Methodology of calculation

for Carbon Footprint of Product

Version 1.1

ASICS Corporation

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1. Introduction

It is said that the fashion industry is responsible for between 2 and 8% of global carbon emissions [1] and is among the industries with the greatest environmental impact. This impact is the result of more than 20 billion pairs of shoes manufactured each year [2] corresponding to an estimated 1.4% of global greenhouse gas emissions [3] as well as apparel, with 100 billion pieces of garments produced each year [4] corresponding to 6.7% of global greenhouse gas emissions.[3] To make a positive impact on our environment for future generations, it is important to understand the environmental impact of the entire lifecycle of our products (footwear and apparel) and make informed efforts to reduce their carbon emissions as well as other potential environmental impacts.

In order to understand the environmental impact throughout the lifecycle of a pair of shoes, we, ASICS, conducted a life cycle analysis (LCA) of a pair of running shoes in a collaborative research project with the Massachusetts Institute of Technology (MIT) in 2012 [5]. Additionally, we performed a LCA of a piece of garment within a program offered by the Japanese Ministry of the Economy, Trade and Industry in 2013. Based on these experiences, we established the basis of the calculation methodology for a pair of shoes and for a piece of garment. After almost a decade since this research, consumers are now demanding sustainability related information such as carbon footprint, recycled content, traceability and microplastics. Accordingly, we have announced the lightest CO_2e emissions sneaker, “GEL-LYTE III CM 1.95”, in 2022 where we also conducted a LCA based on past researches and with some updates.

In this methodology, we define every single aspect such as scope, data and calculation formula required to calculate the product carbon footprint in accordance with ISO 14067:2018. By measuring and communicating the carbon footprint, we hope to bring visibility to the emissions hotspots and help our teams to address these hotspots as they work to consciously reduce carbon emissions.

Further, the calculated carbon footprint will be communicated with consumers to inform them of the environmental impact of our products. We believe open communication with consumers is essential as we progress toward our goals to reduce carbon emissions by 63% by 2030 (versus the baseline year of 2015) and net-zero by 2050 [6].

2. Scope

This section will describe the definition of a unit of the assessment, detailed categories of products, and the boundaries of carbon footprint calculation in this methodology.

2.1. Functional Unit

Based on the ISO definition, the functional unit is a measure of the function or the service of the assessed product (shoe or garment) that provides a reference to a quantified performance of the product over a given period of time. A pair of footwear or a piece of garment will be the unit of the assessment.
The functional unit defined in this methodology is shown in Table 1.

Table 1. Functional unit of the assessment

WHAT	• Footwear - size US M9 • Apparel - size Men's: Large, Women's: Medium
HOW MUCH	• One pair of footwear • One piece of garment
HOW WELL	Wear in good condition with appropriate use
HOW LONG	The lifetime of the product with appropriate use for its intended function. • Footwear* - For footwear, a full use is defined as one year of service, or one full use per lifetime in the Higg Product Module (Higg PM). • Apparel - Following with lifetime use defined in "Product Care Scenarios" of the Higg PM.

*The wear time will depend on a variety of individual factors and walking/running conditions which include, but are not limited to, distances covered, surfaces and weather conditions.

2.2. System Boundaries

Processes to be included in the calculation: the following life cycle stages and processes shall be included in the system boundary, that is the entire life cycle (from cradle to grave) of footwear and apparel products including Materials, Manufacturing, Transportation, Use and End-of-life stages. The detailed descriptions of system boundaries are shown in Table 2 and the process flow is shown for footwear in Figure 1 and for apparel in Figure 2. Some of the main processes for each life cycle stage are also indicated in the below figures.

Table 2. System boundaries of the calculation

Materials	Processes to manufacture/produce finished materials used for a product (footwear/apparel) and packaging, including raw material extraction, yarn formation, textile formation, dyeing, finishing, compounding, forming and any other processes.
Manufacturing	Processes for a product (footwear/apparel) manufacturing process including cutting, sewing, gluing, embroidering, other upper processing, stock-fitting, assembling, finishing and any other processes.
Transport	Transportation during material manufacturing stages, from material suppliers (Tier2) to assembly factories (Tier1), from assembly factories to distribution centers, from distribution centers to directly-managed retail stores or customers, transportation for returns and transportation to disposal facilities for process loss from the assembly factory and for used product and packaging from customers.
Use	• Footwear - Based on the co-research with MIT in 2012, a scenario for shoe care aligning with our care guideline is applied for all types of footwear. • Apparel - Based on “Product Care Scenarios” of the Higg PM with slight adaptions based on European Union draft PRODUCT ENVIRONMENTAL FOOTPRINT CATEGORY RULES (PEFCR) approach, wash times per lifetime and wash/dry scenario for each product category is defined so that actual care for sporting goods is considered.

End-of-life	Since ASICS' products are sold globally, the ratio of disposal mode varies between countries. In this methodology, the scenario of End-of-life in the Higg PM is applied. Regarding the shoe packaging materials, a scenario is set considering the paper recycling ratio in key sales countries and regions (US, EU, Japan). As for process losses during the manufacturing process, the latest disposal data from assembly factories shall be used.

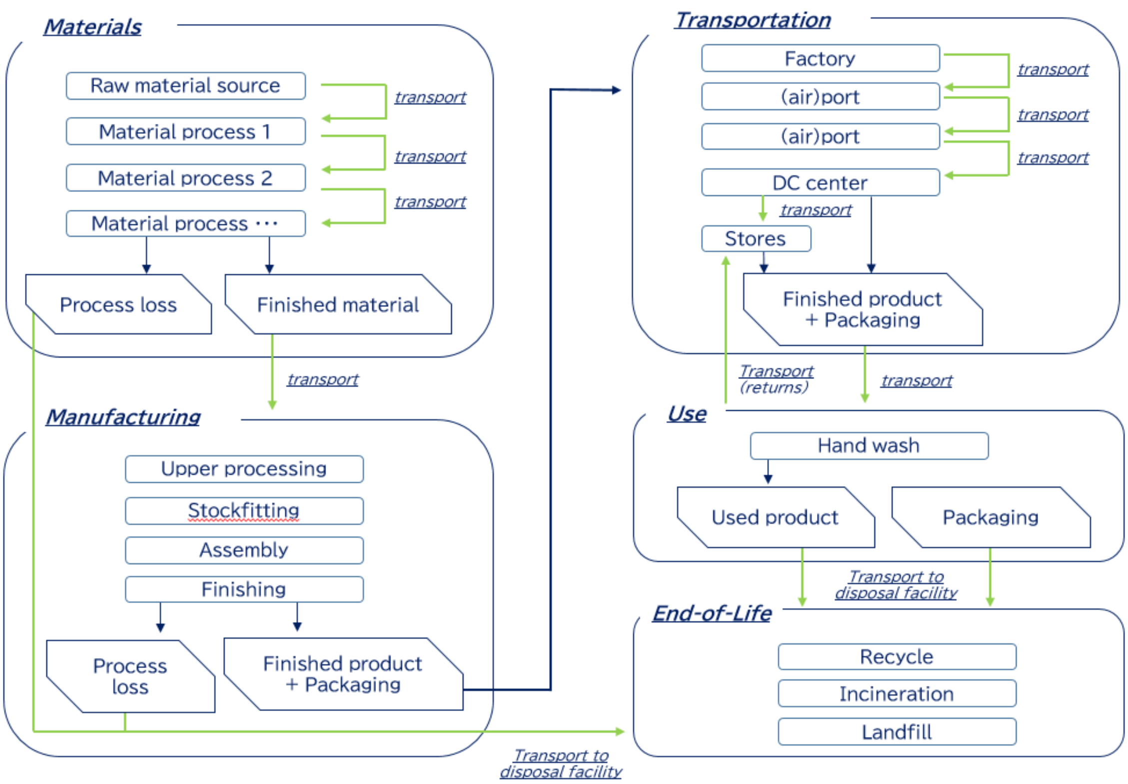

Figure 1. system boundary of footwear product

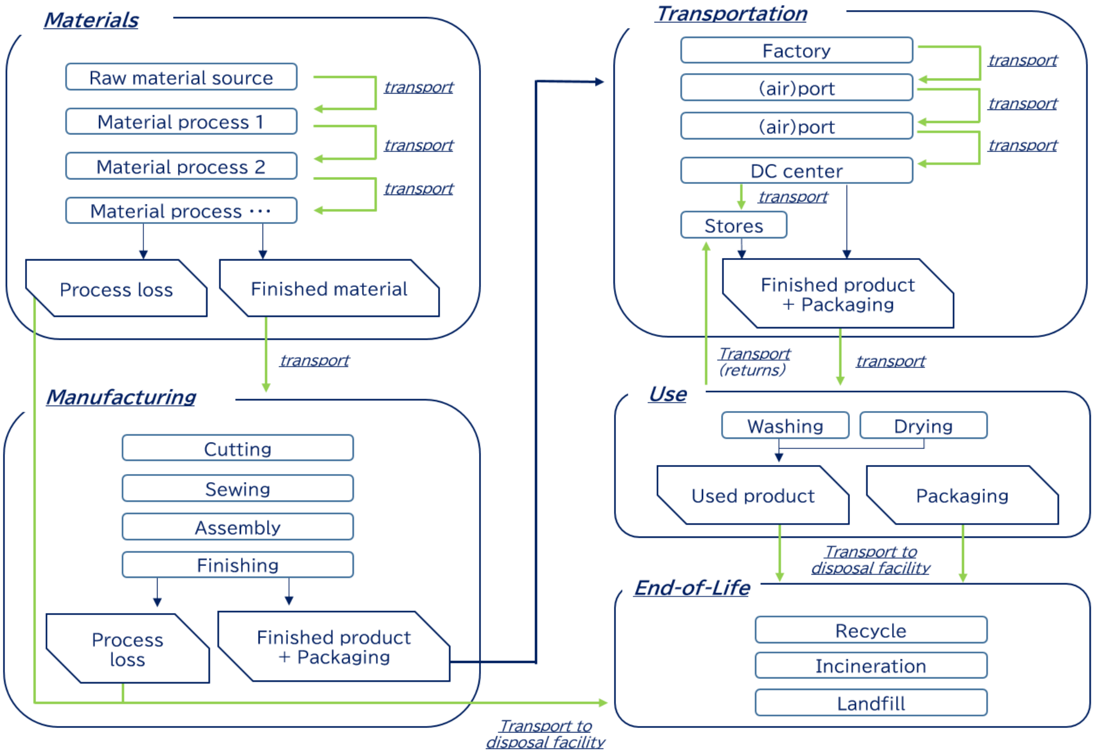

Figure 2. system boundary of apparel product

Within the system boundaries of ASICS' products that is described in the figures above, there is no co-product generated from the main processes. As such, the methodology doesn't take into account the allocation of emissions other than the product's direct emissions.

2.3. Cut-off Criteria

In general, all processes and flows that are attributable to the assessed system boundaries shall be included using both primary and secondary data. However, if individual material or energy flows are found to be insignificant for the product carbon footprint(footwear/apparel), for example 1% or 5% of the total footprint, these may be excluded for practical reasons. This methodology doesn't set any specific number that is considered as insignificant. Consistent cut-off criteria that allow for the exclusion of certain processes of minor importance shall be defined within the goal and scope definition phase of each study due to the variability and uncertainty of different processes and flows. Therefore, in order to determine the cut-off items, contribution analysis shall be performed and the effect of the selected cut-off items shall also be assessed by a sensitivity analysis and described in order to make sure that the impact of excluded items is insignificant then can be cut-off.

2.4. Impact Assessment

In order to assess the emissions, global warming potential of the newest Intergovernmental Panel on Climate Change (IPCC) assessment report shall be used in order to reflect the latest scientific data. Only when there is an absolute necessity to refer to any data that is based on older IPCC reports, shall the use of older ones be accepted. Impact values for GWP were reported in terms of an equivalent mass of carbon dioxide (kg CO_2- equivalent).

According to the requirements of ISO 14067:2018, biogenic greenhouse gas emissions and removals shall be included in the carbon footprint calculation of a product (footwear/apparel) and described to ensure that the impact is visible.

2.5. Data Collection and Data Inventory

For data collection, in principle, primary data shall be prioritized and where it is difficult to obtain, publicly available data sources shall also be used. Primary data means product-specific including bill of materials, material composition and parts weight, and site-specific such as manufacturing countries, manufacturing processes, process time, energy consumptions and transport distances.

As secondary data, in this methodology, the following four public databases and one published research are referred to as major data sources.

I. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
II. Ecoinvent 3.8, Allocation, cut-off
III. CO_2 Emissions from Fuel Combustion 2022-Year 2020, IEA
IV. CFP program common CO_2 emission factor database ver. 4.0 (data in Japan)
V. Natascha M. van der Velden, (2013), *LCA benchmarking study on textiles made of cotton, polyester, nylon, acryl, or elastane*

In terms of the emissions from energy consumption, data that covers the value chain partly such as the above number III. CO_2 Emissions from Fuel Combustion 2022-Year 2020, IEA shall not be prioritized over other databases because this database does not consider any impact other than fuel combustion such as fuel extraction and infrastructure needed. Therefore, the database shall be referred to only when the database has relevant data in terms of the geography and electricity grid mix and other necessary processes such as fuel extraction shall be considered by using other data. The detail of data sources including their priority is described in Table 3 below.

Table 3. Data inventory and data sources

Stages	Required data	Data sources and priorities
Materials	• Weight of material input including loss	• Parts weight based on the information provided by partner factories
	• Emission factors of raw materials	1. GaBi database (IPCC AR6 GWP 100, incl biogenic CO_2) 2. Ecoinvent 3.8 3. CFP database ver 4.0 4. Published research 5. LCAs from suppliers
	• Emission factors of material processing	
Manufacturing	• Process data	• Process inventories provided by partner factories that shows rated power of machines, process lists and process time
	• Emission factors by electricity grid	1. GaBi database (IPCC AR6 GWP 100, incl biogenic CO_2) 2. IEA CO_2 Emissions from Fuel Combustion 2022-Year 2020
	• Emission factors of other energy inputs	
Transport	• Emission factors by transportation mode	1. GaBi database (IPCC AR6 GWP 100, incl biogenic CO_2) 2. Ecoinvent 3.8
	• Distance for inbound transport	• Searoutes • Air Miles Calculator • ASICS list (stores, DCs) • Joint research with MIT • Higg PM (June 15, 2021)
	• Distance for outbound transport	
	• Transportation mode	• Based on latest shipping mode available in the previous three years
	• Return rate	• Sales result in 2022 • Draft PEFCR Version 1.2

Use	footwear	• Footwear care guideline/scenario	• ASICS recommendation • Joint research with MIT
	apparel	• Apparel care guideline/scenario	• Higg PM (June 15, 2021) • Draft PEFCR Version 1.2
		• Emission factors by electricity grid	1. GaBi database (IPCC AR6 GWP 100, incl biogenic CO_2) 2. IEA CO_2 Emissions from Fuel Combustion 2022-Year 2020
End-of-Life	• Emission factors of disposal mode		1. GaBi database (IPCC AR6 GWP 100, incl biogenic CO_2) 2. Ecoinvent 3.8
	• Threshold of disposal mode: product (footwear/apparel), apparel package		• Higg PM (June 15, 2021)
	• Threshold of disposal mode: footwear packaging		• Published reports (EU, US, Japan)
	• Threshold of disposal mode: manufacturing loss		• Waste treatment results provided by partner factories that shows the threshold of each disposal mode

In this methodology, it's defined that the LCA results from partner suppliers could be used as a data source of the calculation of the product carbon footprint(footwear/apparel). However, there could be uncertainty how the suppliers conduct their assessments, therefore the modeling approach of such suppliers' LCA shall be investigated carefully, if possible, in order to confirm whether the modeling approach is aligned with the approach described in this methodology. If a suppliers' LCA methodology is not consistent with this methodology, their data will not have any advantage even though the data input is product-specific and site-specific. In such cases, the relevant secondary data from publicly available databases listed above could be used for the carbon footprint calculation.

2.6. Data Quality

In order to make the assessment results of a product carbon footprint(footwear/apparel) as accurate as possible, a certain level of data quality shall be required for the calculation. This methodology describes the required data quality in terms of time, technology and geography as shown in Table 4. The primary data such as product-specific and site-specific always shall be prioritized and the latest data that reflects technological and geographical characteristics of actual activities shall be collected where possible.

Table 4. Data quality description

Stages	Required data	Data quality description
Materials	• Weight of material input including loss	site specific data shall be collected by either way described in 3.1.I
	• Emission factors of different raw materials	Emission factors shall be collected from as recent as possible databases that fully or partly reflect the geographic characteristic. The data also shall fully or partly match the actual technology and material production processes. When this data is not available, representative data could be used as a proxy
	• Emission factors of material processing	
Manufacturing	• Process data	Site specific data shall be collected by either way described in 3.2.I
	• Emission factors by electricity grid	Emission factors shall be collected from as recent as possible databases that fully or partly reflect the geographic characteristic
	• Emission factors of other energy input	

Transport	• Emission factors by transportation mode		Emission factors shall be collected from as recent as possible databases that fully or partly reflect the geographic characteristic
	• Distance for inbound transport		Site specific data shall be collected by the way described in 3.3. A representative distance could be collected if the site-specific data is not available, but only limited to transport that has minor impacts
	• Distance for outbound transport		Site specific data shall be collected by the way described in 3.3.
	• Transportation mode		The actual shipping results of the latest financial years shall be collected to determine the threshold of the transportation mode between port/airport to port/airport
	• Return rate		The actual sales results of the latest financial year shall be collected. PEFCR default value of return rate for each sales channel could be used
Use	footwear	• Footwear care guideline/scenario	Actual shoe care data is not available and the impact of shoe care is not considered either in the Higg PM or PEFCR. This methodology defines a scenario based on the co-research with MIT in 2012, aligning with ASICS care guideline

Use	apparel	• Apparel care guideline/scenario	The Higg PM, an industrial representative scenario, shall be used as a basis of the scenario so that the global consumer behaviors are considered in the calculation and the definition of wash frequency for sporting goods in PEFCR shall be applied to reflect the actual care scenario better as described in 3.4. When a detailed care scenario can be defined, specific and reasonable care scenarios shall be determined
End-of-Life	• Emission factors of disposal mode		Emission factors shall be collected from as recent as possible databases that fully or partly reflect the geographic characteristic
	• Threshold of disposal mode: product (footwear/apparel), apparel packaging		The Higg PM, an industrial representative scenario of disposal mode shall be used
	• Threshold of disposal mode: footwear packaging		The paper recycling results as recent as possible in key sales regions, US, EU and Japan shall be used as a representative scenario.
	• Threshold of disposal mode: manufacturing loss		Site-specific waste treatment information as recent as possible shall be collected from partner factories for each product (footwear/apparel). In case such data is not available, the Higg PM threshold shall be applied.

2.7. Allocation

When there is multifunctionality between product and co-products, the multifunctionality shall be addressed. Though allocation is one of the approaches for dealing with this, some prior procedures shall be taken before any allocation is applied. In accordance with ISO 14067:2018, a guidance for the allocation procedure is given and that is:

1. To divide the unit process to be allocated into two or more sub-processes separately and collecting the data;
2. To expand the product system to include the additional functions related to the co-products;
3. To partition the inputs and outputs between the different products in a way that reflects the underlying physical relationships between them, such as weight;
4. To partition the inputs and outputs between the different products in a way that reflects the other underlying relationships between them, such as financial value.

Wherever possible, allocation shall be avoided by the procedure 1 and 2 above, then where allocation cannot be avoided, the procedure 3 and 4 shall be considered.

In terms of the allocation methodologies used in the databases listed in 2.5., utmost attention shall be paid to understand how each database applies the allocation approach and the best effort shall be made to choose data that has the same approach for the allocation among several databases.

If the use of data based on a different allocation approach is unavoidable, a sensitivity analysis shall be carried out to address the level of uncertainty in the carbon footprint assessment.

2.8. Land Use Change

Land use change, the replacement of natural land by agricultural systems or change from one to another agricultural system, may occur in farms where any type of plants would be cultivated. The products of such plants could become a raw material source of fibers, plastics, foams and rubbers used for our products. Since the impact of land use change can be significant, the greenhouse gas emissions and removals occurring as a result of land use change shall be assessed in accordance with internationally recognized methods and included in the carbon footprint calculation of a product (footwear/apparel). The land use change is subdivided into two types below:

- direct Land Use Change (dLUC): Change in human use or management of land within the boundaries of the product system being assessed;
- indirect Land Use Change (iLUC): Change in the use or management of land which is a consequence of direct land use change, but which occurs outside of the product

system assessed.

These two different land use changes shall be considered separately, and in addition to that, to assess and report the emissions related to the land use changes, the following items shall be considered:

- assessment methodology;
- time period;
- country where land use change occurs;
- previous land use.

In the case of GaBi databases, Modeling Principles 2020 describes how the databases treat land use change defining that the calculations for carbon stock changes for dLUC is based on IPCC rules whose basic approach is to determine the total carbon stock change by assessing the difference between carbon stocks of the agricultural area - including both, soil and vegetation - of the previous and the changed situation. On the other hand, the iLUC is not considered because of the uncertainty of iLUC quantification approaches and their results. The applied time period for dLUC calculation is 20 years that also references the IPCC guidance and complies with GHG accounting standards. And for all GaBi datasets, the following situation is applied: The country is known (as defined by the respective dataset) but the previous land use is by default unknown.

Land use change assessment can be a source of uncertainty depending on the databases used and assessment methodology. Also, uncertainties and lack of transparency on supplier background data used for their LCAs can further increase the related uncertainty of the results. Consequently, when assessing land use change impacts during an LCA, data sources and methodologies shall be clearly stated in the carbon footprint report.

3. Calculation of Carbon Footprint per Lifecycle Stage

Each product (footwear/apparel) has five lifecycle stages; Material, Manufacturing, Transportation, Use and End-of-life as defined in 2.2. This section describes the details of the calculation methodology of each lifecycle stage and data type that shall be collected. The formula of the calculation will be described in the top of the sub-section. Then, definitions and the description of each factor follows, and data type and its priority will be defined.

3.1. Materials

Formula:

(I)Material weight (kg/pair) x (II)Emission factors of each material type (kgCO_2e/kg)

I. Material weight (kg/pair)

1. *To measure every weight of product part including process loss:*
   Weighing all parts in products (footwear/apparel) and all process loss generated during manufacturing processes shall always be prioritized because of its accuracy and specificity.

2. *To multiple material usage of each part by unit weight of the materials:*
   When the data of the parts and a product's actual weight loss not available, weight shall be calculated by the following formula; material usage (m^2/pair) x unit weight (kg/m^2).
   For most parts, material usage is calculated in order to determine the costing and products' intended use.
   There are some types of parts that don't have the usage in "m^2" such as shoelace and sole components. For such parts, the parts weight shall be weighed individually. (The approach no. 2 is not applicable).

II. Emission factors of each material type (kgCO_2e/kg)

1. *Total material impact calculated by accumulating required processes:*
   The carbon footprint of a material shall be calculated using publicly available data sources such as a LCA database or academic paper and the priority of the databases is described in Table 4 in 2.6. All the related processes including raw material acquisition, material processing and transport between each processing site shall be included in the calculation. Major processes of material processing for footwear are shown in Table 5 and for apparel in Table 6.
   The processes listed in Table 5 and Table 6 generate in most of the case waste, which requires an extra input of raw materials to produce the necessary amount of materials. This extra input has to be taken into account with the according emission factors when calculating the impact of raw materials. Industrial average data can be applied if primary data for the loss rate from the material suppliers is not available

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2. *A LCA result of materials (cradle-to-gate) if material suppliers have certified LCA reports:*
   An assessment result on sourced materials themselves could be used as a data source, but special attention shall be paid when using such suppliers' LCA results as described in 2.5.

Table 5. Major processes included Materials stage for footwear

Material type	Processes
1. Textile	i. Raw material source
	ii. Yarn formation
	iii. Textile formation
	iv. Preparation
	v. Dyeing
	vi. Finishing
2. Synthetic leather	i. Raw material source for substrate
	ii. PU type
	iii. Substrate formation
	iv. Production of synthetic leather
3. Foam	i. Raw material source
	ii. Compounding
	iii. Forming
4. Rubber	i. Raw material source
	ii. Compounding
	iii. Forming
5. Plastics	i. Raw material source
	ii. Compounding
	iii. Forming
6. Hotmelt/lamination	i. Raw material source
	ii. Shaping
7. Leather	i. Raw material source
	ii. Tanning
	iii. Drying
	iv. finishing

The transportation between each process location is also included and the scenario is 200km transportation by large truck.

Table 6. Major processes included Materials stage for apparel

Material type	Processes
1. Textile	i. Raw material source
	ii. Yarn formation
	iii. Textile formation
	iv. Preparation
	v. Dyeing
	vi. Finishing
2. Synthetic leather	i. Raw material source for substrate
	ii. PU type
	iii. Substrate formation
	iv. Production of synthetic leather
3. Plastics	i. Raw material source
	ii. Compounding
	iii. Forming
4. Hotmelt/lamination	i. Raw material source
	ii. Shaping
5. Leather	i. Raw material source
	ii. Tanning
	iii. Drying

The transportation between each process location is also included and the scenario is 200km transportation by large truck.

3.2. Manufacturing

Formula 1:

(I)Σ{Electricity input (kwh/process) x (II)Emission factors of each grid (kgCO_2e/kwh)}

I. Electricity input (kwh/process)

- *To collect the process and machine data for all the processes:*
  Collecting the data of every process for every part from the assembly factories.
  Σ{process time of a part (hour) x Rated power of machine for the process (kw)}
  Required data from the factory is:
  - Process inventory

- Machines used for the processes
- Rated power of the machines
- Energy source of machines
- Process time per part or number of parts processable per a certain time

Processes for material manufacturing shall be included in the 'Material' stage.

II. Emission factors of each grid (kgCO_2e/kwh)

- *To obtain from publicly available database:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2).
  2. When the country grid is not available in the GaBi database, CO_2 Emissions from Fuel Combustion, IEA combined with emission factors from the GaBi database for the fuel extraction and production.

Not only the electricity generation phase, but also upstream activities of the electricity generation (such as fuel extraction, or transport) shall be taken into account for compliance with ISO 14067.
The formula 1, which is a bottom-up approach, shall be prioritized when calculating the 'Manufacturing' stage since this type of data will be more specific to the processes. This formula may include uncertainty of the electricity consumption because rated power is used for the calculation and electricity actually used to run machines is currently not available. Only when the data for the formula 1 is not available, the formula 2, which is top-down approach shall be applied.

Formula 2:

(I)Total annual electricity input at factories (kwh)
x (II)Emission factor of each grid (kgCO_2e/kwh)
/ (III)Total annual production volume at the factories (pairs, pieces/year)

I. Total annual energy input (kwh) at a facility

- *To collect the electricity consumption data from factories:*
  Collecting the annual electricity consumption data from the assembly factories.

II. Emission factors of each grid (kgCO_2e/kwh)

- *<u>To obtain from publicly available database:</u>*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are;
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. When the country grid is not available in the GaBi database, CO_2 Emissions from Fuel Combustion, IEA combined with emission factors from the GaBi database for the fuel extraction and production

III. Total annual production volume at the facility (pairs, pieces)

- *<u>To collect the result of the production volume of assembly factories:</u>*
  The results of 2022 production volume per each factory (pairs, pieces/year)

In case other type of energy is used in the manufacturing processes, the same approach and prioritization shall be applied. Other energy source could be;

- Steam (kgCO_2e/kg, steam use)
- Fuel combustion (kgCO_2e/MJ, fuel use)
- Water (kgCO_2e/m3, of wastewater treatment)

Major processes of the 'Manufacturing' stage for footwear are shown in Table 7 and for apparel in Table 8, but not limited to listed processes.

Table 7. Major processes included Manufacturing stage for footwear

Process	sub-process
1. Upper processing	i. Cutting
	ii. Sewing
	iii. Printing
	iv. Pressing/Welding
	v. Skiving
	vi. Gluing
2. Stockfitting	i. Buffing
	ii. Washing
	iii. Drying
	iv. Preparation
	v. Gluing

	vi. Assembly
3. Assembly	i. Buffing
	ii. Preparation
	iii. Gluing
	iv. Assembly

Table 8. Major processes included Manufacturing stage for apparel

Process	sub-process
1. Cutting	i. Cutting
2. Sewing & 3. Assembly	i. Sewing
	ii. Embroidery
	iii. Seam taping
	iv. Printing
	v. Assembly
4. Finishing	i. Ironing

Formula 3:

$$(I)\Sigma\{\text{Electricity input defined as a representative (kwh/process)} \times \text{(II)Emission factors of each grid } (kgCO_2e/kwh)\}$$

This formula 3 shall only be used when site-specific data, whether it is bottom-up or top-down, is not available.

I. Σ{Electricity input defined as a representative (kwh/process)

- *To define electricity consumption per process as representatives:*
  When actual process data is not available due to, for example, a contract or relationship with factories, representative data also can be used for the calculation of a product carbon footprintas proxy. Such representative data shall be defined based on collected data from other partner factories or based on process data in publicly available databases described in 2.4. if the process data properly/accurately represents the actual process in the factories. The maximum efforts shall be made when the representative data is applied to the calculation so that the data and the actual and technological process shall be identical.

II. Emission factors of each grid (kgCO_2e/kwh)

- *To obtain from publicly available database:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. When the country grid is not available in the GaBi database, CO_2 Emissions from Fuel Combustion, IEA combined with emission factors from the GaBi database for the fuel extraction and production.

3.3. Transport

Formula:

(I)Weight of goods (ton) x (II)Transport distance(km)
x (III)Emission factor of transportation mode (kgCO_2e/tonkm)

I. Weight of goods (ton)

1. *To measure weight of a product:*
   Weighing a finished product (footwear/apparel) shall be always prioritized because of its accuracy and specificity.

2. *To add up part weight calculated with material usage and unit weight:*
   When the weight data of a finished product (footwear/apparel) is not available, the sum of the part weight calculated by the approach described in I-2 of 3.1. and the formula is;
   material usage (m^2/pair) x unit weight (ton/m^2)

II. Transport distance

1. *Collected data of distances from origin to destination:*
   Based on the available data, the actual distance from the origin to the destination shall be calculated in each transportation phase listed in the Table 9. These site-specific primary data shall be always prioritized over any secondary data. The required data is shown below, but not limited to;
   - Factory information (factory address, shipping port/airport)

- Distribution center information (discharge port, center address)
- Retail stores information (address)

2. *Scenario distance from origins to destinations:*
When the primary data for the distance of each transportation is not available, scenario distance defined in the Higg PM shall be used.

Table 9. transportation details

<table>
<tr><th>#</th><th>Product (What)</th><th>(I) Weight (ton/pair, piece)</th><th>Origin (From)</th><th>Destination (To)</th><th>(II) Distance (km)</th><th>Mode (By)</th></tr>
<tr><td>1</td><td>Processed material</td><td>-</td><td colspan="2">Between each material process</td><td>200</td><td>large truck</td></tr>
<tr><td>2</td><td>Finished material</td><td>Total material input</td><td>Material supplier</td><td>Assembly factory</td><td>500*1</td><td>large truck</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Finished product</td><td rowspan="2">Mass in product</td><td>Assembly factory</td><td>Shipment port</td><td rowspan="2">*2</td><td rowspan="2">large truck</td></tr>
<tr><td>Assembly factory</td><td>Shipment airport</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Finished product</td><td rowspan="2">Mass in product</td><td>Shipment port</td><td>Distribution port</td><td rowspan="2">*3</td><td>sea freight</td></tr>
<tr><td>Shipment airport</td><td>Distribution port</td><td>air freight</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Finished product</td><td rowspan="2">Mass in product</td><td>Distribution port</td><td>Distribution center</td><td rowspan="2">*4</td><td rowspan="2">large truck</td></tr>
<tr><td>Distribution airport</td><td>Distribution center</td></tr>
<tr><td>6</td><td>Finished product</td><td>Mass in product</td><td>Distribution center</td><td>Retail store /Customers</td><td>*5</td><td>large truck</td></tr>
<tr><td>7</td><td>Process loss</td><td>loss weight</td><td>Assembly factory</td><td>Disposal facility</td><td>100*6</td><td>large truck</td></tr>
<tr><td>8</td><td>Retired product</td><td>Mass in product</td><td>Customer</td><td>Disposal facility</td><td>100*6</td><td>large truck</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Returns</td><td rowspan="2">Mass in product</td><td>Customer (In store)</td><td>Distribution center</td><td rowspan="2">*5</td><td>large truck</td></tr>
<tr><td>Customer (EC)</td><td>Distribution center</td><td>large truck</td></tr>
</table>

*1 The distance defined in the Higg PM is used.

*2 Distance from assembly factories to shipping port/airport shall be calculated/used.

*3 Distance from shipping port/airport to discharge port/airport shall be calculated based on the sales forecast of each region. The ratio of sales forecast is used for the calculation since the distance between each shipping port/airport varies from one to another, therefore weighted average distances shall be calculated/used.

*4 Distance from discharge port/airport to distribution centers shall be calculated based on the sales forecast of each region. The ratio of sales forecast is used for the calculation since the distance from the port/airport to a distribution center is different depending on the location, therefore a weighted average distance shall be calculated/used.

*5 Distance from distribution centers to retail stores shall be calculated based on the sales forecast of each region. The detailed location data of key stores (global flagship, flagship and brand store) shall be included into the calculation at least. The ratio of sales forecast is used for the calculation since the distance from the distribution centers to retail stores is different in each region, therefore a weighted average distance shall be calculated. In the case of EC sales, the actual distance from distribution centers to every customer is never measured, thus the distance from distribution centers to retail stores is used as a proxy.

*6 The distance defined in the joint research with MIT is used.

The ratio of sea freight and air freight shall be calculated based on the most recent three years shipment results and the ratio is used to calculate the weighted average distance. The results from the most recent three years are:

- Sea freight: 98.3%
- Air freight: 1.7%

With regard to returns, the return rate is largely different from retail/in store and EC sales because in EC cases, customers cannot try a product (footwear/apparel) on before they purchase it. Therefore, a different return rate shall be considered for each sales channel and the return ratio in each channel shall be taken into account to calculate the weighted average return rate.

The return ratio is defined in PEFCR as below:

- Retail/in store scenario: 10%

- EC sales scenario: 40%

The sales results in 2022 for each retail/in store and EC sales are shown as below:

- Retail/in store: 82.2%
- EC sales: 17.8%

III. Emission factors of transportation mode (kgCO_2e/tonkm)

- *To obtain from publicly available database:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. Ecoinvent 3.8

When special offer such as bio fuel transportation program is applied and the program has been certified in accordance with ISO 14067:2018, the reduction value can be accounted for the calculation.

3.4. Use

In the Use stage, the impact from footwear care and apparel care shall be considered separately because washing footwear in a washing machine is not recommended by ASICS and the care will most likely be a hand wash while apparel products are washed in a washing machine multiple times in its lifetime. The below describes the scenario and detailed definition for footwear and apparel care.

<Footwear>

Formula:

(I)Water use (m^3) x (II)Emission factors of wastewater treatment (kgCO_2e/m^3)
+(III)Detergent use(kg) x (IV)Emission factors of detergent (kgCO_2e/kg)

I. Water use (m^3)

- *To apply a scenario made by the co-research with Massachusetts Institute of Technology (MIT) in 2012:*
  Based on the following scenario, water consumption volume for the footwear care

in its lifetime is defined as:

i. 30 liters of cold water per wash
ii. 3 times wash per life cycle
iii. Hand wash, no machine wash
iv. Followed by an air dry, no machine use
v. With mild detergent

Although footwear care impact is not included in PM or PEFCR, many consumers wash their shoes when they get dirty. It is assumed that consumers follow ASICS' recommendation on how to care for shoes.

II. Emission factors of wastewater treatment (kgCO_2e/m3)

- *To obtain from publicly available database;*

  Data collection from reliable and common databases shall be required. Databases which can be referred to are:

  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. Ecoinvent 3.8

III. Detergent use(kg)

- *To follow the guidance of shoes care ASICS offers:*

  The detergent use is assumed as 15-30ml in ASICS shoe care guideline and 30ml use scenario is considered conservatively.

IV. Emission factors of detergent (kgCO_2e/kg)

- *To obtain from publicly available database:*

  Data collection from reliable and common databases shall be required. Databases which can be referred to are:

  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. Ecoinvent 3.8

<Apparel>

When it comes to the impact of apparel care, the three factors below shall be taken account into the calculation:

- Electricity consumption
- Wastewater treatment
- Detergent

The calculation formula for each factor is shown below and any input volume shall be derived from the Higg PM scenario:

Formula for electricity consumption:

(I)Electricity consumption per wash(kwh/load)
x (II)Wash times through a life time per product category
x (III)Emission factor of grid in sales regions (kgCO_2e/kwh)

I. Electricity consumption

- *Default values set in the Higg PM use scenario:*
  The standard scenario of the Higg PM shall be used for the electricity input when washing. Electricity used for operating washing machine and for heating water shall be considered. Wash condition (machine/hand wash, water temperature) is also defined by the Higg PM scenario shown in Table 10.

II. Wash times through a life time per product category

- *Standard scenario defined in the Higg PM with slight adjustments:*
  As well as electricity input and wash condition, the standard scenario in the Higg PM shall be referred to as the basis of the wash times scenario. However, a scenario setting for sportswear in PEFCR shall be applied for wash frequency so that the actual care condition is taken into account better. Scenario details of wash times are shown in Table 11.

III. Emission factors of grid in sales regions

- *To obtain from publicly available database:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2).
  2. When the country grid is not available in the GaBi database, CO_2 Emissions from Fuel Combustion, IEA combined with emission factors from the GaBi database for the fuel extraction and production.

  The weighted average of emissions factors is calculated based on the sales plan for each country/region shall be calculated and applied.

Formula for wastewater treatment:

(I)Water consumption per wash (l/load)
x (II)Wash times through a life time per product category
x (III)Emission factor of wastewater treatment (kgCO2e/m3)

I. Water consumption per wash (l/load)

- *Default values set in the Higg PM use scenario:*
  The standard scenario of the Higg PM shall be used for the water use and wastewater volume as shown in Table 10.

II. Wash times through a life time per product category

- The scenario shown in Table 11 shall be applied.

III. Emission factor of wastewater treatment

- *To obtain from publicly available database:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. Ecoinvent 3.8

Formula for detergent:

(I)Detergent consumption (kg/load)
x (II)Wash times through a life time per product category
x (III)Emission factor of detergent (kgCO_2e/kg)

I. Detergent consumption

- *Default values set in the Higg PM use scenario:*
  The standard scenario of the Higg PM shall be used for the detergent use as shown in Table 10.

II. Wash times through a life time per product category.

- The scenario shown in Table 11 shall be applied.

III. emission factor of detergent (kgCO_2e/kg)

- *To obtain from publicly available database:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. Ecoinvent 3.8

Table 10. Input for washing

Washing mode	electricity input (kwh)	waste water (l)	detergent (kg)
Machine wash, cool, 20C (per 4kg of load)	0.79	61.00	0.08
Machine wash, warm, 40C (per 4kg of load)	1.7690	61.00	0.08
Machine wash, hot, 60C (per 4kg of load)	2.75	61.00	0.08
Drying, Air (/4kg of load)	0	0	0
Drying, Machine (/4kg of load)	3.12	0	0
Hand washing (/kg product)	0	20.80	0.01

Table 11. Wash scenario detail for apparel products

Product Category	Fabric	care practice	use time between washes	lifetime use	Wash times per lifetime
Half sleeve T shirt	Cotton	Machine Wash Warm, Line/Air Dry	1.5	46	30.7
Half sleeve T shirt	Synthetic	Machine Wash Warm, Line/Air Dry	1.5	38.9	25.9
Long sleeve T-shirt	Cotton	Machine Wash Warm, Line/Air Dry	1.5	46	30.7
Long sleeve T-shirt	Synthetic	Machine Wash Warm, Line/Air Dry	1.5	38.9	25.9
Singlet	Cotton	Machine Wash Warm, Line/Air Dry	1	26	26.0

Singlet	Synthetic	Machine Wash Warm, Line/Air Dry	1	12	12.0
Jacket	Cotton	Machine Wash Warm, Line/Air Dry	20	100	5.0
Jacket	Synthetic	Machine Wash Cool, Line/Air Dry	20	100	12.0
Pants	Cotton	Machine Wash Warm, Line/Air Dry	4.2	66	15.7
Pants	Synthetic	Machine Wash Warm, Line/Air Dry	4.2	69.5	12.0
Shorts	Cotton	Machine Wash Warm, Line/Air Dry	1.5	66	44.0
Shorts	Synthetic	Machine Wash Warm, Line/Air Dry	1.5	69.5	46.3
Bra	Cotton	Machine Wash Warm, Line/Air Dry	1	59.8	59.8
Bra	Synthetic	Machine Wash Warm, Line/Air Dry	1	59.8	59.8
Tights	Cotton	Machine Wash Warm Line/Air Dry	1.5	69.5	46.3
Tights	Synthetic	Machine Wash Warm, Line/Air Dry	1.5	69.5	46.3

When specific care scenarios such as washing mode, water temperature, was lifetime use and wash frequency can be defined, this specific scenario shall be applied and the scenario details shall be clearly communicated in the carbon footprint report.

3.5. End-of-life

Formula:

(I)Weight of goods (kg) x (II)Emission factors of each disposal mode (kgCO_2e/kg)

End-of-life scenarios are applied for different scope in the entire value chain of a product (footwear/apparel) as below:

- Product
- Packaging
- Process loss

And in each scope, the required data for the calculation shall be collected based on the principals below:

I. Weight of goods (kg)

- *To measure weight of each product, packaging and process loss:*
  Weighing all parts in a product (footwear/apparel), packaging and process loss generated during manufacturing processes. This approach shall always be prioritized because of its accuracy and specificity.

- *To add up part weight calculated with material usage and unit weight:*
  When the weight data is not available, the sum of the parts, packaging and process loss weight calculated by the approach described in I-2 of 3.1. Material shall be applied:
  material usage (m^2/pair) x unit weight (kg/m^2)

II. Emission factors of each disposal mode (kgCO_2e/kg)

- *To obtain from publicly available databases:*
  Data collection from reliable and common databases shall be required. Databases which can be referred to are:
  1. GaBi Database (IPCC AR6 GWP 100, incl biogenic CO_2)
  2. Ecoinvent 3.8

For the three scopes, different emissions factors shall be applied based on the disposal mode and the disposal mode ratio of the scopes as shown in the table 12.

Table 12. Disposal mode ratio of each End-of-life scope

Scope	Disposal mode	Ratio
1. Product*1	Recycling	5.0%
	Landfill	63.7%
	Incineration	31.3%
2. Packaging*2	Recycling	79.0%
	Landfill	10.5%
	Incineration	10.5%
3. Process loss	Recycling	*3
	Landfill	
	Incineration	

*1 The disposal mode is defined in the Higg PM, but for footwear, recycling mode shall not be applied unless a specific recycling program is performed since shoes recycling is rarely done in the industry practice.

*2 Based on the paper recycling ratio in our key sales countries (US, EU and Japan), recycling rate was defined and the rest of the percentage has been allocated to landfill and incineration equally.

*3 The latest collected data from facilities shall be applied for the calculation. However, when the data is not available, the threshold for product shall be applied.

4. Uncertainty assessment

Since the calculation of a product carbon footprint (footwear/apparel) could be conducted based on information from a specific manufacturing site using various data, whether primary or secondary, and some standard scenarios, each process and data used for the calculation could contain some uncertainty, potentially impacting the final calculation and results. The type of uncertainty could be classified into, but not limited to: timebound, technology and geography.

Uncertainty can also arise from the emission factors used, the scenario developed and the modelling choices. Some major areas of uncertainty that would have effects on the outcome shall be identified when performing a lifecycle assessment of a product and the detail of uncertainty such as parameters and its range shall also be calculated to understand the significance of uncertainties.

5. Sensitivity Analysis

After the calculation of the product carbon footprint has been completed, a sensitivity analysis shall be performed to assess the effects of the modelling and methodological choices on the resulting product carbon footprint (footwear/apparel). Major parameters and activities where potential uncertainty or variability in the data exists (such as system model, methodology, processes and data) shall be assessed. The potential effects of these parameter changes shall be estimated. A sensitivity analysis also can be used to help define the system boundaries by understanding the significance of each activity in terms of the product's carbon footprint. The result of a sensitivity analysis shall be documented separately from the results of the product carbon footprint (footwear/apparel) in the carbon footprint study report, which is a requirement for ISO 14067:2018 compliance.

6. Communication

The product carbon footprint (footwear/apparel) may be communicated to consumers by means of information on a product detail page in the EC site and/or on the packaging material itself. This will help to inform consumers about the environmental impact of our products and allow for informed purchasing decisions. This section will describe in more detail, the communication of the product's carbon footprint.

6.1. Communication Principles

When communicating a product's carbon footprint to consumers, it is essential to make sure that the information provided, is science-based and credible and aligned with state-of-the-art methodologies and international standards. The objective of consumer communication is to provide clear information concerning the environmental impacts of products, to help inform consumers' purchase decisions. Communication concerning product environmental claims must be clear and factual. Any claim which is vague, broad or uses ambiguous terms like "green", "sustainable" or "eco-friendly" shall be avoided. As such, communications shall adhere to ISO 14026:2017 concerning the required details for communicating a product's environmental footprint. The most important of which are:

1. Accurate and verifiable: Following a life cycle assessment, done in accordance with science-based calculations and validated by a third party, results may be communicated to consumers.
2. Relevant to the particular product: A life cycle assessment shall be performed on the exact product and the calculation scope shall be communicated.
3. Specific to the impact area: The impact area of the environmental effect, in most cases carbon footprint, shall be clarified and any claims that suggest positive environmental benefits of products are not permitted.
4. Explicable: Details of the calculation such as functional unit, life cycle stages and their definition shall be described in consumer communications.

5. Understandable: Communication claims shall be accurate and in non-technical terminology for general comprehension by non-expert or technical audiences. In particular, technical or complex information shall be presented in a clear and comprehensible manner. The use of equivalencies is also recommended to help consumers understand the environmental impact of a product. Equivalencies shall always be referenced, data sources and potential modelling assumptions (such as geography) shall be clearly stated.
6. Accessible: The result communicated with consumers shall be supported by a science-based assessment and the sources of the communication shall be available to consumers at the point of sale or any other publicly available communication medium.

An example of communication languages aligned with the above principles could be similar to the following;

"A pair of ASICS "Shoe model" emits XX kg of CO2e. This is the equivalent to charging your phone YY times. The carbon footprint of these shoes is ZZ% lower than its previous generation. To learn more, download the carbon footprint report here."*

**The calculation was performed in "Month and Year" based on our ISO 14067: 2018 compliant carbon footprint calculation methodology and includes the following life cycle stages: Materials, Manufacturing, Transportation, Use and End-of-life. "Model and year of shoe" is used as a comparison."*

In addition to the principles above, when a product comparative footprint is communicated, the comparison shall conform with the following requirements:

- Assessed by the same functional unit;
- Assessed within the same system boundaries;
- The same lifecycle stages are considered;
- The same methodological and modelling choices are made (such as database used, IPCC GWP version used, allocation principles and land use approach)

Any claims that imply an improvement versus previous products shall not be made unless there is a science-based and third party validated result making clear which environmental impacts are compared and improved.

Communication language shall be developed following the above principles and requirements so that the language will be clear and not to be misleading. International standards such as ISO norms and national guidelines such as The Green Guides by Federal Trade Commission shall also be applied when communicating a product's footprint to consumers.

6.2. Representativeness

A product carbon footprint (footwear/apparel) may be calculated based on a functional unit which defined in 2.1. and this footprint will represent a variety of products such as;

- Size
- Gender
- Width (for footwear)

A single representative footprint number can be used if:

- the representativeness in a product series and use of a single representative number for the product series is communicated clearly.
- there is no change in design, technology or process when using a different color or embossing.
- communication claims are developed only in the same country/region that are included in the scope of the footprint calculation.
- the approach for the communication including the representativeness is clarified in a carbon footprint report and any additional explanatory statements and made publicly available.

Here are some examples of the representativeness for footwear;

- Shoe model "A" has 10.0kg CO_2e/pair (men's US9, regular width)
- In the market, the below variation may be labelled as 10.0kg using the same footprint;
  - Shoe model "A" for women, size: US7, regular width
  - Shoe model "A" for men, size US7, regular width
  - Shoe model "A" for men, size US9, narrow width
- On the other hand, in the cases below, a product shall be labelled with footprint numbers calculated exclusively for each product and the number cannot be the same with shoe model "A", men's US9, regular width;

  - Shoe model “A” for kids, size US3, regular width
  - Shoe model “A” for Pre-school, size K11, regular width
  - Shoe model “B” for men, size US9, regular width

A product could be sold in the market over a period of years and as long as the base model is the same and there is no change in design, technology or process and even if the color is different, the same emission number will be used among these items;

- Shoe model “A” v1 sold in 2023.1
- Different color of shoe model “A” v1 sold in 2023.7

If the next generation of the shoe model “A” like v2 will be sold in 2024.1, then the calculation results of the first generation cannot be used as a comparator. Furthermore, a lifecycle assessment for the second generation shall be conducted in order to obtain a validated and science/based carbon footprint of the second generation product before it can be communicated.

6.3. Geographical limitation

Ideally, displayed product footprints should be representative of their respective geography (sales and production country or region) and use location-specific data whenever possible. However, this is not always possible and the use of average or weighted data shall be clearly stated on consumer-facing communications. As described in 3.3, 3.4. and 3.5., the use of average data for transport distances, disposal assumptions and electricity grid mixes for washing machine operation can be used in the assessment. The use of average data leads to several geographies communicating identical results instead of having different life cycle assessment results for each geography.

When a consumer-facing communication about product carbon footprint is planned, the following priority shall be taken account.

1. To calculate different carbon footprints based on the specific data of each sales region such as transport distance and electricity grid mix and to label different footprints in the regions accordingly.
2. To calculate one carbon footprint using the most conservative data for each lifecycle stage, for example, the longest distance for the transportation and the highest grid mix for the use stage and to label a single footprint in the all sales regions.
3. To calculate one carbon footprint using the weighted average data reflecting the

locality of the sales regions by using the sales plan and to label a single footprint in all sales regions.

Given operational difficulties in labelling different footprint results in different sales regions, a single carbon footprint result could be communicated to consumers across different sales regions as mentioned in the second and third priorities above. Even though both approaches are compliant with ISO 14067:2018, the second approach is recommended on product/packaging as this approach offers consumers the most conservative calculation results. In the third case, there are inherent uncertainties and limitations which might result in a product (footwear/apparel) having the same environmental impact regardless of where they are sold or produced.

6.4. Credibility

This methodology has been reviewed by an external partner, Quantis, with decades of experience and expertise in lifecycle assessment and advising organizations in their sustainability plans and been confirmed that the methodology is compliant with ISO 14067:2018. To ensure the methodology is credible and robust, the carbon footprint assessment of a pair of Asics shoes sold in 2023 using the presented methodology have been reviewed and verified by Quantis and thus the results produced by the tool using the methodology can be considered to be compliant with ISO 14067:2018. Both the methodology and product carbon footprint reviews will be performed periodically when significant changes are made, every 1-3 years.

The full responsibility for clarity, robustness and transparency in the creation and communication of the environmental claims (on and off the packaging) is in the sole hands of ASICS who is leading any communication or development of specific claims.

Final statement from Quantis

The ASICS methodology in the version delivered on the March 17th is found to be compliant with ISO 14067/2018 guidelines.

The critical review report has been delivered to ASICS separately. The reviewer cannot be held responsible for the use of their work by any other third party. The conclusions of the reviewer cover the final report "CLEAN_ASICS Carbon Footprint Methodology_230317.pdf" (version of March 17th, 2023) provided by ASICS. These conclusions do not cover any other report, extract or publication which could be produced. The conclusions of the reviewer were provided based on state of the art and information provided during the project. The conclusions of the reviewer *could change in another context.*

7. References

[1] https://www.wri.org/research/roadmap-net-zero-delivering-science-based-targets-apparel-sector

[2] The World Footwear 2022 Yearbook, APICCAPS (2022)

[3] https://quantis.com/wp-content/uploads/2018/03/measuringfashion_globalimpactstudy_full-report_quantis_cwf_2018a.pdf

[4] https://www.mckinsey.com/capabilities/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula

[5] https://dspace.mit.edu/bitstream/handle/1721.1/102070/Olivetti_Manufacturing-focused.pdf?sequence=1&isAllowed=y

[6] https://corp.asics.com/en/csr/planet-operations

19 June 2023
Certificate: SGS23/2002

ASICS Corporation

7-1-1 Minatojima-Nakamachi, Chuo-ku, Kobe, Japan

SGS Japan Inc. was commissioned by the organization above to conduct the independent certification based on the requirements of ISO14067:2018 and SGS protocoll, verified the carbon footprint (CFP) calculation system for following products established by the organization is compliant.

The product: Footwear and Apparel products

This certificate is valid from 19 June 2023 until 19 June 2026 and remains valid subject to satisfactory surveillance audits
Issue 1 Certified since 19 June 2023

Authorised by

Management Committee Member
Head of Certification/Accreditation
Yuji Takeuchi

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SGS 14067 2018 0622

Appendix.

As stated in 6.1., any calculations used for the comparison should be conducted based on the same conditions such as functional unit and lifecycle stages. Therefore, an assessment of average running shoes based on this methodology was performed as a basis for future comparison opportunities, using the data from the research with MIT with some amendments so that the assumption would reflect the current manufacturing practices. The result shows a pair of the shoes could emit 14.5kgCO_2e/pair and the detail of the assessment follows;

Appendix.

Item	Detail
Functional Unit	• A pair of shoes (M's US9)
System Boundary	• Material • Manufacturing • Transport • Use • End-of-Life

Materials	• Based on material detail of the shoe assessed in the co-research with MIT
	    • Polyester: 11%
	    • Other type of fiber: 4%
	    • Polyurethane (PU): 25%
	    • EVA foam: 6%
	    • Rubber: 8%
	    • Olefin copolymer: 9%
	    • Packaging: 21%
	    • Others: 16%
	• Process loss in material manufacturing is included

Manufacturing	• 4.7kWh of electricity consumption and 37.1MJ of steam consumption • No coal use is considered • Major manufacturing countries of footwear (China, India, Vietnam, Indonesia and Brazil) are considered
Transport	• Sea/air freight ratio is 83/17% as per 'Fashion on Climate' report released by the Global Fashion Agenda • Distribution ratio is derived from sales plans of our representative running shoe
Product Use	• 90 liters of cold water per wash • Three times hand wash per life cycle followed by an air dry

End of Life	• Typical disposal mode in the industry;
	    • Landfill: 64%
	    • Incineration: 31%
	    • Recycling: 5%

History of methodology

Date	File name
17^{th} Mar 2023	Methodology version 1.0