



## How smart warewashing technology can help to avoid plastic waste

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The average single-use cup is used for just 15 minutes. Then it is thrown away.

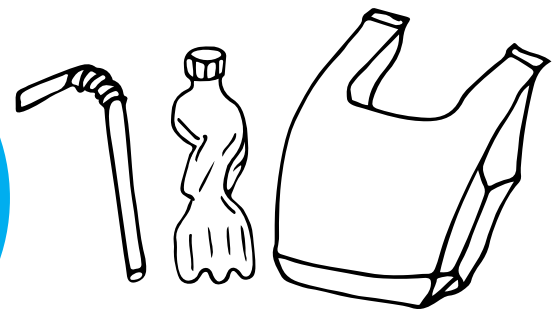
Source: German Environment Agency

## Plastic waste kills more than a million seabirds annually.

Source: NABU

*Packaging accounts for more than a third of all plastic production.*

Source: PlastikAtlas 2019



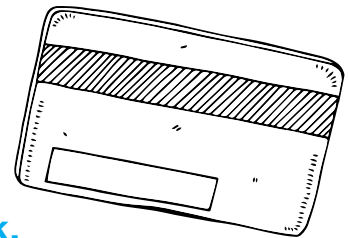
Approx. **8.3** billion

**Facts and figures**

tonnes of plastic had been produced by 2015 – 6.3 billion of which has been discarded:

**5 g**

is how much plastic the average human physically consumes in a week. That is the equivalent of a credit card.



Source: University of Newcastle, Australia

**9 %** recycled

**12 %** burnt

**79 %** sent to landfill or ends up out there in the world

Source: PlastikAtlas 2019

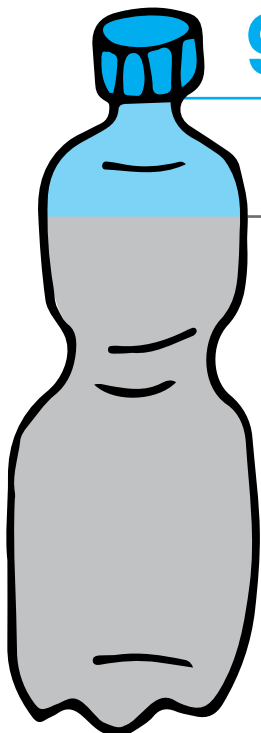
It takes **50 years** for a polystyrene cup to break down into its smallest components in the sea. The material will never fully decompose.



Source: Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT

**150** million tonnes of plastic waste is floating in the world's seas.

Source: Greenpeace





# The world is drowning in plastic waste

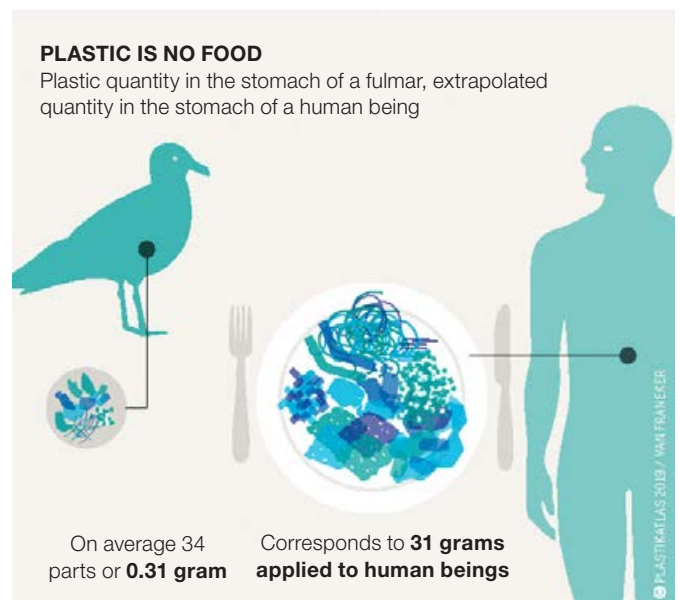
## It is time to act!

We have all seen the pictures: a turtle having a piece of plastic removed from its nose by an animal rights activist. A stranded whale – starved to death because its stomach is full of plastic. Or chicks getting entangled and dying in the bits of plastic their parents used to build the nest. This flood of plastic is one of the most pressing environmental issues of our time. And it is not only people who do not take their rubbish to the bin who are a problem. We all play our part. We all produce rubbish – even if we dispose of it through official channels.

### Only a tiny fraction is recycled

Just 14 % of plastic is recycled worldwide. Another 14 % goes to incinerators. 40 % goes to landfill.<sup>1</sup> The rest can be found on our beaches, streets and inside fish. Micro-plastics have even been found in Arctic ice. Researchers have found a concentration of more than 12,000 particles of microplastic per litre of marine ice in some areas.<sup>2</sup> And we as humans take in plastic via what we eat, drink and breathe. According to recent scientific studies, we physically consume about 5 g plastic per week. That is the equivalent of a credit card.<sup>3</sup>

Single-use cups account for a not insignificant proportion of this environmental pollution. ‘They are one of the top 10 most commonly found items on European beaches,’ says Dr Bettina Rechenberg of the German Environment Agency.<sup>4</sup> Just as many paper cups are found as plastic ones – and they are equally problematic because most of them are lined with plastic so that the



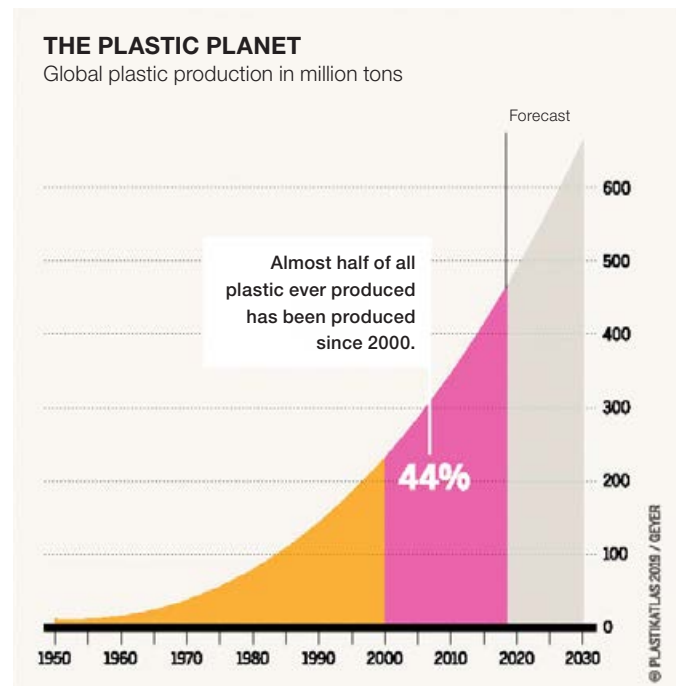
*'If we continue as we are now, by the year 2050, the plastic in the oceans could weigh more than all of the fish put together.'*

'The New Plastic Economy' study by the Ellen MacArthur Foundation (2016)

» liquid does not soak into the cardboard and make it soggy. **The problem is that the plastic layer means they cannot be recycled,** so they end up in the incinerator, in landfill or, in the worst case scenario, out there in the world. This disposable attitude is becoming ever more prevalent and has led to an incredibly sharp increase in global plastic production in recent decades. This trend will continue if we do not change the way we think (see graph on right).

### Consumers want change

Surveys in the UK, France, Germany, Spain and Poland all showed that at least 80 % of consumers are critical of the use of single-use plastics.<sup>5</sup> Movements like 'Fridays for Future' are demanding immediate action to ensure this generation and generations to come can look forward to a future worth living in. **Continue reading to find out how you can play your part in the transition from single-use to reusable cups.**



Every single-use cup puts further strain on our environment. That includes paper cups, since they are usually lined with plastic

# Alternatives to single-use plastics

## Legislators are ramping up the pressure

In several countries, certain single-use plastic items have already been banned. In 2008, Rwanda became one of the pioneers in this area with a ban on plastic bags.<sup>6</sup> Other governments are also responding. In Kenya, manufacturers and users of banned plastic items can face prison sentences of up to four years.<sup>7</sup> New Delhi completely banned single-use plastic cups in 2017, as well as other items.<sup>8</sup> In 2019, a ban on polystyrene containers came into force in New York City.<sup>9</sup> Not to mention, a ban on single-use plastic items like straws, dishes, cutlery and cotton buds will come into force in the EU from 2021. The list could go on forever and further legislation is expected. Bans are not the only solution. Governments are considering other options, as well. For example, the southern German city Tübingen intends to apply an additional tax to sales of single-use cups, with each individual cup being taxed.<sup>10</sup> This is an approach being considered in the UK, too.<sup>11</sup>

### Alternatives to single-use plastics

More and more innovative concepts, unusual materials and novel processes are becoming available on the market all the time. Bamboo, palm leaves, bagasse (by-product of sugar cane processing) or maize – we are seeing a trend for raw materials which grow back and leave the user with a clean conscience. However, there are three major downsides to these supposedly **eco-friendly alternatives**.

**Downside 1:** cups made of bamboo often contain **melamine**, a synthetic resin which acts as a glue, holding the plant fibres together. The problem is that at temperatures

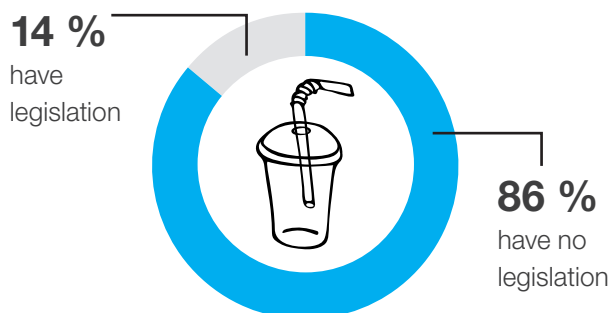
upwards of 70 °C, melamine starts to release formaldehyde, a harmful substance which can cause cancer. Not to mention that bamboo cups cannot be recycled.<sup>12</sup>

**Downside 2:** making a single-use cup from natural materials does not make the production process more environmentally friendly. Huge areas of farmland and quantities of water are needed to produce the raw materials and harmful pesticides are often used, too.<sup>13</sup>

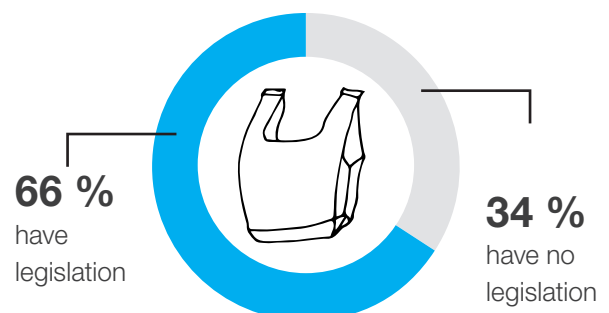
**Downside 3:** products made from biodegradable plastics (e.g. PLA) are very rarely actually composted. This is partly because waste sorting systems for organic waste are unable to tell the difference between a compostable cup and a normal cup so they cannot be sorted. Some compost companies even refuse biodegradable plastics because they do not rot quickly enough. That means biodegradable plastic usually ends up in landfill.<sup>14</sup> **»»»**

**To summarise: use reusable instead of disposable items!** The best solution is not to change what waste we produce but simply to avoid the waste. And it works! Sometimes by going without, often by using and reusing products for as long as possible: reusable products, **not disposable ones!**

### Countries restricting single-use plastics



### Countries restricting plastic bags



Many countries already have laws which require the avoidance of plastic waste. More than one in two has a regulation on plastic bags. Approximately one in every seven countries currently has legislation on other disposable plastic items, usually relating to plates, cups, cutlery or cocktail stirrers.

# The solution: reusable rather than single-use

## » Suitable materials for reusable dishware

If you choose reusable dishware, glass or ceramic is the usual solution. However, there are safety-related issues with these materials in several contexts, such as at festivals, in stadiums and for takeaway drinks. In these cases polypropylene is used instead. This is still a plastic but it can be reused so many times that it is actually an environmentally friendly alternative. The more often a polypropylene cup is used, the smaller the environmental footprint. Not to mention that this type of cup is also 100 % recyclable. Polypropylene cups also have the advantage of being sturdy and heat resistant, while not containing any harmful plasticisers.<sup>15</sup>

## Cups made from old coffee grounds or coffee cherries

The hunt is even on for alternative, more environmentally friendly materials for reusable dishware. One way would be to use a waste product which already exists to make cups. Kaffeeform in Berlin has latched onto this idea – they make their coffee cups from old coffee grounds and other renewable raw materials, which are hardened using biopolymers.<sup>16</sup> Australian start-up Huskee makes cups using the husks from the coffee beans, which are discarded when the coffee cherries are processed. Their cups are used in coffee shops from Singapore to the USA and Hungary.<sup>17</sup>

## We need a deposit system

There are two ways to go reusable: either the customer brings their own cup with them and it will be filled up (like you see in Eurodistrict Strasbourg-Ortenau) or the vendor gives out cups which can be returned to a place where they can be washed and used again. For the second option to work, you need a deposit system.

The German Mineral Water Cooperative is a great example of how this can work well. Members of the cooperative

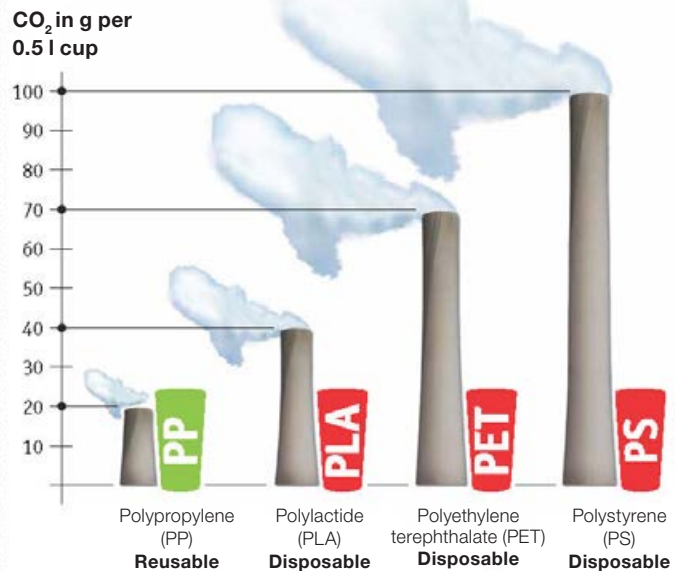
Polypropylene reusable cups may still be plastic but they are sturdier than disposable plastic cups so they are ideal for multi-use systems. That makes their environmental footprint smaller than that of disposable cups made of other types of plastic

have been using standardised reusable bottles since 1969. Consumers return their empty bottles to a drinks retailer and collect their deposit. From there, the drinks distributor collects the bottle and takes it to the nearest spring, where it is refilled. It does not matter which spring the bottle was previously filled at.<sup>18</sup>

## Smart solutions for reusable dishware

This system is useful for bakeries, cafés and anywhere selling takeaway coffee. In Germany, the company Recup offers just this kind of solution. The food service company pays a processing fee and Recup provides reusable cups. The vendor then charges a deposit to their customers and gives out the Recup cups. They also collect empty cups, clean them and reuse them – regardless which vendor they came from beforehand.<sup>19</sup>

## CO<sub>2</sub> EMISSIONS OF DIFFERENT CUP SYSTEMS IN COMPARISON



Source: Österreichisches Ökologie-Institut, Öko-Institut e. V. Germany, Carbotech AG (2008): Comparison of environmental consequences of different cup systems for serving drinks at events.

# Model for success: 'washing reusable dishware'

## Tailor-made solutions for every need



*'If reusable solutions are designed properly, then consumers will use them.*

*We support interested parties by providing reusable systems, consultation and assistance at the point of sale by offering a control system for centrally calculating deposits and by making available our idea pool as well as the transfer of expertise.'*

**Michael Andresen, founder of cup&more**

*'Our vision is to extend the lifecycle of a cup and help our clients to achieve their sustainability goals. To that end, we provide a full reusable cup system to our customers.'*

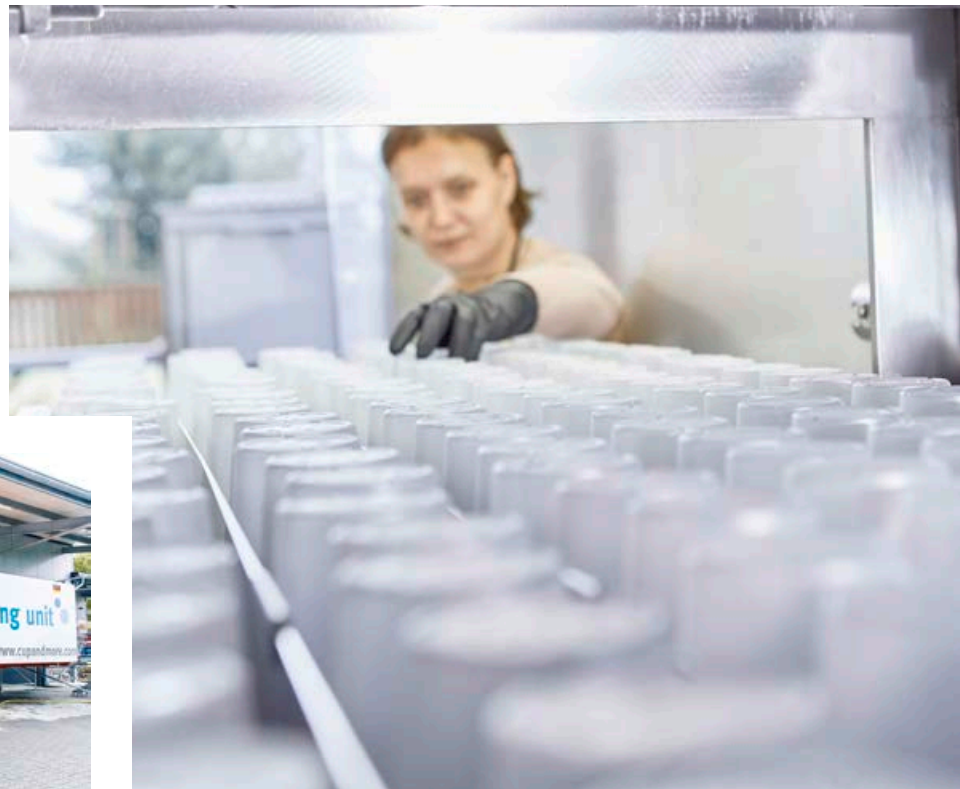
**Mirza van Meerwijk, founding member of CupStack**



*'The right warewashing technology is a prerequisite for a successful reusable cup system. Even back in 2006, MEIKO was washing reusable plastic cups at the Football World Cup in Germany using a M-iQ flight type dishwashing machine. The cups left the machine hygienically clean and, crucially, dry. That is the huge challenge with plastic washware.'*

**Sebastian Hainz, Executive Vice President,  
Sales and Marketing at MEIKO Global**





## cup&more (DE)

### Mobile warewashing for all kinds of events

A large dishwashing machine built into a semi-trailer. This solution is not only attention grabbing for Michael Andresen, it is what makes reusable cup systems feasible in any context. Mr Andresen is a businessman from Bad Segeberg in northern Germany. He has been working with closed systems for decades – as a young man, he had the idea of using reusable cups at parties. To start with, he used glass and the transition went well. He found more and more acceptance, to the point where this became a feasible business model and he has been able to work on it full time since 2006. The company ‘cup&more – Andresen Mehrweglogistik’ has been growing ever since.

These days, cup&more supplies prominent events in Germany, such as the Heavy Metal Open Air Festival 2019 in Wacken and the Dresden Christmas Market, as well as huge international events like the Roskilde Festival in Denmark (2019). The figures are striking: **Mr Andresen and his team washed 400,000 cups per day in Roskilde.** In Stuttgart in 2006, he washed more than 1.5 million cups in total for the Football World Cup.

#### Versatile skills for versatile industries

The success of Michael Andresen's business model must be down to his company's impressive versatility. He both rents and sells reusable cups – and they can be printed for the customer. Plus the washing service. The ‘cup&more mobile cleaning unit’ – their mobile commercial dishwashing machine on a lorry – travels to events with no warewashing set-up. Stationary customers, such as bakeries and cafés, have their takeaway cups collected and cleaned centrally before they are distributed again.

#### Smart organisation using software

This system has to work smoothly, so Michael Andresen commissioned some in-house software for a smart deposit system. It shows all relevant information: which cups have left the warehouse, which have been returned? Which are currently in for washing and which are ready to be hired out? Business owners can see what is going on anytime and anywhere on their smartphone or tablet. That improves the company's transparency and cuts the human effort required for management. It also works whether you are mobile or not.





challenge in the cleaning of plastics has always been the drying process, because plastic is significantly worse at storing heat than, for example, porcelain, and dries only very slowly. In recent years, we have focused on driving forward our drying results and we have been very successful in creating systems where the goal is to stack and clear away the cups after the washing and drying process without residual moisture.'

**Technological advancement is the key to success**

Rather than shaking cups to dry them, Michael Andresen prefers to use patents he has developed himself. He is a trained electrician, so he worked with MEIKO to adapt the **M-iQ flight type dishwashing machine** installed in his lorry. It features a special conveyor and other additions to help with drying so that it meets his needs even better. 'MEIKO and I have been working very closely together for several years, so the supplier benefits from the customer and vice versa,' says Andresen.

**Expansion by franchising**

Michael Andresen is onto something with his business model and technology – at least that is what cup&more's first franchisees in Switzerland must think! Ernst Brunner, owner of Cygnet GmbH, a company which was previously specialised in selling disposable cutlery, among other activities. Regulations coming from both Basel and Bern forced him to rethink his strategy: disposable cups and glassware are no longer the solution at large events. It quickly became clear to him that, 'If we do not move with these developments, we will all be out of a job in a few years.'

**Quick and thorough drying is particularly important when washing plastics**

» 'So far we have around 200 bakery shops taking part in our system, of which a large number are owner-operated. The solution is to wash the cups centrally, so that the smaller bakery shops do not have to take back more cups at any time than they have issued. We have therefore set up a cup pool, which every bakery can sign up to for a fee,' explains Michael Andresen.

**The challenge of plastic cups**

There is a peculiarity to consider when dealing with plastic cups. Sebastian Hainz, Executive Vice President Sales and Marketing at MEIKO Global, explains, 'The largest

He therefore decided on the cup&more reusable cup system. The model involved bringing at least 200,000 reusable cups into circulation in the first year and then twice as many in the second year. With further increases of 250,000 cups each time, the warewashing technology from MEIKO Suisse AG would have paid for itself in year three. In the ideal case scenario, that calculation would balance in year two. 'We had washed 1.4 million reusable cups by that point, overshooting our target,' reports Mr Brunner.

# CupStack (NL)

## Clever reusable cup management

CupStack's warehouse already housed 450,000 cups for three customers when it opened in June 2019. Mirza van Meerwijk, Gawein Hamers and Jeffrey Hooi founded this Dutch start-up in Nieuwegein. They provide a comprehensive service for owners of reusable cups and companies who want to start on that path. Their vision is to contribute to protecting our environment and natural resources. They provide a full reusable cup system for breweries, caterers, event organisers and other customers: from consultation to coordination, storage, transport and cleaning. We interviewed founding member, Mirza van Meerwijk, about what makes CupStack unique.

### How did you come up with the idea to found CupStack?

**Mirza van Meerwijk:** A couple of years ago my business partners Gawein Hamers, Jeffrey Hooi and I started working for Barproducties – a catering company specialised in utilising and optimising bars at events and festivals,

large or small. We worked with reusable cups in that context for over seven years so we were able to learn a lot and gain experience. In January 2019 we had the idea of establishing a new company. We saw a huge opportunity to help organisers achieve their sustainability goals, but also to answer their questions regarding reusable cups and make sure everything goes according to plan.

### What was the motivation for using reusable rather than disposable dishware?

**Mirza van Meerwijk:** Quite simply because it is better for the environment. It used to be normal at festivals to just throw your cup on the ground, which is absolutely absurd! Of course, Amsterdam council, among others, were not too happy about all of that rubbish ending up in the canals. They therefore banned the use of disposable cups in central Amsterdam, so events had to start providing reusable cups.





The MEIKO M-iQ can wash, dry and cool 10,000 cups per hour

### »» What solutions do you offer?

**Mirza van Meerwijk:** Our solutions are tailored to the problems that event organisers have been experiencing in this area. Since we have so much experience and we do not sell cups, we are able to be both expert and objective in our consultations with clients about buying cups. We also provide clean and secure storage for cups and all the logistics. We have even found a trustworthy, sustainable and, most importantly, affordable logistics partner to transport our cups from our warehouse to the festivals. But the most important aspect is washing them. There was not enough washing capacity to accommodate the significant rise in the number of dirty reusable cups at festivals. We chose MEIKO to help us solve this problem. The **M-iQ flight type dishwashing machine** offers maximum warewashing capacity and has been designed by experts, specifically with our needs in mind – so it can even reliably wash and dry plastic cups.

### How happy are you with the quality of the M-iQ by MEIKO and with the washing results?

**Mirza van Meerwijk:** We are completely happy. This 13 m long machine can wash up to 10,000 cups per hour. It is also equipped with unique features, such as cooling units at the end of the conveyor to cool the cups so they can be stacked immediately. If they were not cooled, they might attract condensation, which can lead to mould.



### Why do you not sell or hire out cups?

**Mirza van Meerwijk:** If you sell or hire out cups, you can end up conflicted between washing and sorting them. We prefer to concentrate on offering our customers the best possible service. That is why we do not own any cups. We simply manage cups for other companies, such as breweries. That is what makes CupStack unique.

### What is CupStack's vision?

**Mirza van Meerwijk:** 'Our vision is to extend the lifecycle of a cup and help our clients to achieve their sustainability goals.'

According to the manufacturers, ceramic dishware can survive up to 3,000 wash cycles



## Bregenz Festival (AT)

### the dishwashing machine shall come to the dishes

Of course, reusable dishware made from plastic is not suitable or appropriate for every occasion. One such inappropriate occasion is the world famous Bregenz Festival in Austria. Since 1998, this cultural festival has been supplied by the catering company eventTZ by foodaffairs, providing the highest standards in local delicacies to the most demanding of international guests.

#### Reusable dishware can be stylish

Up to 5,000 guests per day dine at the festival, including the VIPs. Demands are high, so the catering company serves the food and drinks in real glass and porcelain dishware. Despite the demands, manager Zoltan Toth is interested in more than appearances – he cares about responsibility. His company's sustainability report reads: **'Avoid, reduce, recycle** – these are our core principles when dealing with waste. Most waste is comes from using single-use packaging for food and drinks, disposable cutlery and single-use cups at events. We use large containers of food and drink, avoid disposable cutlery and recycle food waste as far as possible.' Ceramics, for

example, can survive up to 3,000 wash cycles. Efficient warewashing technology is part of the company founder's plan for environmentally friendly energy, water and waste management. After all, 'if we don't have the best performance behind the scenes, all the effort in the world at front of house will not make any difference,' believes Zoltan Toth.

#### 1,200 kg warewashing technology on wheels

In Mr Toth's restaurant 'buehnedrei,' the dishes go the the dishwashing machine. Elsewhere, the dishwashing machine must come to the dishes. Mr Toth therefore wanted a mobile commercial dishwashing machine which could travel without being disassembled. A commercial kitchen planner developed a solution for his 5.7 m long **M-iQ flight type dishwashing machine**: the feet have been removed and replaced with a wheeled frame and the machine is equipped with brackets in the exact same dimensions as Euro Pallets. Clever: now any forklift truck can move the machine.

Reusable cups survive 400 wash cycles or more before they need to be recycled



## Goodbye, single-use – hello, reusable dishware!

### No problem if you have the right warewashing technology

Disposable cups are mostly used when glass or porcelain is unsuitable because it might break and would be a safety risk. This is the case at large events such as concerts, festivals and sporting fixtures, as well as in cinemas and at outdoor pools. But, in these cases, reusable cups made from sturdy, heat-resistant polypropylene are an ideal alternative. They are 100 % recyclable and, according to the manufacturers, they can survive up to 400 wash cycles. Some products have even been awarded sustainability certifications meaning they must be able to survive even more wash cycles. The German 'Blue Angel' certification requires at least 500 wash cycles, for instance.<sup>20</sup>


#### **Warewashing technology is key**

If you would like to implement a reusable cup system, a professional dishwashing machine is key. The right machine washes quickly and hygienically, and is efficient and economical to boot. Use the right detergent and drying system for your washware and you will also save on time and staffing costs. That is something

that should be a top priority when selecting the right warewashing technology.

#### **Plastic is a very specific**

type of washware and behaves very differently in wetting than porcelain or glass. Plastic also cools quicker, meaning it does not dry as well. The good news is that professional dishwashing machines like the MEIKO **M-iQ flight type dishwashing machine** are able to wash plastic, glass and porcelain to the same impeccable standard despite the differences. The right rinse aid is key to the process, to improve wetting. Water quality is also important. That is why MEIKO developed the GiO MODULE: a reverse osmosis system which strips almost all minerals, limescale and other problematic substances from the water so that they cannot leave residues on the washware.



## **Summary:** We make cleaning reusable cups easy – warewashing technology is helping to protect our environment!

### **The problem: single-use plastic is suffocating the planet**

The volumes of plastic waste polluting our environment has rapidly increased in recent decades. Annual plastic production has skyrocketed: from 1.5 million tonnes in 1950, it rose to 407 million tonnes in 2015 and scientists expect more than 600 million tonnes in 2025.

The most common use for this plastic is packaging – it accounts for about a third of all plastic production. Disposable cups are a part of this problem. Once they have been used, they go straight in the bin – or maybe they don't even find their way to a bin. The sad truth is that around 32 % of all plastic waste ends up out there in the wild, threatening the health and habitats of all living creatures. Even we humans inevitably end up eating plastic.

### **Single-use products are being banned**

Awareness of the danger is increasing within the population and among politicians. Protests and new organisations are popping up everywhere – legislators are responding. We expect legislative measures to combat the use of single-use plastics to become more common globally.

### **Problematic alternatives**

The industry is experiencing problems with alternative materials. Supposedly environmentally friendly alternatives to reusable dishware are flooding the market for both single-use and reusable products. Yet, on closer inspection, they

do not deliver a real improvement since they require higher energy and resource inputs and still produce waste.

### **The solution: reusable products**

The best way forward is therefore to avoid waste. We can do that by implementing reusable dishware systems. Innovative companies like cup&more (DE) and CupStack (NL) are models for how mobile warewashing and reusable cup management can work.

### **The right warewashing technology is key**

Most reusable cups are made from robust polypropylene. This may be a type of plastic but since it is used for so long, its environmental impact is much lower than that of disposable cups. And it is fully recyclable. The right warewashing technology is a prerequisite of a successful reusable cup system. If cups are to be handled optimally and efficiently, they need to be cleaned and dried quickly and thoroughly. This can only be achieved using a professional dishwashing machine and the right detergent for the washware.

### **31,000 tonnes less waste in Germany alone**

Moving from disposable to reusable dishware can help everyone to play a part in protecting our environment. In Germany alone, going without disposable coffee cups would result in around 31,000 tonnes less waste every year!<sup>21</sup> It is difficult to imagine just how high that figure would be if we banned all single-use cups globally.

# Want to know more?

You can find out even more about 'washing reusable dishware'

in our **online magazine:**

[www.meiko-uk.co.uk/news-press/magazine/](http://www.meiko-uk.co.uk/news-press/magazine/)

Or phone us on

**Telephone: +44 1753 215120**

Our experts will be happy to answer any questions you may have.

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The clean solution

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- <sup>2</sup> <https://www.nationalgeographic.com/environment/2019/08/microplastics-found-in-arctic-snow>
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- <sup>4</sup> [www.welt.de/wirtschaft/article193887251/Coffee-to-go-Bundesregierung-will-Einweg-Kaffebecher-nur-noch-gegen-Aufpreis.html](http://www.welt.de/wirtschaft/article193887251/Coffee-to-go-Bundesregierung-will-Einweg-Kaffebecher-nur-noch-gegen-Aufpreis.html)
- <sup>5</sup> Statista, Ipsos: Global Views on the Environment – 2019
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- <sup>13</sup> <https://www.br.de/radio/bayern1/inhalt/experten-tipps/umweltkommissar/umwelt-plastik-keramik-tasse-100.html>
- <sup>14</sup> Deutsche Umwelthilfe (German Environment Aid): Bioplastik in der Kompostierung (Biodegradable plastics in composting). Results – survey, 2018
- <sup>15</sup> <https://utopia.de/ratgeber/polypropylen-pp-was-du-ueber-den-kunststoff-wissen-solltest>
- <sup>16</sup> <https://www.kaffeeform.com/en>
- <sup>17</sup> <https://huskee.co>
- <sup>18</sup> <https://www.gdb.de/mehrweg/mehrwegsystem>
- <sup>19</sup> <https://recup.de/mitmachen>
- <sup>20</sup> German Federal Agency for the Environment, Nature Conservation and Nuclear Safety: press release no. 257/18
- <sup>21</sup> Deutsche Umwelthilfe (German Environment Aid): Coffee to go-Einwegbecher – Umweltauswirkungen und Alternativen (Disposable takeaway coffee cups – environmental impacts and alternatives). Background information paper by Deutsche Umwelthilfe (German Environment Aid), 2015, [www.duh.de](http://www.duh.de)

## Who is MEIKO?

- MEIKO Maschinenbau GmbH & Co. KG, Englerstr. 3, 77652 Offenburg, Germany
- Warewashing technology for commercial enterprises ranging from the smallest of glasswashers to the largest dishwashing machines on the planet; wet waste treatment systems for food service and communal catering; cleaning and disinfection technology for hospitals and residential homes; cleaners for BA masks/PPE in the safety industry
- Employees: 1,200 in Offenburg, 2,500 in the Group
- Owners: The Oskar and Rosel Meier Foundation; CEO: Dr Stefan Scheringer
- Founded in 1927 in Offenburg by Oskar Meier and Franz Konrad