

Plastics waste prevention - A CHALLENGE

Do you know the 5 R's of waste management?

I am sure you do.

Did you try to introduce them to your life?

If not, I am challenging you,
myself and my colleague Manuel:

5 days – 5 R's

for **PLASTIC MATERIALS / PRODUCTS / PACKAGING**

Let us rethink our actions. Let us be mindful of our consumption.

How does it work?

INSTRUCTION

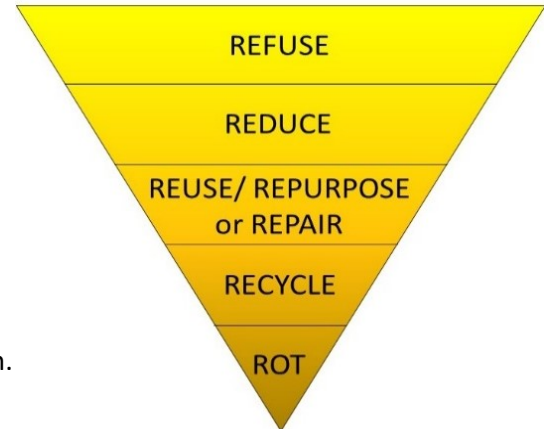
Please consider your behaviour in the sense of plastics waste prevention.

Each day of the five-day challenge, take a closer look at one aspect of behavior and then try to modify it.

Next, fill out the table attached below.

Please send me your answers when the challenge is completed.

If you are interested in comparing your considerations with the considerations and comments of other challenge participants, I will present a summary in September 2019. Just read our blog.



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e-mail title: CHALLENGE

I would like to assure you that the challenge is anonymous; your answers will not be shared with anyone, and will be deleted in September 2019.

Be brave, be smart and have fun!

DAY 1: REFUSE

Don't consume what you don't need.

YOU: _____	MANUEL	MONIKA
	I refuse to buy prepared meals, refusing the packages this way.	I used to drink a lot of bottled water, especially in the summer. I stopped. Now, I drink tap water.

OBSERVATIONS	
YOU: _____	
MANUEL	Nowadays at the supermarkets, you can find more elaborated products than raw material to cook yourself. By refusing to buy them, you don't only save package consumption but also eat healthier.
MONIKA	<p>Drinking tap water is probably the best solution because the water quality is very high and controlled on a regular basis. However, the pipes that distribute water are made of various materials, including plastics (e.g. PVC, PE). These plastics are harder than those used for plastics bottles; however, the wear of the pipes due to moving water under elevated pressure is still a risk. Let's check the facts.</p> <p>PLASTIC PIPES AND DRINKING WATER DISTRIBUTION – FACTS</p> <ol style="list-style-type: none"> the EU Drinking Water Directive (98/83/EC) is in force.¹ It is supported by a report entitled “Materials coming into contact with drinking water” published by European Commission in 2016.² On 28 March 2019, EU Parliament voted in favour of an update of the rules to increase consumer confidence and encourage the drinking of tap water.³ 1 l tap water costs about 0.002 € PVC pipes are (a) non-corrosive, (b) extremely light and thus easy to handle and transport, (c) strong, and (d) come in long lengths that lower installation/transportation costs. However, they are prone to physical damage if exposed to (a) overground, (b) ultraviolet light, and (c) temperatures over 65 °C.³ pipe-in-pipe systems are commonly used to distribute water. The inner pipe for drinking water is made of a plastic called cross-linked polyethylene (PEX).⁴ more dangerous are old pipes than new well-controlled materials. <p style="text-align: right;">Remember some plastic pipes can be used only for cold water!</p>

¹ Council Directive 98/83/EC can be downloaded at <http://data.europa.eu/eli/dir/1998/83/oj> (last access on May 22, 2019). You can also visit website http://ec.europa.eu/environment/water/water-drink/legislation_en.html

² In order to download „Materials coming into contact with drinking water”, please put the name of the document in your search engine (a following link should also work:

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=2ahUKEwix6pvf8JjiAhWBKIAKHZzoCfwQFjACEgQIABAC&url=https%3A%2F%2Fcircabc.europa.eu%2Fsd%2Fa%2F3f3c459a-8d48-4e17-92fd-8eace3113a7a%2F09%2520-%25201.2%2520User%2520guide%2520materials%2520in%2520contact%2520with%2520drinking%2520water%2520at%2520home.pdf&usq=AOvVaw06WID9Sb_Hd2-rsTfNvy_J)

³ „Drinking water in the EU: better quality and access”, published on October 19, 2018 at News European Parliament, Ref.: 20181011STO15887 (please check also website: <http://www.europarl.europa.eu/news/en/headlines/society/20181011STO15887/drinking-water-in-the-eu-better-quality-and-access>)

⁴ Eytan Gur, Dorothee Spuhler from SEECOM GbHm, „Water Distribution Pipes”, updated on May 16, 2019, you can find it at the website: <https://sswm.info/sswm-university-course/module-2-centralised-and-decentralised-systems-water-and-sanitation-1/water-distribution-pipes>

DAY 2: REDUCE

Reduce consumption of (buying) plastics.

YOU: _____	MANUEL ^{*)}	MONIKA
		In order to avoid single-use coffee cups, I bought a bamboo mug. Hooray, grass with growth speed of 3 mm/day! Well, the mug does not look like a piece of a big straw with a glued bottom and a lid. It is rather a composite: bamboo pulp with some resin.

OBSERVATIONS	
YOU: _____	
MANUEL	^{*)} Manuel does not see a big difference between REFUSE and REDUCE steps. It is only a matter of the degree of limiting yourself or your needs. (Comment by Monika)
MONIKA	<p>What are resins of biocomposites? How sustainable are polymer-based biocomposites? Let's check.</p> <p>POLYMER-BASED BIOCOMPOSITES</p> <p>Polymer-based biocomposites are all composites that resin or filler are made of biomass and a resin is a polymeric material. It is eco-friendly alternative for ordinary composites that reduce environmental footprint by decreasing amount of used fossil raw material. However, there is huge difference between polymer-based biocomposites (see a picture below):</p> <ul style="list-style-type: none"> Composites with bio-based fibres (e.g. glass, PLA, and bamboo fibres) By the way, bamboo fibres (bundles) have strength comparable to conventional glass fibres. They are often called 'natural glass fibre'. Composites with bio-based matrix (e.g. bio-PP, bio-PA) Composites with bio-based fibres and matrix <p style="text-align: center;">Classification of biocomposites</p> <p>Legend: (PA = polyamide, PP = polypropylene, PE = polyethylene, PLA = polylactide, GF = glass fiber, CF = carbon fiber, NF = natural fiber, CRF = regenerated cellulose fiber)</p> <p>Source: H.-J. Enders, T. Koplín, C. Haberhann, „Technology and nature combined“, Kunststoffe International 6/12 (2012), pp. 18 - 21</p>

DAY 3: REUSE, REPURPOSE or REPAIR

Share with others.

Find new uses for old objects.

Fix or upgrade your things instead of throwing them away.

YOU: _____	MANUEL	MONIKA
	1. Before buying something, I usually check the second hand market first to see if I can buy a used item. 2. Before disposing, I try to repair any machine if possible.	I will add here USE LESS . I used to have a drawer full of pens. I mean more than 30 or even 35. Well, I need one pen a time. So I give away my old pens. I took them to my office. Now, I am using a pencil when I take notes and I have 6 pens: 2 at home, 1 at my purse, 2 at work and 1 new one.

OBSERVATIONS	
YOU: _____	
MANUEL	1. It also helps others and saves some money. 2. Unfortunately, today, products are not designed to be repaired. We should push for durable and repairable products.
MONIKA	This new pen, I got when I was at the meeting. It is a nice pen with even nicer logo. I could have resisted. Conclusion: I need to correct my behaviour, because “free” does not mean “neutral for the environment”. One pen collection did not harm the environment but if everyone has a pen collection that isn’t needed, it means 30 pens x 7.7 billion people – that matters! Do you have a pen collection? By the way, look here: https://www.worldometers.info/world-population/ HOW MUCH DO WE PURSUE THAT WE DO NOT NEED. Did you hear about DIDEROT EFFECT ? (yes, that Diderot – Denis Diderot the co-author of the first encyclopaedia). Please, check even in Wikipedia ⁵ , it is really an educational story.

⁵ https://en.wikipedia.org/wiki/Diderot_effect

DAY 4: RECYLCE or RECOVER

Close the loop and remake.

Get back energy and materials. And upcycle!

YOU: _____	MANUEL	MONIKA
	At a user level, we can just correctly separate our waste.	We cannot do it at home, but we can help waste collectors and segregate our waste more efficiently. We can also produce less waste by buying less or using our own reusable packaging. It is well known and needs only a bit effort. Still, it is not enough. I will come back to you when I figure out (or find out) something constructive.

OBSERVATIONS	
YOU: _____	
MANUEL	This is not always an easy task, as many packages are a mix of paper and plastics. I think we should avoid this kind of packaging.
MONIKA	<p>The waste collection systems differs in Europe. In some countries plastics are collected separately (e.g. Austria) in others together with metal (e.g. Poland). Colours of the bins also can differ. Please let me which colours are used in your country for collecting waste.</p> <p><u>Austria</u></p> <p>Yellow – plastics Red – paper Blue – metal</p> <p>Brown – bio-waste White – white glass Green – colour glass</p> <p>Black – residual waste</p> <p>P.S. Nota bene, tourists have a problem in German speaking countries - they can be confused about in which bin to throw plastics, because the German name for plastics is KUNSTSTOFF (try to remember 😊).</p>

DAY 5: ROT

Compost.

YOU: _____	MANUEL	MONIKA
	I use the food leftovers (non-animal food) to generate my own compost in a composter that I placed in the garden.	It is shameful to admit, but I collect the rest of my food in plastic bags and then throw everything in the designated communal bin. I think I can improve – I can use biodegradable plastic bags, for instance.

OBSERVATIONS	
YOU: _____	
MANUEL	I know from some communities that even when living in apartments you can install a composter or two on the roof of the building to generate compost for your plants. No garden is not a reason not to do it.
MONIKA	<p>Are biodegradable / compostable bags good? Are they not a next source of microplastics? Are they valuable as a compost source? Let's figure it out.</p> <p>BIODEGRADABLE PLASTICS</p> <p>1. There are some ambiguities among plastics producers and consumers regarding the terminology of green plastics. According to Patricia Oddshammar from Stora Enso⁶), we should consider the following differences:</p> <ul style="list-style-type: none"> • “Bio-based” is defined as derived from biomass (EN 16575) • “Renewable” resources are naturally replenished in the human timescale • “Biodegradable” materials can be broken down by microorganisms into water, carbon dioxide, methane and biomass • “Compostable” materials can be break down in composting conditions (elevated temperature: 55 – 60 °C, a high humidity and the presence of oxygen • “Recyclable” materials can be identified in the PCI coding system⁶ <p>2. Biodegradability process is sometimes called “biological or organic recycling”. Biodegradable plastics are useful in several applications: a) organic waste collection and diversion, b) agricultural and horticultural sectors (mulch-films or plant pots), c) food packaging, d) disposable tableware.⁷ However, biodegradability does not depend on the origin of the material but exclusively on its chemical structure. Typical examples of compostable plastics are cellulose films, starch blends, polylactic acid and PBAT - Poly(butylene adipate-co-terephthalate)</p> <p>3. European Standards: a) EN 13432: 2004 on “Requirements for packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of</p>

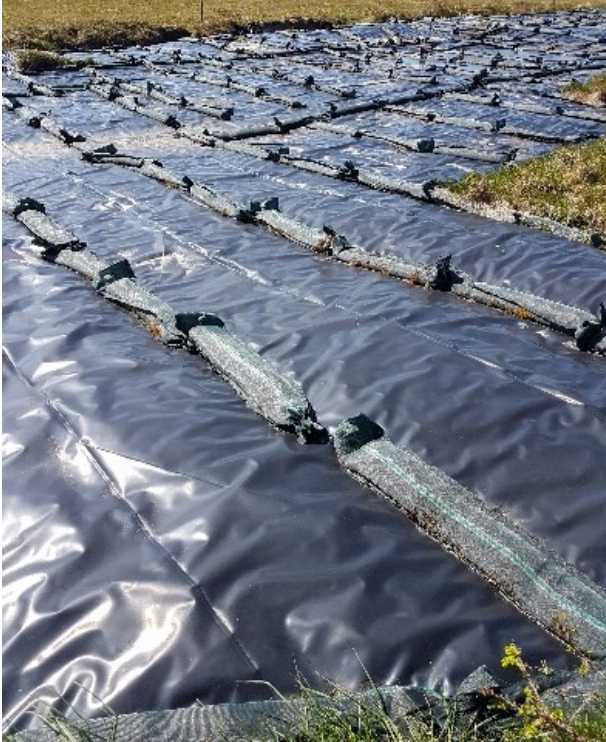
⁶ PCI coding system origins from Payment Card Industry Data Security Standard. A nice description of recycling codes can be find at https://en.wikipedia.org/wiki/Recycling_codes (last access on May 22, 2019)

⁷ Please visit a website of PlasticsEurope to find information about biodegradable plastics

(<https://www.plasticseurope.org/en/about-plastics/what-are-plastics/large-family/biodegradable-plastics>, last access on May 22, 2019)

packaging”⁸⁹, b) **EN 17033: 2018** on “Plastics-Biodegradable mulch films for use in agriculture and horticulture-Requirements and test methods”¹⁰

4. Mulch films on the fields look like in the picture below (Denmark, own source)



5. It is rather difficult to find a reliable source that refers to the possibility of creating microplastics in the process of biodegradation. If you have one, please share with us.

*) source: Patricia’s talk at Plasttechnik Nordic 2019, May 9.

⁸ You can find both standards at www.en-standard.eu (but the texts of standards are not free)

⁹ Description of standard EN 13432 can be found at the website of European Bioplastics (please check: https://docs.european-bioplastics.org/publications/bp/EUBP_BP_En_13432.pdf)

¹⁰ Description of standard EN 17033 can be found at the website of Institute of Agriculture, University of Tennessee (please check: <https://aq.tennessee.edu/biodegradablenmulch/Documents/EU%20reqs%20factsheet.pdf>)

SUMMARY:

Did you complete your challenge? What did you learn? Let me know.
If you have additional remarks, please write to me.

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I can also contact you with our education team, if you, as a teacher, would like to do the exercise with your students.

I will prepare a summary in September 2019 on our eCircular blog comparing your considerations with the considerations and comments of other challenge participants. Therefore, when you complete the challenge, please send me your answers to the e-mail given above with the title: **CHALLENGE**.

And now, a **SUPRISE**.

Do the **CHALLENGE** with your **KIDS!!!** :D

Thank you very much.
Have a good day.

Bye,
Monika and Manuel