Frequently asked questions

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HPE PRODUCT CARBON FOOTPRINT

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WHAT IS A LIFECYCLE ASSESSMENT? WHAT IS A PRODUCT CARBON FOOTPRINT (PCF)?

Hewlett Packard Enterprise uses **lifecycle analysis** (LCA) tools to calculate product-related impacts. A **lifecycle assessment** is the systematic process of assessing the inputs and outputs of materials and energy as well as the corresponding environmental and human health impacts associated with a product or process throughout its lifecycle. Basically, an LCA evaluates all stages of a product's life using an inventory of relevant social and environmental inputs. HPE has completed a wide range of LCAs for products across its portfolio—representative of the high-volume products. HPE uses different methods or models to calculate LCAs for its various products in order to (1) make the impacts of various lifecycle stages visible to customers and (2) design programs in order to address the environmental and social externalities across the various stages of impact of its products.

There are several types of LCA including (1) process-level LCA, (2) EIO-LCA, (3) hybrid LCA, and (4) simplified or streamlined LCA. Any LCA can assess environmental and human health impacts across multiple impact categories. For example, LCA impact categories could include but are not limited to toxic releases, particulates, greenhouse gases, land use, water use, and others. In contrast, a **PCF** only assesses the environmental impact for one category, global warming potential or climate impact, measured in kg CO_2e.

HOW DOES HPE CALCULATE PCF FOR A PRODUCT?

HPE uses the Product Attribute to Impact Algorithm (PAIA)[1] tool to calculate PCFs for the highest volume of sold products. PAIA, which uses a streamlined or simplified LCA approach, requires much less data compared to a traditional process-level LCA. However, there are still critical inputs HPE must provide in order to calculate a representative PCF result. The total energy consumption of HPE products during their use phase is extremely important for calculating a PCF. HPE uses Power Advisor,[2] an HPE developed tool, to calculate the total energy consumption of HPE products during their use phase.

WHAT CAN I LEARN FROM THE PCF RESULTS?

There are four important benefits for calculating and analyzing PCF results:

1. You can gain a reasonable estimate for the product's overall carbon footprint. This enables a more efficient and streamlined environmental assessment of our products.

2. With the PAIA results, you can see the level of uncertainty associated with different components and lifecycle stages. Uncertainty is shown through the standard deviation. If the standard deviation is greater than the average (that is, mean), it means there is great deal of variation in the modeled average. You should always keep uncertainty in mind when viewing PCF results and exercise caution when the uncertainty is high.

3. Potentially, the most helpful insight from PCF results is the relative contribution of components and lifecycle stages on the product's overall carbon footprint. PCF results clearly show which components of a product and during which lifecycle stages contribute the most to a product's carbon footprint—even when considering levels of uncertainty. The results allow us to conduct **hotspot** analysis; meaning, we can identify the components and processes we should prioritize to help minimize carbon emissions for the greatest overall impact like materials selection, product energy reduction, and others.

4. HPE and its customers can improve transparency around the carbon footprint of HPE products for reporting standards and customer procurement requirements. PAIA is aligned with leading standards including EPEAT: IEEE 1680.1, and the French product labelling initiative, Grenelle.

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[1] The PAIA was developed by the Massachusetts Institute of Technology's Materials Systems Laboratory and partners. PAIA is an approach to streamline LCA that aims to provide an efficient and cost-effective estimate of the carbon impact of a product class, including notebooks, desktops, LCD monitors, and televisions. PAIA is primarily a methodology, which as an example, has been applied through a model, known as the PAIA breadboard tool. Read more about the intended uses and limitations of the PAIA model.

[2] HPE Power Advisor is our infrastructure advisement tool used to estimate power requirements, power and cooling costs, bill of materials, total cost of ownership (TCO) analysis, and power efficiency rates.

CAN I COMPARE HPE PCF RESULTS WITH THOSE FROM OTHER VENDORS?

No. The ISO 14040 series, which provides internationally agreed upon standards for conducting LCAs, strongly advises against comparing LCA results. PAIA also explicitly states that PCF results should not be used for comparison. There are two primary reasons why LCA and PCF results should not be used to compare products or processes:

1. Analysts make numerous assumptions while conducting an LCA or a PCF that impact the results. Therefore, you cannot determine whether differences in results are due to analysts' assumptions or the actual product or process. The ISO 14040 series describes several assumptions necessary to complete an LCA. They include goal and scope definition, system boundary definition, functional unit definition, and allocation methodologies used, especially when modeling impacts from end of life.

2. LCAs and PCFs have a high degree of uncertainty. You can see the levels of uncertainty based on the standard deviation reported in PAIA's PCF results. High degrees of uncertainty greatly reduce your ability to find a statistically significant difference between products or processes. For example, if you were comparing two products and found that one has a higher average carbon footprint than the other, but there is high uncertainty, you cannot say that the difference you are observing is accurate or inaccurate. You can only conclude there is an accurate or verified difference between the carbon footprints if there is a statistically significant difference between the products, which is inconclusive when uncertainty is high.

WHAT ARE THE LIMITATIONS OF A PCF?

Due to the high configurability and customization of HPE products, we cannot provide custom PCFs unless customers provide exact configurations. If configurations are not provided, HPE will assume the most common configurations.[3] Another limitation is the inability to reflect PCF improvements based on HPE Greenhouse Gas (GHG) reduction goals initiatives. HPE has several climate-related goals:

- Reduce absolute manufacturing-related GHG emissions in our supply chain by 15% compared to 2016 levels by 2025

- Enable 80% of our production supplier (by spend) to set science-based targets by 2025

- Help minimize operational GHG emissions by 55% compared to 2016 levels by 2025

- Source 50% of total electricity consumption in our operations from renewables by 2025

- Reduce absolute emissions from transportation logistics by 35% compared to 2016 levels

- Increase the energy performance of our product portfolio 30X compared to 2015 levels by 2025

Each of these goals and initiatives should contribute to reducing products' PCF. However, product PCFs are calculated using PAIA, which relies on modeled data that does not integrate carbon reductions driven by company-wide goals. It is challenging to regularly update LCA and PCF models to reflect change due to the heavy data burden and levels of uncertainty associated with these types of analyses. This is an area of ongoing improvement for HPE.

HOW IS HPE ADDRESSING THE PCF LIMITATIONS?

HPE is continually assessing the highest volume of sold products and configurations. These are products and configurations we prioritize to assess PCFs. HPE is also working to improve transparency by highlighting the components and processes that have the biggest impact on a PCF. This should provide customers with more insights on their products in the absence of a PCF with their specific configurations. Lastly, HPE is continually working to improve our LCA and PCF process to reflect the impact of our products more accurately, which includes quantifying improvements based on HPE's climate goals.

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[3] The inputs for this calculation will use product attribute using the highest-selling configurations for FY19, unless otherwise provided by the customers. All server components are assumed to be produced in Asia and shipped to the EU. All power consumption data is taken from HPE Power Advisor tool, assuming the server is operated at 30% of potential maximum utilization for 24x365 and for four years. The electrical emissions intensity used was the average for the EU.

I WANT TO ENGAGE ON A PROJECT/LEARN MORE. WHAT SHOULD I DO?

Contact HPE technologists of IT efficiency and sustainability at lpsalessupport@hpe.com.

Appendix

- PCF inputs: The inputs for HPE PCF calculations use product attributes from the highest-selling configurations for FY19, unless otherwise provided by customers.

  – Location: All server components are assumed to be produced in Asia and shipped to the EU. The electrical emissions intensity used was the average for the EU.

  – Lifespan of the product: We assume four years, based on our recommendations from "Efficiency Benefits and Challenges of Information Technology Lifecycle Management."

  – Configuration: All power consumption data is taken from HPE Power Advisor tool, assuming the server is operated at 30% of potential maximum utilization for 24x365 and for four years.

  – Logistics transportation: Modeling assumes delivery truck will travel 1234 km to final destination. This figure is a weighted average of the distance traveled from final assembly location in the Czech Republic to customers who have requested PCFs in the last 2.5 years, using the final destination capital city as proxy for final city destination.

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