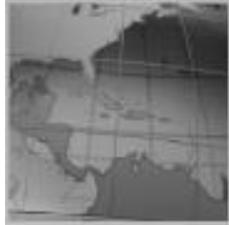


Primary Research



January 2016

Western European Cartridge Collection and Recycling Report

Executive Summary

This report presents the results of a research program by InfoTrends commissioned by HP to understand changes from a previous 2014 study in cartridge collections, usage and disposal practices for remanufactured and new build compatible (NBC) ink and toner cartridges. It also has the objective in Europe to understand what impact the WEEE2 may have on cartridge collection. InfoTrends interviewed 14 remanufacturers, empties collectors and distributors to provide a view of the total Western European market. The following is a glossary of terms used in this report.

Glossary

- **Bad Non-Virgin Empty:** A non-virgin empty that cannot be successfully remanufactured or one for which there is no market.
- **Bad Virgin Empty:** A virgin empty that cannot be remanufactured or one for which there is no market.
- **Bad-Wrong Vender:** A cartridge originally produced by an OEM which is typically not remanufactured. Or a cartridge model that is not remanufactured
- **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.
- **Empty:** A used cartridge that might be suitable for re-use or recycling.
- **Final Disposition:** What happens to a cartridge at the end of its life (sent to landfill, recycled, waste to energy (W2E))
- **Good non-Virgin Empty:** A non-virgin empty that can successfully be remanufactured.
- **Good Virgin Empty:** A virgin empty that can successfully be remanufactured.
- **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. Some municipal waste incineration may also be W2E. However measuring that mix is beyond the scope of this study.

- **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.
- **Non-Virgin Empty:** An OEM empty cartridge that has previously been remanufactured
- **OEM:** Original Equipment Manufacturer.
- **Recycling:** Crushing or melting components for use in other products or industries.
- **Remanufacturing:** The practice of cleaning, servicing, refilling, and re-using cartridges.
- **Remanufacturing Recycling Ratio:** Share of remanufactured cartridge waste that is recycled rather than sent to a landfill or incinerator.
- **Virgin Empty:** An OEM empty cartridge that has not been 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
- **W2E** – Waste to Energy: Burning of waste to produce electricity

Key Findings

- There is almost no collection of NBCs made by the NBC manufacturers and any proportion that is recollected by OEMs and Remanufacturers is accidental, but from a collections side are not a large issue
- The largest change seen in this refresh is strong and continuing move to on the part of remanufacturers towards the use of W2E (as opposed to Landfill).
- Many key metrics have stabilized with only small changes since the 2014 study.
- Landfill is becoming less of an option in many European countries- Municipal waste disposal can mean incineration, (burning or W2E) and in some cases recycling for raw materials
- Under economic stress, particularly against low price NBCs, remanufacturer's reuse of non-virgins has stabilized, even gone down slightly. While re-use may be seen as preferred from an environmental viewpoint, the cost to remanufacture a non-virgin properly is higher than the cost to remanufacture a virgin cartridge.

- Despite the point above, Western European remanufacturers stress that their environmental benefit is that they reuse an OEM cartridge, and in light of WEEE2 are trying to make this point.
- 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. Despite recent stabilization/decline in the reuse of non-virgins by remanufacturers, the law may require remanufacturers to increase their use of non-virgins in the future as well as increase their collections of their own cartridges. Remanufacturers are concerned how this will impact their cost and competitiveness versus NBCs.

New Build Compatible (NBC) Findings

In speaking with the industry it is clear that almost all new build compatible cartridges end up being thrown out by the users. There is no effort by the manufacturers of NBCs to collect and recycle these cartridges at end of life. Any collections of NBCs are unintended and accidental collections by the remanufacturing industry or OEMs under their collections programs. 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 NBCs and the supply industry does not provide replacement parts for NBCs specifically.

Remanufacturers attempt to minimize this unintended collection but when it does happen the waste materials are recycled, sent to waste to energy or landfilled through the same process that the remanufacturer has for all of its waste and so the ratios for landfill, 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. NBCs create economic pressure on remanufacturers (due to having to dispose of these cartridges).

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 due to heavy damage or cartridge model that is not remanufactured.

- Huge improvements have been made across the remanufacturing industry to reduce the amount of collected waste that is disposed in a landfill.
 - The market is consolidating with bigger players who are motivated to move to alternative disposal (material recycling or W2E) rather than landfill (ink & toner)
 - However, the overall proportion of remanufactured product that is recollected and disposed of is still a small minority of the overall number of remanufactured cartridges, most of which are never recollected and, therefore, end up being thrown away by the customer
- W. EU continues to lead the U.S. for recycling waste materials, for both cultural and legal reasons.
- Preference to waste to energy is far greater in W.EU due to some countries where the laws are pushing people away from landfill as there is no landfill availability e.g Netherlands, Germany...
- Regarding municipal waste, individual countries are moving faster than others towards incineration of municipal waste rather than landfill. Some municipal waste that is incinerated may include W2E. However to measure that mix is beyond the scope of this study.
- In some countries respondents suggest that inkjet cartridge plastics are not so recyclable and so the majority of inkjet waste will be incinerated
- Sustainability is also a selling point in both regions, but perhaps more so in W.EU.
- Remanufacturers express that promotion of REUSE as the best solution is growing, W2E and Recycle are secondary

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

	2016
Laser	
Landfill	13%
Waste-to-Energy/Incineration	45%
Recycled	42%
Total	100%

Inkjet	
Landfill	16%
Waste-to-Energy/Incineration	46%
Recycled	38%
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 by a different remanufacturer
- b) NBC's that remanufacturers will not remanufacture
- c) 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 cartridges 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 (without a print heads) now than in the past.

- Laser: 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. The overall share of unusable collections that are non-virgins has gone down slightly because some remanufacturers are willing to remanufacture from Clover (US remanufacturing company) cartridges and because overall the reuse of non-virgins has slightly declined.
- Inkjet Bad Virgins Empty had been going up but stabilizing because remanufacturers report that for integrated cartridges the print-heads are not as robust as in earlier years and more likely not to survive a second cycle.
 - To counter this remanufacturers are using fewer non-virgins

- Collections of Bad-Wrong vendor going down mainly because there are now more uses for cartridges from other vendors (i.e. Remanufacturing of Epson tanks). Remanufacturers are also taking steps to reduce the amount of unwanted empties coming in

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

	2016
Laser	
Bad Virgins	8%
Bad Non-Virgins	4%
Subtotal	12%
Bad-Wrong Vendor	6%
Total	17%
Inkjet	
Bad Virgins	12%
Bad Non-Virgins	4%
Subtotal	16%
Bad-Wrong Vendor	9%
Total	25%

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