

For more than a decade, WRI's Sustainable Enterprise Program (SEP) has harnessed the power of business to create profitable solutions to environment and development challenges. BELL, a project of SEP, is focused on working with managers and academics to make companies more competitive by approaching social and environmental challenges as unmet market needs that provide business growth opportunities through entrepreneurship, innovation, and organizational change.

Permission to reprint this case is available at the BELL case store. Additional information on the Case Series, BELL, and WRI is available at: www.BELLinnovation.org.

THE PROCTER & GAMBLE COMPANY: Disposable and Reusable Diapers – A Life-Cycle Analysis

When the Procter & Gamble (P&G) Company unveiled Pampers disposable diapers in the 1960s, consumer products manufacturers and parents considered it the product breakthrough of the decade. By the early 1990s, P&G's invention contributed over 18% to the company's annual revenues of \$24 billion. The product has also presented consumers with a decision that has generated significant attention in recent years: which type of diapers to use--disposable or reusable? Used by environmental and consumer advocate groups as a symbol of the "throw away" mentality, disposable diapers account for 1-3% of America's yearly trash output, or 3.6 million tons. In an effort to deflect criticism, P&G decided to take matters into its own hands. In 1990, the company commissioned Arthur D. Little, Inc., an international management and technology consulting firm specializing in environmental issues, to analyze the full range of environmental impacts, or to conduct a "life-cycle analysis," of both types of diaper to settle the debate

Life-Cycle Analysis

Life-cycle analysis (LCA) is a tool to measure and inventory the full range of environmental impacts associated with the inputs and outputs of raw materials, energy and waste during the life of a product--from the acquisition of raw materials, material manufacture, final product fabrication, packaging and distribution, to consumer use and disposal. LCA is a total process and product mapping methodology. See **Figure 1**.

LCA is often used to compare two similar products in order to assess which is environmentally favorable. However, such a comparison presents three major difficulties. First, LCA analyses rarely determine that one product is environmentally favorable in every category of environmental impact.

Second, LCA studies typically measure different sorts of things, producing results which are largely inconclusive. And third, processing the information obtained from an LCA requires managers to weigh qualitative and quantitative data. Evaluations range from determining the health and environmental risks associated with a particular waste stream to choosing whether reducing air pollution is more important than reducing water pollution.

Many environmentalists argue that LCA misses the point altogether. Such is the belief of Barry Commoner of New York University, who criticizes LCA and similar tools because they put "a badge of legitimacy on existing levels of pollution," rather than questioning whether that pollution is justifiable from society's perspective.

The Diaper Life-Cycle Analysis

Researchers at Arthur D. Little began their task by determining a prototypical weight and size of both a disposable and reusable diaper and gauging the weekly usage rates of each. They also mapped the life cycle of each, as illustrated in **Figures 2** and **3**.

In constructing the life-cycle diagrams, Arthur D. Little staff made a number of simplifying assumptions concerning the ways in which diapers are used and disposed:

- 1) *The number of daily diaper changes is the same for both disposables and reusables:* The researchers assumed the same frequency rate of changes for both types of diapers, although disposables, due to their greater absorbency, generally require fewer changes.
- 2) *90% of all reusables are laundered at home:* The researchers assumed that only 10% of consumers using reusable diapers subscribe to a diaper service. However, other estimates have placed this figure at a higher percentage.

Arthur D. Little emerged with the following results:

Life-Cycle Analysis of Disposable and Reusable Diapers
(based on weekly diaper needs)

<u>Category</u>	<u>Disposable</u>	<u>Reusable</u>
Raw Materials Consumption (lbs)	25.30	3.60
Energy Consumption (Btu)	23,290.00	78,890.00
Water Consumption (gal)	23.60	144.00
Atmospheric Emissions (lbs)	0.09	0.86
Waste Water Effluents (lbs)	0.01	0.12
Process Solid Waste (lbs)	2.02	3.13
Post-Consumer Waste	22.18	0.24
Total Costs (\$/week)	10.31	7.47-16.92

Questions:

1. Put yourself in the position of the leader of the Arthur D. Little project team that must recommend one type of diaper over the other. Are all of your assumptions correct? Which diaper would you recommend, based on the data?

2. In addition to the environmental information, the study also included an analysis of both the health and the economic implications of each diaper type.

- *Health:* Disposables were found to cause, on average, less incidence of diaper rash (caused by contact between skin and urine) than reusables.
- *Economic:* To calculate the cost to the consumer of using each type of diaper, the research team had to make some assumptions about the cost of washing reusable diapers. It found that when home labor was valued at the minimum wage or higher, disposable diapers were cheaper to use than reusables.

Are the assumptions regarding diaper economics correct? Do the health and economic data change or influence your decision? Should they?

3. Put yourself in the position of the vice president of the diaper division at P&G. P&G was recently rated the most “environmentally conscious” company in an *Advertising Age* survey and yet, the state of Vermont has proposed a ban on disposable diapers. What, if any, action should you take?

References:

Arthur D. Little, Inc., *Disposable versus Reusable Diapers: Health, Environmental, and Economic Comparisons*, report to Procter and Gamble, March 16, 1990.

Society of Environmental Toxicology and Chemistry and SETAC Foundation for Environmental Education, *A Technical Framework for Life-Cycle Assessment*, Workshop Report, January 1991, p. xvii.

David Stipp, “Life-Cycle Analysis Measures Greenness, But Results May Not Be Black and White,” *Wall Street Journal*, February 28, 1991.

Figure 1: Life-Cycle Analysis

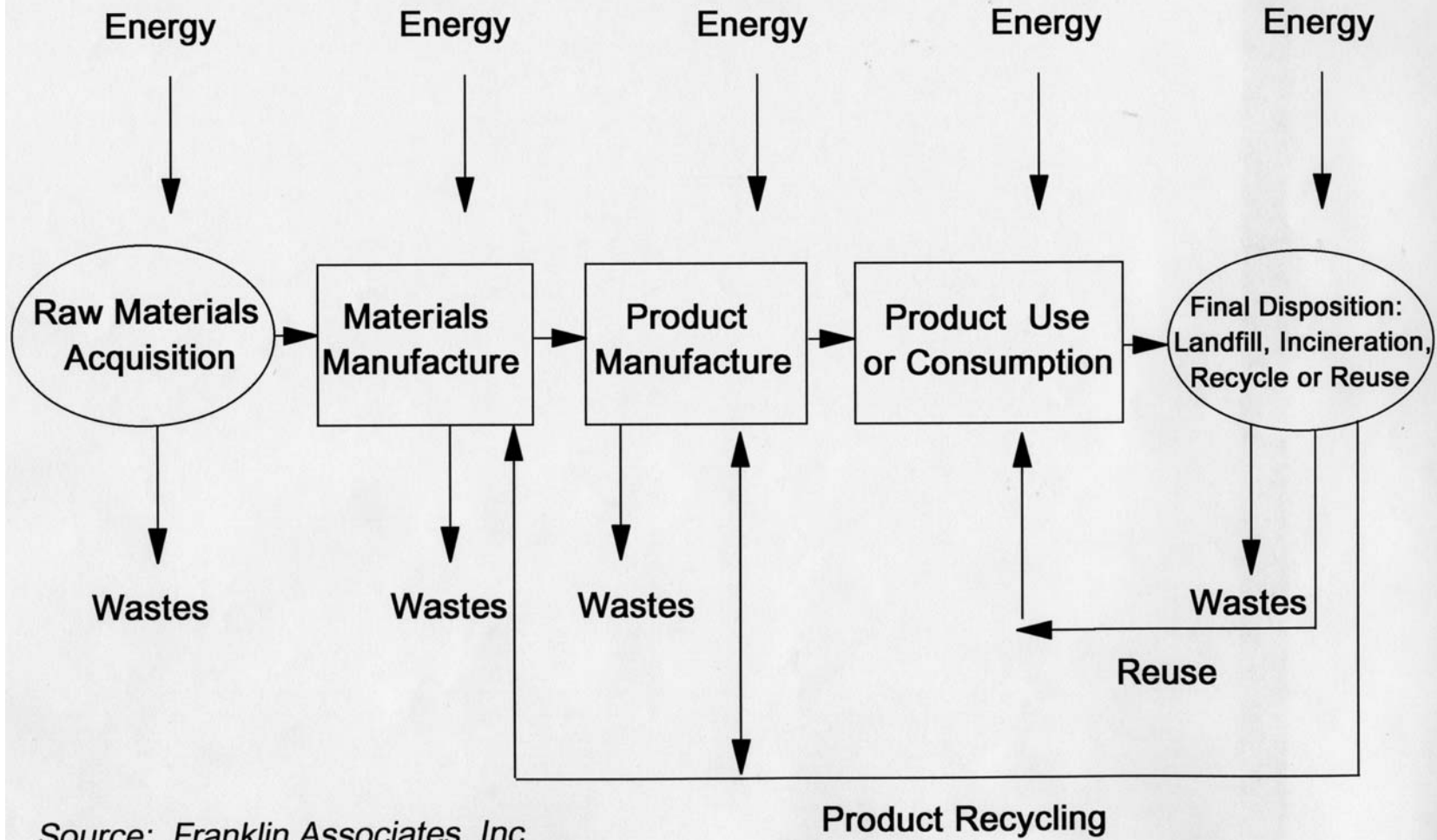
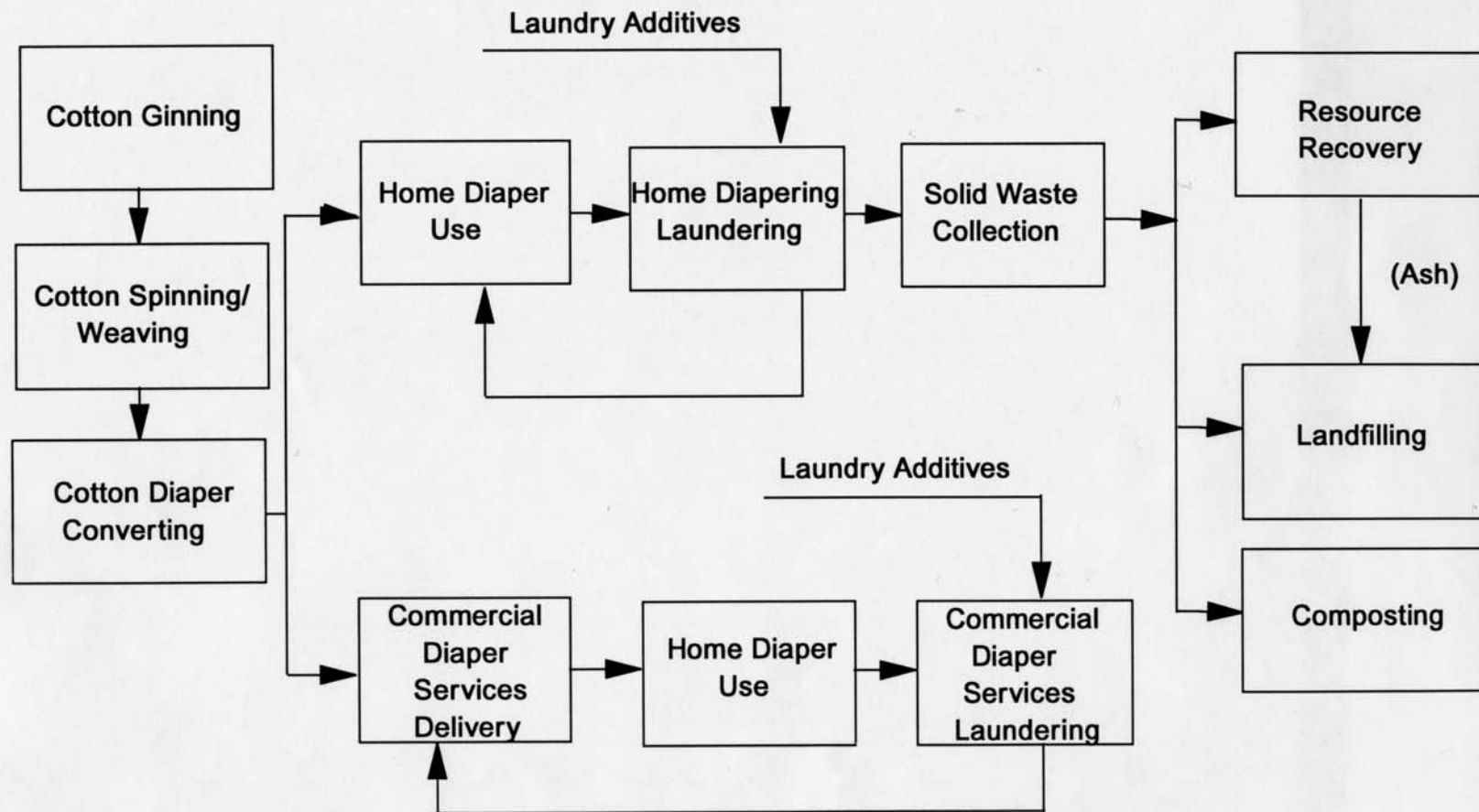
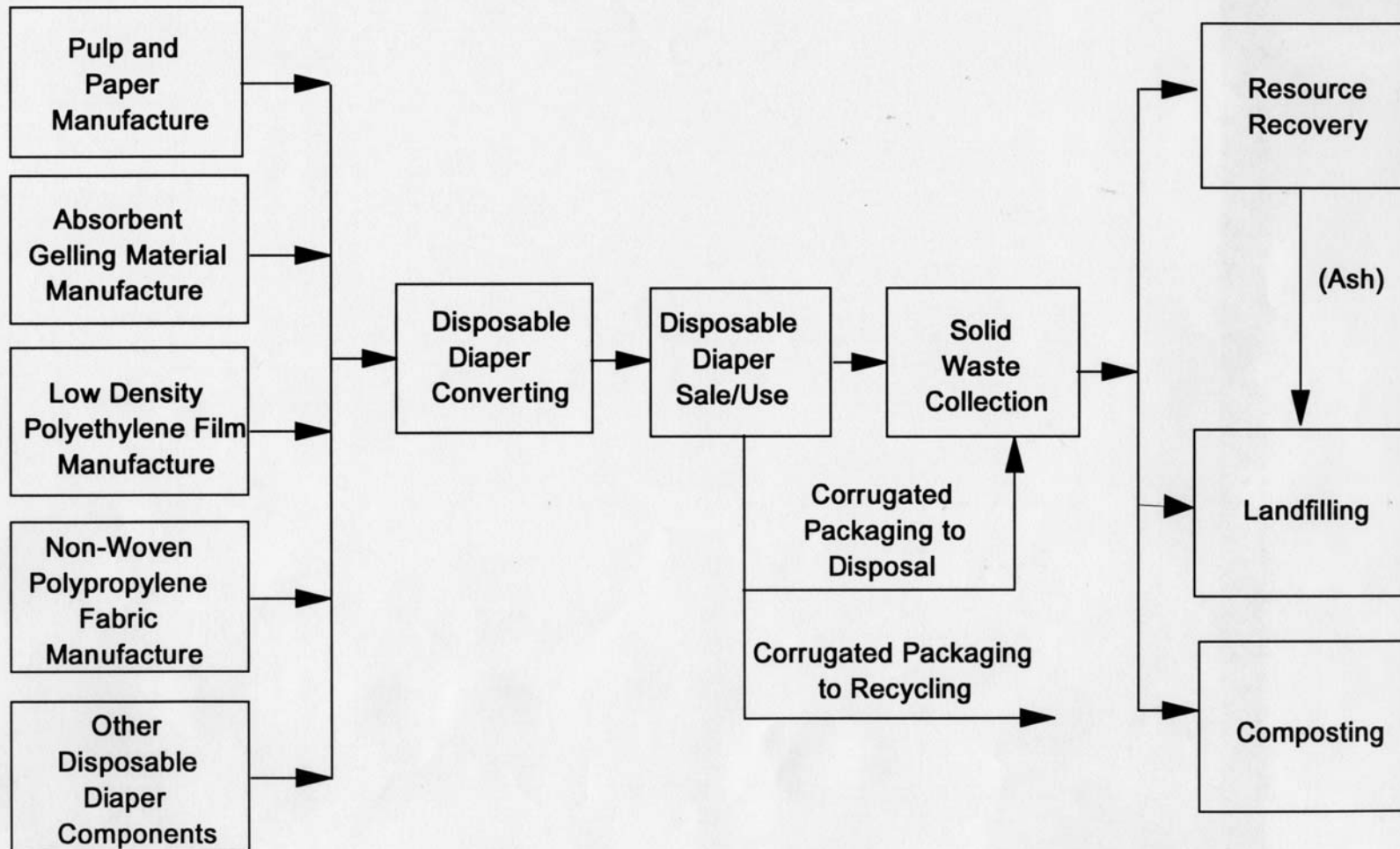


Figure 2: Reusable Diaper Life Cycle Analysis



Source: Arthur D. Little, Inc.

Figure 3: Disposable Diaper Life Cycle Analysis



Source: Arthur D. Little, Inc.