

PRIMARY RESEARCH

WE CARTRIDGE COLLECTION AND RECYCLING REPORT

For HP Internal Use Only or HP Confidential

2018





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Executive Summary

This report presents the results of a research program by InfoTrends to investigate cartridge collections, usage and disposal practices for remanufactured and newly made compatible (NBC) ink and toner cartridges. InfoTrends interviewed 13 remanufacturers, empties collectors and distributors. 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 moulded cartridge shell and internal parts.
- **Clone:** NBC that violated patents
- **Empty:** 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 municipal waste, recycled, waste to energy (W2E))
- **Municipal Waste:** 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. Some municipal waste incineration may also be W2E. However measuring that mix is beyond the scope of this study.
- **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 municipal waste or incinerator.



- **Remanufacturing:** The practice of cleaning, servicing, refilling, and re-using cartridges.
- **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.
- **WEEE2** (WEEE = Waste of Electronic and Electrical Equipment) European law which includes regulation on what accounts for electronic waste, now includes cartridges as part of electronic waste

Key Findings

- ◆ The research still found no NBC supplier operating in Europe that has an active end of life program for their cartridges – Yet.....
 - No one wants NBCs and attempt to avoid collecting them- now many companies charge for them
 - But some approaches are being made by Chinese players to quote for takeback schemes for large tenders
 - In order to compete for large tenders it has become necessary for vendors to have an end of life solution their products
 - So far it does not appear that NBC manufacturers are actually collecting back but some appear to be developing such a method
- ◆ The largest change seen in this refresh is greater availability of empties reducing the need for remanufacturing non virgin empties (largely toner) Only the largest players invest to increase efficiency in remanufacturing non virgins
 - Inkjet is becoming less of a focus for some larger remanufacturers who focus on higher end of the market
- ◆ Remans are struggling economically and so further improvements on the environment slide have slowed
- ◆ Landfill is becoming less of an option in many European countries- Municipal waste disposal can mean incineration and in some cases recycling for raw materials.
 - For inkjet incineration is the main form of disposal for tanks but more try to recycle or sell off parts of integrated to China.
 - For toner recycling to raw materials is greater
- ◆ The volume of NBCs in the market has increased even in the B2B channels



- Larger remanufacturer respondents focus on higher end market and they now see more toner NBCs in the dealer channels
- Economic viability for remanufacturers to compete against NBCs for both with toner and inkjet is of major concern
- Collectors and remanufacturers diversify to survive, get acquired or go out of business
- Strong worry the domestic reman industry is about to collapse
- Inkjet continues to be overrun with NBCs
- ◆ Fear of Chinese take over of the industry while OEMs focus on reducing remanufacturers' efforts is of major concern
 - Ninestar controls chips and components, Printrite now has Pelikan, 121 clone companies have no problem selling into Europe through Amazon/Ebay gateway, component supply from China can be problematic
 - Complaints about lack of OEM focus on suing illegal cloners
 - Strong resentment among remans that Chinese are not following the same environmental rules that the remans follow
- ◆ Remans hope that Chinese product will be required to follow the same environmental requirements and possibly increase their prices as a result
- ◆ WEEE2 is creating greater need for collection and waste management
 - Some are skeptical that it will be enforced by country
 - Others see legal take back as key opportunity to set up waste management and charges for it
 - Should lead to increased prices especially for clones that to date do not factor in disposal

Newly Built Compatible Findings

In speaking with the industry it is clear that almost all newly built compatible cartridges end up being thrown out by the users. Any collections of NBCs are unintended and accidental collections by the remanufacturing industry. Remanufacturers will not remanufacture an NBC due to concerns about patents as well as concerns about the quality and reliability of such a product. Furthermore, replacement parts for remanufacturing Original cartridges may not suit perfectly for NBC's and the supply industry does not provide replacement parts for NBC's specifically.



Remanufacturers attempt to minimize this unintended collection but when it does happen the waste materials are recycled, sent to waste to energy or municipal waste through the same process that the remanufacturer has for all of its waste and so the ratios for municipal waste, W2E and recycle below mirror what remanufacturers do with all of their waste materials. Remanufacturers believe that NBCs use cheaper plastics than do OEM cartridges and so as raw material are of less value.

- ◆ Some purposeful efforts appears to be starting on the part of NBC manufacturers to collect back empties as they wish to be able to supply to government and large business tenders with takeback scheme in place (toner mainly)
 - Partner with existing collectors/ waste management companies
 - Remanufacturers hope that this will require a price hike for NBCs
- ◆ Accidental collection is increasing particularly for toner. Inkjet seems less clone increase in mainstream empties channels
- ◆ Where Chinese companies have taken over remanufacturers there may be some collection (eg Pelikan/Printrite)
- ◆ Greater availability of empties in general means remanufacturers/collectors can charge for rogue clone empties
- ◆ Clones mainly found in Internet channels but increasingly found in reseller (tier 2) and just starting to see in tenders
- ◆ Major remanufacturers and collectors do not want to deal with NBCs as they are regarded as illegal and cheaply made
 - There is therefore little if any remanufacturing of NBCs – no change
- ◆ Large remanufacturers and collectors focus on channels where NBCs are not prevalent and have methods to deter clone empties
 - Therefore most do not see NBCs in Europe as a major problem
 - But NBCs now have a significant influence on the overall levels of aftermarket cartridge pricing
- ◆ Remanufacturers will deal with NBCs as they do with any waste cartridges
 - Remanufacturers see NBCs representing between 5-10%+ of empties and up from before (Italy still higher NBC penetration)



Remanufacturer findings

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.

- ◆ W. EU continues to lead the U.S. for reduction in landfill and municipal waste, for both cultural and legal reasons
 - Governments/ EU through waste laws and WEEE2 push towards reduction in landfill/municipal waste- promoting reuse and recycling- in some cases even at municipal waste level
 - Now happening across Europe– not only Germany and Netherlands etc- but still at different rates by country
 - The market is consolidating with bigger players who are motivated to move to alternative disposal rather than municipal waste
 - Copier toner bottles and tubes do mount up at WEEE facilities and in some cases were named as a bigger problem than AIO and IJ cartridges
 - Some suspect municipal waste is greater than reported - E Europe and Southern Italy are known dumping grounds for W European unwanted empties but this is not measured
- ◆ Preference to incineration (often for waste to energy) has been far greater in W.E due to some countries where landfill no longer happens & more facilities had become available
- ◆ But recycling to raw material is increasingly the aim of major remanufacturers and collectors although it costs a lot
 - Most reported recycling to raw material of inkjet as harder than toner so more inkjet are incinerated but are now seeing recycling growing for inkjet too
 - Incineration of toner requires very high burn rate- not easily achievable in UK- but has been available in most European countries
 - Bigger players are also shifting toner cartridges over to recycling of raw materials from incineration and several report 100% recycling to raw materials
 - One reported that brokers buy waste inkjet printheads and sell to China who may reset them and reuse
 - Another reported that China also collect empty toner cartridges to filter out the OEM toner and reuse the OEM drum



- ◆ Desire of Remans to promote REUSE continues but seemed to put more emphasis on end of life recycling to raw materials this time

Table 1: What happens to cartridges that remanufacturers collect but can't use or sell?

	2018
Laser	
Municipal Waste	10%
Waste-to-Energy	46%
Recycled	44%
Total	100%
Inkjet	
Municipal Waste	13%
Waste-to-Energy	48%
Recycled	39%
Total	100%

Unusable Remanufactured cartridge collections

Remanufacturers need to collect more cartridges than they can actually use because some collections are damaged or unusable because they are a remanufactured previously remanufactured by a different remanufacturer, an NBC that remanufacturers will not collect or of a type of cartridge that simply is not remanufactured.

Virgin empties have a lower defect rate than non-virgins but remanufacturers primarily remanufacture virgin cartridges as opposed to non-virgins so virgin represent a higher share of total bad collections than non-virgins.

Remanufacturers also accidentally collect cartridges that are simply not usable because they may be NBCs, simple toner cassettes and even toner bottles that they typically do not remanufacture.

On the inkjet side a significant volume of collections are bad-wrong vendor because many are ink tanks from vendors where the cartridges are not remanufactured. However those number had been higher as there is more remanufacturing on ink tanks now than in the past.

- ◆ The above estimates are the share of all collections that are unusable.



- ♦ The mix of total collections that are unusable is a combination of the ratio of virgins and non-virgins that the remanufacturers remanufacture and the differing defect rates for virgins and non-virgins. Non-Virgins are more likely to be unusable than virgins due to a variety of factors but sever damage and excessive wear are primary.
- ♦ Changes in defect rates and use of virgin vs non virgins have not changed enough to produce whole number changes in the estimates for 2018.
- ♦ The primary struggle faced by European remanufacturers has been keeping NBC's out of their collections
- ♦ Despite the increased market share of NBCs, remanufacturers have ben able to hold the line on collections of clones due to wide availability of empty virgins and the remanufacturers willingness to refuse NBCs from collections.

The table below shows the percentage of all collections that are bad /unusable for the three types described above.

Table 2: Unusable Remanufacturers cartridge collections

	2018
Laser	
Bad Virgins	8%
Bad Non-Virgins	4%
Subtotal	12%
Bad-Wrong Vendor	6%
Total	18
Inkjet	
Bad Virgins	12%
Bad Non-Virgins	4%
Subtotal	16
Bad-Wrong Vendor	9%
Total	25%



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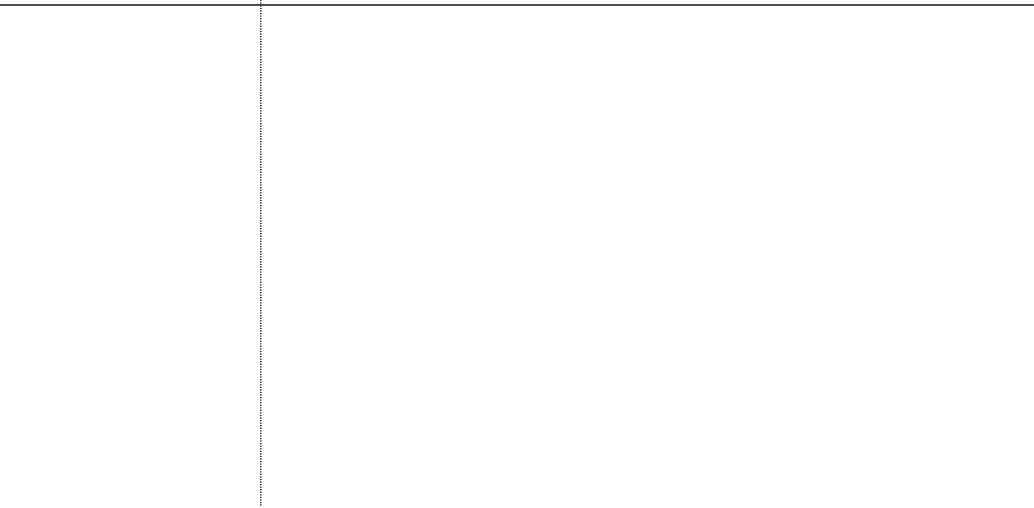


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