

Barcode vs. Plastic Waste: A Citizen Proposal

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Abstract

This proposal seeks to offer a new approach to plastic recycling in response to the severe impact this material has on the environment.

The objective is to demonstrate that the measures implemented by the current recycling model, which are focused on producer responsibility and final consumer awareness, are not enough to prevent the continued accumulation of plastic waste in the oceans. Proof of this can be found in the fact that the Mediterranean Sea is currently experiencing high levels of plastic pollution, even in areas where its coastline meets highly advanced countries.

To continue forward in the argument, it is vital to include a crucial and forgotten player in the current model of consumption: retail or supermarkets. I agree, of course, that consumers must continue recycling, but do question whether the potential to decrease plastic waste could depend only upon consumer awareness.

A high percentage of plastic waste passes through supermarkets and, subsequently, the entire distribution channel. While supermarkets do hold responsibility for ENCOURAGING, and sometimes even FORCING THE USE of, plastic and packaging, they also have the potential, although never considered before, to encourage and provide incentives to producers and consumers to reduce their plastic quantities or eliminate it all together.

Only at this point, with the initiative implemented, would we mention consumers. However, they are no longer protagonists, but simple actors within the process. In the end, consumer's awareness, or lack thereof, will be an indication of the effectiveness of any changes implemented into a revised system.

And so, supermarkets would be responsible for all plastic recollection associated with products they sell, while Public Administration would maintain the duty of control: a barcode which identifies any item sold, and offers the possibility to track all plastics, containers or packaging. For each purchase, we will be able to track the exact materials, along their weights, sold in a particular store on a specific day.

It must be said that the purpose of this proposal is not the elimination of the plastic market or the material itself, but rather its total regulation and, consequently, its future reduction.

We are proposing an efficient, win-win-win model: a sustainable and dynamic circle, a cradle to cradle controlled process for this currently destructive material.

Why plastic market regulation is necessary

While informed citizens are astonished by the magnitude of the damage that plastic is provoking on a daily basis on our planet, politicians and scientists have not yet taken a clear position regarding the issue. This is a result of, on one hand, the powerful **lobbies** that move the oil and plastic market nowadays, and, on the other, the far too slow scientific response for a problem that has reached apocalyptic levels.

However, there is one point that, once we become aware of, we cannot disagree about: while scientists are searching for a way to remove the plastic that has been spread into our planet's waters, it is essential to **stop the pollution immediately**, once and for all; our seas cannot wait any longer.

Residue patches: floating islands

The first patch was discovered in the Pacific, in 1997, when shipman Charles Moore was returning to the United States of America after having participated in a regatta. Other patches have been detected more recently, although the press has barely acknowledged the severity of this problem.

After years of silence, of the few articles that recognized the subject – considering the gravity of the situation – we would like to mention one in particular, published in March 2008 by the supplement “*Crónica*” (Chronicle) of the Spanish newspaper “*El Mundo*”, which highlights that in every square kilometer of saltwater there is found to be about 18,000 floating plastic pieces, as pointed out by the United Nations Environment Programme (UNEP). This waste, that currently represents between 60% and 80% of total garbage – 6.4 million tons per year –, ends up in oceans and rivers of the planet, if not more so. To the east of Indonesia, a highly populated zone, plastic waste covers up to 90% of the coast and beach line, as reported by Greenpeace.¹

Regarding the animals that ingest plastic particles, the article explains that the pieces of residue oftentimes obstruct their throat and digestive tracts, causing death by starvation and/or malnutrition. This residue accumulates in their gut, giving a false sense of satiation. The animal then stops eating and slowly starves to death.

Mentioning the frequently beached marine mammals, *Crónica* adds the fact that many of them have their stomachs filled with PVC bottles, cans and even pieces of toys.

The article, dated six years ago, presents the North Pacific as the location with the largest quantity of floating plastics in the world, while the Mediterranean Sea, on the coasts of Spain, France, and Italy, is the largest holder of underwater residue.

A recent study, published on December 10th, 2014, says “more than five trillion plastic pieces, weighing over 250,000 Tons, afloat at sea²”.

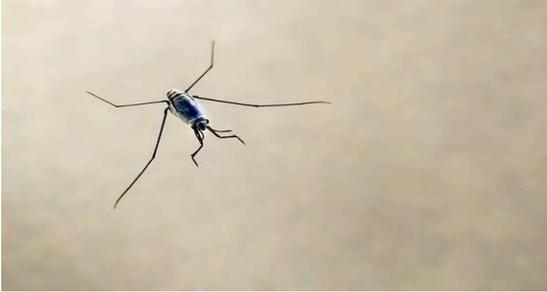
Unfortunately, it does not end here.



¹ <http://www.elmundo.es/suplementos/cronica/2008/646/1204412410.html>

² <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0111913>

In an article³ from LiveScience.com, Miriam Goldstein (University of California San Diego) explains that *Halobates sericeus*, or sea skaters, are proliferating on the patches of residue, resulting in a change in the natural habitat. Previously, in 2001, the Ecological Society of America (ESA) had detected their colonizing presence in the Pacific.⁴



According to Goldstein, these insects represent a food supply for animals higher up in the food chain, and even the bottom level food web of zooplankton and fish eggs is being damaged as a result of increased insect nesting.

Indeed, insect proliferation is possible since eggs are laid around any piece of plastic above 5 millimeters - a perfect nest for their eggs - leading to an unmeasured increase in insect numbers.

Astonishing data is also exposed in a video from the National Oceanic and Atmospheric Administration (NOAA) and LiveScience.com⁵ that shows how just 40% of the seas and oceans are partially non-contaminated, whilst a 60% is classified as 'in danger'.

The recently concluded *Malaspina* expedition, led by Spain, which circumnavigated Earth and is defined as the largest interdisciplinary global change project in history (as noted in an article on September 16, 2014), has confirmed that the contamination issue due to plastic residue is a global trait. The same article reminds us that "*only a global expedition such as Malaspina could acquire these results, and thus evaluate the overall abundance of plastic pollution*".⁶

Are the awareness campaigns enough?

The problems related to plastic waste began in the industrial era, however, with modern consumerism and its most fundamental paradigm – buy and dispose – the problem has grown at an alarming rate. For years, the public model of garbage collection, destined to end up in waste landfills, has been the only method to remove the waste. By the end of the 20th century, however, some nations had altered their approach.

A bit of history

The Italian region of Emilia-Romagna was the pioneer in the crusade for recycling and, by the 1970's, was ahead of European norms that were established many years later. In cities like **Modena and Bologna**, dry waste, such as paper, carton, batteries, cans, and glass were separated from the humid ones.⁷

Germany made history when, in 1991, redirecting the responsibility of all packaging to producers⁸ in an *ante litteram* version of the law, generally called the Extended Producer Responsibility (EPR)⁹. **In response, the producers united, creating a profitable recycling network.**

³ <http://www.livescience.com/20183-plastic-ocean-insect-breeding.html>

⁴ https://esa.confex.com/esa/2001/techprogram/paper_173.htm

⁵ <http://www.livescience.com/15573-humans-hit-oceans-hard.html>

⁶ <http://www.agenciasinc.es/Noticias/La-expedicion-Malaspina-confirma-que-la-contaminacion-llega-hasta-las-zonas-mas-remotas-del-oceano>

⁷ http://www.gruppohera.it/gruppo/com_media/dossier_rifiuti/articoli/pagina54.html

⁸ <http://www.economist.com/node/9249262>

⁹ <http://environment.yale.edu/content/profiles/docs/lifset-publications.pdf?1415668019>

We can recall public awareness campaigns in Italy, starting in the 1990's, with television, radio and press, along with local economic incentive. In 2008, the European Union promulgated the 2008/98/CE Directive¹⁰ with the objective of transforming the continent into a high efficiency society in terms of waste management¹¹, with a double purpose: limiting the production of waste and considering it as a resource. The plan aimed to recycle 50% of paper, metal, glass and plastic by 2020. Unfortunately, most nations will not reach this goal.

The European model – inspired by the German version of 1991 – is based on an ideal paradigm of a motivated consumer: conscious of his own carbon footprint, collaborative with the process, and aware that his daily habits have an important impact on the environment. Years of awareness campaigns, economic incentives, penalties, and higher educational standards were finally translated into a considerable increase in the volume of recycled material, making Europe the ultimate role model.

However, despite all the valuable efforts that have been made, the Mediterranean Sea is full of plastic.

A recent expedition made in September of 2014 by the *Istituto Superiore per la Protezione e la Ricerca Ambientale* (Institute for Environmental Protection and Research, Italy) began their research journey¹² with the purpose of understanding how we reached 892 plastic fragments per square kilometer, as found by studies from 2011¹³.

The solutions related to public systems of recycling relying on consumer awareness have shown their weaknesses; it takes too long for either of these methods to really be effective. The numbers say it clearly: time has nearly run out.

Our current state implies that we must rethink the issue. During the last 30 years, most European countries have implemented enormous educational campaigns to create environmental awareness amongst citizens. Since not all countries have the resources or mentality of “most European countries”, when can we expect that awareness exists on a global scale?

How long will this process take and do we have enough time?

The EPR law, currently being discussed by the governments of many developing nations, follows the same European path: it starts by creating public awareness, the establishment of a collection and recycling center that offers the raw materials to the recycling network member companies that promise energy saving tactics, and implements less exploitation of natural resources.

If we observe the actual situation of the European seas and oceans, we might very well find that the model presented is not enough to face the real magnitude of the issue and its rhythms of growth imposed by a consumers society. This may be because “*we have produced as much plastic in the past decade as we did in the entire twentieth century*”¹⁴.

Unfortunately, it is quite evident the difficulty of generating a conscious will in citizens in the absence of incentives, restrictions, penalties, or a massive communication campaign since, as we have seen, the problems provoked by plastic are seen far from the daily lives of people. In the need to solve the problem within a few years, the facts highlight the urgency of the model.

¹⁰ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:Es:PDF>

¹¹ <http://www.legambiente.it/temi/rifiuti/riciclaggio>

¹² http://www.adnkronos.com/sostenibilita/tendenze/2014/09/05/caccia-alla-plastica-nel-mediterraneo-lavoro-plasticbusters_J5O0HJE4LWXqTYHfPSM7M.html

¹³ http://www.corriere.it/scienze/energia_e_ambiente/11_marzo_10/mediterraneo-plastica_25157d04-4b03-11e0-9e9a-b429a0ac9415.shtml

¹⁴ http://www.susanfreinkel.com/books_Plastic.html

What can we do?

While scientists are seeking different solutions to eliminate the plastic that can be found in the world's seas, we must stop the contamination immediately.

This is why this proposal aims at the necessity of changing the pattern of plastic collection, and making the big distributors (supermarkets and large distributor chains) accountable and responsible for starting the process of recycling. Since big distributors and producers have led the consumption model, the amount of packaging has risen enormously.

Ecologistas en acción, a confederation of over 300 Spanish NGOs, refers to “the myths of supermarkets” from the book “*Supermarket: thanks not*” (2007) by stating:

Packaging is almost 25% of domestic residues, most of them (70%) being food packages or wraps. Instead of pointing on reduction, the food packaging policy of the GDA forces us to spend millions of Euros in recycling. Changing the shopping from a supermarket to a consumer cooperative can save up to a 75% of domestic residues. [The] food and beverage industry generates nearly 20,000 kg of residue on a daily basis: 135 kg per person. [Of] 50% of the plastics consumed in Spain, half is destined to packaging and wraps. An industry that, in just 5 years (2001-2005) has grown nearly 25% and has as a primary client the Agro-Alimentary industry and its distribution.¹⁵

The same book mentions that in Latin America, supermarkets control 50-60% of the food distribution; in 1997, it was only 10-20%.

In this proposal, “*changing the mode*” refers to a shift in focus from raising consumer awareness as the main factor of the recycling process and, instead, enforcing responsibility on the player who is ultimately responsible for the plastic waste increases. This way, we involve all actors in the greater distribution chain.

World's biggest companies



Forcing “a few” to influence millions

As an example, we would like to call your attention to the American multinational supermarket chain Wal-Mart, which is one of the largest companies in the world, just as the *The Guardian*¹⁶ graphic to the left illustrates.

Let us imagine a national law requiring Wal-Mart to be responsible for all the product packaging sold in their stores. On the same day that this law would take force, all Wal-Mart subsidiary stores and supermarkets would already be communicating, educating and, hence, “working” for the environment. Starting with the simple fact that, while paying for the products at the cash register, the consumer would be asked to return the packaging. Following the obligation of the company, the entire supply chain – before and after – would be involved.

Diffused by every nation of the world, this would be really be effective.

World's biggest retailers



¹⁵ http://www.ecologistasenaccion.org/IMG/pdf_Mitos.pdf

¹⁶ <http://www.theguardian.com/business/2010/jan/12/walmart-companies-to-shape-the-decade>

What might happen?

Again, in the path of assumptions, it is very likely that, in the typical private market's problem solving spirit, an immediate solution would be sought to limit the task that has been imposed by law. We are convinced that every legislative imposition carries with it an immediate response, from whom the rule is derived. Marketing departments and human creativity would start to play their role, searching for and implementing changes.

We can assume that the distribution chains would challenge three different issues:

1. How can we make the consumers return the packaging and containers?
2. Where would we store the materials once they have been returned?
3. What is to be done with them afterwards?

Let's analyze the possible outcomes, one by one.

1. How can we make the consumers return the packaging and jars?

- The first necessary measure would be to inform the company's internal staff, the immediate result being awareness amongst the thousands of workers of the given companies.
- As a second step, it would be necessary to implement a visual communication plan (i.e. In store signage that requests and explains the return of product packaging), along with the training of every part of the staff in contact with consumers, coaching them and make them active, informed and efficient players in the process.
- The third possible measure to be taken would be the creation of "return points" within the same store.
- Maximizing any economic return mechanisms, such as the PET bottles in Norway¹⁷. It would be required to include all plastics and varying formats.

It is also very likely that distribution and production actors would start researching alternative ways to reduce the amount of packaging and avoid the massive recollection. Three examples of ways this could be done are:

1) Without entering into any hygiene normative related problems, the entire cleanser and disinfectant industry could be transformed, where product dispensers are installed, offering clients easy access with their own containers. Marketing campaigns to increase packaging fidelity could also be studied, resulting in more efficient, or even more attractive containers, that might interest the clients and ensure they are reused.

2) In some countries, due to the lack of technology, small containers, such as those used for yogurt, cannot be recycled because they are paper wrapped. These containers should no longer utilize paper.

3) Avoid mixing materials; marketing would create new packaging compatible with the recycling process.

2. Where to store the materials once they have been returned?

- The need to make spaces for the returned recyclable material would immediately bring about a reduction in volume: installing dispensers and press-fit tools in markets to immediately begin the recycling and reutilization process. There is room for individual creativity to solve this problem as well.

¹⁷ See other examples of incentives at <http://www.retorna.org/es/elsddr/experiencias.html>

3. What is to be done with them afterwards?

- Governments could initiate a direct collaboration to the public and private sectors under the EPR Law, requiring them to take materials to the Public Recycling Centers under the control of the Public Administration.

- The recycling market offers different destinations to plastic once it reaches the recycling plant, however it is likely that further investigation would find new solutions and uses.

- Lastly, it is worthwhile mentioning a machine (photograph to the right) that can convert plastic into gasoline¹⁸.



It can be noted that in a Nation led by the Rule of Law, it is common ground that the private market submits itself to the law.

As we have said above, when German producers had to, for the first time, begin to care for waste, a recycling network was created that continues to be utilized, providing an inspiring example for other nations. Necessity is the mother of invention.

Why the Big Distribution?

Two reasons: ethics and logic.

Let's start off by explaining the ethical motivation. If Wal-Mart's profitability is high all over the world, we can assume the same applies for other distribution companies seeking to monopolize citizens' consumption all over the world.

Recalling the origin of the contamination and its difficult solution, it seems to be quite clear that, along with being the principal actors responsible for the contamination provoked by plastic, **the Big Distribution has funds.**

As we know, to raise the profitability in some countries, staff exploitation¹⁹, not to mention unfair and admittedly trade competition, along with selling private label brands at slightly lower prices is all too common.

If we consider all factors, the Big Distribution represents the key link of the model of consumption and remembering that seawater pollution is what motivates our argument, we have sufficient reason to justify the proposal that Big Distribution should be charged with any and all costs derived from plastic recollection.

Lastly, if responsibility and economic capacity have yet to justify the aforementioned changes, it is important to highlight the logistical evidence: within supermarkets lies the last opportunity to control packaging and plastic wraps. Obviously, we cannot determine the product's final destination once it has been purchased as this depends on an unpredictable amount of factors - including scarce consumer awareness - once it has been used and its package transformed into trash.

¹⁸ <https://www.youtube.com/watch?v=h1MOqx73K9c>

¹⁹ <http://www.cambio21.cl/cambio21/site/artic/20141212/pags/20141212154752.html>

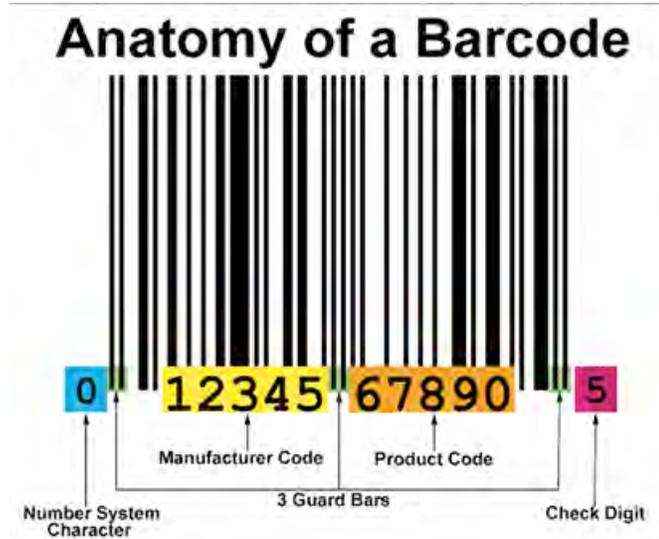
But at this point, it is crucial to remember something already mentioned: **we can add information to the barcodes, including package material and weight. With this addition, we will know exactly – at the end of the day, week, month and year – what type of and how much material has left any particular market, enabling us to establish quantities and control its recollection.**

Tracking plastic by Barcode

A barcode is an assembling of parallel vertical lines of different width and spaces, allowing the reading of information with a simple optical reader.

This way, a barcode allows a quick recognition of a product in a unique, global, and non-ambiguous way at any point of the logistical chain, allowing it to be registered, accounted for, and inquired about its characteristics. The bar code is currently implemented on a global scale.

The possibility to track quantities of plastic products sold is provided by adding this information into the barcode.



Graphic source: <http://www.av1611.org/666/barcode.html>

Symbol	Acronym	Full name and uses
	PET	Polyethylene terephthalate - Fizzy drink bottles and frozen ready meal packages.
	HDPE	High-density polyethylene - Milk and washing-up liquid bottles
	PVC	Polyvinyl chloride - Food trays, cling film, bottles for squash, mineral water and shampoo.
	LDPE	Low density polyethylene - Carrier bags and bin liners.
	PP	Polypropylene - Margarine tubs, microwaveable meal trays.
	PS	Polystyrene - Yoghurt pots, foam meat or fish trays, hamburger boxes and egg cartons, vending cups, plastic cutlery, protective packaging for electronic goods and toys.
	Other	Any other plastics that do not fall into any of the above categories. For example melamine, often used in plastic plates and cups.

Having the package information (weight and material composition) will offer an extremely easy way to obtain the necessary data to apply follow-up control over its recollection. (i.e. PET 2/45gr. – PET5/75gr. – etc.)

We would be able to track the recyclable materials through the entire transaction system in real-time allowing us to review any cash register by days, weeks, months, or years. This information would be provided just as the cash register's account balance appears at the end of the day.

Indeed, supermarket cash registers are the last control in the commercial process; after that, only individual awareness and the environment are remaining.

Barcode control and EPR working together to protect the environment

The main purpose of this proposal is not to be an alternative to the existing EPR law, but improve its impact through collaboration. In a wider perspective, it is also interesting to refer to the latest economy model as being discussed by sustainability experts: the Circular Economy.

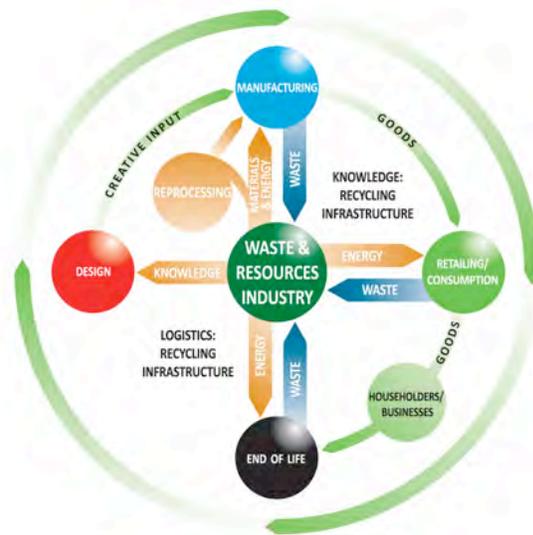
In a European Commission webpage dedicated to the environment²⁰, it states “turning Europe into a more circular economy means:

- boosting recycling and preventing the loss of valuable materials;
- creating jobs and economic growth;
- showing how new business models, eco-design and industrial symbiosis can move us towards zero waste;
- reducing greenhouse emissions and environmental impacts.”

The whole EPR system structure is perfectly applicable to retail or minority trade.

As previously mentioned, given their stockroom dimension, financial capacity, and increase in waste volume responsibility, it is certainly the Big Distribution who should be taking action for the waste it contributes .

It is evident that Barcode Control and the EPR system can function together as a strict control with cradle to cradle design for plastic waste within the circular economy process.²¹



Graphic source: <http://www.fccenvironment.co.uk/circular-economy.html>

Logistics aspects

In discussing logistic aspects, it is worthwhile to mention the “*Revers Logistic in Plastic Recycling*” theory, written in the 1990’s. An article penned by professors Farris and Pohlen of the North Texas University, they provide “a framework, based on interviews and current literature, describ[ing] the reverse logistics channel structure, membership and functions, and provide a foundation for identifying the issues affecting efficiency and marketability, and possible future directions for improving efficiency within the reverse channel structure²².”

Plastic contamination could be tackled by:

1. Forcing the Big Distribution to collect all sorts of plastic packaging, wraps and containers they sell, and establish communication and marketing campaigns
2. Using the strict barcode system to control effective collection

²⁰ <http://ec.europa.eu/environment/circular-economy/>

²¹ <http://www.ellenmacarthurfoundation.org/circular-economy/circular-economy/the-circular-model-an-overview>

²² <http://www.emeraldinsight.com/doi/pdfplus/10.1108/09600039210022051>

Fines and incentives

Thanks to the control allowed by the barcode, it would also be possible to establish, for example:

- A new “inverse” carbon tax, which would be discounted off the final recycled quantities.
- National media campaigns, with special attention given to the virtuous companies.
- Implement the use of reverse vending machines²³, which are devices that accept used (empty) beverage containers, returning money to the user.
- Create an ISO certification for retail companies on plastic recycling.
- Incentives for consumers that return packaging to the store.

“Green” Jobs



It is also very likely that this measure would influence the job market in a positive way. In 2013, the British Environmental Service Association (ESA) declared a “circular economy will create £10 billion of investment²⁴”.

Along with investment, many new jobs will be required for the implementation of a new logistics system within the same retail store; facilitators, storage management, first processing of the returned containers and packaging, and information and awareness staff.



We also do not rule out the possibility of creating alternative sales types, such as the birth of supermarket chains dedicated to “zero packaging²⁵” or *Peso Netto* (net weight)²⁶, that are established as a natural response from the private market.

In an article entitled “*The recycling in search of its own spot in a future commerce*” of *Hub Sustainability's* online magazine, dated March 2014, it is declared in their descent title: “In Europe, it is much more expensive to throw away the recyclable material than the reutilization of the same. It is not just a matter of awareness; there are regulations made for it to be that way²⁷”.

Industry re-conversion and State support

As this proposal aims at a strict ruling of the market, rather than an elimination of the material per se, it is very likely that most companies would find themselves obliged to reduce the number of employees, due to a market's reduction. Considering this probable consequence, the State could participate in the restructuring of these companies, taking advantage of this reorganization to create new “green jobs”.

²³ http://en.wikipedia.org/wiki/Reverse_vending_machine

²⁴ http://www.mrw.co.uk/news/circular-economy-could-save-140-million-tonnes-from-landfill/8649178_article

²⁵ <http://www.treehugger.com/green-food/berliners-create-supermarket-no-packaging.html>

²⁶ www.pesonetto.it

²⁷ <http://www.hubsustentabilidad.com/el-reciclaje-busca-su-lugar-como-un-negocio-con-futuro/>

Plastic bags

Last, but not least, we would like to highlight another important subject, though it already has its place on the environmental agenda. To reach a significant reduction of, although ideally a future without, plastic bags, we propose the idea of introducing a strict carbon tax for every plastic bag provided by any shop, considering that this would likely provoke an immediate reduction of their use.

Supermarkets would be responsible for explaining the reasons of this new cost. This tax would finance environmental care programs and would be an educational platform to explain the damages caused by the same plastic bags.

Conclusions

Even if the immense business that surrounds the plastic industry is challenging to modify, we can utilize the previously stated methods to oblige, control, and regulate the distribution companies to adopt a beneficial, virtuous process.

A Circular economy applied to plastic waste would finally create a producer – distributor – consumer – distributor – producer cycle.

To reiterate, the proposal purpose does not suggest the elimination of the plastic market, but rather its total regulation and control, efficient once it reveals itself as a sustainable, dynamic, win-win-win model.

Finally, thanks to the barcode, a paradigm reversion, and synergy between the EPR law and strict Public Administration supervision, we could:

1. Stop the spread of plastic in the environment as soon as possible, and progressively facilitate the decontamination of our seas and oceans.
2. Limit the use of new natural resources (raw materials, petroleum, and its energy) for its fabrication.

Useful Links

Waste and re-collection map: <http://www.atlas.d-waste.com>

Container deposit legislation: http://en.wikipedia.org/wiki/Container_deposit_legislation

Barcode composition: <https://www.denso-wave.com/en/adcd/fundamental/barcode/>

Waste hierarchy: http://en.wikipedia.org/wiki/Waste_hierarchy

Waste in Sweden: http://www.avfallsverige.se/fileadmin/uploads/Rapporter/SWM_2013.pdf

Incentives and fines in Italy:

<http://www.legambiente.it/contenuti/comunicati/ridurre-e-riciclare-prima-di-tutto-un-nuovo-sistema-di-penalita-e-premialita-un>

European Recycling Model:

- <http://www.plastico.com/temas/El-reciclaje-de-plasticos-en-la-Union-Europea+3043922>
- <http://www.eea.europa.eu/es/pressroom/newsreleases/las-mayores-tasas-de-reciclado>
- http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/8-04032013-BP/EN/8-04032013-BP-EN.PDF

The truth about recycling: <http://www.economist.com/node/9249262>