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### Letter to the Editor

Hertwich, E. G. 1997. **Value Judgments in LCA Are Inevitable and Do Not Limit LCA's Usefulness.** Letter to the editor regarding J. W. Owens's (Winter 1997) "Life Cycle Assessment: Constraints on Moving from Inventory to Impact Assessment," *Journal of Industrial Ecology* 1(1): 37–49.

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It has been an important contribution of Owens (1997) to raise the issue of subjectivity in life cycle assessment and to identify a number of points at which value judgments structure scientific analysis. I do not agree, however, with the conclusions Owens draws from the recognition that value judgments are present in LCA. Owens suggests that subjectivity is a problem; hence, LCA is not capable or sufficient to support decisions about which product is preferable on environmental grounds, at least outside a corporation. He suggests that LCA is only of limited use and should not be used as a stand alone tool. In particular, Owens asserts the aggregation of different stressors is inconsistent with science. In response to a letter to the editor by Udo de Haes, Owens cites my exchange with Heijungs and Guinee to support his claim that the "aggregation [in the categories of toxicity and resources] is inconsistent with or even contradictory to science that regards the effects or resources as independent and non-additive."

The presence of value judgments does not imply that the use of LCAs should be limited or that the aggregation of impacts is scientifically invalid. I feel that Owens misunderstood the point of my letter to the editor (Hertwich 1996). I would like to clarify my position. The proposal for the characterization of resource depletion and LCA by Guinee and Heijungs (1995) did not adequately acknowledge the subjectivity of their proposal. An acknowledgment of this subjectivity would have led to the consideration of alternative formulations of a resource depletion indicator. It would have raised the need to justify the specific choice of the type of scientific data utilized, as well as the aggregation formula used to calculate such an indicator. Such a justification would have to be based on value judgments, e.g., that the particular method chosen more closely reflects our concerns about resource depletion than other methods. The aggregation of resource use to a single indicator is consistent with science, but it does require supplementing analysis with valuation. An explicit valuation exercise, using techniques of decision analysis or environmental economics, should be conducted to define a resource indicator.

Owens seems to suggest that knowledge about environmental impact derived from environmental science should not be used to inform decisions unless there exists a great degree of certainty that the current information is correct and unless this information is highly objective. This implies that he finds the current default situation -- the lack of consideration of the environment in decision making -- more desirable than decisions that are informed by our imperfect knowledge and value-based interpretation of environmental science.

The interpretation and valuation of facts are inherent in any decision. Decision theorists like to point out that when one alternative dominates all the others, i.e. it is better in all dimensions, there is no need to decide because the choice is obvious. Decision support tools are often designed to systematically elicit value judgments and provide for choices that are consistent with each other and reflective of the preferences of the decision maker (Kleindorfer, et al. 1993), (Keeney and Raiffa 1976). The implication of the presence of subjective elements in LCA is that systematic attempts to address and include value judgments should be undertaken, not that the use of LCA should be limited or that impact assessment is optional. In a review of six impact assessment methods, we have distinguished between implicit and explicit valuation (Hertwich, et al. 1997). Only explicit valuation can utilize formal decision analysis methods.

The recognition that LCA is subjective in nature is important because it will influence LCA's further development -- as a decision support tool, not a scientific instrument. LCA offers the most comprehensive and well developed tool to consider the environmental implications of product choice (or product design choice). Even with its current limitations LCA will greatly improve decision making and hence should be widely used.

## References

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Received September 7, 1997

