

Letter of Assurance

Comprehensive Carbon Footprint – Scope 3: Product related Carbon Footprint for Fiscal Year 2021

Fraunhofer IZM reviewed Apple's scope 3 carbon footprint data related to the products manufactured and sold by Apple Inc. in fiscal year 2021.

1 Summary

This review checks transparency of data and calculations, appropriateness of supporting product related data and assumptions, and overall plausibility of the calculated comprehensive annual carbon footprint comprised of emissions derived from the life cycle assessment (LCA) of Apple products shipped in fiscal year 2021. This review and verification focuses on Scope 3 emissions for products sold by Apple Inc. (as defined by WRI/WBCSD/Greenhouse Gas Protocol – Scope 3 Accounting and Reporting Standard). It is noted that emissions relating to the facilities that are owned or leased by Apple (scope 1 and 2 emissions) as well as business travel and employee commute were subject to a separate third party verification and are therefore excluded from the scope of this statement. Confidential data relating to product sales and shipments were also excluded from the scope of this verification.

This review and verification covers Apple's annual greenhouse gas emissions and does not replace reviews conducted for individual product LCAs for greenhouse gas emissions (GHGs). The life cycle emissions data produced by Apple for individual products has been calculated in accordance to the standard ISO 14040/14044: Environmental management – Life cycle assessment – Principles and framework / Requirements and guidelines. This review and verification furthermore complies with ISO 14064-3: Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions.

The review of the annual carbon footprint has considered the following criteria:

- The system, boundaries and functional unit are clearly defined
- Assumptions and estimations made are appropriate
- Selection of primary and secondary data is appropriate and methodologies used are adequately disclosed

These criteria are also fundamental to the review of LCAs conducted for individual product emissions. The reviewers note that the largest share (99%) of Apple Inc. annual carbon

footprint is comprised of scope 3 emissions from individual products. The aforementioned criteria have been regularly reviewed by Fraunhofer IZM since 2007 with a view to providing independent feedback that can facilitate continuous improvement and refinement in the LCA methodology applied by Apple Inc.

Data reported by Apple is as follows:

	Manufacturing	Transportation	Product Use	Recycling	Corporate
2021	16.20	1.75	4.99	0.08	0.17
	[MMT CO ₂ e]	[MMT CO ₂ e]	[MMT CO ₂ e]	[MMT CO ₂ e]	[MMT CO ₂ e]
	(1)		(2)		(3)

MMT CO₂e: million metric tons carbon dioxide equivalents

(1): includes CO₂e reductions due to Apple’s Clean Energy Program and Renewable Energy Certificates, which are not covered by this verification statement

(2): includes CO₂e reductions due to Renewable Energy Certificates, which are not covered by this verification statement

(3): not covered by this verification statement

Including a reported value of 0.17 million metric tons CO₂e for facilities (out of scope of this verification), total comprehensive carbon footprint is reported to be 23,18 million metric tons CO₂e (gross total).

Apple’s comprehensive carbon footprint includes an increasing amount of greenhouse gas emissions reductions for manufacturing resulting from Apple renewable energy projects, supplier renewable electricity purchases, and supplier renewable electricity installations. These reductions are part of Apple’s Clean Energy Program. Fraunhofer IZM has not verified these emissions reductions.

Based on the process and procedures conducted, there is no evidence that the Greenhouse Gas (GHG) assertion with regards to scope 3 carbon footprint

- is not materially correct and is not a fair representation of GHG data and information, and
- has not been prepared in accordance with the related International Standard on GHG quantification, monitoring and reporting.

2 Reviewed Data and Plausibility Check

A verification and sampling plan as required by ISO 14046-3 has been established for the comprehensive carbon footprint review and verification, defining the level of assurance, objectives, criteria, scope and materiality of the verification.

As part of this review and verification Apple disclosed following data to Fraunhofer IZM:

- Sales data for FY2021, including accessories and including AppleCare, Apple's extended warranty and technical support plans for their devices.
- Life cycle GHG emissions for all products, differentiating the actual product configurations (e.g. memory capacity)
- Calculation methodology for the comprehensive carbon footprint and methodological changes implemented in 2021
- The total carbon footprint – scope 3 for the fiscal year 2021
- Detailed analysis of the comprehensive carbon footprint including:
 - The breakdown of the carbon footprint into life cycle phases manufacturing, transportation, product use and recycling
 - Detailed product specific split into life cycle phases
 - The contribution of individual products and product families to the overall carbon footprint

The data and information supporting the GHG assertion were projected (use phase and recycling) and historical (i.e. fiscal year 2021 data regarding sales figures, manufacturing, transportation, use patterns where available).

This review comprises a check of selected data, which are most influential to the overall carbon footprint. The overall plausibility check addressed the following questions:

- Are product LCAs referenced and updated with more recent data correctly?
- Are results for products, for which no full LCA review was undertaken, plausible?
- Are carbon emission data for individual products plausible in the light of methodological changes as indicated by Apple?

This review was done remotely.

3 Findings

In FY2021 and beginning of FY2022 14 recent product LCA studies have been reviewed successfully against ISO 14040/44. These LCAs cover product segments iPhone, iPad, MacBook Air, MacBookPro, iMac, and Apple Watch. These recently reviewed LCA studies cover products which represent in total 44.6% of the total scope 3 carbon footprint. Representatives of other product segments (iPod, Mac Pro, HomePod, AirPort Express /

AirPort Extreme, Apple TV, AirPods and Beats products) underwent no or only minor design changes compared to those which went through a full LCA review in former years. All reviewed LCA studies up to now cover in total 67.3% of the total scope 3 carbon footprint.

All questions raised in the course of the review were answered by Apple and related evidence was provided where needed.

4 Conclusions

Apple's assessment approach is excellent in terms of granularity of the used calculation data. A significant share of components is modelled with accurate primary data from Apple's suppliers.

For all product LCA calculations, where exact data was missing, the principle of a worst-case approach has been followed and results have been calculated with rather conservative estimates.

The review has not found assumptions or calculation errors on the carbon footprint data level that indicate the scope 3 carbon footprint has been materially misstated. The excellent analysis meets the principles of good scientific practice.

Berlin, March 21, 2022



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Reviewer Credentials and Qualification

Karsten Schischke: Experience and background in the field of Life Cycle Assessments include

- Life Cycle Assessment course and exam as part of the Environmental Engineering studies (Dipl.-Ing. Technischer Umweltschutz, Technische Universität Berlin, 1999)
- more than 130 Critical Reviews of LCA studies since 2005 (batteries, displays, mobile devices, networked ICT equipment, home automation devices, servers, desktop computers, inverters, digital advertising solutions, smart cards) for 8 different industry clients and of the EPEAT Environmental Benefits Calculator

- Coordination of and contribution to compilation of more than 100 ELCD datasets (available at www.lca2go.eu; product groups: hard disk drives, semiconductors, printed circuit boards, photovoltaics)
- Environmental Lifecycle Assessments following the MEEuP / MEErP methodology in several Ecodesign Product Group Studies under the European Ecodesign Directive since 2007 (mobile phones and tablets, external power supplies, complex settop-boxes, machine tools, welding equipment)
- various environmental gate-to-gate assessments in research projects since 2000 (wafer bumping, printed circuit board manufacturing)

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Marina Proske: Experience and background in the field of Life Cycle Assessments include

- Life Cycle Assessment course and exam as part of the Environmental Engineering studies (Dipl.-Ing. Technischer Umweltschutz, Technische Universität Berlin, 2009)
- Critical Reviews of LCA studies incl. water, fiber and plastic footprints since 2012 for 2 industry clients and of the EPEAT Environmental Benefits Calculator
- Life Cycle Assessment of two modular smartphones (Fairphone 2, Fairphone 3)
- Studies on the environmental assessment and carbon footprint of ICT
- Studies on material and lifetime aspects within the MEErP methodology

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