

Product Carbon Footprint (PCF)

The **Product Carbon Footprint (PCF)** focuses on global warming potential (GWP) and is seen as a key indicator of the threat to natural resources and people's livelihoods.

The aim of the PCF analysis is to calculate the potential contribution of a product to global warming by quantifying the significant greenhouse gas emissions from raw material extraction to the point at which the product leaves our factory gates ("cradle-to-gate").

According to the study "Environmental Carbon Footprints: Industrial Case Studies" from 2018 (ISBN: 978-0-12-812849-7) based on the ISO/TS 14067:2013 standard, the **PCF per square metre** of printed circuit board is made up as follows (excluding the transport phase to the end customer)

Scope	Life cycle phase	Source	CO ₂ footprint (kg CO ₂ eq./m ²)	Contribution (%)
	Raw materials		122,36	43,25
1		Laminate (FR4)	41,84	14,79
		Galvanisation	70,79	25,02
		Other raw materials	7,25	2,56
		Packaging of raw materials	0,20	0,07
		Transport of raw materials	1,85	0,66
		Product packaging	0,43	0,15
	Manufacture		160,51	56,74
2		Energy	77,34	27,34
3		Production phase	83,17	29,40
		Water consumption	0,34	0,12
		Consumables	56,84	20,09
		Packaging of consumables	4,11	1,45
		Transport of consumables	21,04	7,44
		Waste management	0,84	0,30
		Miscellaneous	0,06	0,01
	Total*	"cradle-to-gate"	282,93	100,00

(* Values from the study truncated to the second decimal place. Total categories below 0,01% not listed due to better readability and error tolerance. Energy = electricity and all other energy sources).

The values from the above-mentioned study indicate the average PCF of a multilayer ENIG PCB. Depending on the PCB specification, the values may vary, especially in the manufacturing and production phase.