White Paper

Understanding Plastic Alternatives
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The different types of plastic resemble an alphabet soup... PVC, ABS, PC, PET, PE, PS. What do these acronyms stand for? More importantly, what is the difference among them?

As we look at plastic alternatives to PVC, there are some that are more preferred for use than others.

Definitions and uses

**PVC: Polyvinyl Chloride** - One of the most common materials in construction products such as piping, siding, flooring and wall covering.

**PU: Polyurethane** - Primary uses include insulation and soft foam product such as carpet underlay.

**PS: Polystyrene** - Used for foam insulation and for hard applications such as cups and toys.

**ABS: Acrylonitrile-Butadiene-Styrene** - Hard plastic used in applications such as pipes, car bumpers and toys.

**PC: Polycarbonate** - Used for products like CDs and refillable milk and water bottles.

**PET: Polyethylene-Terephthalate** - Generally used in packaging such as bottles. In sheet form, PET is the primary material used to make credit and debit cards.

**PE: Polyethylene** - Used for bottles

**PP: Polypropylene** - Used for caps and lids

Ranking Plastics

The most preferred plastic is one manufactured from a sustainably managed bio-based resource, closed-loop recyclable and biodegradable. These would be products manufactured from bio-based plastics, or plastics made from plants. As this is still an emerging technology, few products exist at this point in time.

When looking at alternatives to PVC, consider the following:

- **Polyethylene (PE) and polypropylene (PP)** are the most preferred of fossil fuel-based plastics. These plastics are simpler polymer structures that do not contain any chemicals that are highly hazardous.

- **Polyethylene-Terephthalate (PET)** is made from materials that are a possible developmental toxin. It is more readily recycled versus other plastics and is a somewhat more preferable plastic.

- **Polystyrene (PS)** manufacturing involves known (benzene) and suspected carcinogenic substances.
• Polyurethane (PU) uses hazardous materials and creates hazardous by-products.

• Polycarbonate (PC) is manufactured from bisphenol A, a compound that is suspected to cause health problems, including breast cancer and male infertility.

• Acrylonitrile-Butadiene-Styrene (ABS) is a copolymer that uses three hazardous chemicals that are classified as potentially cancer causing.

Recycling rates of plastics

Another item to consider when selecting plastic products is the recycling rate. PET and HDPE have the highest municipal solid waste recycling rate of all plastics.

Looking toward the future

To more accurately and scientifically determine what products are more "green" than others, life-cycle assessments (LCA) need to be done on every building product. Life-cycle assessment is an examination of the total impact of a product’s environmental and economic effects throughout its lifetime, including raw material extraction, transportation, manufacturing, use and disposal.

Analysis of the life-cycle of a product is highly complex. Researching every step of the process and tracking the ripple effect on the environment, requires large investments of time and dollars. One manufacturer may have an LCA on their product but their competitor may not so the customer has nothing to compare the LCA results to.

Software programs exist that measure the environmental performance of building products by using the LCA approach but at this time they are limited because they focus on generic building materials versus specific products.

When testing standards and a cost-effective solution are established for companies to determine the LCA of their products, the question of what is "green" or not will be answered. Until then, manufacturers need to open with customers about what materials are in their products and what processes were used to manufacture it.
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