

2.9: Waste Prevention

Waste prevention is better than having to treat or clean up wastes. In the earlier years of chemical manufacture the direct costs associated with producing large quantities of wastes were very low because such wastes were simply discarded into waterways, onto the ground, or in the air as stack emissions. With the passage and enforcement of environmental laws after about 1970, costs for waste treatment increased steadily. For example, General Electric announced in April, 2010, that it had spent \$561 million in the first phase of dredging and removing PCBs from deposits in Hudson River sediments produced decades earlier when the extremely persistent PCBs were discarded to the river as wastes from the company's manufacture of electrical equipment. The cost of the second phase of cleanup of these wastes was projected to be much more than the \$561 million already spent. The cleanup of pollutants including asbestos, dioxins, pesticide manufacture residues, perchlorate and mercury are costing various concerns hundreds of millions of dollars. The eventual cleanup costs from the 2010 BP Deepwater Horizon oil well blowout in the Gulf of Mexico may eventually exceed the \$20 billion that the company initially set aside for the project. By the year 2000 in the United States, costs of complying with environmental and occupational health regulations had grown to a magnitude similar to that of research and development for industry as a whole. From a purely economic standpoint, therefore, a green chemistry approach that avoids these costs is very attractive, in addition to its large environmental benefits.

Although the costs of such things as engineering controls, regulatory compliance, personnel protection, wastewater treatment, and safe disposal of hazardous solid wastes have certainly been worthwhile for society and the environment, they have become a large fraction of the overall expense of doing business. Companies must now do **full cost accounting**, taking into account the total costs of emissions, waste disposal, cleanup, and protection of personnel and the environment, none of the proceeds of which go into the final product.

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