

Primary Research



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2012 Latin America Supplies Recycling

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Executive Summary

Remanufacturer findings

- Ultimately, 98% of remanufactured toner and inkjet cartridges are sent to landfill.
- 73% of remanufactured toner cartridges and 70% of remanufactured inkjet cartridges are from virgin empties.
- 27% of remanufactured toner cartridges and 30% of remanufactured inkjet cartridges are from non-virgin empties.
- There is a willingness to remanufacture cartridges previously remanufactured by others.
- Larger ISO-compliant remanufacturers are less willing to remanufacture a non-virgin than are smaller, more local remanufacturers.
- 90% of unusable toner cartridges and replacement parts ultimately go to landfill. For inkjet this increases to 95%.
- 5% of collected but unusable toner cartridges and parts are recycled into new products or raw materials. For inkjet, the figure is 4%.
- 5% of collected but unusable toner cartridges and parts go to waste-to-energy. For inkjet, the figure is 1%.
- 23% of toner cartridges and 40% of inkjet cartridges collected by remanufacturers are unusable.
- Remanufacturers rely on brokers for 65% to 75% for their empty toner and inkjet cartridges.
- Half of remanufactured cartridges used in Latin America are remanufactured in Latin America.
- Of the empty cartridges sourced through brokers, 50% of toner cartridge empties and 60% of inkjet cartridge empties are sourced from Latin America.
- For toner cartridges, over 90% of the time the OPC and blades are replaced on virgin cartridges. This reduces to 50% for non-virgin cartridges.
- 80% of the time the toner primary charge roller (PCR) and magnetic sleeves are replaced on non-virgin cartridges, compared to 20-35% of the time for virgin cartridges.
- Asian clones arrive in Latin America and are often sold as counterfeits.

Refiller findings

- Ultimately, 100% of refilled toner and inkjet cartridges are sent to landfill.
- Refillers are not connected to recycling partners.
- 80% of toner cartridges and 70% of inkjet cartridges are refilled from non-virgin cores.
- 20% of toner cartridges and 30% of inkjet cartridges are refilled one time.
- Toner cartridges are refilled between six and eight times, on average.
- Inkjet cartridges are refilled between seven and nine times, on average.
- 100% of the unusable cartridges and cartridge parts that the refill industry collects but cannot use or sell will ultimately go to landfill. There is virtually no recycling or waste-to-energy.
- On average, 95% of the toner and inkjet refilled cartridges are sourced in-country.
- 50% of toner cartridge refillers report replacing the OPC drum on the 3rd to 4th refill cycle. Other parts are generally not replaced.
- Refillers are willing to refill a cartridge previously filled by someone else.
- All refillers keep spare cartridges on hand in case a customer's cartridge can't be refilled.
- Refillers receive 80% to 90% of their empties from their customers.

Glossary

While reviewing this document, it may be helpful to keep the following definitions in mind:

- **Cartridge Waste:** Cartridges and components that can no longer be profitably remanufactured or refilled.
- **CISS:** A continuous ink system (CIS), also known as a continuous ink supply system (CISS), a continuous flow system (CFS), or an automatic ink refill system (AIRS). All such bulk feed ink systems are methods for delivering a large and practically unlimited volume of liquid ink to a comparatively small inkjet print head.
- **Clone/Compatibles:** Any non-OEM, newly made printing supplies that are compatible with specific imaging devices and are not remanufactured or refilled.
- **Counterfeit:** Any product that is labeled and packaged to look like an original OEM product in such a way that it would deceive or mislead a customer into thinking that the product is a new HP product (whether there is intent to deceive or not).
- **Empty:** A used cartridge that might be suitable for re-use or recycling.
 - 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.
 - 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 be successfully remanufactured.
- **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, or waste-to-energy).
- **Hulk (core):** An empty cartridge of any kind.
- **Inkjet cartridges**
 - Integrated Cartridge: The ink tank, which contains the ink supply, is attached to the print head.
 - Ink Tank: The ink tank is separate from the print head, which is a permanent part of the printer. Therefore, replacing the ink supply requires that only the ink tank be purchased.
- **Recycling:** Crushing or melting components for use in other products or industries.
- **Remanufacturing Recycling Ratio:** Share of remanufacturing waste that is recycled rather than sent to a landfill or incinerator.
- **Refilling:** Refilled cartridges may be sold as a product or a service. As a product, a refilled cartridge is when a customer takes a cartridge to be refilled with toner/ink and then (typically) has the same cartridge returned. As a service, refilled cartridges are used in businesses as a managed service. Refilled cartridges are not typically re-packaged or branded. Refilled cartridges are priced significantly lower than remanufactured cartridges.
- **Remanufacturing:** The practice of cleaning, servicing, refilling, and reusing cartridges. Remanufactured cartridges are produced when a business collects empty used cartridges, sending them through a production process and usually selling them in branded boxes to end users or the channel. They typically are repaired by replacing

some components. In the case of toner cartridges the drum, PCR (Primary Charge Roller), wiper blades and other components may or may not be replaced. In the case of inkjet cartridges, the cartridges are typically opened and cleaned from the inside and then refilled. Remanufactured cartridges carry a considerably higher price than refilled cartridges.

- **Spares:** Spares are extra cartridges that refillers have available to sell to customer if the customer's cartridge is no longer refillable. The spare could be either remanufactured, refilled, or a new clone cartridge.
- **Toner Kits:** Supplies that typically separate the toner and drum into individual units, versus an all-in-one cartridge where the toner and drum are in one unit.
- **Waste-to-energy:** The process of creating energy in the form of electricity or heat from the incineration of waste source.

Introduction

Over the past few months, InfoTrends interviewed 22 remanufacturers, 20 refillers, and 2 brokers in Latin America regarding their supplies collection and recycling programs. Respondents in Argentina, Brazil, Colombia, and Mexico were surveyed about their business practices.

Remanufacturers

Remanufacturing Industry

Latin America is a fragmented market with the remanufacturers frequently relying on a local clientele. The challenges in the market can be considered unique compared to other markets around the world. In fact, in terms of recycling, the Latin America market looks like the US remanufacturing market of about five years ago, with a reliance on landfill and very limited recycling due to lack of infrastructure.

Competition among remanufacturers for the empty cores upon which they rely on is high, due to more brokers entering the market. In addition to local competition for empties, there appears to be a growing Asian presence and a perception among respondents that the Chinese are taking cartridges back to China.

The Latin American toner and inkjet cartridge market competes with refills as well as ubiquitous clones. Generally positioned as lower in price than OEM cartridges but higher in price than either refilled cartridges or even clones, cartridge remanufacturers need to maintain quality or risk having the market shift to those lower priced options.

It is evident that in Latin America the cartridge remanufacturing industry is consolidated at the country level, and is not pan-Latin American. There appears to be no dominant players across all Latin America as there are across the US. The research did not reveal any great variations in cartridge recycling and disposal data across countries.

Empties and Collection

In order to remanufacture toner and inkjet cartridges, remanufacturers require a steady, consistent source of quality empties. InfoTrends found that 23% of toner cartridges collected and 40% of inkjet cartridges collected are not acceptable for profitable remanufacture due to damage or the type of cartridge not being needed. A cartridge that is not needed means it is the wrong vendor type, wrong ink tank, or that the cartridge

model is not in demand. Ink cartridges that are not needed are usually cartridges for which there is a lively clone market, making remanufacturing financially unattractive.

Large remanufacturers primarily use brokers to meet their needs for empty cartridges, while small remanufacturers operate in a local market and collect empties from their customers. Overall, remanufactured inkjet and toner empties are sourced from brokers as shown in the table below.

Table 1: Percent of Empties Collected

Brokers	Own Collections
65%-75%	25%-35%

The remanufacturers would like to collect more empties themselves but acknowledge that self-collecting is becoming more difficult, because more brokers have entered the market resulting in more competition for the empties. Brokers focus collection on virgin cores, and typically sort empties by model and whether it is a virgin or not. Brokers also sort for clone cartridges. Brokers do not certify their empties or guarantee recyclability, but may give credit for defective empties. For remanufacturers to collect their own cartridges, they rely on all channels including customers, schools, charities, and resellers. Partnering with resellers as a source of collections is growing.

In terms of the source of empty cartridges, the remanufacturers estimate that 50% of the empty toner cartridges are sourced from within Latin America, 25% from the US, and the rest from Asia. For inkjet cartridges, 60% of the empties are sourced in Latin America, 30% come from the US, and 10% from Asia.

The respondents universally said that empty collections are more difficult today than in the past due to competition. More brokers are entering the business and some are Chinese, who collect cartridges to take back to China.

Virgin vs. Non-Virgin Cores

The remanufacturing industry tends to favor virgin cartridges because they are more predictable, and they can be remanufactured more reliably because the remanufacturers know what to expect. While the remanufacturing of non-virgin cartridges appears to be growing, the majority of remanufactured cartridges are made from virgin cores as referenced in the table below.

Table 2: Type of Cartridge Core Used in Remanufacturing

Core Type	Toner	Inkjet
Virgin	73%	70%
Non-virgin	27%	30%

While the use of virgin cores in remanufacturing is important in the Latin American market, it is quite a bit lower than the same statistic in the United States: In the United States, the share of remanufactured toner cartridges made from virgin cores is 81%, and for inkjet cartridges, 90%. Some interviewees also indicated that they might remanufacture empty cartridges that have been previously remanufactured by others. The willingness to remanufacture from non-virgin is also somewhat dependent upon the size of the remanufacturer; larger remanufacturers are more reluctant while smaller remanufacturers are more willing. This is an evolving dynamic since it depends on where and when the empties are available.

On average, 90% of virgin cores are suitable for remanufacturing inkjet and toner cartridges, while non-virgins are only about 70%.

Unusable Cartridges and Cartridge Parts

Inkjet cartridges are considered delicate and require proper handling for successful remanufacturing. Because of this, there is a higher rate of damage for inkjet cartridges and, therefore, there is a higher volume of cartridges that are not usable. 40% of the inkjet cartridges collected are deemed unusable; of the 40% above 40% are not needed and 60% are damaged.

For toner cartridges, we found 23% of the empties received by remanufacturers are considered non-usable, where 15% are damaged and 8% are not needed. There is insignificant demand for remanufactured toner kits since new compatibles for kits are so readily available.

Figure 1: Distribution of Unusable Cartridges



For Latin America, toner cartridges are typically remanufactured 1 to 2 times, on average, but some respondents reported remanufacturing up to 3 to 4 times. Inkjet is also remanufactured 1 to 2 times, on average, but respondents said they had remanufactured up to 4 to 5 times.

Remanufacturers almost always replace the drum and blades when remanufacturing a virgin core, while other components are replaced less frequently. When remanufacturing a non-virgin core, the drum is replaced less frequently because a long-life aftermarket drum has most likely been installed. But the other components are frequently replaced since they were less likely to have been replaced on the first cycle. These component replacement rates are the same as those in the US and W. Europe.

Table 3: Frequency of Component Replacement in Toner Cartridges

Components	Virgin Cores	Non-Virgin Cores
OPC Drum	95%	50%
Cleaning & Developer Blades	90%	50%
PCR	35%	80%
Developer Sleeve	20%	80%

Cartridge End-of-Life

What happens to a remanufactured cartridge when it's deemed no longer useful for remanufacturing? The research shows that almost all remanufactured toner and inkjet cartridges end up in the landfill. Table 4 below shows the percent of end-of-life cartridges

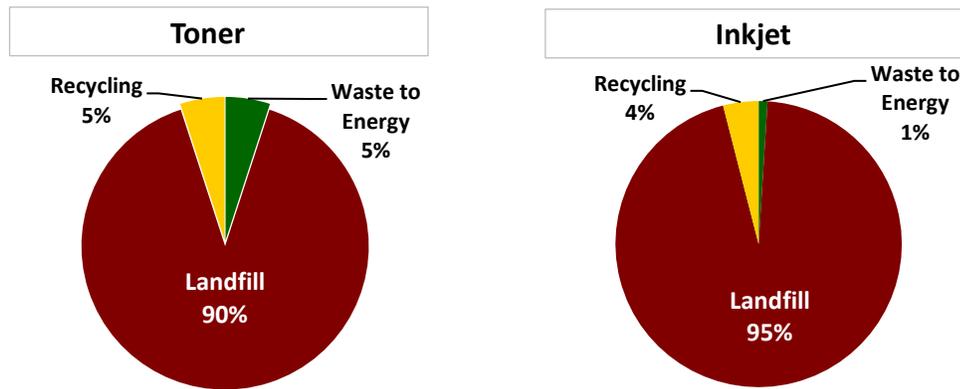
that end up in landfill. It includes cartridges that the remanufacturer never collects and the user/customer discards, as well as cartridges that the remanufacturer has collected that have reached their end-of-life (including waste which can include damaged cartridges and cartridges not in demand, as well as components that have been removed in the remanufacturing process).

Table 4: Percent of Cartridges That End Up In Landfill

Toner	Inkjet
98%	98%

The statistic above includes the waste that the remanufacturers have, as well as the cartridges that users throw away. The following chart shows what the remanufacturers do with the cartridges and parts that they collect but can't use or sell. A very large share of cartridge waste, in the hands of remanufacturers, eventually end up in landfill. Cores and components follow the same landfill/recycling path. Waste components are merged in with other remanufacturing waste, and are disposed of similarly to disposal of overall waste.

Figure 2: Remanufacturers' Cartridge Waste



Remanufacturers in Latin America do not have in-house recycling, and there is a lack of recycling infrastructure in place. Most of the respondents expect such infrastructure to come into place over the next several years, but today remanufacturers lack recycling capability and their landfill percentages resemble where the US was five years ago. If possible, remanufacturers will try to sell the unwanted empty cartridges to China.

According to the remanufacturers surveyed, most of the cartridge is considered recoverable when it comes to recycling the materials. For toner cartridges, 90% is recoverable, while for inkjet cartridges, 100% is considered recoverable.

Remanufacturing Location

It was difficult for the respondents to estimate how much of the remanufactured toner and inkjet cartridges were remanufactured in their own countries. Of those who could answer, they estimated that half of the remanufactured cartridges are sourced from Latin America. InfoTrends suspects that, due to the localized market, that the percent of cartridges sourced from within Latin America is actually higher.

Table 5: Source of Remanufactured Cartridges for Sale in Latin America

Toner	Inkjet	Source
50%	50%	◀ LA domestic
25%	25%	◀ USA
25%	25%	◀ Asia

Refillers

Refilling Industry

In Latin America, refilling is a local activity and is generally a small business. Because of this, customers return to their local, preferred refill vendor repeatedly. It is evident that in Latin America the cartridge refilling industry is country-focused—even locality focused—and not pan-Latin American. There appear to be no dominant players across the whole region. Despite Latin America being very country-focused, the research did not reveal any great variations in recycling and disposal data across countries.

The Latin American toner and inkjet cartridge refilled cartridge market competes with remanufactured cartridges as well as the ubiquitous clone cartridges. Refilled cartridges are generally positioned as the lowest priced option when compared to a remanufactured or clone cartridge. Being so local in activity, the refilled cartridge market tends to be insulated from some of the larger issues related to regional and global collections of empties and the ever increasing influence that China has on the world.

With this close customer relationship, there is an opportunity for refillers to engage with their customers on how to handle cartridges that have reached end-of-life, but this does not happen because of the lack of recycling infrastructure available. Rather, refilled cartridges are left to the last holder for proper disposal, and the options are slim as we will see in the rest of the report.

Empties andio Collectn

Customers usually arrive at the refiller with their empty inkjet or toner cartridge in hand. In fact, end-users provide nearly all (80% to 90%) the empties the refiller needs.

Because not all cartridges the customer brings can be refilled again, refillers must keep spares on hand. In some cases, refillers will sell ready-to-use remanufactured cartridges, or they will sell OEM or clone cartridges. But they also have spare empty cartridges for refill, which they have had to collect or buy. For those empty spares that refillers need, the respondents report relying on their own collections for 50% and replying on brokers for the other 50%. The refillers' own collection programs use the same sources as remanufacturers and include charities, customers, companies and resellers.

Because their need for empties is so small, Latin American refillers do not have a great deal of experience with brokers. They comment that more brokers are entering the market, including Asian collectors, which makes self-collection more difficult. The respondents indicated that a small percentage of the broker-sourced empties may come from outside of Latin America but could not estimate how much. With this collection dynamic, the refillers stated that they may rely more on brokers in the future.

Virgin vs. Non-Virgin Cores

As with remanufacturers, refillers experience different success rates using virgin and non-virgin cartridges. They also have different success rates with cartridges that customers bring in for refilling versus those that they collect or buy as spares. The table below shows the share of cartridges that are usable by those different categories.

Table 6: Percent Refiller Cartridge Collections that are Usable

Core	Spares	Customers' cartridges
TONER		
Virgins % usable	85%	95%
Non-Virgins % Usable	70%	90%
INKJET		
Virgins % usable	90%	95%
Non-Virgins % Usable	70%	70%

Refillers do not mind refilling previously refilled cartridges. In fact, most of the cartridges that have been refilled before are non-virgin cores as detailed in Table 7 below.

In Mexico City, many refillers are located in one place in technology malls. If Vendor A is closed or unavailable, a customer can move to Vendor B, in the next booth, and it will be refilled because vendor B knows vendor A's refill process. Small, local refillers will refill just about any cartridge and will sell counterfeit OEM cartridges if they can't sell their refilled product. Generally speaking, refillers prefer to refill a previously refilled (and never remanufactured) OEM cartridge, or a virgin OEM cartridge. While they will refill a remanufactured cartridge or a clone cartridge, they are less sure of the results because they do not know what is inside the cartridge.

It's interesting that the data in Table 7 is very much the reverse of the situation with remanufactured cartridges. With remanufactured cartridges, most cartridges are remanufactured from virgin cores. With refill, it's the reverse. The difference is because refilling is a very local activity, meaning customers come back with the same cartridge over and over again.

Table 7: Refilled Cartridges Core Type

Core	Toner	Inkjet
Virgin	20%	30%
Non-Virgin	80%	70%

Table 8 below shows how frequently a cartridge will be refilled. Refillers report that they refill a toner cartridge 3-4 times before the drum is replaced or 6-8 times if components have been replaced. Half the refillers in Latin America report that they will replace drums, but they do not replace other components in a toner cartridge. By the time that aftermarket drums would need to be replaced, other components are worn out and the toner cartridge is often considered to be at end-of-life. So, on average in Latin America the drum is replaced 25-33% of the time, and mostly on virgin cartridges.

For inkjet cartridges, interviewees report what we regard as extraordinary: refilling the same cartridge 7-9 times. There are no components to replace on an inkjet cartridge.

Table 8: Number of Times Cartridges are Refilled

Toner	Inkjet	
20%	30%	• % of cartridges that are refilled one time.
6-8	7-9	• X times a cartridge is refilled
3-4	NA	• X times a cartridge is refilled before the drum is replaced

Unusable Cartridges and Parts

Like remanufacturers, refillers receive a share of cartridges that cannot be profitably refilled. This share is higher for inkjet since these cartridges are more susceptible to damage. The table below shows the share of cartridges that cannot be refilled.

Table 9: Share of Cartridges That Cannot be Refilled

Toner	Inkjet
10%	30%

Cartridge End-Of-Life

Essentially, for both inkjet and toner cartridges, 100% of refilled cartridges will end up in the landfill. It’s estimated that 90% of the end-users throw away inkjet and toner cartridges that cannot be refilled, and refillers throw out the remaining 10%. Virtually no cartridges are recycled into new products or raw material. One of the main reasons for this is that refillers do not have recycling partners.

Refilling Location

Refillers believe that 95% of the refilled cartridges sold in their respective countries are refilled in-country. 5% of refilled cartridges may arrive in country from Asia. The reason for this is that refilling is a very local activity.

Because refilling is so local, 90% or more of the empties that refillers use are sourced from their own countries. Most are from their own customer.

Table 10: Source of Refill Cartridges Destined For Sale in Latin America

Toner	Inkjet	
95%	99%	◀ LA Domestic
***%	***%	◀ USA
5%	1%	◀ Other/Asia
		*** Negligible

Summary

Latin America is a group of markets that operate locally, yet the differences between them are small. Across Latin America, we see more willingness to remanufacture a cartridge a second time (compared to the US or W. Europe). We also see a broad willingness to remanufacture a cartridge that had been previously remanufactured by a different remanufacturer. This contrasts with research conducted in other regions where remanufacturers are reluctant to work with other remanufacturer’s cartridges, because they are unfamiliar with the parts that are inside the cartridge and how it was processed. The Latin American remanufacturers must compete with a large clone market, some of which are counterfeit product. Remanufacturers are challenged to maintain product quality above that of clones to justify their higher price.

In terms of recycling and landfill, the remanufacturers have little access to recycling capacity and the industry is fragmented such that no one remanufacturer has the capacity to invest in recycling on their own. That being the case, landfill rates are the highest in the world for the markets we have studied thus far. For example, the Latin America average landfill rate for remanufactured toner cartridges is 98%; that contrasts with 93.6% in the United States.

Despite the markets being quite localized for toner and inkjet cartridge remanufacturing and refilling, the industry in Latin America is not immune to the influence from China or the US. China is increasingly selling remanufactured cartridges and clones into Latin America, and is perceived as using Latin America as a collection point for empties, stressing the local cartridge collection operations. The respondents in Latin America also believe they are competing with North American imports of remanufactured cartridges.

Latin America has an abundance of toner and inkjet cartridge refilling activity that is characterized as extremely local. There is essentially no import or export of refilled products. Refilling is active both on the toner and inkjet side, with a slight edge possibly on toner cartridges. This contrasts with the United States where there is essentially no refilling of toner cartridges; and what refilling does exist is for inkjet cartridges. Because of the lack of recycling infrastructure and refilling activity being so focused on small organizations, there is essentially no recycling for refilled cartridges in Latin America. Refillers are more immune to the global issues that impact remanufacturers due to the very local nature of the industry and the closer relationship between the customer and refiller.

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