Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

The circular economy, which is regenerative and restorative by design, is helping organisations to create more value while reducing their dependence on scarce resources. The print industry is already playing a leading role in the shift to a circular economy; a transition which has been driven by the desire for greater economic and environmental sustainability. Circular business models are well established across the product lifecycle – encompassing circular supply chains, recovery and recycling, product life extension and a move from product-based to service-based models. Meanwhile, digital innovations that leverage the cloud, the Internet of Things (IoT) and 3D printing promise to further spur the adoption of circular business models in the print industry.

This paper outlines the case for the circular economy, and highlights how organisations can 'turn circular' in their investment in print technology.

What is a circular economy?

Circular economy terminology was brought to prominence by the work of the Ellen MacArthur Foundation, following the 'cradle to cradle' concepts established by William McDonough and Michael Braungart. A circular economy is one that keeps products, components and materials at their highest use and value at all times.

The core vision is of replacing the current largely linear economy of 'take, make and dispose' with one in which resources circulate at high value, avoiding or reducing the need for virgin resources. The linear model is a huge drain on finite natural resources and generates vast amounts of waste. This is perhaps most evident in the fast-moving consumer goods (FMCG) industry, where approximately 80% of the $3.2 trillion worth of materials used each year is not recovered.[1]

The main drivers for the circular economy are the increasing volatility of commodity prices, restricted supply of resources and policy drivers such as producer responsibility regulations, as well as a rapidly changing consumer culture. There are several benefits to a more circular economy – from reducing greenhouse gas (GHG) emissions to relieving pressure on water resources, virgin materials and habitats, and limiting pollution. It is estimated that large-scale deployment of a circular economy model could have highly positive effects on the climate: in Europe, it could reduce greenhouse gas emissions by 1,200 million tonnes of CO2 equivalent per year, or 14.6% of Europe's total annual emissions.[2]

There is a growing body of evidence on the scale of the economic opportunity to be gained from the circular economy. Analysis by the Ellen MacArthur Foundation and McKinsey suggests this could be worth a trillion dollars globally.[3] The shift to a circular economy not only boosts productivity, by reducing the demand on raw materials, but also stimulates innovation in areas like product design, reuse and remanufacturing facilities as well as new business models.

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

Legislative momentum

The concept of the circular economy is gaining broader traction, and is a key policy property in leading economies including Denmark, Sweden, the Netherlands, Japan and China. The European Commission announced a €24 billion EU Circular Economy Package in December 2016 **which includes revised legislative proposals on waste** to stimulate Europe's transition towards a circular economy, which will boost global competitiveness, foster sustainable economic growth and generate new jobs. The proposed actions will contribute to 'closing the loop' of product lifecycles through greater recycling and reuse, and bring benefits for both the environment and the economy. The plans will extract the maximum value and use from all raw materials, products and waste, fostering energy savings and reducing greenhouse gas emissions.

The publication of the Circular Economy Package coincided with the agreement at the COP21 in Paris in December 2015 on a new approach to global climate change. The Paris Agreement, a legally binding treaty on climate action, contains emission reduction commitments from 187 countries, starting in 2020. Countries will submit updated climate plans – called nationally determined contributions (NDCs) – every five years, thereby steadily increasing their ambition in the long-term. Implementation of NDCs will mean that by 2030 renewables will make up 78% of new power generation investment in major economies, driving down the cost of renewable energy. Delivering this will require extensive reforms to electricity markets, business and financing models.[4]

Service models in the circular economy

Our relationship with all types of products and services could change dramatically under a circular economy. This is already evident in the way new models of service consumption have enabled organisations such as Uber and Airbnb to flourish. Flexible access to products, services and new technologies – for example through pay-per-use agreements – and the performance they deliver is becoming more important than ownership. Service-based models reduce environmental impact by allowing organisations to purchase only what they need, and therefore reduce waste. Customers are not burdened by significant upgrade costs and can more accurately estimate the ongoing cost of access to technology.

For instance, Philips already sells lighting as a service for its business customers, who pay only for the light while Philips takes care of the technology risk and investment. Customers can also take the equipment back to recycle the materials or upgrade them for reuse. Live and reliable data on customers' usage patterns allows Philips to continuously optimise power consumption and enhance light installations.

This service-based approach is long established in the print industry, with 'print-as-a-service' models becoming a proven approach to lowering both financial and environmental costs, reducing risk and improving device utilisation and reliability.

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

How has the print industry adopted a circular economy approach?

Sustainable and circular economy practices are well established in the print industry, largely in response to CSR (corporate social responsibility) concerns and recycling obligations. This applies not only in their manufacturing processes but also in the provision of energy-efficient products and recycling and remanufacturing. Manufacturers are also making the shift from product- to service-based models, and providing intelligent hardware and software that support the transition to the 'less-paper' workplace. Circular economy principles apply across the following areas (as defined in Accenture's *Waste to Wealth*[5] report):

- **Circular supply chain.** Products are designed and optimised for a cycle of disassembly and reuse. This provides opportunities for remanufacturing and refurbishment across the supply chain. Products are increasingly built for longevity and energy efficiency, with fewer moving parts that can fail and fewer consumables that add to waste and need to be replaced. Innovation in inkjet print technology, for instance, is designed to reduce environmental impact. This is enabled through higher capacity ink models plus lower CO_2 emissions and power consumption in comparison to laser print technology.

- **Recycling and recovery.** Manufacturers operate take-back programmes at the device end of life, that make it easy for organisations to return and responsibly recycle hardware and supplies such as toner cartridges. HP Planet Partners is a return and recycling programme that provides recycling of original HP Inkjet and HP LaserJet supplies, any brand of computer hardware and rechargeable batteries. HP recycles its cartridges using a closed-loop recycling process in which recycled plastics are used as raw material in new HP cartridges. No Original HP cartridges returned through HP Planet Partners are ever sent to a landfill.

- **Product life extension.** Manufacturers can extend product life through hardware repairs, software upgrades and firmware updates. This ensures optimal device reliability as well as protecting hardware from security breaches. In addition, new software features could be added remotely to provide additional device functionality, while new solutions that are backwards compatible with older products help to further extend product life.

- **Product-as-a-service.** Manufacturers have already developed innovative models to move away from selling printers to selling printing-as-a-service. A managed print service (MPS) helps customers reduce the cost, complexity and risk of an unmanaged and inefficient print infrastructure. Through a usage model, MPS offers organisations predictable expenses and eliminates capital expenditure while reducing operational expenses. In this way, manufacturers retain ownership of their products and sell their use as a service, enabling the optimal use of resources.

HP Print Manufacturing – Closing the loop

At HP, approximately 80% of the ink cartridges rolling off its production lines utilise closed-loop technology, achieved through the use of recycled plastic from HP cartridges and the upcycling of plastic from other types of post-consumer recycled plastic, such as plastic bottles and clothes hangers. 100% of the company's LaserJet toner cartridges feature some recycled content.

Based on HP data, the recycled plastic used in Original HP ink cartridges has a carbon footprint up to 33% smaller than the virgin plastic used in Original HP ink cartridges, consuming 54% less fossil fuels and using 75% less water during manufacturing.

For details see www.hp.com/go/recyledplasticsLCA

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

HP and the circular economy

HP is applying circular economy principles across its business model and operations (Figure 1). It has set new long-term goals for sustainability which include:

- Committing to 100% renewable electricity in its global operations by 2020
- Achieving zero deforestation associated with HP brand paper and paper-based product packaging by 2020
- Reducing GHG emissions intensity of HP's product portfolio by 25% by 2020, compared to 2010
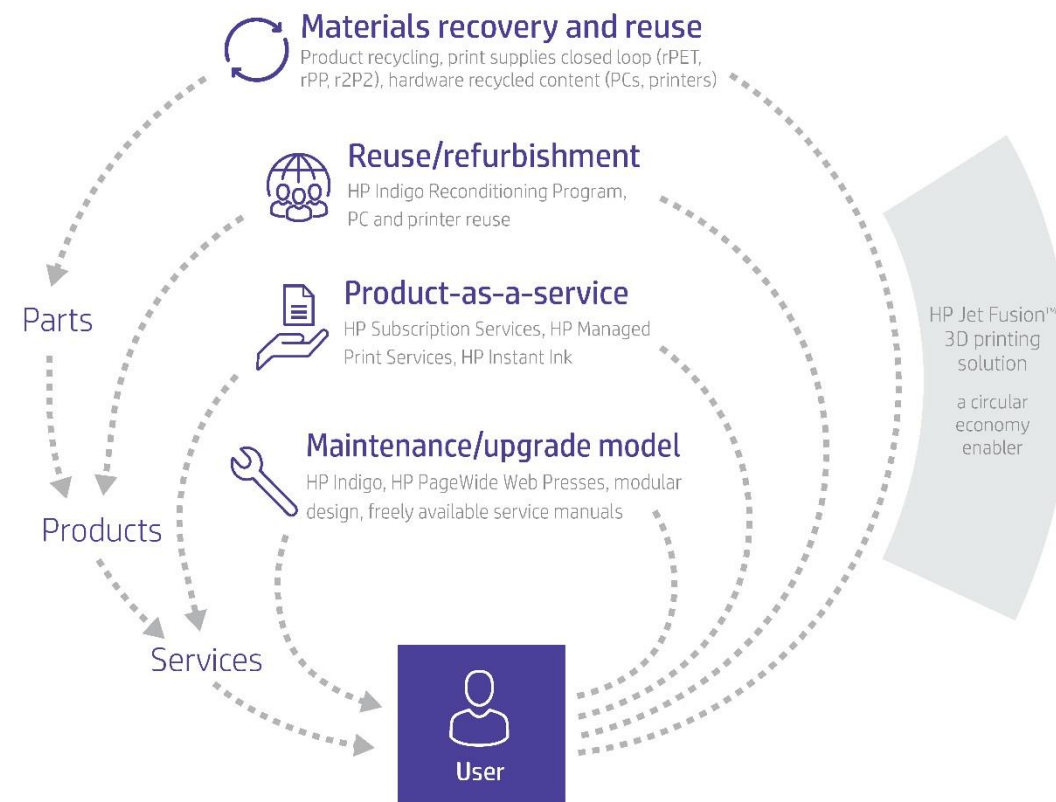
Materials recovery and reuse
Product recycling, print supplies closed loop (rPET, rPP, r2P2), hardware recycled content (PCs, printers)

Reuse/refurbishment
HP Indigo Reconditioning Program, PC and printer reuse

Product-as-a-service
HP Subscription Services, HP Managed Print Services, HP Instant Ink

Maintenance/upgrade model
HP Indigo, HP PageWide Web Presses, modular design, freely available service manuals

Parts

Products

Services

User

HP Jet Fusion™ 3D printing solution

a circular economy enabler

Figure 1: HP's Circular Economy Approach

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

Buyer recommendations – applying circular economy thinking

There is a significant opportunity for organisations to gain economic and environmental benefits through operating a more efficient print environment. To maximise the true gains, organisations should harness disruptive technologies such as the cloud, the Internet of Things, data analytics and 3D printing. These are increasingly providing a bridge between the physical and digital worlds and emerging as a catalyst for driving more efficiencies from circular economy principles.

Quocirca recommends the following best practices:

1. **Assess current environmental impact.** Begin with assessing energy consumption, paper use, carbon footprint and costs across the printer fleet. Some MPS providers offer environmental or carbon footprint calculators or assessments specifically for this purpose. An assessment should focus on identifying areas where the organisation can lower its environmental impact, and recommend a balanced deployment of hardware and software to decrease energy use, paper waste and consumables. By redesigning the print infrastructure with fewer devices, the fleet is optimised with less hardware that is more energy-efficient. MPS can provide further benefits by leveraging best practices through management of change and print policy enforcement, such as duplex or booklet printing and rules-based printing. This encourages users to print responsibly, eliminating wasteful paper usage and encouraging better recycling practices.

2. **Save energy.** Consider energy-efficient products that meet eco-labelling qualifications, such as ENERGY STAR, EPEAT or Blue Angel. Through the years, the US Environmental Protection Agency (EPA) has strengthened the energy efficiency requirements so that certified models are 30 percent more efficient than standard models.[6] Look for printers and multifunction printers (MFPs) with fast warm-up times and deep-sleep and toner-saving modes. Intelligent print management tools can also ensure the most appropriate device is used for each print job by automatically routing large jobs to lower-cost, more energy-efficient printers or MFPs.

3. **Enable digital transformation.** Reducing paper waste through digitisation and rules-based printing can lead to significant financial and environmental savings. Smart MFPs operate as sophisticated document processing hubs that allow users to scan documents, then store and share them digitally, either on-premises or in the cloud. This minimises an inefficient and costly paper trail. Meanwhile simple ways to reduce paper wastage include setting double-sided (duplex) printing as default or introducing booklet printing. Pull printing or PIN printing saves jobs on a virtual print server until users log in at the print device. This reduces the risks of users forgetting to pick up their documents and reprinting them later, or the wrong person picking them up, compromising security and confidentiality.

4. **Encourage good recycling practices.** Consider how effective existing approaches are for recycling paper, print cartridges and older printing devices, and set recycling guidelines for these items. Look for providers that offer a take-back programme and responsibly recycle returned toner cartridges. For imaging equipment, the Nordic Swan and Blue Angel labels ensure this support is in place. Switching to recycled or sustainably sourced paper, such as Forest Stewardship Council (FSC)-certified paper, can also lead to considerable environmental savings, particularly in terms of carbon emissions.

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

5. **Measure and manage.** Integrated reporting provides enterprise-wide visibility of a print infrastructure's environmental impact, including the amount of paper used, overall energy consumption and carbon footprint. This provides excellent opportunities for continuous improvement. In fact, many manufacturers now offer tools and resources to help organisations quantify the impact of their printer environment and develop plans for improvement.

HP's 3D printing technology helps cut costs, wastes and GHG emissions

HP's innovations in commercial 3D printing technology enable shorter production runs and manufacture of one-of-a-kind products and parts locally, rapidly and inexpensively. HP aims to make 3D printing ubiquitous with the launch of its HP JetFusion 3D printing solution. Key sustainability benefits include:

- Matching of supply and demand – dramatically reducing waste and costs associated with manufacturing products and spare parts that are never used (analogous to improvements HP has achieved by digitising commercial print production and enabling the analogue-to-digital shift).

- Localised manufacturing – eliminating the environmental impacts and expense associated with transportation to and from large regional or global factories and warehouse operations, and decreasing the need for packaging.

- Extended product lifespans – due to the ability of organisations to manufacture spare parts on demand that would otherwise not be available or affordable, or would require advanced warehouse and logistics systems.

- Streamlined prototyping processes – enabling more rapid iteration in product design and development, including for features that enhance environmental performance.

Source: HP Sustainability Report, 2015 (www.hp.com/sustainability)

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

Case study: Managed Print Services as an enabler for sustainability

Background

wolfcraft GmbH, which manufactures and sells tools and power tool accessories, was one of the key players that helped to establish the DIY market in Germany. With over 450 employees in 16 countries and a 70% export share, wolfcraft is an international organisation with a brand that stands for innovation, quality and excellent customer service. The organisation had introduced a sustainability programme that integrated several measures, including energy saving measures and offsets to its carbon footprint with high recycling rates, short transportation distances and optimised machine use.

Objective

wolfcraft was looking to optimise its printer fleet and reduce power consumption, emissions and consumables costs by introducing a new concept with efficient printer and copier systems. As well as finding a solution with a purely click-based invoicing system, consumption-based billing model and the latest generation of printers and multifunction devices, the organisation wanted to explore the option of having its existing systems incorporated into a special maintenance contract.

The initial evaluation revealed that the existing printer fleet comprised more than 70 devices, including 22 different models from two different manufacturers. As well as taking a lot of time to maintain, this setup also required a lot of time and effort to replenish and reorder consumables and replacement parts.

Solution

The process of replacing the existing fleet with new HP PageWide devices gave the organisation the opportunity to reassess its infrastructure and internal workflows, and determine where multifunction devices would be a more sensible option. This meant it could reduce the total number of devices by 30%. Where the devices are used by multiple employees, or in public or generally accessible areas, the organisation now has a PIN printing system to ensure that confidential documents never end up in the wrong hands.

Benefits

The consumption-based concept, along with the emissions-free and cost-effective HP PageWide Pro and HP PageWide Enterprise devices, have enabled wolfcraft to be more environmentally friendly and save money. The MPS not only reduces employees' workloads, but also gives wolfcraft full control over print costs.

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

Sustainable printing with HP PageWide Technology

HP printers and MFPs featuring HP PageWide Technology are the latest in a long line of innovative HP products that boast a smaller per-page environmental footprint.

HP PageWide Technology is a new printing platform that features a stationary print bar that spans the width of a page and prints entire pages in a single pass. It enables high print speeds and professional quality.

Reduced waste with high-capacity cartridges

Original HP high-yield PageWide cartridges provide more pages than standard cartridges, which means there are fewer spent cartridges to be disposed of over the life of the printer. In addition, HP PageWide Technology requires a lower volume of PageWide pigment to print a page compared to the volume of toner required to print a page with laser technology. The result is that HP PageWide cartridges are smaller and require less packaging, per page printed, than supplies for laser devices.

Lower energy use

HP business printers featuring HP PageWide Technology require less energy to print a single page than any other HP printing and imaging device. PageWide printers and MFPs use significantly less power than laser printing technology. According to a third-party analysis by Buyers Lab in 2016, business printers using HP PageWide Technology use at least 98% less energy and generate up to 95% less supplies and packaging waste than comparable laser printers, and can reduce the carbon footprint of printing by up to 52%. Additionally, HP PageWide Technology-based business printers have fewer moving parts to replace over their lifetime than in-class laser devices.

Fewer moving parts also contribute to lower energy use. The stationary print head, with more than 40,000 nozzles, spans the width of a page, simultaneously delivering Original HP PageWide pigment onto a moving sheet of paper.

Source: http://www.hp.com/united-states/campaigns/pagewide/media/PageWideEcoWhitepaper_March2015.pdf

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

Conclusion

The circular economy represents a markedly different way of doing business, forcing organisations to rethink everything from the way they design and manufacture products to their relationships with customers. It requires a different approach across the value chain: leasing rather than selling products, remanufacturing goods, seeking ways to extend the life of products or their components, and changing the behaviours of end-users. However, the concept of the circular economy is far from mainstream and there is still a need to educate and guide organisations in what opportunities it can bring – as a concept it may seem a daunting challenge to embrace all aspects. Ultimately a long-term vision is required, and organisations should look to their suppliers for guidance in how to practically apply circular economy principles to their business.

References

[1] McKinsey & Co, Remaking the industrial economy, Insights & Publications, February 2014

[2] http://newsroom.suez-environnement.com/reducing-co2-emissions-the-circular-economy-is-a-solution/

[3] Towards the Circular Economy, Ellen MacArthur Foundation, 2014

[4] https://www.e3g.org/library/judging-cop21-outcome-and-whats-next-for-climate-action

[5] Waste to Wealth: Creating Advantage in a Circular Economy by Accenture, 2015

[6] https://www.energystar.gov/products/office_equipment/imaging_equipment

Big data, smart MFPs and MPS in the circular economy

The foundation of an effective 'as-a-service' model is the use of big data analytics. This provides the insight necessary to ensure that devices are optimally utilised from a cost, security and reliability perspective.

Smart MFPs play a key role in achieving this goal. With its advanced connectivity and capacity to store large volumes of data, the smart MFP is an integral part of the Internet of Things (IoT) landscape. IoT devices have been recognised as key to unlocking the potential of the circular economy[3]. Integrated self-monitoring and reporting allows manufacturers to track a product's operating characteristics and history, and better understand how it is being used.

This rich data can be exploited by manufacturers to improve product design and accelerate innovation, and to optimise the performance and longevity of assets through applying predictive analytics to deliver proactive and automated service, maintenance, repair and replenishment of supplies.

This ultimately supports the transition to smart service contracts and predictive maintenance. Manufacturers can understand usage over time, and are better equipped to shift business models from selling printers to a contractual approach that includes service and ink/toner.

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

About HP

As a global leader in managed printing and content solutions for large organizations, HP offers technical expertise along with reliable products and services. We provide our clients with:

- Consulting services, including procurement, installation, management, and support that can be customized to enhance your organization's effectiveness.
- Relationships with industry-leading solution providers.
- Powerful solutions to help optimize your fleet, ensure data and document security, and manage your evolving workplace.

Get started

Contact your local HP representative to:
- Set up a workshop to assess your specific business needs.
- Establish a plan to implement the best solution for today and into the future.
- Identify an environmental approach that can help your organization save money.

About Quocirca

Quocirca is a research and analysis company with a primary focus on the European market. Quocirca produces free to market content aimed at IT decision makers and those that influence them in business of all sizes and public sector organisations. Much of the content Quocirca produces is based on its own primary research. For this primary research, Quocirca has native language telephone interviewing capabilities across Europe and is also able to cover North America and the Asia Pacific region. Research is conducted one-to-one with individuals in target job roles to ensure the right questions are being asked of the right people. Comparative results are reported by geography, industry, size of business, job role and other parameters as required. The research is sponsored by a broad spectrum of IT vendors, service providers and channel organisations. However, all Quocirca content is written from an independent standpoint and addresses the issues with regard to the use of IT within the context of

Unlocking the circular economy in the print industry

Louella Fernandes, Associate Director

an organisation, rather than specific products. Therefore, Quocirca's advice is free from vendor bias and is based purely on the insight gained through research, combined with the broad knowledge and analytical capabilities of Quocirca's analysts who focus on the 'big picture'. Quocirca is widely regarded as one of the most influential analyst companies in Europe. Through its close relationships with the media, Quocirca articles and reports reach millions of influencers and decision makers. Quocirca reports are made available through a selection of Quocirca's media partners.

To see more about Quocirca's analysts, click here. To see a list of some of Quocirca's customers, click here. To contact Quocirca, please click here.