THE GRIFFIN GROUP

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Bluewaters Power Station Phase III and IV Expansion

Greenhouse Gas Management Plan

Prepared for
Griffin Power 3 Pty Ltd
by Strategen

July 2009

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Phase III and IV Expansion

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July 2009

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Client: Griffin Power 3 Pty Ltd

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BLUEWATERS POWER STATION PHASE III AND IV EXPANSION

GREENHOUSE GAS MANAGEMENT PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

BLUEWATERS POWER STATION PHASE III AND IV EXPANSION

GREENHOUSE GAS MANAGEMENT PLAN

1. INTRODUCTION

1.1 BACKGROUND

Griffin Power 3 Pty Ltd (Griffin Power) is proposing to expand the Bluewaters Power Station facility at Collie by constructing and operating Bluewaters Phases III and IV (the Proposal). Each phase of the Proposal consists of one 229 MW (gross output) base-load coal-fired generating unit, located within the Coolangatta Estate approximately 4.5 km from the eastern edge of Collie, Western Australia. Bluewaters Phases III and IV will be located adjacent to Bluewaters Phase I and II power stations (each 229 MW) and all four phases of the power station will share infrastructure. The regional location and power station layout are shown in Figure 1.1 and Figure 1.2 respectively.

The Bluewaters Power Station has been designed for expansion in modular phases in order to grow with the demands of the Western Australian electricity market. It is envisaged that the Bluewaters Phase III and IV expansion will be approved for construction and operation under Part IV of the *Environmental Protection Act 1986* (EP Act) and under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Proposal involves a range of potential environmental impacts requiring management to meet the objectives of the approval of the Proposal. The emissions of greenhouse gas (GHG) resulting from the fuel combustion process, is a specific issue requiring management and is the subject of this plan.

1.2 PURPOSE OF DOCUMENT

This GHG Management Plan has been prepared to detail the specific approach proposed to be taken by Griffin Power in managing the GHG emissions resulting from operation of the proposal.

This management plan describes those strategies and procedures that will be implemented to ensure Griffin Power complies with its obligations and management objectives specified in the Public Environmental Review (PER) document (Strategen 2009) prepared for approval under Part IV of the EP Act.

Figure 1.1 Regional location

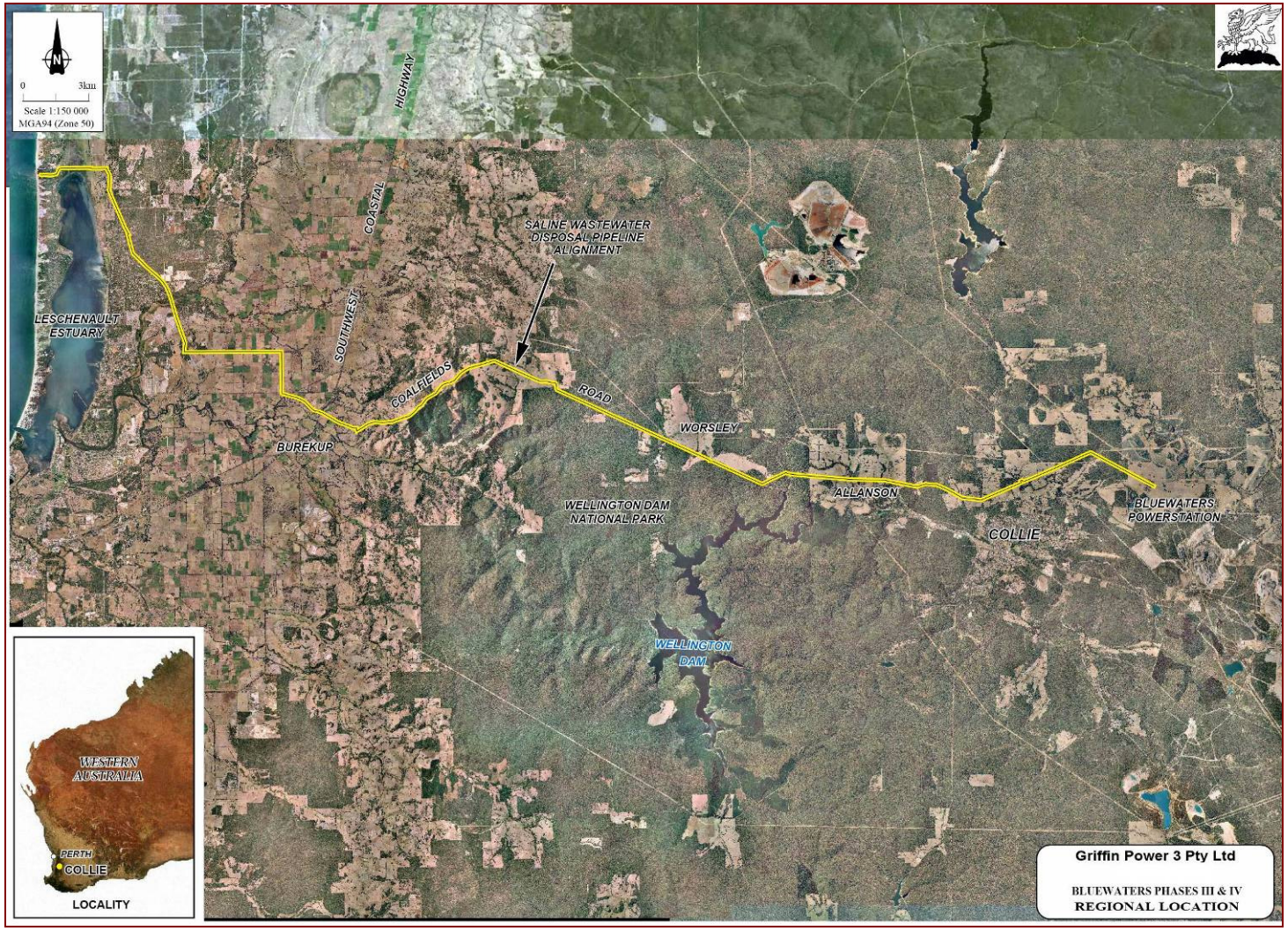
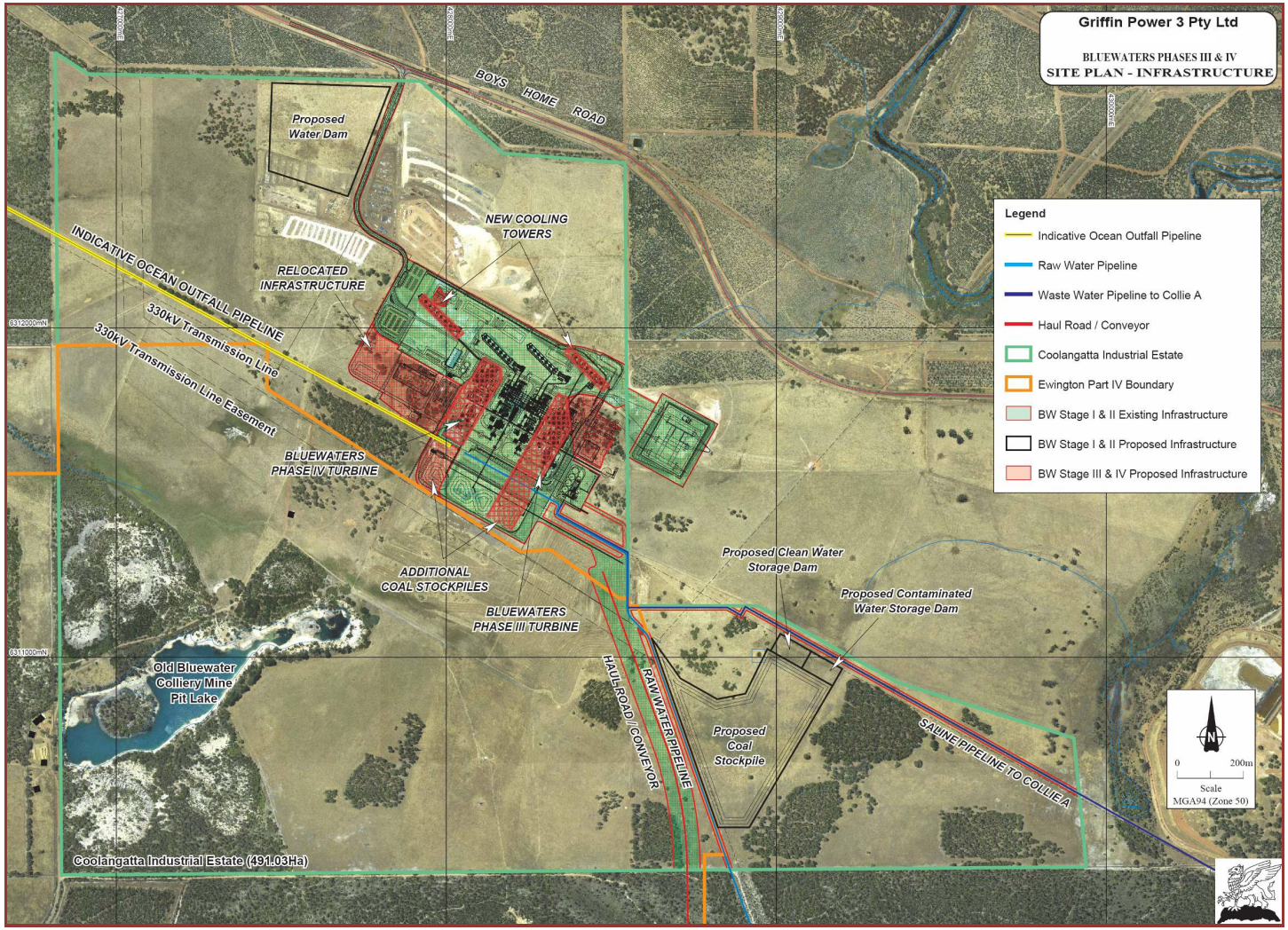


Figure 1.2 Site plan



2. MANAGEMENT PLAN

2.1 MANAGEMENT PLAN OBJECTIVE, KEY STATUTORY REQUIREMENTS AND ENVIRONMENTAL POLICY

The objective for this GHG management plan is congruent with the EPA objective with respect to GHG emissions, as set out in The EPA *Guidance Statement for Minimising Greenhouse Gas Emissions*:

To reduce emissions to a level which is as low as is practicable.

To achieve this, potential GHG emissions emitted from the proposal must be addressed in the planning/design and operation of projects and that:

- best practice is applied to maximise energy efficiency and minimise emissions
- comprehensive analysis is undertaken to identify and implement appropriate offsets
- proponents undertake an ongoing program to monitor and report emissions and periodically assess opportunities to further reduce GHG emissions over time.

Increasing global GHG emissions and the implications for climate change is a significant issue at the national and international level and the Australian Government is establishing a market based Carbon Pollution Reduction Scheme (Australian Government 2008a, 2008b) as part of a framework to meet the climate change challenge and to reduce emissions by the required amounts. This scheme is based on, amongst other things, a commitment to reducing GHG emissions by 60% below 2000 levels by 2050. The scheme was initially outlined as a proposal in a "green paper" (Australian Government 2008a), with the final decisions by Government on the form of the scheme released in a "white paper" (Australian Government 2008b), released in December 2008.

Emission trading through a capped system of tradeable permits will be the key mechanism for achieving sustainable reductions in emissions in accordance with a preset reduction trajectory aimed at meeting the proposed 2050 target level of emissions nationally. The targets for this compulsory national scheme align exactly with the targets announced in the *Premier's Climate Change Action Statement* (Government of Western Australia 2007a). The State Government will set an aspirational 50% Cleaner Energy Target (CET) for the SWIS by 2010 and will work to achieve this by continuing to work on emissions trading, supporting renewable energy and working to ensure that Western Australia has access to sufficient natural gas for domestic use (Government of Western Australia 2007a).

The Australian Government (2008c) has set the target ranges to be achieved by 2020 as being from 5% to 15% below 2000 levels, dependent upon the extent to which there is global agreement of major economies to commit to take on reductions comparable to Australia. The first indicative national emissions trajectory has been published (Australian Government 2008b) as:

- in 2010–11, 109% of 2000 levels
- in 2011–12, 108% of 2000 levels
- in 2012–13, 107% of 2000 levels.

Future indicative trajectories will be progressively announced from 2010 on. Participation of Griffin Power in the ETS will ensure that the project contributes to achievement of the proposed national trajectory.

To support the Carbon Pollution Reduction Scheme, a new reporting system has been developed and legislated. The *National Greenhouse Gas Emissions Reporting Act 2007* (NGER Act), establishes the National Greenhouse Gas Emissions Reporting Scheme (NGERS) as a national framework for Australian corporations to report GHG emissions, reductions, removals and offsets, and energy consumption and production[1].

The key features of the NGERS are:

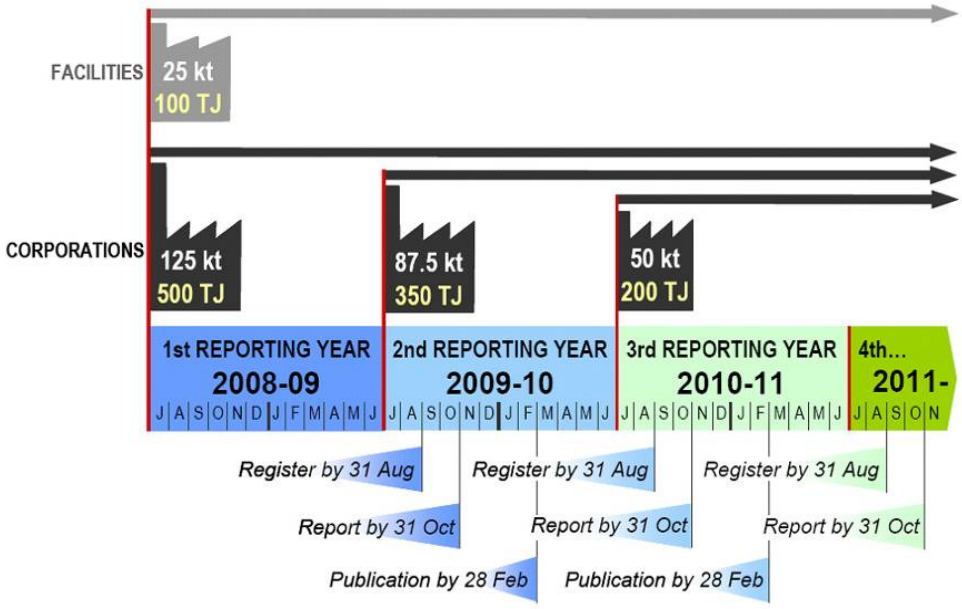
- cutting red tape for business by reducing the number of reports to government and eliminating duplication across existing State, Territory and national schemes
- providing robust data as a foundation for an emissions trading scheme
- facilitating reporting of abatement and offsets prior to commencement of emissions trading
- providing company level information to the public on greenhouse and energy performance for the first time
- creating a single online entry point for reporting based on the Australian Government Online System for Comprehensive Activity Reporting.

The reporting requirements of the NGER Act are:

1. The NGER Act requires controlling corporations to register and report if they emit GHG, produce energy, or consume energy at or above specified quantities per financial year (1 July to 30 June).
2. From 1 July 2008, corporations are required to register and report if:
    - they control facilities that emit 25 kt or more of GHG ($CO_{2\text{-}e}$), or produce/consume 100 TJ or more of energy; or
    - their corporate group emits 125 kt or more GHG ($CO_{2\text{-}e}$), or produces/consumes 500 TJ or more of energy.
3. Lower thresholds for corporate groups will be phased in by 2010–11. The final thresholds will be 50 kt of $CO_{2\text{-}e}$ or 200 TJ of energy.
4. Companies must register by 31 August, and report by 31 October following the financial year in which they meet a threshold. Data will be published by the Greenhouse and Energy Data Officer by 28 February following each reporting period.
5. These thresholds and timings are illustrated in Figure 2.1.

[1] http://www.greenhouse.gov.au/reporting/publications/pubs/nger-fs.pdf [12 May 2008]

Figure 2.1 NGER Act reporting timeline



kt = kilotonnes in CO_2 equivalent of greenhouse gases emitted
TJ = terajoules (10^{12} joules) of energy consumed or produced

2.2 SCOPE OF THE PLAN

The scope of this plan includes:

1. Calculation of the GHG emissions associated with the Bluewaters Phase III and IV Expansion project according to the requirements of the EPA Guidance for the Assessment of Environmental Factors No. 12 *Minimising Greenhouse Gas Emissions*.
2. Specific measures to minimise the total net GHG emissions and the GHG emissions per unit of product associated with the proposal.
3. Estimation of the GHG efficiency of the project and comparison with the efficiencies of other comparable projects producing a similar product within Australia and overseas.
4. Implementation of thermal efficiency design and operating goals consistent with the Australian Greenhouse Technical Efficiency Guidelines in design and operational management.
5. Actions for the monitoring, regular auditing and annual reporting of GHG emissions and emission reduction strategies.
6. A program to achieve reductions in GHG emissions over time.
7. Review of practices and available technology.
8. Continuous improvement approach so that advances in technology and potential operational improvements of plant performance are adopted where practicable.
9. Research relating to options for carbon capture and storage of carbon dioxide emissions.

This plan does not include provision for direct offsetting of GHG emissions. Given the expectations regarding implementation of the National Carbon Pollution Reduction Scheme, and the mandatory requirement for the proposal to be a participant in the associated emissions trading scheme, Griffin Power does not believe that direct offsets for the resulting emissions are appropriate. It is acknowledged that some level of offsetting may be appropriate in the absence of an emissions trading scheme designed to achieve the State Government emission targets. However, given that the national scheme targets exactly match the State targets, through a soon to be legislated mandatory process for participation, the imposition of additional reductions through offsets is considered unjustified with respect to this proposal.

The National Carbon Pollution Reduction Scheme 'Green Paper' (Australian Government 2008a) notes that the broad coverage proposed for the scheme creates limited scope for the creation of offset credits. The reasons for this are:

1. Offset credits are rewards for reductions in emissions measured against an assumed baseline, with issues regarding the determination of the baselines, and complexity of administering such systems.
2. Offsets do not increase national GHG abatement, as the provision of credits allows additional emissions in the covered sector.

The 'Green Paper' notes that offsets may be considered for sectors not proposed to be covered by the scheme (for example, emissions from uncontrolled burning of savannah in the tropical north of Australia). However, the power generation sector will be covered by the scheme, and offsets will therefore not be considered.

Achievement of the Carbon Pollution Reduction Scheme targets will progressively and substantially increase the costs of permitting GHG emissions from the proposal and force the incorporation of GHG reduction technologies as they become commercially viable. Griffin Power believes that any additional cost imposts through offsetting requirements under the State environmental approval are not justified, as credits for any such offsets will not be recognised under the Carbon Pollution Reduction Scheme. Participation in the Scheme with an additional requirement for offsets that cannot be credited is considered unjustified and unreasonably onerous. That is not to say that Griffin will avoid taking measures to reduce its CO_2 emissions, as outlined in Section 2.6.

2.3 EVALUATION OF AVAILABLE COAL FIRED GENERATION TECHNOLOGIES

The range of potentially available coal fired generation technologies were examined and evaluated (E3 2008). These included the following, which are discussed below:

- subcritical pulverised coal
- supercritical pulverised coal
- ultra-supercritical pulverised coal
- fluidised bed technologies
- gasification technologies.

Subcritical pulverised coal

The most commonly used technology for coal combustion in Australia is *subcritical pulverised coal*, meaning that coal is ground (pulverised) into a fine powder which is then combusted, creating steam at a pressure and temperature below the critical point of water (below 221 bar). Subcritical plants are well established and relatively easy to control, with overall energy conversion efficiencies in the range of 35 - 37% (calculated in terms of net generation and the higher heating value (HHV) of the coal). The technology is reliable, relatively low cost, and is importantly available in a range of unit sizes from as small as 50 MW up to 1400 MW. The GHG intensity of a *subcritical pulverised coal* plant operating at 36% efficiency would be in the order of 932 kg CO2-e/MWh. A 200 MW *subcritical pulverised coal* plant would create approximately 1.5 Mt of CO_2-e/yr.

In summary *subcritical pulverised coal* has the following attributes:

1. Availability – *subcritical pulverised coal* equipment in the crucial <400 MW unit sizes is commonly available from a range of equipment supplies.
2. Proven technology – *subcritical pulverised coal* is reliable and has a clearly understood risk profile when seeking project financing.

Supercritical pulverised coal

Higher efficiencies and improved greenhouse intensities can be achieved by increasing steam temperature and pressure to supercritical conditions. Some 400 *supercritical pulverised coal* power plants are currently operating around the world, including three in Queensland. Steam conditions of *supercritical pulverised coal* plants reach over 300 bar/600°C and achieve HHV efficiencies of around 42%. The GHG intensity of a *supercritical pulverised coal* plant operating at 42% efficiency would be in the order of 807 kg CO2-e/MWh.

However, these high efficiencies are only available to the largest plant (>1000 MW units) operating in the most conducive environments. The most efficient black coal fired power stations operating in Queensland are operating at efficiencies between 37 – 39%. Importantly these units are all greater than 420 MW, which would be too large for the West Australian market. The minimum size *supercritical pulverised coal* equipment readily available is 350 MW. To scale down to this size, the full efficiency advantages of the supercritical cycle cannot be realised due to the effects of scale such as high blade tip losses in the high pressure turbines. The expected efficiency of a 350 MW *supercritical pulverised coal* unit is 37%.

A 350 MW *supercritical pulverised coal* plant operating at 37% efficiency would create approximately 2.3 Mt of CO_2-e/yr.

In summary *supercritical pulverised coal* has the following attributes:

1. Availability – supercritical pulverised coal equipment is available in sizes upward from 350 MW. Units smaller than 400 MW offer only marginal greenhouse savings, and significantly higher costs than subcritical offerings.
2. Proven technology – supercritical pulverised coal equipment in 350 MW sizes is uncommon globally and is likely to require significant technology guarantees from vendors to meet the requirements of project financers. These guarantees significantly reduce the number of vendors interested in bidding for equipment tenders and significantly increase the cost of final equipment.

Ultra-supercritical pulverised coal

It is possible to pursue even further efficiencies through the application of so-called *ultra-supercritical* technologies. As *ultra-supercritical* plant designs cross the 670°C threshold, they require more-expensive, nickel-based alloys for high-temperature components. Although there are a number of large pilot facilities in Europe, Asia, and the United States, this technology is not yet commercially proven.

In summary *ultra-supercritical* technologies require further commitment to advanced alloys materials development, and gain approval from industry standards organisations and insurers before they can be considered for private power developments in Australia.

Fluidised bed technology

In addition to the above pulverised coal technologies, there is emerging interest in options based around fluidised bed and gasification technologies. Fluidised bed combustion (FBC) is a method of burning coal in a bed of heated particles suspended in a gas flow. This can occur either at atmospheric pressures (Atmospheric Fluidised Bed Combustion [AFBC]) or in pressured environments (Pressurised Fluidised Bed Combustion [PFBC]).

The principle benefits of AFBC are its ability to use wide varieties of poor quality fuel, but with good combustion and environmental performance. AFBC allows the use of cheaper, low-grade fuel, and finds application in the disposal of waste materials. Efficiencies are normally around 32 % HHV. AFBC technology offers environmental benefits in that the removal of SO_2 (90 – 95 %) and NOx (below 100 ppm) which takes place within the combustion process without the need for additional post-combustion cleanup.

The PFBC is a relatively compact pressure vessel that holds coal particles in suspension in a rising gas stream. Downstream of the combustor, the hot gas cleanup plant conditions the combustion gases to remove particulates and other contaminants. A more rugged gas turbine than standard is used to accommodate the residual contaminant level of the hot combustion gases. The use of steam and gas turbines in a combined cycle enables higher overall efficiencies to be achieved than a steam only cycle with comparable steam conditions. PFBC units have shown HHV efficiencies of around 40%, however, this has been based on limited testing, and the advances in waste gas cleanup have to some extent eroded the advantages of PFBC technology.

Both AFBC and PFBC have been prototyped in sizes suitable for the West Australian market but neither technology can be considered commercially proven at this time. In addition, the coal at Collie does not warrant the use of FBC and there is no GHG intensity advantage over subcritical pulverised fuel.

In summary *AFBC and PFBC* have the following attributes:

1. Availability – AFBC or PFBC are not commercially available in the West Australian market (due to either size limitations or lack of supplier availability).
2. Proven technology – AFBC or PFBC are not commercial proven to the extent required for financiers in the unit sizes required for the West Australian market.

Gasification technologies

Gasification technologies such as Integrated Gasification Combined Cycle (IGCC) are based on the integration of three well-established processes; pressurised gasification, gas refining and combined cycle electricity generation. When coal is brought into contact with steam and oxygen, thermo chemical reactions produce a fuel gas, largely carbon monoxide and hydrogen, which when combusted can be used to power gas turbines.

Demonstration plants currently in operation have an HHV efficiency level of about 45%, and with recent advances in gas turbine technologies, these systems are now capable of reaching above 50%. Plant availability of 80% to 85% is reported for the limited experience to date. IGCC technology is still at the demonstration phase with estimates of total plant capacity varying. IGCC is considered to be as efficient as subcritical and supercritical units, but with lower emissions and significantly higher costs. Before being considered commercially viable, IGCC must overcome higher costs, poor reliability and unproven flexibility compared with rival technology.

In summary IGCC has the following attributes:

1. Availability – IGCC is not commercially available in the West Australian market (either due to size limitations or lack of supplier availability).
2. Proven technology – IGCC is not commercial proven to the extent required for financiers in the unit sizes required for the West Australian market.

Summary of technology evaluation

Of the available coal fired technologies only *subcritical* coal meets the required equipment availability and proven technology characteristics required for coal fired generation in the West Australian market. Supercritical coal plants are available in unit sizes down to 350 MW, but at these sizes have significantly higher capital costs for only marginal improvements (~1%) to efficiency. Ultra-supercritical, gasification and fluidised bed coal generation technologies fail to meet the unit size - equipment availability, and proven technology characteristics required to obtain financing.

2.4 ENVIRONMENTAL RISKS

Each Bluewaters power station unit will emit GHG as a consequence of the burning of coal in the generator units, as summarised in Table 2.1. The calculated emissions and equivalents are based on using coal to generate a total 1 845 557 MWh/yr (229 MW at a load factor of 92%) at the generator with 1 676 314 MWh/yr (208 MW at a load factor of 92%) being delivered to the switchyard. The energy content of the coal is 19.9 GJ/t and 833 112 t/yr of coal (total coal energy of 16 578 926 GJ/yr) is required to generate 6 034 729 GJ/yr (1 676 314 MWh/yr) at the switchyard, based on a sent-out thermal efficiency of 36.4%. These results are based on a Scope 1 emissions factor of 93.1 (Office of Climate Change 2008).

Table 2.1 Summary of absolute annual emissions from Bluewaters Power Station (per Phase)

Component	Value
Bluewaters Power Station Capacity (MW)	208
Availability (%)	92
Production (MWh)	1 676 314
Average Efficiency of Power Station	36.40%
Power Station Fuel Input (GJ)	16 578 926
CO_2 Emissions Factor (kg CO_2/GJ)	93.1
CH_4 Emissions Factor (mg CH_4/PJ)	0.9
N_2O Emissions Factor (mg N_2O/PJ)	0.8
CO_2 Emissions (t CO_2)	**1 543 977**
CH_4 Emissions (t CH_4)	**1492**
N_2O Emissions (t N_2O)	**1326**
Total CO2 Equivalents (Mt)	**1.547**

Note: Emission factors sourced from NGGI Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks: Energy (Stationary sources) (2006).

The thermal efficiency of a coal-fired power plant is defined as the ratio of energy sent out to useful energy in, and may be expressed in terms of generated thermal efficiency or sent out thermal efficiency. The Australian Greenhouse Office Technical Efficiency Guidelines outline the target values of sent out thermal efficiency for the combustion of black coal. This section states that the world best plant in 1999 had a thermal efficiency of 43.6% HHV and that after adjusting to typical Australian cooling water conditions, the best practice achievable under Australian conditions becomes 41.7% HHV, based on a supercritical plant. Best practice thermal efficiency for a < 250 MW sub critical plant is considered to be 37.7% HHV and when adjusted for Collie coal is 37.1% HHV.

From Table 2.1, it can be seen that the total GHG emissions expected to be emitted by the two generator units comprising the proposal, when fully operational, are estimated to total 3.1 Mt $CO_{2\text{-}e}$/yr. The total indirect emissions (Scope 3) would be 76 263 t $CO_{2\text{-}e}$/yr, based on a GHG emissions factor of 2.3 (Office of Climate Change 2008).

The Bluewaters Project is expected to achieve an average sent-out thermal efficiency of 36.4% HHV and 38.6% LHV. This is considered to be close to best practice for a subcritical plant of this size.

The temporal emission profiles for Scope 1 (direct), Scope 3 (indirect), and combined Scope 1 and 3 emissions over the life of the proposal (2012 to 2042) are presented in Figure 2.2, Figure 2.3 and Figure 2.4 respectively.

In the context of the Bluewaters project the GHG intensity of the project is calculated as the direct equivalent GHG emissions (1 543 977 t CO_2-e) divided by the sent out electricity (1 676 314 MWh). The carbon intensity of power generated by Bluewaters Phases III and IV has been calculated at 921 kg CO_2-e/MWh sent out.

However, the fitting of flue gas desulphurisation technology will result in a 0.5 to 0.9% reduction in sent out electricity as it will increase auxiliary electricity consumption through a combination of increased direct power consumption and increased induced draft fan loads. The net GHG emissions for the project will not change as a result of the technology, but the GHG intensity will increase. In effect, the same GHG emissions are produced to generate less sent out electricity.

Figure 2.2 Annual direct greenhouse gas emission profile

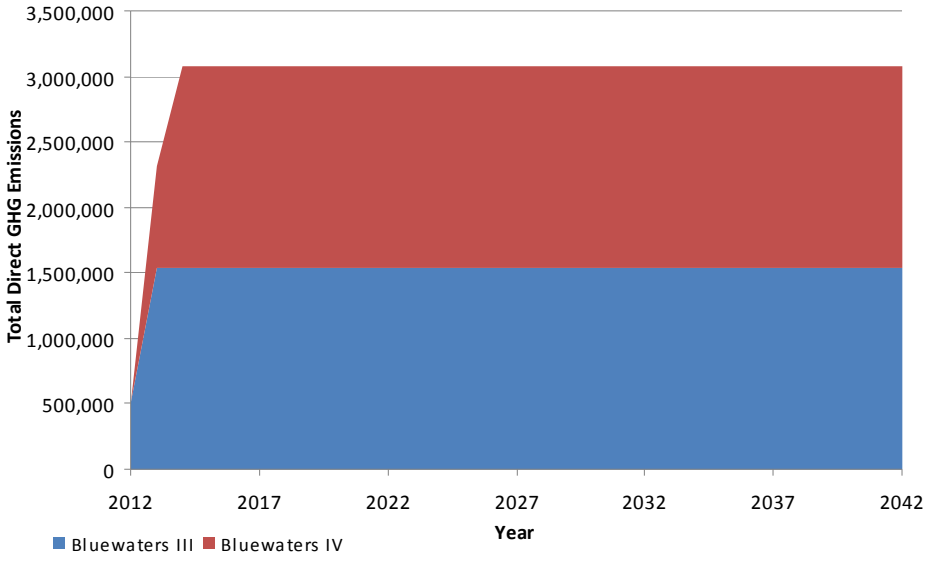


Figure 2.3 Annual indirect greenhouse gas emission profile

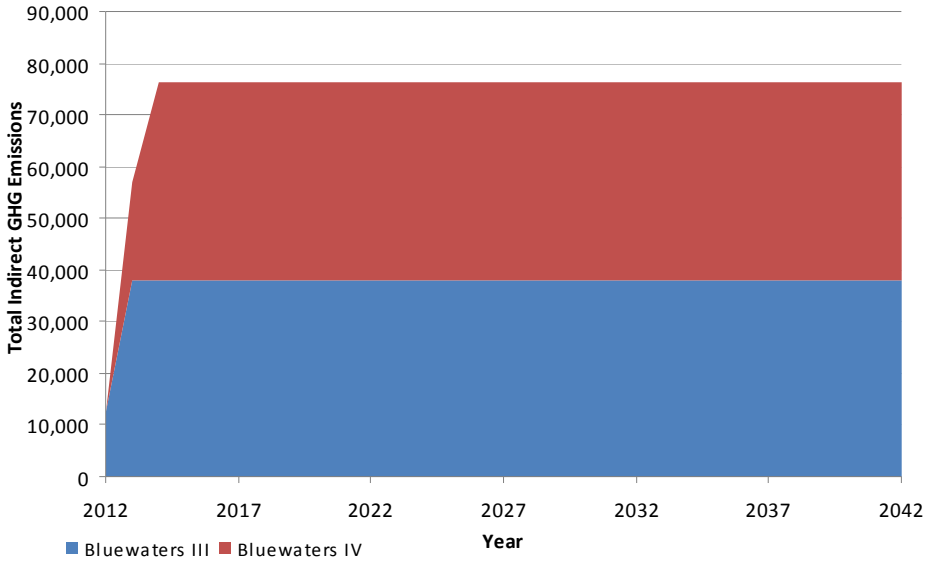
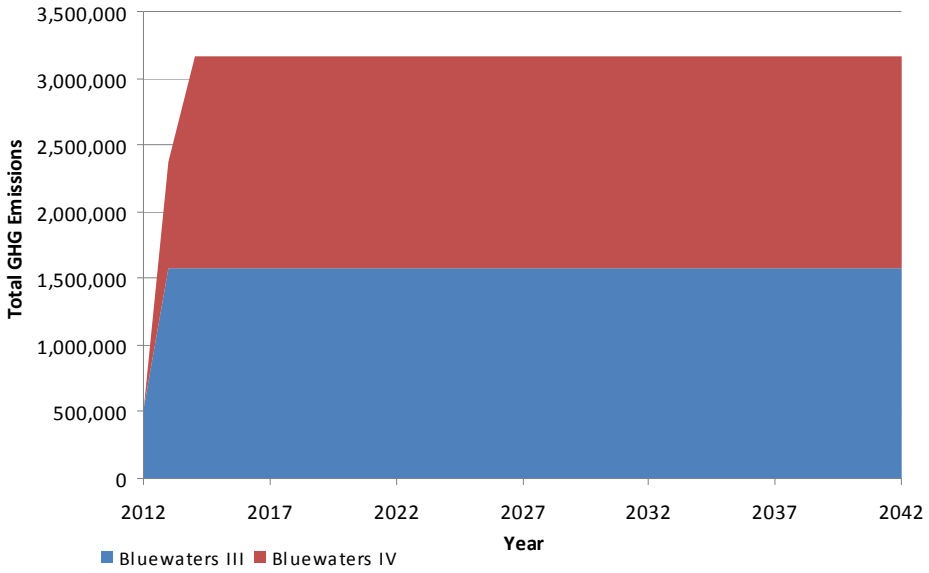


Figure 2.4 Annual direct and indirect greenhouse gas emission profile



The expected changes to the sent out electricity and GHG intensity as a result of flue gas desulphurisation are presented in Table 2.2.

Table 2.2 Greenhouse gas intensity with and without flue gas desulphurisation

Reduction in sent out electricity due to flue gas desulphurisation	Sent out electricity (MWh)	GHG intensity (kg CO2-e/MWh)
0.0%	1 676 314	921
0.5%	1 667 932	926
0.9%	1 661 227	929

The power station will be operated at maximal efficiency load all of the time, offering the best GHG intensity for generation requirements.

2.5 APPLICABLE LEGISLATION

Griffin Power employees and contractors will comply with all Commonwealth and State legislation that applies to the Bluewaters Power Station Phase III and IV Expansion. Current legislation relevant to GHG management is summarised in Table 2.3.

Table 2.3 Relevant legislation

Relevant Legislation	Scope	Administering Body
National Greenhouse Gas Emissions Reporting Act 2007	National framework for Australian corporations to report GHG emissions, reductions, removals and offsets, and energy consumption and production.	Department of Climate Change (Cwlth)

2.6 MANAGEMENT PROGRAM

2.6.1 Environmental objectives and key performance criteria

The GHG emissions from the construction of the Proposal will be managed to meet the environmental objectives as set out in Table 2.4.

Table 2.4 Environmental objectives and performance indicators

Issue	Environmental Objective	Performance Indicator
Best practice	Ensure the use of best practicable technology to minimise the total net GHG emissions from the plant	Comparison with similar plants nationally and internationally
Reduction of emissions	Provide for reducing GHG emissions over time	Extent to which reductions in emissions are achieved
		Participation in national Carbon Pollution Reduction Scheme
Reporting	Meet legislative requirements on reporting of GHG emissions from the plant	Compliance with NGER Act and any reporting required under conditions of project approval

2.6.2 Management actions

Griffin Power has made provisions for reducing CO_2 emissions by designing the plant to be readily capable of carbon capture when such technology becomes technically and commercially viable.

With respect to carbon capture readiness, design of the power station generating units will include features that can be incorporated into the conventional coal fired power station to be carbon capture ready, to the extent possible under the current state of knowledge of these aspects.

For the purposes of the proposal, carbon capture readiness will be in accordance with the International Energy Agency summary of considerations for carbon capture ready power plants (IEA 2007):

> *"A CO_2 capture ready power plant is a plant which can include CO_2 capture when the necessary regulatory or economic drivers are in place. The aim of building plants that are capture ready is to reduce the risk of stranded assets and 'carbon lock-in'.*
>
> *Developers of capture ready plants should take responsibility for ensuring that all known factors in their control that would prevent installation and operation of CO_2 capture have been identified and eliminated.*
>
> *This might include:*
>
> - *A study of options for CO_2 capture retrofit and potential pre-investments*
> - *Inclusion of sufficient space and access for the additional facilities that would be required*
> - *Identification of reasonable route(s) to storage of CO_2."*

Until the preferred site(s) for carbon storage (geosequestration) are defined, it would not be practical to identify the route(s) to be taken. When implemented, it is likely to be a joint facility to accommodate other greenhouse gas emitters in the Collie region and beyond the scope of the Bluewaters Power Station Phase III and IV Expansion proposal.

Griffin Power is committed to reporting under the NGER Act and to participation in the emissions trading scheme under the national Carbon Pollution Reduction Scheme, and believes that this approach will provide an appropriate and adequate means of management of this environmental factor in terms of a contribution to reducing overall national and international GHG emissions.

The specific management actions to be implemented are set out in Table 2.5.

Table 2.5 Management actions

Aspect	Action	Responsibility
Best practice	Griffin will continue to review the available technologies for a coal fired power station and adopt the most effective practicable technologies commercially available to minimise GHG emissions.	Griffin Power
	Griffin will continue to actively support the Coal Futures Group research into potential geosequestration sites capable of being utilised by industry in the Collie region.	Griffin Power
	Griffin will monitor developments in biomass fuel and carbon capture technologies and undertake annual evaluations of practicable applicability to the Bluewaters Power Station.	Griffin Power
Reduction of emissions	Griffin will design the power station units to be carbon capture ready in accordance with the International Energy Agency considerations for carbon capture readiness.	Griffin Power
	Griffin will install facilities to capture and store carbon when the technology is commercially viable and available.	Griffin Power
	Griffin will participate in the national Carbon Pollution Reduction Scheme.	Griffin Power
	Griffin will investigate opportunities to improve efficiency beyond the manufacturer's specifications for the generator units, including: • boiler tuning – improving combustion control to optimise the boiler mix of fuel and air to reduce waste and energy • low excess air operation to minimise the amount of hot air sent up the boiler chimney stack.	Griffin Power
	Ensure that the Griffin Energy portfolio of energy generation projects consists of at least 5% renewable sources.	Griffin Power
Monitoring and Reporting	Griffin will establish a GHG emissions monitoring program to enable reporting as required under the NGER Act, and under any future GHG emissions management legislation that may be enacted.	Griffin Power
	Griffin will report its GHG emissions as required under the NGER Act and under any future emissions management legislation that may be enacted.	Griffin Power
	Griffin will provide copies of the NGERS reports to the DEC.	Griffin Power

2.7 DOCUMENT REVIEW

Griffin Power will review and revise this management plan as necessary:

- on a three-yearly basis
- if there are major changes to the project or its operations
- in response to issues raised by the regulatory agencies
- in response to any incident which results in a failure to meet any of the commitments of this plan.

Any changes to this plan will be taken in a manner that ensures that the plan maintains consistency with all regulatory requirements applicable to the Bluewaters Power Station Phase III and Phase IV Expansion.

3. IMPLEMENTATION

3.1 PUBLIC COMPLAINTS

Where any public complaints are received with respect to any environmental issues associated with the Bluewaters Phase III and IV construction activities, they will be managed under the Griffin Energy Environmental Management System. Griffin Power will record and investigate all public complaints and will take all reasonable and practicable measures to avoid further grievances.

All public complaints and the responsive actions made by Griffin Power will be reported in the annual compliance report required under the conditions of the Ministerial Statement.

3.2 TRAINING AND AWARENESS

The Power Station Manager will be responsible for ensuring that environmental training and awareness programs are provided to all operations personnel. Specific attention will be made to incident management and reporting, use of plant and equipment, water management and conservation, dust and noise control, and complaints management.

Operations personnel will be required to participate in an induction program so that an acceptable level of environmental awareness is achieved prior to work commencing. This induction program will be directed to assist in minimising any on-site and off-site environmental problems. The Power Station Manager will maintain a record on site of environmental training undertaken for all employees, detailing the type and purpose of the training.

3.3 INCIDENT REPORTING

All environmental hazards or incidents will be recorded in the on-site incident report system, investigated, remediated if necessary and reported as required, including within any required compliance reports.

3.4 ROLES AND RESPONSIBILITIES

Griffin Power will be responsible for the overall implementation of this plan.

4. REPORTING AND REVIEW

4.1 COMPLIANCE REPORTING

Griffin Power will report on its compliance with the Ministerial Statement and conformance with environmental management plans as required by the conditions in that statement.

Griffin Power will report on compliance with any Environmental Licences in accordance with the conditions attached to those licences.

Unless otherwise specified within this plan, Griffin Power will provide an Environmental Incident Report to the Department of Environment and Conservation (DEC) within seven days of becoming aware of an environmental incident, including details of:

- the date, time and reason for the incident
- the period over which the incident occurred
- the cause, nature and extent of the incident over that period and potential or known environmental consequences
- corrective action taken or planned to mitigate adverse environmental consequences if appropriate
- corrective actions taken or planned to prevent a recurrence of the incident, if appropriate, including a timeline for implementation.

4.2 DOCUMENT REVIEW

Griffin Power will review and revise this management plan:

- on a three-yearly basis
- if there are major changes to the project or its operations
- in response to issues raised by the DEC
- in response to issues raised through the Community Liaison Committee
- in response to any incident which results in a failure to meet to meet any of the commitments of this plan.

Due to the relationship between this management plan and the Ministerial Statement, any changes to the management measures described in the plan must remain consistent with the requirements of the Statement. Additionally, the Audit Branch of the DEC must be notified of any relevant changes to the plan and the audit table for the Statement updated as appropriate.

This Management Plan will be audited and reviewed and a performance assessment conducted in accordance with the conditions of the Ministerial Statement.

5. REFERENCES

Australian Government 2008a, *Carbon Pollution Reduction Scheme Green Paper*, published by the Department of Climate Change, Canberra, Australian Capital Territory.

Australian Government 2008b *Carbon Pollution Reduction Scheme - Australia's Low Pollution Future White Paper*, published by the Department of Climate Change, Canberra, Australian Capital Territory.

E3 2008, *Applicability of coal generation technologies*, report prepared for Griffin Power by E3, Western Australia (Commercial in Confidence).

Government of Western Australia 2007, *Premier's Climate Change Action Statement – Making Decisions for the Future: Climate Change*, Perth, Western Australia.

Intergovernmental Panel on Climate Change (IPCC) 2007, *Summary for Policymakers,* Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Bangkok, Thailand.

Strategen 2009, *Public Environmental Review – Bluewaters Power Station Phases III and IV*, report prepared for Griffin Power 3 Pty Ltd by Strategen, Leederville, Western Australia.