

# **Life Cycle Metrics for Product Environmental Management: Principles and Practices**

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As businesses continue to respond to global social and environmental challenges by adopting sustainability goals, new requirements for product-focused environmental assessment have emerged. The business drivers of sustainability require an expansion in the traditional boundaries of environmental assessment and product evaluation. Decision makers (both private and public) need scientifically rigorous tools and techniques based on systematic approaches to product environmental analysis.

Life cycle assessment provides the ideal framework for evaluating product environmental performance. In particular, the product life cycle encompasses all processes associated with addressing a societal need (including materials production through end-of-life management), links product production to consumer use, enables a comprehensive accounting of environmental impacts, and supports metrics meaningful to multiple stakeholder audiences. The author proposes principles and processes for the application of life cycle environmental metrics in the evaluation of product performance. Although no one-size-fits-all solutions exist to environmental assessment challenges, the following principles represent the steps common to several successful measurement programs:

- Know the audience
- Integrate with existing business processes
- Scope the system appropriately
- Apply tools and external data sources effectively
- Compile data and information efficiently
- Bring in supporting data as necessary
- Communicate results clearly

As a demonstration of these principles, case study examples are presented from the chemical (BASF), pharmaceutical (GlaxoSmithKline), and automotive (Volvo and DaimlerChrysler) industries.

The review of current practice suggests that key challenges include availability of relevant life cycle inventory data, limitations of theory and methods (particularly in the area of impact assessment), and time and resource constraints. The intent of this paper is to provide both a set of meaningful guiding principles consistent with state of the art practice and a survey of actual implementation methods, thus creating a pragmatic foundation for establishing an effective environmental performance measurement process.