Disposable Drinking Bottles- Plastic vs. Glass vs. Aluminum

In Australia bottled and canned drinks represent big industry, generating more than $9 billion in revenue in 2012. While there has been a gradual shift in public opinion over the ecological effects of supporting these industries in recent years, time will be necessary for a massive shift in public opinion on the use of disposable containers. With Macquarie and a number of other institutes of higher learning across the globe moving to phase out the selling of disposable drinking bottles, it is our responsibility to determine which mode of packing has the least eco-cost, until further steps towards a plastic free campus can be taken.

- **Aluminum**- Aluminum is made from bauxite, mined from open-pit or dredging mines that have damaging environmental impacts. Australia is one of the world's biggest exporters of bauxite, and bauxite mining threatens sensitive ecosystems, while aluminum processing is water and energy hungry and produces a variety of pollutants. The majority of energy used for aluminum containers comes from the mining and producing of new aluminum, and although roughly 50% of the aluminum packaging in Australia is currently produced from recycled material, both mining companies and various drink companies are lobbying to do away with federal recycling programs like 'Cash For Cans'.

- **Glass**- Like aluminum and plastics, glass is also made from non-renewable resources – sand, silica and limestone. Although these are more plentiful and less environmentally damaging to extract than petroleum and bauxite, glass bottles still swing the eco-cost meter to high during manufacture because the elements require energy to heat them to 1200°C in a furnace. The weight of glass, compared to those of aluminum and plastic also needs to be taken into consideration, being that glass requires a substantial more amount of energy to transport.

- **Plastic**- Most plastic drink bottles are made from polyethylene terephthalate (PET). Like all plastics, PET is sourced from non-renewable petroleum and its extraction and manufacture leave yeti-sized carbon footprints. Although bottles containing recycled plastic are becoming more widely available, the majority is still formed from virgin plastic.

Although plastics are frequently regarded as one of the most environmentally unfriendly and unsustainable sources of packaging, unless the drinks and their containers are being produced locally, it appears that ***plastic is the most environmentally friendly of the three materials***. This was determined by taking into consideration the amount of energy used in the mining, transportation and manufacturing of these three materials.

Although aluminum is relatively light, the eco-cost from the destructive mining process cannot be fixed with recycling.

Heavy glass bottles, although they have the potential to create a closed looped system of production, being they are 100% recyclable, the energy required for manufacturing and transportation is too great when compared to plastics.

	GLASS	**ALUMINIUM**	**PLASTIC** (PET)
Average Weight per Container (g)	140	14	20
Melting Point (degrees/f)	2700	1100	2700
Specific Heat (j/g)	0.84	0.9	1.2
Energy Required per Container (kJ)	76	9	9
Material's Recyclable Potential	100%	100%	30%
Average Amount Currently Recycled	50%	50%	60%

Research and report compiled by Cody Spencer, on behalf of the Macquarie University Sustainability Team

Sources

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