



Assessment Shows Service-based Models Deliver Positive Environmental Impact

Against a backdrop of rapid population growth, an expanding global middle class, and increasingly scarce natural resources, the traditional linear “take, make, dispose” business model is no longer viable.

Reinventing how products and services are delivered

According to the Global Footprint Network, global resource consumption in 2019 occurred 1.75 times faster than the planet’s ecosystems could regenerate.

Faced with the inevitability of a constrained resource environment, HP is reinventing how it designs, delivers, and recovers its products to enable its customers to grow while shrinking their carbon and materials footprint.

This document shows how independently reviewed research conclusively proves that HP’s circular printing and computing services provide individuals and organizations with the services they can rely on—and are significantly better for the planet. Using this information, buyers can join the circular journey and become a force for good.

HP’s full circle approach to the circular economy

The Ellen Macarthur Foundation defines the circular economy as an economy that is restorative and regenerative by design. It aims to keep products, components, and materials at their highest utility and value at all times.

HP has adopted a “full circle” approach to its products and services, shifting to selling services rather than products.



At a glance

- Global trends necessitate that everyone uses resources more efficiently and keeps them in use as long as possible
- Independent life cycle impact studies prove that HP’s circular solutions yield reduced environmental impacts in all environmental impact categories
- All solutions have a smaller carbon footprint than conventional alternatives, between 11% and 74% lower; organizations that seek to decarbonize their operations need to adopt circular measures, and those that seek to be leaders need to embrace access over product ownership
- Leading organizations can now confidently procure printing and computing as a service versus *buying* printers and computers to reduce their environmental impacts
- New computing and printing services allow organizations to “future-proof” their operations by decoupling their environmental impacts from their growth

Shifting to a service-based model

The predominant consumption-based approach that organizations are accustomed to follows a linear transactional path, in which customers purchase goods—for example, PCs, printers, or ink cartridges—and replace them regularly. The circular economy is ushering in an altogether different model, called product-as-a-service (PaaS), which replaces these one-time transactions with ongoing, contractual, subscription-based customer service relationships.

Research provided by MarketsandMarkets, a B2B research firm that quantifies high growth emerging market opportunities, projects that the PC-as-a-service market (PCaaS) alone will reach USD 141.6 billion by 2024 from USD 15.9 billion in 2019, at an annual growth rate of 54.9%. According to its research, the growth of the PCaaS market is driven by the inclination of businesses toward the OPEX model rather than the CAPEX model, and the flexibility and scalability of PCaaS offerings.

Not only do these services provide more value for customers, who pay only for the service they need rather than the hardware and materials that provide them, but they also provide proven environmental benefits as well.

HP uncovered this significant finding via three studies it commissioned in 2019 and 2020 of its PaaS circular offerings. HP engaged third-party experts to conduct ISO-compliant, peer-reviewed life cycle assessments (LCAs) of three of its offerings: HP Device as a Service (DaaS), HP Managed Print Services (MPS), and HP Instant Ink. HP wanted to determine conclusively whether these circular services have beneficial environmental impacts compared to their conventional transactional counterparts.



Computing solution:
HP Device as a Service



Printing solution:
HP Managed Print Services



Printing solution:
HP Instant Ink

HP PaaS solutions significantly better for the environment

The LCA study results were clear and unmistakable: not only do HP's circular service-based solutions have better environmental profiles—they also do so across all the environmental impact areas studied. These results are significant for HP, its customers, and the circular economy movement, in that there is now empirical evidence of a long-believed truth: circular solutions are powerful routes to decoupling society's impact on natural resources and the climate. The graphs on the next three pages provide an at-a-glance summary of the findings.

Each study considered four or more different scenarios, such as product lifespan, user geography, end-of-life approaches, and transportation variables. The results of these comprehensive sensitivity analyses reveal that across all but a few minor scenarios, HP circular solutions remain less damaging to the environment. In addition, the assessments show that PaaS systems outperform conventional retail systems across all environmental categories—providing a high level of confidence in the results.

Together, these three studies stand out for the dramatic, unequivocal results that every environmental impact category was impacted positively due to their circular and low-carbon innovations. They also demonstrate that organizations that want to decarbonize and reduce their other sustainability impacts must embrace circular business models and procurements.

Over 25 years assessing product impacts

Life cycle assessment (LCA) is a rigorous, science-based quantitative methodology that assesses environmental impacts associated with all stages of a product's life—from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling.

HP conducted its first LCA on an inkjet cartridge in 1994, a first in the IT industry. Since then HP's LCA program has expanded to encompass all its products, the results of which are used to guide environmental improvements in product development, business models, and the company's climate goals.

The LCAs HP commissioned of its circular PaaS solutions are full comparative LCAs, completed in accordance with ISO 14040 and 14044. The assessments analyzed 20 environmental impact categories.

PaaS life cycle assessment

As the science shows, PaaS systems significantly advance the circular and low carbon economy through:

- Extended product life
- Usage optimization
- Avoided manufacturing
- Material and transportation reductions

HP found that while PaaS is always better for the environment, it is not always for the same reason. Each product system has different attributes which underwrite the circular improvement. Regardless of the benefits generated by the product system, however, the circular solutions materially and reliably reduce greenhouse gas (GHG) emissions and improve resource efficiency. They have demonstrably superior environmental performance, making them the preferred choice for eco-conscious buyers. The following sections go into more detail about these product specific eco-benefits.

Device as a Service LCA results

Study scope

HP DaaS versus a traditional transactional business model for commercial PCs.

Findings

Compared with transactional sales, DaaS reduces GHG emissions by 25%, improves resource efficiency by 28%, decreases ecosystems impacts by 28%, and reduces human health impacts by 29%. Impact reductions range between 25-30% compared to the linear model. DaaS has lower environmental impacts than retail for all LCA categories.

Key reasons

These eco-benefits are mainly due to keeping PCs in use for multiple life cycles, which avoids manufacturing of additional devices and extends the life of high-value materials.

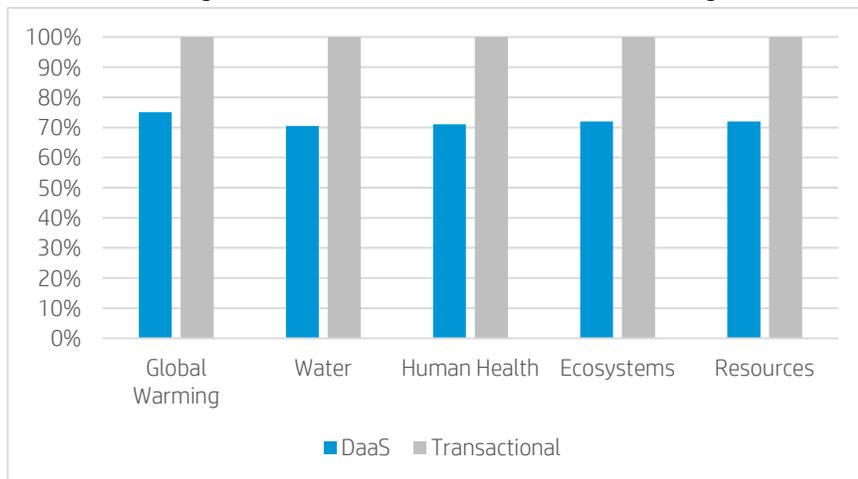


Figure 1: Comparison of Device as a Service to traditional transactional model

HP Managed Print Services LCA results

Study scope

HP MPS versus traditional transactional business model for HP Enterprise LaserJet printers.

Findings

Compared to traditionally purchased printers, HP MPS reduces GHG emissions by 12%, improves resource efficiency by 13%, decreases ecosystems impacts by 12%, and reduces human health impacts by 10% for a multi-function color laser printer. Impact reductions

Meet Tom

He is the **Finance VP** at a post-secondary institution. He is always looking for ways to boost productivity, reduce operating costs, and foster the university's long-term resilience to shocks. He faces a decision to upgrade the university's printing capacity, functionality, and security. Obsolete product risk, product failure risk, and maintenance requirements are a concern. His institutional clients want printing, not printers, so the PaaS option is very attractive to him.

Meet Aahna

She **runs her own small start-up** business from her home. She has been hearing about PaaS from the Entrepreneurship and Innovation Group she belongs to. As she scales her business, she wants the latest and most flexible technology solutions that can adapt as her company grows. She sees circular models as key to the future and wants to be an early adopter of innovation that is good for the environment and her business.

Meet Chang

He is the **IT decision-maker** for a mid-sized bank. He has been reading about the risks associated with the use of scarce and non-renewable resources, and the risk of failing to innovate or adapt as society shifts to use less. He intends to put his organization at the forefront of these trends by switching to DaaS. This will reduce the bank's operating costs, align with the organization's agile commitments, and help future-proof the company.

range between 9-12% compared to the linear model. HP MPS has lower environmental impacts per printed image than retail for all LCA categories.

Key reasons

These eco-benefits are mainly due to more efficient product use (higher duplexing rates) and reduced waste.

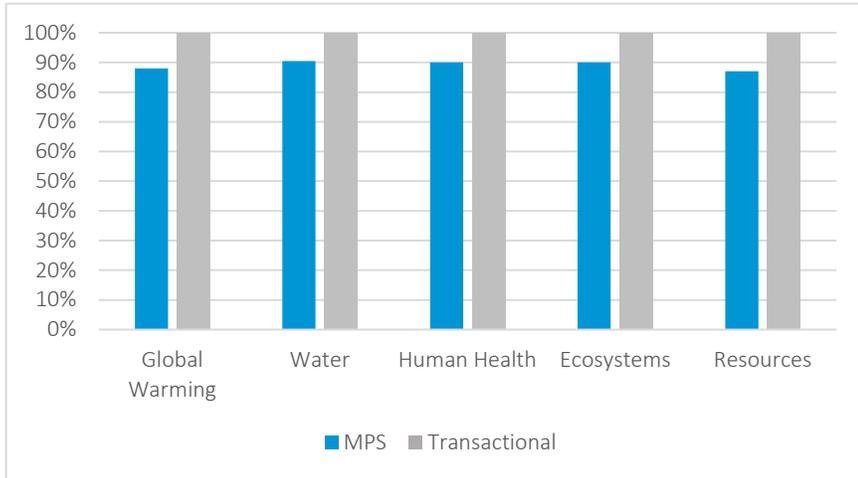


Figure 2: Comparison of HP MPS to traditional transactional model

HP Instant Ink LCA results

Study scope

HP Instant Ink versus traditional transactional retail system for black and color ink cartridges for the same printer.

Findings

Compared to transactional retail systems, HP Instant Ink reduces GHG emissions by 73%, improves resource efficiency by 73%, and lowers water use by 70%. Impact reductions range between 59-74% compared to the linear model. HP Instant Ink has lower environmental impacts than retail for all LCA categories.

Key reasons

These eco-benefits are mainly due to reduced materials use (higher capacity cartridges, less packaging, and higher recycling rates) and improved distribution efficiency (bulk shipping and avoided trips to the store).

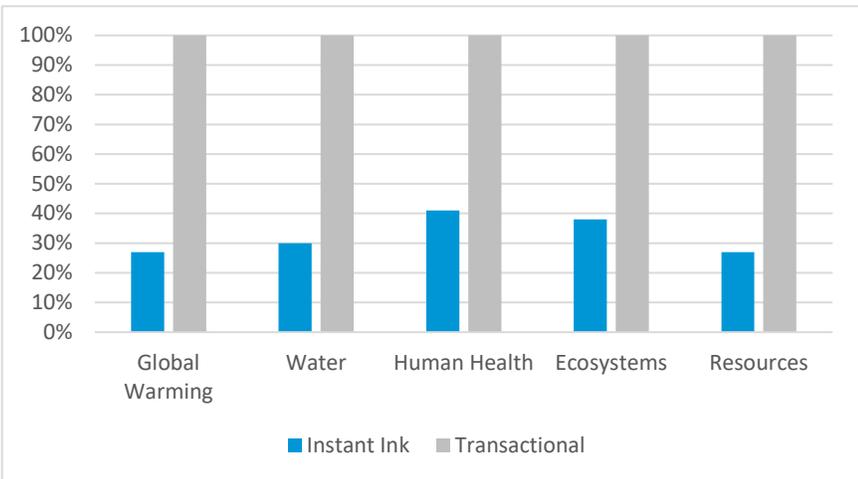


Figure 3: Comparison of HP Instant Ink to traditional transactional retail system

In summary

HP is transforming how it functions as a business while enabling entire industries to eliminate waste and drive efficient, low-carbon, and circular value chains. Transformations, such as a shift to service-based models, will support this necessary transition to a circular, decarbonized world.

HP's service-based solutions—such as HP Device as a Service, HP Managed Print Services, and HP Instant Ink—provide customers with access to the latest technologies, enabling them to scale as their business needs evolve, while supporting environmental sustainability.

HP is leading the way with this modernization of IT, delivering complete solutions across printing and computing for customers that seek to gain the productivity benefits of IT innovation, the reputational benefits of innovation leadership, and the environmental benefits of dematerialized services.

Where to go from here

Now that HP has incontrovertible evidence that PaaS solutions are better for the environment, the company plans to make more PaaS solutions available to more customers. HP will continue its efforts to improve the durability, repairability, and upgradability of its devices. HP imagines a future in which customers prefer service-based solutions, viewing ownership models as expensive, inefficient, and outdated. A paradigm shift is underway in terms of humanity's relationship to "things" and HP is—and intends to remain—at the forefront of this transition.

Learn more at

HP Sustainable Impact: www.hp.com/sustainableimpact

HP Eco Solutions: www.hp.com/ecosolution

Circular economy: www.ellenmacarthurfoundation.org

What you can do

- Think about using services rather than buying the product outright. Ask yourself: do I need to own the product, or do I want to access what it can do?
- Upgrade to service-based solutions in all your purchasing choices where you can.
- Switch to subscription-based offerings such as service-based computing or printing to gain the environmental advantages, and access tailored solutions that meet your needs.