Port Waratah Coal Services

Kooragang Coal Terminal
Proposed Increase to Throughput Capacity
Response to Submissions Part B

January 2007

Umwelt
Environmental Consultants

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Response to Submissions Part B

Prepared by

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on behalf of

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APPENDICES

1.0 Introduction

This document has been prepared in response to a request from the Director-General in accordance with section 75H(6) of the *Environmental Planning and Assessment Act* 1979 (NSW) (EP&A Act) that Port Waratah Coal Services Limited (PWCS) prepare a response to the issues raised during the public exhibition period for the Kooragang Coal Terminal Proposed Increase to Throughput Capacity Project (Project). This report provides Part B of PWCS' Response to Submissions and focuses on the issues raised by relevant interest groups and the community.

For each primary issue, the theme of the matters raised is noted in bold, followed by a response in normal type.

1.1 Summary of Issues Raised in Submissions

A total of 58 submissions were received during the Environmental Assessment (EA) exhibition period. Of these, 52 objected and 5 supported the proposed project. The reasons given for supporting the project within the community submissions were primarily in relation to the ability of PWCS to operate the Project in an environmentally responsible manner. Two form letters made up 28 of the submissions objecting to the project, with the remaining 24 objections comprised individual submissions. The form letter submissions raised issues associated with greenhouse gases and climate change impacts. There was a greater diversity of issues raised in the individual submissions.

2.0 Assessment Methodology

A number of submissions raised specific issues in relation to the assessment of cumulative impacts associated with the Project in the broader context of the expansion of the coal mining industry in NSW. Specific issues raised in submissions included:

Kooragang Coal Terminal expansion should be assessed as one with mining proposals (Liddell open-cut extension, Hunter Valley Operations South Project and Drayton extension), since they are currently being assessed and can be reasonably considered as one project.

There needs to be a cumulative and full life-cycle impact study of all coal mining proposals in NSW, together with all the proposals to expand coal export operations.

All coal mining proposals in NSW, together with all proposals to expand operations, should be brought in and assessed under one cumulative and full life-cycle impact study.

The KCT expansion proposal is one part of a larger project, and that the project includes an expansion of coal mining in NSW. As such, the Environmental Assessment for the proposal is flagrantly inadequate, as it fails to address the impacts of more mining in NSW.

Coal mining threatens clean air.

The proposed development will increase coal dust problems associated with mining.

Coal mining threatens visual amenity.

Coal mining threatens biodiversity.

Coal mining threatens sensitive hydrological systems and clean water.

Thorough consideration has not been given to the hydrological impacts of increases in mining activity on the Hunter River and aquifers in the Liverpool Plains.

Thorough consideration has not been given to the social impacts of mining in the Hunter and Liverpool Plains including dislocation, dust and noise.

EA fails to assess full impacts of the loss of community in areas affected by coal mining.

Environmental impacts generated by the mining of extra coal can reasonably be considered to be caused by the construction and operation of the loader itself.

Thorough consideration has not been given to the environmental impacts of mining activities in the Hunter and Gunnedah basin, including:

- **the loss of endangered woodlands in Leard State Forest;**
- **the hydrological impacts of increased mining activity on the Hunter River and aquifers in the Liverpool Plains; and**
- **the social impacts of mining in the Hunter and Liverpool Plains including dislocation, dust and noise.**

Coal mining threatens sensitive hydrological systems, clean water, clean air, biodiversity, precious agricultural production and visual amenities.

The Project does not seek approval for any mining operations and as such, does not assess any new coal mine proposals or expansions. Such proposals are subject to separate environmental assessment processes and any approval requirements being met by the proponents of the specific mining operations.

The EA was prepared in accordance with the Director General's Environmental Assessment Requirements (EARs) issued under Part 3A of the EP&A Act. A checklist of where each of the EARs has been addressed by the EA is included in Section 9.0 of the EA, with the EARs reproduced in full in Appendix 2.

The identification of the key issues for assessment in the EARs necessitated the detailed assessments undertaken as part of the EA. All assessments were undertaken in accordance with relevant guidelines and, in many cases, in accordance with detailed and extensive consultation with relevant authorities.

The Director General (DG) formed the opinion, notified to PWCS by letter dated 15 November 2006, that the EA lodged by PWCS "adequately addressed" the EARs for the Project, as required by Section 75H(2) of the EPA Act.

2.1 Cumulative Impacts

Lack of overall monitoring of the cumulative effects of industrial activities on and around Kooragang Island:

At this stage, there is heavy reliance on self-monitoring for industries and this does not satisfy the community. The increase in capacity for the coal loader will directly affect the overall background of emissions and this fact should not be evaded by the developer.

There is a lack of overall monitoring of the cumulative effects of industrial activities on and around Kooragang Island.

The assessment of potential cumulative impacts associated with the Project and other relevant operations within the surrounding area was a key consideration in the preparation of the EA. Specifically the EA provided detailed cumulative assessments in relation to:

- Noise Assessment (section 6.3.1 of EA); and
- Air Quality (section 6.3.2 of EA).

The cumulative assessment undertaken as part of the EA included the consideration of the contribution of existing and proposed industry within the surrounding Kooragang Island area, including the proposed NCIG coal export terminal.

Where relevant to the Project, the EA assessed potential impacts in relation to the regional setting of the Project. This was specifically undertaken for the Socio-economic assessment (refer to section 6.4.8 of EA).

An aspect of EARs issued for the Project is the assessment of cumulative aspects associated with the Project. As outlined above, the DG formed the opinion, notified to PWCS by letter dated 15 November 2006, that the EA lodged by PWCS "adequately addressed" the EARs for the Project, as required by Section 75H(2) of the EPA Act.

3.0 Coal Industry

A number of submissions raised an objection to the expansion of the coal industry in the Hunter Valley and Australia generally and the role of the proposed Increase to Throughout Capacity of KCT in the continued expansion of the industry. Specific issues raised in submissions included:

Expansion of the PWCS Kooragang terminal will make it more difficult for Newcastle and the Hunter to make the necessary transition away from coal, and will facilitate further damaging mining activities in the Hunter and Gunnedah Basin.

Coal mining and the burning of fossil fuels is not a sustainable global resource of energy. Approval of the development is not moving towards a sustainable future.

It is not in the best interest of the national economy to facilitate coal industry expansion.

Clearly, the NSW Government has a responsibility to both its own constituents, and to the rest of the world, to begin the move away from coal. While it is possibly true that

the NSW coal industry cannot be shut down overnight, it is certainly true that there is an urgent need for a swift and just transition away from coal for NSW, into clean and sustainable alternative industries.

The first step of a transition to move away from coal and towards clean and sustainable alternative technologies is a ban on new coal infrastructure projects in NSW, including new coal export projects, including the proposal to increase the throughput capacity of the Kooragang Coal Terminal. This project must not be approved.

The coal industry has a significant impact on the national economy. In 2004-05, the Australian Treasury reported the mining sector accounted for approximately $43 Billion, or 5 per cent of the Australian GDP (Grant et. al. 2005). For the same period, the Australian Bureau of Agriculture and Resource Economics (ABARE 2006) found that the gross value of Australian coal production was $18.561 Billion and the value of Australian exports of coal was $24.209 Billion.

KCT is the largest coal export terminal in Australia and as such, there are extensive potential economic benefits associated with the Project at a regional, state and national level. As outlined in Section 6.4.8 (p6.24) of the EA, there will be substantial economic benefits as a result of the $78M capital expenditure associated with the Project, including:

- combined (direct and induced) economic benefit of $136M to the region associated with the upgrade aspects of the Project;

- combined (direct and induced) operations benefit of approximately $194M for each financial year of operation at the proposed 120 Mtpa throughput capacity;

- during the upgrade component of the Project, Federal income from increased tax receipts will total approximately $12M, with State government revenue estimated at more than $2M, and a total public sector benefit of approximately $15M; and

- during the operation of KCT at the proposed 120Mtpa throughput capacity, total public sector benefits are estimated as approximately $19M for every financial year of operation, of which approximately $16M will be received by the Federal Government and approximately $3M by the State Government.

In addition to the direct and indirect economic impacts associated with the coal industry within Australia, the coal industry is also integral to supporting the energy generation industry. Fossil fuels (including black and brown coal and gas) accounted for approximately 93% of the electricity generated within Australia in 2004-2005, with renewable energy sources accounting for the remaining 7% (Cuevas-Cubria and Riwoe 2006).

Given the relative abundance of coal within Australia, coal and gas-fired power stations are able to provide a continuous and reliable base load power supply (Roarity 2000). This consistent and reliable base load power supply is essential for industrial, commercial and household use (Roarity 2000). The ability of viable renewable energy sources being able to provide this consistent base source of electricity have led to these sources being seen as being largely supplementary sources for the conventional source of base load power supply (Roarity 2000). Projections of electricity generation within Australia to 2030 indicate that, whilst the proportion of coal will decrease, the proportion of renewables is only predicted to increase slightly to 8% by 2030 (Cuevas-Cubria and Riwoe 2006). As outlined in **Section 12.3** below, the energy consumption and fuel mix trends are consistent with medium term projections of global energy demand, where energy sourced from coal combustion is expected to increase in the period 2005-2025.

Based on current projections and the significant economic contributions of the coal industry, there appears to be relatively little scope to make a broad scale movement away from the coal power generation industry in the short to medium term.

A major expansion of coal exports from Newcastle, which is the purpose of the Project in question, would be pointless if it were not for an increase in rail infrastructure and a commensurate increase in mining activity.

EA fails to acknowledge or assess the inevitable increase in coal mining from the KCT expansion.

As outlined in Section 1.1 (p1.2) of the EA, the continuing international demand for Hunter Valley coal has provided the impetus for the increase in the efficiency of the coal handling and delivery infrastructure and necessitated the proposed increase in throughput capacity of KCT.

The issues raised in submissions in relation to the expansion of the coal industry focus on the perceived role of the Project in driving the expansion of the coal industry within the Hunter Valley. As emphasised in the EA (refer to Section 3.1 [p3.1] of the EA), the key driver for the Project is to respond to the coal industry's projected ongoing increase in international demand for export coal, as outlined below.

It is expected that Hunter Valley coal exports will continue to grow beyond the current capacity of the coal chain, requiring the provision of additional capacity. This anticipated growth is projected, considering:

- PWCS Customers have provided binding commitments for future coal shipments, which exceed the current combined approved capacity of 102 Mtpa for both PWCS Carrington and Kooragang Terminals.

- The ABARE, the Commonwealth government economic research agency, has predicted that international demand for Hunter Valley coal will maintain a strong level of growth in the medium term. In its study on *Infrastructure Issues in the Hunter Valley Coal Supply Chain* (ABARE 2005), ABARE forecasts that potential demand for coal from the Hunter Valley will increase at an annual rate of 2.8%, to reach 122 Mtpa in 2015.

- In addition, ABARE forecasts that international demand could drive Hunter Valley coal producers to supply between 130 Mtpa and 200 Mtpa by 2015, dependent on international coal prices and if unconstrained by coal chain capacity. At a national level, constraints in coal transport and handling infrastructure in NSW and QLD in recent years have limited, to some extent, Australia's ability to respond to strong growth in world thermal coal demand (ABARE 2006). Therefore, the ability to meet continuing international demand for Hunter Valley coal is dependent on the capacity of the coal transport system.

- The ARTC has recently commenced a 60 year lease of the interstate and Hunter Valley rail lines within NSW. ARTC has developed the 2006-2011 *Hunter Valley Coal Chain Capacity Improvement Strategy* (ARTC 2006), based on industry forecasts for total coal demand on the Hunter Valley network. These forecasts, although different to ABARE's, indicate that demand will increase to approximately 133 Mtpa in 2009 and 145 Mtpa in 2011. The forecasts presented by ARTC are also dependent on minimal constraints to coal production and the capacity of the coal transport system. The proposed infrastructure improvement strategy is supported by a $375 million (ARTC 2006) Commonwealth funding package, to enhance the capacity of the existing rail system.

With the anticipated further development of coalfields in the Hunter Valley and Gunnedah basin, there will be a significant increase in the production of export coal. This extra supply of export coal indicates that higher forecast tonnages are likely to eventuate, increasing the need for coal handling and export services in the Port of Newcastle.

The Project will accommodate the anticipated growth in demand for PWCS' export coal loading capacity, which will be needed to meet the requirements of the coal export industry.

4.0 Air Quality

There is a lack of information about the amount and size of TSP's coming from the coal loader. In order to assess the overall health impact to the community, it is necessary to know where in the course of coal operations the particulates are coming from (e.g. transport, stockpiles, shiploading).

As outlined in Section 6.3.2.1 (p6.15) of the EA, dust concentration refers to airborne dust and is measured in micrograms per cubic metre ($\mu g/m^3$). Relevant criteria for dust concentration are defined in terms of two classes, total suspended particulates (TSP) and PM_{10}. TSP relates to all suspended particles, which are usually in the size range of zero to 50 micrometres (µm). Particle sizes larger than 50 µm are typically measured in dust deposition levels. The human respiratory system has in-built defensive systems that prevent particles larger than approximately 10 µm from reaching the more sensitive parts of the respiratory system. PM_{10} refers to particulate matter with a diameter less than 10 µm.

The approach to air quality assessment undertaken as part of the EA (refer to Section 6.3.2 (p6.15) of the EA) applies emission factors developed both locally and by the US EPA, derived from predictive equations to specify dust emissions associated with various components of the operation. This approach enables the analysis of the contribution of the operational components of KCT at approved (77 Mtpa) and proposed (120 Mtpa) throughput capacities.

The comprehensive air quality impact assessment (refer to Section 6.3.2 (p6.15) and Appendix 5 of the EA) included the prediction of dust emissions resulting from the Project, which included the contribution of all relevant components of KCT operations (refer to **Table 1**).

Table 1 – Estimated Project Dust Emissions Inventory (included as Table 6.18 (p6.18) of the EA)

Activity	Annual TSP (kg/y)	
	77 Mtpa scenario	120 Mtpa scenario
Trains unloading to unloading station[1]	7509	11702
1st transfer between unloading station and stockpiles[1]	7509	11702
2nd transfer between unloading station and stockpiles[2]	7509	11702
Stacking to coal stockpiles	25029	39006
Reclaiming coal from stockpiles	21224	33077
1st transfer between stockpile and shiploader[2]	6367	9923
2nd transfer between stockpile and shiploader[2]	6367	9923
Transfer to buffer bins (enclosed)	0	0
3rd transfer between stockpile and shiploader	21224	33077
Loading coal to ships	6367	9923
Wind erosion from stockpiles and exposed areas	197722	197722
Diesel train exhausts	894	894
Annual throughput (t)	**77,000,000**	**120,000,000**
TOTAL DUST (kg)	**307,721**	**368,650**

[1] Activity takes places underground – control factor applied for emission calculation purposes
[2] Activity within an enclosed building – control factor applied for emission calculation purposes

As concluded by the comprehensive air quality assessment, all predicted air quality impacts associated with the Project will remain within relevant air quality limits. As outlined in the Part A Response to Submissions, this conclusion of the comprehensive air quality assessment was specifically acknowledged on the Department of Environment and Conservation (DEC) submission.

As outlined in Section 7.0 of the EA (p7.3) PWCS has committed to the continuation of the of air quality monitoring, in accordance with the existing Stage 3 development consent conditions and the associated dust monitoring program, developed in consultation with the DEC and Newcastle City Council (NCC).

5.0 Biodiversity

EA fails to assess full impacts of destruction of threatened species habitat and biodiversity corridors.

As outlined in Section 6.4.5 (p6.22) of the EA, the KCT Stage 3 Expansion EIS (ERM Mitchell McCotter 1996) undertook a detailed ecological assessment. All relevant ecology considerations were taken into account during the EIS process and subsequent development consent requirements for the Stage 3 Expansion. While the proposed project will increase the capacity of the KCT, there will be no alteration to the approved footprint in any way.

Furthermore, as discussed in Section 6.4.5.2 of the EA, as a consequence of marginal dust impacts and no predicted increase in off-site noise impacts, there are no expected indirect impacts on fauna habitat in the adjacent Kooragang Nature Reserve. Similarly, the current water management system will not be changed, which provides adequate protection from potential water quality impacts on the wetland system.

Therefore, there are no adverse aquatic, wetland or terrestrial ecology impacts associated with the proposed Project.

6.0 Water Management

Water use on site should be constantly monitored and every effort made to reduce the amount consumed.

As outlined in Section 2.3.3 of the EA (p2.4), the current water management system operates to collect water from operational activities and to harvest storm water for recycling. All areas of the plant, including the wharf, capture water and channel it back to settling ponds for clarification, prior to being held in storage ponds for re-use.

Potable water supplies from the Hunter Water Corporation for dust suppression are used on a supplementary basis, to account for supply shortages from the reuse of storm water and wash down water harvested from the site.

As stated in Section 6.4.1 of the EA (p6.20), it is anticipated that with the proposed increased volume of coal throughput, there will be an increase in water usage. With the proposed additional 43 Mtpa of coal passing through the terminal, an estimated further 43 ML of water per year will be required. This will take the total consumption of water from the Hunter Water Corporation for KCT to a maximum of 393 ML/year.

Additional supplies will be sought from Hunter Water Corporation whilst PWCS continues to investigate opportunities to make greater use of recycled water across the site and investigate alternate sources of water supply. Ongoing consultation with Hunter Water is currently required under the existing Stage 3 conditions of consent which state:

The Applicant shall continue discussions with Hunter Water Corporation or other appropriate bodies regarding the possible use of treated wastewater for dust suppression or other purposes on the site.

The feasibility of providing commercially viable recycled water to Kooragang Island is currently being investigated by Hunter Water Corporation, and to this end PWCS will continue to participate in discussions with Hunter Water Corporation with a view of using more recycled water, pending the outcomes of Hunter Water Corporation Kooragang Island feasibility investigation.

EA fails to assess full impacts of damage to and destruction of surface waterways and aquifers.

As outlined in Section 3.2 (p3.2) of the EA, the Project will not involve any change to the approved footprint or approved facilities of KCT. All works involved in achieving the capacity increase are either optimised design for currently approved drives and conveyors, or retrofitting these with higher capacity components.

As such, the Project will not result in any impacts on surrounding waterways and aquifer systems above the approved Stage 3 expansion of KCT. As the Project will not alter the approved footprint of KCT, the current approved water management system will not be altered.

As outlined in Section 2.3.3 (p2.4) of the EA, PWCS has established a totally closed water management system to meet the design requirement of a 1 in 100 year design storm event or equivalent. The water management system operates to collect water from operational activities and to harvest storm water for recycling. All areas of the plant, including the wharf, capture water and channel it back to settling ponds for clarification prior to being held in storage ponds for re-use.

In the event of the design storm event or equivalent in periods of prolonged wet weather being exceeded, overflows are controlled within an existing storm water channel, which provides a vegetated flow path to the North Arm of the Hunter River. The location of the rail loop embankment between the storm water channel and the adjacent Kooragang Nature Reserve provides a barrier to protect the Kooragang Nature Reserve in the unlikely event that the capacity of the storm water channel is exceeded.

7.0 Transport

EA fails to acknowledge increases in capacity will require increases in all parts of the production and transport systems.

Similar to the issues addressed in **Section 3.0**, this issue focuses on the perceived role of the project in driving the expansion of the coal industry within the Hunter Valley. As stated previously, the continuing international demand for Hunter Valley coal has provided the impetus for the increase in the efficiency of the coal handling and delivery infrastructure and necessitated the proposed increase in throughput capacity of KCT.

Notwithstanding this, it is acknowledged that KCT is only one component of the Hunter Valley Coal Logistics Chain, and other aspects of this transport chain will need to increase capacity in response to continued growth of coal exports.

The present capacity (prior to the recent completion of the Sandgate Grade Separation Project) of the Main Northern Line system into the Port of Newcastle is approximately 85 Mtpa, with industry forecasts indicating a projected increase in demand to approximately 145 Mtpa by 2011 (ARTC 2006). ARTC (2006) has developed the 2006-2011 *Hunter Valley Coal Chain Improvement Strategy,* which specifies a number of specific strategies to enhance the capacity, safety and reliability of the rail system to meet projected demand.

Specific strategies include works to address junction conflicts and increased congestion along the rail system south of Whittingham, which will improve train movements and ultimately increase the capacity of the rail network in the short to medium term. The ARTC has recently completed the Sandgate Grade Separation Project, which will allow the removal of conflicts between coal trains and other rail users and has increased the current coal capacity of the Hunter Valley Rail line to approximately 115 Mtpa (ARTC 2006).

The proposed infrastructure improvement strategy proposed by the ARTC is underlain by a $375M Commonwealth funding package to enhance the capacity of the existing rail system.

As outlined in Section 6.3.1.6 (p6.10) of the EA, the upgrades referred to in the ARTC publications would be subject to a public environmental assessment process under the *Environmental Planning and Assessment Act* 1979 and ultimately, regulation by the DEC via an Environmental Protection Licence.

The increase in the throughput capacity of KCT operations as a result of the Project will require an increased number of ships utilising KCT. The Project will increase coal shipping

traffic through the Port of Newcastle to approximately 1300 vessels per year (or 3 – 4 per day), which represents an increase of 380 vessels per year (or 1 per day) over ship movements at the current throughput capacity of KCT. Consultation with the Newcastle Port Corporation (NPC) by PWCS has confirmed that sufficient navigational capacity is available for the additional shipping and that marine safety would not be jeopardised as a result of the Project.

The NPC is responsible for the management of maritime incidents in the Port. It has conducted appropriate maritime oil spill response training and has a detailed environmental management plan and an environmental procedures manual in place.

Increased shipping in the Port of Newcastle is concerning for residents due to rises in traffic volumes and overall emission increases.

As outlined above, the increase in throughput capacity of KCT operations as a result of the proposed Project will require an increased number of ships utilising KCT. As outlined in Section 6.4.3 (p6.21) of the EA, the proposed increase in shipping traffic through the Port of Newcastle would represent 380 vessels per year, equating to 1 per day, over current ship movements. The Newcastle Port Corporation (NPC) has confirmed sufficient navigational capacity is available for the additional shipping and that marine safety would not be jeopardised as a result of the Project.

In addition, PWCS has undertaken an assessment of the greenhouse gas emissions associated with the shipping of coal from KCT to overseas ports. This assessment is provided in **Section 12.0**.

PWCS could allay fears regarding increased shipping traffic by publishing a warning of changed conditions during construction in local newspapers, such as the *Stockton Messenger* and the *Medowie Murmurs*, and include a phone number to be used by the public.

PWCS will issue notices within the Stockton Messenger and Medowie Murmurs with updates on construction activities associated with the Project. PWCS currently has in place a 24-Hour Community Enquiry line 02 49072280 and this will be maintained throughout the Project.

8.0 Ecologically Sustainable Development (ESD)

EA fails to pay sufficient regard to the principles of ESD, as required under the *Environmental Planning and Assessment Act 1979*.

The Precautionary Principle has not been considered adequately.

Intergenerational equity has not been assessed adequately.

This issue has been previously addressed in the Part A Response to Submissions in response to a similar issue raised in the submission by NCC. The Part A Response to Submissions includes an assessment of the Project in relation to the principles of ESD, including a consideration of the precautionary principle and intergenerational equity.

9.0 Economic Impacts

Potential economic benefits reported including 820 full time regional positions in each year of full capacity operation are too hard to substantiate or believe.

As outlined in Section 6.4.8 (p6.24) of the EA, the socio-economic assessment undertaken as part of the EA is based on the regional socio-economic impacts associated with the Project. KCT is the largest coal export terminal in Australia and as such, there are extensive socio-economic benefits associated with the Project at a regional, state and national level.

As part of this assessment, the Hunter Valley Research Foundation (HVRF) developed an Input-Output (I-O) model for the Project based on 29 regional economic sectors (refer to Appendix 7 of the EA). The analysis essentially identifies and evaluates linkages between sectors in the regional economy. The analysis is made in terms of the direct (or initial) impacts of the final expenditure on the regional economy, and the induced (or flow-on) impacts, as all sectors provide inputs to enable the final project completion. The impacts are quantified, using multiplier coefficients derived from the model, in terms of the value of the goods and services and the number of jobs which result from production of the specified good or service and the expenditure of salaries and other income earned, due to that production within the region.

The assessment specifically determined the regional socio-economic impacts associated with the upgrade (i.e. the expenditure required to increase throughput capacity) and subsequent operational aspects of the Project in relation to direct and induced regional production and consumption, employment impacts and increased state and federal revenue through additional taxation receipts.

As outlined the EA, (refer to Table 5 of Appendix 7 of the EA), the Project will result in the creation of approximately 820 jobs within the region for each year of operation at 120Mtpa throughput capacity, which includes the creation of 440 jobs directly associated with the Project and an additional 382 jobs from induced production and consumption within the region.

As noted in the EA, (refer to Section 6.4.8 (p6.25)of the EA), the regional employment impacts outlined above do not relate to the employment at KCT. Although there will be a workforce of approximately 50 people at times associated with the upgrade of KCT, this will be consistent with existing maintenance activities and employment levels will remain largely unchanged during the operational phases of the Project

10.0 Social Impacts

It is not in the best interest of the social environment to facilitate coal industry expansion.

There are extensive socio-economic benefits associated with the Project. As outlined above, the socio-economic analysis, (refer to Section 6.4.8 (p6.24) and Appendix 7 of the EA), predicts region wide socio-economic impacts resulting from the upgrade and operational aspects of the Project, including estimated regional employment generation by sector.

The most significant socio-economic impacts associated with the Project relate to employment impacts as a consequence of the upgrade and operational aspects of the Project. As outlined in Section 6.4.8 (p6.25) of the EA, regional employment impacts associated with the Project include:

- the creation of approximately 330 jobs within the region during the capacity increase period, which includes 191 equivalent full-time positions and an additional 141 jobs created by direct and induced production and consumption within the region. The majority of the employment growth will occur within fabricated metals product, miscellaneous manufactured products and construction sectors of the economy; and

- the creation of approximately 820 jobs within the region for each year of operation at 120 Mtpa throughput capacity, which includes the creation of 440 jobs directly associated with the Project and an additional 382 jobs from induced production and consumption within the region.

11.0 Community Consultation

A 24 hour, 7 days complaint line should be made available to the public.

PWCS have in place a 24 hour Community Enquiry line, 02 49072280 and this will be maintained throughout the Project.

12.0 Greenhouse Gas Emissions

12.1 Assessment Methodology

GHG Assessment fails to account for all relevant Scope 3 emissions.

EA fails to account for cumulative impacts of the GHG emissions arising from the project.

Environmental assessments for major projects must include thorough greenhouse gas assessments of downstream emissions.

A greenhouse gas and energy assessment was undertaken as part of the EA (refer to Section 6.4.4 (p6.21) and Appendix 6 of the EA) which provided an assessment of indirect emissions associated with electricity use at KCT and small amounts of direct emissions associated with diesel and petrol use on site. This assessment was based upon the methodologies outlined in:

- the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) Greenhouse Gas Protocol 2004 (GHG Protocol);

- the Australian Greenhouse Office (AGO) Factors and Methods Workbook December 2005 (Workbook) (AGO Workbook); and

- the draft NSW Energy and Greenhouse Guidelines (EIA Guidelines) for Environmental Impact Assessment, Sustainable Energy Development Authority and Planning NSW, 2002 (Draft NSW EIA Guidelines).

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions by entities. Under the GHG Protocol, the establishment of operational boundaries involves identifying emissions associated with an entity's operations, categorising them as

direct or indirect emissions, and identifying the scope of accounting and reporting for indirect emissions.

Three "Scopes" of emissions (Scope 1, Scope 2, and Scope 3) are defined for GHG accounting and reporting purposes. These scopes are briefly outlined below:

Scope 1 emissions refer to direct emissions associated with a development. Direct GHG emissions are defined as those emissions that occur from sources that are owned or controlled by the entity. Direct GHG emissions are those emissions that are principally the result of the following types of activities undertaken by an entity:

- generation of electricity, heat, or steam. These emissions result from combustion of fuels in stationary sources, e.g., boilers, furnaces, turbines;

- physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g.: the manufacture of cement, aluminium, adipic acid and ammonia, or waste processing;

- transportation of materials, products, waste, and employees. These emissions result from the combustion of fuels in entity owned/controlled mobile combustion sources, e.g. trucks, trains, ships, aeroplanes, buses and cars; and

- fugitive emissions. These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; HFC emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport.

Scope 2 emissions are a category of indirect emissions that accounts for GHG emissions from the generation of purchased electricity consumed by the entity.

Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity. Scope 2 emissions physically occur at the facility where electricity is generated. Entities report the emissions from the generation of purchased electricity that is consumed in its owned or controlled equipment or operations as Scope 2.

Under the GHG Protocol, Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions.

Scope 3 emissions are defined as those emissions that are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 activities provided in the GHG Protocol are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

In order to achieve a harmonisation of the international reporting of GHG emissions, the AGO Workbook (December 2005 version) and the EIA Guidelines have adopted the emissions categories outlined in the GHG Protocol. In this context, both the AGO workbook and EIA guidelines provide that the scope of emissions that are reported by an entity including both direct (Scope 1) and indirect emissions from a project (Scope 2 and Scope 3 emissions).

In addition, the EIA Guidelines also define reporting boundaries for a particular project. These boundaries are not physical, but related to the extent to which emissions are associated with "upstream" and "downstream" components of a project and its products. The

EIA guidelines consider 'upstream' components to include essential inputs to a project including materials, plant and equipment, whilst 'downstream' include outputs of the project, including the use of products or waste or the implications in terms of induced use of products, infrastructure or services.

The current policy framework has historically regarded the assessment and reporting of Scope 3 emissions to be optional and only to be included along with Scope 1 and Scope 2 emissions, where an organisation believes that Scope 3 emissions are a significant component of the total emissions inventory. In addition, the EIA guidelines specify that the application of 'upstream' and 'downstream' project boundaries should be considered on a case by case basis.

Recent interpretations of the application of GHG assessment to the EIA process has indicated that where a project has a direct link to the contribution of GHG emissions beyond its immediate boundaries, these emissions need to be included in the GHG assessment.

To date, the NSW government has not developed policy to further define the application of the assessment of indirect GHG emissions on a project-by-project basis. In this context, it is considered that the Project will result in the generation of indirect GHG emissions associated with the burning of diesel fuel in the transport of coal by trains to KCT and through the shipping of coal from KCT to overseas ports. As such, the assessment of indirect downstream GHG emissions have been undertaken and included in **Appendix 1**.

In addition, the greenhouse gas assessment included in **Appendix 1** also assesses the greenhouse gas emissions associated with the end use of coal handled by KCT. It is important to note that KCT is not a producer of coal, but a link in the transport and handling chain. As outlined in **Section 3.0** above, the continuing international demand for Hunter Valley coal is the key driver for the increase in the efficiency of the coal handling and delivery infrastructure and necessitated the proposed increase in throughput capacity of KCT.

It should be acknowledged that there are a range of practical implications of the assessment of indirect GHG emissions, particularly in relation to the issue of double counting of emissions and the assumptions underlying the assessment of indirect emissions. The GHG Protocol specifically acknowledges the importance of the avoidance of double counting of GHG emissions. For instance, at an international scale, double counting needs to be avoided when compiling national (country) inventories, under the Kyoto Protocol. The limitations of the assessment of indirect emissions in relation to double counting of emissions should be taken into account in the interpretation of this assessment.

The interpretation of indirect GHG assessments needs to acknowledge the limitations imposed by the assumptions upon which the assessment is based. For instance, this assessment assumes the management of indirect GHG emissions resulting from the Project will be managed by relevant international, domestic and project specific regulations of each of the potential end users. In addition, there is no allowance for the use of clean technology initiatives or other abatement measures at sources of indirect emissions.

Additionally PWCS does not have control over the management of indirect greenhouse gas emissions beyond the boundary of KCT. In the context of the Project this is a significant limitation to mitigation of indirect emissions by KCT, particularly as emissions associated with shipping exported coal to overseas ports and the end use of coal account for the majority of indirect greenhouse gas emissions.

12.2 Greenhouse Gas Emissions

GHG emissions will increase as a result of proposed throughput increases if the expansion is approved, which is equivalent to doubling NSW domestic emissions from electricity, transport and mining.

GHG emissions will rise – "it would result in 100 million tonnes of greenhouse pollution every year, equivalent to doubling NSW emissions from power generation, transport and mining".

As outlined in **Section 12.1** the greenhouse gas assessment (refer to **Appendix 1**) includes an assessment of all relevant Scope 1 and Scope 2 emissions, including on site diesel use and indirect emissions associated with electricity use at KCT, and Scope 3 emissions associated with the burning of diesel fuel in the transport of coal by trains to KCT and through the shipping of coal from KCT to overseas ports. In addition, the greenhouse gas assessment (refer to **Appendix 1**), also included a consideration for the greenhouse gas emissions associated with the end use of coal overseas for both power generation and steel production.

The Scope 1, 2 and 3 Greenhouse Gas and Energy Assessment for the Project has found that:

a) the Scope 1 and 2 greenhouse emissions from the Project have been estimated at approximately 32,322 TCO_2e per annum from the additional 43 Mtpa of coal handled. Scope 3 greenhouse emissions from diesel, petrol and electricity use by the KCT Project has been estimated at approximately 6,346 TCO_2e per annum from the additional 43 Mtpa of coal handled. The 38,688 TCO_2e represents in total approximately 0.007% of the Australian annual GHG emission rate;

b) the Scope 3 greenhouse emissions from coal transport have been estimated at approximately 946,991 TCO_2e per annum from the additional 43 Mtpa of coal handled. This represents in total about 0.168% of the Australian annual GHG emission rate; and

c) the Scope 3 greenhouse emissions from the end use of the additional 43 Mtpa of coal handled by the project would produce approximately 116,689,203 TCO2e per annum. This is equivalent to 0.278% of annual global GHG emissions. [Total annual global emissions in 2000 have been estimated at approximately 42,000,000,000 T CO2-e. (Stern, 2006, p.170)].

As indicated above, the annual Scope 1, 2 and 3 greenhouse emissions from the 43 Mtpa net increase in coal handled by the Project represents only 0.17% of Australia's total greenhouse emissions of 564,700,000 TCO_2e in 2004 (AGO, 2006).

Additionally, given that all of the KCT coal throughput will be utilised overseas, it is appropriate to evaluate the greenhouse gas emissions from the utilisation of coal on a global scale. As indicated above, the greenhouse emissions from the end use of the additional 43 Mtpa of coal handled by the project are equivalent to 0.278% of annual global GHG emissions.

12.3 Climate Change Impacts

Climate change would be enhanced if the project was approved.

Specifically, the EA must include an assessment of the climate change caused by the burning of the coal after it is sold.

Climate change impacts will have a direct impact on human health. Human health around the world will be threatened as warmer temperatures spread disease.

As discussed in Umwelt (2006), the weight of scientific opinion supports the generally held view that the world is warming due to the release of emissions of carbon dioxide and other GHGs from human activities, including industrial processes, fossil fuel combustion, and changes in land use, such as deforestation (Pew Center 2006).

The Earth has warmed by 0.6º (plus or minus 0.2ºC) on average since 1900 (CSIRO 2001). This warming is predicted to have environmental consequences for the world apart from the fact of average temperature increase itself. It is predicted that a continuation of historical trends of GHG emissions will result in additional warming over the 21st century, with current projections of a global increase of between 1.4ºC to 5.8ºC by 2100 (NSW Greenhouse Office 2005). The environmental consequences of such a temperature rise are less certain, but is likely to include additional sea-level rise (due to polar ice cap melting), changes in precipitation patterns, increased risk of droughts and floods, threats to biodiversity and a number of potential challenges for public health (NSW Greenhouse Office 2005).

On a national scale a number of potential climate change impacts have been predicted for Australia including:

- In Australia, the climate has been projected to become warmer and drier, with warming projected to be approximately 0.4° to 2°C over most of the continent by 2030 (NSW Greenhouse Office 2005). There is also projected to be more variation in rainfall patterns. Where average rainfall increases, there are likely to be more extremely wet years, and where average rainfall decreases, more droughts are anticipated. Less snowfall and greater fire risk are also likely.

- Australian research has predicted that the bio-climates of some species of plants and vertebrates will disappear with a warming of just 0.5-1.0°C (Australian Greenhouse Office 2005b). Warmer conditions associated with climate change have contributed to the movement of many animals and plants. Rapid warming and other stresses, such as habitat destruction, could possibly lead to extinctions of some species (Australian Greenhouse Office 2005b).

- Sea-level rise will have impacts on soft sediment shorelines and intertidal ecosystems, which will be especially vulnerable to change with additional impacts from extreme events. Low-lying coastal terrain may become inundated, beaches eroded, coastal infrastructure damaged or destroyed, and people injured or killed. Warmer ocean waters and sediment transport following heavy rainfall will affect fisheries and coastal ecosystems (CSIRO 2001)

- A 2 ºC rise in temperature in Australia would be likely to have a number of negative environmental impacts, such as the regular bleaching of near-shore coral reefs and a reduction in the total area in which some plants and animals naturally occur, particularly in the Southern Alps. Above a 2 ºC rise, the risk of more severe impacts becomes high, including a 12-25% reduction in river flow in the Murray Darling Basin (Australian Greenhouse Office 2005b).

If the full fuel cycle GHG emissions of the Project are considered, the direct and indirect emissions (including the end use of coal) from the Project equates to 0.28% of global GHG emissions. Although insignificant in a global context, it may be argued that the GHG emissions may contribute to climate change. However, in assessing any impact there must be consideration of the benefits bought by the Project. A range of benefits including national, state and local economic and employment impacts are discussed in the EA. There are other benefits to the global community through the provision of energy to assist in developing countries and to maintenance of quality of life in other countries. Energy is supplied to meet market demand and both Australian and global energy demand predictions are that there is continuous growth in energy demand into the future.

ABARE has recently calculated that total world energy consumption is projected to increase at an average rate of 2 per cent a year between 2005 and 2025. Asia is expected to account for much of the increase in world energy consumption (NSW Government 2004).

Over this period, while growth in consumption of non-fossil fuel sources of energy will be strong, with renewable, nuclear and hydroelectricity technologies growing at average annual rates of 6.6 per cent, 1.3 per cent and 2.4 per cent respectively between 2005 and 2025, growth in world coal consumption is projected to grow at an average annual rate of 2.1 per cent between 2005 and 2025. As a result of these trends, coal's share in the global energy mix is projected to rise slightly from 27.8 per cent to 28.1 per cent over the period 2005–25 (NSW Government 2004).

In parallel with growing energy consumption, world black coal consumption is projected to increase by 2.1 per cent a year between 2005 and 2025 to reach 7.5 billion tonnes in 2025. Thermal coal is projected to account for 81 per cent of the increase in coal consumption worldwide, growing at an average annual rate of 2.1 per cent. This growth is driven largely by significant growth in coal consumption for electricity generation in the developing Asian region, primarily in China, India and the ASEAN region (NSW Government 2004).

Growth in global coal consumption over the period to 2025 will be influenced by a number of key drivers, including economic growth and changes in the pattern of output, population trends, fuel choices made by individual economies to meet their future energy needs, and relative price movements of competing fuels (NSW Government 2004).

In the current policy context and with the predicted growth in global demand for export coal and the abundance of black coal reserves in NSW, Queensland and elsewhere in the world, it is certain that if the increase to capacity throughput of KCT was not developed, the demand for coal would be met by another project either in NSW or in Queensland, or from overseas without any reduction in global greenhouse gas emissions.

12.4 Greenhouse Gas Management

The money spent on the expansion should be changed to developing renewable energy in the Hunter Valley and exporting renewable energy technology overseas. China wants to have energy resourced by renewables to 15% of energy used by 2020.

A percentage of profits made by PWCS should be put in a fund for exploration of alternative sustainable technologies that will reduce the effects of coal's current contribution to global warming.

As outlined in the greenhouse gas assessment (refer to **Section 7** of **Appendix 1**), PWCS will assess and implement, where benefits are identifiable, energy and greenhouse management initiatives during the Project. Some of the opportunities for improving energy

efficiency and reducing greenhouse emissions from the Project are discussed below. KCT greenhouse mitigation measures are largely focused on energy management and energy efficiency, in particular, the efficient plant and equipment and optimisation of existing operations. Whilst emissions from the transport of coal are outside the control of PWCS, PWCS will cooperate with transport operators in implementing ways of reducing their emissions.

PWCS is therefore assessing the viability of the following energy and greenhouse mitigation measures for the Project:

- Review energy efficiency in plant and equipment procurement – consideration to be given to the life cycle cost advantages obtained by using energy efficient components.

- Review the opportunity to install additional sub metering for offices, workshops, conveyors, stackers and reclaimers.

- Review operational initiatives such as turning off idle plant and equipment.

- Review control and temperature settings for air conditioning units in offices and switchrooms.

- Review automatic control of lighting.

- Review potential energy efficiency opportunities in water pumping and dust suppression systems eg variable speed drive pumps.

- Review changes in power consumption with installation of new equipment and install power factor correction equipment to suit.

- PWCS will review with Pacific National and Queensland Rail possible ways of reducing the diesel used in transporting coal to KCT.

- PWCS will review with shipping companies possible ways of reducing the diesel used in transporting coal from KCT to the export destination.

The objective of these measures is to seek further opportunities to reduce greenhouse gas emissions.

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APPENDIX 1

Scope 1, 2 & 3 Energy and Greenhouse Assessment

FINAL

SCOPE 1, 2 AND 3 GREENHOUSE GAS AND ENERGY ASSESSMENT

FOR

KOORAGANG COAL TERMINAL PROJECT

BY

SEE SUSTAINABILITY CONSULTING

JANUARY 2007

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1. Introduction

As part of the Environmental Assessment for the Kooragang Coal Terminal (Proposed Increase to Capacity Throughput) Project (the Project), a Greenhouse Gas and Energy Assessment was prepared for the Project. Port Waratah Coal Services (PWCS) is seeking approval to increase the throughput capacity of the Kooragang Coal Terminal (KCT) from its present approved capacity of 77 million tonnes per annum (Mtpa) to a nominal 120 Mtpa, an increase of up to 43 Mtpa.

This subsequent assessment of Scope 1, 2 and 3 greenhouse emissions has been prepared in response to submissions received during the Environmental Assessment exhibition period. This assessment reviews the main sources of greenhouse gases from KCT including:

- direct emissions of $CO_2$from the combustion of petrol and diesel (Scope 1)
- indirect emissions of CO_2 from the consumption of electricity (Scope 2)
- indirect emissions of CO_2 from the combustion of diesel for coal transport to and from KCT (Scope 3) and
- indirect emissions of CO_2 from the end use of coal handled by KCT eg for combustion in overseas power generation and steel production plants (Scope 3).

The Scope 1, 2 and 3 Greenhouse Gas and Energy Assessment report for the project includes:

1. An assessment of the energy and greenhouse gas emissions from the Project in accordance with recognised assessment guidelines;
2. Calculation of energy consumption and greenhouse gas emissions for the Project for various operational scenarios, and
3. Calculation of the emissions from the combustion of the coal handled by the Project.

The greenhouse assessment is based upon the methodologies outlined in:

- the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) *Greenhouse Gas Protocol* 2004 (GHG Protocol) and
- the Australian Greenhouse Office (AGO) *Factors and Methods Workbook December 2006 (Workbook)*.

The Scope 1, 2 and 3 Greenhouse Gas and Energy Assessment has also been prepared having regard to the NSW Greenhouse Plan produced by the NSW Greenhouse Office.

The Scope 1, 2 and 3 Greenhouse Gas and Energy Assessment has been prepared using information provided by PWCS regarding:

- estimated annual coal handling schedules
- estimated annual electricity consumption
- estimated on site annual petrol and diesel consumption
- estimated coal production locations and transport distances and
- estimated coal export destination and transport distances.

2. Energy and Greenhouse Emissions

This section provides an assessment of the energy consumption and greenhouse gas emissions for the Project.

Scope of Emissions Inventory

The abovementioned guidelines define three "scopes" of emissions categories for a project:

- **Scope 1** covers *direct* emissions from the combustion of fuels (e.g. diesel) and industrial processes within the boundary of the operation
- **Scope 2** covers *indirect* emissions from the operation's consumption of purchased electricity produced by another organisation.
- **Scope 3** includes other *indirect* emissions as a result of the operation's activities that are not from sources owned or controlled by the organisation (for example, product transport by sea).

Direct emissions are produced from sources within the boundary of an operation as a direct result of its activities e.g. combustion of diesel fuels in product handling.

Indirect emissions are produced outside the boundary of the operation by other organisations but are directly linked to the operation's activities. Indirect emissions mainly result from the generation of electricity consumed by the operation. It is usual industry practice that the emissions resulting from the end use of the coal handled by the Project are not included in this type of assessment as the end use emissions are assessed separately under the project assessment and approval process for that activity. It should also be noted that KCT is not a coal producer but a link in the transport and handling chain. Nevertheless, **Table 1.3, 1.4 and 1.5** includes an assessment of the emissions resulting from the end use of the coal handled by the Project.

The term "operation's activities" refers to the activities associated with the Project that occur within the Project Area.

Scope 3 emissions for diesel, petrol, electricity consumed by the operation and emissions from rail and sea transport of coal have been included in the inventory calculation for the Project. The World Business Council for Sustainable Development and World Resources Institute *Greenhouse Gas Protocol* 2004 considers the reporting of Scope 3 emissions to be optional. If an organisation believes that Scope 3 emissions are a significant component of the total emissions inventory, these can be reported along with Scope 1 and 2. However, it should be noted that reporting Scope 3 emissions can result in double counting of emissions and can also make comparisons between organisations and/or projects difficult because reporting is voluntary. Despite the KCT Project not controlling Scope 3 emissions such as those from coal transport or coal combustion, the assessment of Scope 3 emissions have been included in the tables below.

An assessment of the Scope 1, Scope 2 and Scope 3 energy and greenhouse gas emissions from the Project was undertaken for the approved (77Mtpa) and proposed (120Mtpa) throughput capacities and the net increase in throughput of 43 Mtpa.

Consistent with the methodologies previously described, Scope 3 emissions not included in the greenhouse inventory for the assessment are:

- disposal of waste generated;
- disposal (end of life) of products sold;
- employee business travel;
- employees commuting to and from work;
- extraction, production and transport of other purchased materials and goods;
- out sourced activities; and
- transport of materials and waste off site.

(AGO, 2006, p.3)

The estimated energy and GHG emissions for the Project based on operational scenarios are shown in **Tables 1.1** and **1.2** below.

Table 1.1 KCT Project Annual Scope 1, 2 & 3 Energy Usage Estimate (excluding end use of the coal)

Throughput Capacity	Coal Handled Tonnes	Energy Content of Coal (GJ)	Emissions Source	Scope 1 Usage	Scope 2 Usage	Scope 3 Usage	Units	Energy Content/Unit	Total Energy in GJ	% of Energy	GJ/T Coal Handled
Currently Approved	77,000,000	2,093,360,500	Diesel (Automotive)	10		48,510	kL	38.6	1,872,872	7.6%	0.024
			Petrol	110			kL	34.2	3,762	0.0%	0.000
			Diesel (Marine)			569,015	kL	39.6	22,532,998	90.9%	0.293
			Electricity		107,427,717		kWh	0.0036	386,740	1.6%	0.005
			Total						**24,796,372**	**100.0%**	**0.322**
Proposed	120,000,000	3,262,380,000	Diesel (Automotive)	10		75,600	kL	38.6	2,918,546	7.6%	0.024
			Petrol	110			kL	34.2	3,762	0.0%	0.000
			Diesel (Marine)			886,777	kL	39.6	35,116,360	91.1%	0.293
			Electricity		143,299,804		kWh	0.0036	515,879	1.3%	0.004
			Total						**38,554,548**	**100.0%**	**0.321**
Increased Throughput	43,000,000	1,169,019,500	Diesel (Automotive)	10		27,090	kL	38.6	1,046,060	7.6%	0.024
			Petrol	110			kL	34.2	3,762	0.0%	0.000
			Diesel (Marine)			317,762	kL	39.6	12,583,362	91.4%	0.293
			Electricity		35,872,087		kWh	0.0036	129,140	0.9%	0.003
			Total						**13,762,324**	**100.0%**	**0.320**

AGO Factors & Methods Workbook 2006, Table 1, p. 7, Table 3, p. 10 and Table 26, p. 38

Table 1.2 KCT Project Annual Scope 1, 2 & 3 Greenhouse Emissions Estimate (excluding end use of the coal)

Throughput Capacity	Coal Handled Tonnes	Energy Content of Coal (GJ)	Emissions Source	Scope 1 Usage	Scope 2 Usage	Scope 3 Usage	Units	Emissions Factor for Scope 1	Scope 1 Emisions in TCO2e	Emissions Factor for Scope 2	Scope 2 Emisions in TCO2e	Emissions Factor for Scope 3	Scope 3 Emisions in TCO2e	Total Emisisons in TCO2e	% of Emissions	T CO2e/T Coal Handled
Currently Approved	77,000,000	2,093,360,500	Diesel (Automotive)	10		48,510	kL	2.7	27			0.3	130,980	131,007	7.2%	0.002
			Petrol	110			kL	2.4	261			0.3	33	294	0.0%	0.000
			Diesel (Marine)			569,015	kL	2.8				0.3	1,564,792	1,564,792	86.4%	0.020
			Electricity		107,427,717		kWh			0.893	95,933	0.176	18,907	114,840	6.3%	0.001
			Total						**288**		**95,933**		**1,714,712**	**1,810,933**	**100.0%**	**0.024**
Proposed	120,000,000	3,262,380,000	Diesel (Automotive)	10		75,600	kL	2.7	27			0.3	204,123	204,150	7.3%	0.002
			Petrol	110			kL	2.4	261			0.3	33	294	0.0%	0.000
			Diesel (Marine)			886,777	kL	2.8				0.3	2,438,636	2,438,636	87.2%	0.020
			Electricity		143,299,804		kWh			0.893	127,967	0.176	25,221	153,187	5.5%	0.001
			Total						**288**		**127,967**		**2,668,013**	**2,796,268**	**100.0%**	**0.023**
Increased Throughput	43,000,000	1,169,019,500	Diesel (Automotive)	10		27,090	kL	2.7	27			0.3	73,146	73,173	7.4%	0.002
			Petrol	110			kL	2.4	261			0.3	33	294	0.0%	0.000
			Diesel (Marine)			317,762	kL	2.8				0.3	873,845	873,845	88.7%	0.020
			Electricity		35,872,087		kWh			0.893	32,034	0.176	6,313	38,347	3.9%	0.001
			Total						**288**		**32,034**		**953,337**	**985,659**	**100.0%**	**0.023**

AGO Factors &Methods Workbook 2006, Table 1, p. 7, Table 3, p. 10, Table 5, p. 12; and Table 26, p. 38.

3. Scope 1, 2 & 3 Energy Consumption (excluding end use of the coal)

Table 1.1 shows that the Project's estimated energy usage in handling the additional 43 Mtpa is dominated by diesel consumption at 99%. This is due to the use of diesel for coal transport by rail to KCT and by ship from KCT to the export destination. Marine diesel used to transport the coal from KCT accounts for 91% of the energy used by the KCT Project. Electricity is used by electric motors for conveying coal and powering mobile equipment such as stackers, reclaimers and ship loaders. Other electricity consumption is for lighting and general power, stockpile sprays and pumping. Petrol and diesel are used for the on site vehicle fleet. The energy consumed in handling the additional 43 Mtpa is approximately 13,762,324 GJ per annum.

The energy index for the operation at 120 Mtpa throughput capacity is estimated at 0.321 GJ/tonne of coal handled.

The energy use estimates contained in **Table 1.1** are based on estimated consumption of diesel fuel (kL), petrol (kL) and electricity (kWh) by PWCS for the Project. The calculations are detailed below:

- the diesel consumption figure was multiplied by 38.6 GJ/kL (or 39.6 GJ/kL for marine diesel) to arrive at the total GJ of diesel consumed;
- the petrol consumption figure was multiplied by 34.2 GJ/kL to arrive at the total GJ of petrol consumed; and
- the electricity consumption figure was multiplied by 0.0036 to convert it from kWh to GJ.

(AGO 2006, Table 1, p. 7, Table 3, p. 10 and Table 26, p. 38)

The diesel, petrol and electricity GJ were added together to arrive at the total GJ of energy consumed by the Project. This figure was then divided by coal handled to arrive at the energy use indices.

4. Scope 1, 2 and 3 Greenhouse Emissions (excluding end use of the coal)

Table 1.2 shows the Project's estimated greenhouse gas emissions associated with energy consumption in handling the additional 43 Mtpa. The Scope 1, 2 and 3 annual greenhouse emissions for the operation are dominated by diesel use at 96.1%. Marine diesel used to transport the coal from KCT to the export destination accounts for 88.7% of the greenhouse emissions by the KCT Project. Electricity use makes up the remaining 3.9% of the greenhouse inventory. The annual greenhouse emissions from the 43 Mtpa net increase in coal handled by the Project is 985,659 TCO_2e which represents only 0.17% of Australia's total greenhouse emissions of 564,700,000 TCO_2e in 2004 (AGO, 2006).

The greenhouse index for the operation at 120 Mtpa throughput capacity is estimated at 0.023 TCO_2e/tonne of coal handled.

The GHG emissions estimates contained in **Table 1.2** are based on estimated consumption of diesel fuel (kL), petrol (kL) and electricity consumption (kWh) by PWCS for the Project. The calculations are detailed below:

- the diesel consumption figure was multiplied by 3.0 T CO_2-e/kL (3.06 T CO_2-e/kL for marine diesel) to arrive at the total tonnes of CO_2-e from diesel consumption;
- the petrol consumption figure was multiplied by 2.6 T CO_2-e/kL to arrive at the total tonnes of CO_2-e from petrol consumption; and
- The electricity consumption figure was multiplied by 1.068 kg CO_2-e/kWh to arrive at the total tonnes of CO_2-e from electricity consumption.

(AGO 2006, Table 1, p. 7, Table 3, p. 10, Table 5, p. 12; and Table 26, p. 38).

The emissions from these sources were then added together to estimate the total tonnes of CO_2-e emitted by the Project. This figure was then divided by coal handled to arrive at the greenhouse indices.

Greenhouse Emissions from the Transport of the Coal

The Scope 3 emissions from the diesel fuel consumed by rail and sea transport of the coal handled by KCT have been included in the preceding inventory. The annual Scope 3 emissions from the diesel fuel consumed by rail transport of the coal to KCT is 73,146 TCO_2-e or 7.4% of total emissions. The Scope 3 emissions from diesel fuel consumed by sea transport of the coal from KCT to the export destination is 873,845 TCO_2-e or 88.7% of total emissions.

In calculating the emissions for coal transport by rail to KCT, based on expected future production locations, it has been assumed that:

- approximately 6% of coal per annum will be transported to KCT from the Gunnedah region approximately 307 km away;
- approximately 13% of coal per annum will be transported to KCT from the Upper Hunter region approximately 187 km away;
- approximately 77% of coal per annum will be transported to KCT from the Lower Hunter region approximately 92 km away; and
- approximately 4% of coal per annum will be transported to KCT from Other regions approximately 67 km away.

(PWCS, 2007)

In calculating the emissions for coal transport by sea from KCT, based on current coal export destination tonnages, it has been assumed that:

- approximately 59% of coal per annum will be transported to the port of Osaka in Japan approximately 8,065 km away;
- approximately 14% of coal per annum will be transported to the port of Kaohsiung in Taiwan approximately 7,821 km away;
- approximately 11% of coal per annum will be transported to the port of Busan in Korea approximately 8,380 km away;
- approximately 7% of coal per annum will be transported to the port of Mazatlan in Mexico approximately 12,453 km away;
- approximately 4% of coal per annum will be transported to the port of Penang in Malaysia approximately 8,488 km away;
- approximately 3% of coal per annum will be transported to the port of Shanghai in China approximately 8,469 km away; and
- approximately 2% of coal per annum will be transported to the port of Rotterdam in the Netherlands approximately 21,530 km away.

(PWCS, 2007)

5. Emissions from the end use of the Coal

Table 1.3, 1.4 and 1.5 show the estimated GHG emissions associated with the end use of the coal handled by the Project, based on the assumption that all coal is consumed for its heating value or in the steel making process

The emissions from the end use have been calculated based on an average thermal coal energy content of 26.690 GJ/tonne and coking coal of 30 GJ/tonne. The standard emissions factors for coal combustion have been taken from the AGO Workbook for combustion of fuel.

The Full Fuel Cycle (Scope 1 plus Scope 3) greenhouse emissions from the end use of the additional 43 Mtpa of coal handled by the project are estimated to be 116,689,203 TCO_2e per annum.

The combustion of the thermal coal handled by the project would generate an average 272,455,790 MWh per annum at an average power station efficiency of 36%. The average power station efficiency in OECD countries is estimated at 36% (IEA, 2005). By way of comparison, the efficiency of the Bayswater and Liddell power stations operated by Macquarie Generation is 36% and 35% respectively (Macquarie Generation, 2006).

The emission factors used in **Table 1.3, 1.4 and 1.5** are the Full Fuel Cycle Emission Factor for Black Coal – NSW Electricity Generation of 97.7 kg CO_2-e/GJ and Black Coal Used in the Steel Industry of 111 kg CO_2-e/GJ. (AGO 2006, Table 1, p. 7)

Table 1.3 KCT Project Annual Scope 1 & 3 Greenhouse Emissions Estimate from the End Use of Thermal Coal

Throughput Capacity	Thermal Coal Handled	Energy Content GJ/t	EF for Scope 1 kg CO2e/GJ	EF for Scope 3 kg CO2e/GJ	Full Fuel Cycle EF kg CO2e/GJ	Scope 1 kg CO2e/T	Scope 3 kg CO2e/T	Full Fuel Cycle EF kg CO2e/T	Annual Scope 1 T CO2e	Annual Scope 3 T CO2e	Annual Full Fuel Cycle EF T CO2e	MWh Generated
Currently Approved	65,450,000	26.690	89.8	7.8	97.6	2,397	208	2,605	156,868,073	13,625,512	170,493,585	174,825,799
Proposed	102,000,000	26.690	89.8	7.8	97.6	2,397	208	2,605	244,469,724	21,234,564	265,704,288	272,455,790
Increased Throughput	36,550,000	26.690	89.8	7.8	97.6	2,397	208	2,605	87,601,651	7,609,052	95,210,703	97,629,992

Note: Emission Factors taken from Table 1 AGO Factors & Methods Workbook 2006; Assumes average energy content of thermal coal of 26.690 GJ/tonne; and OECD Average power station efficiency (IEA 2005)

Table 1.4 KCT Project Annual Scope 1 & 3 Greenhouse Emissions Estimate from the End Use of Coking Coal

Throughput Capacity	Coking Coal Handled	Energy Content GJ/t	EF for Scope 1 kg CO2e/GJ	EF for Scope 3 kg CO2e/GJ	Full Fuel Cycle EF kg CO2e/GJ	Scope 1 kg CO2e/T	Scope 3 kg CO2e/T	Full Fuel Cycle EF kg CO2e/T	Annual Scope 1 T CO2e	Annual Scope 3 T CO2e	Annual Full Fuel Cycle EF T CO2e
Currently Approved	11,550,000	30.000	90.2	20.7	111	2,706	621	3,330	31,254,300	7,172,550	38,461,500
Proposed	18,000,000	30.000	90.2	20.7	111	2,706	621	3,330	48,708,000	11,178,000	59,940,000
Increased Throughput	6,450,000	30.000	90.2	20.7	111	2,706	621	3,330	17,453,700	4,005,450	21,478,500

Note: Emission Factors taken from Table 1 AGO Factors & Methods Workbook 2006; Assumes average energy content of coking coal of 30.0 GJ/tonne; and OECD Average power station efficiency (IEA 2005)

Table 1.5 KCT Project Annual Scope 1 & 3 Greenhouse Emissions Estimate from End Use of Total Coal

Throughput Capacity	Total Coal Handled	Annual Scope 1 T CO2e	Annual Scope 3 T CO2e	Annual Full Fuel Cycle EF T CO2e
Currently Approved	77,000,000	188,122,373	20,798,062	208,955,085
Proposed	120,000,000	293,177,724	32,412,564	325,644,288
Increased Throughput	43,000,000	105,055,351	11,614,502	116,689,203

Note: Emission Factors taken from Table 1 AGO Factors & Methods Workbook 2006; Assumes average energy content of coal of thermal coal of 26.690 GJ/tonne and coking coal of 30.0 GJ/tonne; and OECD Average power station efficiency (IEA 2005)

6. Summary of Greenhouse Emissions

The Scope 1, 2 and 3 Greenhouse Gas and Energy Assessment for the KCT Project has found that:

(a) the Scope 1 and 2 greenhouse emissions from the Project have been estimated at approximately 32,322 TCO_2e per annum from the additional 43 Mtpa of coal handled. Scope 3 greenhouse emissions from diesel, petrol and electricity use by the KCT Project has been estimated at approximately 6,346 TCO_2e per annum from the additional 43 Mtpa of coal handled The 38,688 TCO_2e represents in total about 0.007% of the Australian annual GHG emission rate;

(b) the Scope 3 greenhouse emissions from coal transport have been estimated at approximately 946,991 TCO_2e per annum from the additional 43 Mtpa of coal handled. This represents in total about 0.168% of the Australian annual GHG emission rate and

(c) the Scope 3 greenhouse emissions from burning of the additional 43 Mtpa of coal handled by the project would produce approximately 116,689,203 TCO2e per annum. This is equivalent to 0.278% of annual global GHG emissions. [Total annual global emissions in 2000 have been estimated at approximately 42,000,000,000 T CO2-e. (Stern, 2006, p.170)]

7. Greenhouse Mitigation Strategies

PWCS will assess and implement where possible, energy and greenhouse management initiatives during the Project. Some of the opportunities for improving energy efficiency and reducing greenhouse emissions from the Project are discussed below. KCT greenhouse mitigation measures are largely focused on energy management and energy efficiency, in particular, the efficient plant and equipment and optimisation of existing operations. Whilst emissions from the transport of coal are outside the control of PWCS, PWCS will cooperate with transport operators in implementing ways of reducing their emissions.

PWCS is therefore assessing the viability of the following energy and greenhouse mitigation measures for the Project:

- Review energy efficiency in plant and equipment procurement – consideration to be given to the life cycle cost advantages obtained by using energy efficient components
- Review the opportunity to install additional sub metering for offices, workshops, conveyors, stackers and reclaimers
- Review operational initiatives such as turning off idle plant and equipment
- Review control and temperature settings for air conditioning units in offices and switchrooms
- Review automatic control of lighting

- Review potential energy efficiency opportunities in water pumping and dust suppression systems eg variable speed drive pumps
- Review changes in power consumption with installation of new equipment and install power factor correction equipment to suit
- PWCS will review with Pacific National and Queensland Rail possible ways of reducing the diesel used in transporting coal to KCT and
- PWCS will review with shipping companies possible ways of reducing the diesel used in transporting coal from KCT to the export destination.

The objective of these measures is to seek further opportunities to reduce greenhouse gas emissions.

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