

# Foreword

The regulatory approaches to control point-source releases of waste that were used in the 1970s and 1980s were instrumental in creating a change for improved environmental management. However, because these were based on a single stage in the product's life cycle (e.g., production, use, or disposal), or a single issue (e.g., individual chemical limits), they did not always lead to a net environmental benefit.

With the improvement in the treatment of air and water emissions and waste from manufacturing operations, there was recognition that end-of-pipe treatment can only go so far. Additional examination of what enters the end-of-pipe treatment led to the development of pollution prevention and pre-treatment programs. These programs were influenced by a combination of government regulations and organizations who realized that they could save money by preventing pollution. 3M's Pollution Prevention Program (3Ps), for example, was a landmark program initiated in the 1980s which has saved 3M nearly one billion USD since the 1980s. As well, it has prevented emissions and waste from entering the environment.

At the same time, society realized that attempting to solve our environmental problems went beyond the manufacturing facilities. We realized that products (and packaging) were creating an enormous amount of solid waste after their useful life was over. We also learned that how much electricity used in the use stage of a product influenced the amount of mercury being released into the environment by coal power plants, to provide another example. Many other observations were occurring by organizations and leaders who were asking whether there were other ways to more completely understand that full impact of society on the planet. Life cycle assessment (LCA) surfaced as one of those emerging tools that was advanced enough to fill the gap to allow us to more fully understand the risks, opportunities, and trade-offs among the many stages of product system life cycle and the multiple impacts that could occur at each stage.

In 1990, the Society of Environmental Toxicology and Chemistry (SETAC) sponsored an international workshop (in Smugglers Notch, Vermont, USA) where the term 'life cycle assessment' was coined. SETAC, the International Organization for Standardization (ISO), and the United Nations Environment Programme (UNEP) have since established and advanced the understanding and use of the LCA framework, methodology, and data.

LCA, as governed by the ISO standards 14040 and 14044, has become a recognized instrument to assess the ecological burdens and human health impacts connected with the complete life cycle (creation, use, end-of-life) of products, processes and activities, enabling the practitioner to model the entire system from which products are derived or in which processes and activities operate.

We have seen a dramatic shift in the development and application of LCA over that last 20 years, as part of the modern era of LCA. Our initial efforts were to develop and enhance basic methodological elements, e.g., goal and scope definition, inventory analysis, impact assessment, and data quality and availability. These efforts are continuing. However, over the last 5–8 years, we have seen an increase in the demand for life cycle information as shown by green building, retail, electronic, and purchasing expectations. With this demand there is the need to make the life cycle information available to non-LCA specialists in professional functions, like procurement, innovation, marketing, etc. While LCA will continue to be a tool for specialists, life cycle information will be embedded in existing decision support tools (e.g., CAD systems) and business practices (e.g., the stage gate process). Mainstreaming of life cycle information is upon us and its use will grow steadily to allow us to speed and scale up the transition to more sustainable product systems.

This book series on LCA is the first work of its kind—a major undertaking to create a comprehensive collection of writing aimed at illuminating all aspects of LCA. Volumes in the series will discuss such topics as the main drivers in LCA (SETAC, UNEP/SETAC Life Cycle Initiative, etc.), the strengths and limitations of LCA, the gaps and research needs in LCA, LCA phases as defined by ISO standards, specific applications of LCA, Life Cycle Management (LCM) and Life Cycle Sustainability Assessment (LCSA). Written by international LCA experts, this book series will be an invaluable resource for those involved in assessing environmental performance through all stages of goods and services.

I encourage you to read, learn and apply the information and knowledge in the chapters and volumes as they are released. Use them as a reference to apply life cycle assessment frameworks, methodologies, information, data and insights. Let's work together to mainstream the use of life cycle information to improve the sustainability of product systems.

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