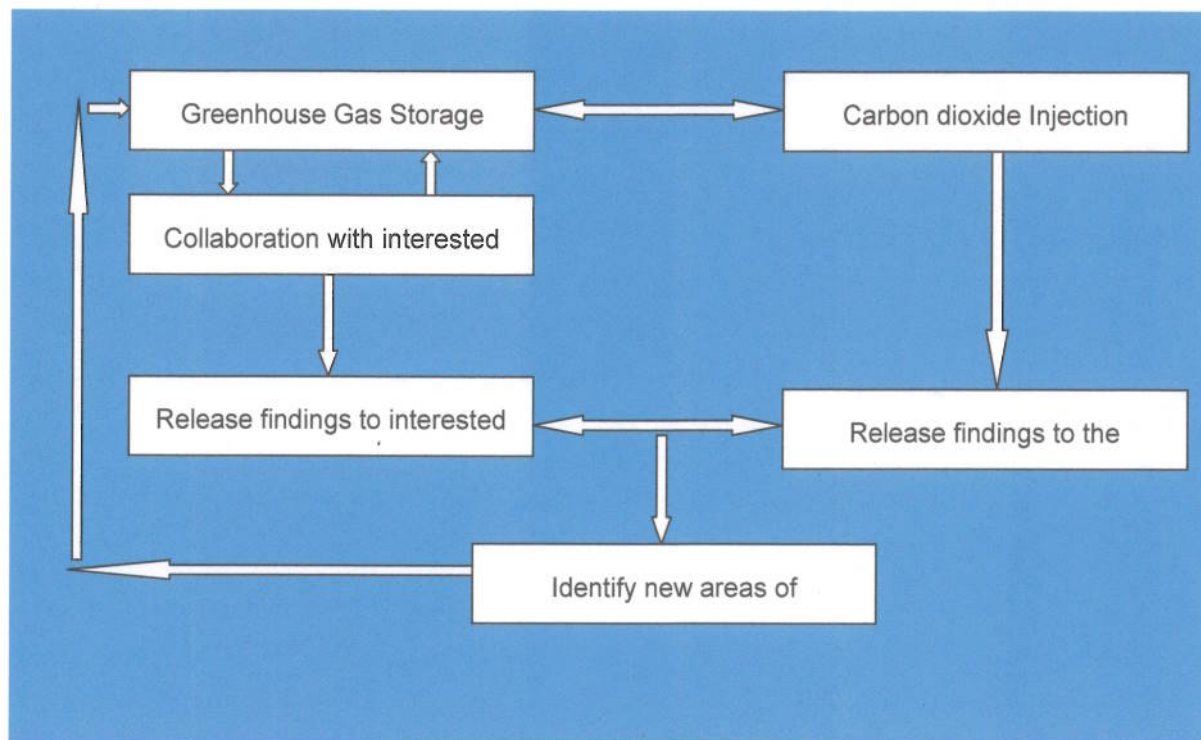
### ***Process for commercialisation***

The process for developing the commercialisation of carbon dioxide injection and monitoring technology is to:

- Research
  - Collaborate with researchers and other interested proponents of carbon dioxide injection technology to increase the knowledge surrounding this technology particularly as it relates to monitoring of carbon dioxide injection and storage
  - Release the findings of this research to government, researchers and other interested proponents of this technology
  - Release the findings of this research to the market place
  - Commission additional research regarding carbon dioxide injection and monitoring where necessary
- Monitoring
  - Release the findings of this research to government, researchers and other interested proponents of this technology in accordance with the Data Retention Plan.
  - Release the findings of the monitoring activities to the market place

A summary of this commercialisation pathway is presented in the following figure.





**Summary of the Gorgon Carbon Dioxide Injection Project  
Commercialisation pathway**

## ATTACHMENT 5: Intellectual Property Plan

The Gorgon Carbon Dioxide Injection Project will use technology that is currently being used by the oil and gas industry worldwide:

- the capture of carbon dioxide from reservoir gas is a standard part of gas processing for LNG production;
- the transport of carbon dioxide by pipeline is well understood with over 31 000 kilometres of carbon dioxide pipelines in service in the USA, Canada, Turkey and Trinidad and Tobago with a total estimated capacity to transport 45 MTPA of carbon dioxide to producing fields to enhance oil recovery in a process known as Enhanced Oil Recovery (EOR);
- the drilling and operating of injection wells is occurring at, for example, EOR projects including approximately 20 to 30MTPA of carbon dioxide being injected in the USA for EOR. Demonstration geosequestration projects occur around the world e.g. 1 MTPA being injected at both the Sleipner geosequestration project in the North Sea and the In Salah geosequestration project in Algeria, and
- techniques such as seismic surveys and downhole sensing (e.g wireline logging; pressure/flow tests) which may be applied to the monitoring of injected carbon dioxide are common oil field practices.

It is not expected at this stage that new intellectual property will be generated in the capture, pipeline and injection of carbon dioxide as both the hardware and software (including management procedures) of the processes are current industry practice.

The monitoring and verification of carbon dioxide behaviour following injection will build on existing worldwide knowledge of carbon dioxide behaviour and in doing so could generate new intellectual property regarding long term geologic storage of carbon dioxide.

The areas of intellectual property that may have relevance to the Gorgon Carbon Dioxide Injection Project are:

- Patents to protect inventions as new or improved products and processes; and
- Copyright to protect computer programs and engineering drawings (this protection applies automatically as the work is created).

To date no specific technologies have been developed by the Gorgon Joint Venturers which might constitute intellectual property that could be protected by patent. This in part arises from the observation that while carbon dioxide injection as a greenhouse gas emissions mitigation tool is new, the underlying technologies are well established in the oil and gas industry. In addition large numbers of researchers are also working in the field.

Areas where technology development has occurred as a result of the Gorgon Carbon Dioxide Injection Project include:

- Development of computer code dealing with carbon dioxide behaviour for the purposes of reservoir simulation. Similar coding has been developed and is now included in the commercially available reservoir simulators.
- Carbon dioxide flood samples on core data. There is no identifiable published information on this type of core analysis, but the techniques are somewhat similar to those widely used for analysis of core data in the petroleum industry.

Areas where future technology development could result in intellectual property include:

- Improved seismic imaging technology. However, it is difficult to foresee the development of new acquisition technologies or processing algorithms without significant investment outside the Carbon Dioxide Injection Project.
- Innovative monitoring techniques such as soil gas flux metering. It is unclear if these would involve patentable technologies.



### ***Commitment to Make Monitoring Data Available***

The Joint Venturers have committed to publically release information from the ongoing carbon dioxide injection monitoring program. A decision as to the processes for making this data publicly available will be determined closer to the time injection operations are to commence.

The Gorgon Project will be the one of the world's largest carbon dioxide injection projects. It will have benefits for both the Western Australian and Commonwealth Governments. This value stems from the potential for the Gorgon Carbon Dioxide Injection Project to add to the scientific and engineering knowledge around the commercial scale deployment of greenhouse gas storage, facilitating the wider uptake of the technology.

The existing undertaking to make data on the monitoring activities publicly available enables government to have confidence that this project will contribute significantly to the information base available to government, researchers and other proponents of this technology. The availability of such information should facilitate Australia emerging as a centre of excellence in greenhouse gas storage technology and its application. It will also assist in the public acceptance of greenhouse gas storage as a viable and safe option for the abatement of greenhouse gas emissions.

### ***Options for the public release of data***

While the Gorgon Joint Venturers are yet to determine a process for making data available to the public, several options have been identified:

- Gorgon Joint Venture publicly disclose data on monitoring
- Form an alliance with the Cooperative Research Centre for Greenhouse Gas Technologies or its successor organization
- Form an alliance with a university or consortium of universities
- Formation of a standalone Joint Industry Program (JIP)
- Participation in the Carbon Sequestration Leadership Forum (CSLF); or
- Through an alliance with the Global Carbon Capture and Storage Institute.

### ***Ownership of Intellectual Property***

The Gorgon Carbon Dioxide Injection Project involves researchers, the Gorgon Joint Venture participants and subcontractors working together to design, construct and operate the project.

Intellectual property owned by contractors working on the Gorgon Project will be extensively utilised but not transferred to the Gorgon Joint Venturers. The intellectual property retained by contractors is likely to be made available to others seeking to utilise the services of these contractors.

Intellectual property generated as a result of the Gorgon Carbon Dioxide Injection Project could either be retained and made commercially available by the individual Gorgon Joint Venture participants or shared at no cost through the commitments previously made by the Gorgon Joint Venturers.



**ATTACHMENT 6: Project Expenditure Statement****CO2 Project Expenditure Statement**

For the Period 14 September 2009 to 30 June 2010

| Specifically Identifiable Items                | Capital Budget<br>(A\$ Millions) <sup>1</sup> | Total Expenditure<br>For Reporting Period<br>14/09/09 to 30/06/10<br>(A\$ Millions) | Expenditure Comprised of:                 |  |
|--|---|---|---|--|
|  |   |   | Eligible<br>Expenditure<br>(A\$ Millions) | Unclassified<br>Expenditure<br>(A\$ Millions) <sup>2</sup> |
| CO2 Compressors (purchase)*                    | s 47(1)(b)                                    |   |   |  |
| CO2 Pipeline (purchase and<br>installation)    |   | s 47(1)(b)  |   |  |
| CO2 Owners Team Charges                        |   |   |   |  |
| Injection Wells (9)                            |   |   |   |  |
| Surveillance Wells (4)                         |   |   |   |  |
| Water Production Wells (4)                     |   |   |   |  |
| Water Injections Wells (4)                     |   |   |   |  |
| Plug and abandon existing wells<br>(7)         |   |   |   |  |
| Drilling Services                              |   |   |   |  |
| Seismic Baseline Survey <sup>4</sup>           |   |   |   |  |
| Power generation costs <sup>5</sup>            |   |   |   |  |
| Indirect costs <sup>6</sup>                    |   |   |   |  |
| Drill centre facilities <sup>6</sup>           |   |   |   |  |
| Pressure management<br>facilities <sup>6</sup> |   |   |   |  |
| Remediation of CO2 data well                   |   |   |   |  |
| Contingency <sup>3</sup>                       |   |   |   |  |

**Total Budget****Notes**

- 1 - The Capital Budget excludes historical costs associated with the exploration and appraisal of the injection site and front end engineering costs incurred prior to the Project's Final Investment Decision on September 14, 2010.
- 2 - Amounts reported as Unclassified Expenditure comprise expenditure that includes both eligible and non eligible expenditure; however Chevron's finance systems do not allow these amounts to be differentiated.
- 3 - Expenditure reported against the Seismic Baseline Survey represent expenditure incurred during the reporting period for processing of survey data that was acquired prior to the reporting period. Expenditure for this survey was not included in the Future Capital Expenditure Budget.
- 4 - Expenditure in relation to items noted is not currently separately identifiable within the Gorgon Project's Work Breakdown Structure. Accordingly expenditure has not been reported against these items for the period ended 30 June 2010. We propose to include all costs incurred on these items in future financial reports once a robust reporting mechanism has been established.
- 5 - No actual expenditure will be reported against Contingency, rather Contingency will be drawn down as required and expended against other line items.
- 6 - The Project has not received any Eligible or Unclassified Income during the reporting period.

This Expenditure Statement should be read in conjunction with the Notes to the Expenditure Statement.

## ATTACHMENT 7: Notes to the CO2 Project Expenditure Statement

**Chevron Australia Pty Ltd**  
**Notes to the CO2 Project Expenditure Statement**  
**For the period 14 September 2009 to 30 June 2010**

**Note 1. Basis of compilation**

This Expenditure Statement has been prepared to meet the requirements of the Low Emissions Technology Demonstration Fund Deed dated 15 October 2008 (the Deed) between Chevron Australia Pty Ltd and the Commonwealth of Australia. Significant accounting policies applied in the compilation of the report include:

**(a) Eligible Income and Expenditure**

Income as reported in the CO2 Project Expenditure Statement (the Statement) as eligible income includes:

- Funding received under the Deed from the Commonwealth for the reporting period to be applied to eligible expenditure
- Proceeds from borrowings raised for the reporting period to be applied to eligible expenditure
- Proceeds from equity raised for the reporting period to be applied to eligible expenditure

Expenditure as reported in the Statement only includes expenditure that is defined as eligible in the Deed and the *Low Emissions Technology Demonstration Fund Customer Information Guide* (LETDF Guide).

**(b) Unclassified Project Income and Expenditure**

Income as reported in the Statement as Unclassified Project Income includes all income received in relation to the project that may not be considered eligible income as defined in Note 1 (a).

Expenditure as reported in the Statement as Unclassified Project Expenditure includes all expenditure incurred in relation to the project that may not be considered eligible as defined in Note 1 (a).

**Note 2 Related parties**

The following summarises the entities that are considered related parties to Chevron Australia Pty Ltd in accordance with Clause 32.1 of the Deed; the nature of the relationship and the value and nature of transactions that have flowed between Chevron Australia Pty Ltd and the related party in relation to this project for the reporting period.

| Related party                                    | Nature of relationship | Eligible expenditure paid to / (by) related party | Unclassified project expenditure paid to / (by) related party |
|--|------------------------|---|---|
| Chevron Energy and Technology Company            | Chevron Group Company  | Nil   | s 47(1)(b)  |
| Chevron International Exploration and Production | Chevron Group Company  | Nil   |   |
| Chevron Thailand Exploration and Production      | Chevron Group Company  | Nil   |   |

Chevron Australia Pty Ltd has complied with the requirements of the LETDF Customer Information Guide in relation to the above transactions.



**Chevron Australia Pty Ltd  
Certification by Brian Dalzell  
For the period 14 September 2009 to 30 June 2010**

I hereby certify that the Expenditure Statement of Chevron Australia Pty Ltd is in accordance with Low Emissions Technology Demonstration Fund Deed dated 15 October 2008. In particular, the Expenditure Statement:

- (i) gives a true and fair view of the project income and expenditure for the period ended 30 June 2010 in accordance with the accounting policies described at Note 1;
- (ii) gives a true and fair view of the cumulative project income and expenditure since the commencement of the project on 14 September 2009 in accordance with the accounting policies described at Note 1; and
- (ii) gives a true and fair view of the budget and cumulative budgets approved by the Department as at the date of the annual Expenditure Statement.

s 22

**Finance and Compliance Manager  
Chevron Australia Pty Ltd**

*30 September 2010*

## ATTACHMENT 8: Financial Audit Statement



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## **Independent audit report on the CO2 Project Expenditure Statement to the directors of Chevron Australia Pty Ltd**

### **Report on the CO2 Project Expenditure Statement**

We have audited the accompanying CO2 Project Expenditure Statement (the Statement) being a special purpose financial report, of Chevron Australia Pty Ltd (the company) for the period ended 30 June 2010.

#### *The responsibility of the directors for the Statement*

The directors of the company are responsible for the preparation and fair presentation of the Statement and have determined that the accounting policies described in Note 1 to the Statement, are appropriate to meet the requirements of the Low Emissions Technology Demonstration Fund Deed dated 15 October 2008 and are appropriate to meet the needs of the Department of Resources, Energy and Tourism (the Department). The responsibility of the directors also includes establishing and maintaining internal control relevant to the preparation and fair presentation of the Statement that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

#### *Auditor's responsibility*

Our responsibility is to express an opinion on the Statement based on our audit. No opinion is expressed as to whether the accounting policies used are appropriate to meet the needs of the Department. We conducted our audit in accordance with Australian Auditing Standards. These Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the figures are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the Statement. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the figures, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's determination of the figures in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the reasonableness of accounting estimates made by the directors of the company, as well as evaluating the overall presentation of the Statement.

The Statement has been prepared for distribution to the Department for the purpose of fulfilling the financial reporting obligations of the directors of the company under the Low Emissions Technology





**Independent audit report on the CO2 Project Expenditure Statement to the directors of Chevron Australia Pty Ltd (continued)**

Demonstration Fund Deed dated 15 October 2008. We disclaim any assumption of responsibility for any reliance on this audit report or on the Statement to which it relates to any person other than the directors of Chevron Australia Pty Ltd and the Department, or for any purpose other than that for which it was prepared.

Our procedures include reading the other information in the Annual Progress Report to determine whether it contains any material inconsistencies with the Statement.

Our audit did not involve an analysis of the prudence of business decisions made by directors or management.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

*Auditor's opinion*

In our opinion, the CO2 Project Expenditure Statement of Chevron Australia Pty Ltd is in accordance with the Low Emissions Technology Demonstration Fund Deed dated 15 October 2008, including:

- (a) giving a true and fair view of the project income and expenditure for the period ended 30 June 2010 in accordance with the accounting policies described in Note 1;
- (b) giving a true and fair view of the cumulative project income and expenditure since the commencement of the project on 14 September 2009 to 30 June 2010 in accordance with the accounting policies described in Note 1.

s 22

PricewaterhouseCoopers

s 22

Partner

Perth  
30 September 2010



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## **Certification of Other Certain Matters by the Auditor to the Directors of Chevron Australia Pty Ltd**

I understand that the Commonwealth of Australia and the Chevron Australia Pty Ltd (Grantee) have entered into a Funding Deed dated 15 October 2008 (Deed) for the provision of funding under the *Low Emissions Technology Demonstration Fund (LETDF)* to the Grantee for the Project. A condition of funding under the Deed is that the Grantee provides an audited financial report in accordance with the Deed.

In fulfilment of the condition, I hereby certify that:

1. I am a member of the Institute of Chartered Accountants in Australia
2. I have prepared the audit report on the financial report details and grant details dated 30 September 2010.
3. I have reviewed the Low Emissions Technology Demonstration Funding Deed and related Guidelines and understand the requirements pertaining to financial reporting and eligible expenditure contained therein.
4. I have not prepared the financial report to which my audit opinion relates.
5. I have complied with the professional independence requirements of the Institute of Chartered Accountants in Australia.

I specifically certify that I:

- a. am not, and have not been, a director, officeholder, or employee of Chevron Australia Pty Ltd or a related body corporate of Chevron Australia Pty Ltd
- b. have not been previously engaged by Chevron Australia Pty Ltd for the purpose of preparing their LETDF application
- c. have no financial interest in Chevron Australia Pty Ltd.

s 22

Partner

Perth  
30 September 2010