BHP

Scope 3 Emissions Calculation Methodology 2019

September 2019

BHP Scope 3 Emissions Calculation Methodology 2019

About this document

This document describes the calculation boundaries, methodologies, assumptions and key references used in the preparation of the FY2019 inventory of scope 3 emissions in BHP's value chain, as published in our Sustainability Report 2019 and available online at bhp.com/climate.

Scope 3 emissions for our business are calculated using methodologies consistent with the *GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (Scope 3 Standard), and with reference to the additional guidance provided in the *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions* (Scope 3 Guidance) as appropriate.[1]

This document, in combination with the data on scope 3 emissions for our business published in our Sustainability Report 2019, meets the disclosure requirements of Global Reporting Initiative (GRI) standard GRI 305 ('Disclosure 305-3 – Other indirect (Scope 3) GHG emissions'). These disclosures are also aligned with the recommendation of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) that organisations disclose *"scope 1, scope 2, and, if appropriate, scope 3 greenhouse gas emissions, and the related risks"*.

EY has provided limited assurance in respect of our Sustainability Report 2019, including in respect of the scope 3 emissions inventory for our business; a copy of EY's independent assurance statement can be found in that report.

1 Building on the earlier *GHG Protocol Corporate Accounting and Reporting Standard,* the Scope 3 Standard and Scope 3 Guidance are published by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), and were developed with the aim of providing a standardised approach and set of principles for companies to use in preparing scope 3 inventories. The Scope 3 Standard is the accounting standard used by the majority of those companies that report scope 3 emissions.

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Introduction

BHP has set the long-term goal of achieving net-zero operational (scope 1 and 2) greenhouse gas (GHG) emissions in the second half of this century, consistent with the Paris Agreement. However, while reducing our operational emissions is vital, emissions from our value chain (scope 3) are significantly higher than those from our own operations. Understanding the scope 3 emissions associated with our business helps us to assess and manage our exposure to climate-related risk, and to capitalise on the opportunities arising from the transition to a lower carbon economy. Working with others in our value chain to reduce emissions supports our stewardship role in promoting sustainability throughout our products' life cycles.

GHG Protocol emissions scopes

The *GHG Protocol Corporate Accounting and Reporting Standard* classifies corporate GHG emissions into three 'scopes'.

Scope 1 emissions are direct GHG emissions from operations that are owned or controlled by the reporting company (e.g. for BHP, emissions from fuel consumed by haul trucks at our mine sites).

Scope 2 emissions are indirect emissions from the generation of purchased energy consumed by a company (e.g. emissions from electricity BHP buys from the grid for use at our mine sites).

Scope 3 emissions are all other indirect emissions (not included in scope 2) that occur in the value chain of the reporting company (e.g. for BHP, emissions from our customers burning the energy coal we sell in their power stations, or processing our iron ore to steel).

Organisational boundary

For GHG reporting purposes, BHP defines its organisational boundary on an operational control basis, and our scope 1 and 2 emissions are reported on this basis (i.e. we account for 100 per cent of such emissions from operations over which BHP or one of its subsidiaries has operational control, but not for emissions from operations in which BHP owns an interest but does not have operational control).

'Scope 3' is the term used to describe the indirect GHG emissions resulting from activities in our value chain but outside of our operational control. They include upstream emissions related to the extraction and production of the materials we purchase for use at our operations; downstream emissions from our customers' processing and use of the products we sell; and emissions from both upstream and downstream transportation activities. Because our organisational boundary for reporting our scope 1 and 2 emissions is defined on an operational control basis, the scope 3 emissions for our business also include the scope 1 and 2 emissions from our non-operated assets[2] (reported under the Scope 3 Standard Investments category (see below)).[3]

Scope 3 emissions categories

The Scope 3 Standard divides scope 3 emissions into upstream and downstream emissions, based on the financial transactions of the reporting company:

- **Upstream** emissions are indirect GHG emissions related to purchased or acquired goods and services;
- **Downstream** emissions are indirect GHG emissions related to sold goods and services.

The Scope 3 Standard further categorises scope 3 emissions into fifteen distinct categories. Where relevant to our organisation, we report scope 3 emissions for our business according to these categories. Where it enhances relevance and transparency – or where particular emissions sources are deemed critical by key stakeholders or contribute to our risk exposure – we further disaggregate this data as appropriate. For example, in our Sustainability Report 2019 we provide a breakdown of emissions in the *Processing of sold products and Use of sold products* categories (categories 10 and 11) according to the major commodities we produce.

2 Assets that are owned as a joint venture but not operated by BHP.

3 Our scope 3 emissions inventory for FY2019 has been presented on a Continuing and Discontinued operations basis to include the contribution from our Onshore US assets for the four months prior to completion of their sale. On 28 September 2018, BHP completed the sale of 100 per cent of the issued share capital of BHP Billiton Petroleum (Arkansas) Inc. and 100 per cent of the membership interests in BHP Billiton Petroleum (Fayetteville) LLC, which held the Fayetteville assets, for a total cash consideration of US$0.3 billion. On 31 October 2018, BHP completed the sale of 100 per cent of the issued share capital of Petrohawk Energy Corporation, the BHP subsidiary which held the Eagle Ford (being Black Hawk and Hawkville), Haynesville and Permian assets, for a total cash consideration of US$10.3 billion (less preliminary customary completion adjustments of US$0.2 billion). While the effective date at which the right to economic profits transferred to the purchasers was 1 July 2018, BHP continued to control the Onshore US assets until the completion dates of their respective transactions.

Overlap in calculation boundaries

The emissions categories defined by the Scope 3 Standard are designed to be mutually exclusive such that for a given company there is no double counting of emissions between categories. However, for BHP (in common with other producers of raw materials) there is a degree of overlap in reporting boundaries due to our involvement at multiple points in the lifecycle of the commodities we produce and consume. The most significant example of this relates to emissions from the processing of our iron ore to steel, reported under the *Processing of sold products emissions* category. Steel production also consumes metallurgical coal as an input, a portion of which is produced by us. For reporting purposes, we account separately for scope 3 emissions from the use of our metallurgical coal with all other fossil fuels under the *Use of sold products* category. This means that a portion of metallurgical coal emissions are accounted for under two categories. Further examples of overlapping calculation boundaries are noted below for individual emissions categories.

This double counting of emissions in the current scope 3 inventory for our business is an expected outcome of emissions reporting between the different scopes and categories as applied in practice to a producer of raw materials, and is not considered to detract from the overall value of the scope 3 emissions disclosure for our business. However, this double counting means that the emissions reported under each category should not be added up, as to do so would give an inflated total figure. For this reason we do note report a total scope 3 emissions figure.

In general, we take a 'conservative' approach to calculating scope 3 emissions for each category (as noted below for individual emissions categories), which results in over-reporting, rather than under-reporting, of the total scope 3 emissions figure. This is the case for our approach to the double counting of emissions; selection of emissions factors; and assumptions about product processing routes and end uses.

FY2019 scope 3 emissions inventory

The most significant contributions to scope 3 emissions in our value chain come from the downstream processing and use of our products, in particular emissions emanating from the steelmaking process (the processing and use of our iron ore and metallurgical coal). In FY2019 emissions associated with the processing of our non-fossil fuel commodities (iron ore to steel; copper concentrate and cathode to copper wire) were 305 million tonnes of CO_2-e. Emissions associated with the use of our fossil fuel commodities (metallurgical and energy coal, oil and gas) were 233 million tonnes of CO_2-e. Our FY2019 scope 3 emissions inventory is summarised on the following page.

The sections that follow describe in more detail the calculation boundaries (including any exclusions of particular emissions sources within a category), methodologies, assumptions and references we have used to calculate an emissions estimate for each relevant scope 3 category for FY2019. For categories where we have not calculated an emissions figure, the rationale behind why we have concluded that the emissions source is not relevant to our business is provided.

Scope 3 category	Emissions in BHP's value chain (million tonnes CO_2-e)[1]		
	FY2019	FY2018	FY2017
Upstream			
1. Purchased goods and services (including capital goods)	**17.3**	8.2	7.7
2. Capital goods		Not applicable	
3. Fuel and energy related activities	**1.3**	1.4	1.4
4. Upstream transportation and distribution	**3.6**	3.6	3.2
5. Waste generated in operations		Not applicable	
6. Business travel	**0.1**	0.1	0.1
7. Employee commuting	**<0.1**	<0.1	<0.1
8. Upstream leased assets		Not applicable	
Downstream			
9. Downstream transportation and distribution	**4.0**	5.0	2.8
10. Processing of sold products			
– Iron ore processing[2]	***299.6***	*317.4*	*309.5*
– Copper processing	***5.1***	*5.2*	*4.2*
Total processing of sold products	**304.7**	322.6	313.7
11. Use of sold products			
– Metallurgical coal[2]	***111.4***	*112.3*	*105.5*
– Energy coal	***67.0***	*71.0*	*72.1*
– Natural gas	***28.3***	*36.4*	*38.3*
– Crude oil and condensates	***23.3***	*29.6*	*33.1*
– Natural gas liquids	***2.8***	*4.5*	*5.1*
Total use of sold products	**232.7**	253.8	254.1
12. End-of-life treatment of sold products		Not applicable	
13. Downstream leased assets		Not applicable	
14. Franchises		Not applicable	
15. Investments (i.e. BHP's non-operated assets)	**3.1**	1.7	1.9

1 FY2017 and FY2018 data includes Continuing operations and Discontinued operations (Onshore US assets). FY2019 data includes Discontinued operations (Onshore US) to 31 October 2019 and Continuing operations.

2 Scope 3 emissions reported under the 'Processing of sold products' category include the processing of our iron ore to steel. This third party activity also consumes metallurgical coal as an input, a portion of which is produced by us. For reporting purposes, we account for scope 3 emissions from combustion of metallurgical coal with all other fossil fuels under the 'Use of sold products' category, such that a portion of metallurgical coal emissions is accounted for under two categories.

Looking ahead to FY2020

In the BHP Prospects blog post and associated whitepaper *Addressing greenhouse gas emissions beyond our operations: Understanding the 'scope 3' footprint of our value chain*[4], we set out the challenges and opportunities inherent in measuring and playing a role in addressing GHG emissions beyond the boundaries of our operations, and describe the limitations of our current scope 3 calculation methodology.

Our approach to addressing scope 3 emissions is evolving. In FY2020, we will look for additional opportunities to work with our customers, suppliers and others in our value chain to seek to influence scope 3 emissions reductions. We will also set public goals related to these emissions. We intend to design our goals to help us manage our exposure to climate-related risk, measure the effectiveness of our stewardship activities, and allow us to evaluate how the actions we are taking to influence emissions reductions across our value chain support the goals of the Paris Agreement.

Our goals will be set consistent with all of the following principles:

- **Risk-based**: focused on material risks and opportunities;
- **Measurable, accountable and time-bound**: clearly defined with clear responsibilities for delivery and against which it is possible to measure progress over a defined timeframe;
- **Paris-aligned**: support decarbonisation pathways for our products in line with the goals of the Paris Agreement;
- **Collaborative**: engage the right partners to support action at the point of operational control;
- **Outcomes-focused**: deliver tangible outcomes and value rather than focus only on activity;
- **Attainable**: recognise our stewardship role relating to sold products as compared to the operational control of our managed facilities;
- **Based on consultation**: engage with external expert and/or academic parties to inform the development of appropriate goals;
- **Assured**: reporting will be subject to external verification and assurance.

Assessing alignment with the Paris Agreement goals is challenging for a diversified resources business such as BHP. Our commodities are used in a variety of ways, resulting in a range of potential sources of scope 3 emissions and variable mitigation opportunities. Emissions reduction strategies – and the goals to support them – must be customised by commodity. We intend our scope 3 goals to strike a balance between the need to reflect these complexities and the need for simplicity and transparency.

4 https://www.bhp.com/media-and-insights/prospects/2018/08/addressing-greenhouse-gas-emissions-beyond-our-operations

Scope 3 Standard emissions categories

Category 1: Purchased goods and services (including capital goods)			
Scope 3 Standard category description	Upstream (i.e. cradle-to-gate) emissions from the extraction, production and transportation of goods and services purchased or acquired by the reporting company in the reporting year, where not otherwise included in categories 2 to 8.		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	17.3
Calculation status rationale	This is not a material source of scope 3 emissions in BHP's value chain. Despite this, these emissions are relevant as they may contribute to the exposure of our business to climate-related risk, and because in some instances we may have the ability to influence our suppliers or other service providers to reduce emissions from their activities. A high-level estimate has been calculated for completeness and transparency.		

Calculation boundary

This category covers emissions generated upstream of BHP's operations associated with the extraction, production and transportation of goods and services purchased or acquired by BHP during the reporting year.

For BHP, this category includes emissions associated with purchases of capital goods, which are classified as a separate category (category 2) under the Scope 3 Standard. (As described in the Scope 3 Guidance, depending on a company's internal procurement processes, purchases of capital goods can be difficult to segregate from this *Purchased goods and services category*.)

Emissions associated with goods and services categorised as relating to fuel and energy related activities, upstream transportation, business travel and employee commuting are not included in this category. These are assigned to separate emissions categories (categories 3, 4, 6 and 7 respectively) as recommended by the Scope 3 Standard.

Exclusions

None. Emissions associated with all spend on goods and services not directly attributable to another scope 3 category have been included in this estimate.

Calculation methodology

The 'spend-based' method as described in the Scope 3 Guidance is used to calculate these emissions, with industry-average emissions factors applied based on the economic value of the goods and services.

Spend data is broken down according to BHP's internal taxonomy codes and allocated to the most appropriate product group category available within the *GHG Protocol Quantis Scope 3 Evaluator* tool (Quantis tool). The corresponding emissions factors from the Quantis tool are then applied to calculate an overall emissions estimate for this category. A weighted average emissions factor is applied for any uncategorised spend.

Data sources

Annual spend data is extracted from the BHP internal system that tracks all external spend.

Emissions factors are sourced from the Quantis tool.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (v1): Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard*; WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *GHG Protocol Quantis Scope 3 Evaluator tool*; https://quantis-suite.com/Scope-3-Evaluator/

Category 2: Capital goods			
Scope 3 Standard category description	Upstream (i.e. cradle-to-gate) emissions from the extraction, production and transportation of capital goods purchased or acquired by the reporting company in the reporting year.		
Calculation status of FY2019 emissions in BHP's value chain	Not material, included in the Purchased goods and services category (category 1)	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	Not applicable
Calculation status rationale	As described in the Scope 3 Guidance, depending on a company's internal procurement processes, purchases of capital goods can be difficult to segregate from the *Purchased goods and services* category. Given all our spend data (which includes purchases of capital goods) has been captured in the calculation methodology for category 1, emissions related to purchases of capital goods are not reported separately here. Instead, for BHP's value chain, the emissions reported under category 1 include emissions associated with purchases of capital goods.		

Scope 3 Standard emissions categories

Category 3: Fuel and energy related activities			
Scope 3 Standard category description	Emissions related to the extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, not already accounted for in scope 1 or scope 2.		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	1.3
Calculation status rationale	Although this is not a material source of scope 3 emissions in BHP's value chain, consumption of fuels and energy represent a material contribution to our scope 1 and 2 operating emissions; the associated scope 3 emissions are therefore also of interest.		

Calculation boundary

This category covers emissions arising from the extraction, production, and transportation of fuels and energy consumed by the facilities over which BHP has operational control, primarily (i) upstream emissions from the extraction, production, and transportation of fuels (e.g. diesel for haul trucks or natural gas for on-site power generation) we purchase for use at our operations, and (ii) upstream emissions from the extraction, production and transportation of fuel (e.g. coal or natural gas) burned to generate the electricity we purchase from the grid. (Note that emissions from the *combustion* of fuels at our facilities are accounted for as our scope 1 emissions; similarly emissions from the *generation* of purchased electricity consumed by BHP are accounted for as our scope 2 emissions.)

Overlap in calculation boundaries

BHP owns and operates a number of facilities extracting primary fuels (energy coal, natural gas and petroleum products), and a portion of these fuels may eventually be consumed by us. It is recognised that a portion of the upstream emissions associated with the extraction of the fuels or energy consumed by our facilities (as reported under this *Fuel and energy related activities* scope 3 category) may therefore also be reported under our scope 1 and 2 emissions. This is an expected outcome of emissions reporting between the different scopes defined under standard GHG accounting practices and is not considered to detract from the value of the scope 3 emissions reported for this category.

Exclusions

Upstream emissions from a small quantity of energy consumed which is reported internally under a mixed 'other' category (representing less than 2 per cent of total energy consumed) are excluded due to the difficulty in assigning a meaningful scope 3 emissions factor to the variety of energy sources involved (including coal seam gas, hydrogen, LPG, steam, and heat).

Calculation methodology

The 'average-data' method as described in the Scope 3 Guidance is used to calculate these emissions. Industry-average scope 3 emissions factors for each fuel type or natural gas/electricity source (i.e. grid) are applied to the relevant consumption volumes to calculate an overall emissions estimate for this category.

Data sources

Fuel and energy consumption data is sourced from BHP's internal database, with consumption of each type of fuel and energy being recorded by each of our operations.

For our Australian operations, scope 3 emissions factors are sourced from the most recent *Australian National Greenhouse Accounts Factors* published by the Australian Government Department of the Environment and Energy. For our non-Australian operations, regional scope 3 emission factors for fuels and energy are not readily available at this stage, so the relevant Australian scope 3 emissions factors are applied as a proxy.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions v1.0 – Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard*; WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *National Greenhouse Accounts Factors – July 2018* (Tables 37 to 41); Australian Government Department of the Environment and Energy; 2018; https://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/publications/national-greenhouse-accounts-factors-july-2018

Category 4: Upstream transportation and distribution			
Scope 3 Standard category description	Emissions from the transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company); transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (e.g. of sold products); and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company).		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	3.6
Calculation status rationale	Although this is not a material source of scope 3 emissions in BHP's value chain, emissions associated with the freight of our products to customers are of increasing interest as a component of our value chain. They may contribute to the exposure of our business to climate-related risk, and in some instances we may have the ability to influence our suppliers or other service providers to reduce emissions from their activities.		

Calculation boundary

Because the Scope 3 Standard categorises scope 3 emissions as upstream or downstream on the basis of financial transactions, this category includes emissions from the transport of our products where freight costs are covered by BHP (e.g. under Cost and Freight (CFR) or similar terms), as well as purchased transport services for process inputs to our operations.

This category includes emissions from road, rail and marine freight (the latter accounting for over 95 per cent of the total).

Exclusions

Emissions from the transport of process inputs to BHP's operations where spend data is not available (i.e. transport costs are incorporated into the supplier price) are excluded. These emissions are likely to be captured under the Purchased goods and services category (category 1).

Calculation methodology

For all marine cargoes other than zinc, RightShip – a leading maritime risk management and environmental assessment organisation equally owned by BHP, Rio Tinto and Cargill – was contracted to develop an accurate scope 3 emissions estimate based on its certified methodology.

For zinc marine cargoes, as well as road and rail freight, the 'distance-based' method as described in the Scope 3 Guidance is used to calculate these emissions. Emissions are calculated for each cargo by applying the appropriate emissions factor to the mass x distance multiplier for the voyage.

For purchased transport services for process inputs to our operations, the spend-based method is used to calculate these emissions, as described in the calculation methodology for the *Purchased goods and services* category.

Category 4: Upstream transportation and distribution (continued)

Data sources

Product transport data is sourced from BHP's internal system for each commodity, including load and destination ports, cargo weight, and vessel deadweight (for marine vessels) for each individual product cargo.

Where emissions are calculated using RightShip's methodology, emissions factors are sourced from RightShip.

Where emissions are calculated using the distance-based method:

- Emissions factors on a mass-distance basis are sourced from the most recent *Greenhouse Gas Reporting Conversion Factors* published by the UK Government. For marine cargoes, the vessel deadweight is used to categorise the vessel as a Bulk Carrier or General Cargo vessel, and the appropriate emissions factor assigned.
- For marine freight emissions calculations, online tools (www.ports.com and www.marinetraffic.com) are used to calculate an estimation of the distance covered based on the load and destination ports.
- For road and rail freight emissions calculations, online tools (driving distance calculator http://www.worldatlas.com/travelaids/driving_distance.htm or published data on rail operator websites) are used to calculate an estimation of the distance covered.

Where emissions are calculated using the spend-based method, data is sourced from the BHP internal system that tracks all external spend, and emissions factors are sourced from the Quantis tool, as described for the *Purchased goods and services* category.

References

- *RightShip Carbon Accounting;* https://site.rightship.com/sustainability/carbon-accounting/
- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions v1.0 – Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *Greenhouse Gas Reporting: Conversion Factors 2018* (Freighting goods); UK Government Department for Business, Energy & Industrial Strategy; 2018; https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018
- *Ports.com;* www.ports.com
- *MarineTraffic;* www.marinetraffic.com
- *Worldatlas Driving Distance Mileage Calculator;* http://www.worldatlas.com/travelaids/driving_distance.htm
- *GHG Protocol Quantis Scope 3 Evaluator tool;* https://quantis-suite.com/Scope-3-Evaluator/

Category 5: Waste generated in operations			
Scope 3 Standard category description	Emissions from third-party disposal and treatment (in facilities not owned or controlled by the reporting company) of waste generated in the reporting company's operations in the reporting year.		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	Not applicable
Calculation status rationale	This category has been identified as not material to the scope 3 inventory for our business and an emissions figure is not calculated. BHP's operations do not generate waste resulting in GHG emissions other than minimal quantities of domestic waste. This assessment will be periodically reviewed.		

Scope 3 Standard emissions categories

Category 6: Business travel			
Scope 3 Standard category description	Emissions from the transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company).		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	0.1
Calculation status rationale	This is not a material source of scope 3 emissions in BHP's value chain, however a high-level estimate has been calculated for completeness and transparency.		

Calculation boundary

This category covers emissions from all domestic and international flights undertaken by employees for business travel purposes, as well as other purchased business travel services (hotel accommodation and car rental) as identified from annual spend data.

Exclusions

Emissions from business travel activities for which distance or spend data is not available are excluded.

Calculation methodology

For flights, the distance-based method as described in the Scope 3 Guidance is used to calculate these emissions, with industry average emissions factors applied based on whether the flight distance is categorised as being short, medium or long-haul.

For hotel accommodation and car rental, the spend-based method is used to calculate these emissions, as described in the calculation methodology for the *Purchased goods and services* category (category 1).

Data sources

Flight mileage data is sourced from BHP's corporate travel services provider.

Scope 3 emission factors for flights are sourced from the most recent *Center for Corporate Climate Leadership GHG Emission Factors Hub* published by the US EPA.

Hotel and car rental spend data is extracted from the BHP internal system that tracks all external spend.

Emissions factors for hotel and car rental spend are sourced from the Quantis tool, as described for the Purchased goods and services category.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (v1): Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *Center for Corporate Climate Leadership GHG Emission Factors Hub* (Table 8); US EPA; 2018; https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub
- *GHG Protocol Quantis Scope 3 Evaluator tool;* https://quantis-suite.com/Scope-3-Evaluator/

Category 7: Employee commuting			
Scope 3 Standard category description	Emissions from the transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company).		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	<0.1
Calculation status rationale	This is not a material source of scope 3 emissions in BHP's value chain, however a high-level estimate has been calculated for completeness and transparency.		

Calculation boundary

This category covers emissions from fly-in fly-out (FIFO) flights and mine site bus services utilised by employees for commuting purposes.

Exclusions

Emissions from employee commuting activities for which spend data is not available are excluded.

Calculation methodology

The spend-based method is used to calculate these emissions, as described in the calculation methodology for the *Purchased goods and services* category (category 1).

Data sources

FIFO flight and bus service spend data is extracted from the BHP internal system that tracks all external spend.

Emissions factors are sourced from the Quantis tool, as described for the *Purchased goods and services* category.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (v1): Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *GHG Protocol Quantis Scope 3 Evaluator tool;* https://quantis-suite.com/Scope-3-Evaluator/

Scope 3 Standard emissions categories

Category 8: Upstream leased assets			
Scope 3 Standard category description	Emissions from the operation of assets leased by the reporting company (lessee) in the reporting year and not included in scope 1 and scope 2 reported by lessee.		
Calculation status of FY2019 emissions in BHP's value chain	Not relevant, not calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	Not applicable
Calculation status rationale	An emissions figure is not calculated for this category as BHP does not lease upstream assets in the course of normal operations. This assessment will be periodically reviewed.		

Category 9: Downstream transportation and distribution			
Scope 3 Standard category description	Emissions from transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company).		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	4.0
Calculation status rationale	Although this is not a material source of scope 3 emissions in BHP's value chain , emissions associated with the freight of our products to customers are of increasing interest as a component of our value chain, and may contribute to the exposure of our business to climate-related risk.		

Calculation boundary

Because the Scope 3 Standard categorises scope 3 emissions as upstream or downstream on the basis of financial transactions, this category includes emissions from the transport of our products where freight costs are not covered by BHP (e.g. under Free on Board (FOB) or similar terms).

This category includes emissions from road, rail and marine freight (the latter accounting for over 95 per cent of the total).

Exclusions

None.

Calculation methodology

The distance-based method is used to calculate these emissions, as described in the calculation methodology for the *Upstream transportation and distribution* category (category 4).

Assumptions

For some FOB cargoes, destination ports are not known and an assumption is applied based on known product market locations by customer.

Data sources

Product transport data and emissions factors are sourced as described for the *Upstream transportation and distribution* category.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions v1.0 – Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *Greenhouse Gas Reporting: Conversion Factors 2018 (Freighting goods);* UK Government Department for Business, Energy & Industrial Strategy; 2018; https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018
- *Ports.com;* www.ports.com
- *MarineTraffic;* www.marinetraffic.com
- *Worldatlas Driving Distance Mileage Calculator;* http://www.worldatlas.com/travelaids/driving_distance.htm

Scope 3 Standard emissions categories

Category 10: Processing of sold products			
Scope 3 Standard category description	Emissions from the processing of intermediate products sold in the reporting year by downstream companies (e.g. manufacturers) subsequent to sale by the reporting company.		
Calculation status of FY2019 emissions in BHP's value chain	Material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	304.7
Calculation status rationale	Along with the *Use of sold products* category (category 11), this is a material source of scope 3 emissions in BHP's value chain.		

Calculation boundary

BHP produces a number of products that undergo third party processing resulting in GHG emissions, the most significant of which are:

- Iron ore, which is processed to steel. This is recognised as being an emissions-intensive process that is technologically difficult to decarbonise; it accounts for over 98 per cent of emissions in this category.
- Copper, which is processed to manufacture wire, sheets and tubes for a variety of end uses.

Emissions from the third party processing of these two products are estimated for this category.

Overlap in calculation boundaries

For BHP, scope 3 emissions reporting necessarily requires a degree of overlap in reporting boundaries due to our involvement at multiple points in the lifecycle of the commodities we produce and consume. A significant example of this is that emissions reported under this *Processing of sold products* category include the processing of our iron ore to steel, a third party activity that also consumes metallurgical coal as an input, a portion of which is produced by us. For reporting purposes, we account for scope 3 emissions from combustion of metallurgical coal with all other fossil fuels under the *Use of sold products* category, such that a portion of metallurgical coal emissions is accounted for under two categories. While in principle the emissions categories defined by the Scope 3 Standard are designed to be mutually exclusive, this double counting of emissions in our current scope 3 inventory is an expected outcome of emissions reporting between the different scopes and categories as applied in practice to a producer of raw materials, and is not considered to detract from the value of the scope 3 emissions reported for this category, or from the overall value of the scope 3 emissions disclosure for our business.

Similarly, the emissions factor used to calculate emissions from the processing of our copper products is for the full lifecycle of the selected copper end-product (copper wire), i.e. it is based on a cradle-to-grave assessment and includes all emissions associated with mining and extracting ore to create copper cathodes – as well as from the subsequent manufacturing to the end-product. This will necessarily include emissions from activities included within BHP's scope 1 and 2 emissions. This double counting is estimated to represent less than 1 per cent of the total emissions for this category. It is an expected outcome of emissions reporting between the different scopes defined under standard GHG accounting practices and is not considered to detract from the value of the scope 3 emissions reported for this category.

Exclusions

In addition to iron ore and copper, BHP also produces nickel, zinc, gold, silver, ethane and uranium oxide which are in some cases processed to meet a range of purposes. The variety of end uses associated with these products means applying a meaningful average emissions factor is challenging. In addition, the production volumes for these commodities – and associated emissions – are not significant compared to those for iron ore and copper. As a result, emissions from the downstream processing of these products have been excluded at this stage.

Emissions from the processing and refining of our petroleum products have also been excluded as these emissions are considered not material compared to the emissions from the end-use combustion of these products already reported under the *Use of sold products* category.

These exclusions will be periodically reviewed.

Calculation methodology

The average-data method as described in the Scope 3 Guidance is used to calculate these emissions, with industry-average emissions factors applied to production volumes (on an equity basis) for each commodity to calculate an overall emissions estimate for this category.

Refer to Appendix 1 for additional details of calculations for this *Processing of sold products category*.

Assumptions

To estimate emissions from the processing of iron ore, all iron ore production is assumed to be processed to steel.

To estimate emissions from the processing of copper, we apply an emissions factor for the processing of copper to copper wire (rather than alternative products such as tubes or sheets), as this is the most emissions-intensive process and therefore the most 'conservative' assumption.

Data sources

Production volumes are sourced from the BHP Operational Review for the year, with calculations performed on an equity basis.

For iron ore processing, key data sources are:

- An industry-average emissions factor is sourced from the most recent *Sustainability Indicators* report published by the World Steel Association. This emissions factor is based on data reported on a voluntary basis by steelmakers. Note that the crude steel produced by these reporting companies represents just over half of global production, allowing an industry-average emissions factor to be calculated based on route-specific CO_2 intensities for the major steelmaking routes (the integrated blast furnace (BF) and basic oxygen furnace (BOF) route; and the electric arc furnace (EAF) route), weighted based on the production share of each technology. As a result, the emissions factor may not accurately represent (geographically, technologically or temporally) the actual emissions intensities of our customers' facilities. It is considered, however, to be sufficiently representative of average industry conditions as to provide a meaningful estimation.
- The quantity of steel produced from the input quantity of iron ore is calculated using the 'tonnes of iron ore feedstock/tonne crude steel produced' ratio for the BF/BOF steelmaking route published in the World Steel Association publication *Sustainable Steel: At the core of the green economy*.

For copper processing, emissions factors are sourced from the European Copper Institute publication *The Environmental Profile of Copper Products*. This study is based on European operations and hence will be impacted by the local electricity emissions intensity and other factors, however it is considered to provide a reasonable estimation.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions v1.0 – Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *BHP Operational Review for the year ended 30 June 2019;* BHP; 2019; https://www.bhp.com/media-and-insights/news-releases/2019/07/bhp-operational-review-for-the-year-ended-30-june-2019
- *Sustainability Indicators 2003–2017* (page 1); World Steel Association; 2018; https://www.worldsteel.org/en/dam/jcr:6315d64c-c3a9-460b-8f80-dcbeaeaac5c4/ Indicator%2520data%25202003%2520to%25202017%2520and%2520relevance.pdf
- *Sustainable Steel: At the core of a green economy* (page 18); World Steel Association; 2012; https://www.worldsteel.org/publications/bookshop/product-details.~Sustainable-steel--At-the-core-of-a-green-economy~PRODUCT~sustainability2012~.html
- *The Environmental Profile of Copper Products – A 'cradle-to-gate' life-cycle assessment for copper tube, sheet and wire produced in Europe (page 7);* European Copper Institute; 2012; https://copperalliance.eu/resources/environmental-profile-copper-products-cradle-gate-life-cycle-assessment-copper-tube-sheet-wire-produced-europe/

Scope 3 Standard emissions categories

Category 11: Use of sold products			
Scope 3 Standard category description	Emissions from the end use of goods and services sold by the reporting company in the reporting year.		
Calculation status of FY2019 emissions in BHP's value chain	Material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	232.7
Calculation status rationale	Along with the *Processing of sold products* category (category 10), this is a material source of scope 3 emissions in BHP's value chain.		

Calculation boundary

BHP produces metallurgical coal, energy coal, natural gas and petroleum products, all of which release GHG emissions when consumed by end users. Emissions from the end use of these products by third parties are estimated for this category.

Overlap in calculation boundaries

As described under the *Processing of sold products* category, there is an element of double counting across the *Processing of sold products* and *Use of sold products* emissions categories for our iron ore and metallurgical coal products, both of which are used in the same process (steelmaking) further downstream, which inflates the total scope 3 emissions figure.

Similarly, emissions reported under this *Use of sold products* category include downstream emissions from the consumption of the energy coal, natural gas and petroleum products we produce. A small portion of these is consumed within BHP's own operations, and therefore these emissions are also included within our scope 1 and 2 inventory.

Exclusions

None.

Calculation methodology

The method recommended in the Scope 3 Guidance for 'direct use-phase' emissions calculations for 'Fuels and feedstocks' is used to calculate these emissions, with industry-average emissions factors applied to production volumes (on an equity basis) for each commodity to calculate an overall emissions estimate for this category.

Refer to Appendix 2 for additional details of calculations for this *Use of sold products* category.

Assumptions

All metallurgical coal, energy coal, natural gas and petroleum products are assumed to be combusted.

In practice, metallurgical coal is primarily used in steelmaking and a portion of the carbon content remains embedded in the final steel product and is not released to the atmosphere; the quantities involved vary according to the feedstocks, processing technologies and output specifications of the process route used.

All energy coal is assumed to be bituminous (which has a mid-range energy content among the three sub-categories of black coal (the others being sub-bituminous coal and anthracite) listed in the *Australian National Greenhouse and Energy Reporting (NGER) Measurement Determination* published by the Australian government (Australian NGER Determination), from which these emissions factors are sourced.

All crude oil and condensates are assumed to be refined and combusted as diesel (rather than alternative products such as gasoline) as the most emissions-intensive therefore most conservative assumption. The energy content of the crude oil and condensates volumes is used to estimate the corresponding quantity of diesel which would be produced, assuming that no fuel is 'lost' during the refining process.

Emissions from LPG and ethane volumes are included in emissions reported for 'natural gas liquids' (NGL) production and are assumed to be combusted with the same NGL emission factors; this assumption has minimal impact on estimated emissions due to the small volumes involved.

Data sources

Production volumes are sourced from the BHP Operational Review for the year, with calculations performed on an equity basis.

Emissions factors are sourced from the Australian NGER Determination published by the Australian government, with the scope 1 emissions factors given for each fuel applied as the scope 3 emissions factor for the use of BHP's sold products.

Produced crude oil and condensate volumes are converted to tonnes using conversion tools published by Global Tech Australia.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions v1.0 – Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *BHP Operational Review for the year ended 30 June 2019;* BHP; 2019; https://www.bhp.com/media-and-insights/news-releases/2019/07/bhp-operational-review-for-the-year-ended-30-june-2019
- *National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018; https://www.legislation.gov.au/Series/F2008L02309
- *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal); http://www.globaltechaustralia.com.au/conversion-tools/

Scope 3 Standard emissions categories

Category 12: End-of-life treatment of sold products			
Scope 3 Standard category description	Emissions from the waste disposal and treatment of products sold by the reporting company in the reporting year at the end of their life.		
Calculation status of FY2019 emissions in BHP's value chain	Not material, not calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	Not applicable
Calculation status rationale	This category has been identified as not material to the scope 3 inventory for our business and an emissions figure is not calculated. BHP's products that are not incorporated into the assessment of scope 3 emissions in the *Use of sold products* category (category 11) include metals and minerals with minimal emissions at end of life. This assessment will be periodically reviewed.		

Category 13: Downstream leased assets			
Scope 3 Standard category description	Emissions from the operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in scope 1 and scope 2 reported by lessor.		
Calculation status of FY2019 emissions in BHP's value chain	Not relevant, not calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	Not applicable
Calculation status rationale	An emissions figure is not calculated for this category as BHP does not lease downstream assets in the course of normal operations. This assessment will be periodically reviewed.		

Category 14: Franchises			
Scope 3 Standard category description	Emissions from the operation of franchises in the reporting year, not included in scope 1 and scope 2 reported by franchisor.		
Calculation status of FY2019 emissions in BHP's value chain	Not relevant, not calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	Not applicable
Calculation status rationale	An emissions figure is not calculated for this category as BHP does not have franchised operations. This assessment will be periodically reviewed.		

Category 15: Investments			
Scope 3 Standard category description	Emissions associated with the operation of the reporting company's investments (including equity and debt investments and project finance) in the reporting year, not already included in scope 1 or scope 2.		
Calculation status of FY2019 emissions in BHP's value chain	Not material, calculated	**FY2019 emissions in BHP's value chain (million tonnes CO_2-e)**	3.1
Calculation status rationale	Although this is not a material source of scope 3 emissions in BHP's value chain, emissions associated with BHP's investments are relevant in that they contribute to the exposure of our business to climate-related risk.		

Calculation boundary

For BHP, this category covers the scope 1 and 2 emissions (on an equity basis) from our assets that are owned as a joint venture but not operated by BHP. (The Scope 3 Standard categorises this as a downstream category as the provision of capital or financing is framed as a service provided by BHP.)

Our non-operated minerals joint ventures and petroleum non-operated assets relevant to the FY2019 reporting year are described in our Annual Report 2019. Additional investments are added, and divestments removed, each year as appropriate.

Exclusions

None.

Calculation methodology

The accounting approach for 'equity investments' as described in the Scope 3 Guidance is used to calculate these emissions.

Data sources

Estimates of scope 1 and 2 emissions for each investment (which form the basis of scope 3 emissions in BHP's value chain) are sourced from publicly available information in the first instance. The following key sources are consulted for each investment, noting that emissions information must be available at the facility/asset level corresponding to BHP's investment: most recent government-published data from mandatory or voluntary reporting programs in place in the country, state or region; most recent reports published by the operating entity e.g. sustainability and annual reports; and other sources if identified through desktop research.

If the most recent available emissions figure for an investment is for a previous reporting year, it is adjusted for the current year's production levels; this approach covered approximately 90 per cent of the emissions reported for this category.

For those investments for which no publicly available emissions data is available, the emissions intensity from a similar operation in BHP's portfolio is applied to the current year's production to calculate an emissions estimate.

Where required, production volumes from investments are sourced from the BHP Operational Review for the year.

References

- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions v1.0 – Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *BHP Operational Review for the year ended 30 June 2019;* BHP; 2019; https://www.bhp.com/media-and-insights/news-releases/2019/07/bhp-operational-review-for-the-year-ended-30-june-2019
- *Sustainability Report 2017* (page 89); Antamina; https://www.antamina.com/reporte-sostenibilidad-2017/
- *Safeguard facility reported emissions 2017–2018;* Australian Government; 2019; http://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/safeguard-facility-reported-emissions/safeguard-facility-emissions-2017-18
- *FLIGHT (Facility Level Information on Greenhouse gases Tool);* USA EPA; https://ghgdata.epa.gov/ghgp/main.do

Glossary[5]

Activity data	A quantitative measure of a level of activity that results in GHG emissions. Activity data is multiplied by an emissions factor to derive the GHG emissions associated with a process or an operation. Examples of activity data include kilowatt-hours of electricity used, quantity of fuel used, output of a process, hours equipment is operated, distance travelled, and floor area of a building.
Capital goods	Final goods that have an extended life and are used by the company to manufacture a product, provide a service, or sell, store, and deliver merchandise. In financial accounting, capital goods are treated as fixed assets or plant, property and equipment (PP&E). Examples of capital goods include equipment, machinery, buildings, facilities, and vehicles.
CO_2-equivalent (CO_2-e)	The universal unit of measurement to indicate the global warming potential (GWP) of each greenhouse gas, expressed in terms of the GWP of one unit of carbon dioxide. It is used to evaluate releasing (or avoiding releasing) different greenhouse gases against a common basis.
Cradle-to-gate	All emissions that occur in the lifecycle of purchased products, up to the point of receipt by the reporting company (excluding emissions from sources that are owned or controlled by the reporting company).
Direct emissions	Emissions from sources that are owned or controlled by the reporting company.
Direct use-phase emissions	Emissions that occur directly (i.e. the scope 1 and scope 2 emissions of the end users) from the use of the following sold products over their expected lifetime: products that directly consume energy (fuels or electricity) during use (e.g. vehicles); fuels and feedstocks (e.g. combustion of petroleum products, natural gas, coal, biofuels, and crude oil); and GHGs and products that contain or form GHGs that are emitted during use (e.g. refrigeration and air-conditioning equipment). See also the definition for "indirect use-phase emissions" below.
Downstream emissions	Indirect GHG emissions from sold goods and services. Downstream emissions also include emissions from products that are distributed but not sold (i.e. without receiving payment).
Emissions factor	A factor that converts activity data into GHG emissions data (e.g. kg CO_2-e emitted per litre of fuel consumed, kg CO_2-e emitted per kilometre travelled).
Equity share approach	A consolidation approach whereby a company accounts for GHG emissions from operations according to its share of equity in the operation. The equity share reflects economic interest, which is the extent of rights a company has to the risks and rewards flowing from an operation. See also the definition for "Operational control approach" below.
Global warming potential (GWP)	A factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GHG relative to one unit of CO_2.
Greenhouse gases (GHG)	For the purposes of the Scope 3 Standard, GHGs are the six gases covered by the UNFCCC: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF_6).
Indirect emissions	Emissions that are a consequence of the activities of the reporting company, but occur at sources owned or controlled by another company.

5 Definitions provided are taken from the Scope 3 Standard.

Indirect use-phase emissions	Emissions from the use of sold products over their expected lifetime that indirectly consume energy (fuels or electricity) during use (e.g. apparel (requires washing and drying), food (requires cooking and refrigeration)). See also the definition for "direct use-phase emissions" above.
Lifecycle	Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to end of life.
Materiality	Concept that individual or the aggregation of errors, omissions and misrepresentations could affect the GHG inventory and could influence the intended users' decisions.
Operational boundaries	The boundaries that determine the direct and indirect emissions associated with operations owned or controlled by the reporting company.
Operational control approach	A consolidation approach whereby a company accounts for 100 per cent of the GHG emissions over which it has operational control (a company is considered to have operational control over an operation if it or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation). It does not account for GHG emissions from operations in which it owns an interest but does not have operational control. See also the definition for "Equity share approach" above.
Organisational boundaries	The boundaries that determine the operations owned or controlled by the reporting company, depending on the consolidation approach taken (equity or control approach).
Primary data	Data from specific activities within a company's value chain.
Process	A set of interrelated or interacting activities that transforms or transports a product.
Proxy data	Data from a similar process or activity that is used as a stand-in for the given process or activity without being customized to be more representative of the given process or activity.
Scope 1 emissions	Emissions from operations that are owned or controlled by the reporting company.
Scope 2 emissions	Emissions from the generation of purchased or acquired electricity, steam, heating or cooling consumed by the reporting company.
Scope 3 emissions	All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.
Scope 3 category	One of the 15 types of scope 3 emissions defined by the Scope 3 Standard.
Secondary data	Data that is not from specific activities within a company's value chain.
Upstream emissions	Indirect GHG emissions from purchased or acquired goods and services.
Value chain	Refers to all of the upstream and downstream activities associated with the operations of the reporting company, including the use of sold products by consumers and the end-of-life treatment of sold products after consumer use.

References

- *Addressing greenhouse gas emissions beyond our operations: Understanding the 'scope 3' footprint of our value chain;* BHP; 2018; https://www.bhp.com/media-and-insights/prospects/2018/08/addressing-greenhouse-gas-emissions-beyond-our-operations
- *Center for Corporate Climate Leadership GHG Emission Factors Hub* (Table 8); US EPA; 2018; https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub
- *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures (June 2017);* Task Force on Climate-related Financial Disclosures; 2017; https://www.fsb-tcfd.org/publications/final-recommendations-report/
- *FLIGHT (Facility Level Information on Greenhouse gases Tool);* USA EPA; https://ghgdata.epa.gov/ghgp/main.do
- *GHG Protocol Corporate Accounting and Reporting Standard;* WRI/WBCSD; 2004; http://ghgprotocol.org/corporate-standard
- *GHG Protocol Quantis Scope 3 Evaluator tool;* https://quantis-suite.com/Scope-3-Evaluator/
- *GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2011; http://ghgprotocol.org/standards/scope-3-standard
- *GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (v1): Supplement to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard;* WRI/WBCSD; 2013; https://ghgprotocol.org/scope-3-technical-calculation-guidance
- *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal); http://www.globaltechaustralia.com.au/conversion-tools/
- *Greenhouse Gas Reporting: Conversion Factors 2018 (Freighting goods);* UK Government Department for Business, Energy & Industrial Strategy; 2018; https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018
- *MarineTraffic;* www.marinetraffic.com
- *National Greenhouse Accounts Factors – July 2018* (Tables 37 to 41); Australian Government Department of the Environment and Energy; 2018; https://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/publications/national-greenhouse-accounts-factors-july-2018
- *National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018; https://www.legislation.gov.au/Series/F2008L02309
- *Ports.com;* www.ports.com
- *RightShip Carbon Accounting;* https://site.rightship.com/sustainability/carbon-accounting/
- *Safeguard facility reported emissions 2017–2018;* Australian Government; 2019; http://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/safeguard-facility-reported-emissions/safeguard-facility-emissions-2017-18
- *Sustainability Report 2017* (page 89); Antamina; https://www.antamina.com/reporte-sostenibilidad-2017/
- *Sustainability Report 2019;* BHP; https://www.bhp.com/
- *Sustainable Steel: At the core of a green economy* (page 18); World Steel Association; 2012; https://www.worldsteel.org/publications/bookshop/product-details.~Sustainable-steel--At-the-core-of-a-green-economy~PRODUCT~sustainability2012~.html
- Sustainability Indicators 2003–2017 (page 1); World Steel Association; 2018; https://www.worldsteel.org/en/dam/jcr:6315d64c-c3a9-460b-8f80-dcbeaeaac5c4/Indicator%2520data%25202003%2520to%25202017%2520and%2520relevance.pdf
- *The Environmental Profile of Copper Products – A 'cradle-to-gate' life-cycle assessment for copper tube, sheet and wire produced in Europe* (page 7); European Copper Institute; 2012; https://copperalliance.eu/resources/environmental-profile-copper-products-cradle-gate-life-cycle-assessment-copper-tube-sheet-wire-produced-europe/
- *Worldatlas Driving Distance Mileage Calculator;* http://www.worldatlas.com/travelaids/driving_distance.htm

Appendix

Appendix 1: Processing of sold products calculations

Item	Quantity	Units	Comment
Processing iron ore to steel			
FY2019 iron ore production	229,182,100	tonnes	*Reference sources* • *BHP Operational Review for the year ended 30 June 2019* *Assumptions* • Assumed that production volumes approximate sales volumes; small year-end inventory volumes will be smoothed out over year-on-year calculations.
Conversion factor	1.4	tonnes iron ore feedstock per tonne crude steel	*Reference sources* • *Sustainable Steel: At the core of a green economy (page 18); World Steel Association; 2012* *Assumptions* • Conversion factor used is for the integrated blast furnace (BF) and basic oxygen furnace (BOF) steelmaking route.
Crude steel produced	163,701,500	tonnes	*Assumptions* • Assumed that all iron ore sold is converted to crude steel.
Emissions factor	1.83	tonnes of CO_2 per tonne crude steel cast	*Reference sources* • *Sustainability Indicators 2003–2017 (page 1); World Steel Association; 2018;* https://www.worldsteel.org/en/dam/jcr:6315d64c-c3a9-460b-8f80-dcbeaeaac5c4/Indicator%2520data%25202003%2520to%25202017%2520and%2520relevance.pdf
FY2019 emissions	299,573,745	tonnes CO_2-e	
Manufacturing copper to copper wire			
FY2019 copper production	1,206,798	tonnes	*Reference sources* • BHP Operational Review for the year ended 30 June 2019 *Assumptions* • Assumed that production volumes approximate sales volumes; small year-end inventory volumes will be smoothed out over year-on-year calculations.
Conversion factor	1.0	tonnes copper feedstock per tonne copper end-use product	*Assumptions* • Copper end-use products are generally extruded/reshaped forms of the feedstock metal. A one-to-one conversion is therefore assumed.
Copper end-use product produced	1,206,798	tonnes	*Assumptions* • Assume all copper produced is manufactured into copper wire.

Item	Quantity	Units	Comment
Manufacturing copper to copper wire (continued)			
Emissions factor	4.2	tonnes CO_2-e per tonne copper wire produced	*References sources* • *The Environmental Profile of Copper Products – A 'cradle-to-gate' life-cycle assessment for copper tube, sheet and wire produced in Europe (page 7); European Copper Institute; 2012* *Assumptions* • The life cycle emissions factor for the copper wire end-product has been used. Copper wire manufacture primarily uses copper cathode as the raw material while the other end-uses (sheets or tubes) can often include significant quantities of remelted scrap metal, lowering the emissions associated with manufacture. Choice of this emissions factor therefore represents a 'conservative' assumption that will provide a high-side estimation of emissions in BHP's value chain from this process. • This emissions factor is based on a cradle-to-grave assessment and includes all emissions associated with mining and extracting ore to create copper cathodes, as well as subsequent manufacturing into copper wires. The study notes the dominance of the mining and extraction steps of the copper lifecycle in the total emissions calculated, which BHP already reports within its scope 1 and 2 emissions inventory. Due to this double counting, the choice of this emissions factor represents a 'conservative' assumption that will provide a high-side estimation of emissions in BHP's value chain from this process. • This study is based on European operations and hence will be impacted by the local electricity emissions intensity and other factors, however it is considered to provide a reasonable estimation.
FY2019 emissions	5,114,007	tonnes CO_2-e	
Processing of sold products total			
FY2019 emissions	304.7 million tonnes CO_2-e		

Appendix 2: Use of sold products calculations

Commodity	FY2019 production	Production units	FY2019 production (converted)	Converted production units	Energy content (GJ per production unit)	Energy content of sold products (GJ)	Emissions factor (kg CO_2-e per GJ)	Emissions (tonnes CO_2-e)
Crude oil & condensates	53,707,000	barrels	7,325,635	tonnes	45.3	331,851,256	70.2	23,295,958
Comment *Reference sources* • *Production: BHP Operational Review for the year ended 30 June 2019* • Conversion factor: *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal) • Energy content & emission factors: *NGER Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018 *Assumptions* • All energy produced as crude oil/condensates combusted as diesel for stationary energy purposes. • Crude oil energy content is applied to convert to the equivalent amount of energy embedded in the refined diesel product, and diesel emission factors applied to calculate the resulting emissions.								
Natural gas liquids (NGLs)	11,394,000	barrels	982,163	tonnes	46.5	45,670,570	61.3	2,799,606
Comment *Reference sources* • *Production: BHP Operational Review for the year ended 30 June 2019* • Conversion factor: *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal) • Energy content & emission factors: *NGER Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018 *Assumptions* • Includes LPG and ethane combined. There is no breakdown between the two products available, so conservatively assumed that all NGLs are combusted.								
Natural gas	493	bcf	13,957,560,000	m^3	0.0393	548,532,108	51.53	28,265,860
Comment *Reference sources* • *Production: BHP Operational Review for the year ended 30 June 2019* • Conversion factor: *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal) • Energy content & emission factors: *NGER Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018 *Assumptions* • All natural gas produced is combusted for stationary energy purposes.								

Commodity	FY2019 production	Production units	FY2019 production (converted)	Converted production units	Energy content (GJ per production unit)	Energy content of sold products (GJ)	Emissions factor (kg CO_2-e per GJ)	Emissions (tonnes CO_2-e)
Metallurgical coal	40,348,000	tonnes	40,348,000	tonnes	30	1,210,440,000	92.02	111,384,689

Comment

Reference sources

- *Production: BHP Operational Review for the year ended 30 June 2019*
- Conversion factor: *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal)
- Energy content & emission factors: *NGER Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018

Assumptions

- All coking coal produced is combusted.

Energy coal	27,487,000	tonnes	27,487,000	tonnes	27	742,149,000	90.23	66,964,104

Comment

Reference sources

- *Production: BHP Operational Review for the year ended 30 June 2019*
- Conversion factor: *Global Tech Australia – Conversion tables* (Table 2 – Petroleum and coal)
- Energy content & emission factors: *NGER Measurement Determination 2008 (as amended July 2018)* (Schedule 1 Part 1); Australian Government; 2018

Assumptions

- All energy coal produced is bituminous and is combusted.

Use of sold products total	
FY2019 emissions	232.7 million tonnes CO_2-e

BHP