

Review

Review Details

The project included regular milestone meetings with representatives of all participating producers and PlasticsEurope as system operator. The reviewer participated in these meetings. In addition, a review meeting between the LCA practitioner and the reviewer was held, including a model and database review, and spot checks of data and calculations.

Specific comments on the results include:

- The nitrous oxide (laughing gas, N₂O) emission abatement in terms of technologies used, their elimination efficiency, and degree of use was subject to review and received due attention. It became apparent that adoption of such technologies is at quite different stages across industry, in some cases being very recent developments, which may partly explain the disparities in reported N₂O levels. Further, the monitoring of N₂O levels varied from continuous to intermittent, adding some uncertainty to reported levels in a few cases. An effort was made to confirm the reported N₂O emission with reports under the ETS scheme.
- The use of system expansion and substitution to account for ammonium sulphate (AMS) and, in some cases, sulphuric acid (H₂SO₄) co-production alongside caprolactam reflects an emerging consensus among industry experts (*WBCSD working group*), but is still debatable and by no means unanimous. As with all allocation decisions, it remains a subjective decision with pros and cons. Its effects on final results are, in fact, quite substantial, as shown by the sensitivity analysis (Table 1) of this aspect.
- The differentiation of the water inventory by source and destination (allowing for a water balance and supporting water footprints) should be included in future updates.

Compliance with ILCD Entry-level Requirements

Table 21: General review reporting items (reproduced with kind permission of JRC)

REVIEW REPORTING			
General information			
Data set name	Polycaprolactam (PA6)		
Data set UUID and version number	n/a		
Data set locator (e.g. Permanent URI, URL, contact point, or data-base name and version, etc.)	n/a		
Data set owner	PlasticsEurope aisbl		
Review commissioner(s)	PlasticsEurope aisbl		
Reviewer name(s) and affiliation(s), contact	Dr.-Ing. Ivo Mersiowsky, DEKRA Consulting GmbH		
Review type applied	Independent external		
Date of review completion (DD/MM/YYYY)	13/12/2013		
Reviewed against / Compliance system name	ILCD Data Network – Entry-level requirements		
Reviewer assessment:			
Aspect	Yes	No	Comments
Quality compliance (ISO 14040 & 14044) fulfilled (see Table 22)	X		
Method compliance (ISO 14040 & 14044) fulfilled and documented in data set	X		
Nomenclature compliance (see Table 23) fulfilled	X		
Documentation compliance (see Table 23) fulfilled	X		
Review compliance (Independent external review report) fulfilled	X		
Compliant with ISO 14040 & 14044	X		
Overall compliant with compliance system	X		
Date, location, reviewer signature	13 December 2013, Stuttgart, Germany		

Table 22: Specific/detailed review reporting items for LCI data set: quality compliance (ISO 14040 & 14044; reproduced with kind permission of JRC)

ITEMs	Comments
<p>Time-related coverage/representativeness: cover- age/representativeness: “age of data and the minimum length of time over which data should be collected” “qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Very Good Foreground: 12 month averages representing the years 2010–2012. Background: 2010—2012 (tbc based on list of secondary datasets). Maximum temporal validity until 2016. (p.9)</p>
<p>Geographical coverage/representativeness: cover- age/representativeness: “geographical area from which data for unit processes should be collected to satisfy the goal of the study” “qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Very Good European production average (data from four producers with seven sites in four different European countries; supplemented by average from literature). (p.9)</p>
<p>Technology coverage/representativeness: cover- age/representativeness: “specific technology or technology mix” “qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Very Good Technology mix representing European production (see above). 57 % of the European production capacity (EU-27) in 2010–2012. (p.9)</p>
<p>Precision: “measure of the variability of the data values for each data expressed (e.g. variance)”</p>	<p>n/a Relevant foreground data is primary data, or modelled based on primary information sources of the owners of the technologies. See Uncertainty below for explanation of “n/a” rating. (p. 10)</p>
<p>Completeness: “percentage of flow that is measured or estimated”; assessed on level of process</p>	<p>Very good Primary data used for the gate-to-gate production covered all relevant flows in accordance with the cut-off criteria, i.e. at least 95 % of mass and energy of the input and output flows, and 98 % of their environmental relevance (according to expert judgment) were considered. (p.10)</p>
<p>Consistency: “qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis”</p>	<p>Very Good Primary data of the same level of detail and background data from DEAM and other databases were used. While building up the model, cross-checks ensured the plausibility of mass and energy flows. Due to the relevance of background datasets from different databases and the inclusion of literature data, the overall consistency rating is reduced. Allocation was solved as follows:</p> <ul style="list-style-type: none"> • AMS as co-product of caprolactam: system expansion, credits were awarded for substitution of AMS from alternative production. • Phenol/acetone co-production from cumene: mass allocation. <p>(p.10)</p>
<p>Sources of the data; Appropriateness of use primary/secondary data source</p>	<p>The main data source was a primary data collection from European producers, providing site-specific gate-to-gate production data for processes under operational control of the participating companies. Data for the upstream supply chain until the precursors are taken from several databases (DEAM, PlasticsEurope, GaBi, ecoinvent). (p.10)</p>

ITEMs	Comments
Uncertainty of the information (e.g. data, models and assumptions).	Variation of single data was not recorded. Variation of the model/dataset not applicable due to vertical average of production lines and technologies. Hence, Precision above was rated "n/a". Critical elements within the model include: <ul style="list-style-type: none"> level of N₂O emissions (based on effectiveness and use of abatement technologies as well as completeness of monitoring) allocations for phenol/acetone and capro/AMS <p style="text-align: right;">(p.10—11)</p>

Table 23: Specific/detailed review reporting items for LCI data set: nomenclature and documentation (reproduced with kind permission of JRC)

ITEMs	Comments
Nomenclature	
Correctness and consistency of applied nomenclature	Yes
Documentation	
Appropriateness of documentation extent (see document "Documentation of LCA data sets")	Yes
Appropriateness of documentation form (ILCD Format)	Yes

Review Summary

This Eco-profile is considered a representative, reliable and high-quality quality representation of PA6 production in Europe. The allocation decision affects energy and GWP indicators with approximately 10%. The critical review confirms that this Eco-profile adheres to the rules set forth in the PlasticsEurope's Eco-profiles and Environmental Declarations – LCI Methodology and PCR for Uncompounded Polymer Resins and Reactive Polymer Precursors (PCR version 2.0, April 2011).

Reviewer Name and Institution

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