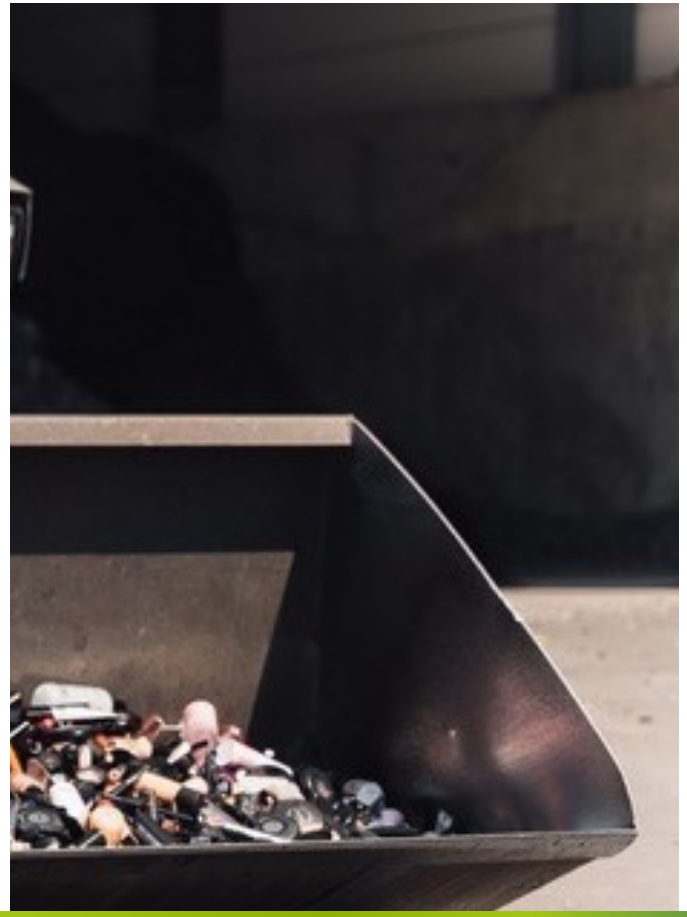


MBAPOLYMERS

Global Pioneer

in Post-Consumer

Plastics Recycling

Auf Wiedersehen!
Wie Take-Back-Programme wirken

20.07.2023, POLY:Solution Lunch

MBA Polymers is already today “Closing the Loop” in its facilities

The MBA technology is a key element in post-consumer recycling in a market with significant and ever-growing demand for recycled plastics

About MBA Polymers

Founded 1997 by Dr. Mike Biddle in the USA, MBA Polymers is the pioneer of sustainable plastic production and guarantees **a purity of 99% post-consumer plastics.**

MBA Polymers having developed and owning more than **45 patents worldwide** and has build commissioned 5 state-of-the-art plants in US, China, Austria, England and Germany and is further expanding to India and Western Europe.

MBA Polymers is the largest recycler of post-consumer plastic waste (WEEE) and has installed since 2003 capacities to feed over **150.000 mt/year**.

MBA Polymers has the vision to be the leading globally recognized brand with a special **focus on circular economy** and **post-consumer plastic production** (products ABS, HDPS, HDPE, PP).

Market Trends & Growth Drivers

Zeitgeist	Global trend for ESG focused products, production processes, investments and general sustainable societies bigger than ever
Demand	Driven by general Zeitgeist consumers building awareness for recycling and driving incremental demand for recycled products
Supply	Global e-waste growing at 3% p.a. on the back of higher consumption rates of electronics, shorter product lifecycles and limited repair options
Producers	Producers of consumer products seeking ways to reduce CO^2 footprint, meeting consumer demand and adhering to regulatory framework
Regulation	Regulators (EU etc.) constantly increasing mandatory recycling rates, encouraging recycling and building framework for a circular economy
Close Loop	Direct customer approach and verification of recycling activities are pushing close the loop solutions and offer to take back post consumer plastics

MBA Polymers is already today "Closing the Loop" in its facilities

The MBA technology is a key element in post-consumer recycling process – example Estée Lauder Group

MBAs Position in the Circular Economy

[redacted]

MBA Recycling Process

[redacted]

Recycling | Closing the Loop | Collecting & Sorting

Polymerization (recycled)
Polymerization (virgin)

- MBA providing high and mid quality polymer products
- MBA can use its position to add virgin materials, becoming a main polymers supplier rather than a sub-supplier
- MBA building brand for premium recycled polymers

Additives

- Additives and compounding can be included/added to MBA's production process upgrading the supply chain and production competence of the business
- MBA already uses certain additives to achieve certain quality polymers (mainly colours)

Compounder

Converter

- In the future, MBA could even produce its own branded or white label end-products (e.g. computer keyboards) on the back of huge shifts in supply chain of injection moulding etc.

End Product Distribution

- Already when purchasing the end products, consumer are more and more aware of and deciding on the purchase of products that contain recycled materials
- At the same time, end product distributors market the ESG product features as well as the collectability of their products at POS

End User

Value chain: collection completes the circularity of the “Loop” approach

The MBA Loop provides all value chain elements for a clear and efficient recycling process. This is important as collection efforts in post-consumer plastics still underdeveloped leading to lower recycling rates compared to other input streams

The MBA Loop

Step 1: Receiving & Collecting

- Take-back of consumer electronics printer, coffee machines, TV etc.) and consumer goods – collect through own POS collection points
- Signed technology and license agreements with production partners in Europe to recycle post consumer plastics in Europe, Asia (India, China)
- [redacted]

Step 2: Sorting

- Following our patented technology we are separating, sorting and cleaning the plastics
- The technology uses water and electronic and magnetic devices to provide an automated sorting process
- Sorting of colours

Step 3: Pelletizing

- PCR content of standard grades is typically >97%, all products are RoHS and REACH-compliant
- Compounding with additives if required
- Adding colours if required

Results and Advantages

Step 4: Marketing and Distribution

- ABS is a product containing primarily ABS, but with minor amounts of SAN and HIPS
- HIPS is a product containing primarily HIPS, but with minor amounts of ABS and mineral filled PP
- PP is a mixture of various individual plastic materials including PP copolymers and small amounts of HDPE, HDPE is segregated separately and offered to customers, as well

Advantages and Benefits

- Life cycle analysis, quality control

Better verification and monitoring of the use of PCR material and proportion in the product, as well as concrete calculation of the CO2 savings

- Clear communication and a pioneering role

The close-the-loop approach takes on a pioneering role in the manufacture of products (“Eco Line”). Great scale-up potential in Europe, USA, Asia with enormous impact

Today, MBA mainly focuses on recycling of post-consumer plastics

MBA produces premium engineered plastics derived from 100% post-consumer recycled content for blue chip manufacturers across several industries. Today's focus is on consumer waste and WEEE. In the future, MBA could also enter the industrial and automotive waste segment.

Input & Output Products and Customers (German Plant)

Collection | MBA POLYMERS | External

Input Products & Recycling Process

Consumer

WEEE

Industrial & Automotive

Purchase pre-sorted WEEE residues from metal recyclers — 90%

Close the Loop & take back

MBA Collection of WEEE and post-consumer waste — 10%

Proprietary MBA Recycling Technology

Output Products

ABS PC/ABS	ABS 4124 ABS 4134 EvoSource ABS 4136 EvoSource ABS 4535 EvoSource PC/ABS 5366
HIPS-PS	PS 3122 PS 3123 PS 3124 EvoSource PS 3122E EvoSource PS 3524
PP	PP 2126 PP 2131 PP 2131F20 PP 2143
HDPE	HDPE 1107E
Metals	sold to metal smelters (Aurubis, etc.)
EBS	distributed to waste incineration or cement and concrete manufacturers

Including BPM´s activities

Selection of End Products & Customers

Deutsche Telekom

NESPRESSO

LEXMARK

Schoeller Allibert

LEONI

Mercedes-Benz

Various studies confirm the eco-friendly impact of the MBA Technology

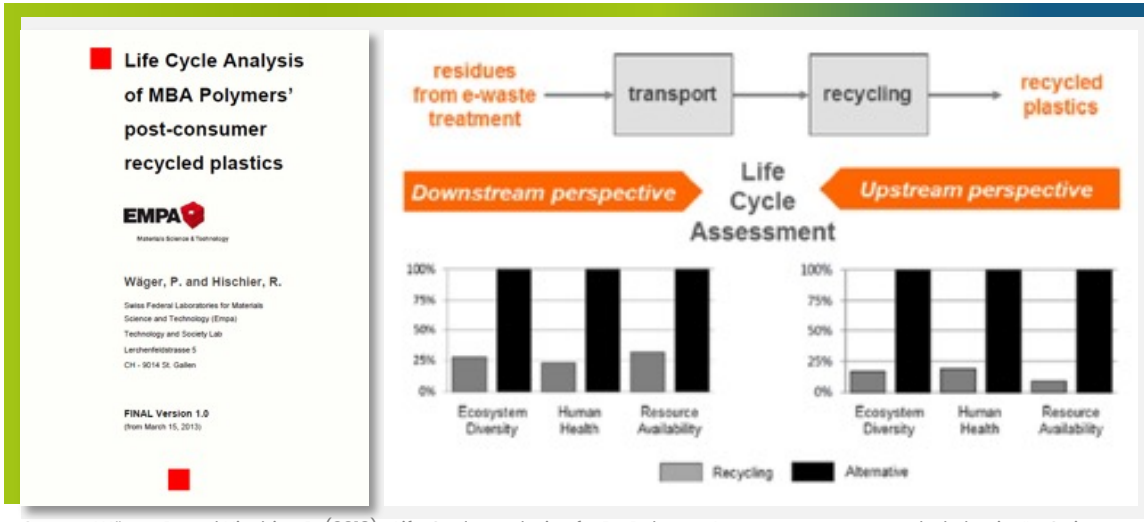
The approach of MBA Polymers is significantly more environmentally friendly (-83%) in the production of plastics than conventional methods

The Environmental Impact of MBA Polymers' Approach

In 2013, the Swiss Federal Laboratories for Materials Science and Technology (EMPA) carried out a study concerning the environmental impact of MBA Polymers' processes of handling post-consumer plastics in comparison to other processes ("Life Cycle Analysis of MBA Polymers' post-consumer recycled plastics")

A Life cycle assessment (LCA) quantifies the environmental impact of a product or process over its entire life cycle. Following steps are necessary to implement an LCA:

- Compilation of the relevant inputs and outputs of a defined system
- Assessment of the environmental impact of the inputs and outputs
- Interpretation of the results in terms of the objectives of the study



Source: Wäger, P. and Hischier, R. (2013): „Life Cycle Analysis of MBA Polymers' post-consumer recycled plastics" - Swiss Federal Laboratories for Materials Science and Technology

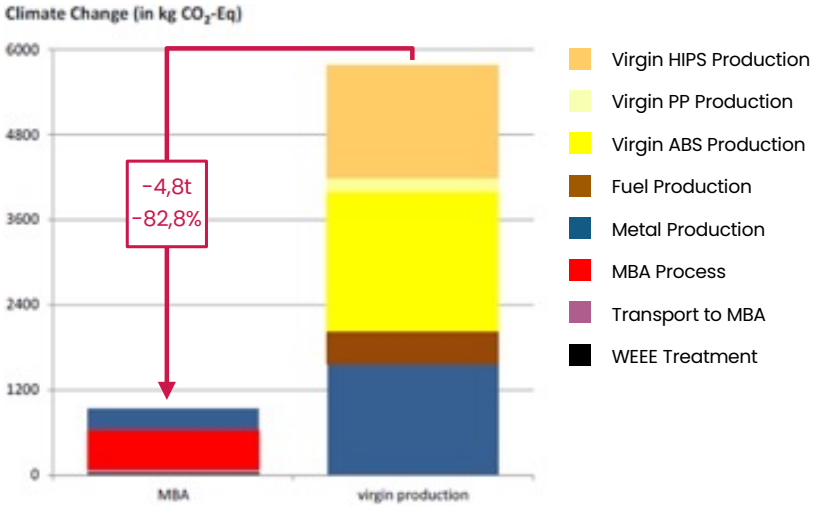
Frequently Asked Questions

What's more environmentally friendly? The conventional production of a ton of plastic or the production of a ton of recyclate by MBA Polymers?

One ton of plastic produced by MBA Polymers saves 4.8 tons of carbon dioxide compared to conventional production processes

What's more environmentally friendly? The recycling of a ton of WEEE shredder residues in a waste incineration plant or the recycling by MBA Polymers?

Compared to the energetic recovery of the shredder residues by waste incineration, 3.6 tons of CO_2 can be saved



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