PLASTICSEUROPE ECO-PROFILES: PROGRESS WITH AN AMBITIOUS PROGRAMME

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ABSTRACT

The PlasticsEurope methodology for Life Cycle Inventory in the chemical and plastics sector continues to be developed with a view towards compatibility and globally harmonised procedures. On-going updates concern all relevant precursors and polymers. Challenges include data requirements, emerging methodologies, and decision support. An outlook is given to emerging trends and best practices in industrial LCA and footprinting.

INTRODUCTION

PlasticsEurope, the pan-European association of plastics producers, has been compiling environmental data for polymers since the 1990s. In association with *The Parliament Magazine*, PlasticsEurope organised a meeting at the European Parliament on 10 October 2012 entitled "Life Cycle Assessment (LCA): the future for improved sustainability in Europe?" hosted by the MEP Bas Eickhout of the Dutch Greens Party. Three key challenges were identified:

- Keeping data requirements practical to ensure wide participation;
- Providing high-quality data to support emerging footprint methodologies;
- Developing reliable and scientifically sound footprint approaches to enable informed decisions by policy-makers, industry, and consumers.

Having recently stepped up the ambition of the Eco-profile programme, PlasticsEurope can now report on progress with regards to these challenges.

CHALLENGES FOR ECO-PROFILES

Data Requirements

As a life cycle inventory (LCI) database with global relevance, Eco-profiles critically depend on being up-to-date, internally consistent, and quality assured. In 2011, the PlasticsEurope Management Team decided to have all Eco-profiles fully updated. With more than 70 single datasets and in view of the substantial effort going into the preparation of each dataset, this presents a serious challenge. The adopted strategy is two-fold:

- Update projects involving primary data collection for foreground processes were launched for all relevant polymer families, such as styrenics and polyolefins. It is recognised, however, that key contributions result from upstream precursors, such as benzene and ethylene, which are often outside the operational control of member companies.
- Drawing on the collaboration with several service providers, secondary data for background processes are sourced from pre-validated databases or validated on a case-by-case basis and then used as defaults for future projects. While some basic chemicals and utilities may be entirely generic, petrochemical precursors need to reflect the actual supply situation of polymer manufacturers.

This is exemplified by the update of polystyrenes which showed a strong influence by the choice from two production routes for styrene and, even more so, for benzene. As a result, information about the currently representative market mixes for benzene and styrene production was found to be a key factor in the environmental performance of polystyrenes.

Consequently, obtaining high-quality data cannot be limited to primary data collection, but also entails secondary data, such as petrochemical hydrocarbon feedstocks. Access to quality-assured and validated databases thus becomes critically important, even more so when considering feedstock alternatives, such as renewables with the same rigorous LCI methodology. Critical review of Eco-profiles and the verification of third-party databases are hence part of the quality assurance provided by DEKRA (Schulz & Mersiowsky, 2013).

The collection of activity data from the participating member companies continues to be the single most relevant driver of effort and cost. With new methodologies necessitating an even greater scope and detail (e.g. water balance, statistical variations, data quality assessment), primary data requirements need to be balanced with practicality. By aligning LCI standards with various other initiatives and programmes, such as greenhouse gas inventories, carbon disclosure, and pollution registers, feasibility for industry can be improved. Conversely, new methodologies need to take the effort of collecting appropriate data into careful consideration (Baitz *et al.* 2012).

Emerging Methodologies

Decision makers in industry and policy expect life cycle results to be consistent, irrespective of where they are generated. However, experts are keenly aware that due to methodological differences in life cycle practices this cannot be taken for granted. In fact, industry LCI programmes and even acknowledged databases may sometimes differ substantially in their modelling philosophy of complex operations.

For instance, different value judgments in allocation of the petrochemical cracker and aromatics separation may render downstream results incomparable. The definition of product ranges and appropriate allocation, recognising internal loops and integrated plants, requires careful consideration and justification. As a case in point, the cracker is often shown to provide high-value chemicals (HVC), such as ethylene and other olefins, as main output. In addition, however, the output stream pyrolysis gas is a source of aromatics (BTX), such as benzene, which is mostly counted among the HVC. And finally, there is so-called fuel gas with a high calorific value which may be fed back to the refinery or otherwise used for thermal energy generation. Obviously, the burdens assigned to downstream products, such as polyolefins, are very sensitive to the respective allocation choices.

Likewise, the assumptions about environmental burdens of feedstocks, such as renewable materials and secondary raw materials, may introduce a bias to calculations. In view of the sometimes very disparate production technologies even within one polymer family, it is essential that despite different supply chains and with complex integrated sites, the results be even-handed and consistent.

And finally, the broad variety of impact assessment methods and, in some cases, normalisation and weighting schemes, corresponding with requirements for life cycle inventory detail and nomenclature, exacerbate the issue. Hence, PlasticsEurope supports and contributes to the development of Product Category Rules and a consistent international database.

- As a sector-specific methodology for the chemicals and plastics industry, the Eco-profile Methodology (PlasticsEurope, 2011) builds on the basis of state-of-the-art life cycle assessment practice, specifically the ISO 14040/44 standards as a baseline and striving for alignment with the ILCD Handbook. The methodology is aimed at compatibility and robustness. To ensure compatibility, only scientifically agreed and established methods are adopted, while sector-specific adaptations are kept to a minimum.
- Through engagement with the UNEP/SETAC life cycle initiative, PlasticsEurope fosters the industrial practice of LCA and the world-wide applicability of life cycle databases (UNEP/SETAC 2011). The Eco-profile programme management provided by DEKRA ensures that the database is continuously improved and managed for consistency.

Decision Support
PlasticsEurope provides information consistently across three different levels:

- Life Cycle Inventory (LCI) data to support LCA studies by experts using different software systems;
- Environmental Product Declaration (EPD) as building blocks (information modules) in business-to-business communication, in particular in the building and construction sector;
- Environmental Footprints are currently under development and pilot-tested from a methodological point of view, especially through collaboration with the European Commission’s DG Environment and JRC.

PlasticsEurope believes that the aggregation of multiple criteria to a simplified, single score can be beneficial to support decisions. However, this will require the involvement of the whole supply chain and stakeholders as well as full transparency and accessibility to upstream data. A careful balance needs to be struck between, the complexity reduction through single-score indicators and the transparency and reproducibility of a full-fledged LCA with its necessarily exploratory approach to understanding complex industrial systems. Multi-layered scientific communication, allowing for drill-down from high-level scores to underpinning data, is the guidance here.

CONCLUSIONS

The wide-spread need for readily available high-quality inventory data which support relevant and consensual environmental footprint methodologies is obviously the challenge which the Eco-profiles programme will address in its third decade. The programme aims at being recommended as the most preferable database for the chemical and plastics industry in Europe and with global compatibility. An even better integration, validation, and seamless availability of intermittent updates will be the focus of dataset development in the years to come.

Besides fostering continuous improvement within the plastics industry, Eco-profiles are used in technology assessment, for instance, when considering the pros and cons of alternative feedstock resources or materials from a whole life cycle view. Downstream industries, such as plastics converters and brand companies, rely on Eco-profiles for assessing the environmental footprint of their products.

In preparation of emerging water footprint methods, a more complete water balance has recently been implemented. More generally, alignment with the European Commission's Product Environmental Footprint (PEF) Methodology (EC, 2013) is being sought.

Future development will be geared towards smarter procedures which improve data robustness while at the same time reducing the efforts: this ambitious goal can be achieved through further streamlining of primary data collection combined with an even stronger integration with accredited databases. Quality assurance through review and validation procedures will remain critically important.

REFERENCES

Baitz, Martin, *et al*. (2012) LCA's theory and practice: like ebony and ivory living in perfect harmony? *Int J Life Cycle Assess.* DOI:10.1007/s11367- 012-0476-x.

European Commission (EC) (2013). Product Environmental Footprint (PEF) Guide to the Commission Recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations. Consolidated Version. Web source: http://ec.europa.eu/environment/eussd/smgp/product_footprint.htm

PlasticsEurope (2011). Eco-profiles and Environmental Declarations. Version 2.0. Web source: http://www.plasticseurope.org/plastics-sustainability/eco-profiles.aspx

Schulz, Matthias, and Mersiowsky, Ivo (2013) Critical Review of LCA – Essential for Quality and Understanding. Proceedings of the 6th International Conference on Life Cycle Management in Gothenburg 2013.

UNEP-SETAC Life Cycle Initiative (2011). Global Guidance Principles for Life Cycle Assessment Databases: A Basis for Greener Processes and Products. ISBN: 978-92-807-3174-3.