AdeptPackaging
ENGINEERING PACKAGING EXCELLENCE

Choosing the Right Design for Sustainability

Packaging Design with a Sustainable Mindset

An Adept Packaging White Paper

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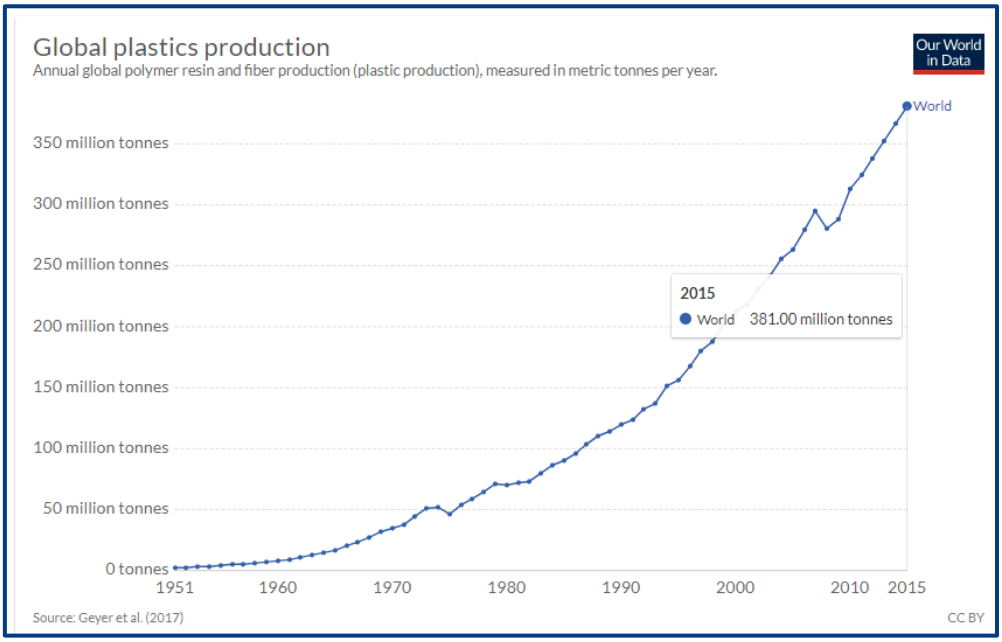
Choosing the Right Design for Sustainability

More than ever, packaging design is in the eye of the storm. For many years, cost was the driving force behind packaging decisions, but over the course of the last decade, sustainability has played a growing role in many brands' packaging decisions.

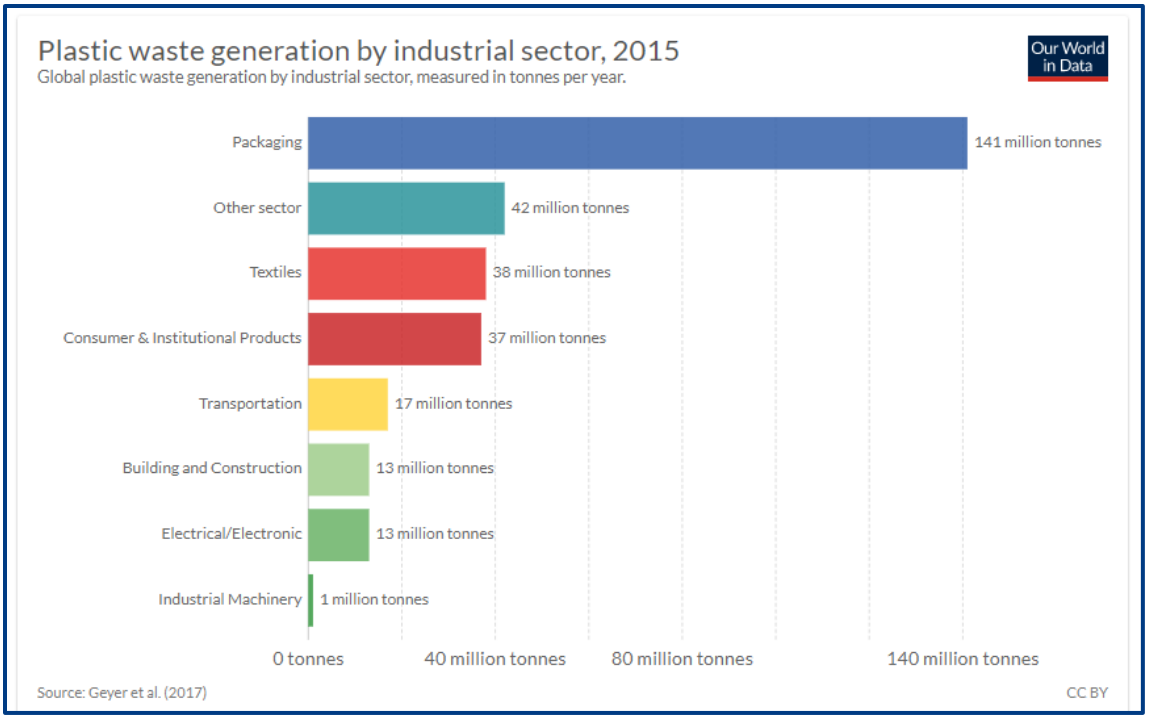
Every packaging material has its own sustainability advantages and environmental consequences. Glass is highly recyclable, but costly to produce, and its weight means high carbon emissions from transportation.

The energy cost to produce virgin materials for Paper and cardboard is high, and while both are highly recyclable, those advantages only extend as far as consumers' ability and willingness to recycle. Aluminum is lightweight and easy to recycle, but processing virgin materials is energy intensive and the environmental consequences of mining the necessary ore are considerable.

For many years, plastics have been the go-to packaging material because it is inexpensive to produce, but widespread reliance on plastic for packaging has consequences that become more apparent by the day. Production of plastics has steadily increased since 1980,



Source: https://ourworldindata.org/faq-on-plastics



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Benefits and Challenges of Plastic

While it is important to recognize that production of plastics continues to increase, it is also important to understand the advantages of producing and working with plastics, factors which drive the increase.

Benefits of Plastic

While plastic is often viewed as harmful to the environment, it also brings many benefits to society, the economy and even the environment, as laid out by the site Better Meets Reality:

- Very versatile material in terms of the shapes and sizes into which it can be molded and cheaper to produce than most alternatives.
- Light in comparison to other packaging materials, reducing the cost and emissions associated with transportation. Plastic parts also make automobiles lighter and more fuel efficient.
- Keeps food safe and hygienic, minimizing food waste.
- Used in the health field to keep medical instruments sterile and safe.
- Helps with the manipulation, storage and transportation of some hazardous materials.
- Viable beyond its single-use reputation. In construction, for example, many plastic materials can be reused many times over the course of decades.
- Takes up less space in a landfill than paper.
- Can save a lot of resources in the textile industry in comparison with using cotton, wood or other land grown fibers.

- Useful for plumbing and piping that helps with human sanitation and hygiene.

Challenges of Plastic

There is also, of course, a huge negative impact from this exponential increase of plastic production.

- Pollution accumulates on land and in oceans and rivers.
- Pollution from plastics can harm animals if they eat it, get tangled or are otherwise injured by it.an opportunity to challenge any preexisting assumptions or biases driving those decisions and find opportunities to save on costs.
- Microplastics have been detected in water supplies and food, such as seafood. It can also leach from drink bottles. However, the real impact of microplastics to the environment, animals and humans is still not fully understood.
- Some plastics, such as PVC, have demonstrated toxic output. Apart from being difficult to dispose of and recycle, exposure to PVC can lead to contact with phthalates, with can cause severe health effects.
- BPA can be found in polycarbonate plastic in baby bottles, reusable water bottles and other common products. BPA can have an impact on the brain and prostate glands of fetuses, infants and children. Exposure to BPA can affect children's behavior and its link to increased blood pressure is currently being studied.
- Plastics are mainly non-biodegradable in comparison with other materials, requiring as many as 1,000 years to break down, in the case of plastic bags.
- Producing plastics requires the use of many resources, including petroleum. With collateral impacts as destruction of habitat, extraction of crude oil, security issues from the volatile countries where oil is produced, manipulation of chemicals within manufacturing processes (source: https://plasticevaluvationmadurai.wordpress.com/author/gliterringflowers/)
- Plastic waste management involves high cost.

Mitigating the Challenges of Plastic

Some of the negative impacts of plastics can be mitigated by recycling, but not all plastics can be recycled. The question of which types of plastic are recyclable is more complicated than many expect. To find out which plastics are recyclable, view this chart at Our World in Data. Additional problems regarding recycling plastics include:

- Plastics can only be recycled a limited number of times and, eventually, they can't go back into the recycling stream. The best-case scenario is that they end up in a landfill or an incinerator; worst case, they wind up as litter.

- Due to a variety of factors – the market value of recycled plastic, the energy requirements for the recycling process, the cost of recycling equipment, etc. – the recycling process is not always economically or environmentally viable.

Taking the pros and cons into account provides a thorough picture of a material that has been useful for a myriad of applications, but the global reliance on plastics creates an unsustainable situation. To address this complex problem, we need the participation of all society, including consumers, brand owners and government/regulatory bodies.

Cutting-edge sustainable packaging options have a direct cost (investigation, investment, production, collection, etc.), which makes it difficult for the aforementioned stakeholders to adopt and promote those new initiatives. Corporate metrics are a broader umbrella that covers not only to the package, but also the plants, property and equipment that an organization operates.

Design for sustainability

There are two ways one can think about designing or redesigning products and packaging to be more sustainable. First, it is important to think about ways to revamp existing resources to minimize waste and maximize the sustainability of the systems currently in place. Check if the materials currently used on packaging lines are recyclable. Common materials that can be recycled include:

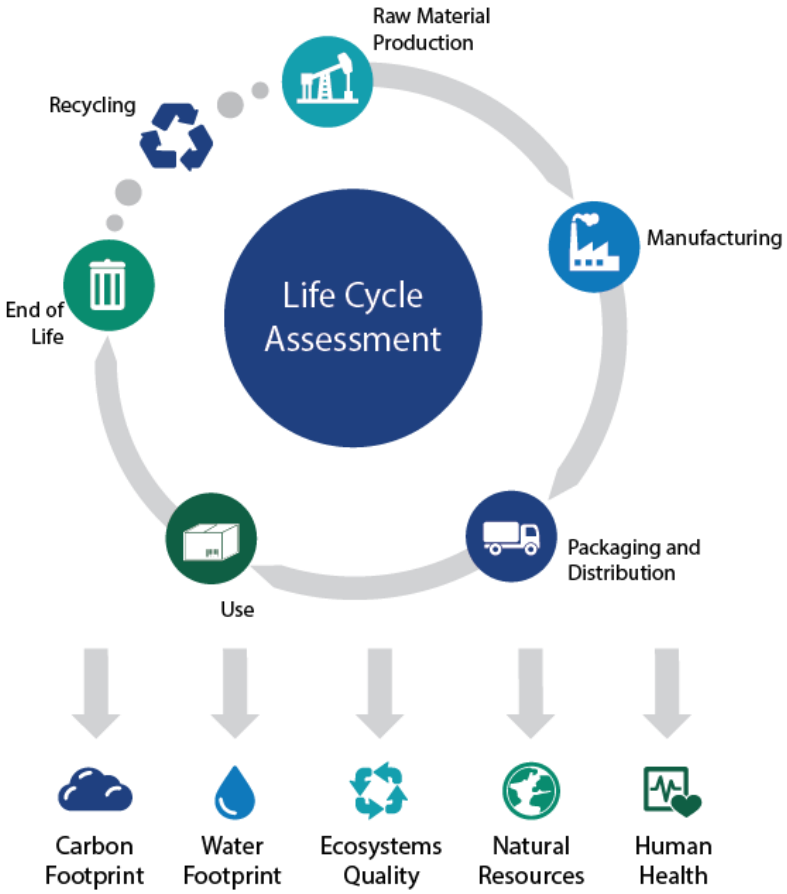
- Polyethylene terephthalate (PET)
- High-density polyethylene (HDPE)
- Aluminum
- Glass
- Paper
- Paperboard

Evaluate materials used throughout the distribution cycle of your packaging, including tertiary packaging. Review the sourcing of your packaging material and look for more sustainable sources.

While reviewing existing systems is an important step to improving the sustainability of product packaging, achieving significant improvement likely means designing new systems that prioritize sustainability.

Many companies get stuck on the end-of-life of a package, but to determine how sustainable an existing system is, obtaining a comprehensive view of the packaging's life cycle is vital.

Conduct a Life Cycle Assessment



Recreated from: https://quantis-intl.com/metrics/footprints-lca/product/

While a Life Cycle Assessment (LCA) is most commonly used for new product development, it is also a good starting point for revamping the packaging of current products. This method is a measured approach to evaluating each step in the life cycle of a product and its packaging, focusing on inputs (e.g. energy, water, raw materials, etc.) and outputs (e.g. waste, emissions, etc.)

As demonstrated in the graphic above, the phases of a products life cycle include:

- **Raw material extraction and production** – All materials used to manufacture the final product come from a previous activity, which may require its own packaging and have an impact on overall sustainability.
- **Manufacturing** – Many of the steps involved in the fabrication and assembly of parts that comprise the finished product may have their own packaging needs.
- **Packaging and transportation/distribution** – The way a product is packaged and shipped plays a significant role in overall sustainability.

- **Use phase** – While product use may have its own sustainability considerations, it has little impact on the sustainability of the packaging unless use complicates package recyclability.
- **End of life** – The way users dispose of packaging after the product reaches their hands is one of the most impactful factors on sustainability and includes many of its own considerations. Choices made in the design phase play a major role in the ultimate destination of the packaging, including the landfill, a recycling facility, reuse as part of a circular economy or becoming litter.

This analysis is a complex exercise that provides a thorough picture of all inputs and outputs of packaging throughout the product's life cycle. Evaluating each step of the process in this level of detail highlights opportunities to reduce waste, improve efficiency, and redesign or substitute each component to optimize sustainability.

Evaluate All Packaging Components

- In order to optimize recyclable capabilities of the packaging, it's important to evaluate even the smallest of its components, including coatings, sleeves, labels and plastic lids, among others. Whenever possible, make all materials recyclable and of the minimal thickness that still achieves aesthetic and protective goals, and use water-soluble coatings when possible.
- In addition to the packaging used for each individual product, the secondary and tertiary packaging used throughout the distribution environment must also be reviewed to find opportunities to increase sustainability. UK-based sustainability group Wrap outlines the key elements to considered when optimizing secondary and tertiary packaging for sustainability and cost efficiency, advising packaging departments to:
- Understand the needs of the product in terms of integrity, functionality, safety and aesthetics till end of his life (including consumer usage).
- Understand the complete supply chain, including manufacturing/filling operations, distribution, retail and consumer use.
- Collect and analyze data about critical performance in consultation with suppliers and other stakeholders, and work when possible in cross functional teams.
- Test packaging to ensure all needs are met once a sustainable solution is identified.
- Review performance, effectiveness and potential saving of your secondary and tertiary packaging every two years.

Sustainable packaging resource Greener Package provides a detailed example of this process from Unlimited Water Processing, Inc, which made a switch from shipping bottled water in corrugate to a shrink-pack technology called The Nested Pack™. This change reduced the total cost of packaging to about 35 cents per case and made their packaging more efficient in terms of palletization and easier to dispose.

Evaluate Reusable Packaging Options

It's possible for many types of packaging to be reused, either for the same purpose it was originally intended or for a different purpose, provided it is both useful and aesthetically appealing enough to prompt the end user to repurpose it. According to a report from the Ellen MacArthur Foundation, up to 20% of plastic packaging could be reusable.

Reusability is a feature that extends beyond plastics as well. One great example is the Clever Little Bag by PUMA and designer Yves Béhar. In addition to its reusability, PUMA estimates Clever Little Bag reduces the brand's cardboard use by 65% and doubles as the bag in which consumers take shoe purchases home from its stores. further enhancing the packaging's sustainability.

Many elements beside the final product packaging that reaches the consumer are strong candidates for reusability, including secondary and tertiary packaging elements such as pallets, pallet collars, handheld containers, bulk containers, dunnage and wraps. Reusables provide benefits in addition to sustainability, including cost reduction and even ergonomic benefits from the use of durable, reusable goods.

Minimize Waste

Packaging should be considered from a holistic perspective, ideally during the product development phase, to identify opportunities to minimize waste. This can be done by reducing the amount of packaging, revamping logistics, optimizing packaging during shipping or incorporating reusable packaging elements. For example, many household cleaning brands have improved the sustainability of their packaging by focusing on product refills with reusable dispensers.

Review the Sources of Packaging Materials

An additional path to sustainability lies in acquiring packaging materials from responsible, sustainable sources. Transparency has increasingly become a major concern among CPG brands, as consumers now expect more visibility into where the products they purchase come from. Mattel went through this exercise more than a decade ago, when Greenpeace accused the brand of sourcing large amounts of timber from Indonesian rain forests. In response, it created a series of sourcing goals:

By the end of 2011, 70% of Mattel's paper packaging to be composed of recycled material or sustainable fiber and increase that goal to 85% by the end of 2015

Where feasible, use materials certified by the Forest Stewardship Council.

Consider Using a Single Material for the Entire Package

The fewer unique materials combined to create packaging, the easier it is to sort and recycle. This includes limiting or outright eliminating the use of glue and lamination, which makes it easier to separate and recycle packaging components.

Construct Packaging to Help Consumer Use All of the Product

Food packaging that helps the consumer use as much of its contents as possible not only reduces food waste, but also cuts down on the amount of cleaning the packaging will need before recycling, which increases the likelihood it will be recycled. Hellmann's approached this problem with its Easy Out! Mayonnaise packaging, which reduces waste and allows consumers to dispense the product more precisely.

Design Packaging for Assembly at the Manufacturer

This helps to reduce waste at the manufacturer stage, as packaging components that can be assembled early in the process cuts down on the wasted materials, reprocessing, etc.

Consider the Consumer Experience

Intentionally designing packaging that is easy for consumers to separate into individual components improves sustainability at the end of the packaging's life cycle. Ensuring the consumer understands how to separate and dispose each part of the packaging makes them more likely to dispose of it in a sustainable manner. Including a How2Recycle label helps with this communication.

Partner with Sustainable Packaging Experts

This paper is a provides an overview of actions brand owners and manufacturers can take to increase the sustainability of their packaging systems and make progress toward aggressive sustainability goals. Leveraging packaging experts with experience successfully designing and implementing sustainability initiatives can accelerate your efforts and help to ensure your sustainability program is optimized for cost.

Outside consultants can help execute a Life Cycle Analysis to audit your current level of sustainability and build an action plan that helps you to make your current activities more sustainable. Adept Packaging's sustainability subject matter experts have the resources, tools, and expertise to guide companies through any stage of their sustainability journey. From taking the first step to becoming a recognized industry leader.

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