

Environmental Life-Cycle Assessment in the Service Industries

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Introduction:

Industrial ecology, offering new insights and approaches to making the economy more sustainable and improving environmental quality, has focused mostly on manufacturing, neglecting services which compose 75% of the U.S. Gross Domestic Product (GDP). Most service industries (e.g., retail trade, banking) generate little pollution at the point of production (notable exceptions being transportation and public utility sectors) but are indirectly responsible for the majority of pollution and resource use through the products and fuels they purchase.

For example, consulting is a service industry which essentially has no direct environmental discharges. The large amount of travel associated with consulting does result in important resource use and pollution discharge from transportation sectors (e.g., airlines).

A greater understanding of the full economic, environmental, and sustainability implications of the service industries is needed for our society to make better informed choices and decisions.

Objectives:

Quantitative measures are being developed to measure the environmental impacts of the following service sectors:

- Telecommunications
- Tourism
- Trucking and courier services
- Retail trade
- Hotels
- Educational institutions

The life-cycle assessment (LCA) approach will be employed to identify and quantify the environmental implications of these industries throughout the lifetime of their products and services, as well as identify and quantify the direct and indirect economic, environmental, and sustainability implications of these industries.

Material and energy inputs will be assessed along with emissions and wastes (toxic discharges, hazardous waste generation, criteria pollutant emissions, greenhouse gas discharges, and ozone-depleting chemical releases) associated with the service economy.

Our objective is to provide metrics and analysis tools that can help define industrial ecology for service industries in our economy. Opportunities for environmental improvements of service sector outputs will be evaluated.

Approach:

Systems descriptions of the service industries are being developed to help identify the life-cycle stages and components of the service sectors, and ultimately to assess the environmental effects of each of these stages. The economic input-output life cycle analysis (EIO-LCA) model will be used to quantify the direct and indirect environmental effects of the service sectors.

Representative Publications:

“Supply Chain Environmental Assessment of the Telecommunications Sectors,” *Arpad Horvath*, Proceedings of the 1999 IEEE International Symposium on Electronics and the Environment, Danvers, MA.

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