The Down-cycling of Plastic Bottles

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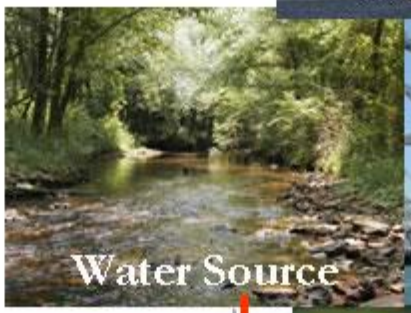
Plastic Bottles Come from Virgin Sources

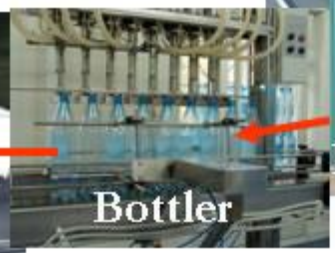
- PET = Polyethylene Terephtalate: Petroleum & Natural Gas
- Oil Extraction: Middle East, Nigeria - Environmental & Social Issues
- Shipped to Refineries: mix HC's from crude oil w/ chemical catalysts triggering polymerization - forms plastic pellets

Plastics are sold on open market as Commodities (subject to Supply & Demand)

- Brokers buy virgin plastic pellets and sell to manufacturers
- Manufacturers (i.e. China) melt pellets into “pre-forms” (small test tubes) by heating ~270’C and mixing them to form homogenous paste, than reheat ~100’C w/ infrared lamps to regain plasticity. Bottling Companies purchase “Pre-forms”
- Bottling Companies (i.e. Coca-Cola) stretch and blow mold the “pre-forms” under high pressure to create the bottles’ final shape. Bottles must be sterilized for FDA regulations and than they are filled, capped, labeled, packed into cases, and prepared for shipping to consumer.

Life Cycle of a Plastic Water Bottle





Back2Tap

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Plastic bottle pre-forms.

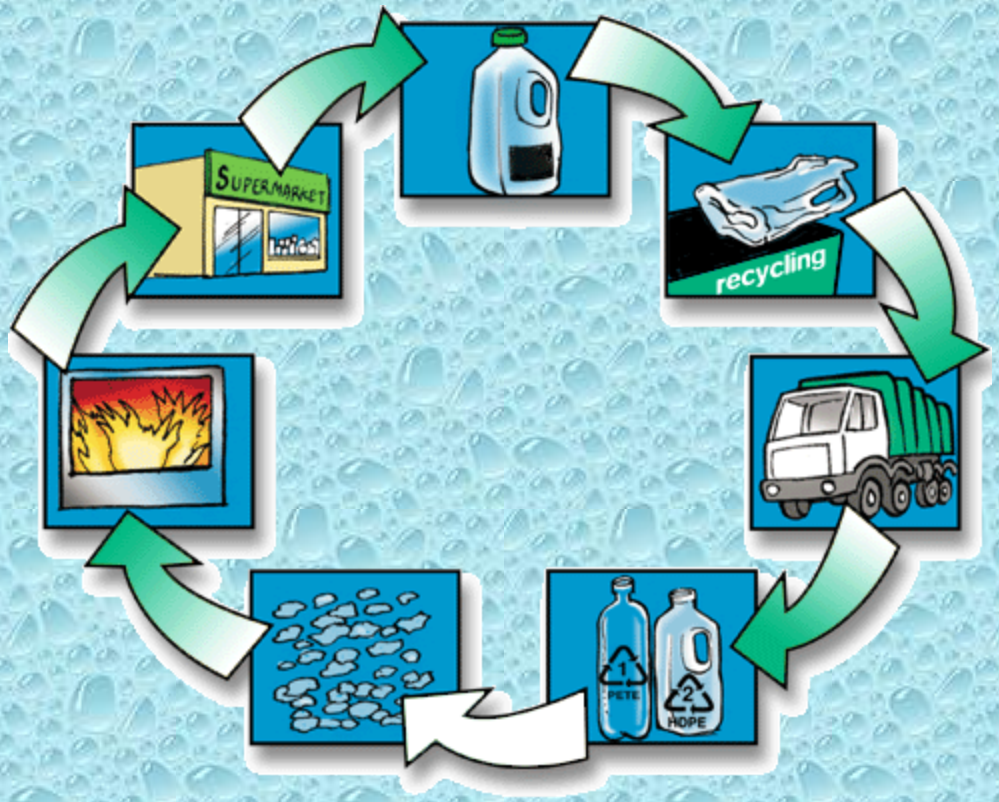
Pre-form molds.

Consumers: Intermediary part of the Cycle

- Dept. of Conservation provides incentives for consumers to recycle their “Redemption Value Containers”
- CRV = $0.05 < 24 oz/ $0.10 > 24 oz.
- Plastic Bottle Recycling is on the Rise but not as high as it should be
- More than 2.3 billion pounds of plastic bottles were recycled in 2007. Although the amount of plastic bottles recycled in the U.S. has grown every year since 1990, the actual recycling rate remains steady at around 24 percent. (earth911.org)

- Consumer places in recycling bin, recycling is collected (usually by waste hauler) and further sorted to remove garbage, caps and separate colors. The used plastic bottles are then crushed and baled into large squares each weighing about 2,000 lbs.
- Bales of petroleum are sold by the recycler to a broker (again on the open market as a commodity). The recycled petroleum must compete w/ Virgin petroleum on the open mkt. Currently ~ $0.10-$0.12/lb (current projection - Waste & Recycling News Sep 2009)
- Demand for recycled petroleum is in China (~40%) due to concentrated manufacturing practices overseas. One reason why recycled is most popular in western states (CA/Oregon) because we have closest/easiest access to Asian markets.

- Actual recycling Process: Bottles are crushed, washed, floated, sorted and granulated into chips which are then sterilized and sold to companies which produce products from recycled plastics. Very difficult to re-recycle back into plastic bottles partly due to FDA regulations for "food grade" containers - most common forms are items that themselves cant be easily recycled : bottom of carpets, fleece, and plastic lumbar.
- * Coca-Cola is working to actually re-recycle their bottles w/ a partnership w/ a national rry company and a patented process called UNPET. They plan to have all of their plastic bottle packaging to contain 10% recycled petroleum by 2010 and 25% by 2015. The Plant, operated by United Resource Recovery Corp. is located in South Carolina and plans to purchase 98% of its petroleum from curbside recyclers on the open market. Coca cola plans to purchase 40-60% of the output and 3 other bottling companies will purchase the rest. The plant offers some new technology that require less energy input and produce a higher grade plastic, hence the "food grade" quality. They have similar plants in Mexico, Austria, Germany, UK, Switzerland, Phillipines, France. This plant will be the largest petroleum recycling plant that produces food-grade plastic in the world.
- http://www.urrc.net/new/pdf/PlasticsNews-webpage.pdf


SUPERMARKET
recycling
1
PETE
2
HDPE

- **Conclusion**
- **Although plastic water bottles are convenient, hygienic, and durable - they still require magnificent amounts of energy input in the forms of drilling & refining of oil, transportation (i.e. middle east to refineries to China to US and back to China and back to US), water use for extraction and washing, electricity for extraction, refining, manufacturing and transport, etc.**
- **Plastic bottles clearly complement our "on the go" lifestyle, but unfortunately this means many bottles usually somehow some way find themselves littered among our speedways along w/ a significant amount of other trash - much of it plastic.**
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- Alternatives to plastic bottles are of course, reusables - glass & metal. Although these containers also require significant amounts of energy and water to manufacture and to reuse.

- Although it is a good feeling to recycle, we must be aware that the actual recycling process is not ideal and there needs to be more technological innovations (such as the new Coca Cola plant) in order to lessen the impact of the tremendous environmental externalities associated with recycling, especially in plastics.

- With companies like Coca-cola leading the way in recycling technology, we have more to look forward to at least feeling a little better about using our convenient single-use containers.
- What can you do?

- *Five Strategies to Reduce the Environmental Impact of Plastics*
- **1. Reduce the use**
  2. Reuse containers
- **3. Require producers to take back resins**
- **4. Legislatively require recycled content**
- **5. Standardize labeling and inform the public**

Visit our Appropedia page!

- http://www.appropedia.org/Plastic_bottles

Where recycling is SO 1970.

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