

## Book Reviews

### Code of Life Cycle Inventory Practice

(<http://www.setac.org/pubsalphalist.html>)

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The book reviewed here is based on the results of the SETAC Europe Working Group on Data Availability and Quality. It is published within the SETAC series in parallel with the book 'Life Cycle Impact Assessment (LCIA): Striving Towards Best Practice (2002)' 10 years after the first Code of Practice in LCA published in 1993. It presents the results of three years of intensive work from May 1998 until final submission at the end of 2001. A total of three peer reviews of each of the five chapters of the book were performed together with an overall review to ensure scientific quality and soundness.

The Code is published in a time that is characterised by a rising interest in Life Cycle Inventory Data as an inevitable backbone of any Life Cycle Assessment, but also of a rising number of Life Cycle Thinking approaches. The launch of the UNEP/SETAC Life Cycle Initiative and an increasing number of national database projects clearly reflect the growing public awareness in this area. With the focus lying on consensus building along the borderline of scientific theory and practical applicability, three key features are the overarching elements of this code:

- Improvement of efficiency and quality in data collection,
- data exchange and presentation,
- and the assessment of data quality.

All these features are burning issues to tackle in LCA practice and do not seem to be adequately addressed by any ISO standardisation. By having a quick look through the Code, it is found that ISO and its 14040 series are taken as starting point and diverging statements or supplementary suggestions are clearly indicated. The three features are addressed by five subgroups which have been formed by internationally acknowledged authors from academy, consultancy, government, and industry. Their results make up the five main chapters of the 136 pages book which also includes a CD-ROM with a large appendix.

Chapter 1 deals with the **Driving Forces for Data Exchange**. The elaboration of the driving forces is preceded by a more general introduction for the newcomer, which contains some elementary explanations of important acronyms. The driving forces are approached by analysing interviews with data collectors from industry and academies and discussions with stakeholders representing government, industry, consultancy, and academies. The conclusions are compiled comprehensively in tabular form and are excellent literature for all who experienced barriers and pitfalls in data collection and exchange.

Chapter 2 is entitled **Recommended List of Exchanges**, which is not clearly evident from the following pages. Instead, the reasons and discussion tracks on the way towards achieving the outstanding results of this working group are clearly documented and might cut short the permanently flaring demand for mandatory parameter lists which "...would violate the ISO standards..." (p.19). Practitioners will find clear recommendations and argumentation lines for nomenclature, measurement units, the treatment of sum parameters, hierarchies, and miss-

ing data. The overall impression is that this chapter represents a comprehensive document from practitioner to practitioner sharing long-term practical experience in structured data acquisition. The conclusions are given as LCI data exchange guidelines and recommendations for 'good practice', which might well be considered a masterpiece in consensus building in view of the diversity of 'existing practices'. During second reading, the link to LCIA and the findings of the parallel working group, which have been published in the same SETAC series, appears to be unevenly developed. For selected issues like radionuclides a close co-operation is visible whilst an adjusted suggestion for resources is missing.

Chapter 3 concentrates on **Interfaces to Existing Software** and, therefore, is focused entirely on the LCI data exchange issue. The charm of this chapter results from the honesty with which failures are reported parallel to success stories. A major part deals with a user survey and practical experience with the exchange format of the Society for the Promotion of Life Cycle Assessments (SPOLD). The interpretation of the survey results makes the authors conclude that the SPOLD exchange format has major deficiencies as such, but indeed should be considered as a useful research result and starting point for the standardisation of data exchange. Today, we see that the knowledge compiled in SPOLD proved useful in the development of both the ISO TS 14048 and the prominent and operational EcoSpold format of the Swissecoinvent database. Success stories of in-house solutions for data transfer between different types of LCA software confirm the creativity of users in developing macros for format conversion. The chapter ends with an introduction to the SPINE format which has proved to be an accepted data exchange format among a large variety of users and also fostered the development of the ISO TS 14048.

Chapter 4 deals with three models which are hardly negligible in any LCI: **Energy, Transport, and Waste**. Each of these models has been subject of a large number of scientific publications and is complex by nature. The authors follow a systematic structure and clearly explain essential and basic prerequisites which should always be kept in mind when modelling. For each model, a simple and understandable diagram illustrates the relations between different processes. Default modules and necessary unit processes are suggested and discussed. They might serve as a starting point for an objective comparison of different LCI studies. Look-up tables facilitate access to common default values. Further reading is stimulated by references to advanced literature. However, the usefulness of an annexed list of internet sites must be doubted, as it is sorted neither by subject nor by language.

The fifth chapter is dedicated to a **Framework for Evaluating Data Uncertainty in Life Cycle Inventories**. It has already been published in this Journal (6(3):127-132), where it has been among the top ten downloads since months, which is a recommendation in itself. Within this comprehensive chapter, the

authors focus on lack of data and data inaccuracy. Lack of data is further subdivided into data gaps and data unrepresentativeness. Data gaps are also treated systematically in the sub-chapter 'Missing or Incomplete Information' of Chapter 2 (p. 50). Representativeness in LCI is the degree to which the data set reflects the system of interest. A pedigree matrix is suggested in which different grades of spatial, temporal, and technological correlations are ranked qualitatively and used to calculate a single uncertainty indicator. Inaccuracy in LCI is related to the precision of measurements and therefore seems suitable for quantitative analyses. The well-known technique of stochastic Monte Carlo simulation is suggested as framework for data inaccuracy analysis and described as stepwise procedure. Compared to the other chapters of the book, examples might have been helpful to illustrate intermediate results and decision steps during the analysis.

The appendix enclosed on a CD-ROM comprises an 81-page pdf document and two Excel sheets. The latter contain the SPOLD list of parameters and a capacious parameter hierarchy. In the documents, additional information on SPOLD and nomenclature rules are given as well as a scheme for spatial differentiation and further supplementary tables of chapter 2. Even if the authors do not claim to end up with mandatory lists, they have done their very best to suggest a common basis by a sound scientific compilation of data and information. Current data base projects like the Swiss ecoinvent already build on the recommended elementary flow nomenclature.

The practicability of such Code does not only depend on the timeliness and appropriateness of information but also on its accessibility. Even though the chapters are numbered, numbers for subsections are missing in the layout. This requires the use of font sizes for orientation, which, in some cases, is confusing, as different types of subsections follow each other like 'special issues' and 'discussions'. This makes it also difficult to assess the target of cross-references, which are given in page numbers. The large index as encyclopaedic reference shows that certain issues are treated in many chapters, which complicates the re-visiting of sub-chapters and the navigation through the code. On the other hand, the sometimes accidental structure is explained in the chapters and proves to be appropriate for the parallel treatment of general and specific issues.

In conclusion, this book demonstrates the efficiency of three years of international and voluntary cooperative work of the Working Group Data Quality and Data Availability. In an arena, where data collection appears to be an adventure trail through commercial interests, confidentiality, complex nomenclature, a multitude of measurements, software incompatibilities, complex models, and numerous uncertainties, this Code represents a well-balanced portrait of the state of art and current challenges. Even if some listings are a bit outdated at the end of 2003 considering the rapid data and information technology development, this combination of surveys, science, and practical considerations may well serve as a handbook for practitioners and anyone interested in the complexities of LCI practice.

Code of Life-Cycle Inventory Practice (book & CD)	\$36 / 36 E	\$60 / 60 E	#SB02-8	160 pp.	2003	Edited by Beaufort-Langeveld, Bretz, Hischier, Huijbregts, Jean, Tanner, van Hoof
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## Book Presentations

### A Theory of the Environment and Economic Systems

#### A Unified Framework for Ecological Economic Analysis and Decision Support\*

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Edward Elgar Publishing, Cheltenham, 2001 (<http://www.e-elgar.co.uk>), Hardbound, 352 pp., 64.95 GBP / 100.00 USD; ISBN 352-1-84064-643-8

**Contents:** Preface Part I: Introduction 1. The Questions 2. The Scientific Context 3. Outlook Part II: Economic Systems 4. Introduction to Part Two 5. Economic Processes 6. On Solving the First Fundamental Equation 7. Towards Concrete Tools for Environmental Analysis and Decision-Support: Inventory Analysis Part III: The Environment 8. Introduction to Part Three 9. Environmental Processes 10. Environmental Impacts 11. The Environmental Problem 12. Towards Concrete Tools for Environmental Analysis and Decision-Support: Impact Analysis Part IV: Conclusion 13. The Answers 14. Further Reflections 15. Summary of Findings References Index

A number of tools for environmental analysis and decision support have been developed over time, including life-cycle assessment, substance-flow analysis, environmental impact and risk assessment. Many of these tools have different economic sys-

tems – a product, a regional substance-flow, a factory or emission pattern etc. – as their object. This book aims to reconcile and unify the many different tools for environmental analysis and decision-support into one meta-tool.

The subject of this study revolves around two problems: the attribution problem – which environmental problems are to be attributed to which economic activities; and the position problem – what is the relative position of a number of the various tools for environmental decision-support? Both these problems can be resolved by the construction of a general framework and specific methodological steps within the framework. The main focus of this study is on the methodology.

By providing a common framework for topics often treated in isolation this book enables experts from many fields, including scholars of environmental, resource and ecological economics, environmental science as well as researchers and professionals within industrial ecology, to understand the full depth and range of the material.

\* Heijungs, R.: Economic Drama and the Environmental Stage. Formal derivation of algorithmic tools for environmental analysis and decision-support from a unified epistemological principle. Proefschrift. Leiden 1997 [see also Int J LCA 2 (4) 195–196 (1997)]