Brambles

Sustainability Review 2022
Supplementary Information
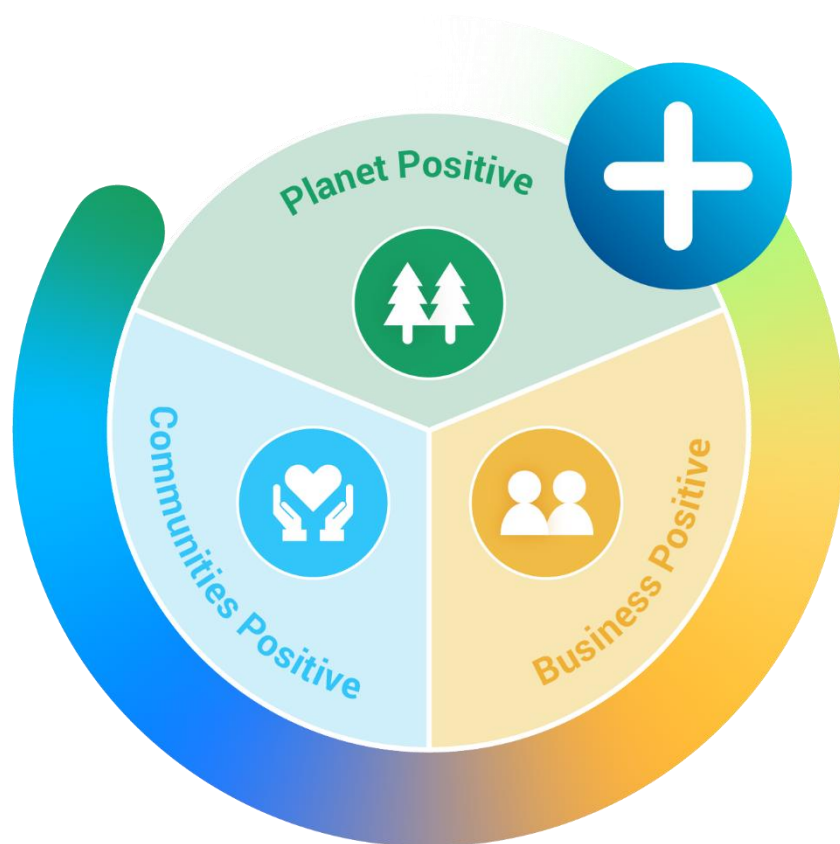
Step into the positive

Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

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Brambles defines sustainability as the strategies and activities the Group has adopted in relation to its employees, the environment, ethics and the community

Bramble's sustainability framework focuses our activities in three areas: Business Positive, Planet Positive and Communities Positive

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Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

As of 23 September 2022

BOUNDARIES

This Sustainability Review covers Brambles' businesses for the fiscal year ended 30 June 2022 (FY22, or 'the year'). Brambles Limited is an ASX-listed supply chain logistics company with a network of 750+ service centres in approximately 60 countries, employing 12,000 people. Brambles is the world leading provider of supply chain logistics solutions based on the provision of 360 million reusable pallets, crates and containers for shared use by multiple participants throughout the supply chain. Brambles' longstanding asset management expertise and superior network advantage are integral to its customer solutions. Brambles primarily serves customers in the fast-moving consumer goods (e.g., dry food, grocery, and health and personal care), fresh produce, beverage, retail and general manufacturing industries, counting many of the world's best-known brands among its customers. During FY22 Brambles operated primarily through the CHEP brand and manages its businesses within the following operating segments:

- CHEP EU – The pallet and container pooling businesses in Europe
- CHEP IMETA – The pallet and container pooling businesses in India, Middle East, Turkey and Africa, in addition the CHEP-branded RPC (Reusable Plastic Crates) business in South Africa;
- CHEP Americas – The pallet and container pooling businesses in the Americas; and
- CHEP Asia-Pacific – The pallet and container pooling businesses in Asia-Pacific and the CHEP-branded RPC business in Australia and New Zealand.
  In April 2021 Brambles combined its Kegstar keg rental business with MicroStar, a leading US beer keg solution provider. Consequently, the prior year results of Kegstar are presented in discontinued operations in the consolidated statement of comprehensive income and all related note disclosures. Brambles accounts for its 16% interest in MicroStar within share of results of associate in the consolidated statement of comprehensive income. Therefore Kegstar is no longer under Brambles operational

control as defined by GHG Protocol, therefore is not included in any FY22 reporting.
To note, for historical data, IFCO was divested on 31st May 2019. IFCO data to the date of divestment are included in the document named '5 year performance update' which is available on the Brambles Website. The FY22 Sustainability Review (the Review) covers operations as listed above, with the following exceptions:

- The Review does not include data from service centres operated by a third party (outsourced service centres), with the following exceptions:
- An estimation of emissions data associated with third party service centres operating on CHEP's behalf and transportation associated with balancing its pallet pool;
- Wood purchased directly by third party service centres, subsequently used in the repair or manufacture of CHEP pallets.
- Brambles undertook an exercise to identify sites representing 95% of emissions for FY22. Of 138 sites this identified 92 sites. The remaining sites that represented 5% of emissions are estimated based on the average emissions of the 92 sites. 100% of fleet data was collected.
- For Brambles product waste, diverted from landfill, a 95% pareto is applied to all sites that handle Brambles' products, identifying 112 Brambles managed sites and 478 sub contracted sites.

All other reported data covers all segments of Brambles' business. Consideration has been given to the impact of sustainability issues on Brambles' customers as described in the Share and Reuse Model and Supply Chain Collaboration and Emissions sections of the Review.

ASSESSMENT OF MATERIAL TOPICS, KEY IMPACTS, RISKS AND OPPORTUNITIES

Brambles continued to follow an annual material sustainability topics process to identify sustainability topics deemed material by its businesses and stakeholders. Brambles identifies

sustainability issues through stakeholder engagement processes covering key external and internal sources of feedback. This includes a review of stakeholder feedback through both formal and informal processes, either directly from stakeholder responses via survey and comments, or as summarised and analysed by the responsible function for that stakeholder group. Ranking is also conducted as a part of this process through Brambles Sustainability Risk Committee (SRC). In FY19, Brambles structured a survey to achieve two objectives:

1. Inform the materiality process
2. Inform Brambles sustainability programme to 2025 and beyond the survey was delivered as both an online method and direct conversation / recording method in order to gain richer insights through discussions.

The key results of the materiality survey have been incorporated into the materiality matrix through consultation with Brambles SRC. Some issues have been included under modified headings, for example in FY18 'Sustainable Sourcing raw materials' is now included as Overuse of the world's resources (including raw materials) Key additions include;

1. Climate change impacts
2. Move to a climate-neutral circular economy
3. Social impact of the value chain
4. Overuse of the world's resources (including raw materials)
5. Transparency and corporate governance including anti-corruption and bribery)

Background on Brambles' Materiality Process

Brambles risk management processes considers the Australian Stock Exchange Corporate Governance Council's Corporate Governance Principles and Recommendations. Since 2015, economic, environmental and social sustainability risks were incorporated into the Group's risk management framework and in FY16, this framework was further enhanced with the establishment of an SRC. The SRC is a management committee comprising Brambles' Group Senior Vice President, Human

Resources, Global Head of Sustainability and Director of Risk and a cross section of senior Brambles corporate and business unit executives with relevant and applicable functional expertise. (For further information, please see the 2022 Corporate Governance Statement , Principle 7. Recognise and Manage Risk, available online). This process has contributed to the identification of material sustainability topics for the FY22 Sustainability Review. Stakeholders are engaged throughout the Year through a number of other ongoing business processes, including programs such as the employee surveys and a customer insights program, which are under the direct control of senior management and reported in the Review where applicable.

While internal stakeholders were engaged as proxies to represent external associations in some cases, this was limited and may not result in a complete and unbiased contribution. The top sustainability issues of concern to each stakeholder group were identified and ranked. These were approved by senior management responsible for the stakeholder group. The environmental, economic and social sustainability risks assessed by our internal risk management processes were also included in our analysis. The material sustainability issues were identified as being those sustainability issues applicable to multiple stakeholder groups and/or with a material impact on our businesses. In FY20, Brambles conducted a review in consideration of the Global Reporting Initiative (GRI)standards, in order to identify material aspects that reflect Brambles' economic, environmental and social impacts. Consideration was also given to the requirements of the ASX Corporate Governance Principles recommendation 7.4.

Brambles have published a second TCFD disclosure, available on the website;
Brambles_2021_TCFD_Disclosures.pdf
The TCFD disclosure outline Brambles climate-related impacts, including the financial risks and opportunities of a low-carbon economic transition, it reinforces Brambles' sustainable business model and its newly adopted 2025 targets' ambition to Pioneer Regenerative Supply Chains as the appropriate strategy.

Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

Brambles released their 2025 sustainability targets and strategy during FY21, this can be found on the website; [Brambles 2025 Sustainability Targets](.). In FY20/21, the following material sustainability issues were identified:
- Climate change impacts
- Sustainable (business) growth
- Zero Harm;
- Move to climate-neutral circular economy
- Overuse of the world's resources (including raw materials)
- Learning and development;
- Transparency and Corporate governance (including anti-corruption and bribery);

- Customer collaboration and benefits of share and reuse model to customers;
- Social impact of the value chain including Labour standards;
- Work/life balance;
- Environmental impacts of direct operations
  The results of this process were approved by the SRC, followed by the Executive Leadership Team and the Board, as part of the approval of the Sustainability Review 2021.

Brambles efforts to address sustainability risks and opportunities is reported in three areas:

Business Positive	
Supply Chain Positive	Brambles provides pallets, reusable plastic crates and containers that are shared and reused amongst our customers (previously referred to as 'pooling'). Sharing our reusable equipment in this circular model is inherently sustainable.
Positive Collaboration	Brambles works with customers and suppliers to reduce waste across the supply chain. We use our logistics knowledge to minimise the footprint of our customers and our supply chain, through network optimisation and the use of collaborative and multimodal transportation.
Workplace Positive	Brambles believes an engaging, safe tolerant and diverse work environment brings out the best in our people and helps them reach their potential. This will help us attract and retain employees capable of delivering exceptional value to customers and appropriate returns to investors.
Planet Positive	
Forest Positive	Brambles Forest Positive initiatives will support both Brambles and customers' decarbonisation objectives while increasing global forest cover. Reforestation is an effective nature-based solution delivering multiple benefits such as addressing critical biodiversity issues, climate change and opening opportunities in carbon markets.
Climate Positive	Brambles are committed to a Science Based Target scenario of a 1.5C degree climate future through alignment of our carbon emissions target.
Waste Positive	Brambles is committed to using resources efficiently and minimising waste. With pooling models that operate on the principles of recover, reuse, reduce and recycle we are focused on continuously improving our performance to reduce material consumption maintenance costs and meet stakeholders' sustainability expectations.
Communities Positive	
Food Positive	Brambles are collaborating with food banks to serve rescued food to 10 million people.
Circular Economy Transformation	Brambles are leaders in circular economy, using this expertise, puts them in a position to advocate, educate and impact one million people to become circular economy change makers.
Positive Impacts for People and Plant	Brambles are committed to developing natural and social capital accounting approaches.
The framework and content of the review has been reviewed and approved by the Executive Leadership Team and the Chief Executive Officer and presented to Brambles Board.	

APPLICATION OF THE GLOBAL REPORTING INITIATIVE – G4 REPORTING STANDARDS

The above material issues and other sustainability issues raised throughout FY22 were compared to the GRI G4 standard and the following GRI aspects were identified as material and reported against:

- Economic: Economic Performance, Procurement;
- Environmental: Materials, Water, Biodiversity, Emissions, Effluents and waste, Products and services, Compliance, Transport, Supplier environmental assessment;
- Social: Labour Practices and Decent Work: Employment, Occupational Health and Safety, Training and Education, Diversity and Equal Opportunity, Equal Remuneration for Women and Men, Supplier Assessment for Labour Practices;
- Human Rights: Child Labour, Forced and Compulsory Labour, Indigenous Rights, Supplier Human Rights Assessment;
- Society: Anti-Corruption, Supplier Assessment for Impacts on Society, Grievance Mechanisms for Impacts on Society; and
- Product Responsibility: Customer Health and Safety

A table outlining Brambles response to each of the indicators that applies to these aspects is provided on our website at www.brambles.com. Brambles considers its application of the GRI G4 standards to be 'in accordance' to a 'comprehensive' level.

ASSURANCE

In FY22, Brambles engaged KPMG to undertake a limited assurance engagement in respect to Select Sustainability Information. KPMG issued an unmodified limited assurance opinion which is available on our website; Sustainability Review (brambles.com).

The Select Sustainability Information contained within the FY22 Sustainability Review and accessible through the 'Sustainability Review' section of Brambles Limited's website is identified below. Information which has been subject to such

assurance is clearly identified by the words, "This page is covered by assurance" or "Data on this page is covered by assurance.

Selected Sustainability Information	Page reference
Afforestation: Number of trees planted and associated CO2e sequestered	7
Percent and volume of certified lumber and percent of chain of custody wood	7, 21 & 22
Science Based Target CO2e reduction Scopes 1, 2 and 3	7, 24 & 25
Carbon Neutral Operations	7 & 24
Renewable Energy	7 & 24
Percent sites zero product waste to landfill	7 & 28
Percent recycled and upcycled content in new plastic purchases	7
Measure positive impact of share and reuse pooling model through savings of emissions, water, wood, waste and trees	8 & 10
Brambles leadership position in the circular economy metrics; Circulytics Rating	8 & 10
Number of customers in collaboration and number of collaborative initiatives, plus associated CO2e saved through collaboration	8 & 13
Brambles Injury Frequency Rate	8 & 17
Employee Pulse survey Wellbeing result	16
Percent women in management positions and on the Brambles Board	8 & 18
Percent of women in plant roles	18
Gender salary ratio	18
Inclusive company Pulse Survey results: Inclusivity & Authenticity	18
Number of countries and regions awarded Top Employer Accreditations	8 & 16
Employee Engagement Pulse Survey result	16
Number of suppliers gone through due diligence	19
Percent of Brambles employees trained on ethics	19
Number of people served meals through working with Foodbanks	8 & 30

As of 23 September 2022

$ Donated through volunteering, in-kind donations and charitable donations	31
Hours volunteered by Brambles employees to charity	31
Number of people reached through Circular Economy Transformation	8 & 32

KPMG has not been engaged to, and do not, provide assurance over metrics not listed within their signed opinion, or in respect to the application of the GRI G4 reporting standard or claims included in the FY22 Sustainability Review, this document or other pages of the Brambles website, other than the Assured Information as identified above.

EXTERNAL BENCHMARKING

Brambles 2022 Sustainability Review is published 'in accordance' with the GRI G4 guidelines to a comprehensive level. Brambles reported in line with SASB metrics for the first time in FY21. Reporting for FY22 in both Containers & Packaging Standard and the Forestry Management Standard. In addition, Brambles have added a workforce health and safety metric to report against, taken from the Waste Management & Industrial Machinery & Goods.

Brambles supports the Ten Principles of the United Nations Global Compact in the areas of Human Rights, Labour, Environment and Anti-Corruption. Brambles became a signatory to the United Nations Global Compact in June 2013. Brambles' communication of progress and table addressing each of the principles can be found on its website. External ESG Recognition On page 6 in the FY22 Sustainability Review Brambles outlines the external ESG recognitions for the period in review. Where appropriate Brambles indicates the ranking and a change in ranking if appropriate. Brambles was again selected in 2021 as a component of the Dow Jones Sustainability World Index, the Dow Jones Sustainability Asia-Pacific Index and the Dow Jones Sustainability Australia Index. The Dow Jones Sustainability Indices serve as benchmarks for investors who integrate sustainability considerations into their portfolios and provide an effective engagement platform for companies who

want to adopt sustainable best practices. Brambles is a constituent of the FTSE4Good Index Series. FTSE4Good is an equity index series that is designed to facilitate investment in companies that meet globally recognised corporate responsibility standards. Brambles also references Circulytics, MSCI, Barron's, Corporate Knights, Terra Carta and CDP (Climate Change and Forests) surveys.

Stakeholder Engagement

Brambles actively seeks feedback from four key stakeholder groups. Key stakeholders are identified as those groups significantly impacted by the policies and practices of Brambles businesses. Feedback from key stakeholders is reported annually in our sustainability reporting.

Group	Responsible function
Customers	Group Presidents of businesses
	Customer insight teams
	Global key account managers
	Customer-driven external evaluations (e.g., EcoVadis, SEDEX, CDP supply chain survey)
Investors	Group Vice President, Investor Relations, Capital Markets, Company Secretary
	Investor-driven external evaluations, e.g., DJSI and CDP
Employees (including contractors)	Group Senior Vice President – Human Resources
	Group General Counsel (human rights)
Suppliers	Group Presidents of businesses Senior Vice President – Operations Vice President – Global Procurement (assisted by Procurement Lead with responsibility for sustainability)

Feedback from key stakeholders, conducted through both external and internal processes, is reported throughout the Sustainability Review within the relevant section. These processes are outlined below. Brambles iterative conversations with relevant regulatory bodies, government and non-government organisations (NGOs) and employee representative bodies and also conducts customer, employee and supplier surveys and consultation forums. Brambles uses the Annual Report and the Annual General Meeting to communicate with shareholders about its financial

situation, performance, strategies and activities. General Meetings allow an opportunity for shareholders to engage directly with the Board. The Group Vice President, Capital Markets and Group Company Secretary deal with shareholder enquiries at other times. Brambles encourages vigorous and robust analysis by the investment community and a policy of consistent access and treatment is applied, irrespective of the views and recommendations expressed. Brambles holds briefings with investors and analysts to provide information and seek feedback from time to time. No new materials or price sensitive information is provided at those briefings unless it has been previously or is simultaneously released to the market. A record of any briefings is maintained, and copies of presentation materials are available on the Brambles website. New or updated information and materials provided at these meetings are also released to the Australian Securities Exchange. Brambles follows a calendar of regular disclosure to the market on its financial and operational results. This calendar is available on the Brambles website. Brambles ensures that employees are informed of significant company news and strategic developments through regular announcements and newsletters, in-house publications, information posted on the intranet and face to face meetings with senior managers. Employee engagement is a bi-annual process administered through the Brambles Employee Pulse Survey. The survey is confidentially offered to all employees in both web and paper-based formats. The results of that survey are communicated to employees. Data is used to track year on year progress from previous surveys, measuring Brambles against internal and external best practice and identifying key actions for improvement.

In continuing to improve customers' experience of our products, services and people, Brambles gathers the Voice of the Customer through a variety of channels. This includes strategic leadership forums, face-to-face customer interviews, global market insights, sharing of global best practice throughout the Group, the Relationship Program and customer care centres. Brambles expects its suppliers' practices to be in line with its principles.

Brambles is committed to driving efficiency and environmental sustainability in the supply chains it serves. Brambles Global Procurement is responsible for sourcing direct and indirect suppliers for the business, as well as managing those relationships and monitoring performance. Brambles Supply Chain is responsible for sourcing logistics and sub-contractor suppliers. Brambles last updated its global procurement policy, that is approved by the Brambles Board, in 2018, this is reviewed annually. The Policy confirms the alignment of the Procurement function to Brambles Code of Conduct principles and part of its scope is to be the sourcing basic tool to ensure the higher ethical standards and respect for Code of Conduct itself. Brambles recognises that its business units need to collaborate closely with their third-party operators and suppliers to meet customers' growing interest in understanding their environmental impact and in turn to demonstrate the benefits of using Brambles' products and services. By working in partnership with suppliers as it rolls out its supplier policy, Brambles' business units will be able to improve supply chain transparency and understanding for more sustainable and mutually beneficial outcomes. As part of Brambles' internal compliance efforts, designated country General Managers are required to include details of any representations received from local communities, governments or legitimate special interest groups raising any significant, or potentially significant, community relations issues in bi-annual management declarations.

DATA MEASUREMENT TECHNIQUES AND EXPLANATIONS
Business Positive
Share & Reuse

This section describes the methods used to estimate the environmental benefits that the Brambles sharing and reusing models produce in our customers' supply chains. Calculations stated in the pooling model diagram are based on the results of independent life cycle analyses (LCA) for pallets and RPCs. The unit benefits of the pooled solutions were obtained by comparing the environmental impacts of a) Brambles pooled solutions, versus b)

the most commonly used market alternative in the absence of pooling. Depending on the particular region, these alternatives are exchangeable or disposable systems. LCA studies provide the unit factors for CO2-e emissions, water consumption, wood consumption, food waste, and total waste to landfill generated by platforms. They cover the whole lifecycle of the product, from the raw materials to the end of life. Pallet LCA studies have been independently conducted using ISO 14044 Life Cycle Assessment methodology. The European, USA and Australian studies were summited to a peer review process, following the ISO 14044 standard. The RPC study for Australia in 2010 and New Zealand in 2021 also follows ISO and has been peer reviewed. In order to quantify the total benefits, unit factors were applied to the corresponding activity volumes in each region. These volumes were obtained from Brambles financial management reports. Only regions with LCA studies available were considered for the calculations. The following regions are included in the calculation:

Region	Wooden Pallets LCA	RPC LCA
Europe	X	
North America	X	
South America	X	
South Africa	X	
Australia	X	X
New Zealand	X	X

Food waste has not been reported since FY18 due to the divestment of IFCO in FY19 as all previous calculations on food waste related savings were made using the IFCO LCA. It should be noted that Brambles continues to address the issue of food waste in several ways however, these are not currently factored into the LCA calculations.

1. Issuing in-kind equipment to food rescue organisations such as Food Banks to allow efficient transfer of surplus food to distribution locations
2. Plastic products such as produce bins reduce food waste by protecting the produce through the supply chain
3. RPC's have been an integrated part of CHEP's business in Australia, South Africa and New Zealand and will continue to remain so

BXB Digital is developing technology to monitor the 'cold chain' thus ensuring the integrity of perishable food throughout the supply chain and reducing food waste.

The LCA studies consider the savings generated associated with the following specific equipment types in the applicable regions were:

Region	Equipment
Europe	8060 Pallet
Europe	1208 Pallet
Europe	1210 Pallet
Europe	German 0604 ¼ pallet
USA	48x40 Inch Pallet
North America (Canada)	48x40 Inch Pallet
North America (Canada)	48x20 Inch Pallet
South Africa	1210 Pallet
South America	1210 Pallet
South America (Mexico)	48x40 Inch Pallet
Australia	1165 Pallet
Australia	RPC
New Zealand	RPC

This approach represents a conservative estimate of the annual global environmental benefits of our pooled solutions, since it:

− Does not include any savings from regions that don't currently have an LCA.
− Does not include all equipment types, and therefore not all issues made by Brambles in the year. It is estimated that the savings associated with the pooling model includes more than 80% of pallets issued in the year.
− Alternate CHEP pallet solutions that would give even better results compared to alternative platforms were not considered.
− Not all LCAs consider all factors.
− Avoided solid waste and water savings for Australia RPC movements.

Customer Benefits

The benefits of customers' use of our pooled equipment are made possible because of our continuous reuse model, asset control, use of certified and sustainable timber, control of end-of-life management and transport efficiencies due to our global multimodal network.

As of 23 September 2022

Customer driven environmental savings	FY22
Tonnes CO2	2.5m
Trees	3.1m
Megalitres Water	4,470
Tonnes of Waste	1.5m
Cubic Metres of wood	3.2m

The number of trees saved by customers' use of our pooled wooden pallets was calculated using the following method:

− Conversion of the LCA data on whitewood m3 savings.
− Estimates are based on Radiata Pine (ex New Zealand), which is a softwood species (as are the majority of CHEP wooden pallets). This species was chosen because of the availability of credible data;
− Source of Radiata Pine estimates was the New Zealand Forestry Industry Facts and Figures 2013 version.
− We approximated millable log yield, based on the information provided in this document.
− We estimated large scale modern mill board yield to be around 55% and discounted by an additional 10% to allow for harvesting differences to other regions. This resulted in a board yield per tree. This board yield was applied to the LCA data on whitewood savings to give an approximate number of trees saved;
− This methodology resulted in a conversion rate of approx. 1 m3 of pallet timber per tree.
− Final numbers are represented in millions and rounded to 1 decimal point. However, CHEP is unlikely to get all elements of the sawlog.

For both economic and engineering performance reasons, CHEP only purchases elements of the log; therefore, any reference to number of trees used or saved is theoretical.

Customer Collaboration

There are two types of customer collaboration measured in our accounting. The first is initiatives driven by our Zero Waste World Programme and the second are collaborations that focus on reducing CO2 emissions through logistics efficiencies. These are measured using two separate methodologies, but then are totalled under the same KPI;

Customer Collaborations	FY22
CO2 Saved	105,962
Customers in collaboration	370
Collaborative initiatives	1,488

Zero Waste World Collaborations

Reporting for collaborative initiatives through the Zero Waste World was added into FY22 reporting, following the development of the measurement methodology.

Zero Waste World is a Global Collaboration Programme aimed at co-creating to deliver innovations and Scalable Solutions, going beyond Bramble's core business. It offers the following;

- Ideation & Trends
- Collaborative Research
- Co-Creation Prototype
- Joint Pilot Test and Marketing

Zero Waste World initiatives and customers are counted towards the Collaboration target where; Brambles and a customer(s) or potential customer(s) initiative will save packaging, transport or process waste beyond Brambles standard service offer in the country or region where the initiative is based.

To be considered as a collaboration the project/initiative must include Brambles work and customers work and value for both. The initiative must have been agreed between Brambles and the customer and must be started. Standard service offerings are out of scope, these are defined as an existing product or service and any work done on these by the Zero Waste World team is not counted towards the collaboration target.

Logistics Collaborations

Our customer collaboration kms and CO2e savings are generated by four main initiatives:

1. Transport Collaboration, avoiding empty kms with our customers;
2. Transport Orchestration, avoiding empty kms between customers;
3. Plant Network Optimisation, is also known as Total Pallet Management (TPM) at customer sites, avoiding one leg of transport to repair sites;
4. Multimodal transport, reducing CO2 emissions per km by replacing truck kms with boat and rail

As of 23 September 2022

The CO2e saved is the difference between the original journey and the 'collaborative journey'. To calculate emissions from avoided Logistics activity we follow the methodology as defined by the SmartFreight GLEC Framework. The framework calculates fuel used from a group of similar journeys and applies a fuel emissions factor to calculate CO2e output.

Brambles reviewed the definition for 'Customers in collaboration' to ensure there is clarity when measuring the number of customers that the business engages in collaboration projects. Customers in collaboration is defined as:

Customers engaged in collaborative projects is defined as those customers who have started logistics activity in Customer Collaboration, Orchestration or Multi-modal projects where a collaborative agreement is in place. Customer are classified separately by their country boundary.

Since FY19, 'where a collaborative agreement is in place' has been added to the definition to ensure we only count customers where collaboration is agreed between CHEP and the customer. As many agreements had been established verbally or via email, going forward a letter is to be shared with customers to create a more transparent audit trail. To fully appreciate the collaboration Brambles engage with from FY21 Brambles also began to track and report the number of customer collaboration initiatives we have with our customers;

− For customer collaboration initiatives we count the number of lanes we have in collaboration
− For Plant Network Optimisation we count the number of TPM sites we have at customer locations

Transport

In FY19 Brambles undertook a project to harmonise the measurement of logistics emissions globally using SmartFreights GLEC framework. This adopted a standard for measuring logistics carbon dioxide equivalence (CO2e) emissions. The GLEC framework promotes the adoption of standard methodologies and standard sets of consumption and emissions factors as defaults where primary data is not available. The framework allows Brambles to consistently measure the carbon savings achieved through supply chain collaboration using distance saved from the following initiatives;

1. Customer Collaboration
2. Transport Orchestration
3. Plant Network Optimisation
4. Multi-Modal activity

Using our own reverse logistics network for the process of recovering pallets, together with BRIX our state-of-the-art Lane Matching Tool developed by BXBDigital, CHEP collaborates with customers identifying empty lanes, optimising the supply chain and improving performance while reducing environmental impact of CO2e.

Transport Orchestration

BRIX also enables CHEP to facilitate collaborations between different customers, in which transport resources are being integrated in our network. CHEP helps close open logistics loops reducing empty trucks and therefore unnecessary carbon emissions. The number of collaboration trips are established between customers at the beginning of their commercial agreement. The distance of each lane is then multiplied by the number of agreed collaborative trips which is then converted to CO2e. Transport Orchestration consists of two project types, Orchestration Promotor and Orchestration Partner. Customers who take part in both are counted twice in customer collaboration numbers. Customers projects here can also be counted separately from Customer Collaboration.

Plant Network Optimisation

Plant network optimisation is the practice of strategically positioning the service centre and TPMs (Total Pallet Management service centres installed at customer locations) in our network in a specific location to reduce the distance needed to travel for pallet issues and returns via Truck. There are regional variations in methodology to measure the optimised distance (km) saved for material regions. There methodologies are defined as follows: USA / Mexico / Europe

An average length of haul for each month of the reported year is calculated from all shipments of issues, returns and relocations. An average length of haul for each month is also calculated from FY17 due to limits of data retrieval. For Mexico FY16 was

used as data was unavailable from FY15. The difference between these average lengths of haul is multiplied by the number of trips in each month of the reported year to determine the distance saved. Europe supply chain team also track the implementation of TPMs in a local database. An average distance avoided is calculated from the strategic placement of TPMs at customer locations. For each of these TPMs the total number of TEUs issued to customers from the TPM is recorded on an annual basis. The number of trips avoided are calculated by dividing the total TEUs issued by the average quantity of a full truck. To calculate the total distance avoided the number of trips are then multiplied by previously calculated avoided distance of a single trip from the use of the TPM. The savings data is used internally however the number of TPMs from this are used in our annual reporting.

Multi-Modal

This activity involves the movement of products on alternate more efficient modes of transport, such as rail or sea to reduce cost and deliver environmental benefits. CO2e savings are calculated by taking the distance that would have been travelled via road and calculating the CO2e for rail and sea travel, the saving is the difference between the two.

Customer Insights Programme

In continuing to improve customers' experience of our products, services and people, Brambles gathers the Voice of the Customer through a variety of channels. This includes strategic leadership forums, face-to-face customer interviews, global market insights, sharing of global best practice throughout the Group, the Relationship Program and customer care centres. In particular, the Relationship Program, which initially began in 2010, allows us to focus on the areas that are of importance to customers, with the ability to track and measure our performance in these areas over time. Since FY22, feedback is being collected on a six-monthly annual basis. This is an increase in surveying frequency from a quarterly rolling 2-year cycle started during Calendar Year 2018. The questionnaires sent to customers measure their perceptions of the level of partnership they have with the Brambles Group, the factors driving their

loyalty and identifies the areas in which we can enhance their overall customer experience. Key benefits achieved through the change to surveying frequency are the access to more frequent and more recent trend data and the increase in our responsiveness to changes in customer attitudes, whilst not increasing the overall customer surveying burden. The Relationship Programme is global and covers over 30 countries across Pallets, Pallecon Containers and Automotive Containers. The target is that all business units participating reach out to at least the companies that account for 80% of revenue. With the Relationship Program, Brambles is better positioned to actively listen to customer feedback on the Group's performance and can be more agile in the pursuit of customer centricity.

People

For the 2022 Sustainability Review, Brambles collected data on permanent employees via the Human Resources (HR) database and reporting platform, Workday, and linked it to a PowerBI dashboard created specifically to help with the production analysis required for the Sustainability report. Detailed People Data can be found in the 5year Performance Summary
People data is reported as at 30 June 2022 to provide a 'snapshot' of the organisation. Brambles extracted the following data in a format where individuals could not be identified by name:
- gender;
- age;
- base salary;
- banding (pay grade);
- parental leave (taking and returning from leave);
- training days (including compulsory work-based training, development courses); and
- volunteering (hours that comply with three days paid leave).

Employees by segment - Headcount

Headcount includes permanent part-time and permanent fulltime employees and casual and temporary staff paid through brambles payroll. It excludes temporary workers and contractors paid through a third-party provider.

Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

Gender

Gender percentages were calculated by dividing the number of employees (headcount) by gender by total permanent headcount, to obtain a percentage split. There are three categories of gender in the HR system; Male, Female and Undeclared.

Age distribution

The age of each employee (headcount) was gathered and then sorted into six age bands.

Parental leave

Parental leave data was calculated using employee headcount number of employees who took parental leave during FY22 as a percentage of total employees. Employees returning to work after parental leave was also calculated using the headcount number of employees.

Management

Brambles employees are assigned a 'band' based on their position and salary, with management defined as Band 3 and above (manager through to Band 8 CEO).

Employee data (Headcount) is split into 'non-management' (Bands zero to 2) and 'management' (Band 3 and above) and analysed and reported by gender, group and segment.

Women in Plant Roles

Headcount of females located in Service Centre/Plant includes all full and part time Brambles Group employees. Where gender has not been declared, the employee is not included in the calculation.

The percentage of women in plant roles as of 30th June 2022 was 7.3%.

Salary ratio data

Salary ratios by gender were calculated using FY22 salary data from Workday. All salaries were converted to USD. Employees were split into the categories of 'management' (see definition of Management above for details), the average salary for male and the average salary for female employees were then calculated. The average salary of males were divided by the average salary of females to obtain the ratios.
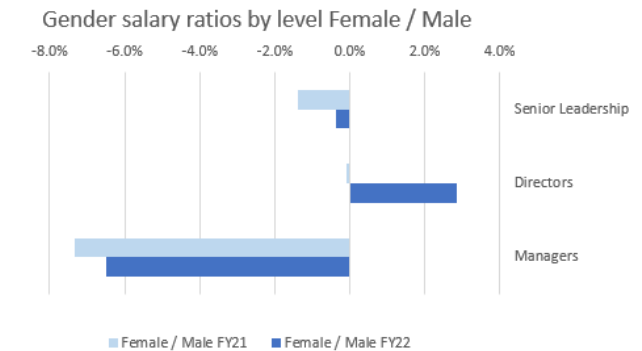
In FY22 the overall the gender salary ratio increased marginally in favour of females. This was due to the average salary for males reducing by $2,100 USD while the female average only reduced by $160 USD

compared to FY21 across all Bands. Male average salaries only increased at Band 1 Entry Level, while female averages only increased at Band 4 Senior Director.

Pay parity ratio (male:female)	FY21	FY22
Group	0.86:1	0.89:1
Non-management	0.90:1	0.95:1
Management	1.12:1	1.10:1

As the higher bands have smaller population sizes, individual changes have a more visible impact on the comparison. Averages are also affected when staff are promoted as they become part of a higher band with salaries that are typically lower than existing staff of the same band.

The chart below shows a breakdown of different management bands in comparison to FY21;

Gender salary ratios by level Female / Male

Voluntary turnover data

Voluntary turnover data was calculated using actual employee data where employment ceased on a voluntary basis and includes those whose redundancy was not compulsory divided by average headcount during FY22.

Brambles Employee Pulse Survey

Employee engagement is monitored through the annual Brambles Employee Pulse Survey through a third party provide, GLINT. This is extended to all permanent employees (employed for at least three months at the date of survey) and is confidential. It surveys employees' perceptions of their workplace, and the data is used to track progress from previous surveys, measure Brambles against internal and external best practice and identify key actions for improvement. Brambles Pulse results were analysed and converted to a percentage score which was benchmarked against GLINT's high performing benchmark. Comments will be analysed using GLINTS technology to identify important themes

and areas for attention by region and function the high-performance norm is a standard benchmark index compiled from the collective results of a group of external organisations, which display outstanding financial performance in their industries.

Employee Engagement Pulse Score for FY22 is 78.

Health & Safety

The Brambles Injury Frequency Rate (BIFR) is the primary measure of safety performance in Brambles. BIFR was measured at 4.1 for FY22. BIFR should be regarded as being generally comparable to the Total Recordable Injury Rate (TRIR) used in other businesses. The difference is that BIFR is a measure of incidents per million work hours (exposure hours) while the more common TRIR measures incidents per 200,000 exposure hours. BIFR is a measure of the sum of work-related fatalities and medical treatment incidents per million exposure hours during any given period. Safety incidents affecting Brambles employees as well as labour hire, contract or temporary staff working under Brambles supervision and their associated exposure hours are included in the BIFR calculation. The Lost Time Injury Frequency Rate (LTIFR) is a measure of the sum of work-related lost time incidents per million work hours (exposure hours), lost time incidents are included in BIFR calculation. Fatalities reported as the work-related fatalities and included in BIFR calculation.

All incidents are reported, investigated and classified as either BIFR or work-related First Aid Treatment. Safety incidents involving visitors, customers and third parties (e.g., trades people, servicemen, etc.) on Brambles operations are reported as required and investigated but are not included in the internal BIFR or statistics.

Wellbeing

The Brambles Employee Pulse Survey score for the question 'Brambles takes a genuine interest in the employees' wellbeing', is taken as an indicator of Brambles employees' wellbeing. In addition, Brambles measures the number of initiatives made available to Brambles employees.

Wellbeing initiatives must meet all the following criteria:

- Part of a structured, multi-year programme;

- Covering one or more of the following focus areas: Mental Health, Financial Health, Physical Health or Social Health;
- Sponsored by a member of the regional ELT; and
- Initiative is no longer in planning phase and has launched

KPI	FY21	FY22
Wellbeing Pulse Survey Score (Benchmark: Our Score)	78:77	78:78
Number of initiatives	11	13

Inclusion & Diversity

Glint have a benchmarkable set of questions, the two questions that measure inclusive companies are:

- I feel comfortable being myself at work
- Leaders at our company value different perspectives

Pulse Survey Scores	FY21	FY22
Inclusive company score (Benchmark: Our Score)	74:73	74:74
Authentic company score (Benchmark: Our Score)	81:81	81:82
Number of accessibility programmes	1	3

Accessibility Programmes set the right conditions within Brambles for people of all backgrounds to come to work for us, focusing on groups who traditionally have been under-represented in the workforce. An accessibility initiative must meet all the following criteria:

- Part of a structured, multi-year programme;
- Covers one or more of the following focus areas: disability, ethnicity (race, indigenous peoples), age, LGBTIQ+, veterans or people from a locally recognised disadvantaged socio-economic group
- Sponsored by a member of the regional Executive Leadership Team and;
- Initiative is no longer in planning phase and has launched

Top Employer

Top Employer Institute is the global authority on recognising excellence in people practices. CHEP & Brambles use the Top Employers Institute to assess and benchmark our HR practices.

They assess the business on six domain areas with

As of 23 September 2022

20 topics and over 100 questions covering 400 best practices.

KPI	FY21	FY22
Number of country Top Employer Accreditations	17	21

Responsible Business

Due Diligence

As a global leader in supply chain logistics, we are deeply committed to, and passionate about, respecting and promoting ethical and legally compliant practices in our supply chains. Brambles endeavour to only do business with suppliers who share this commitment. Brambles communicate these expectations to suppliers during onboarding and throughout the lifecycle of the engagement. All new suppliers must satisfactorily undergo risk-based due diligence before they are onboarded. Risk-based due diligence is completed, stored and tracked using a cloud-based platform which automates and facilitates Brambles' programme. Consistent with Brambles Third Party Due Diligence Programme**,** each supplier's bribery, money laundering, human rights, and environmental risk profile must be assessed by examining geography, industry, government nexus and potential use of vulnerable populations, as well as the results of a screen using Refinitiv's WorldCheck One platform. Where such risks are present, the supplier must undergo a form of enhanced due diligence. The nature and extent of this enhanced due diligence is dictated by the risk. This due diligence is renewed periodically consistent with the supplier's risk profile.

Brambles issue purchase orders or enter contracts that typically incorporate standard compliance terms and conditions and reference our Supplier Policy, making clear the expectation for suppliers to work safely and with respect for the principles set out in the Brambles Supplier Policy. By signing these terms and conditions, suppliers must agree to comply with, amongst other items, applicable anti-bribery and anti-corruption, anti-money laundering and environmental laws and our prohibition of child labour, forced, bonded or compulsory labour, human trafficking or other kinds of slavery.

Supplier Acknowledgement

All newly onboarded suppliers are asked to complete a Supplier Acknowledgment Form (SAF), confirming that they have been made aware of and adhere to the principles set out in Brambles' Supplier Policy. SAFs are issued directly through Brambles' due diligence platform to every new supplier once it successfully completes due diligence. The supplier's answers are recorded in Brambles' due diligence platform.

KPI	FY21	FY22
Number of supplier acknowledgement forms completed	593	590

Speaking Up

Brambles' Speak Up Policy sets out the company's commitment to an open speaking up process in which individuals are encouraged to raise any concerns of wrongdoing, as set out in the Speak Up Policy.

As set out in Brambles' Speak Up Policy, complaints may be made by any current or former officer, employee or associate of Brambles and any party with whom Brambles has or had a business relationship (including customers, suppliers, contractors, agents or distributors). Additionally, relatives or dependents of any of the foregoing can lodge a Speak Up complaint.

All Speak Up complaints as well as any other reports made using Brambles Speak Up hotline are tracked using a cloud-based case management platform. Access to the system is restricted for confidentiality purposes.

Ethics Training

All Brambles employees must complete compliance training on a regular basis. New office-based employees must complete induction training within their first thirty days of employment, this induction training includes a chapter on modern slavery and offers specific guidance on how to identify and report suspicions of child labour and forced, bonded or compulsory labour, human trafficking or other kinds of slavery. Moreover, all current office-based employees must regularly complete refresher courses on Brambles' Code of Conduct, which includes awareness around Brambles Human Rights Policy and the principles it espouses. The last

refresher took place between 23 April 2022 and 30 June 2022. Both training modules are delivered and tracked using Brambles' Learning Management System (LMS).

Whilst all plant-based employees are required to carry out training, including Code of Conduct and Safety trainings, in sessions led by plant management, plant-based employees are not included in FY22 reported figures.

Training courses explain what human rights are and how they relate to and impact Brambles and reference Brambles Human Rights Policy, set out red flags for potential human rights abuses (e.g., around modern slavery), provide more detailed content on how a particular issue (e.g., privacy or diversity) can advance human rights when responsibly managed or, if not, hinder human rights.

% Employees trained on human rights is calculated based on number of office-based employees assigned both induction and Code of Conduct refresher training since the launch of the last Code of Conduct refresher training against number of employees who completed the training.

KPI	FY21	FY22
% Employees trained in Ethics	95.9%	98.68%

Planet Positive

Reforestation & Afforestation

Reforestation is the natural or intentional restocking of existing forests and woodlands that have been depleted. Afforestation is the establishment of a forest or stand of trees in an area where there was no previous tree cover (a method to create new forests). Brambles quantify and measure both reforestation and afforestation. These projects can be implemented directly by Brambles or by partnering with credible and expert external organisations.

In the instance of acquisition of new timber farms by Brambles, these trees will be classed as "afforestation". The number of trees to report will be determined by the forestry teams using their operational methodology. The trees will be reported once FSC certification has been acquired, either at the time of acquisition of the farms should the farms already hold certification, or once FSC certification has been completed by Brambles. Brambles definition of a "tree" is - a woody plant that regularly renews its growth (perennial). Any tree grown (additional to the ones grown through FSC and PEFC) will be accounted for, irrespective of the region or species.

Afforestation

Afforestation projects are either implemented directly by Brambles or by partnering with credible and expert external organisations.

A count of the trees planted through the project is provided along with relevant calculations of carbon sequestered for type of tree species planted. Where not available Brambles use a calculation of 15kg CO2e per tree per year, this conservative amount from several different sources;

- [European Environment Agency](#) – *"Over one year a mature tree will take up about 22 kilograms of carbon dioxide from the atmosphere, and in exchange release oxygen"*
- [TenMillionTrees.org](#) – Same as above
- [Carbonneutral.com.au](#) - *"Carbon sequestration is measured on a per hectare basis. That may vary from 100 to 300 tonnes CO_2-e per ha at year 30 depending on site and rainfall. Tree density also varies from 500 to 2000 stems per hectare. Measuring trees per tonne CO_2 is therefore highly variable."* Conservative approach – 100 tonnes/2000 stems = 50 kg CO2/tree * year (mature, 30 years old trees).
- [UrbanForestryNetwork.org](#) - *"Young trees absorb CO2 at a rate of 5.9 kg per tree each year. Trees reach their most productive stage of carbon storage at about 10 years at which point they are estimated to absorb 22 kg of CO2 per year."*
- [Ecomatcher.com](#) – *"EcoMatcher estimates that the trees planted by our partners sequester CO2 at an average of 50 pounds per tree per year; we use an average of 500 pounds over a tree's lifetime."*
- A count of trees from the purchase of our Scope 1 VCOs in the Wayerhauser project is included by calculating the purchased percentage of CO2 from the project total CO2. The total number of trees planted for the project is then multiplied by this calculated portion.

Potential thinning impacts will be considered according to the specific projects. Proof of permanence and continuous monitoring (e.g., through remote sensing) will be required from project partners to ensure long-lasting impact.

Reforestation

CHEP purchases, controls, or has due diligence oversight of all of the wood used in the manufacturing and repair of CHEP pallets. Third party outsourced service centres purchase wood directly from approved CHEP providers. The volume of wood purchased by third parties service centres is estimated using the repair rates of the service centres multiplied by the average volume of wood used per repair in own service centres. All lumber purchases for new assets and the repair process will be included.

To quantify and measure the number of trees that need to be grown, Brambles first need to estimate the number of trees that are used for new assets and repair every year. Brambles uses following methodology:

- $0.98m^3$ of lumber purchased = 1 tree
- this estimate is based on Radiata Pine (ex New Zealand), a softwood species (as are the majority of CHEP wooden pallets). This species

was also chosen because of the availability of credible external data
- Source of Radiata Pine: New Zealand Forestry Industry Facts and Figures 2013 version
- Estimated large scale modern mill board yield to be around 55% and discounted by an additional 10% to allow for harvesting differences to other regions. This resulted in a board yield per tree of 0.98m^3 per tree

Materials & Resource Management

Extract from 2022 Annual Sustainability Review

Wood Certification

CHEP purchases, controls, or has due diligence oversight of all of the wood used in the manufacturing and repair of CHEP pallets. Third party outsourced service centres purchase wood directly from approved CHEP providers. The volume of wood purchased by third parties service centres is estimated using the repair rates of the service centres during FY22 multiplied by the average volume of wood used per repair in own service centres. All wood purchased by CHEP meets one of the following definitions:

1) Chain of Custody (COC) certified wood: Where CHEP can verify supplier claims, through documentation, that wood purchased has an associated COC certification.
2) Wood from certified sources, where the wood is not covered by CoC certification all along its supply chain, however CHEP has access to documentation and proof that the wood comes from a certified forest (whether under FSC, PEFC or PEFC endorsed FM scheme).
3) Policy compliant wood source: Where the purchased wood does not carry COC certification and is not from a certified source, CHEP has undertaken due diligence to establish that the wood flow has not been contaminated

by controversial source wood.[1] Wood will not be purchased from a source where due diligence is not satisfied.

At the end of the Year, each Pallets' region submits to Brambles information on:
- The volume of wood (cubic metres) purchased;
- A breakdown of this volume by definition (as above); and
- Details of species purchased and in particular any species that appear on the IUCN Red List of threatened species

For species that are classified in the IUCN category of "Near threatened" or worse, the regions are asked to provide the volume of wood involved and details on what the business has done to work with suppliers to better understand and optimize its use, so to not affect the population in a negative way. The data is then reviewed by the Procurement team and reported in Brambles Sustainability Review.

Chain of Custody

Where CHEP purchases COC certified wood, records (including invoices) detailing the chain of custody certification number of each supplier for each purchase are maintained. Brambles has not been prescriptive on what type of COC certification CHEP should use, only that it is well recognised and is considered credible. For FY22, CHEP has purchased wood from suppliers that are registered as COC certified by the Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC) and the Sustainable Forestry Initiative (SFI) (see Glossary for definition of FSC and PEFC).

Plastics

Brambles collected internal figures on the volume of plastics for manufacture of reusable plastic crates, plastic pallets and containers purchased by our businesses in FY22. We did not collect data for other plastic purchased, for example, plastic stretch wrap.

Closed-loop

All purchases of Brambles' plastic products and components are tracked through purchase orders and weights of virgin and recycled material collated. Brambles has measured the percentage of recycled materials in all plastic products purchased FY22.

Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

Brambles defines recycled Material as; Post-Consumer + Pre-Consumer Recycled Material;

- Post-Consumer Material: "Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain." (Source: ISO 14021:2016)
- Pre-Consumer Material: "Material diverted from the waste stream during a manufacturing process. Excluded is reutilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it." (Source: ISO 14021:2016)

KPI	FY21	FY22
Tonnes Virgin Plastic Purchased	25,986	32,028
Tonnes Recycled Plastic Purchased	4,621	5,194
% recycled plastic	15	14

Detergent

Brambles collated internal figures on the volume of detergent for use in the cleaning of pallets, reusable plastic crates, plastic pallets and containers purchased by our businesses in FY22. This review included due diligence on the responsible sourcing of palm oil. Product MSDS Sheets have been checked for ingredients to verify palm oil content. No detergents purchased in FY22 contained any palm oil.

Water

Brambles businesses report their water consumption data monthly. Businesses enter data on water purchased from utilities, recycled water, harvested rainwater and the amount of water discharged. Only a limited number of sites are currently reporting water recycled and rainwater harvesting; however, we expect this to improve over time. Water discharged is a difficult metric to collect and can be inaccurate even from utility bills due to limited metering. The back page in the FY22 Sustainability Review contains conversions which help readers understand in relative terms the impact each employee has had throughout the year.

Water Scarcity

Brambles tracks its impact on water scarcity by using the World Resources Institute (WRI) Aqueduct tool. All locations in scope for reporting are geocoded and imported into their tool. The output gives a scarcity rating for that location and enables Brambles to focus on high scarcity areas of concern to improve data collection and improve water resource management.

The below map demonstrates our analysis where water volume is represented by the size and scarcity is represented by darker shading.

Brambles Water Scarcity mapping

Waste

Brambles applied a materiality scoping exercise on sites to measure Zero Waste to Landfill. Both CHEP managed active sites and sub-contracted sites are in scope.

The scoping for all active sites uses a 95% Pareto, 'Total Out' KPI was used for the pareto. Total Out includes all issues and transfers from a location, this ensures we capture material flows from sites that do not perform repairs.

Sites were sent a 'Zero Waste Declaration' via Microsoft Forms, declaring their Zero Waste to Landfill status. These were digitally signed by either Plant Manager or higher to confirm the sites waste status for FY22. Only Brambles product waste was in scope, waste received from other sources such as packaging from purchases are not included in this measurement, however Brambles endeavours to recycle all recyclable materials that pass through its sites. TPMs were unmonitored during FY22, these will be monitored from FY23 onwards. In the absence of any declarations for in scope sites, it was assumed that the site sends product waste to landfill. With information obtained through these declarations Brambles has a clearer view of recycling processes across operations, this will be

As of 23 September 2022

used to continue to divert product waste from landfill.

KPI	FY21	FY22
% Brambles Sites with Zero Product Waste to Landfill	76%	74%
% Subcontracted sites with Zero Product Waste to Landfill	17%	55%
% All in scope sites with Zero Product Waste to Landfill	27%	58%

Brambles also reports the tonnage of all waste from their managed service centres, this data is consolidated through the Arete system to calculate the total amount of general waste, hazardous waste, lumber recycling, paper/card recycling, metal recycling, comingled recycling and lumber reused in metric tonnes. The measurement of waste recycled varies depending on data provided by the waste service provider. Some providers will weigh the recycling and provide a report. Reused wood data is collated by CHEP service centres during the reclaim process. All wood salvaged is recorded, usually in 'number of elements' then converted to average weight. Recycled wood data is captured mainly by the companies who purchase the wood from us, using weight and /or volume calculations.

GHG Emissions

Kilotonnes CO2e	FY21	FY22
Scope 1	29.410	31.748
Scope 2 market based	12.950	3.798
Scope 2 location based	30.840	20.262
Scope 3;		
1. Purchased goods and services	97.374	111.313
2. Capital Goods	379.702	407.260
3. Fuel and energy related activities	5.425	4.633
4. Upstream transportation & distribution	23.836	24.264
5. Waste generated in operations	41.451	38.727
6. Business travel	0.492	2.746
7. Employee commuting	2.014	2.014
8. Upstream leased assets	-	-
9. Downstream transportation & distribution	863.344	825.038
10. Processing of sold products	151.190	149.059
11. Use of sold products	-	-
12. End-of-life treatment of sold products	-	-
13. Downstream leased assets	-	-
14. Franchises	-	-
15. Investments	-	-
Scope 3 total	1607.193	1600.600

Science Based Targets

To calculate Scope 1, 2 and 3 emissions from the entire value chain, Brambles have adopted the GHG Protocol operational approach
https://ghgprotocol.org/corporate-standard
Brambles use the Science Based Targets initiative (SBTi) Absolute Based approach to measure emissions against an emissions baseline;
https://sciencebasedtargets.org/resources/files/SBTi-criteria.pdf
The baseline year for the SBTi target is FY20.
For Scope 1 & 2 accounting, Brambles applies an aggregated method for site selection to determine the contribution of sites and offices to the overall materiality of emissions. For most regions site information is sourced from SAP, however the US data comes from a live PlantOps database. Europes sites list are sourced from Plant Optimisation teams throughout the region. In FY22, sites that contributed to 95% of the groups FY21 emissions were selected as in scope. Additionally, sites that sit outside the pareto but that are considered to have significant stakeholder interest are added into scope. The CO2e from these sites are removed from the remaining 5 percent that require

estimating. 100% of fleet emissions were included in scope.

In FY22 data was locked down on the 3rd June where it can therefore be assured by external auditors. This means it is not changed at a later time. Estimations for all missing data in scope for the fiscal year are made prior to the audit close off using the Arete system estimation engine detailed in Appendix I.

Emissions Factors

Emissions factors are sourced from the most appropriate regional public sources.

Geography	Source of emissions factors
Australia	National Greenhouse Accounts Factors
Canada	National Inventory Report: Greenhouse Gas Sources and Sinks in Canada
Ireland	Sustainable Energy Authority of Ireland
New Zealand	New Zealand energy sector greenhouse gas emissions data tables, Ministry of Business, Innovation & Employment
South Africa	Eskom Annual Report, national
United Kingdom	2Government greenhouse gas conversion factors for company reporting: Methodology Paper
USA	US Environmental Protection Agency eGRID, by state
Other	International Energy Agency Data Services, by country

For Australia Emissions factors use Table 46 latest estimate because a) AU falls below the threshold for reporting to NGERs which would use Table 5, b) the estimates reflective of the current grid mix.

Data Collection

Brambles collects its material emissions data primarily from vendor reports sent directly to the Areté Sustainability analysis system. Data is processed semi-automatically to minimise the manual handling of data and reduce error. This process is continually improving to ensure accuracy. Some energy and fuel invoices received at smaller sites are also interpreted by Energy Admins and processed into the Areté system each month. Production data used for analysis are Issues data by product type and site, sourced from standard Business Warehouse reports. This production data is then weighted as normalised volume factors in terms of Twenty Foot Equivalent Unit (TEU) equivalents. They form the basis for the calculation of the carbon intensity figures. The TEU factors are housed in the Areté system and are updated regularly.

For Scope 3 accounting, Brambles' value chain emissions are calculated using a hybrid approach based on direct physical data and economic modelling with Input-Output Analysis (IOA). Spend (Direct/Indirect) data is categorised and mapped to a detailed multi-regional input-output databases (EXIOBASE). For many indicators EXIOBASE compiles emissions and resource extractions by country and industry, integrating these with global economic transactions (covering all trade flows). The result of the IOA approach and EXIOBASE are environmental multipliers for a detailed breakdown of industries for 44 main national economies and five world regions.

- The resulting carbon multipliers (also known as emission factors) facilitate a complete, boundary-less carbon inventory of the full Brambles supply chain.
- Further, available physical data is then blended with the expenditure data to improve accuracy and specificity. Physical emissions factors are used from the comprehensive EcoInvent life cycle inventory (Version 3.7.1) and other high quality, country-specific sources. There is extensive physical data on most of the main source of Brambles' Scope 3 emissions, such as masses of timber and fastenings, litres of paint, distance of logistics movements, numbers of new pallets and other assets, business flights and so on.
- The term "hybrid analysis" means an optimal use of these financial and physical data to achieve both full coverage & material and country specificity. Further sense-checking is then undertaken where possible with bottom-up analysis and against recent case studies, such as life cycle assessments.
- An initial scoping study for materiality was completed at a high level using economic modelling on a summary of financial spend data only to determine where more effort and data would be required for the full carbon inventory.

Brambles performs an annual inventory of its full supply chain emissions however as some of the categories are deemed immaterial, they were out of scope for our approved Science Based Targets.

As of 23 September 2022

Brambles SBTi Target emissions categories selected are as follows:

SBTi Categories	SBTi Target Category	FY20 Materiality
1. Purchased goods and services		6.6%
2. Capital goods	x	22.2%
3. Fuel and energy related activities		0.3%
4. Upstream transportation & distribution	x	1.3%
5. Waste generated in operations	x	2.6%
6. Business travel		0.6%
7. Employee commuting		0.1%
8. Upstream leased assets		0.0%
9. Downstream transportation & distribution	x	57.0%
10. Processing of sold products	x	9.2%
11. Use of sold products		0.0%
12. End-of-life treatment of sold products		0.0%
13. Downstream leased assets		0.0%
14. Franchises		0.0%
15. Investments		0.0%

These main sources of the Scope 3 inventory are:
- Category 2, Timber supply – the acquisition, processing and transport of lumber.
- Category4, Upstream transportation and distribution
- Category 5, Waste Generated in operations.
- Category 9, Logistics – Outsourced Transport suppliers
- Category 10, Outsourced Service Centres – 3rd Party Service centre operations
- Category 12, End-of-Life treatment of sold products is captured with Category 5

All logistics emissions calculations are based on SAP activity data and obtained through TMS systems. Each region supplies a full year of activity data. Activity data must have planned distance with further optional fields that can improve the accuracy of calculating the work done. If additional detail is not available, we refer to regional defaults.
- Shipment weight / Number of Pallets / Number of TEUs
- Carrier Type / Vehicle Type / Mode

For outsourced production facilities, emissions are calculated using
- Production data (Issues) and;
- Regional business unit emission intensities

Spend data for all other scope 3 is supplied by Supply Chain Finance. They supply total Direct spend and total indirect spend, globally.

Direct spend includes Capex for Timber, Plastic, Nails/Fasteners and Paint. Timber includes an estimate of lumber purchased through our outsourced service centres.

Emissions are calculated using IO methodology, mapping the spend categories to EXIOBASE spend categories. EXIOBASE estimates emissions and resource extractions by country and industry to allow the calculation of Brambles value chain carbon inventory.
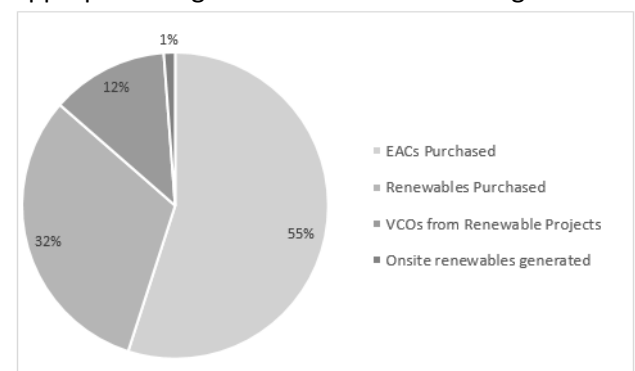
Renewable Energy

Renewable energy sources refer to renewable, non-fossil fuel energy sources, that is, wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

Electrical energy purchased from renewable energy sources are recognised as Zero Emissions in Brambles emissions reporting.

All assets under direct operational control of the business are considered in scope. Leased assets or sub-contracted locations are considered out of scope.

Carbon offsets are included as part of Brambles renewable energy calculation in the form of either; Brambles' renewable electricity result includes electricity generated onsite from solar panels, renewable electricity contracts, certified 'Greenpower', Energy Attribute Certificates (EACs) and Verified Carbon Offsets (VCOs) from renewable energy projects.

Once the EACs and VCOs are purchased their volume data is uploaded against appropriate country level meters in order to provide the appropriate negative emissions accounting.

Global Renewable Electricity Coverage

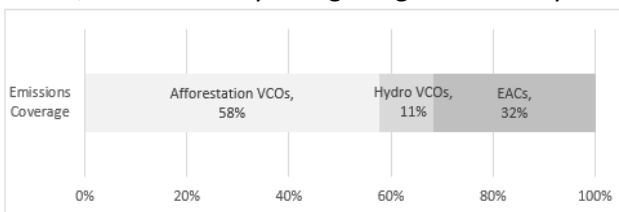*As of 23 September 2022*

Carbon Neutrality

Brambles has reported becoming carbon neutral through means of carbon abatement in its operations, by purchasing carbon credits to neutralise its Scope 1&2 emissions (as reported in SBT). Leased assets or sub-contracted locations are considered out of scope.

Brambles uses the following types of Carbon Credits;

- Voluntary Carbon Offsets (VCOs) for Scope 1
- Energy Attribute Certificates (EACs) for Scope 2

These are purchased in advance of year end to ensure that carbon credits are secured in a timely manner.

Credit volumes are allocated against appropriate regionally aligned meters as negative measures. EACs are bought in the country where the emissions originated where possible, however some countries have had to be aggregated due to low volumes.

If by region there was not enough coverage, then regions with surplus credits are used to bring a region into balance. Any surplus electricity category VCOs will be used to offset scope 1 and Scope 2 from other regions where there is a deficit provided that most emissions are offset with regional offsets. Where there is a surplus of MWh EACs a global emissions factor will be used to help offset other regions. This global factor will be the average tCO2e/MWh intensity of regular grid electricity.

Global Emissions Offsetting

Communities Positive

Food Positive

With food poverty continuing to rise, Brambles will use their expertise in logistics and food waste reduction to help facilitate the provision of food to millions of people alongside our partners.

Brambles has partnered globally with FEBA (Fédération Européenne des Banques Alimentaires - European Federation of Food Banks), GFN (Global FoodBanking Network) and Feeding America.

Brambles measures the number of people it has helped feed through its in-kind donations derived from the number of people our 3 main partners (GFN, FEBA and Feeding America) have supported. These organisations report on impact numbers every year on a calendar year basis and provided Brambles with the impact numbers for the previous calendar year to Brambles' reporting calendar. To derive the portion of people supported by Brambles through in-kind donations, Brambles will use 2 main KPIs depending on the region and availability of data:

- Number of assets loaned in the United States and Europe
- Market share in LATAM, IMETA and APAC: Internal data on regional or national market share gathered from marketing/strategy teams, supply chain and Country General Managers.

Brambles have measured the number of people it has helped feed through its in-kind donations. To avoid double counting volunteering and financial donations will be tracked but not counted towards the target, unless in the future a food bank does not use Brambles equipment then volunteering and financial donations will be included.

KPI	FY21	FY22
Number of people served	17,425,891	16,216,021

Circular Economy Transformation

Brambles experience, and expertise in the circular economy places them in the ideal position to communicate and generate consciousness, share, train, and inspire people to adopt more environmentally friendly production and consumption models based on the principles of circularity.

Collaboration with external organisations such as the Ellen MacArthur Foundation and other leading coalitions has been key to help accelerate the circular transition.

Brambles strategy is to reach, educate and inspire through three pillars: Education, Events and Communications. Brambles measured the cumulative total number of people reached through either physical and/or digital media:

As of 23 September 2022

- Events (industry trade shows, panel debates, conferences, etc.)
- Educational sessions (webinars, videos, face to face training sessions, etc)
- Communications on digital platforms and printed/online press.
- Training of Brambles' employees

The cumulative total captures the sum of people reached by each individual interaction.

In FY22 we updated our methodology on social media through more intensive postings, the appropriate use of hashtags, a diversified portfolio of media (instagram, facebook, linkedin, twitter) and expanded the reach globally, now with all regions actively reporting and more detailed methodology, a much larger figure was reported in FY22 than reported in FY21. Brambles takes a conservative approach in the measurements for every specific activity and appropriate measures are adopted to avoid double counting, especially for employee training and communications through social media.

KPI	FY21	FY22
Number of people educated (cumulative)	95,159	599,464
Number of people educated (non-cumulative)	95,159	504,305

Charitable Donations

Brambles' totals donations data from monetary donations, in-kind donations and employee volunteering hour values. Brambles global finance teams identified all monetary donations to charitable and community organisations. Donations were converted to US dollars using June 2022 foreign exchange rates

The value of in-kind donations to community and not-for-profit organisations was calculated by applying the commercial value of the donated products in the country where the donation occurred. Donations were converted to US dollars using June 2022 foreign exchange rates.

Donation Type	FY21	FY22
$ In-Kind	4,063,198	4,290,121
$ Monetary	1,007,878	1,396,659
$ Volunteering	424,297	555,527
TOTAL $	**5,495,373**	**6,424,308**

Volunteering

Brambles has an employee volunteering policy, which provides employees with three days (or 24hours) of paid volunteer leave per year during usual contracted hours to provide volunteer services to community-based not-for-profit, educational, or environmental organisations. Brambles collects the number of manager approved volunteer hours recorded in HR systems. Actual annual hourly salary (based on the FTE salary and contracted hours) of the individual employee who has volunteered is used to calculate the value of hours volunteered.

KPI	FY21	FY22
Number of hours volunteered	11,404	14,834

GLOSSARY

Arete	An online platform for ingesting, archiving, cleansing, manipulating, integrating and reporting Sustainability data sets for Scope 1, Scope 2, Scope 3, Waste, Recycling and Water.
Assurance	Assurance relates to the review of sustainability data by an independent third party. In FY22 Brambles engaged KPMG to provide limited assurance. The engagement consisted of KPMG making inquiries, primarily of persons who are responsible for the preparation of data included in the Brambles' Sustainability Review and for the preparation of the selected sustainability information presented in the Review and applying analytical and other evidence gathering procedures to that information, as appropriate. The extent of evidence gathering procedures performed in a limited assurance engagement is less than that for a reasonable assurance engagement, and therefore a lower level of assurance is provided. KPMG's statement of limited assurance can be found on the Brambles' website on the Sustainability Reviews page.
Bi-annual management declarations	Bi-annual management declarations confirm, among other matters, the adequacy of internal control procedures, the effectiveness of risk management systems and compliance with material regulatory and statutory requirements. General Managers and Finance Managers are required to sign off the management declaration questionnaires for their area of responsibility.
Brambles injury frequency rate (BIFR)	Brambles Injury Frequency Rate is the primary measure of safety performance in Brambles. BIFR is generally comparable to the total recordable injury frequency rate (TIFR), or total recordable injury rate (TRR) used in other businesses. BIFR records all fatalities and three types of injury, each at a rate of injury per million hours worked: work related fatalities; loss of a full work shift due to injury; modified duties following an injury; and incidents that require medical treatment.
Certified sources (of wood)	CHEP promotes sourcing of wood for its pooled pallet requirements from sustainable wood sources. Brambles set a target in 2010 for 100% certified sources for wood purchased by CHEP. Brambles reports all wood purchased in three categories: Chain of custody certified wood (see Chain of custody certification) Wood from certified sources; and Policy compliant wood (see Policy compliant wood). Wood from certified sources is wood for which CHEP has confidence, via Due Diligence, that source forest or mill is certified by FSC, PEFC or equivalent. This could be the case of timber from a certified forest, sourced to CHEP through a supply chain where one or more actors are not certified for Chain of Custody. Equivalence is based on the Montreal sustainability criteria that underpin PEFC and FSC. .
Chain of custody certification	Chain of custody certification is the process by which certified forest products are verified to come from certified forests. To become chain of custody certified, organisations must meet minimum requirements in product traceability, storage and handling, invoicing and record keeping, and have an on-site audit by an accredited third-party verifier. There are several recognised standards that promote sustainable forestry management, including those set by the Forest Stewardship Council (FSC) and schemes endorsed by the Program for the Endorsement of Forest Certification Programs (PEFC). For example, FSC Chain of Custody certification allows companies to label FSC products and applies to manufacturers, processors and traders of FSC certified forest products. It provides assurance regarding the sustainability status of wood at all stages along the supply chain. At each stage in the chain of processing and transformation, chain of custody certification is needed to confirm that FSC certified wood products are not being compromised by the entry of uncertified products. Brambles has an aspirational target for 100% chain of custody certification for wood purchased by CHEP and a commitment to increase year on year the volume of Chain of Custody certified purchased material.
Circulytics	World leading Circular economy measuring tool pioneered by the Ellen McArthur Foundation.

Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

CO2-e	Carbon dioxide equivalent (CO2-e) is the universal unit of measurement to indicate the full global warming potential (GWP) of a particular greenhouse gas emission. It takes into account the GWP of each of the six Kyoto greenhouse gases and expresses them in terms of the equivalent units of carbon dioxide. It is used for measuring and reporting different emissions sources on a common basis. At the corporate level, CO2-e is typically reported in kilotonnes (kt).
Containers	Brambles' business is organised into a number of segments, which includes Pallets, RPCs and Containers. Containers serves the bulk goods, automotive, aerospace and chemical sectors. Operates mostly under the CHEP brand worldwide, as well as the CAPS brand in bulk goods in the Americas.
EACs	Energy Attribute Certificate. Each EAC represents proof that 1 MWh of renewable energy has been produced and added to the grid.
Executive Leadership Team (ELT)	The Brambles Executive Leadership Team assists in implementing Brambles' strategic direction, and ensuring its resources are well managed. The members of the Team and their biographies can be found on the Executive Leadership Team page on Brambles' website.
GLEC Framework	SmartFreight Centre established the Global Logistics Emissions Council (GLEC) as a voluntary partnership of companies, industry associations and green freight programs, backed by governments and other stakeholders. Together they developed the GLEC Framework for logistics emissions accounting and reporting. https://www.smartfreightcentre.org/en/smart-freight-glec/
Greenhouse gas (GHG) emissions	Gases that trap heat in the atmosphere are often called greenhouse gases. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and fluorinated gases. Like most businesses, Brambles impacts on climate change through the consumption of energy, which entails the burning of fossil fuels.
LTIFR	The Lost Time Injury Frequency Rate is a measure of work-related lost time incidents per million work hours (exposure hours).
Net positive carbon impact	Net positive is a term that describes how an organisation can provide more positive benefits from activities than negative measured carbon impacts. Brambles' CO2-e savings in the Year for customers must be greater than the total of our own scope 1, 2 and 3 emissions for the Year to make this statement.
Pallets	Brambles' business is organised into a number of segments, which includes Pallets, RPCs and Containers. Pallets serves customers in multiple supply chains, in particular consumer goods, fresh produce and general manufacturing, across three regions: Americas; Europe, Middle East & Africa (EMEA); and Asia-Pacific. The Americas region consists of the CHEP Canada, CHEP Latin America and CHEP Services (USA). The EMEA region consists of the CHEP Central & Eastern Europe, CHEP Western Europe, India, Middle East and Africa. The Asia-Pacific region consists of the CHEP Asia and CHEP Australia & New Zealand customer business units.
Policy compliant wood sources	CHEP promotes sourcing of wood for its pooled pallet requirements from sustainable wood sources. Where the purchased wood does not carry chain of custody certification, or is not from a certified source, CHEP undertakes due diligence to establish that the wood flow has not been contaminated by controversial source wood. CHEP's due diligence includes consideration of legislation, biodiversity, conservation, protected and endangered species, labour practices for forest workers, indigenous rights, and so on. Wood will not be purchased from a source where CHEP's due diligence is not satisfied.
Reusable Plastic Crates (RPCs)	Brambles' business is organised into a number of segments, which includes Pallets, RPCs and Containers. RPCs serves the fresh produce sector.

SASB	Sustainability Accounting Standards Board. SASB Standards guide the disclosure of financially material sustainability information by companies to their investors. Available for 77 industries, the Standards identify the subset of environmental, social, and governance (ESG) issues most relevant to financial performance in each industry. SASB Standards are designed for communication by companies to investors about how sustainability issues impact long-term enterprise value. Similarly, SASB Standards enable robust implementation of the Integrated Reporting () framework, providing the comparability sought by investors.
Science Based Targets (SBTs)	Science Based Targets are Targets that are public set with the Science Based Targets Initiative. The targets provide a clearly defined path to reduce emissions in line with the Paris Agreement goals.
Scope 1, Scope 2 & Scope 3 greenhouse gas emissions	Scope 1 emissions come from direct purchases of fuel, for company-owned transport or heating. Scope 2 emissions are indirect purchases of energy, like electricity. Scope 3 emissions are generated upsteam and downstream activities, they are split into the following categories: 1. Purchased goods and services 2. Capital goods 3. Fuel and energy related activities 4. Upstream transportation & distribution 5. Waste generated in operations 6. Business travel 7. Employee commuting 8. Upsteam leased assets 9. Downstream transportation & distribution For more information visit [Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf (ghgprotocol.org)](Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf) Page 34, table 5.4
TCFD	To support the goals of the Paris climate agreement, the Financial Stability Board (FSB) created the Task Force on Climate-related Financial Disclosure (TCFD) in 2015. This voluntary disclosure platform was designed to "provide a framework for companies and other organizations to develop more effective climate-related financial disclosures through their existing reporting processes" and support "more informed investment, credit [or lending], and insurance underwriting decisions"
TEU	The Twenty Foot Equivalent Unit is borrowed from a logistics term to describe the capacity of a shipping container. We use it to describe the equivalent factors for the size of our products.
The IUCN Red List of Threatened Species™	The IUCN Red List of Threatened Species™ is recognised as a leading inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognised as the most authoritative guide to the status of biological diversity.
The Year	Brambles' 2022 fiscal year: 1 July 2021 – 30 June 2022
Voluntary Carbon Offsets	VCOs are carbon credits generated by unregulated independent voluntary carbon offset projects. They exist outside of the Kyoto Protocols Clean Development mechanism (CDM)

Appendix I: Extract from Estimation Engine Overview Areté

Areté Online

Document File Name	Arete Estimation Engine Overview v1.1.docx
Document Version Number	1.1
Last Updated	1 September 2020
Document Author	Matt Vale
Status	Current

Solution Description

ABOUT THIS DOCUMENT

Document Purpose

The purpose of this document is to describe the business rules and system which govern the automated estimation of general usage and cost data and the associated greenhouse gas emissions and energy usage

For more information

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Document History

Version	Date	Author(s) and Department	Change Description
0.1	15/08/2018	Matt Vale	Initial Version
1.0	25/01/2019	Chris Dey	Minor Updates
1.1	01/09/2020	Chris Dey	Current Version

Solution Description

1 ESTIMATION ENGINE CONTEXT

1.1 Overview

Pictured here is a high level diagram of data flow from imported data files through to Qlik Sense Cloud.

Of note is the data warehouse which serves the following purposes:

- Normalise incoming data sets to common units of measurement (tonnes, litres, kWh etc)
- Normalise incoming data sets to common time periods – all data sets are split out to the day level
- Store the data in a reporting friendly context. The preferred reporting platform is Qlik Sense, however the data warehouse supports a wide range of reporting platforms

1.2 Estimation Engine Date Parameters

The estimation engine runs against the data warehouse, which has the data stored at the day level. If data was imported for a calendar month, this data is stored in the data warehouse split out by the number of days in that month.
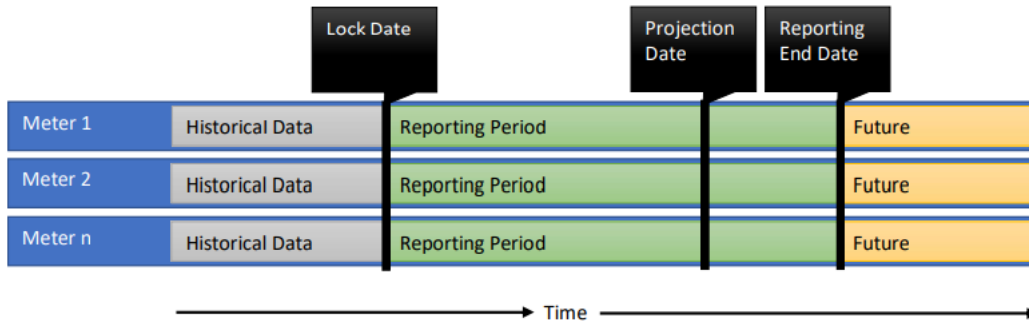
The algorithm used to estimate data is prescribed at the Meter level. The algorithms available are described in subsequent sections of this document.

The time window in scope for data estimations is described by three system parameters

Parameter Name	Description
LockDate	Estimations are only applied to time periods greater than the Lock Date
ReportingEndDate	Estimations are applied up until the reporting End Date
ProjectionDate	This additional parameter enables some extra functionality in the estimation process – see below for details

As of 23 September 2022

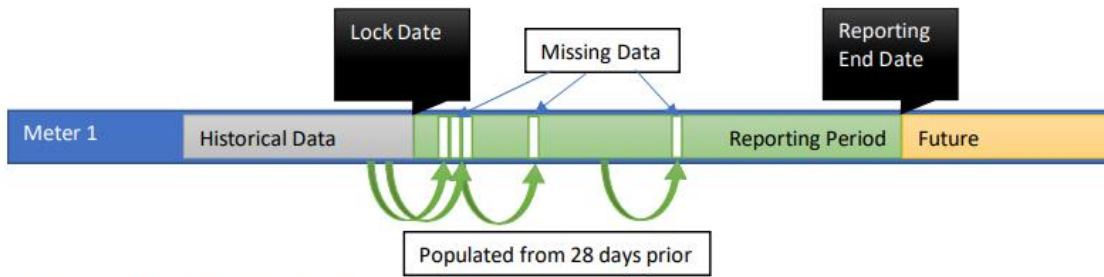## 2. ESTIMATION ENGINE - ALGORITHMS

2.1 Essential Reading
It cannot be overstated that the data in the data warehouse is stored at the day level – regardless of the nature of the incoming data.
- A data "gap" is defined as no data for a given meter for a given day
- An actual physical zero (0) value is NOT a data gap
- The data gap is filled from the same meter from a day determined by the estimation method. Cost and usage data are estimated using identical methodology. Emissions are calculated using the appropriate emission factors against the estimated usage data, in other words not estimated directly. This therefore takes into account changing emissions factors.

2.2 Prior Month
The prior month estimation method populates all missing data from 28 days prior to the required date. Missing data is only populated for days in between the Lock Date and Reporting End Date. As shown in the diagram, missing data can "leapfrog" forward multiple times if required.
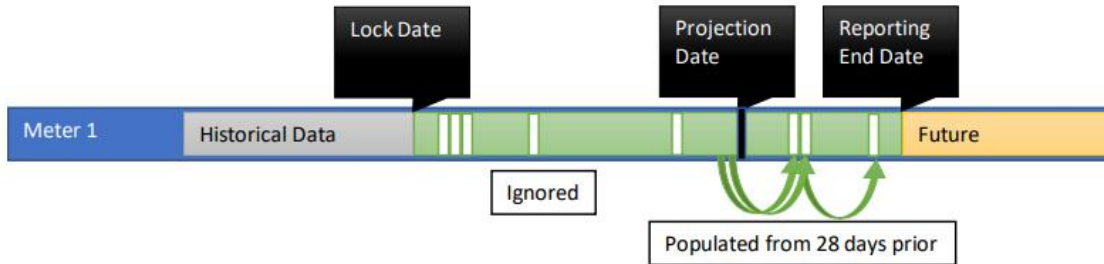
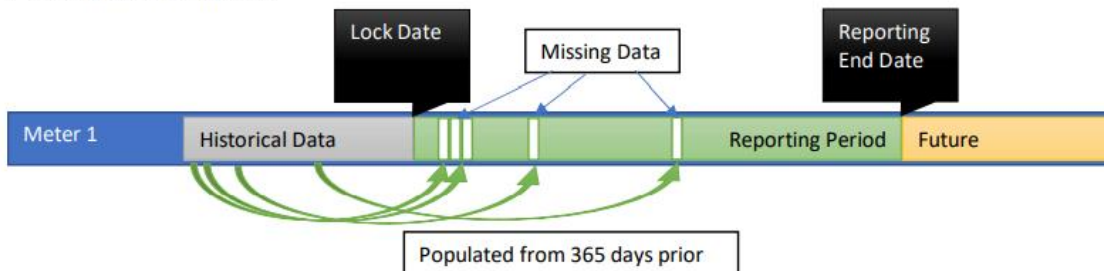## 2.3 PRIOR_MONTH_PROJECTED

The prior month projected estimation method also populates all missing data from 28 days prior. However, missing data is only populated in between the Projection Date and Reporting End Date, ie. projected forward.

This is useful when historical data is known to be accurate and only future periods require estimations.
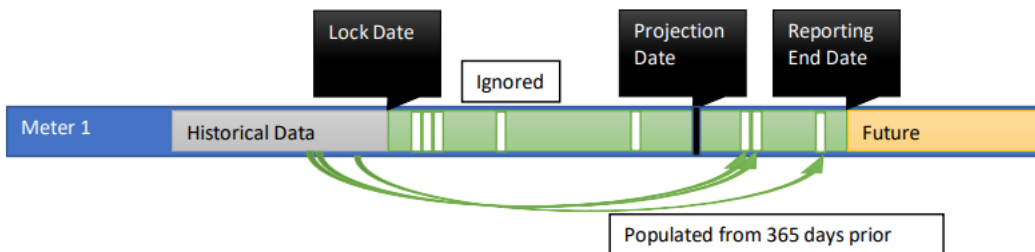

2.4 PRIOR_YEAR

The prior year estimation method populates all missing data from 365 days prior. Missing data is only populated in between the Lock Date and Reporting End Date. For example, this will generally mean the monthly data for the previous reporting year is used again in the current reporting year.

2.5 PRIOR_YEAR_PROJECTED

The prior year projected estimation method also populates all missing data from 365 days prior. Missing data is only populated in between the Projection Date and Reporting End Date. This is useful when historical data (typically monthly) is known to be accurate and only future periods require estimations

2.6 NONE

This setting disables all estimation methods for the given meter. If a meter becomes non-operational (such as when a site is closed), it is preferable to also set a meter closing date so that there is a further level of control over data estimations.

3 ESTIMATION ENGINE – RATIONALE

Brambles Sustainability Review 2022 - Supplementary Information

As of 23 September 2022

3.1 Principles

The estimation engine is designed to facilitate systematic, accurate, and repeatable filling of missing data using a clearly defined procedure. Applied at the meter level, the chosen estimation method is used for the whole reporting year for that meter. Previous reporting years, those occurring prior to the Lock Date, could have had different estimation methods for the same meter. Generally, for a full fiscal year reporting situation, the Prior Year method is the most appropriate estimation method. Clearly this applies only if the meter is not new, but it is also a good option when there is high seasonal variation with data, such as for example winter natural gas heating in North America, or similar shutdowns or holiday periods in production data. Prior Year may not be the best method if there were very "lumpy" prior year data, which may have been due to missing data in the historical data set. Or, if the prior year is atypical or there are good and known reasons why the meter's prior year data might be at systematic variance to a reasonable estimate for the current year. Prior Month is generally the method used if Prior Year is not appropriate. Current year data may be more reliable for example, or there may not be much seasonal variation, meaning the previous month represents a good estimate. Note that if at a later time actual data become available for a meter, it can still be uploaded into the Arete system, and the estimation method is then not relevant for that data point. The Projected estimations methods are useful if there is full confidence in data for a meter up to the Projection Date. Hence with this method, estimations will only be made going forward from the Projection Date to the End Date.

3.2 In Practice

It should be noted that different estimation methods can also be more appropriate for different types of data. Where data is likely to be continuous, such as monthly electricity usage without seasonal effects, prior month is likely to be better. For more discrete data types, such as waste/material collected data or bulk delivery data, where there may be months with 0 values, care must be taken. In rare instances a manual data point can be entered at invoice level if there is no clear method that appears accurate. Finally, the appropriateness of the choice of estimation method can be very usefully examined by using the various reporting views in Qlik Sense Business. Using targeted filters and charts, the smoothness of data points, whether real (actual) or estimated, can be ascertained at different reporting levels, right down to the meter. In this way, highly important data points can be found, and their history checked using trend graphs. If required, the estimation method assigned to that meter can then be changed, and the estimations recalculated, and then re-examined in Qlik. In general, there is a lot of value in visually examining data trends in Qlik and using Real | Estimated Fact Source filters to check reasonable trends and reveal anomalies.