The second main recommendation is to make an update of the database in regular intervals, e.g. five years. If such an update should be executed, the Peer Review should start again from the beginning, as recommended by SETAC [2].

The third recommendation of the Panel does not directly address the Sponsor, but the LCA-community and international bodies. It concerns the format of the international energy database, which should be harmonized (and filled with the best available data).

We also recommend that the procedure proposed by SETAC [2] should be considered within the framework of the ISO LCA-standardization process. The Peer Review is called "Expert Review" in a recent committee draft [13] as one way of conducting the "critical review process".

9 References


LCA Standardization

Life Cycle Assessment Standards

Industrial Sectors and Environmental Performance

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Abstract

The newly emerging LCA standards provide an opportunity to review and improve upon the current LCA methodology. As more industrial practitioners enter the arena, the opportunity arises to not only demand environmental improvement from industrial service and product providers but also to fill LCA data gaps. A framework is suggested for improvement in the current LCA framework that focuses on the business relationships of the industrial practitioner. The framework seeks to promote environmental improvement from industrial sectors through the identification of state-of-the-art technologies used throughout a life cycle. Basing LCAs on the best performers in an industry will create a market for a high level of environmental performance, disperse the responsibility of inventory data gathering, and improve upon the advancements already anticipated through the widespread application of LCA.

Key words: Life cycle assessment standards; LCA standardization; influence hierarchy; environmental performance; frontier analysis; valuation, LCA

1 Introduction

Although both public and private organizations have been involved in the development of life cycle assessment (LCA) for several years, the involvement of standards organizations such as ISO and ASTM promises to change the playing field. Lessons learned from the widespread application of total quality management (TQM) practices as a result of ISO 9000 provides some indication of what might be expected from emerging environmental standards. ISO 9000 provided a process for the improvement of all levels of firm operation by overcoming traditional discipline-specific barriers determined by both engineering education and firm organizational structure. Design engineers have become members of interdisciplinary design teams and have learned to apply such principles as design for manufacture, test, quality, use, and maintenance.
Particularly in the case of industrial practitioners, the emergence of LCA and other environmental standards promises further team building both within and between firms. Within firms, environmental engineers will be added to design teams and thus add impacts to human health and the environment to design considerations. Interactions between firms will come in the form of supplier mandates which would ideally cause the supplier to request changes from its own suppliers. Extending supplier-customer chains from cradle-to-grave builds into the current definition of a life cycle.

The newly emerging LCA standards provide an opportunity to review and improve upon the current LCA methodology. As more industrial practitioners enter the arena, the opportunity arises to not only demand environmental improvement from industrial service and product providers but also to fill LCA data gaps.

2 The Influence of the LCA Practitioner

Generally speaking, life cycle improvements identified through the application of LCA will entail either the substitution of the materials flows and technologies or the improvement of existing materials flows and technologies that make up all or part of a life cycle. The new LCA standards have the opportunity to invoke both types of improvements. The first type of improvement, the substitution of materials flows and technologies, represents very radical changes from a business perspective. In that environmental considerations do not hold all the votes in this type of decision making, changes of this type are often more difficult to implement. The second type of improvement, the improvement of existing flows and technologies, promises a more immediate response throughout industrial sectors.

Improving life cycle flows and technologies must work within the existing industrial market structure. Supplier-customer relationships within the market structure drive the level of practitioner influence. The true influence of the industrial LCA practitioner is not evenly distributed throughout the life cycle. Thus, an influence hierarchy is created. Industrial practitioners have the most influence over decisions made within their own firm and the least influence over decisions made by their customers.

Among a firm’s customers, an industrial practitioner has the least direct influence over decisions made. This assumes it is unlikely that the majority of industrial firms applying LCA, now or in the future, will choose their customers based on how the provided product or service will be used. Firms supplying products to a small number of customers are able to accurately inventory inputs and outputs. Excluding these businesses, products will likely be dispersed, often throughout a nation or the world. In this situation, the influence of the practitioner becomes one of effecting a range of use and final management scenarios. This can include improving product characteristics related to maintenance and life, reuse and recycle potentials, as well as a range of potential effects associated with waste management and mismanagement.

Among a firm’s material suppliers and waste managers, a practitioner can lead efforts towards service mandates. Suppliers can be asked to deliver products to desired specifications such as meeting tolerances, cleanliness, and packaging system requirements. Within an industrial practitioner’s own firm, a practitioner can lead technology improvement efforts. In this way, the practitioner can become the impetus for upgrade projects prioritized and implemented to afford real improvements from an environmental perspective.

As illustrated in Fig. 1, the influence hierarchy expands into a system life cycle. Each industrial practitioner represents both a product or service supplier and customer. As a product or service supplier, the ability to meet customers’ environmental specifications, whether or not prompted by standards registration, should increase a firm’s business market. As a customer, a firm can dictate environmental specifications from its materials and service suppliers.

Hence, LCA standards should provide a methodology for a firm to identify state-of-the-art environmental performance. To gain acceptance between firms, the methodology must address cause and environmental effects by being based on well established, validated, and verifiable theories explaining linkages between actions and impacts and must minimize the incorporation of valuation. Firms will apply the knowledge gained through the application of such a methodology in the selection materials and service suppliers and to evaluate internal technological improvements.

Fig. 1: Practitioners in Life Cycle Stages

3 Identification of the Environmental State-of-the-Art

LCA standards should play upon the practitioner influence hierarchy by including a methodology for the identification of the environmental state-of-the-art to be used by each practitioner for decision making related to both improvements internal to a firm and the selection of suppliers and waste managers. SMITH (1996) defines environmental performance as a measure of the effectiveness of a firm or