



Solving Plastic Pollution and Global Warming. The Case for Degradable Plastics

CONFIDENTIAL INFORMATION

The following explains the benefits of Degradable plastic in the light of the claims that plastic is harmful to the environment. This subject has raised a few questions which needed to be addressed. It is hoped that this information will assist the discussions in some way.

Barbados, by a reversal of its position to ban plastics and adopt the use of Degradable plastics, has the opportunity to set a positive global standard that can produce significant visionary, leadership and economic benefits for the country, on the world stage. On the other hand, to the extent that the practice currently favoured by the government is taken up by other countries, there could be a catastrophic exponentiation of the global warming crisis and climate change.

Of the least concern and the aspect most readily proven about this subject, is that the science supporting Degradable plastics and their performance is voluminous, widely accepted and incontrovertible. Here is some of that evidence.

Safety

- The safety of Degradable plastic additive components at concentration levels higher than used in the products with respect to eco-toxicity as it relates to soil microorganisms, earth worms, freshwater organisms and plants is well documented.
- The products are approved for direct food contact by the US FDA, the CFIA in Canada and the EFSA in Europe.
- The products contained none of the dangerous substances (very toxic, toxic, carcinogenic, mutagenic and toxic for reproduction substances) listed in the relevant international directives and totally comply with the requirements of the laws, regulations and administrative provisions.
- They comply with the international directives with respect to EPA - USA and CONEG Model Toxics Legislation regulations for regulated metals/inorganics or their compounds and contain no such substances or any substance that would require a warning notice under California Proposition 65 regulations.
- The additive components are stable up to (350° C/662° F). There is no decomposition at lower temperatures, and thus no harmful by-products or toxic vapours.
- None of the additive components or additive itself is classified as a carcinogen by the International Agency for Research on Cancer (IARC).

Performance

- The lifespan of Degradable plastics is predetermined at the time of manufacture and can be adjusted according to the particular application. Its predictability is enhanced by the fact that Degradable plastics are made with virgin resins, which thus convey enhanced performance characteristics.

Landfill benefits

- In a managed landfill, bagging refuse in Degradable plastic will avoid preservation of waste as with non-degradable, conventional plastics, which will facilitate reduced methane emissions (methane is 24 times more toxic than CO₂).

- It will expose organic wastes to oxygen, water and microorganisms, thus accelerating aerobic biodegradation which produces CO₂ instead of methane and will extend the useful life of the landfill through accelerated volume reduction and compaction.
- In an unmanaged landfill Degradable plastics bagging of refuse also avoids preservation of disposed organic matter and will facilitate the aerobic degradation of the refuse (producing CO₂) while there is oxygen available.
- At the lower depths, oxygen will be depleted and anaerobic biodegradation will prevail, leading to methane generation. The degraded organic matter thus reduces the amount of organic material that would eventually anaerobically biodegrade (producing methane) and therefore significantly reduce the methane escaping to the atmosphere.
- Methane could be captured and used to offset energy costs and conventional plastics should be kept out of landfills. Both measures would benefit the community but especially those in poor countries or small island developing states (SIDS) which could apply such cost savings in other areas.

Applications

- Degradable plastic products made from polyethylene, polystyrene or polypropylene, namely, shopping bags, reusable grocery bags, trash bags, food storage bags, freezer bags, vegetable storage bags, film for food packaging and wraps for loaded pallets, laundry bags, garment bags and packaging for clothing, banana sleeves, banana sleeve ties, and box liners for fruit, plates, cups, drinking straws, cutlery, catering ware, articles for retailing food, liquids and other retailed products, shrink wrap, packaging for agricultural products, bakery products, paper products, landfill covers, mulch films, *inter alia*.

The foregoing information is to the best of our knowledge true and accurate.

Definitions

The following definitions are pertinent:

Degradable - technically oxo-biodegradable plastics, refer to those which are inherently or intrinsically degradable, via initially an oxidative process, that achieves a breakdown of flexible plastics by molecular weight via covalent bond strength reduction and exposes any contents, compostable or otherwise to degradation, followed by bio-degradation to CO₂, H₂O and biomass, which requires aerobic or anaerobic bacterial activity. The process is irreversible and is initiated by any form of stress such as the product being put to use, by heat or by light. They are indistinguishable from conventional plastic and retain all of its useful qualities such as strength, clarity, sealability and durability throughout their useful life.

Bio-degradable - not inherently degradable but requires life forms which may or may not be present, throughout the entire process. True biodegradable plastics are uneconomical since the cost of the resins is 3 – 4 times the cost of standard resins and the films are usually thicker. The films give up the inherent properties of conventional plastic such as strength, clarity, sealability and durability and the performance characteristics are impacted by moisture and other factors.

Photo-degradable - not inherently degradable but requires the presence of light which may or may not be present, throughout the entire process.

Discussion

A study of solid waste management materials that have the least environmental impact is a significant undertaking and could entail the below.

1. an evaluation of the exposure to risks that will accompany the large scale removal of the use of plastics
2. an assessment of the problems being generated by plastic pollution
3. an examination of the foundations of the claims of fragmentation against Degradable plastic
4. a comparison of Degradable plastic with conventional plastic and any competitive product such as bio- and photo-degradable products, their performance characteristics, production and disposal costs and environmental impacts

Degradable plastics have been used successfully in Barbados and certain parts of the Caribbean by a large cross section of businesses in several industry sectors since their introduction in 1998.

The following is a concise summary of the benefits of Degradable plastics.

Beginning with Barbados, it must be noted that petro based Degradable plastic was embraced by the founder of the Future Centre Trust Dr. Colin Hudson <http://www.barbadospocketguide.com/our-island-barbados/meet-a-bajan/dr-colin-hudson.html> who absolutely welcomed their introduction. He detailed their immense potential from an environmental benefits point of view and the launch of Degradable plastic was hosted by Dr. Hudson at the Future Centre Trust in August of 1998. It was attended by representatives of various companies already using the product on the island. In fact, Dr. Hudson was so motivated by the prospects that he captured time-lapse photography of samples as they degraded down to and past flecks that were smaller than the size of a pin's head, which he enthusiastically displayed in several encounters. But there is more below that Dr. Hudson did as well. So it is here that we begin our examination of just **some** of the benefits of Degradable plastics.

Before doing so we must point out that the problem of plastic pollution cannot be overstated. It is equally important to note, however, that it is **conventional plastics** that have caused these problems.

The portrayals of turtles dying, blocked drains, flooding, strangled coral reefs, littered oceans, piles of unwanted plastic etc. caused by plastic are all accurate. They cannot be over-exaggerated and are just the tip of the iceberg. If however these plastics degraded, such problems would not exist, or would at least be restricted. Degradable plastic would drastically reduce such problems, their effects and related costs, as after its useful life it would cease to exist and would become a part of the life cycle as a food source of carbon dioxide, water and biomass. The fragments become irreversibly progressively smaller once the process has started. If the concern then becomes that smaller size of particles being ingested, then there is a manageable two-part fix to the problem: 1) legislation that temporary use plastics must be degradable and 2) legislation that they must be discarded in a responsible manner at the end of their useful life. To the extent that either of these mandates is ignored the problems will not be completely resolved, but we would nonetheless have made the planet environmentally more sound, without giving up any of the benefits of plastic, changing the status quo, or running the risks we will undoubtedly expose ourselves to if plastics are removed completely. Simply put, there is no reason to reinvent the wheel, but every reason to apply smart-plastics technology which is available in each of the applications facing the proposed ban.

Plastic plays a crucial role in the prevention of disease by protecting food, refuse and medical supplies from exposure to disease carrying vectors and contamination by air or chemicals. Aseptic packaging and

sterility are two features of modern hygiene that protect untold numbers from sickness and their respective governments from higher health care costs.

Good packaging habits promote several bags being used for a given purchase with good reason. Distributors' warehouses and supermarket storerooms are frequented by rodents, roaches and other vermin, not to mention dust. Hence, a supermarket will package cheese or bleach in separate bag before placing it into a bag with bread, meat or vegetables. Note that if the drippings from meat or fish interact with vegetables or pastry in an environment where a synthetic reusable bag is used, that by itself is a recipe for potentially serious health risks. In fact, many householders will discard wet plastic bags on arrival at home. The potential for bacterial spread extends beyond the carry bag, if lengthy delays ensue after the groceries are packed, especially in our hot climate. If one compounds this with the bacteria spread by vermin that are known to be present in the average warehouse, one might conclude that the only reason we are not seeing bacterial epidemics now is because the use of plastic bags predominates.

Unless individual customers therefore, are going to similarly package in smaller bags certain items so they do not comingle with other items on the way home, fabric bags could court serious outbreaks of disease, which would put intense pressure on medical treatment facilities and related costs.

The average household uses plastic shopping bags as refuse bags, thus minimizing the exposure to vermin as the garbage awaits collection. Again, there is the extra vigilance of some to place certain scraps in the freezer until refuse collection day, whereupon it is included with the regular garbage just prior to collection as a means of not attracting rodents, flies and animals. It is audacious to assume that, particularly in the present economic climate, 94,000 households, disadvantaged or otherwise, preparing chicken, fish and meats and produce daily, will reliably purchase plastic bags for disposing their scraps or other domestic garbage and that there will not be an increase in illegal dumping of inadequately bagged litter, island-wide.

Terminating plastics altogether therefore, for an entire population without there being a readily acceptable and available alternative could proliferate direct danger to human health.

Plastic has already been shown to be a benefit to health care, but their use also has a very powerful and direct impact on the environment. The more that plastic that is produced, the more petroleum resins are consumed in a beneficial way. If these resins, which are a byproduct of the petroleum mining process, are not utilized, the excess polymers that produce the resins have to be burned as flare off in order to dispose of them. Discontinuing plastics on a global scale will usher in massive environmental problems with respect to atmospheric pollution and climate change. This is one of the reasons why **B2N**[®] Degradable products are produced using only pure virgin resins as opposed to recycled resins, as this helps to reduce the level of carbon dioxide going into the atmosphere.

Dr. Hudson had some other brilliant ideas. He established a composting site at the FCT and wanted to see composting established in every community in Barbados and even in every household. He had made some forays into the surrounding neighbourhood to start this trend. Another site which was successfully established was at the then Casurina Beach Resort, then a member of the Almond group of hotel properties. There, organic material collected in degradable refuse bags and thrown onto the compost heap and broken apart with the equipment would vanish within days. The benefits he saw are that we would produce healthier produce and gardens by reducing the use of chemical fertilizers and the related import bill, and healthier people by reducing the impact of chemical fertilizers on the underground water reserve system and the morbidity and mortality associated with their use. It was a sustainable

approach that would secure employment for many entrepreneurs and could increase our earnings from exports of packaged organic fertilizer. He recognized that using degradable plastics could simplify the management of solid waste as compostable materials could be placed in a colour coded degradable bag for collection or composting, while recyclables could similarly be collected. The volume of refuse going into the limited landfill would be significantly reduced along with the associated management costs.

There is a mischaracterization with respect to Degradable plastic that plastic particles are being ingested by animals and / or humans. Plastic particles and micro particles are derived from the many other applications of plastic polymers in use today such as clothing, carpeting, drapery, furniture, insulation and various others, where abrasion and practical use lead to mechanical erosion of the fabric or fibers. Micro particles or micro plastics pollution found in the sea, and elsewhere in the environment are caused by the mechanical breakdown of these conventional plastics over many decades. Degradable plastics are, however, not at all common in most parts of the world. There is no evidence to show that Degradable plastic will create more micro plastics than other types of plastic such as starch based materials, particularly if they are adequately discarded.

There is much debate about the total carbon, fossil fuel and water usage in manufacturing bioplastics from natural materials and whether they have a negative impact to human food supply. To make 1 kg (2.2 lb) of polylactic acid, the most common commercially available compostable plastic, 2.65 kg (5.8 lb) of corn is required.^[12] Since 270 million tonnes of plastic are made every year,^[citation needed] replacing conventional plastic with corn-derived polylactic acid would remove 715.5 million tonnes from the world's food supply, at a time when global warming is reducing tropical farm productivity - Source - https://en.wikipedia.org/wiki/Biodegradable_plastic.

Attempts by very large influential companies which had experimented with photo-degradable and bio-degradable technologies in the past (70's – 90s) were unsuccessful. A regular **B2N**[®] Degradable plastic bag tossed into a compost heap with or without compostable waste inside will completely degrade within hours or at most 7 – 10 days, depending on how the compost heap is managed. **B2N**[®] Degradables are compostable but such claims cannot be legally made in the US which is heavily regulated as it relates to the marketing of degradable plastic.

These are just some of the benefits to be derived from the use of Degradable plastic. Of course there are others. One such would be the use of longer life reusable Degradable bags which would be inexpensive, easy to fold and could be retained for several trips to the supermarket.

Conclusion

Plastic has served hygiene and other purposes well over the decades and there should be no rush to dispose of it in favour of the many uncertainties and risks that will accompany any other medium at this time. Degradable plastic is the most beneficial option that there is. Unlike biodegradable plastic it retains all the excellent properties of conventional plastic and ceases to exist after its useful life which is pre-programmed at the time of manufacture. It is the least demanding on energy and other resources to produce and is competitive in price to conventional plastics. It has been used in Barbados and the Caribbean for two decades to date.

Please visit the following unassociated website:

https://greenliving.lovetoknow.com/Why_Should_We_Not_Ban_Plastic_Bags.

All **B2N**[®] Degradable Plastic products are made with **EPI**[®] **TDPA**[®] additives.