

Packaging

A. Materials and Impact on Landfills

Facts:

- Coffee is kept freshest if packed either in steel cans or in vacuum brick packs.
- Steel is 45% recyclable (meaning 55% of it winds up in landfills and 45% can be re-used for other products.)
- Vacuum brick packs can not be recycled.

Options:

Packaging 65 pounds of coffee requires either 20 pounds of steel, or 3 pounds of vacuum brick pack material.

Problems:

1) What is the amount (weight) of material that will wind up in the landfill for each packaging choice?

2) What does the % recyclability of the steel need to be to produce the same amount of waste as the vacuum brick packs?

B. Buying in Bulk

Facts:

- A 33-ounce box measures 6 inches high by 6.5 inches wide by 3 inches deep
- A 132-ounce box measures 9 inches high by 9 inches wide by 5 inches deep.

Problems:

1) How many square inches of material is required if you purchase 264 ounces of detergent in the small, easy to manage 33 ounce packages?

2) How many square inches of material is required if you purchase 264 ounces of detergent in the large, bulk size 132-ounce packages?

Electronics Industry & Energy

1. Your company produces and sells cathode ray tube (CRT) video display monitors. You produce 1 million units per year. Your company is looking to differentiate itself from the competition and marketing research shows that if your customers are “Greenback Green” and “Sprouts” and that by selling your monitors as environmentally friendly you may pick up some market share. Your R&D people decide that



you should move into production and sale of flat panel display (FPD) monitors because they use less energy and don't contain some of the toxic materials present in CRTs (mercury, lead, etc.). In doing the comparison between the two product lines (assume number of units will remain at 1 million), you determine the following:



- Energy usage by the CRT when it is active is 240 watts
- Energy usage by the FPD when it is active is 65 watts
- Both units have a “sleep” mode (inactive) with power consumption of 3 watts
- Usage for both are: 24 hrs/day, 365 days/year, 25% of the time is active, 75% of the time is in sleep mode
- Average electricity rates are \$0.15 per kW-hr
- The use of electricity produces global warming gas emissions, primarily in the form of carbon dioxide (CO₂). The average generation of electricity in the country is as follows:
 - Natural gas, 30%, produces 0.5 Ton CO₂/MWhr
 - Coal-fired, 50%, produces 1.1 Ton CO₂/MWhr
 - All others (hydro, nuke, wind, solar, etc.), 20%, produces 0.1 Ton CO₂/MWhr
- The retail sale price for a CRT is \$200 and the price for a FPD will be \$400.

Determine the following:

- a) Total power used by 1 million VDUs for CRTs and FPDs?
- b) How much CO₂ produced per 1M VDUs of CRTs and FPDs?
- c) How much CO₂ could be reduced?

Extra credit: how long will it take for a consumer to make up for the additional cost to buy an FPD vs. the CRT just from cost of electricity?

[show your calculations]