

Chapter 9

Mystery of Recycling: Glass and Aluminum Examples

Yasin Galip Gencer
Bogazici University, Turkey

ABSTRACT

Recycling is a key component of modern waste reduction and is the third component of the “Reduce, Reuse and Recycle” waste hierarchy. Recycling and/or waste minimization is a prerequisite for sustainable value and green environment. Recyclable materials include many kinds of glass, paper, metal, plastic, textiles, and electronics. The composting or other reuse of food is also considered recycling. This chapter starts with an expanded definition of recycling; afterwards, the recycling processes of glass and aluminum are examined in detail. Besides recycling, for a green environment the necessity for reducing and reusing of waste is also considered. Another topic will be the myths of recycling-unknown realities about recycling process. Furthermore, types of recycling and cost-benefit analysis will be explained. Ultimately, the chapter will be concluded by criticisms about recycling, and potential areas for further discussion.

RECYCLING

Definition and Scope

Recycling and/or waste minimization is a prerequisite for sustainable value and green environment. This chapter starts with an expanded definition of recycling; afterwards, the recycling processes of glass and aluminum are examined in detail. Besides recycling, for a green environment the necessity for reducing and reusing of waste is also considered. Another topic will be the myths of recycling-unknown or misknown realities about recycling process. Furthermore, types of recycling and cost-benefit analysis will be explained. Ultimately, the chapter will be concluded by criticisms about recycling, and potential areas for further discussion.

Recycling, mainly driven by economic and regulatory factors, is performed to retrieve the material content of used and nonfunctioning products (Srivastava, 2007). Recyclable materials include many kinds of glass, paper, metal, plastic, textiles, and electronics. The composting or other reuse of food is

DOI: 10.4018/978-1-4666-9723-2.ch009

Mystery of Recycling

also considered recycling. Materials to be recycled are either brought to a collection center or picked up from the curbside, then sorted, cleaned, and reprocessed into new materials bound for manufacturing. Recycling can also be defined as a process to change waste materials into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, reduce air pollution and water pollution by reducing the need for conventional waste disposal, and lower greenhouse gas emissions as compared to plastic production.

Many types of waste can be retrieved by recycling material. Among the diverse types of waste, glass is one of the most valuable recycling materials because it can be revived and recycled completely and hardly decomposes. Recycled glass can be used for porcelain, building material, sidewalks, and asphalt roads. Glass recycling has many advantages such as the preservation of natural resources and minerals, reduction in energy consumption, and reduction in air pollution. If glass can be recycled effectively, the environment can be greatly improved (Furlani et al., 2010; Ismail & Al-Hashmi, 2009).

Recycling is a key component of modern waste reduction and is the third component of the “Reduce, Reuse and Recycle” waste hierarchy. Aluminum is also another product that is mostly recycled and reused. Aluminum recycling has a number of key environmental and economic benefits. Compared to other high volume materials, aluminum production has one of the largest energy differences between primary and secondary production: 186 MJ/kg for primary compared to 10–20 MJ/kg for secondary (Green, 2007). With energy and cost savings in mind, many producers now have targets of increasing their usage of secondary materials (2002; Alcoa, 2006). However, the accumulation of impurities in these recycled material streams provides a significant, long-term compositional barrier to these goals (Liu, 2003).

On the other hand, these processes have also important quality standards. The examples for such standards related to recycling are ISO 15270:2008 for plastics waste and ISO 14001:2004 for environmental management control of recycling practice. These standards are needed for more efficient and effective processes in terms of recycling.

Continuously increase in world population and changes on the habits of consumption demand on the materials leads to rapid decrease on natural resources. It is inevitable that these resources will be run out shortly by the high consumer demand. In order to use effectively the limited resources, some of countries have taken a number of decisions, contributing the effective consumption on the resources. One of the most important ways of preserving the resources has been recycling, which is a process of reusing the materials used before and waste materials which have no use. In order to preserve the resources for the future generations and crises on energy leads the countries to take some radical action on energy and resources consumptions. All the material which can be reused such as asphalt, concrete, timber, paper, glass etc. has been reused for the same purposes or different. Especially construction industry has been a major resource for recycling to preserve and protect the environment. Unfortunately all this kind of preservation policy has no effective implementation. This chapter will underline the preservation policies and recycling carried out around the world.

Waste management has received in the last decades increasing attention. This is mainly due to the growing volume of waste produced, the scarcity of disposal areas and environmental protection. Lately, due to the harmful environmental effects of disposal, the emphasis has been shifting towards recycling. (Barros et al., 1998) Recycling is the process of remaking materials from ones that have already been used. It also means using the used materials as raw material. If a product is described as “recycled”, it means that it contains material that has been reprocessed. Most common materials recycled are paper, aluminum, plastic and glass (Go Facts Environmental Issues, 2006).

18 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/mystery-of-recycling/141895

Related Content

Energy Efficient Wireless Body Area Network (WBAN)

Prasenjit Maiti, Sourav Kanti Addya, Bibhudatta Sahoo and Ashok Kumar Turuk (2017). *Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications* (pp. 1093-1112).

www.irma-international.org/chapter/energy-efficient-wireless-body-area-network-wban/169626

Legislation for Solid Waste Management

Azhar Abdul Halim and Siti Hafizan Hassan (2016). *Control and Treatment of Landfill Leachate for Sanitary Waste Disposal* (pp. 24-42).

www.irma-international.org/chapter/legislation-for-solid-waste-management/141846

Big Data and Artificial Intelligence: Creative Tools for Destination Competitiveness

Sandhya H. and Bindi Varghese (2023). *Multidisciplinary Approaches in AI, Creativity, Innovation, and Green Collaboration* (pp. 155-166).

www.irma-international.org/chapter/big-data-and-artificial-intelligence/322875

A System Safety Analysis of Renewable Energy Sources

Warren Naylor (2017). *Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications* (pp. 1209-1219).

www.irma-international.org/chapter/a-system-safety-analysis-of-renewable-energy-sources/169631

GIS-Based Decision Support System for Village Level: A Case Study in Andhra Pradesh

Subbu Lakshmi Esakki Pandian, Kiran Yarrakula and Probal Chaudhury (2019). *Environmental Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 1384-1402).

www.irma-international.org/chapter/gis-based-decision-support-system-for-village-level/212998