

Closing the loop for Plastic in Electronic Products

Main drivers, challenges and key success factors

III Congreso Nacional RAEE in Toledo, Spain
October 2019

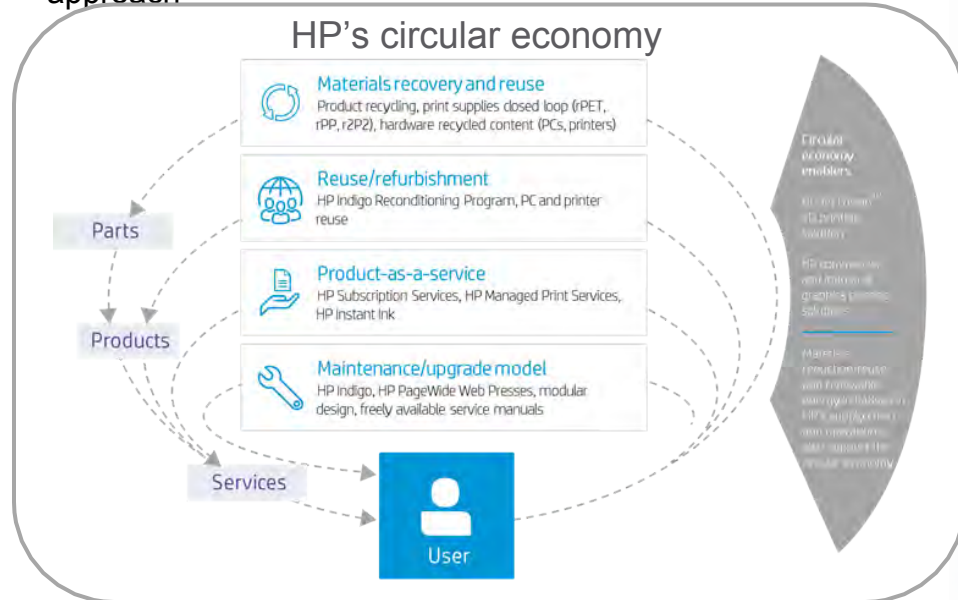
Marta Jakowczyk
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HP Inc.



Introduction

Plastic dilemma due to its ease of manufacturing, versatility, durability and low cost and being one of the biggest environmental problems of our time.

We need a more thoughtful plastics use and recycling approach



HP's Sustainable Impact goals

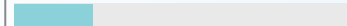
PRODUCTS AND SERVICES

NEW GOAL

Use 30% post-consumer recycled content plastic in HP personal systems and print products by 2025

PROGRESS

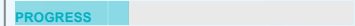
23% of goal achieved



Recycle 1.2 million tonnes of hardware and supplies by 2025

PROGRESS

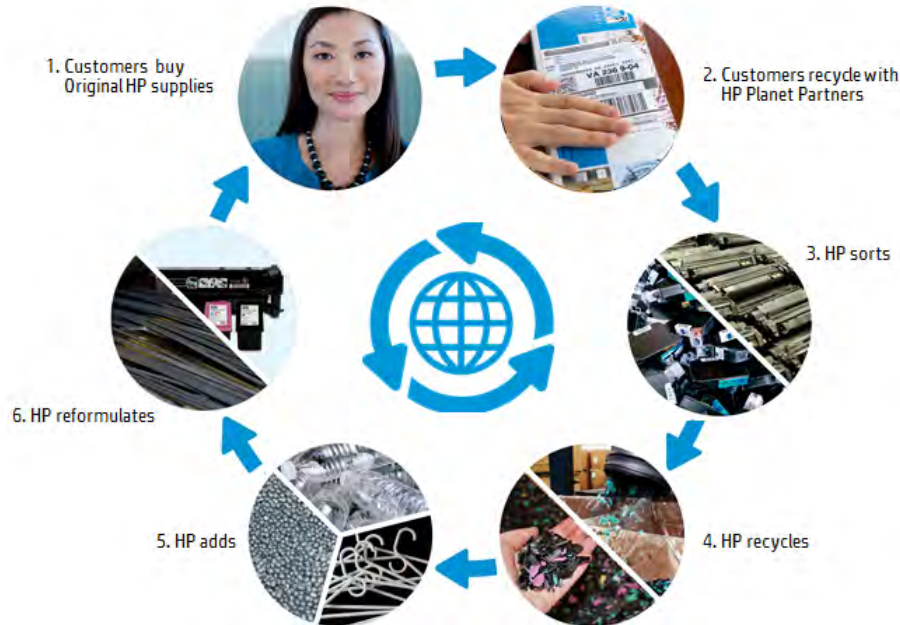
33% of goal achieved



Ink cartridge recycling and plastic close-loop

Since 2005, HP has included recycled plastics (PET, HIPS, ABS, PC/ABS, PP, PE) in HP ink cartridges.

Using RC from HP' s recycling processes as raw material in new cartridges, ensures the highest value instead of open-loop, open-market and down-cycling into low value applications.



Why focus on postconsumer electronics plastic close loop?

Almost all current post consumer plastic close loop solutions can be defined as “**boutique solutions**” that have demonstrated the potential, but not the scale up.

Pivoting from the *boutique solution* approach, to the *open ecosystem* vision to become a truly global and environmental solution.



Challenges

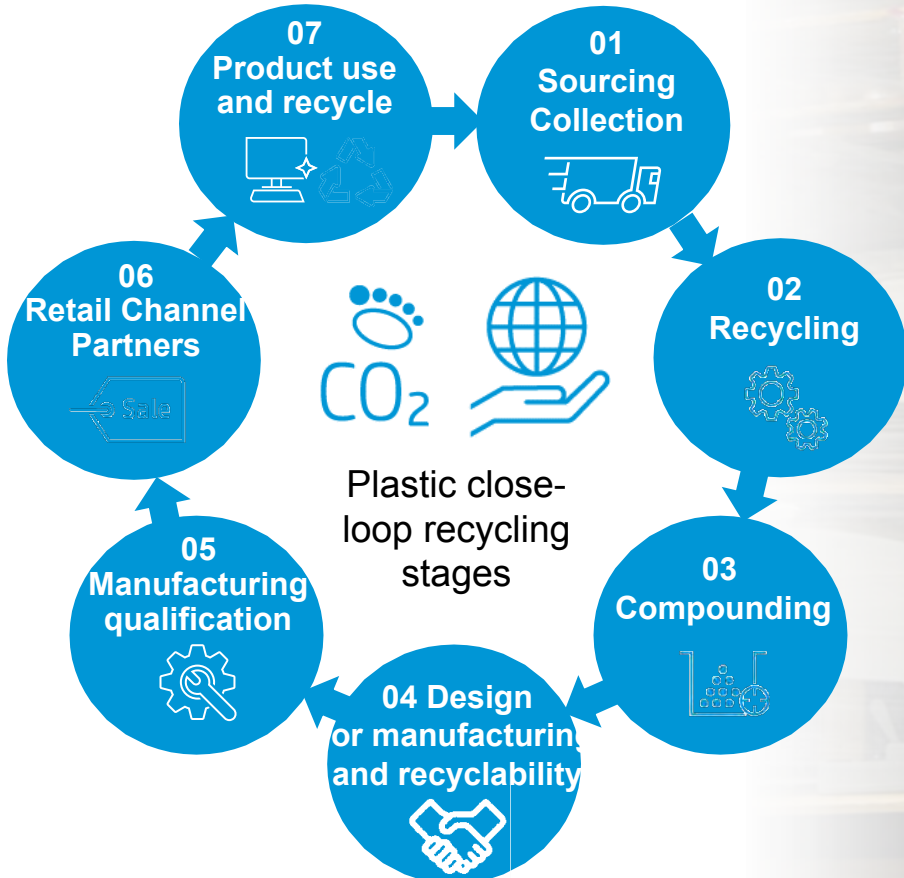
- ✓ HP Company internal alignment
- ✓ External Partners/Stakeholders
- ✓ Assurance of supply at necessary volumes
- ✓ Product design and material qualification
- ✓ Resources to lead maintain/grow the initiative
- ✓ Investment barriers with untested results
- ✓ Technical challenges (color/finish match/virgin quality)
- ✓ Uncertain market demand
- ✓ RC cost versus virgin



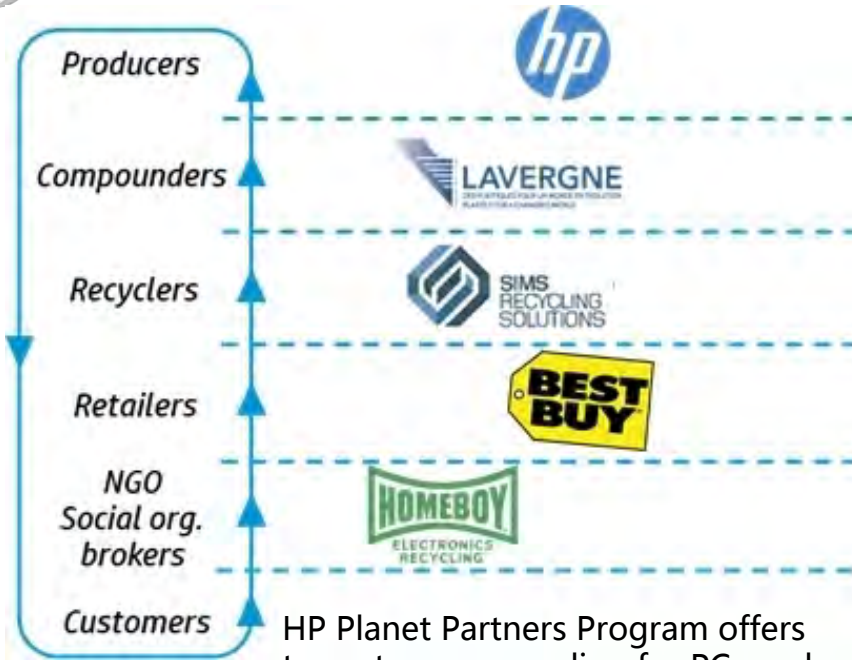
Opportunities

- ✓ Reduce reliance on non-renewable commodities
- ✓ Corporate Social Responsibility (CSR)
- ✓ Create end-to-end RC plastic supply chain (leverage Mandatory/Voluntary Take Back, channel partners, recyclers, RC plastic partners)
- ✓ EPEAT – Eco labels
- ✓ Legislative future obligations
- ✓ Cost savings
- ✓ Evolution of cartridge recycling and plastic close loop experience in HP since 2005

High level program stages



01 Sourcing-Collection



HP Planet Partners Program offers to customers recycling for PCs and printers



02 Recycling

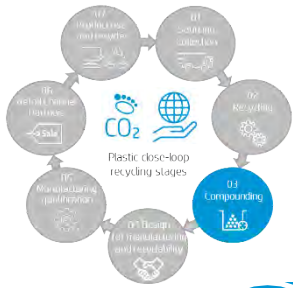


Disassembly vs. shredding



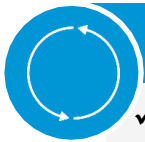
RC plastic is the main driver but...
what if part harvesting is also a focus
area?

03 Compounding



Step 1. Cleaning and separation

- ✓ Cleaning – Remove contaminants (metals, packaging, other materials, moisture)
 - ✓ Separation
 - ✓ Sorting by type of plastics
 - ✓ Sorting by color
- Metric: Yield Quality



Step 2. Compounding

- ✓ Homogenizing material
 - ✓ Incorporating additives
 - ✓ Extrusion and palletization
- Metric: Material Quality



04 Design for manufacturing and recyclability



Adequate design of parts facilitate plastic recycling use and adequate recycling/compounding facilitate use of parts

Considerations

Contaminants

- Removal of BRF's, rubber, glass, metals, etc.

Color challenges

- External/Internal parts
- Reduced palette/Color sorting requirements

Consistency

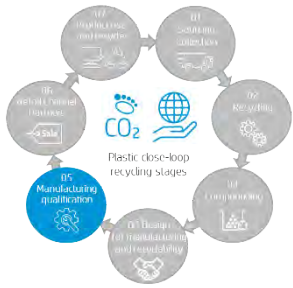
- Blending high volumes to create homogeneity

Material performance

- Additives -> lift RC to virgin resin performance



05 Manufacturing and qualification



No concessions to recycled plastic material

- Required the same quality as virgin
- Must be RoHS and REACH compliance
- Higher scrutiny than virgin plastic

R&D

- Easy when part is designed for recycler material.
- Almost impossible for current products

Procurement

- Involve as soon as possible because it is a great ally

Molders

- Requires new time-sensitive process development

Manufacturing

- Manufacturing uncertainty associated with a new material
- More rigorous testing than virgin



06 Retail Channel Partners



Recycling promotions drive awareness, participation and sales

Retail collection for recycling drives traffic into th

Save on HP inkjet printers when you recycle.

Recycle any used printer and get a coupon for 15% off the current price of HP inkjet printers.

[Watch the Best Buy HP video to learn more >](#)



<https://www.bestbuy.com/site/clp/bbyon/pcmcat249300050019.c?id=pcmcat249300050019&wid=1561270735&intl=nospl>



07 Product use

HP ENVY Photo Printer: A Printing System Backed by Sustainable Design

Printer, cartridge and paper, sustainability in mind.



HP ENVY Photo 6200, 7100, 7800

World's first in-class printers made with closed-loop recycled plastic - more than 10% by weight¹



Original HP 303 cartridges
Made with 48-73% recycled plastic



HP Planet Partners
Easy recycling for printers, computers and HP cartridges²



HP paper
Made with 100% certified fiber or recycled content

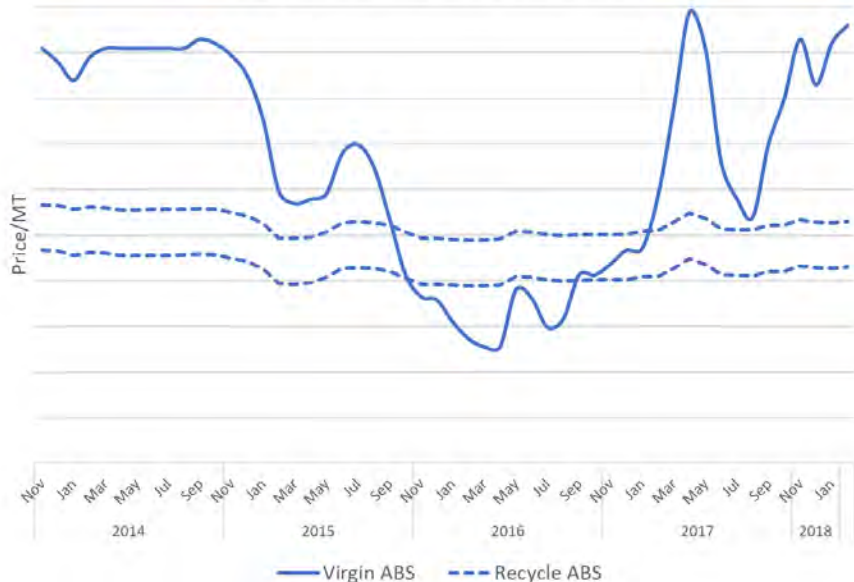


Cost

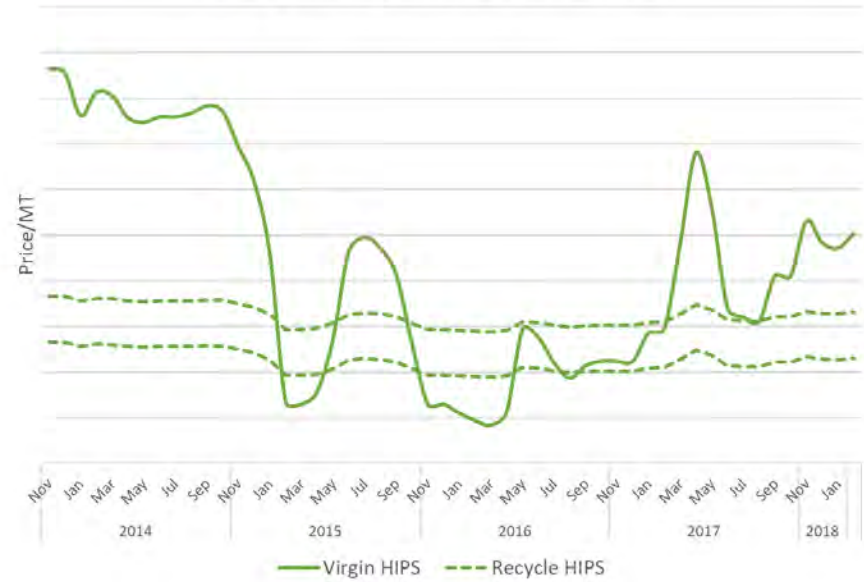
Recycled plastic' s cost ...

- ✓ does not follow virgin pricing' s fluctuations & unpredictability
- ✓ is relatively stable. Compounding price additives might fluctuate

ABS Virgin vs Recycle Plastic Price



HIPS Virgin vs Recycle Plastic Price



Key to success

Trust

Collaboration

Partnership

Shared long term strategy

TRY- FAIL- success approach

Patience for the right results

Collective knowledge and partner
discussion with focus on efficiency

Technological innovation

Conscious investments



Ever tried
Ever failed
No matter
Try again
Fail again
Fail better
Until succeed
Fail/Learn and Win



Win-win solution

Two key benefits when scaling up post consumer plastic close loop

1- Business improvement

- ✓ New way to collaborate among the Supply Chain partners
- ✓ Industry recycling development. New process and equipment
- ✓ Long terms savings vs. Virgin resin
- ✓ Enforcement of Corporate Social Responsibility (CSR)

2- Environment benefit

- ✓ Lower pollution, reduction of GHG emissions
- ✓ Improvement of human health by reducing ecotoxicity impact of recycle instead of disposal.



keep reinventing

Closing the loop on plastics

HP is leading the industry on efforts to source and incorporate postconsumer plastic into our products—and keep it out of the ocean.

- More than 80% of our Original HP ink cartridges contain 45–70% postconsumer recycled content, and 100% of Original HP toner cartridges¹ contain 5–45% postconsumer or post-industrial recycled content.
- HP Envy photo printers contain between 20-30% recycled plastic by weight.
- HP Tango is made with more than 30% closed-loop recycled plastic by weight using plastic from recycled printers and other electronics.
- Recycled content plastic makes up more than 33% of the plastic used in the HP T1700, Z6, and Z9 DesignJet Printer series.
- Business PCs and displays include 24% recycled plastic content, on average.²

1. Does not include toner bottles.

2. As defined by the IEEE 1680.1 2018 EPEAT standard. Data are calendar year 2018.

3. Recycled content plastic (RCP) as a percentage of total plastic used in all HP personal systems and printer hardware and printing supplies shipped during the reporting year. Total volume excludes brand-licensed products and after-market hardware accessories. Total RCP includes post-consumer waste recycled plastic, closed-loop plastic, and ocean-bound plastic used in HP product manufacturing. Personal systems plastic is defined by EPEAT eco-label criteria. Subject to relevant restrictions on the use and distribution of materials destined for recycling and/or recycled feedstocks.

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Innovating products with closed loop plastics

GOAL

Use 30% postconsumer recycled content plastic across HP's personal systems and print product portfolio by 2025.³

PROGRESS

Through the end of 2018, we achieved 7% postconsumer recycled content plastic use in HP personal systems and print products.



20,000

Plastic bottles are produced every second¹

8 MILLION TONNES

Of plastic leaks into the marine environment from land-based sources every year²

BY 2050

There will be more plastic, by weight, than fish in the ocean³

Extending our leadership to tackle ocean-bound plastics

In 2016, HP launched an [ambitious program in Haiti](#) to help tackle the growing challenge of ocean-bound plastics chains.

THROUGH MARCH 2019

716,000

Pounds (325 tonnes) of ocean plastic sourced for use in HP products

100

Children enrolled in school

795

Income opportunities created for adults in Haiti⁴



[A Haitian woman's reinvention story](#), powered by HP and The First Mile Coalition

1. [A million bottles a minute: world's plastic binge as dangerous as climate change](#). The Guardian (May 2018)

2. [The New Plastics Economy](#). Ellen MacArthur Foundation. (2016)

3. Ibid

4. One income opportunity equals the ability for a person to earn a consistent income for one month.

A world without waste

Our Priorities

Decoupling growth from consumption

- Dematerialization and increased recycled content
- Durability and repairability
- Product repair, re-use and recycling

Transforming industry business models

- Shift from transactional to service-based models
- Digitizing supply chains to reduce waste and cost

Collaborating with partners and customers

- Building new circular supply chains
- Supporting customers

1. [Earth Overshoot Day](#), Global Footprint Network.
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1.7x

Global resource consumption in 2018 occurred 1.7 times faster than the planet's ecosystems can regenerate.¹

