

## FlashSystem 5200 product carbon footprint



IBM® is committed to environmental leadership in all its business activities, from operations to the design of its products and use of its technology. To help our clients better understand the environmental impacts associated with IBM products, we report the product carbon footprint for representative products.

FlashSystem 5200 configuration	
Model	4662-6H2
System memory	256 GiB
I/O adapter cards	1x Quad 16Gb Fibre Channel HBA pair
Flash drives	9 x 9.6 TB FCM 3

**Table 1:** Typical product configuration

## The estimate

# 11,000

kg CO<sub>2</sub>e<sup>1</sup>

This number is the estimated mean GHG emissions in carbon dioxide equivalent associated with the manufacturing, assembly, electricity consumption<sup>2</sup>, transportation and end-of-life handling of the IBM® Storage FlashSystem 5200 over 5 years using hypothetical average GHG emissions factors for the European Union.

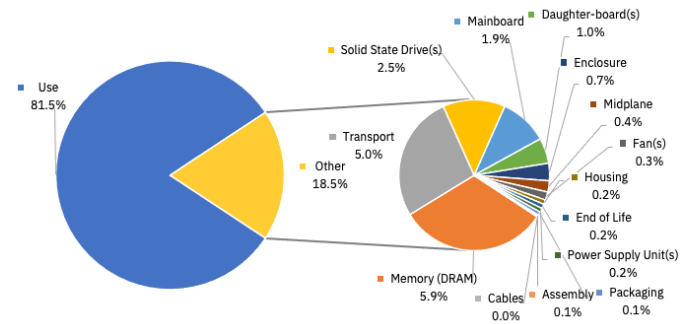
This PCF estimate was produced using the Product Attributes to Impact Algorithm (PAIA) model, developed by the Massachusetts Institute of Technology's Materials Systems Laboratory and partners, Version 1.3.2, March 10, 2023, copyright by the ICT Benchmarking collaboration including the Massachusetts Institute of Technology's Materials Systems Laboratory and partners.

All estimates of carbon footprint are uncertain. For this product, the estimate has a mean of 11,000 kg CO<sub>2</sub>e and a standard deviation of 7,000 kg CO<sub>2</sub>e (11,000 ± 7,000 kg CO<sub>2</sub>e) over a use period of 5 years using hypothetical average GHG emissions factors for the European Union. IBM also reports the 95<sup>th</sup> percentile of the carbon footprint estimate, which is 30,000 kg CO<sub>2</sub>e over a use period of 5 years using hypothetical average GHG emissions factors for the European Union. The 95<sup>th</sup> percentile means that 5% of the time the carbon footprint will exceed the value provided.

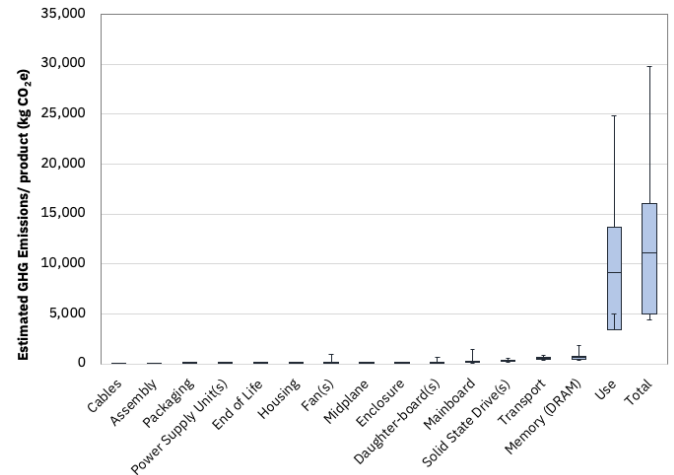
### Impact by phases of the product's lifecycle

The PCF for server equipment is largely driven by the use phase which is highly variable based on the electricity generation source used to power the product, the expected use life of the product, and the power profile. This PCF was generated using a distribution of emissions factors across the European Union. The analysis for this product shows that 81.5% of its carbon footprint occurs in the use phase.

Figure 1 shows the estimated mean contribution for the individual phases of the product's lifecycle over a use period of 5 years using hypothetical average GHG emissions factors for the European Union. Figure 2 shows the uncertainty in the product's carbon footprint. The blue bar representing the mean and one standard deviation and the error bars representing the 5<sup>th</sup> and 95<sup>th</sup> percentile of the carbon footprint estimate.



**Figure 1:** Carbon footprint impact by phase for the IBM® Storage FlashSystem 5200 typical product configuration listed in Table 1 using the PAIA model; 81.5% occurs in the use phase and the remaining 18.5% is broken out.



**Figure 2:** Uncertainty in the PCF estimate for the IBM® Storage FlashSystem 5200 typical product configuration listed in Table 1; the estimate has a total mean of 11,000 ± 7,000 kg CO<sub>2</sub>e over a use period of 5 years.

## PAIA input assumptions

The PCF assumes a typical configuration of the product as described in Table 1. The numbers for your specific configuration might be different. The data used in the PAIA storage tool is provided in Table 2 for the IBM® Storage FlashSystem 5200.

PAIA input information <sup>3</sup>	
Storage enclosure type	Rack
Storage array weight	6.5 kg
Number of arrays	1
Packaging	
Cardboard mass	5.6 kg
Plastic foam mass	0.9 kg
Cardboard insert mass	0.0 kg
Chassis / Enclosure	
Chassis weight	7.2 kg
Non-ferrous metal chassis weight	Default
Chassis IC package area	11.3 cm <sup>2</sup>
Chassis PWB area	0.11 m <sup>2</sup>
Power Supply Unit	
Number of PSU	2
PSU dimensions	32.2 x 5.5 cm
PSU mass	1.25 kg
Cable	
Length of cable	Default
Fan	
Number of fans	8
SSD	
Number of SSD per array	9
Mass of SSD	0.17 kg
SSD IC die area	Default
SSD ICC packaging area	118.3 cm <sup>2</sup>
SSD IC fabrication location	Asia
SSD non-ferrous metal mass	0.07 kg
SSD PWB area	239 cm <sup>2</sup>
SSD PWB substrate layers	12
Mainboard and DIMM/Memory	
Number of mainboards	2
Area of PWB	710.7 cm <sup>2</sup>
Mainboard PWB layers	12
IC quantity	177
IC fabrication electricity intensity	Default
IC die area	Default
Total IC package area	116.5 cm <sup>2</sup>
DRAM IC count	288
DRAM IC package area	Default
DRAM die area	316.6 cm <sup>2</sup>
DRAM IC fabrication location	Asia
Sub-boards	
Number of sub-boards	6

Assembly	
Assembly location	Mexico
Transportation	
To country of use by air	9700 km
Within country of use by truck	150 km
Use <sup>4</sup>	
Use location	Europe
Product lifetime	5 years
Yearly energy use	3766 kWh
End of Life	
Percent recycled	0.97
Percent shredded recycling	0.00

**Table 2:** PAIA input information for the FlashSystem 5200

## Limitations of PAIA

PAIA results represent a streamlined Life Cycle Assessment (LCA). While the product carbon footprint provides a high-level estimate of the emissions associated with the product, it should not be used for emissions inventory, formal carbon foot printing exercises or comparing products. LCA results are strongly influenced by the assumptions made by the analyst; if those assumptions are inconsistent, comparisons are not likely meaningful. Furthermore, PAIA may not be compliant with the primary data requirements of some LCA standards. The results from the PAIA tools are liable to change over time as the methodology is improved and data is updated. More information on these limitations, as well as general guidance for interpreting this report, is available in the publication “[Assessment of lifecycle carbon footprints of products](#)”

## Disclaimers

<sup>1</sup> The results are reported using the units of kilograms of carbon dioxide equivalent (kg CO<sub>2</sub>e). This represents the amount of global warming caused by a quantity of GHGs (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs and SF<sub>6</sub>) at a specific point in time, expressed in terms of the amount of CO<sub>2</sub> which would have the same instantaneous warming effect. Recognizing the uncertainty in carbon footprint estimates, the results have been rounded to the nearest thousand.

<sup>2</sup> The electricity consumption is incurred by clients using an IBM product. The estimate used is not specific to any client deployment of the IBM product or client workload.

<sup>3</sup> The estimated carbon footprint was computed excluding the system frame.

<sup>4</sup> Power consumption data was obtained using the IBM Storage Modeller, a web-based tool for estimating performance for IBM Storage systems. This tool estimates typical power requirements for a specific system configuration under normal operating conditions. The power consumption assumes that the product operates at maximum throughput across a range of I/O workloads, 24 hours a day, 365 days a year, for its product lifetime.

© Copyright 2023 IBM Corporation  
1 Orchard Road  
Armonk, NY 10504

Produced in the United States of America, March 10, 2023

IBM, the IBM logo, ibm.com are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies.

A current list of IBM trademarks is available on the web at “Copyright and trademark information” at [ibm.com/legal/copytrades.html](https://ibm.com/legal/copytrades.html)

This document is current as of the initial date of publication and may be changed by IBM at any time. Not all offerings are available in every country in which IBM operates.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

THE INFORMATION IN THE DOCUMENT IS PROVIDED “AS IS” WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OR CONDITION ON NON-INFRINGEMENT. IBM products are warranted according to the terms and conditions of the agreements under which they are provided.