KEYPOINT INTELLIGENCE

Communications Supplies Consulting service

Office Document Technology Group

PRIMARY RESEARCH

AP CARTRIDGE COLLECTION AND RECYCLING REPORT 2021

contents

Document

Tables

Executive Summary

This report presents the results of a research program by Keypoint Intelligence to investigate cartridge collections, usage and disposal practices for remanufactured, refilled and newly built compatible (NBC) ink and toner cartridges. Keypoint Intelligence interviewed 31 industry participants including remanufacturers, refillers, NBC suppliers, and resellers in Australia, China, India, Indonesia, S. Korea, and Thailand to understand the current situation. The following is a glossary of terms used in this report.

Glossary

- Empties collector: A company that buys and sells empty cartridges.
- A captive empties collector is owned by a remanufacturer. They are a profit center to the parent company and will supply primarily to the parent company as well as the aftermarket when excess empties are on hand.
- Independent empties collectors are an independent business and serve the remanufacturing industry overall.
- New Build Compatible (NBC): A 3rd party replacement cartridge that does not use an empty cartridge from an OEM, but rather uses a newly molded cartridge shell and internal parts.
- Clone: NBC that violates patents
- Empty/core: A used cartridge that might be suitable for re-use or recycling.
- Extra - Wrong Vendor: Cartridges from vendors that the remanufacturers do not accept
- Final Disposition: What happens to a cartridge at the end of its life (sent to landfill, recycled, waste to energy (W2E))
- Landfill: Use of municipal waste. Municipal solid waste is commonly known as trash or garbage (US), refuse or rubbish (UK) is a type of waste consisting of everyday items that are discarded by the public. Depending on local laws, trash or rubbish may be buried untreated or may first be incinerated before the ashes are disposed of based on local laws.
- Non-Virgin Empty: An empty cartridge that has previously been remanufactured
- Bad Non-Virgin Empty: A non-virgin empty that cannot be successfully remanufactured or one for which there is no market.
- Good non-Virgin Empty: A non-virgin empty that can successfully be remanufactured.
- Recycling: Crushing or melting components for use in other products or industries.

- Remanufacturing Recycling Ratio: Share of remanufactured cartridge waste that is recycled rather than sent to a landfill or incinerator.
- Remanufacturing: The practice of cleaning, servicing, refilling, and re-using cartridges.
- Refilling: the cartridge is typically not opened or cleaned inside, and components are not typically replaced. The cartridge is simply refilled with toner or ink.
- Virgin Empty: An empty cartridge that has not been remanufactured.
- Bad Virgin Empty: A virgin empty that cannot be remanufactured or one for which there is no market.
- Good Virgin Empty: A virgin empty that can successfully be remanufactured.

Key Findings

55% of remanufactured ink and toners ultimately go to landfill

67% of refilled toner and 70% of refilled ink cartridges ultimately end up in landfill

81% of newly built compatible toners and 85% of newly built compatible ink cartridges ultimately end up in landfill

Newly built compatible toner and ink cartridge manufacturers only recollect 22% of toners and 16% of their ink cartridges

Remanufacturer findings

Below are a series of findings regarding remanufacturer collections and processes.

Remanufactured cartridges that will ultimately go to landfill

The volume of cartridges that ultimately end up in landfill is a combination of those cartridges that users throw away because they are not collected again by the remanufacturing industry and the much smaller volume of unusable cartridges and cartridge components that the remanufacturing industry collects but do not recycle or sent do water to energy. There is also a small volume of cartridges that users are able to send directly to recycling, mainly in China.

The volume of remanufactured cartridges that ultimately end up being thrown out has been going down year on year but remains significant.

- The historical trend for landfill rates is downward with a slight uptick in 2018 but then a very significant decline in 2020

- Respondents comment on an awakening regarding the environment as well as increased opportunities and access to recycling
- None of the respondents suggested that they recycle in-house. Rather the services are more available

Table 1: Remanufactured cartridges that will ultimately go to the landfill

	2018	2020
Laser	72%	55%
Inkjet	81%	55%

What happens to cartridges that remanufacturers collect but can't use or sell?

Remanufacturers need to collect empty cartridges to remanufacture them and not all collected cartridges are suitable for use. The table below provides our estimates on what the remanufacturing industry does with cartridges and components that they cannot use or sell.

- Respondents report significant changes from 2018 to 2020
- The trend for the use of waste to energy has most consistently gone up. This is also being reported in Europe
- Recycling has gone up and down over the years, but the overall trend is down as W2E has gone up
- Landfill has also gone up and down over the years, but 2020 results show decrease in landfill vs 2018

Table 2: What happens to cartridges that remanufacturers collect but can't use or sell?

	2020
Laser	
Landfill	39%
Waste-to-Energy/ Incineration	32%
Recycled	29%
Total	**100%**

Inkjet	
Landfill	31%
Waste-to-Energy/ Incineration	31%
Recycled	38%
Total	**100%**

Cartridges remanufactured from non-virgin cores

Below are the estimates shared of remanufactured toner and inkjet cartridges that are remanufactured using a previously remanufactured cartridge. As part of a product that relies in part on the environmental benefits of using a remanufactured cartridge, one aspect of that message could be the extent that a remanufactured cartridge that originally reuses an empty OEM cartridge is actually remanufactured a second time. Historically re-use of a remanufactured cartridge has been low but increasing. This 2020 research shows a significant increase the re-use of remans from the 2018 research

- 2020 results show increase in the use of non-virgin cartridges for both ink and toner. This is a significant jump from fairly steady results for prior years.
- 53% of reman toner and 47% of reman ink cartridges are only remanufactured once.
- The significant increase in the use of NBCs has also likely confused the respondent's ability to make this distinction
- It is possible that various impacts of the pandemic have influenced the use of non-virgins
- Questions were worded to ask respondents to only consider integrated ink cartridges however with the increase in ink tank use and the mixing in of NBC cores this question is likely becoming more difficult for respondents to answer

Table 3: Cartridges Remanufactured from non-virgin cores

	2018	2020
Laser	35%	47%
Inkjet	32%	53%

Reman unusable cartridge collections

Remanufacturers need to collect more cartridges than they can use because some collections are damaged or otherwise unusable.

Virgin empties have a lower defect rate than non-virgins. As such among total collections the bad non-virgins are larger than bad virgin cartridges. Remanufacturers also accidentally collect cartridges that are simply not usable because they may of a style that can compete against NBCs such as simple toner cassettes and even toner bottles that they typically do not remanufacture.

Bad-Wrong vendor primarily relates to cartridge models that are so simple that it's impossible for remans to make a profit on based on competition between NBCs and refill. In the past, NBCs would have been counted as Bad-Wrong vendor but with increased remanufacturing of NBCs, this is less likely to be so.

Table 4: Unusable remanufactured cartridge collections

	2018	2020
Laser		
Bad Virgins	9%	5%
Bad Non-Virgins	8%	10%
Subtotal	17%	15%
Bad–Wrong Vendor	9%	9%
Total	**26%**	**23%**
Inkjet		
Bad Virgins	9%	6%
Bad Non-Virgins	11%	12%
Subtotal	20%	18%
Bad–Wrong Vendor	17%	10%
Total	**37%**	**29%**

Refilled Cartridge Findings

Following are a series of metrics on refilled cartridge activities.

Refilled cartridges that will ultimately go to landfill

- Refillers report that the rate at which their cartridges ultimately end up being throw (Landfilled) out has decreased.
- Over the year's respondents have indicated increased recycling of their own waste as well as a decreased propensity for users to simply throw an empty cartridge in the trash

Table 5: Refilled cartridges that ultimately end up in landfill

	2018	2020
Toner	89%	67%
Ink	90%	70%

Refiller disposal of unusable cartridges

- Refillers report changes in waste disposal trends which bring their ratios closer to the ratios reported by remanufacturers.
- Causes could be the continued graying of the line between refill and reman as well as that many remanufacturers were also refillers and vice versa so their disposal ratios may be converging
- Refillers like remans report a significant increase in W2E while refillers also report greater recycling of waste

Table 6: Refiller disposal of unusable cartridge waste

Laser	
Landfill	49%
Waste-to-Energy/ Incineration	18%
Recycled	34%
Total	**100%**
Inkjet	
Landfill	50%

Waste-to-Energy/ Incineration	17%
Recycled	33%
Total	**100%**

Virgin vs. non-Virgin cartridges and failure rates

- Refillers report that damaged cartridges constitute a larger proportion off unusable cartridges than cartridges from the wrong vendor
- Wrong vendor may be low due to increased willingness among refillers to refill and NBC
- When a customer has a damaged cartridge the refiller may simply sell the customer a new cartridge of any type. When the cartridge is from the wrong vendor it may mean that the refiller has little opportunity to sell something to the customer

Table 7: Refill Virgin and non-virgin usage and failure rates

		2020
Toner	Bad Virgins	9%
	Bad Non-Virgins	9%
	Subtotal	18%
	Bad Wrong Vendor	3%
	Total	21%
Ink	Bad Virgins	9%
	Bad non-Virgins	16%
	Subtotal	25%
	Bad wrong vendor	9%

	Total	34%

Newly Built Compatible Findings

NBCs that end up in landfill

As can be assumed from the analysis above, changes are happening in terms of what happens to NBCs at end of life. Remanufacturers and refillers are reporting that they will reman and refill NBCs. This diverts products that are originally NBCs into Remans and refills which then follow the waste processes used by remans and refillers. However, that doesn't mean that a great deal more NBC avoid being landfilled at end of life. Additionally, this 2020 researched discovered that NBC producers are increasingly collecting their empties either to reman or to dispose of waste. Both activities above decrease the volume of NBCs that ultimately end up in landfill. However, NBCs still ultimately end up in landfill more often than do remans and refills.

- A much larger proportion of NBCs ultimately end up in landfill then do remans and refills though it appears that landfill rates are declining.
- Unlike previous years, respondents report that some NBC manufactures are now taking back empty cartridges to either remanufacture or refill them.
- Newly built compatible toner and ink cartridge manufacturers only recollect 22% of toners and 16% of their ink cartridges
- Newly built compatible toner and ink cartridge manufacturers do not recollect 78% of toners and 84% of their ink cartridges
- Increased re-use of NBCs by remanufactures and refillers has the effect of redirecting NBCs down the reman or refiller waste process
- If remans and refillers were not remanufacturing or refilling NBCs, the NBC landfill rate would be 9% and 8% higher for toner and ink respectively

Table 8: Newly built cartridges that will ultimately go to landfill

	2018	2020
Toner	97.8%	85%
Ink	99.3%	81%

opinion

Keypoint Intelligence' Opinion

OEM cartridges remain the largest choice that users are making when they need cartridges for their inkjet or laser device, but 3rd party products are also very popular in the Asia Pacific region. Remanufactured cartridges are seen as losing market share to NBCs and refills as they are not necessarily seen as better than the other two in terms of quality and reliability, but they are more expensive. In several countries it appears that the reman industry may be in great peril.

OEMs are seen as maintaining their market share while NBC and refill are taking share from reman.

The reman and refill industries are seen as changing with refill in particular filling the role of reman as an environmental alternative to NBCs as refill, (and reman) reused in existing product. Refill is becoming for packaged product focused and less as a micro business industry as it was in the past.

While reman and refill use existing cartridges as their claim to being environmentally friendly, the results of this study conclude that very large majorities of those products are still thrown in the trash at end of live and only a small percentage as a whole are recycled.

NBC producers are now collecting back their own empties to remanufacture and recycle but in terms of the share of product ultimately going to landfill, when compared with reman and refill, they still have room for improvement

About the Author

John Shane
Director
+ 1 339-666-3729

john.shane@keypointintelligence.com

authors

John Shane is a leading industry expert on marking materials such as toner, OPC, inkjet ink, and cartridges. As a Director for the Communication Supplies Consulting Service, Mr. Shane is responsible for all forecasts, research reports, consulting, and client care concerning those topics. He is a well-known authority on all-in-one toner cartridges, the cartridge recycling industry, and the world toner industry. In addition, he has conducted extensive research following similar trends related to inkjet cartridges, refills, and compatibles. Having consulted on these markets since 1988, Mr. Shane is a frequent expert presenter at industry conferences and trade events.

Prior to joining Keypoint Intelligence, Mr. Shane spent seven years at BIS Strategic Decisions, where he served as an Analyst as well as Director of the company's Hard Copy Supplies Service. He also served as a Consultant for International Data Corp. (IDC) and a Site Manager of a consumer research center within the U.S. Testing Company. Mr. Shane holds a B.A. Degree in Marketing and an M.B.A. Degree from the University of Massachusetts at Amherst.