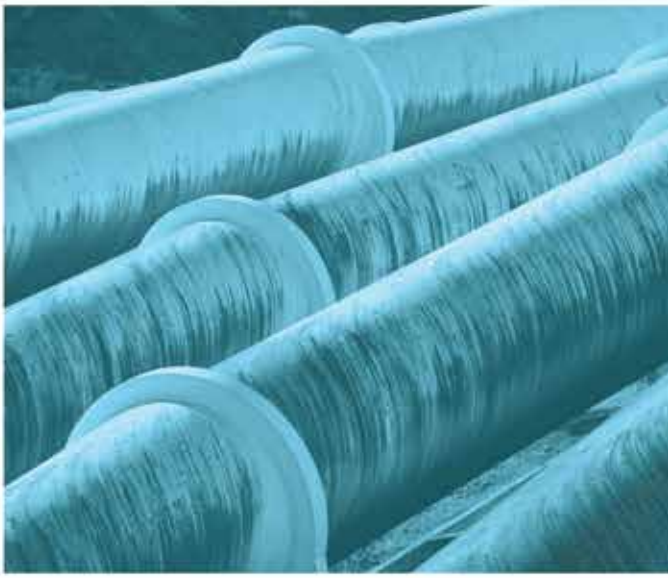
Appendix K

Charbon Colliery - Greenhouse gas emissions assessment


Charbon Colliery - Modification 2

Greenhouse gas assessment

Prepared for Charbon Coal Pty Limited
August 2020

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Charbon Colliery - Modification 2

Greenhouse gas assessment

Report Number

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1 Introduction

Charbon Colliery (Charbon) is an underground and open cut coal mine owned and operated by Charbon Coal Pty Limited (Charbon Coal), a joint venture between Centennial Coal Company Limited (Centennial) and SK Networks Resources Australia Pty Ltd. Charbon is approximately 87 kilometres (km) north-west of Lithgow and 3 km south of Kandos in the Western Coalfields of New South Wales (NSW) within the Mid-Western Regional local government area (LGA).

Charbon Coal is seeking to modify SSD 08_0211, pursuant to Section 4.55(2) of the EP&A Act, to allow for the transfer of coarse coal rejects (CCR) from Clarence Colliery (Clarence) to Charbon and the use of this material on-site during rehabilitation activities.

This greenhouse gas (GHG) assessment has been prepared to support the modification report. It provides estimates of Scope 1, 2 and 3 emissions and a comparison to State and National inventories. It also provides a comparison of GHG emissions for existing and proposed scenarios on an annual basis.

This GHG assessment has been prepared in accordance with the guidelines specified by the Commonwealth Department of Environment and Energy (DoEE) (now Commonwealth Department of Agriculture, Water and the Environment or DAWE) *National Greenhouse Accounts Factors* (NGAF) workbook (DoEE 2019).

2 Greenhouse gas calculations

2.1 Introduction

The estimation of GHG emissions for Charbon was based on the DoEE (2019) NGAF workbook. The methodologies in the NGAF workbook follow a simplified approach, equivalent to the 'Method 1' approach outlined in the *National Greenhouse and Energy Reporting (Measurement) Technical Guidelines* (Technical Guidelines) (DoE 2014). The Technical Guidelines are used for the purpose of reporting under the Commonwealth *National Greenhouse and Energy Reporting Act 2007* (the NGER Act).

For accounting and reporting purposes, GHG emissions are defined as 'direct' and 'indirect' emissions. Direct emissions (also referred to as Scope 1 emissions) occur within the boundary of an organisation and as a result of that organisation's activities. Indirect emissions are generated as a consequence of an organisation's activities but are physically produced by the activities of another organisation (DoEE 2019). Indirect emissions are further defined as Scope 2 and Scope 3 emissions. Scope 2 emissions occur from the generation of the electricity purchased and consumed by an organisation. Scope 3 emissions occur from all other upstream and downstream activities, for example the downstream extraction and production of raw materials or the upstream use of products and services.

Scope 3 is an optional reporting category (Bhatia et al 2010) and should not be used to make comparisons between organisations, for example in benchmarking the GHG intensity of products or services. Typically, only major sources of Scope 3 emissions are accounted and reported by organisations.

2.2 Emission sources

The GHG emission sources included in this assessment are listed in Table 2.1, representing the most significant sources associated with Charbon.

GHG emissions from Charbon are estimated using the methodologies outlined in the NGAF workbook, using fuel energy contents and scope 1, 2 and 3 emission factors for diesel and electricity use in NSW.

Table 2.1 Scope 1, 2 and 3 emission sources

Scope 1	Scope 2	Scope 3
Direct emissions from diesel combustion.	Indirect emissions associated with the consumption of purchased electricity.	Indirect emissions from the extraction, production and transport of diesel.
-	-	Indirect emissions from fuel for employee travel.
-	-	Indirect emissions from fuel used by trains to deliver materials to site.

2.3 Excluded emission sources

Charbon is currently being rehabilitated. Therefore, there are no emissions related to coal mining (eg fugitive emissions from underground mining, combustion of product coal, transport of product coal, etc). Charbon Coal has also indicated that there is no sulfur hexafluoride (SF_6), oils, greases or liquid petroleum gas (LPG) used at Charbon.

2.4 Activity data

Estimates of fuel, substances and electricity consumption associated with activities at Charbon have been provided by Charbon Coal. The adopted activity data for the emission estimates is presented in Table 2.2.

It is noted that the only difference between the existing and proposed scenarios is the additional diesel used in the proposed scenario (ie to transport CCR from Clarence to Charbon).

Table 2.2 Activity data inputs for GHG calculations

Process	Existing operations	Proposed operations (modification)
Diesel used for stationary energy purposes (L)	88,331	88,331
Diesel used for transport energy purposes (L)	232,823	232,823
Diesel used by trains for transportation of materials to Charbon (L)	-	567,000
Electricity (kWh)	125,966	125,966
Employees per year	3 permanent, up to 10 contractors	3 permanent, up to 10 contractors
Employee travel origins	Clandulla, Rylstone and Mudgee	Clandulla, Rylstone and Mudgee

2.5 Emission estimates

The estimated annual GHG emissions for each emission source are presented in Table 2.3 (existing) and Table 2.4 (proposed), respectively. Details of the GHG emissions calculations are provided in Appendix A.

The significance of Charbon's GHG emissions relative to State and National GHG emissions is made by comparing annual average GHG emissions against the most recent available total GHG emissions inventories (calendar year 2018[1]) for NSW (131,685 kt CO_2-e) and Australia (537,446 kt CO_2-e).

Annual average GHG emissions (Scope 1 and 2) generated by Charbon in both the existing and proposed scenarios represent approximately 0.001% of total GHG emissions for NSW and 0.0002% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018.

The proposed modification will not result in an increase in annual Scope 1 and 2 GHG emissions at Charbon. Scope 3 emissions from Charbon are approximately 57 t CO_2-e per year under the existing scenario and 136 t CO_2-e per year under the proposed scenario. The increase is related to diesel used by trains to transport CCR from Clarence Colliery to Charbon Colliery in the proposed scenario.

Table 2.3 Estimated annual GHG emissions – existing operations

Source	Scope 1 (t CO_2-e/year)	Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)	Total
Diesel combustion	873	-	45	918
Employee travel	-	-	1	1
Electricity consumption	-	102	11	113
Total	**873**	**102**	**57**	**1,032**

Table 2.4 Estimated annual GHG emissions – proposed operations

Source	Scope 1 (t CO_2-e/year)	Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)	Total
Diesel combustion	873	-	123	996
Employee travel	-	-	1	1
Electricity consumption	-	102	11	113
Total	**873**	**102**	**135**	**1,111**

[1] https://ageis.climatechange.gov.au/SGGI.aspx

3 Conclusions

This GHG assessment supports a modification application for Charbon. It provides estimates of Scope 1, 2 and 3 emissions and a comparison to State and National inventories. The assessment has been prepared in accordance with the guidelines specified by the NGAF workbook (DoEE 2019).

Annual average GHG emissions (Scope 1 and 2) generated by Charbon total 975 t CO_2-e per year in both the existing and proposed scenarios, which represents approximately 0.001% of total GHG emissions for NSW and 0.0002% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018. The proposed modification will not result in an increase in annual Scope 1 and 2 GHG emissions at Charbon.

Scope 3 emissions from Charbon are approximately 57 t CO_2-e per year under the existing scenario and 136 t CO_2-e per year under the proposed scenario. The increase is related to diesel used by trains to transport CCR from Clarence Colliery to Charbon Colliery in the proposed scenario.

Mitigation of GHG emissions will continue to be conducted in accordance with the *Charbon Colliery Greenhouse Gas and Energy Management Plan* (Centennial 2012).

References

AEGIS 2015, *Australian Greenhouse Emissions Information System*, viewed 26 June 2020, https://ageis.climatechange.gov.au/SGGI.aspx.

Australian Bureau of Statistics (ABS) 2018, *9208.0 - Survey of Motor Vehicle Use, Australia, 12 months ended 30 June 2018*, https://www.abs.gov.au/ausstats/abs@.nsf/mf/9208.0.

Bhatia, P, Cummis, C, Brown, A, Rich, D, Draucker, L & Lahd, H 2010, Greenhouse Gas Protocol. *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*. Supplement to the GHG Protocol Corporate Accounting and Reporting Standard, World Resources Institute & World Business Council for Sustainable Development.

Centennial 2012, *Charbon Colliery Greenhouse Gas and Energy Management Plan.*

DoE 2014, *National Greenhouse and Energy Reporting (Measurement) Technical Guidelines*, Department of Environment.

DoEE 2019, *National Greenhouse Accounts Factors*, Department of Environment and Energy.

Abbreviations

CO_2-e	carbon dioxide equivalent
DoEE	Commonwealth Department of the Environment and Energy
GHG	greenhouse gas
kW	kilowatt
LGA	local government area
Charbon	Charbon Colliery
NGAF	National Greenhouse Accounts Factors

Appendix A

Greenhouse gas calculation data

A.1 Fuel consumption

A.1.1 Diesel

GHG emissions from diesel consumption were estimated using the following equation:

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1000}$$

Where:

E_{ij}	=	Emissions of GHG from diesel combustion	(t CO_2-e)
Q_i	=	Quantity of fuel	(kL)
EC_i	=	Energy content of fuel	(GJ/kL)[2]
EF_{ijoxec}	=	Emission factor (scope 1 or 3) for diesel consumption	(kg CO_2-e/GJ)[3]

The quantity of diesel used in the existing and proposed scenarios are listed in Table 2.2 and Table A.2 below. The increase in diesel in the proposed scenario is due to the diesel used by trains to transport CCR from Clarence to Charbon in the proposed scenario. These emissions have been accounted for as Scope 3 emissions. It is noted that the trains are not owned by Centennial.

GHG emission factors and energy content for diesel were sourced from the NGAF (DoEE 2019). These are presented in Table A.1.

The estimated annual GHG emissions from diesel are presented in Table A.2.

Table A.1 Diesel GHG emission factors

Fuel type	Energy content (GJ/kL)	Scope 1 emission factors (kg CO_2-e/GJ)			Scope 3 emission factor (kg CO_2-e/GJ)
		CO_2	CH_4	N_2O	CO_2
Stationary energy	38.6	69.9	0.1	0.2	3.6
Transport energy	38.6	69.9	0.1	0.5	3.6

Table A.2 Estimated CO_2-e (tonnes) for diesel consumption per year

Scenario	Diesel use (L/annum)	Emissions (t CO_2-e)		Total
		Scope 1	Scope 3	
Existing scenario	321,154	873	45	918
Proposed scenario	888,154	873	123	996

[2] GJ = gigajoules

[3] kg CO_2-e/GJ = kilograms of carbon dioxide equivalents per gigajoule

A.1.2 Employee travel

GHG emissions from employee travel were estimated using the following equation:

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1000}$$

Where:

E_{ij}	=	Emissions of GHG from gasoline combustion	(t CO_2-e)
Q_i	=	Quantity of fuel	(kL)
EC_i	=	Energy content of fuel	(GJ/kL)
EF_{ijoxec}	=	Emission factor (scope 3) for gasoline consumption	(kg CO_2-e/GJ)

Employee fuel use was estimated using the following information:

- Number of permanent employees = 3;
- Number contractors = maximum of 10;
- Employee travel origins = Clandulla, Rylstone and Mudgee;
- Work hours = 5 days per week, 47 weeks per year;
- Estimated total km travelled = 91,340 km return per year; and
- Fuel consumption rate of 0.108 L per km (Australian Bureau of Statistics 2018).

GHG emission factors and energy content for gasoline were sourced from the NGAF (DoEE 2019). These are presented in Table A.3.

The estimated annual GHG emissions from employee travel are presented in Table A.4.

Table A.3 Gasoline GHG emission factors

Fuel type	Energy content (GJ/kL)	Scope 3 emission factor (kg CO_2-e/GJ)
		CO_2
Gasoline	34.2	3.6

Table A.4 Estimated CO_2-e (tonnes) for employee travel

Scenario	Gasoline use (L/annum)	Emissions (t CO_2-e)
		Scope 3
Existing scenario	9,865	1
Proposed scenario	9,865	1

A.2 Electricity use

GHG emissions associated with electricity consumption were estimated using the following equation:

$$E_{CO_2-e} = \frac{Q \times EF}{1000}$$

Where:

E_{CO2-e}	=	Emissions of GHG from electricity consumption	(t CO_2-e)
Q_i	=	Quantity of electricity	(MWh)[4]
EF	=	Emission factor (scope 2 or 3) for electricity consumption	(kg CO_2-e/kWh)[5]

GHG emission factors for electricity use were sourced from the NGAF (DoEE 2019). These are presented in Table A.5. the Scope 3 emissions were taken from the NSW 'latest estimate' section of the NGAF.

The estimated annual existing and proposed scenario GHG emissions from electricity are presented in Table A.6.

Table A.5 Electricity GHG emission factors

Use	Emission factors (kg CO_2-e/kWh)	
	Scope 2	Scope 3
Electricity	0.81	0.09

Table A.6 Estimated CO_2-e (tonnes) for electricity consumption

Scenario	Electricity use (kWh)	Emissions (t CO_2-e)	
		Scope 2	Scope 3
Existing scenario	125,966	102	11
Proposed scenario	125,966	102	11

[4] MWh = megawatt hours

[5] kg CO_2-e/kWh = kilograms of carbon dioxide equivalents per kilowatt hour