

BHP

**Scope 1, 2 and 3 GHG
emissions calculation
methodology**

2022

**Bringing people and
resources together to
build a better world**

In this report:

Organisational boundary	4
Energy consumption	5
Scope 1 emissions – operated assets	5
Scope 2 emissions – operated assets	7
Scope 1 and Scope 2 emissions – non-operated assets	8
Operational GHG emissions (including carbon offsets)	9
Operational GHG emissions (Scope 1 and Scope 2) targets	9
Scope 3 emissions categories	11
Scope 3 goals and targets	11
Overlap in Scope 3 calculation boundaries	12
Scope 3 Standard emissions categories	13
Category 1: Purchased goods and services (including capital goods)	13
Category 2: Capital goods	13
Category 3: Fuel and energy related activities	14
Category 4: Upstream transportation and distribution	14
Category 5: Waste generated in operations	15
Category 6: Business travel	16
Category 7: Employee commuting	16
Category 8: Upstream leased assets	16
Category 9: Downstream transportation and distribution	17
Category 10: Processing of sold products	17
Category 11: Use of sold products	19
Category 12: End-of-life treatment of sold products	20
Category 13: Downstream leased assets	20
Category 14: Franchises	20
Category 15: Investments	21
Glossary	22
References	24
Appendix	25
Appendix 1: Processing of sold products (steelmaking) calculations	26
Appendix 2: Use of sold products calculations	28

About this document

This document describes the calculation boundaries, methodologies, assumptions and key references used in the preparation of BHP's reported inventory of Scope 1, Scope 2 and Scope 3 greenhouse gas (GHG) emissions for FY2022, as published in the BHP Annual Report 2022 and BHP ESG Standards and Databook 2022, available at bhp.com/climate.

GHG emissions for our business are calculated using methodologies consistent with the Greenhouse Gas (GHG) Protocol: A Corporate Accounting and Reporting Standard, with reference to the additional guidance provided in the GHG Protocol: Scope 2 Guidance (amendment to GHG Protocol), GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard) and GHG Protocol Technical Guidance for

Calculating Scope 3 Emissions (Scope 3 Guidance) as appropriate.¹

We have also reviewed GHG emissions guidance across a range of other standards in preparing the disclosures, including the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Inventories, International Standard ISO 14064-1 and the Sustainability Accounting Standards Board (SASB).

This document, in combination with the published data on Scope 1, Scope 2 and Scope 3 emissions in relation to our business, meets the disclosure requirements of the Global Reporting Initiative (GRI) standard GRI 305.² Our 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'.

Changes from prior year

GHG emissions reporting area	Details of change
Scope 1 and Scope 2 emissions – Caval Ridge fugitive emissions (BHP Mitsubishi Alliance, Queensland, Australia)	In FY2022, the Caval Ridge operation moved to a facility-specific emissions calculation methodology for fugitive emissions as detailed in Australia's National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 (Method 2 – extraction of coal). Previously, default factors were used as provided in the NGER (Measurement) Determination 2008 (Method 1 – extraction of coal) for open-cut coal mines located in Queensland, Australia.
Scope 1 and Scope 2 emissions – equity share accounting	In FY2022, we improved the equity share accounting approach for our Minerals Americas assets in Chile to better reflect the overall net emissions position between our non-operated Kelar power generation facility (Kelar) and operated Escondida and Pampa Norte assets. We refined the emissions reporting boundaries for Tamakaya Energía SpA (Kelar) to allocate emissions associated with spot power purchased by the asset to the Scope 2 category. Previously, these emissions were combined with Kelar's power generation activity emissions under Scope 1. In addition, for our equity share GHG emissions inventory, we amended the adjustment made to Escondida's and Pampa Norte's Scope 2 emissions to more accurately exclude emissions from electricity generated and supplied by Kelar (noting these emissions are included in our equity share GHG emissions inventory under Kelar's Scope 1 and Scope 2 emissions).
Scope 3 emissions from purchased goods and services	In FY2022, we piloted switching the emissions estimation of high-spend goods from select categories (including explosives, grinding media, conveyor belts, tyres and select bulk materials) from spend-based emission factors to industry average quantity-based emission factors or emission factors sourced directly from suppliers. These changes are intended to improve the accuracy of the GHG emissions estimate. We have restated FY2021 and FY2020 emissions for this category to allow for comparability.
Scope 3 emissions from upstream transportation and distribution	In FY2022, we successfully developed and operationalised a carbon accounting and decision support system tailored to ship chartering, leveraging DNV's Veracity platform. In FY2022, we also added emissions associated with inbound freight to this category of purchased goods that we transitioned to a quantity method in the 'Purchased goods and services (including capital goods)' category. These changes resulted in a restatement of our maritime emissions in the 'Upstream transportation and distribution' category in FY2021 and FY2020 to allow for comparability.
Scope 3 emissions from processing of sold products	In FY2022, we updated our approach to estimating GHG emissions from the downstream processing of our copper products, and developed a new methodology for estimating emissions of our nickel products. We increased the granularity of calculations for downstream emissions associated with the processing of our copper products. We now split our product volumes into copper concentrates that are processed into cathodes by third parties and our own copper cathodes, which are assumed to be processed into copper semi-fabricated products. This has also removed the double counting of our Scope 1 and Scope 2 emissions previously present in our calculations. These changes resulted in a restatement of copper processing in the 'Processing of sold products' category for FY2021 and FY2020. We also began reporting downstream Scope 3 emissions for nickel processing to increase transparency as our nickel business grows to be sufficiently material to report. Our methodology accounts for battery and non-battery products' downstream emissions.
Scope 3 emissions from downstream transportation and distribution	In FY2022, we successfully developed and operationalised a carbon accounting and decision support system tailored to ship chartering, leveraging DNV's Veracity platform. This resulted in a restatement of our maritime emissions in the 'Downstream transportation and distribution' category in FY2021 and FY2020 to allow for comparability.

¹ The GHG Protocol Corporate Accounting and Reporting Standard, Scope 2 Guidance, 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 GHG emissions inventories.

² 'Disclosure 305-1: Direct (Scope 1) GHG emissions', 'Disclosure 305-2: Energy indirect (Scope 2) GHG emissions', 'Disclosure 305-3: Other indirect (Scope 3) GHG emissions'.

Greenhouse Gas 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 GHG emissions from the generation of purchased energy consumed by a company (e.g. GHG emissions from electricity BHP buys from the grid for use at our mine sites).

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

Organisational boundary

BHP develops Scope 1 and Scope 2 emissions totals based on the following organisational consolidation approaches to boundaries, consistent with the GHG Protocol Corporate Accounting and Reporting Standard definitions:

- **Operational control approach:** We account for 100 per cent of Scope 1 and Scope 2 emissions from operations over which BHP (including any one or more subsidiaries in the BHP group of companies) has operational control, but not for GHG emissions from operations in which BHP owns an interest but does not have operational control.
- **Financial control approach:** We account for Scope 1 and Scope 2 emissions based on the accounting treatment in BHP's Consolidated Financial Statements, as follows:
 - 100 per cent for operations accounted for as subsidiaries, regardless of equity interest owned
 - for operations accounted for as a joint operation, BHP's interest in the operation
 - GHG emissions are excluded for operations that are accounted for using the equity method in BHP's Financial Statements
- **Equity share approach:** We account for BHP's equity share of Scope 1 and Scope 2 emissions for all operations in which BHP owns an interest.

Scope 3 emissions are the indirect GHG emissions resulting from activities in our value chain or from our investments outside of our Scope 1 and Scope 2 operational control approach emissions. We currently use the equity share approach to define the organisational boundary for the downstream portion of our Scope 3 emissions inventory. For upstream categories, however, the boundary is currently defined on a category-by-category basis due to data limitations. For more information about the boundary approach, refer to the methodology for each category.

When considering the different inventories reported under different boundary definitions, it should be noted that non-operated asset GHG emissions are also included under the Scope 1 and Scope 2 financial control and equity share emissions where relevant criteria are met as described above.

We present GHG emissions data inclusive of divestments up to the date of the divestment, unless otherwise specified. This applies to Scope 1, Scope 2 and Scope 3 reported emissions.

Verification

EY was engaged by BHP to provide reasonable assurance over Scope 1 and Scope 2 emissions and progress against climate change targets as reported in the BHP Annual Report 2022 and the ESG Standards and Databook 2022.

EY provided limited assurance over Scope 3 emissions reported in the BHP Annual Report 2022 and the ESG Standards and Databook 2022.

For more information refer to 7.19 'Independent limited assurance report' of the BHP Annual Report 2022 available at [bhp.com](https://www.bhp.com).

Energy consumption

Definition

Energy consumed in activities under BHP's operational control (petajoules).

Calculation boundary

We account for 100 per cent of energy consumed at operations over which BHP has operational control, but not for energy consumption at operations in which BHP owns an interest but does not have operational control. This includes all fuels and electricity consumed in the operation of vehicles and machinery, onsite heat, steam or electricity generation activities, as a chemical or process feedstock, or any other purpose.

This aligns with the organisational boundary used to report operational GHG emissions, as defined in the 'Organisational boundary' section of this document.

Calculation methodology

BHP's operated assets record energy consumption quantities by fuel type (e.g. diesel, natural gas) throughout the year, using sources such as supplier invoices, metering, stockpile changes and other industry standard practices. All fuel quantities are converted to energy-based units using energy content factors specific to each fuel (e.g. gigajoules per kilolitre for diesel), sourced from appropriate references. Electricity quantities are not required to be converted, as consumption is recorded in energy-based units by definition. These quantities are recorded in BHP's internal system and subject to review and approval processes prior to finalisation.

Operated assets already reporting under mandatory local regulatory programs are required to use the same energy content factors for reporting fuels under BHP's operational control boundary. This ensures a single energy consumption inventory is maintained for consistency and efficiency. Local regulatory programs are applicable to the majority of BHP's operated assets, as listed in the Scope 1 emissions – operated assets section of this document.

In the absence of mandatory local regulations, Australia's National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 has been set as the default source for factors and methodologies for consistency.

Scope 1 emissions – operated assets

Definition

GHG emissions released from activities under BHP's operational control (million tonnes carbon dioxide-equivalent (MtCO₂-e)).

Calculation boundary

We account for GHG emissions arising from our activities under three organisational boundaries – operational control, financial control and equity share, as described in the Organisational boundary section of this document.

For BHP's operated assets included in each of these organisational boundaries, we account for all carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulphur hexafluoride (SF₆), nitrogen trifluoride (NF₃) and hydrofluorocarbon (HFC) emissions i.e. all relevant GHG emissions listed under the United Nations Framework Convention on Climate Change and the Kyoto Protocol (perfluorocarbon emissions, largely associated with the aluminium sector, are excluded as they are not considered relevant to our activities). All GHGs are expressed in CO₂-e quantities based on global warming potentials (GWP) sourced from the Intergovernmental Panel on Climate Change (IPCC) (refer to the Glossary for a definition of GWP factors). BHP currently uses GWP from the IPCC Assessment Report 5 (AR5) across all operated assets.

Scope 1 emissions are calculated for all relevant sources including:

- combustion of fossil fuels for energy
- use of fossil fuels as a feedstock to a chemical process producing GHGs as a by-product (e.g. the process to produce nickel matte at our Kalgoorlie smelter)
- fugitive release of GHGs from extraction of natural resources, such as methane drainage from coal mines or oil production facilities

Calculation methodology

BHP's operated assets record Scope 1 emissions by source throughout the year, using methodologies and emission factors appropriate to each source as follows:

- **GHG emissions from combustion of fossil fuels for energy:** These GHG emissions are calculated by multiplying the quantity of fuel consumed by the applicable emission factor for the fuel (e.g. tonnes CO₂-e/kilolitre diesel), sourced from appropriate references or, in some cases, from fuel sampling and analysis.
- **GHG emissions from use of fossil fuels as a feedstock to a chemical process:** These GHG emissions are calculated using 'carbon balance' methodologies sourced from appropriate references, involving estimation of the total carbon content of inputs to the process and total carbon content of products and by-products from the process. The difference in carbon content is assumed to be converted to CO₂ through the process. Methodologies and carbon contents for inputs and products are sourced from appropriate references.
- **GHG emissions from immaterial sources:** In instances where calculation of GHG emissions is overly onerous given the immateriality of the source to the facility's total emissions, it may be estimated using a simplified approach for efficiency.
- **'Fugitive' emissions from extraction of natural resources:** These GHG emissions are either metered directly (e.g. at gas flare points on offshore oil and gas platforms) or calculated using source-specific methodologies and emission factors based on the characteristics of the resource. The methods used to measure fugitive emissions at BHP-operated coal operations are listed below. These methods are periodically reviewed and may change in the future.

Asset	Operation	Type	Measurement method for coal mine fugitive emissions (NGER (Measurement) Determination 2008)	
BHP Mitsubishi Alliance	Blackwater	Open-cut	Method 1 – Default emission factor applied to run of mine coal extraction.	
	Broadmeadow	Underground	Gas drainage (flared)	Method 1 – Default emission factors applied to measured quantities of gas flared.
			Gas drainage (vented)	Method 4 – The direct measurement of emissions released from the drainage of coal mine gas using continuous monitoring of the gas stream.
			Underground ventilation	Method 4 – The direct measurement of emissions released from the extraction of coal using continuous and periodic monitoring of the gas stream.
			Post-mining coal handling	Method 1 – Default emission factor applied to run of mine coal extraction.
	Caval Ridge	Open-cut	Method 2 – Quantities of fugitive emissions contained in coal extracted calculated based on measured in-situ gas content and composition.	
	Daunia	Open-cut		
	Goonyella Riverside	Open-cut		
	Peak Downs	Open-cut		
	Saraji	Open-cut		
New South Wales Energy Coal	Mt Arthur Coal	Open-cut	Method 1 – Default emission factor applied to run of mine coal extraction.	
BHP Mitsui Coal ³	Poitrel	Open-cut		
	South Walker Creek	Open-cut	Method 1 – Default emission factor applied to run of mine coal extraction.	

Scope 1 emissions for facilities already reporting under mandatory local regulatory programs are required to use the same emission factors and methodologies for reporting under BHP's operational control boundary. This ensures that a single GHG emissions inventory is maintained for consistency and efficiency. Local regulatory programs are applicable to the majority of BHP's Scope 1 emissions inventory within our operational control boundary, as listed in the table below.

A local regulatory program in this context refers to any scheme requiring GHG emissions to be calculated using mandated references (e.g. the Green Tax legislation in Chile, which requires GHG emissions to be calculated using the IPCC factors) or mandated factors (e.g. the Australian NGER or US Greenhouse Gas Reporting Program (GHGRP), which publish factors specific to the programs).

³ BHP Mitsui Coal emissions are presented until date of divestment (sale completed on 3 May 2022).

In the absence of mandatory local regulations, the Australian NGER (Measurement) Determination has been set as the default source for factors and methodologies for consistency with the majority of the GHG emissions inventory.

Asset	Location	Local regulations
BHP Mitsubishi Alliance (BMA), BHP Mitsui Coal (BMC), New South Wales Energy Coal (NSWEC), Olympic Dam, Nickel West, Western Australia Iron Ore (WAIO), Petroleum – Australia	Australia	NGER scheme
Escondida, Pampa Norte	Chile	Green Tax legislation (referencing IPCC factors)
Petroleum – Gulf of Mexico	United States	US EPA GHGRP (US GHGRP)
Jansen Potash Project – Canada	Canada	Canadian GHGRP (referencing IPCC factors)
Petroleum – Trinidad and Tobago	Trinidad	None

Scope 2 emissions – operated assets

Definition

GHG emissions associated with the third-party generation of electricity consumed in activities under BHP's operational control (MtCO₂-e).

Calculation boundary

We account for GHG emissions arising from our activities under three organisational boundaries – operational control, financial control and equity share, as described in the Organisational boundary section of this document.

For BHP's operated assets included in each of these organisational boundaries, we calculate Scope 2 emissions from all electricity supplied.

Calculation methodology

Scope 2 emission factors are expressed as the quantity of GHGs released per unit of electricity generated (e.g. tonnes CO₂-e/megawatt-hour) based on the mix of fuels used in the generation process. BHP's operated facilities record Scope 2 emissions throughout the year by multiplying applicable Scope 2 emission factors by the electricity quantities provided.

Two reporting methods are used for these calculations as recommended by the GHG Protocol Scope 2 Guidance – the market-based method and the location-based method. Definitions of location- and market-based reporting used in BHP's accounting are consistent with the GHG Protocol terminology as follows:

- **Market-based reporting:** Scope 2 emissions based on the generators (and therefore the generation fuel mix) from which the reporting company contractually purchases electricity and/or is directly provided electricity via a direct line transfer.
- **Location-based reporting:** Scope 2 emissions based on average energy generation emission factors for defined geographic locations, including local, subnational or national boundaries (i.e. grid factors). In the case of a direct line transfer, the location-based GHG emissions are equivalent to the market-based GHG emissions.

For market-based reporting, electricity emission factors are sourced directly from the supplier where available. In some instances, this includes emission factors available in the public domain for the specific generation plant supplying the facility. An emission factor in the public domain, which is specific to the generation plant supplying the facility, is considered equivalent to a supplier-specific factor in this context.

Where supplier-specific factors are not available, a default location-based emission factor for electricity is used instead, as published in local regulations or industry frameworks.

Residual mix emission factors that account for grid electricity emissions remaining after removal of quantities directly contracted between parties are currently unavailable in the locations of BHP's operated assets. As a result, low emissions or renewable electricity contributions may be double-counted across grid-supplied consumers.

The location-based method is applied using electricity emission factors for the relevant grid network, as sourced from local regulations, industry frameworks or publications from the local grid administrator.

FY2022 operational GHG emissions

Operational GHG emissions (MtCO₂-e)^{4, 5, 6, 7}

Year ended 30 June	2022	2021	2020
Scope 1 GHG emissions ⁸	9.2	10.1	9.6
Scope 2 GHG emissions ⁹	3.1	6.2	6.3
Total operational GHG emissions	12.3	16.3	15.9
Scope 1 GHG emissions (adjusted for divested operations) ¹⁰	7.9	8.8	8.3
Scope 2 GHG emissions (adjusted for divested operations) ¹⁰	3.0	6.1	6.2
Total operational GHG emissions (adjusted for divested operations)¹⁰	11.0	14.9	14.6
Carbon offsets retired ¹¹	–	0.3	–
Total operational GHG emissions (including carbon offsets)¹¹	12.3	16.0	14.6

- 4 Data in italics indicates that data has been adjusted since it was previously reported. FY2021 originally reported emissions data that has been restated as 10.0 MtCO₂-e for Scope 1 GHG emissions and 16.2 MtCO₂-e for total operational GHG emissions, due to minor amendments to fugitive emissions from the coal-operated assets as part of the annual reconciliation process for Australian regulatory reporting purposes. FY2021 and FY2020 Total operational GHG emissions (adjusted for divested operations) have been restated from 16.2 and 15.9 Mt CO₂-e respectively due to the inclusion of divested operations (Petroleum and BMC) (also see footnote 10). Previously reported data included the Onshore US assets only. Additionally, non-material adjustments in prior year asset-level data and changes to presentation of the data has, in certain instances, resulted in minor impacts to the rounding of data since it was previously reported.
- 5 BHP currently uses GWP from the IPCC AR5 based on a 100-year timeframe for all operations. Minerals Americas operated assets transitioned from IPCC Assessment Report 4 (AR4) to AR5 GWP in FY2022. All other operated assets transitioned in FY2021.
- 6 Scope 1 and Scope 2 GHG emissions have been calculated based on an operational control approach (unless otherwise stated) in line with the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard. Data has been rounded to the nearest 0.1 MtCO₂-e to be consistent with asset/regional GHG emissions information in this document. In some instances, the sum of totals for sources, commodities and assets may differ due to rounding.
- 7 More information on our strategy to further reduce GHG emissions, including our investments in low-emissions technology and natural climate solutions, is available in the BHP Climate Change Report 2020 and the BHP Climate Transition Action Plan 2021 available at bhp.com/climate.
- 8 Scope 1 refers to direct GHG emissions from operated assets. Scope 1 emissions currently include diesel consumed in explosives; some refinements may be made to emissions reported from this source in future.
- 9 Scope 2 refers to indirect GHG emissions from the generation of purchased or acquired electricity, steam, heat or cooling that is consumed by operated assets. Our Scope 2 GHG emissions have been calculated using the market-based method, in line with the Greenhouse Gas Protocol Scope 2 Guidance unless otherwise specified. A residual mix emission factor is currently unavailable to account for grid electricity emissions remaining after removal of quantities directly contracted between parties; this may result in double counting of low emissions or renewable electricity contributions across grid-supplied consumers. Scope 2 emissions from Escondida and Pampa Norte are currently sourced from metered data; some refinements may need to be made to emissions reported from these assets in the future.
- 10 Divested operations are BHP Mitsui Coal (sale completed on 3 May 2022) and BHP's Petroleum business (merger with Woodside completed on 1 June 2022) and Onshore US assets (sale completed on 31 October 2018). Non-material acquisitions and divestments are included in the total.
- 11 From FY2021, we have calculated an additional operational GHG emissions total for the reporting year including contributions from the retirement of a quantity of carbon offsets. This figure is calculated by subtracting the number of carbon offsets retired, if any (each equivalent to a single tonne of CO₂-e reduced or 'removed' from the atmosphere) from the total GHG emissions reported under our operational control boundary for the year. This is not intended to establish a recurrent approach. More information on our approach to carbon offset use and the specifics of the carbon offsets retired in FY2021 is available at bhp.com/climate. BHP is committed to transparently disclosing the carbon offsets that we retire towards meeting our own climate change targets and goals. We did not retire any offsets for this purpose in FY2022.

Scope 1 and Scope 2 emissions – non-operated assets¹²

Definition

GHG emissions released directly (Scope 1) and associated with the third-party generation of electricity consumed (Scope 2) at operations in which BHP owns an interest but does not have operational control (MtCO₂-e).

Calculation boundary and methodology

Our equity share and financial control boundary emissions inventories include several operations that are not under our operational control, as described in the table that follows. For these non-operated assets (or interests), we have worked with the relevant operators to obtain GHG emissions data for FY2022 wherever possible. In cases where the most recent available information was based on a different reporting period (e.g. calendar year), we have used the data provided to estimate FY2022 emissions based on a review of operational conditions and activities across the reporting periods, as detailed in the table that follows.

The non-operated assets' GHG emissions dataset was also used to calculate Scope 3 emissions based on an equity boundary ('investments' source), as discussed in the Scope 3 'Investments' category.

We refined the emissions reporting boundaries for our non-operated Tamakaya Energía SpA (Kelar) power generation facility in Chile to allocate emissions associated with spot power purchased by the asset to the Scope 2 category. Previously, these emissions were combined with Kelar's power generation activity emissions under Scope 1. In addition, we amended the adjustment made to Escondida's and Pampa Norte's Scope 2 emissions to more accurately exclude emissions from electricity generated and supplied by Kelar for our equity share GHG emissions inventory (noting these emissions are included in our equity share GHG emissions inventory under Kelar's Scope 1 and Scope 2 emissions).

Historical Tamakaya Energía SpA emissions have been restated to include emissions associated with Kelar Power Plant generation that was sold to the grid and to update data that was provisional in FY2021. The categorisation of Scope 3 emissions from Tamakaya Energía SpA is under review and may change in the future.

12 Assets that are owned as a joint venture but not operated by BHP. References in this document to a 'joint venture' are used for convenience to collectively describe assets that are not wholly owned by BHP. Such references are not intended to characterise the legal relationship between the owners of the asset.

The following table summarises the non-operated assets included, and the data sources used for each. While we have endeavoured to include all our investments with associated GHG emissions, some relevant non-operated interests may not have been identified due to our lack of access to underlying information.

Asset(s)	Scope 1 and Scope 2 emissions data sources
Australian Petroleum (North West Shelf, Bass Strait)	Provided by the operators for FY2022 to the date the merger of BHP's Petroleum business with Woodside Energy Group Ltd (Woodside) completed (1 June 2022), noting that data remains subject to finalisation for the reporting year.
US Petroleum (Atlantis, Mad Dog)	Provided by the operators for FY2022 to the date the merger of BHP's Petroleum business with Woodside completed (1 June 2022), noting that data remains subject to finalisation for the reporting year.
Tamakaya Energía SpA – Kelar Power Plant	Provided by the operator for FY2022, noting that data remains subject to finalisation for the reporting year.
Antamina	Provided by the operator for FY2022, noting that data remains subject to finalisation for the reporting year.
Rhourde Ouled Djemma (ROD) Integrated Development, Algeria	Provided by the operator for FY2022 until the divestment of our interest was completed in April 2022, noting that data remains subject to finalisation for the reporting year.
Samarco	Provided by the operator for CY2021, assumed to continue at the same level for FY2022 reporting year (production recommenced in January 2021), noting that data remains subject to finalisation for the reporting year.
Solgold Plc	Based on FY2021 GHG emissions levels from annual report published by the operator, assumed to continue at same level in FY2022 (exploration phase, no production).

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; ghgprotocol.org/scope-3-technical-calculation-guidance
- Solgold Annual Report 2021; Solgold Plc; 2021; wp-solgold-2021.s3.eu-west-2.amazonaws.com/media/2021/09/SolGold-Annual-Report-2021.pdf

Operational GHG emissions (including carbon offsets)

Although we prioritise internal GHG emission reduction, we acknowledge a role for high-quality carbon offsets in a temporary or transitional capacity while abatement options are being studied, as well as for 'hard to abate' GHG emissions with limited or no current technological solutions and where access to renewable energy is constrained. In FY2021, we made the decision to retire a quantity of high-quality carbon offsets, equivalent to the net increase in our total Scope 1 and Scope 2 emissions from FY2020 to FY2021. We also calculated an additional operational GHG emissions total for FY2021 reporting year that reflected contributions from the retirement of a quantity of carbon offsets. This figure was calculated by subtracting the number of carbon offsets retired (with each carbon offset representing 1 tonne of CO₂-e reduced or removed from the atmosphere) from the total GHG emissions reported under our operational control boundary for the year. We did not retire any carbon offsets in FY2022.

BHP is committed to transparently disclosing the carbon offsets we retire towards meeting our own climate change targets and goals. The use of carbon offsets will be governed by BHP's approach to carbon offsetting described at bhp.com/climate.

Operational GHG emissions (Scope 1 and Scope 2) targets

Our previous short-term operational GHG emissions reduction target was achieved in FY2022. Going forward, we have a medium-term target in place to support the achievement of our long-term goal to achieve net zero operational GHG emissions by 2050.

Operational GHG emissions targets – short-term target

Our short-term target was to maintain our total operational GHG emissions (Scope 1 and Scope 2 from our operated assets) at or below FY2017 levels by FY2022, while we continued to grow our business. We have successfully achieved our short-term target as described in the BHP Annual Report 2022, available at bhp.com. The FY2017 baseline was reviewed annually and adjusted for any material acquisitions and divestments based on the Scope 1 and Scope 2 GHG emissions for the acquired or divested operation in the baseline year, and to reflect progressive refinement of emissions reporting methodologies. This was required to retain comparability between the baseline year's GHG emissions and GHG emissions for the years within the short-term target period.

Operational GHG emissions – medium-term target

Our medium-term target is to reduce operational GHG emissions (Scope 1 and Scope 2 from our operated assets) by at least 30 per cent from FY2020 levels by FY2030. The target year of FY2030 provides scope for realising significant decarbonisation opportunities, while establishing a trajectory to meet our 2050 net zero operational GHG emissions goal.

Note that we do not expect our operational GHG emissions to decrease in a straight-line trajectory from FY2020 to FY2030. This is because the abatement opportunities we are prioritising involve a range of implementation timelines. As such, the timing of resulting GHG emissions reductions may be distributed unevenly across the target period.

The baseline year of FY2020 represents the most recently completed operating year (at the time the target was set) from which to measure our performance to FY2030. The FY2020 baseline is reviewed annually and adjusted for any material acquisitions and divestments based on the Scope 1 and Scope 2 GHG emissions levels for the acquired or divested operation in the baseline year, and to reflect progressive refinement of emissions reporting methodologies. This is required to retain comparability between the baseline year's GHG emissions and future years' GHG emissions.

Baseline adjustments

The following table lists the adjustments made to the FY2017 and FY2020 baselines and, where required, to reported operational emissions from FY2018 to FY2022 for the purposes of target performance assessment only. For more information on the adjusted baseline and target outcomes refer to the BHP Annual Report 2022, available at [bhp.com](https://www.bhp.com).

Adjustment	Adjustment methodology	Adjustment applied to FY2017 baseline	Adjustment applied to FY2020 baseline
Divestment: Onshore US assets (Applied in FY2019)	BHP's Onshore US assets were divested in FY2019 (sale completed 31 October 2018). To retain comparability between the baseline and target performance years, Scope 1 and Scope 2 emissions from these assets were removed from the FY2017 baseline and all subsequent years of emissions performance, up to the time of the divestment (FY2018 and FY2019).	Yes	Not applicable
Divestment: BHP Mitsui Coal (Applied in FY2022)	BHP's interest in the BHP Mitsui Coal asset was divested in FY2022 (sale completed 3 May 2022). To retain comparability between the baseline and target performance years, Scope 1 and Scope 2 emissions from this asset were removed from the FY2017 baseline and all subsequent years of emissions performance, up to the time of the divestment (FY2018, FY2019, FY2020, FY2021 and FY2022).	Yes	Yes
Divestment: Petroleum business (Applied in FY2022)	BHP's Petroleum business was divested in FY2022 (via a merger with Woodside completed on 1 June 2022). This included operated assets in the Australian Production Unit, Gulf of Mexico Production Unit and Trinidad and Tobago Production Unit, as well as the supporting ancillary activities. To retain comparability between the baseline and target performance years, Scope 1 and Scope 2 emissions from these assets were removed from the FY2017 baseline and all subsequent years of emissions performance, up to the time of the divestment (FY2018, FY2019, FY2020, FY2021 and FY2022).	Yes	Yes
Methodology change: Global Warming Potentials (GWPs) (Applied in FY2021 and FY2022)	From FY2017 to FY2020, all BHP-operated assets used Global Warming Potentials (GWP) in their emissions accounting sourced from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 4 (AR4). In FY2021, all operated assets other than Minerals Americas transitioned to using GWPs from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 5 (AR5). Minerals Americas continued using AR4 GWPs in FY2021 and then transitioned to AR5 in FY2022. GWP values (tonnes/tonnes CO ₂ -equivalent) relevant to BHP's activities which changed as a result of the transition from AR4 to AR5 were as follows: ¹³ – methane (CH ₄) increased from 25 to 28 – nitrous oxide (N ₂ O) decreased from 298 to 265 – sulphur hexafluoride (SF ₆) increased from 22,800 to 23,500 To retain comparability between the baseline and target performance years, total methane, nitrous oxide and sulphur hexafluoride emissions were recalculated using AR5 GWPs. This adjustment was made for the FY2017 baseline and all subsequent years of emissions performance up to the year of the transition (FY2018, FY2019 and FY2020 for all operated assets, with an additional adjustment for FY2021 for Minerals Americas operated assets only).	Yes	Yes
Methodology change: Caval Ridge (Applied in FY2022)	From FY2017 to FY2021, the Caval Ridge operation (BHP Mitsubishi Alliance, Queensland, Australia) calculated fugitive emissions using default factors provided in Australia's National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 (Method 1 – extraction of coal) for open-cut coal mines located in Queensland, Australia. In FY2022, Caval Ridge moved to a facility-specific emissions calculation methodology for these emissions as detailed in the NGER (Measurement) Determination 2008 (Method 2 – extraction of coal). To retain comparability between the baseline and target performance years, fugitive emissions for the Caval Ridge operation were recalculated using the facility-specific method for the FY2017 baseline and all subsequent years of emissions performance up to the year of the transition to Method 2 (FY2018, FY2019, FY2020 and FY2021).	Yes	Yes

¹³ Global Warming Potential Values, GHG Protocol, 2016, ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

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 15 distinct categories. Where relevant to BHP, we report Scope 3 emissions for our business according to these categories. Where it enhances relevance and transparency – or where particular GHG 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 ESG Standards and Databook 2022 (available at bhp.com/climate) we provide a breakdown of GHG emissions in the 'Processing of sold products' and 'Use of sold products' categories (categories 10 and 11) according to the major commodities we produce. The gases included in the calculation of Scope 3 emissions vary depending on the emission factors available. Information on the emission factors used can be found in the Data Sources section for each category.

Scope 3 emissions are presented inclusive of divestments up to the date of the divestment, unless otherwise specified. This year, we have also presented an illustrative line-item 'Total Scope 3 GHG emissions (adjusted for divested operations)' as part of the Scope 3 emissions inventory reporting. The emissions reported in this line item has been adjusted for the merger of our Petroleum business with Woodside (completed on 1 June 2022), divestment of our interest in the ROD Integrated Development, Algeria (completed in April 2022), divestment of our interest in BMC (completed on 3 May 2022) and divestment of our interest in Cerrejón (effective 31 December 2020).¹⁴ Only associated downstream Scope 3 emissions from the 'Use of sold products' (category 11) and 'Investments' (category 15) have been removed to generate this illustrative total, noting that other categories have not been adjusted for the merger or divestments due to complexity of underlying data.

Scope 3 goals and targets¹⁵

We are pursuing the long-term goal of net zero Scope 3 GHG emissions by 2050. Achievement of this goal is uncertain, particularly given the challenges of a net zero pathway for our customers in steelmaking, and we cannot ensure the outcome alone. To progress towards this goal:¹⁶

- We will target net zero by 2050 for the operational GHG emissions of our direct suppliers.¹⁷
- We will target net zero by 2050 for GHG emissions from all shipping of BHP products.
- We will continue to partner with customers and others to try to accelerate the transition to carbon neutral steelmaking and other downstream processes.

Our 2030 goals are to:

- support industry to develop technologies and pathways capable of 30 per cent emissions intensity reduction in integrated steelmaking, with widespread adoption expected post 2030
- support 40 per cent emissions intensity reduction of BHP-chartered shipping of BHP products

For details regarding our Scope 3 goals and targets refer to bhp.com/climate.

¹⁴ Due to the effective economic date of 31 December 2020 for sale of BHP's interest in Cerrejón, Scope 3 emissions (on an equity basis) from Cerrejón are not included in FY2022 reporting. As a result, the removal of Cerrejón only impacts FY2021 and FY2020 emissions totals for the illustrative Total Scope 3 GHG emissions (adjusted for divested operations) figures reported.

¹⁵ These positions are expressed using terms that are defined in the Glossary to this document, including the terms 'target', 'goal', 'net zero' and 'carbon neutral'. The baseline year(s) of our targets will be adjusted for any material acquisitions and divestments and to reflect progressive refinement of emissions reporting methodologies. The targets' boundaries may in some cases differ from required reporting boundaries. The use of carbon offsets will be governed by BHP's approach to carbon offsetting described at bhp.com/climate.

¹⁶ The targets are referable to a FY2020 baseline year. Our ability to achieve the targets is subject to the widespread availability of carbon neutral solutions to meet our requirements, including low/zero-emissions technologies, fuels, goods and services.

¹⁷ Operational GHG emissions of our direct suppliers means the Scope 1 and Scope 2 emissions of our direct suppliers included in BHP's Scope 3 reporting categories of purchased goods and services (including capital goods), fuel and energy related activities, business travel and employee commuting.

Overlap in Scope 3 calculation boundaries

The GHG 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 GHG 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 life cycle of the commodities we produce and consume. As a result, some double counting may be inherent due to our position in the value chain and may inflate the total Scope 3 emissions figure reported. This and other double counting of GHG emissions in our current

reported Scope 3 inventory is an expected outcome of GHG emissions reporting between the different Scopes and is not considered to detract from the overall value of the Scope 3 emissions disclosure.

Scope 3 emissions by category	GHG emissions in BHP's value chain (MtCO ₂ -e) ^{18, 19}		
	FY2022	FY2021	FY2020
Upstream			
1. Purchased goods and services (including capital goods)	9.9	10.1	9.8
2. Capital goods	Not applicable		
3. Fuel and energy related activities	1.0	1.1	1.2
4. Upstream transportation and distribution	4.6	4.8	4.6
5. Waste generated in operations	Not applicable		
6. Business travel	0.1	0.1	0.1
7. Employee commuting	0.3	0.4	0.2
8. Upstream leased assets	Not applicable		
Downstream			
9. Downstream transportation and distribution	3.2	3.1	2.9
10. Processing of sold products			
– GHG emissions from steelmaking	305.3	300.5	292.9
– Iron ore processing to crude steel	270.8	260.7	252.8
– Metallurgical coal processing to crude steel	34.5	39.8	40.1
– Copper processing	1.0	1.0	1.0
– Nickel processing	0.3		
Total processing of sold products	306.7	301.5	294.0
11. Use of sold products			
– Energy coal	37.6	38.3	56.4
– Natural gas	17.4	19.5	20.6
– Crude oil and condensates	15.9	16.8	17.9
– Natural gas liquids	1.7	1.8	1.9
Total use of sold products	72.6	76.4	96.8
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)	2.7	2.7	2.7
Total Scope 3 emissions	401.2	400.1	412.3
Total Scope 3 GHG emissions (adjusted for divested operations)	364.3	359.7	369.5

We continue to improve our approach and methodology for GHG emissions estimations. Key refinements to our methodology for Scope 3 this year, in line with the GHG Protocol, were detailed at the beginning of this document and are further described below, in the detailed methodology description for each category.

The following sections describe in more detail the calculation boundaries (including any exclusions of particular GHG emissions sources within a category), impact of divestments, methodologies, assumptions and references we have used to calculate a GHG emissions estimate for each relevant Scope 3 category

for FY2022. For categories where we have not calculated a GHG emissions figure, the rationale behind why we have concluded that the GHG emissions source is not relevant to our business or appropriate to include is provided.

¹⁸ Data in italics indicates that data has been adjusted since it was previously reported.

¹⁹ Refer to the detailed methodology description for each applicable category under the Scope 3 Standard emissions categories section that follows for information about the calculation boundaries, impact of divestments, methodologies and assumptions and references we have used to calculate a GHG emissions estimate for each category in this table.

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) GHG 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 FY2022 GHG emissions in BHP's value chain	Material, calculated	FY2022 GHG emissions in BHP's value chain (MtCO₂-e)	9.9
Calculation status rationale	From a quantitative perspective, this is not a materially large source of Scope 3 emissions for BHP on a whole-of-Group basis. However, Scope 3 emissions from this category are considered a material part of our non-ferrous metals (copper and nickel) value chains. In addition, we set a Scope 3 2050 procurement target in 2021 that covers some of the emissions in this category. We therefore consider this category material and relevant as emissions in this category may contribute to the exposure of our business to climate-related risk.		

Calculation boundary

This category covers GHG emissions generated upstream of BHP's operations associated with the extraction and/or production of goods and services purchased or acquired by BHP during the reporting year. Transport of goods and services to BHP may be included in this category when we do not have a reliable way to estimate it separately.

All spend recorded in BHP's internal system for the purchase of goods and services, excluding spend on categories that do not have attributable emissions, is included in the calculation boundary for this source. Spend that is not associated with the purchase of goods and services is excluded, including intra-company payments, internal payroll, community and charitable donations, and expenses associated with regulatory compliance and taxation.

For BHP, this category includes GHG emissions associated with the 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 category.

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

Exclusions

None. GHG 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

In FY2022, we made improvements in how we calculate Scope 3 GHG emissions associated with the 'Purchased goods and services (including capital goods)' category. Emissions estimates for 'high-spend goods' from select categories (including explosives, grinding media, conveyor belts, tyres and select bulk materials) were transitioned from spend-based emission factors to industry average, quantity-based emission factors or

emission factors sourced directly from suppliers. FY2021 spend data was used as a basis to determine what constituted a 'high-spend good' for the select categories mentioned earlier. For categories moved to quantity-based emission factors, we also estimated the emissions associated with the transport of those goods to BHP, which we reported under the Scope 3 'Upstream transport and logistics' category.

For remaining purchased goods and services (i.e. other than select 'high-spend goods'), we continued to use the 'spend-based' method, as described in the Scope 3 Guidance, to calculate these GHG emissions, with industry average emission 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 emission factors from the Quantis tool are then applied to calculate an overall GHG emissions estimate for this category. A weighted average emission factor is applied for any remaining uncategorised spend.

Data sources

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

Emission factors for spend-based categories are sourced from the Quantis tool.

Annual invoice data is extracted from BHP internal systems for specific vendors and specific material categories to calculate the quantity-method.

Emission factors for quantity-based categories are sourced from industry average Life-Cycle Analysis (LCA) databases (EconInvent and AusLCA) or supplier-specific LCA reports.

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; ghgprotocol.org/scope-3-technical-calculation-guidance
- GHG Protocol Quantis Scope 3 Evaluator tool; Quantis; 2022; quantis-suite.com/Scope-3-Evaluator/

Category 2: Capital goods

Scope 3 Standard category description	Upstream (i.e. cradle-to-gate) GHG emissions from the extraction, production and transportation of capital goods purchased or acquired by the reporting company in the reporting year.		
Calculation status of FY2022 GHG emissions in BHP's value chain	Material, included in the 'Purchased goods and services' category (category 1)	FY2022 GHG emissions in BHP's value chain (MtCO₂-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 our spend data (which includes purchases of capital goods) has been captured in the calculation methodology for category 1, GHG emissions related to purchases of capital goods are not reported separately here. Instead, for BHP's value chain, the GHG emissions reported under category 1 include GHG emissions associated with purchases of capital goods.		

Category 3: Fuel and energy related activities

Scope 3 Standard category description	GHG 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 FY2022 GHG emissions in BHP's value chain	Material, calculated	FY2022 GHG emissions in BHP's value chain (MtCO₂-e)	1.0
Calculation status rationale	From a quantitative perspective, this is not a materially large source of Scope 3 emissions for BHP on a whole-of-Group basis. However, we set a Scope 3 2050 procurement target in 2021 that covers some of the emissions in this category. We therefore consider this category material. Additionally consumption of fuels and energy represent a material contribution to our Scope 1 and Scope 2 operating emissions; the associated Scope 3 emissions are therefore relevant.		

Calculation boundary

This category covers GHG 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 onsite 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.

Upstream emissions associated with natural gas burned for energy at our Petroleum operations are excluded from this category as the majority of the natural gas is extracted onsite and therefore included in our Scope 1 emissions (up to the date of completion of the merger with Woodside).

Note that GHG emissions from the combustion of fuels at our facilities are accounted for as our Scope 1 emissions; similarly, GHG emissions from the generation of purchased electricity consumed by BHP are accounted for as our Scope 2 emissions.

Overlap in calculation boundaries

Until 1 June 2022 (the date of completion of the merger of our Petroleum business with Woodside), BHP owned and operated facilities extracting primary fuels (natural gas and other petroleum products) and continues to own and operate a facility extracting energy coal, 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 Scope 2 emissions. This is an expected outcome of GHG 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 that is reported internally under a mixed 'other' category (representing less than

2 per cent of total energy consumed) are excluded. This is due to the difficulty in assigning a meaningful Scope 3 emission factor to the variety of energy sources involved (including coal seam gas, hydrogen, LPG, steam and heat). For more information refer to the Calculation boundary section.

Calculation methodology

The 'average-data' method as described in the Scope 3 Guidance is used to calculate these GHG emissions. Industry average Scope 3 emission 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 emission factors are sourced from the most recent Australian National Greenhouse Accounts Factors published by the Australian Government Department of the Environment and Energy available at the time of the calculations.

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 emission 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- National Greenhouse Accounts Factors – August 2021 (Tables 42 to 46); Australian Government Department of Industry, Science, Energy and Resources; 2021; industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021

Category 4: Upstream transportation and distribution

Scope 3 Standard category description	GHG 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 FY2022 GHG emissions in BHP's value chain	Material, calculated	FY2022 GHG emissions in BHP's value chain (MtCO₂-e)	4.6
Calculation status rationale	From a quantitative perspective, this is not a materially large source of Scope 3 emissions for BHP on a whole-of-Group basis. However, GHG 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. We have also established a 2030 goal and 2050 target for the maritime portion of this category of Scope 3 emissions. Therefore, we consider this category material and relevant.		

Calculation boundary

As the Scope 3 Standard categorises Scope 3 emissions as upstream or downstream on the basis of financial transactions, this category includes GHG 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 GHG emissions from road, rail and marine freight, where the latter makes up the majority of emissions.

Exclusions

GHG 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). These emissions are likely to be captured under the 'Purchased goods and services' category (category 1).

Calculation methodology

For all marine freight cargoes, DNV's Veracity – a data platform used to collate, validate and report vessel GHG emissions under regulatory and voluntary schemes – was used to develop a Scope 3 emissions estimate based on its accredited verification methodology.

BHP requests reporting of fuel consumption values from vessel owners. All fuel consumption values reported to BHP by vessel owners are systematically assessed to seek to identify missing data and anomalies.

If vessel owners have reported load port to discharge port(s) fuel consumption values to BHP that appear (to the extent that can be reasonably determined) complete and consistent, the reported values are used to generate emissions estimates using fuel emission factors from the British Standards Institution (BSI) EN 16258 standard.

Where fuel consumption values are unavailable, incomplete or appear anomalous, vessel-specific and voyage-specific data is sourced from a range of publicly and privately available sources to generate fuel consumption estimates instead, applying assumptions where required. Estimated fuel consumption values are then converted into emissions using fuel emission factors from the BSI EN 16258 standard as above. In some cases, an additional assumption is applied to appropriately account for BHP's share of GHG emissions associated with the 'unused' carrying capacity of partially loaded container ships.

For road and rail freight, the 'distance-based' method as described in the Scope 3 Guidance is used to calculate these GHG emissions. GHG emissions are calculated for each cargo by applying the appropriate emission factor to the mass x distance multiplier (e.g. tonne.km) for the voyage.

For purchased transport services for process inputs to our operations, the spend-based method is used to calculate these GHG emissions, as described in the calculation methodology for the 'Purchased goods and services' category. For 'high-spend goods' that were moved to quantity-based emission factors in FY2022 (as discussed in the Purchased goods and services section of this document), emissions for transport of goods to our operations are estimated for each product based on the distance travelled via sea and road. BHP is not always aware of the

precise discharge port(s) for these cargoes. Where required, BHP uses reasonable assumptions (for example, an assumption regarding the most likely discharge port) to estimate distance travelled. Emissions are then calculated by applying the emission factors for container shipping and Heavy Goods Vehicles (HGV) sourced from the most recent version of Greenhouse Gas Reporting Conversion Factors (published by the UK Government) available at the time of the calculations.

Data sources

Product transport data is sourced from BHP's internal system for each commodity. For each individual product cargo, data includes loading and destination locations and cargo weight.

For road and rail freight GHG emissions calculations, online tools (driving distance based on Google Maps [google.com/maps](https://www.google.com/maps)) or published data on rail operator websites are used to estimate the distance covered. Emission factors on a mass-distance basis are sourced from the most recent version of Greenhouse Gas Reporting Conversion Factors (published by the UK Government) available at the time of the calculations.

For marine freight GHG emissions, sea route geolocal positions, distances and speed are calculated by DNV's Veracity platform.

Where GHG emissions are calculated using the spend-based method, data is sourced from the BHP internal system that tracks external spend, and emission factors are sourced from the Quantis tool, as described for the 'Purchased goods and services' category. For 'high-spend goods' (as discussed in the 'Purchased goods and services' category), distance travelled is estimated using Google Maps and Sea Distance Calculator, and emission factors are sourced from the most recent version of Greenhouse Gas Reporting Conversion Factors (published by the UK Government) available at the time of the calculations.

References

- Veracity; DNV; 2022; dnv.com/data-platform/index.html
- MRV and DCS verification; DNV; 2022; dnv.com/maritime/insights/topics/MRV-and-DCS/verification-services.html
- 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- BS EN 16258; BSI; British Standards Institution (BSI); 2012; knowledge.bsigroup.com/products/methodology-for-calculation-and-declaration-of-energy-consumption-and-ghg-emissions-of-transport-services-freight-and-passengers/standard
- Greenhouse Gas Reporting: Conversion Factors 2021 (Freighting goods); UK Government Department for Business, Energy & Industrial Strategy; June 2021; gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
- Google Maps; [google.com/maps](https://www.google.com/maps)
- GHG Protocol Quantis Scope 3 Evaluator tool; Quantis; 2022; quantis-suite.com/Scope-3-Evaluator/
- Sea Distance Calculator, Ship Traffic Net; 2012; shiptraffic.net/2001/05/sea-distances-calculator.html

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 FY2022 emissions in BHP's value chain	Not material, not calculated	FY2022 emissions in BHP's value chain (MtCO 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. Spend associated with waste related utility services would be captured as part of reporting for category 1 'Purchased goods and services (including capital goods)'. This assessment will be periodically reviewed.		

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 FY2022 emissions in BHP's value chain	Material, calculated	FY2022 emissions in BHP's value chain (MtCO₂-e)	0.1
Calculation status rationale	From a quantitative perspective, this is not a materially large source of Scope 3 emissions for BHP on a whole-of-Group basis. However, we set a Scope 3 2050 procurement target in 2021 that covers some of the emissions in this category. We therefore consider this category material and a high-level estimate has been calculated for transparency.		

Calculation boundary

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

Exclusions

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

Calculation methodology

Emissions from flights undertaken by employees for business travel are sourced directly from BHP's third-party corporate travel service provider's FY2022 emissions report.

The calculation methodology applied in the report (as stated by the provider) aligns with the latest UK Department for Environment, Food and Rural Affairs (DEFRA) standards for air travel. DEFRA standards consider the distances travelled for domestic, short and long-haul flights in each class of travel (ranging from economy to first-class). Calculations include radiative forcing (RF), a measure of the additional environmental impact of aviation, including impacts from emissions of nitrous oxide and water vapour at high altitudes. Scope 3 emissions including RF are

determined by multiplying the distance (km) travelled by the appropriate emission factor.

For purchased business travel services, the spend-based method is used to calculate associated emissions, as described in the calculation methodology for the 'Purchased goods and services' category (category 1).

Data sources

Emissions from flights undertaken by employees for business travel are sourced directly from BHP's third-party corporate travel service provider's carbon emissions report (see the Calculation methodology section).

Purchased business travel service spend data is extracted from the BHP internal system that tracks external spend.

Emission factors for business travel 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- GHG Protocol Quantis Scope 3 Evaluator tool; Quantis; 2022; 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 FY2022 emissions in BHP's value chain	Material, calculated	FY2022 emissions in BHP's value chain (MtCO₂-e)	0.3
Calculation status rationale	From a quantitative perspective, this is not a materially large source of Scope 3 emissions for BHP on a whole-of-Group basis. However, we set a Scope 3 2050 procurement target in 2021 that covers some of the emissions in this category. We therefore consider this category material and a high-level estimate has been calculated for transparency.		

Calculation boundary

This category covers emissions from chartered fly-in fly-out (FIFO) flights and ground transport services (e.g. bus and car fleet services) utilised by employees for commuting purposes.

Exclusions

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

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

Charter flight and ground transport spend data is extracted from the BHP internal system that tracks external spend.

Emission 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- GHG Protocol Quantis Scope 3 Evaluator tool; Quantis; 2022; quantis-suite.com/Scope-3-Evaluator/

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 FY2022 emissions in BHP's value chain	Not relevant, not calculated	FY2022 emissions in BHP's value chain (MtCO₂-e)	Not applicable
Calculation status rationale	An emissions figure is not calculated for this category as, under BHP's selection of the operational control approach to boundaries, emissions from any upstream leased assets we control are included in our Scope 1 emissions inventory. 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 FY2022 emissions in BHP's value chain	Material, calculated	FY2022 emissions in BHP's value chain (MtCO₂-e)	3.2
Calculation status rationale	From a quantitative perspective, this is not a materially large source of Scope 3 emissions for BHP on a whole-of-Group basis. However, GHG 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. We have also established a 2030 goal and 2050 target for the maritime portion of this category of Scope 3 emissions. Therefore, we consider this category material and relevant.		

Calculation boundary

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

This category includes emissions from road, rail and marine freight, where the latter makes up the majority of emissions.

Exclusions

None.

Calculation methodology

For all marine freight cargoes, DNV's Veracity – a data platform used to collate, validate and report vessel GHG emissions under regulatory and voluntary schemes – was used to develop a Scope 3 emissions estimate based on its accredited verification methodology.

Where fuel consumption values are unavailable, incomplete or appear anomalous, vessel-specific and voyage-specific data is used from a range of publicly and privately available sources. DNV uses these sources to make assumptions and produce estimations of fuel consumption values. Estimated fuel consumption values are then converted into CO₂-e using fuel emission factors from the BSI EN 16258 standard.

For all road and rail freight cargoes, the 'distance-based' method as described in the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (Scope 3 Guidance) is used to calculate estimated GHG emissions figures. BHP uses data from a range of publicly and privately available data sources, including vehicle type, cargo, distance travelled or expected to be travelled (noting that BHP is not always aware of the precise discharge location(s)). Where required, BHP uses reasonable assumptions (for example, an assumption regarding the most likely discharge location) as the basis for estimations. Emissions are calculated by applying the appropriate emission factors from a globally recognised standard (the UK Department for Business, Energy & Industrial Strategy's Greenhouse Gas Reporting: Conversion Factors (Freighting goods)) to the mass of BHP cargo x distance multiplier for each trip (tonne.km).

Data sources

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

For road and rail freight categories, emission factors on a mass-distance basis are sourced from the most recent version of Greenhouse Gas Reporting Conversion Factors (published by the UK Government) available at the time of the calculations. Online tools (driving distance based on Google Maps [google.com/maps](https://www.google.com/maps)) or published data on rail operator websites are used to calculate an estimation of the distance covered. Vehicle types are assigned with internal knowledge of typically used vehicles and loading for each commodity and location.

For marine freight cargoes, sea route geolocational positions, distances and speed are calculated by DNV's Veracity platform.

Assumptions

For some FOB cargoes, destination ports are not known and DNV's Veracity uses AIS (i.e. publicly reported geolocational tracking data) to derive the first destination port within the intended destination country.

References

- Veracity; DNV; 2022; dnv.com/data-platform/index.html
- MRV and DCS verification; DNV; 2022; dnv.com/maritime/insights/topics/MRV-and-DCS/verification-services.html
- 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- BS EN 16258; BSI; British Standards Institution (BSI); 2012; knowledge.bsigroup.com/products/methodology-for-calculation-and-declaration-of-energy-consumption-and-ghg-emissions-of-transport-services-freight-and-passengers/standard
- Greenhouse Gas Reporting: Conversion Factors 2021 (Freighting goods); UK Government Department for Business, Energy & Industrial Strategy; June 2021; gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
- Google Maps: [google.com/maps](https://www.google.com/maps)

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 FY2022 emissions in BHP's value chain	Material, calculated	FY2022 emissions in BHP's value chain (MtCO₂-e)	306.7
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 (by our customers) resulting in GHG emissions, the most significant of which are:

- iron ore, which is assumed (for the purposes of estimated downstream Scope 3 emissions) to be processed into steel. This is recognised as being an emissions-intensive process that is technologically difficult to decarbonise
- metallurgical coal, which is assumed to be used in the processing of iron ore to steel as a reductant in the chemical reactions, an internal structural component and as an energy source
- copper, which we split into two product segments for the purposes of estimated downstream Scope 3 emissions: (1) copper concentrates that are processed into cathodes by third parties; and (2) our own copper cathodes, which are assumed to be processed into copper semi-fabricated products
- nickel, which we split into four product segments based on sales data, for the purposes of estimated downstream Scope 3 emissions: (1) our nickel intermediates that go to third-party refiners; (2) nickel metal that goes into stainless steel and alloys production; (3) nickel metal that goes into nickel sulphate (NiSO₄) for battery value chains; and (4) BHP's NiSO₄ that goes directly into battery precursor material production

Overlap in calculation boundaries

We have endeavoured to develop our emissions calculation methodologies for copper and nickel to a level of granularity that allows us to remove the double counting of our Scope 1 and Scope 2 emissions. However, for BHP Scope 3 emissions reporting necessarily requires a degree of overlap in reporting boundaries due to our involvement at multiple points in the life cycle of the commodities we produce and consume.

Exclusions

In addition to iron ore, metallurgical coal, copper and nickel, BHP also produces zinc, gold, silver, cobalt, 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 emission factor is challenging. In addition, the production volumes for these commodities – and associated emissions – are not significant compared to those for iron ore, metallurgical coal, copper and nickel. 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 reported under the Scope 3 'Use of sold products' category. Following the merger of our Petroleum business with Woodside (completed on 1 June 2022), we no longer have petroleum products (including ethane).

The other 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 emission factors applied to production volumes (on an equity basis) for each commodity to calculate an overall emissions estimate for this category.

Steelmaking (iron ore and metallurgical coal processing)

Carbon emissions relating to steelmaking from processing BHP raw materials are estimated using global average emissions intensity factor of tonnes of CO₂ per tonne of crude steel for the blast furnace-basic oxygen furnace (BF-BOF) process route sourced from the International Energy Agency (IEA).

The emissions intensity factor is applied to an equivalent crude steel production volume related to the processing of BHP's iron ore and metallurgical portfolio in crude steelmaking. The crude steel equivalent production volume is calculated based on FY2022 iron ore equity production and the average percentage iron (Fe) content in BHP's products, converted to equivalent crude steel quantity using the average content of crude steel from the IEA Iron and Steel CCS Study (April 2013).

The majority of BHP's steelmaking raw materials portfolio (iron ore and metallurgical coal) is sold into and processed through the blast furnace integrated steelmaking route. To resolve the double counting between the iron ore and metallurgical coal inputs into the steelmaking process, BHP estimates the total steelmaking emissions in the processing of our iron ore quantities in steelmaking. The contribution of BHP's metallurgical coal production and required third-party metallurgical coal to total steelmaking emissions is allocated based on the global average mass input into the process sourced from the World Steel Association (WSA).

Refer to Appendix 1 for additional details of calculations for this Scope 3 'Processing of sold products' category for iron ore and metallurgical coal processing, including the mass balance applied.

Copper processing

To estimate emissions from the processing of copper concentrates and copper cathodes, we apply industry-wide average emission factors to the production volumes of the respective products. These are sourced from recent studies conducted by the International Copper Association (ICA) and the Copper Council.

Nickel processing

For nickel products, we apply industry average emission factors for each product segment to the production volumes for each segment as defined above, sourced from LCA analysis done by the Nickel Institute (2021), or from third-party analysis, including CRU and BloombergNEF. Production volumes are allocated to each product segment based on internal sales information. There is a small differential between production volumes and sales volumes resulting from inventory movements. For more information refer to the Data sources section below.

Assumptions

Steelmaking (iron ore and metallurgical coal processing)

To estimate emissions from the processing of iron ore, all iron (Fe) content in produced iron ore is assumed to be processed to crude steel via the BF-BOF route. The crude steel equivalent produced is assumed to be attributable to iron ore only and not scrap steel.

The total emissions from steelmaking are apportioned between the iron ore and BHP's metallurgical coal inputs by applying the average ratio of each input required to produce 1,000 kg of crude steel using the WSA's data on the integrated furnace BF-BOF route to the crude steel emission factor. The metallurgical coal portion of the emission factor is applied to emissions from the crude steel equivalent volume produced from BHP's metallurgical coal production. Emissions from third-party metallurgical coal necessary to process BHP's iron ore quantities not covered by BHP's metallurgical coal are included in the emissions allocated to iron ore.

Copper processing

All copper cathode is assumed to be manufactured into semi-fabricated products. As copper semi-fabricated products are generally extruded/reshaped forms of the feedstock metal, a one-to-one mass conversion factor is assumed.

All copper concentrate is assumed to be processed into copper cathode.

For more information refer to the Data sources section below.

Nickel processing

For nickel products going into stainless steel production, we assume a nickel content of 8 per cent in series 304 (SAE 304) stainless steel.

For NiSO₄ going into precursor cathode active material production (PCAM), we assumed the nickel content and manufacturing emissions intensity of the NCM 811 type cathode material used for lithium-ion batteries (nickel:cobalt:manganese at a ratio of 8:1:1).

For nickel products going into NiSO₄ production, we assume a powder dissolution process specific to battery supply chains.

For more information refer to the Data sources section below.

Data sources

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

Steelmaking (iron ore and metallurgical coal processing)

- An industry average emission factor for the BF-BOF is sourced from the IEA Iron and Steel Technology Roadmap (October 2020). As a result, the emission factor may not accurately represent (geographically, technologically or temporally) the actual emissions intensities of our customers' facilities. However, it is considered to be sufficiently representative of average industry conditions as to provide a meaningful estimation.
- The quantity of crude steel equivalent produced from the input quantity of iron ore is calculated using a conversion factor based on the average iron (Fe) content of BHP iron ore product and the average content of crude steel from IEA Iron and Steel CCS Study (April 2013).
- The global average input mass ratio of metallurgical coal vs iron ore to the BF-BOF steelmaking route is sourced from the Worldsteel publication – Fact sheet Steel and raw materials, 2019.

Copper processing

- Concentrate to cathode refining by third parties: An industry average emission factor is sourced from the 2022 ICA Global Copper Decarbonization Roadmap (GCDR) Compendium.
- Cathode to semi-fabricated copper products: An indicative industry average emission factor has been developed by dividing the total 2021 global emissions from this activity (as calculated by the ICA) by the total 2021 global production of semi-fabricated copper production (sourced from the Copper Council).

Nickel processing

- Nickel intermediates to third-party refiners: Assumed the global industry average emission factor of conversion of nickel concentrates to nickel metal sourced from the Nickel Institute's LCA analysis. Only emissions associated with the primary extraction and refining portions of the overall process are used.
- Nickel metal going into stainless steel and alloys: ISSF industry average emission factor for stainless steel, and average 8 per cent Ni content in series 304 stainless steel sourced from the Nickel Institute. We were not able to source emission factors for conversion to alloys so have generalised those volumes into the stainless steel category.

- Nickel metal going into NiSO₄ for the battery sector: China grid emissions intensity factors and process inputs assumptions from the CRU Market Analysis Group are used in estimation of emissions from the powder dissolution process. Nickel content of NiSO₄ for batteries is based on BHP's FY2022 product assay.
- NiSO₄ going directly into battery PCAM: NMC811 precursor manufacturing emissions are sourced from BloombergNEF, with assumed nickel content (mass ratio) of NMC811 precursor active material sourced from IDTechX.

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; ghgprotocol.org/scope-3-technical-calculation-guidance
- BHP Operational Review for the year ended 30 June 2022; BHP; 2022; bhp.com/news/media-centre/releases/2022/07/bhp-operational-review-for-the-year-ended-30-june-2022
- Fact sheet Steel and raw materials; World Steel Association; 2019; worldsteel.org/steel-by-topic/sustainability/sustainability-indicators.html
- Iron and Steel CCS Study; IEA; 2013; ieaghg.org/publications/technical-reports/reports-list/9-technical-reports/1001-2013-04-iron-and-steel-ccs-study-techno-economics-integrated-steel-mill
- Iron and Steel Technology Roadmap (pg. 43); IEA; 2020; ieablob.core.windows.net/assets/eb0c8ec1-3665-4959-97d0-187ceca189a8/Iron_and_Steel_Technology_Roadmap.pdf
- Semis Production and Demand; Copper Council; 2021; coppercouncil.org/wp-content/uploads/2021/10/Semis-Production-and-Demand.xlsx
- Nickel life cycle data; Nickel Institute; 2022; nickelinstitute.org/en/policy/nickel-life-cycle-management/nickel-life-cycle-data/
- Stainless Steel: the Role of Nickel; Nickel Institute; 2022; nickelinstitute.org/en/about-nickel-and-its-applications/stainless-steel/
- Fact sheet Steel and raw materials 2019 (pg1); World Steel; 2019; worldsteel.org/steel-by-topic/sustainability/sustainability-indicators.html

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 FY2022 emissions in BHP's value chain	Material, calculated	FY2022 emissions in BHP's value chain (MtCO ₂ -e)	72.6
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

Until 1 June 2022 (the date of completion of the merger of our Petroleum business with Woodside), BHP produced natural gas and other petroleum products, and continues to produce energy coal, 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. Metallurgical coal is excluded from this category and included in the Scope 3 'Processing of sold products' category to remove the potential double counting of emissions across the two categories, and to report it together with iron ore, as both commodities serve as inputs into the steelmaking process.

BHP has historically marketed a small portion of BMA products against thermal coal indexes. In FY2022, this portion was approximately 6 per cent, up from 2 per cent in FY2021. For purposes of enhancing the transparency and accuracy of our Scope 3 emissions reporting, for FY2022 we have estimated the energy coal component of BMA production based on the percentage of BMA product marketed as thermal coal and associated GHG emissions under this 'Use of Sold Products' category.

Overlap in calculation boundaries

Emissions reported under this 'Use of sold products' category include downstream emissions from the consumption of the energy coal, natural gas and other petroleum products we produced during FY2022. A small portion of these may be consumed within BHP's own operations.

Therefore, these emissions may also be included within our Scope 1 and Scope 2 inventories.

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 emission factors applied to production volumes (on an equity basis) for each commodity to calculate an overall emissions estimate for this category.

For more information on the calculations for this 'Use of sold products' category refer to Appendix 2.

Assumptions

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

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 NGER Measurement Determination published by the Australian Government, from which these emission 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 a more conservative assumption. The energy content of the crude oil and condensates volumes is used to estimate the corresponding quantity of diesel that 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.

Emission factors are sourced from the Australian NGER Determination published by the Australian Government, with the Scope 1 emission factors given for each fuel applied as the Scope 3 emission 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- BHP Operational Review for the year ended 30 June 2022; BHP; 2022; bhp.com/news/media-centre/releases/2022/07/bhp-operational-review-for-the-year-ended-30-june-2022
- NGER Measurement Determination 2008 (as amended July 2021) (Schedule 1 Part 1); Australian Government; 2021; legislation.gov.au/Series/F2008L02309
- Global Tech-Conversion tables (Table 2 – Petroleum and coal); Global Tech Australia; 2022; globaltechaustralia.com.au/conversion-tools/

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 FY2022 emissions in BHP's value chain	Not material, not calculated	FY2022 emissions in BHP's value chain (MtCO₂-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 FY2022 emissions in BHP's value chain	Not relevant, not calculated	FY2022 emissions in BHP's value chain (MtCO₂-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 FY2022 emissions in BHP's value chain	Not relevant, not calculated	FY2022 emissions in BHP's value chain (MtCO₂-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 FY2022 emissions in BHP's value chain	Not material, calculated	FY2022 emissions in BHP's value chain (MtCO₂-e)	2.7
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

This category covers the Scope 1 and Scope 2 emissions (on an equity basis) from our assets that are owned (as a joint venture or other ownership structure) 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 assets relevant to the FY2022 reporting year (including divestments that were completed in FY2022) are described in the Scope 1 and Scope 2 emissions – Non-operated assets section of this document.

Additional investments are added and divestments are removed each year as applicable.

Emissions from Tamakaya Energía SpA (Kelar Power Plant) that are additional to the emissions reported under Scope 2 for Escondida and Pampa Norte under the operational control boundary are reported in this category. The categorisation of Scope 3 emissions from Tamakaya Energía SpA is under review and may change in the future.

Exclusions

Inclusions and exclusions are described in the Scope 1 and Scope 2 emissions – Non-operated assets section of this document.

Calculation methodology

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

Data sources

As described in the Scope 1 and Scope 2 emissions – Non-operated assets section of this document.

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; ghgprotocol.org/scope-3-technical-calculation-guidance
- Solgold Annual Report 2021; Solgold Plc; 2021; wp-solgold-2021.s3.eu-west-2.amazonaws.com/media/2021/09/SolGold-Annual-Report-2021.pdf

Glossary²⁰

Activity data	A quantitative measure of a level of activity that results in GHG emissions. Activity data is multiplied by an energy and/or emissions factor to derive the energy consumption and 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.
Assets	Assets are a set of one or more geographically proximate operations (including open-cut mines, underground mines, and onshore and offshore oil and gas production and processing facilities). Assets include our operated and non-operated assets.
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.
Carbon offsets	The central purpose of a carbon offset for an organisation is to substitute for internal GHG emission reductions. Offsets may be generated through projects in which GHG emissions are avoided, reduced, removed from the atmosphere or permanently stored (sequestration). Carbon offsets are generally created and independently verified in accordance with either a voluntary program or under a regulatory program. The purchaser of a carbon offset can 'retire' or 'surrender' it to claim the underlying reduction towards their own GHG emissions reduction targets or goals or to meet legal obligations.
CO₂ equivalent (CO₂-e)	The universal unit of measurement to indicate the global warming potential (GWP) of each GHG, expressed in terms of the GWP of one unit of carbon dioxide (CO ₂). It is used to evaluate releasing (or avoiding releasing) different GHGs against a common basis.
Cradle-to-gate	All GHG emissions that occur in the life cycle of purchased products, up to the point of receipt by the reporting company (excluding GHG 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). Also see the definition for Indirect use-phase emissions.
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. distributed without receiving payment).
Emission factor	A factor that converts activity data into GHG emissions data (e.g. kg CO ₂ -e emitted per gigajoule (GJ) of fuel consumed, kilogram (kg) CO ₂ -e emitted per KWh of electricity used).
Energy	Energy means all forms of energy products where 'energy products' means combustible fuels, heat, renewable energy, electricity, or any other form of energy from operations that are owned or controlled by BHP. The primary sources of energy consumption come from fuel consumed by haul trucks at our operated assets, as well as purchased electricity used at our operated assets.
Energy content factor	The energy content of a fuel is an inherent chemical property that is a function of the number and types of chemical bonds in the fuel.
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. Also see the definition for Operational control approach.
Financial control approach	A consolidation approach whereby a company reports GHG emissions based on the accounting treatment in the company's consolidated financial statements, as follows: – 100 per cent for operations accounted for as subsidiaries, regardless of equity interest owned – for operations accounted for as a joint operation, the company's interest in the operation It does not report GHG emissions from operations that are accounted for using the equity method in the company's financial statements.
Fugitive emissions	Emissions that are not physically controlled but result from the intentional or unintentional releases of GHGs.
GHG (greenhouse gas) emissions	For BHP reporting purposes, these are the aggregate anthropogenic carbon dioxide equivalent (CO ₂ -e) emissions of carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF ₆). Nitrogen trifluoride (NF ₃) GHG emissions are currently not relevant for BHP reporting purposes.
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 . BHP currently uses GWP from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 5 (AR5) based on a 100-year timeframe.
Grid	A system of power transmission and distribution (T&D) lines under the control of a coordinating entity or 'grid operator', which transfers electrical energy generated by power plants to energy users also called a 'power grid'.
Indirect emissions	Emissions that are a consequence of the activities of the reporting company, but occur at sources owned or controlled by another company.

²⁰ Definitions provided are based on Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, the Scope 3 Standard and BHP's own definitions.

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)). Also see the definition for Direct use-phase emissions.
IPCC (Intergovernmental Panel on Climate Change)	The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.
Life cycle	Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to end of life.
Location-based reporting	Scope 2 GHG emissions based on average energy generation emission factors for defined geographic locations, including local, subnational or national boundaries (i.e. grid factors). In the case of a direct line transfer, the location-based emissions are equivalent to the market-based emissions.
Market-based reporting	Scope 2 GHG emissions based on the generators (and therefore the generation fuel mix from which the reporting company contractually purchases electricity and/or is directly provided electricity via a direct line transfer).
Material	Concept that individual or the aggregation of errors, omissions and/or misstatements are of sufficient significance as could meaningfully affect the GHG inventory and could influence the intended users' decisions.
Nickel intermediates	Includes BHP nickel concentrates, matte, residue and mixed sulphides.
Onshore US	BHP's petroleum asset (divested in the year ended 30 June 2019) in four US shale areas (Eagle Ford, Permian, Haynesville and Fayetteville), where we produced oil, condensate, gas and natural gas liquids.
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. Refer also to the definition for Equity share approach.
Operations	Open-cut mines, underground mines, onshore and offshore oil and gas production and processing facilities.
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).
Proxy	Data from a similar process or activity that is used as a stand-in for the given process or activity without being customised to be more representative of the given process or activity.
Residual mix	The mix of energy generation resources and associated attributes such as GHG emissions in a defined geographic boundary left after contractual instruments have been claimed/retired/cancelled. The residual mix can provide an emission factor for companies without contractual instruments to use in a market-based method calculation. A residual mix is currently unavailable to account for voluntary purchases and this may result in double counting between electricity consumers.
Scope 1 emissions	Scope 1 emissions are direct GHG emissions from operations that are owned or controlled by the reporting company. For BHP, these are primarily emissions from fuel consumed by haul trucks at our operated assets, as well as fugitive methane emissions from coal and petroleum production at our operated assets.
Scope 2 emissions	Scope 2 emissions are indirect GHG emissions from the generation of purchased or acquired electricity, steam, heat or cooling that is consumed by operations that are owned or controlled by the reporting company. BHP's Scope 2 emissions have been calculated using the market-based method unless otherwise specified.
Scope 3 emissions	Scope 3 emissions are all other indirect GHG emissions (not included in Scope 2) that occur in the reporting company's value chain. For BHP, these are primarily emissions resulting from our customers using and processing the commodities we sell, as well as upstream emissions associated with the extraction, production and transportation of the goods, services, fuels and energy we purchase for use at our operations; emissions resulting from the transportation and distribution of our products; and operational GHG emissions (on an equity basis) from our non-operated joint ventures.
Scope 3 category	One of the 15 types of Scope 3 emissions defined by the Scope 3 Standard.
Scope 3 Guidance	Greenhouse Gas Protocol Technical Guidance for Calculating Scope 3 Emissions.
Scope 3 Standard	The Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.
Upstream emissions	Indirect GHG emissions from purchased or acquired goods and services.
Value chain	Refers to all 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. Emissions in BHP's value chain refers to BHP's reported Scope 3 emissions inventory (also see the definition for Scope 3 emissions).

References

- BHP Operational Review for the year ended 30 June 2022; BHP; 2022; bhp.com/news/media-centre/releases/2022/07/bhp-operational-review-for-the-year-ended-30-june-2022
- BS EN 16258; BSI; British Standards Institution (BSI); 2012; knowledge.bsigroup.com/products/methodology-for-calculation-and-declaration-of-energy-consumption-and-ghg-emissions-of-transport-services-freight-and-passengers/standard
- Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures (June 2017); Task Force on Climate-related Financial Disclosures; 2017; fsb-tcfd.org/publications/final-recommendations-report/
- GHG Protocol Corporate Accounting and Reporting Standard; WRI/WBCSD; 2004; ghgprotocol.org/corporate-standard
- GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard; WRI/WBCSD; 2011; ghgprotocol.org/standards/scope-3-standard
- GHG Protocol Quantis Scope 3 Evaluator tool; Quantis; 2022; quantis-suite.com/Scope-3-Evaluator/
- 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; ghgprotocol.org/scope-3-technical-calculation-guidance
- Global Tech Australia – Conversion tables (Table 2 – Petroleum and coal); Global Tech; 2022; globaltechaustralia.com.au/conversion-tools/
- Global Warming Potential Values, GHG Protocol; 2016; ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf
- Google Maps: google.com/maps
- Greenhouse Gas Reporting: Conversion Factors 2021 (Freighting goods); UK Government Department for Business, Energy & Industrial Strategy; 2021; gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
- Iron and Steel CCS Study; IEA; 2013; ieaghg.org/publications/technical-reports/reports-list/9-technical-reports/1001-2013-04-iron-and-steel-ccs-study-techno-economics-integrated-steel-mill
- Iron and Steel Technology Roadmap; IEA; 2020; iea.blob.core.windows.net/assets/eb0c8ec1-3665-4959-97d0-187ceca189a8/Iron_and_Steel_Technology_Roadmap.pdf
- MRV and DCS verification; DNV; 2022; dnv.com/maritime/insights/topics/MRV-and-DCS/verification-services.html
- National Greenhouse Accounts Factors – August 2021 (Tables 42 to 46); Australian Government Department of the Environment and Energy; 2021; industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021
- National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008 (as amended July 2021) (Schedule 1 Part 1); Australian Government; 2021; legislation.gov.au/Series/F2008L02309
- Nickel life cycle data; Nickel Institute; 2022; nickelinstitute.org/en/policy/nickel-life-cycle-management/nickel-life-cycle-data/
- Sea Distance Calculator, Ship Traffic Net; 2012; shiptraffic.net/2001/05/sea-distances-calculator.html
- Semis Production and Demand; Copper Council; 2021; coppercouncil.org/wp-content/uploads/2021/10/Semis-Production-and-Demand.xlsx
- Solgold Annual Report 2021; 2021; Solgold Plc; wp-solgold-2021.s3.eu-west-2.amazonaws.com/media/2021/09/SolGold-Annual-Report-2021.pdf
- Stainless Steel: the Role of Nickel; Nickel Institute; 2022; nickelinstitute.org/en/about-nickel-and-its-applications/stainless-steel/
- Steel and Raw materials fact sheet; World Steel Association; 2019; worldsteel.org/steel-by-topic/sustainability/sustainability-indicators.html
- Veracity; DNV; 2022; dnv.com/data-platform/index.html

Appendix

Appendix 1: Processing of sold products (steelmaking) calculations

Item	Quantity	Units	Comment
Processing iron ore to steel			
FY2022 iron ore production (on equity basis)	244,429,700	wet metric tonnes	<i>Assumptions</i> – Assumed that production volumes approximate sales volumes; small year-end inventory volumes will be smoothed out over year-on-year calculations. <i>Reference sources</i> – BHP Operational Review for the year ended 30 June 2022
Crude steel equivalent	138,792,340	tonnes	<i>Assumptions</i> – Assumed that all iron ore sold is processed in crude steelmaking together with BHP's metallurgical coal and third-party metallurgical coal.²¹ – Crude steel produced is attributable to iron ore only (not scrap steel). – Conversion factor is calculated based on the average iron (Fe) content of BHP iron ore product and the average content of crude steel from IEA Iron and Steel CCS Study (April 2013). A minor portion of the average Fe content is estimated using nine-month data. <i>Reference sources</i> – IEA Iron and Steel CCS Study (April 2013), pg. A3-16 ieaghg.org/publications/technical-reports/reports-list/9-technical-reports/1001-2013-04-iron-and-steel-ccs-study-techno-economics-integrated-steel-mill
Emission factor	2.2	tonnes of CO ₂ per tonne crude steel cast	<i>Assumptions</i> – Global average emissions intensity for the BF-BOF processing route. – Assumes all iron ore production (including from non-operated assets) goes via the BF-BOF route. <i>Reference sources</i> – IEA Iron and Steel Technology Roadmap (October 2020), pg. 43. iea.blob.core.windows.net/assets/eb0c8ec1-3665-4959-97d0-187ceca189a8/Iron_and_Steel_Technology_Roadmap.pdf.html
FY2022 emissions	270.8	Million tonnes CO ₂ -e (MtCO ₂ -e)	<i>Assumptions</i> – Iron ore allocation includes Scope 3 emissions from third-party metallurgical coal necessary to process BHP's iron ore and is calculated based on the difference between total steelmaking emissions of 305.3 MtCO₂-e and BHP's metallurgical coal share of 34.5 MtCO₂-e. <i>Reference sources</i> – Worldsteel publication – Fact sheet Steel and raw materials, 2019, p.1 worldsteel.org/steel-by-topic/sustainability/sustainability-indicators.html
Processing of metallurgical coal to steel			
FY2022 metallurgical coal production	33,731,080	metric tonnes	<i>Assumptions</i> – Assumed that production volumes approximate sales volumes; small year-end inventory volumes will be smoothed out over year-on-year calculations. – BMA produces a small amount of product that is marketed as thermal coal. This has been estimated based on share of sales percentage and excluded from the metallurgical coal production figure. <i>Reference sources</i> – BHP Operational Review for the year ended 30 June 2022

²¹ BHP produces more iron ore than metallurgical coal. Therefore, additional third-party metallurgical coal is required to process BHP's iron ore globally.

Item	Quantity	Units	Comment
Crude steel equivalent	43,244,974	tonnes	<i>Assumptions</i> – Assumed that all metallurgical coal sold is processed in crude steelmaking together with BHP's iron ore. – Crude steel produced is attributable to iron ore only (not scrap steel). – Conversion factor is based on the average input mass ratio of metallurgical coal of 0.78 tonnes per tonne of crude steel to the BF-BOF steelmaking route. <i>Reference sources</i> – Worldsteel publication – Fact sheet Steel and raw materials, 2019, p.1 worldsteel.org/steel-by-topic/sustainability/sustainability-indicators.html
Emission factor	2.2	tonnes of CO ₂ per tonne crude steel cast	<i>Assumptions</i> – Global average emissions intensity for the BF-BOF processing route. <i>Reference sources</i> – IEA Iron and Steel Technology Roadmap (October 2020), pg. 43. iea.blob.core.windows.net/assets/eb0c8ec1-3665-4959-97d0-187ceca189a8/Iron_and_Steel_Technology_Roadmap.pdf.html
FY2022 emissions	34.5	MtCO ₂ -e	<i>Assumptions</i> – Emissions are allocated based on the ratio of metallurgical vs iron ore to the BF-BOF steelmaking route i.e. 36.3 per cent. <i>Reference sources</i> – Worldsteel publication – Fact sheet Steel and raw materials, 2019, p.1 worldsteel.org/steel-by-topic/sustainability/sustainability-indicators.html
Steelmaking (iron ore and metallurgical coal processing) total			
FY2022 emissions		305.3 MtCO ₂ -e	

Appendix 2: Use of sold products calculations

Commodity	FY2022 production	Production units	FY2022 production (converted)	Converted production units	Energy content (GJ per production unit)	Energy content of sold products (GJ)	Emission factor (kg CO ₂ -e per GJ)	Emissions (tonnes CO ₂ -e)
Energy coal²²	15,449,520	tonnes	15,499,520	tonnes	27.0	417,137,040	90.24	37,642,446
Comment								
<i>Assumptions</i>								
– All energy coal produced is bituminous and is combusted. – Approximately 6 per cent of BMA's production is estimated to be marketed as thermal coal. It is added to our total energy coal production volume, and excluded from the metallurgical coal production volume. – Energy coal component of BMA production is estimated based on the percentage of BMA product marketed as thermal coal (approximately 6 per cent) in FY2022.								
<i>Reference sources</i>								
– Production: BHP Operational Review for the year ended 30 June 2022 – Conversion factor: Global Tech Australia – Conversion tables (Table 2 – Petroleum and coal) – Energy content and emission factors: NGER Measurement Determination 2008 (as amended July 2021) (Schedule 1 Part 1); Australian Government; 2021								
Natural gas	303.2	bcf	8,580,560,000	m ³	0.0393	337,216,008	51.53	17,376,741
Comment								
<i>Assumptions</i>								
– All natural gas produced is combusted for stationary energy purposes.								
<i>Reference sources</i>								
– Production: BHP Operational Review for the year ended 30 June 2022 – Conversion factor: Global Tech Australia – Conversion tables (Table 2 – Petroleum and coal) – Energy content and emission factors: NGER Measurement Determination 2008 (as amended July 2021) (Schedule 1 Part 1); Australian Government; 2021								
Crude oil and condensates	36,559,000	barrels	4,986,648	tonnes	45.3	225,895,136	70.20	15,857,839
Comment								
<i>Assumptions</i>								
– 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.								
<i>Reference sources</i>								
– Production: BHP Operational Review for the year ended 30 June 2022 – Conversion factor: Global Tech Australia – Conversion tables (Table 2 – Petroleum and coal) – Energy content and emission factors: NGER Measurement Determination 2008 (as amended July 2021) (Schedule 1 Part 1); Australian Government; 2021								
Natural gas liquids (NGLs)	6,961,000	barrels	600,038	tonnes	46.5	27,901,776	61.28	1,709,821
Comment								
<i>Assumptions</i>								
– Includes LPG and ethane combined. There is no breakdown between the two products available, so conservatively assumed that all NGLs are combusted.								
<i>Reference sources</i>								
– Production: BHP Operational Review for the year ended 30 June 2022 – Conversion factor: Global Tech Australia – Conversion tables (Table 2 – Petroleum and coal) – Energy content and emission factors: NGER Measurement Determination 2008 (as amended July 2021) (Schedule 1 Part 1); Australian Government; 2021								
Use of sold products total								
FY2022 emissions								72.6 MtCO ₂ -e

22 Due to the effective economic date of 31 December 2020 for sale of BHP's interest in Cerrejón, Scope 3 emissions (on an equity basis) from Cerrejón are not included in FY2022 reporting.