Emissions Guidebook

Part 5: Commodity Carbon Intensities

Section 3: IODEX Carbon Intensity Quantification Methodology

Multi Region

Version 1.0

Center of Emissions Excellence

emission excellence@spglobal.com

About the Emissions Guidebook

Purpose

Greenhouse gas (GHG) emissions have emerged as a critical metric for governments and investors given an ever-growing focus on establishing transparent frameworks for measuring, reporting, quantifying and ultimately reducing GHG emissions globally. It is of utmost importance that methodologies used by different entities are transparent and clear so different studies and emission estimates can be compared on a like-for-like basis. Without this transparency, emissions estimates have limited utility in the marketplace. The Emissions Guidebook is an evergreen document that provides the market with unparalleled transparency into S&P Global Energy' approach, methodology and key assumptions behind our emissions work. We hope this document can contribute to advancing consistency in GHG emissions accounting.

Context

The Emissions Guidebook is a product of the S&P Global Energy Center of Emissions Excellence. The "Center" is a dedicated team of carbon accounting specialists focused on ensuring consistency, transparency and credibility of emissions data across any emissions offerings.

About S&P Global Energy

At S&P Global Energy, our complete view of global energy and commodity markets enables our customers to make decisions with conviction and create long-term, sustainable value.

We're a trusted connector that brings together thought leaders, market participants, governments and regulators, and we create solutions that lead to progress. Vital to navigating commodity markets, our coverage includes oil and gas, power, chemicals, metals, agriculture, shipping and energy transition. Platts® products and services, including the most significant benchmark price assessments in the physical commodity markets, are offered through S&P Global Energy. S&P Global Energy is a division of S&P Global (NYSE: SPGI).

S&P Global is the world's foremost provider of credit ratings, benchmarks, analytics and workflow solutions in the global capital, commodity and automotive markets. With every one of our offerings, we help many of the world's leading organizations navigate the economic landscape so they can plan for tomorrow, today.

For more information visit:
www.spglobal.com/energy

For more emissions information visit:
www.spglobal.com/commodityinsights/en/ci/products/emissions-capabilities.html

Table of contents

Approach

Overview

This document outlines the detailed methodology and formulae used to calculate a carbon intensity attribute for IODEX grade iron ore fines. IODEX is the main prevailing fines benchmark that represents medium-grade iron ore with 62% iron content. The IODEX assessment consists of five different fines brands: namely, Pilbara Blend Fines (PBF), Mining Area C Fines (MAC), Newman High-Grade Fines (NHGF), Jimblebar Fines and Brazilian Blend Fines (BRBF), which are produced in Western Australia and Brazil. To estimate the carbon intensity of fines flowing into IODEX, supply chain emissions from onsite mining operations, mine site haulage, processing, stacking and reclaiming, transport using railway, port operations and maritime shipping are accounted for each contributing mine up to the discharge port.

Table 1

Brand specifications contributing to IODEX 62% fines blend*

Brand name	Country	Producer	Fe (%)	Al (%)	Si (%)	P (%)	Moisture (%)
Pilbara Blend Fines	Australia	Rio Tinto	61.6	2.25	3.7	0.09	9
MAC Fines	Australia	BHP	60.6	2.5	4.30	0.08	7.8
Newman-High Grade Fines	Australia	BHP	61.7	2.55	4.75	0.095	7.8
Brazilian Blend Fines	Brazil	Vale	63.0	1.50	5.00	0.07	8
Jimblebar Fines	Australia	BHP	60.5	3.3	4.70	0.115	7.6

*The brand specifications are reported as of July 2024; specifications are likely to change from time to time and will be duly accounted in the assessments.
Source: S&P Global Energy.

Key purpose and expected application

S&P Global Energy seeks to provide an independent carbon intensity (CI) attribute to IODEX, providing the industry with an emission benchmark alongside its widely referenced price assessment.

The carbon intensity calculated by S&P Global Energy is a sum of the production weighted average of individual carbon intensities of mining and railway transportation from the mines contributing to IODEX, and the weighted average carbon intensity arising out of maritime shipping of traded fines to China from Western Australia & Brazil. Any other individual supply chain may differ materially from the IODEX CI. Therefore, it is important to point out that this work attempts to quantify emissions from a specific supply chain associated with the IODEX grade (62% iron content). Our objective is to serve as an independent resource for industry, investors and buyers to look to and compare their own operations, supply chains and investments against.

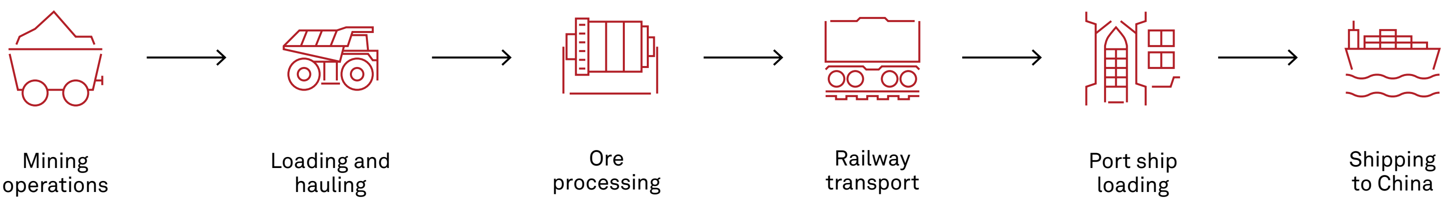
Supply chain emissions accounting

Supply chain system boundary

Emissions are added over a supply chain of iron ore from the mine to discharge/destination terminal (port). The mines contributing to IODEX grade are primarily open-pit mines. A section of the mine site is drilled and blasted to obtain a mixture of waste rocks and ore. The mined ore and waste rocks are loaded and handled using front-end loaders, excavators and trucks. The waste rocks and ore are hauled to designated locations for further storage and processing. The ore undergoes stages of dry/wet processing operations including screening, crushing, thickening, etc., to obtain the desired fines product alongside lumps. The products are then transported to the loading port using railways; the ore is subsequently unloaded at the loading port and loaded into bulk vessels that ship the fines product to the discharge ports located in China (IODEX is a delivered price – Qingdao basis). Figure 1 shows the system boundary used for the emissions accounting from mine to key discharge locations (ports).

Figure 1

IODEX Supply Chain System Boundary



Source: S&P Global Energy.

Units

Functional unit

A functional unit must be chosen before an assessment is undertaken and it must be kept consistent throughout the evaluation of each segment of a supply chain. This functional unit is the denominator basis for a greenhouse gas (GHG) intensity calculation. The units of kilograms of carbon dioxide equivalent per wet metric ton ($kgCO_2e/wmt$) are the units of choice for this assessment.

Reporting unit

The reporting unit must be one that is accepted across the industry; therefore, the units of kilograms of carbon dioxide equivalent per dry metric ton ($kgCO_2e/dmt$) are used as the reporting units for the assessment.

Treatment of coproducts

The overall carbon intensity across the IODEX supply chain can be defined by:

$$CI = \frac{kgCO_2e}{wmt\ fines} = \left(\frac{kgCO_2e\ mining\ \&\ transporting\ fines}{wmt_{fines}} + \frac{kgCO_2e\ maritime\ shipping\ fines}{wmt_{fines}} \right)$$

Where emissions allocated to fines based upon mass ratio:

$$kgCO_2e_{mining\ \&\ transporting\ fines} = kgCO_2e_{mining\ \&\ transporting\ fines + lump} \times \frac{wmt_{fines}}{wmt_{fines + lump}}$$

It follows that,

$$CI = \frac{kgCO_2e}{wmt\ fines} = \left(\frac{kgCO_2e\ mining\ fines + lump}{wmt_{fines + lump}} + \frac{kgCO_2e\ shipping\ fines}{wmt_{fines}} \right)$$

Any typical iron ore processing operation produces fines and lumps simultaneously as coproducts, since the processes (crushing, screening, etc.) involved in producing these products are typically common to the products. Therefore, both lumps and fines will have the same resulting carbon intensity.

Global warming potential

GHGs emitted into the atmosphere trap heat from the sun and contribute to a rise in global temperatures. Once in the atmosphere, various GHGs can interact with the environment differently and contribute to varying degrees of global warming. This concept is known as global warming potential (GWP). GHG emissions are often expressed in units of mass of carbon dioxide equivalent (CO_2e), with GWPs being used to convert different gases into this comparative basis.

The United Nations Framework Convention on Climate Change (UNFCCC) International Panel on Climate Change (IPCC) publishes Assessment Reports (AR) of GWP. These are typically referenced as AR4, AR5 or AR6. For each GHG, the warming potential of each gas differs by the time horizon that is looked at because each gas has a different lifespan in the atmosphere and ability to absorb energy. The UNFCCC publishes two different time horizons to show short- and long-term effects of GHGs on global warming: 20-year and 100-year. For this work, AR4 100-year GWPs were used to convert emissions to a CO_2e basis, provided in Table 2.

Table 2

100-year AR4 Global Warming Potentials of CH_4 and N_2O

Gas	GWP AR4 100-yr
CO_2	1
CH_4	25
N_2O	298

CH_4 = methane; N_2O = nitrous oxide.
Source: IPCC Fourth Assessment Report (AR4).

Mine to export port emissions modeling

High-level methodology

We have adopted a two-pronged approach to estimating the carbon intensity of mines associated with the IODEX benchmark. The first step involves gathering mine-level reported emission data from regulatory authorities in Australia and Brazil. The mines in Australia report their emissions under the Australian Clean Energy Regulator's (CER's) safeguard mechanism. However, no such reporting mechanism exists for the Brazilian mines contributing to IODEX-grade iron ore. Subsequently, to estimate emissions from mines whose data is not reported, an in-house emission estimation model is developed and calibrated against the reported data, to estimate emissions and carbon intensity of the remaining mines adding up to IODEX.

The following sections highlight the approach used in our in-house model to calculate emissions from different mining and processing activities.

Emissions from onsite diesel consumption

Several operations at the mine site are performed with heavy-duty equipment that use diesel fuel. This section describes the methodology followed to estimate fuel consumption for each operation. In all cases, an end-use diesel combustion emission factor is used to arrive at final emissions estimates per operation (denoted as $EF_{Diesel\ Combustion}$).

Dozing and grading

Diesel consumption by crawler dozers and motor graders is estimated based on the annual quantity of ore mined and specific energy required by crawler dozers and motor graders to prepare the mine site for mining operations. The specific energy consumption data of crawler dozers and motor graders is reported by federal regulatory bodies in their reports on mining operations.

$$kgCO_2e_{Dozing} = \left\{ Quantity\ of\ ore\ handled \times Specific\ Energy_{Dozing} \times EF_{Diesel\ Combustion} \right\}$$

$$kgCO_2e_{Grading} = \left\{ Quantity\ of\ ore\ handled \times Specific\ Energy_{Grading} \times EF_{Diesel\ Combustion} \right\}$$

Drilling

Drilling diesel consumption is estimated based on the annual quantity of ore mined and specific energy required by mining bore rigs to drill holes into the surface, following which explosives can be placed into the bore holes. The specific energy consumption data of drill rigs is reported by federal regulatory bodies in their reports on mining operations.

$$kgCO_2e_{Drilling} = \left\{ Quantity\ of\ ore\ mined \times Specific\ Energy_{Drilling} \times EF_{Diesel\ Combustion} \right\}$$

Excavation and loading

Diesel consumption by excavators and front-end loaders (FELs) is estimated based on the number of operating excavators and FELs, hours of operation, quantity of material handled, and the size of the excavators and FELs. These parameters are then used with diesel consumption factors (liter/hp-hr - unit) published by the US Argonne National Laboratory's Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) model.

$$kgCO_2e_{Excavator} = Hours\ of\ Operation \times Excavator\ Size \times No.\ of\ excavators \times GREET\ Factor_{Excavator} \times EF_{Diesel\ Combustion}$$

$$kgCO_2e_{FEL} = Hours\ of\ Operation \times FEL\ Size \times No.\ of\ FELs \times GREET\ Factor_{FEL} \times EF_{Diesel\ Combustion}$$

Hauling

Diesel consumption from mine site hauling is estimated based on the number of operating haul trucks, hours of operation, quantity of material moved, distance and the size of the haul trucks. These parameters are then used with diesel consumption factors (liter/hp-hr - unit) published by GREET for mine site haul trucks. Diesel consumption from haul trucks is the largest contributor to diesel emissions from mine site operations.

$$kgCO_2e_{Haul\ trucks} = Hours\ of\ Operation \times Truck\ Size \times No.\ of\ trucks \times GREET\ Factor_{trucks} \times EF_{Diesel\ Combustion}$$

Water tanker

Water tanker diesel consumption is estimated based on the annual quantity of ore mined and specific energy required by water tankers for dust suppression, soil compaction, etc. The specific energy consumption data of tankers is reported by federal regulatory bodies in their reports on mining operations.

$$kgCO_2e_{Water\ trucks} = Quantity\ of\ ore\ mined \times Specific\ Energy_{Water\ truck} \times EF_{Diesel\ Combustion}$$

Net emissions from onsite diesel consumption

The net emissions from onsite diesel consumption are given by:

$$kgCO_2e_{onsite\ diesel\ emissions} = kgCO_2e_{Water\ truck} + kgCO_2e_{Haul\ truck} + kgCO_2e_{FEL} + kgCO_2e_{Excavator} + kgCO_2e_{Drill\ Rig} + kgCO_2e_{Grader} + kgCO_2e_{Dozer}$$

Emissions from electricity consumption

Several operations at the mine site are electricity powered. This section describes the methodology followed to estimate electricity consumption for each operation. In all cases, the local electricity grid intensity factor is used to arrive at final emissions estimates per operation (denoted as EF_{grid}).

Crushing and grinding

Comminution is generally the most electricity-intensive process amongst ore processing operations. The electricity consumed is calculated using a work index of hematite ore, feed size (F80) and product size (P80). The electricity consumed also accounts for equipment efficiency and transmission losses.

$$kgCO_2e_{comminution} = \frac{\left[10 \times Work\ Index_{Hermatite\ Ore} \times \left\{\frac{1}{P_{80}^{0.5}} - \frac{1}{F_{80}^{0.5}}\right\} \times Quantity\ of\ Ore\ Processed\right]}{[1 - Transmission\ Loss] \times [Equipment\ Efficiency]} \times EF_{grid}$$

Screening

Screening is essential to segregate feed and products based on their physical size or dimensions. The electricity consumed is calculated using quantity of material handled, capacity of screen and rated power of the motors. The electricity consumed accounts for equipment efficiency and transmission losses.

$$kgCO_2e_{screening} = \frac{[\,Power\ Consumed\ by\ screener\ motors\,]}{[\,1 - Transmission\ Loss\,] \times [\,Equipment\ Efficiency\,]} \times EF_{grid}$$

Conveying and stacking

Conveying enables movement of ore and products from one section of the mine or processing plant to the other. The electricity consumed is calculated using quantity of material handled, length of conveying system, belt specifications, belt speed and elevation. The electricity consumed also accounts for equipment efficiency and transmission losses.

$$kgCO_2e_{conveying} = \frac{[\,Power\ Consumed\ by\ conveyor\ motors\,]}{[\,1 - Transmission\ Loss\,] \times [\,Equipment\ Efficiency\,]} \times EF_{grid}$$

Reclaiming

Reclaimers facilitate the loading and unloading of products from stockpiles to conveyors or railway wagons. The electricity consumed is calculated using quantity of material handled, reclaimer capacity, reclaimer specifications and discharge frequency. The electricity consumed also accounts for equipment efficiency and transmission losses.

$$kgCO_2e_{reclaiming} = \frac{[\,Power\ Consumed\ by\ reclaimers\,]}{[\,1 - Transmission\ Loss\,] \times [\,Equipment\ Efficiency\,]} \times EF_{grid}$$

Water pumps

The electricity consumed by water pumps is calculated using the volume of water pumped, flow, head and rated power. The electricity consumed accounts for equipment efficiency and transmission losses.

$$kgCO_2e_{pumping} = \frac{[\,Power\ Consumed\ by\ water\ pumps\,]}{[\,1 - Transmission\ Loss\,] \times [\,Equipment\ Efficiency\,]} \times EF_{grid}$$

Wet processing circuit

The wet processing circuit comprises classification, thickening and filtration of ultra fines to produce concentrated ultra fines, which is generally used as pellet feed. The electricity consumed is calculated using a specific electricity consumption factor for a standard wet processing circuit comprised of classification, thickening, filtration, and quantity of ore processed. Additionally, it is assumed that 30% of the feed is rejected as tailings out of the wet processing circuit. The electricity consumed accounts for respective equipment efficiency and transmission losses.

$$kgCO_2e_{wet\ processing\ circuit} = \frac{[\,Specific\ Energy_{Wet\ Processing\ Circuit}\,] \times [\,Quantity\ of\ Ore\ Processed\,]}{[\,1 - Transmission\ Loss\,] \times [\,Equipment\ Efficiency\,]} \times EF_{grid}$$

Port operations

Port operations are comprised of reclaimers, screeners, conveyers, etc., for loading and unloading iron ore from railway wagons into bulk vessel carriers. The electricity consumed during port operations is calculated using a specific electricity consumption factor and quantity of ore handled. The specific electricity consumption factor is sourced from data published by industry operators in their annual technical reports.

$$kgCO_2e_{port\ operations} = \left(\left[Specific\ Energy_{port\ operations}\right] \times [\ Quantity\ of\ Ore\ Handled\ ]\right) \times EF_{grid}$$

Net emissions from electricity consumption

The net emissions from electricity consumption are given by:

$$kgCO_2e_{electricity\ emissions} = kgCO_2e_{comminution} + kgCO_2e_{screening} + kgCO_2e_{conveying} + kgCO_2e_{reclaiming} + kgCO_2e_{pumping} + kgCO_2e_{wet\ processing\ circuit} + kgCO_2e_{port\ operations}$$

Transportation emissions modeling

Railway transport

Emissions from railway transport are estimated by accounting for emissions from diesel consumption during round-trip journeys to transport iron ore products from the processing facilities to the maritime export terminals.

A diesel electric locomotive is assumed. The railway transport emission model considers factors such as quantity of iron ore carried, distance, velocity, locomotive specifications, engine characteristics, traction motor characteristics, alternator characteristics and idling characteristics to arrive at the total diesel consumption.

Once the diesel consumption from railway transport operations is estimated, the combustion emission factor of diesel is used to arrive at net emissions from railway transport.

$$kgCO_2e_{Rail\ transport\ emissions} = Diesel\ consumed\ in\ a\ roundtrip \times No.\ of\ roundtrips \times EF_{Diesel\ combustion}$$

Maritime transport

S&P Global Energy's proprietary service Commodities at Sea (CAS) is used to determine movement of iron ore fines from Australia and Brazil to China. CAS provides the most comprehensive coverage of near real-time visibility into the waterborne trade volumes of globally traded iron ore and into freight analytics and fleet metrics. CAS tracks actual volumes of iron ore fines shipped along specific routes using different vessel types (Capesize, Newcastlemax, Valemax, etc.) on a twice-daily basis. The data is summarized monthly and used to arrive at the carbon intensity of shipping ores over a route in a certain month.

The shipping emissions model considers critical factors including route and distance, vessel characteristics (DWT, draught, fuel consumption, etc.), bunkering fuel, vessel speed, idling time, conditions at sea and volume of cargo to estimate the carbon intensity of shipping the bulk commodity from loading to the discharge port.

Three major discharge ports are considered based on the volume of iron ore handled historically and port turnover (listed in Table 3).

Table 3

Shipping routes

Route
Delivered Caofeidian from Australia and Brazil
Delivered Qingdao from Australia and Brazil
Delivered Zhanjiang from Australia and Brazil

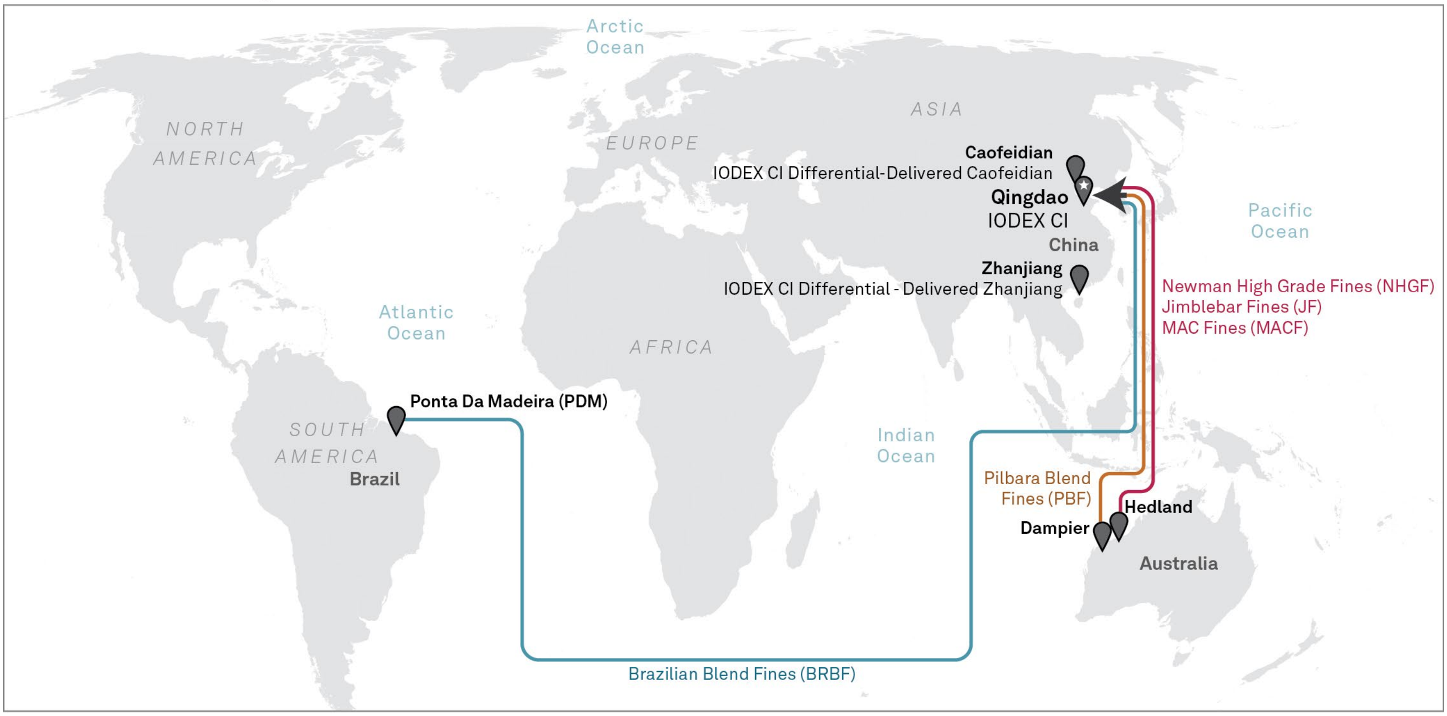
Source: S&P Global Energy.

Final IODEX Carbon Intensity

IODEX CI and CI Differential Supply Chain

Figure 2

IODEX carbon intensity assessment



Data compiled November 2025.
Credit: Content Design
Source: S&P Global Energy: IC-252159-01.

The IODEX CI comprises two parts: (i) production volume weighted average carbon intensity of mined, processed and transported iron ore fines and (ii) traded volume weighted average carbon intensity of shipped iron ore fines. The final IODEX CI is a result of carbon intensity of produced fines and shipped fines, corrected to a dry-iron metric ton basis.

CI of each mine to each export port:

$$CI_{PBF/BRBF/BHP*} = \frac{\left\{ kgCO_2e_{onsite\ diesel\ emissions} + kgCO_2e_{electricity\ emissions} + kgCO_2e_{rail\ transport\ emissions} \right\}}{Total\ Production \left(wmt_{PBF/BRBF/BHP*} \right) * \left(100\% - Moisture\ \ Content\ \%_{PBF/BRBF/BHP*} \right)}$$

[*] BHP = Newman High Grade Fines, MAC Fines and Jimblebar Fines

CI of each shipping route:

$$CI_{Shipping\ PBF/BRBF/BHP} = \frac{\left\{ kgCO_2e_{maritime\ shipping} \right\}}{Total\ Shipped\ (\ wmt\ ) * (\ 100\% \ - Avg.\ \ Moisture\ \ Content\ \%\ )}$$

IODEX CI traded fines weighted average carbon intensity:

$$IODEX\ CI = \frac{\left(SO_{IODEX-Dampier} \left[CI_{PBF} + CI_{Shipping\ PBF} \right] + SO_{IODEX-Hedland} \left[CI_{BHP} + CI_{Shipping\ BHP} \right] + SO_{IODEX-PDM} \left[CI_{BRBF} + CI_{Shipping\ BRBF} \right] \right)}{Total\ Shipped\ (\ dmt\ )}$$

Where $SO_{IODEX - Dampier}$, $SO_{IODEX - Hedland}$ and $SO_{IODEX - PDM}$ are the shipped ore (dmt) from each of the mining operations, exported to China from Dampier, Hedland and Ponta da Madeira.

Assessment frequency

The IODEX CI is assessed monthly based upon shipped volumes. The shipped volumes from different contributing mines situated in Australia and Brazil are summarized retrospectively each month, which eventually flow into China, i.e., the July release is based upon June iron ore fines traded data. The shipped iron ore volumes from Australia and Brazil to China vary by month, and therefore, the overall intensity will also vary monthly.

Appendix A: Overview of S&P Global products and models

Commodities at Sea™

Commodities at Sea (CAS) is a service that offers near real-time visibility into the waterborne trade volumes of globally traded commodities such as coal, iron ore and soybeans (among many others) and into freight insights and fleet metrics that together can help clients to:

- Potentially better spot trading signals, competitive insight and strategic alternatives
- Better support negotiations, deal-making and operational planning in the physical commodity and freight markets.

Our clients — who are typically commodity or freight traders, analysts, marketers, buyers and procurement teams or chartering managers at miners, traders, utilities, refiners, mill operators, steel makers, investors and more — choose to buy CAS when they discover that our near real-time visibility helps them to better understand, confirm and potentially even anticipate market movements and early reporting signals on market-moving trade reports.

CAS is built with our authoritative, proprietary data sets of ships, berths, ports and automatic identification system (AIS) vessel positions (each data set being the most complete of its kind in the world) and the combined research expertise of both our CAS-specific team of market analysts (drawn from industry) and also our company's many research teams across disciplines.

Our models start with vessel activity tracking but also integrate third-party data sets from vessel lineups, fixtures, bills of lading and inspection records to help identify the cargoes and company names for voyages and use machine learning-based data science techniques in its predictions of vessel estimated times of arrival (ETAs) and destinations.

Appendix B: Reference definitions and data

Glossary of key terms

Table B-1

Glossary of Key Terms

Term	Definition
AR4	IPCC 4th Assessment Report – referred to for GWPs
AR5	IPCC 5th Assessment Report – referred to for GWPs
AR6	IPCC 6th Assessment Report – referred to for GWPs
BRBF	Brazilian Blend Fines
Btu	British thermal unit
CER	Australian Clean Energy Regulator
CH_4	Methane
CI	Carbon intensity
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
dmt	Dry metric ton
DWT	Deadweight ton
EF	Emission factor
F80	F80 is the 80% passing size of the feed material
Fe	Iron
Fines	Iron ore between 1mm to 10mm in size
Fuel	Gas or diesel that is combusted at a site
GHG	Greenhouse gas
GREET	Greenhouse gases, Regulated Emissions, and Energy use in Technologies
GWP	Global warming potential
Hp	Horsepower
Lump	Iron ore between 10 mm to 40mm in size
N_2O	Nitrous oxide
NHGF	Newman High Grade Fines
P80	P80 is the 80% passing size of the product material
PBF	Pilbara Blend Fines
wmt	Wet metric ton
Wt. Avg.	Weighted average

Source: S&P Global Energy.

Conversion factors

Table B-2

Mass conversion

Source unit	Equals or denotes
1 kilogram (kg)	2.205 pounds
1 metric ton (t)	1,000 kg
1000 grams	1 kg
1 Mt	1 mega metric ton
1 kt	1 kilo metric ton

Source: S&P Global Energy.

Table B-3

Volume conversion

Source Unit	Equals or denotes
1 m^3	35.31 ft^3
1 MMcf	1,000,000 ft^3
1 gallon	3.785 liters

Table B-4

Energy conversion

Source unit	Equals or denotes
1 Megajoule (MJ)	1,000,000 J
1 MMBtu	1,000,000 Btu
1 MJ	1,055 MMBtu
1 MWh	3,600 MJ
1 gigajoule (GJ)	1,000 MJ

Source: S&P Global Energy.

Diesel characteristics

Higher and lower heating value definitions

Higher heating values (HHVs) or gross heating values are obtained by assuming that all water in the combustion products is in liquid form, therefore resulting in more energy availability in the fuel (as the energy to condense the water vapor is included as available energy). Most combustion processes do not condense the water vapor in the exhaust. The lower heating value (LHV) or net heating value assumes that the water remains vapor in the exhaust. In the work that the Center of Emissions Excellence does for supply chain emission accounting, LHVs are used to represent carbon intensities of energy commodities such as natural gas, crude oil and natural gas liquids.

Table B-5

Diesel characteristics

Source unit	Equals or denotes
Heating value (LHV)	129,306 Btu/gal
Density	0.85 kg/L

Source: S&P Global Energy.

CONTACTS

Americas: +1 800 597 1344
Asia-Pacific: +60 4 296 1125
Europe, Middle East, Africa: +44 (0) 203 367 0681

www.spglobal.com/energy
www.spglobal.com/en/enterprise/about/contact-us.html