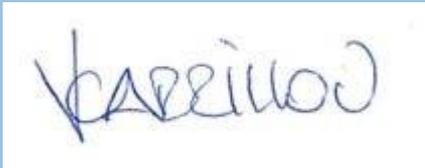


# LCI Review report (reviewed against "ILCD Data Network - entry-level requirements")

## Crude palm oil

**Table 1: General review reporting items**

<b>REVIEW REPORTING</b>	
<b>General information</b>	
Data set name	Crude palm oil (incl. LUC; incl. peat emissions, ELCD)
Data set UUID and version number	{E6DA9E63-A0FD-46FB-BD00-95F8192FD5E5}  V1.0
Data set locator (e.g. Permanent URI, URL, contact point, or database name and version, etc.)	ERASM ( <a href="http://www.erasm.org">www.erasm.org</a> )  Data sets will be made available via <a href="http://eplca.jrc.ec.europa.eu/ELCD3">http://eplca.jrc.ec.europa.eu/ELCD3</a>  Based on GaBi 7, DB version 6.115, SP 29
Data set owner	ERASM: Environmental & Health Risk Assessment and Management of Surfactants, a research partnership of the European Detergents and Surfactants Industries: A.I.S.E., the International Association for Soaps, Detergents and Maintenance Products, and CESIO, the European Committee of Organic Surfactants and their Intermediates ( <a href="http://www.erasm.org">www.erasm.org</a> )
Review commissioner(s)	ERASM
Reviewer name(s) and affiliation(s), contact	Dr. Thilo Kupfer and Viviana Carillo, thinkstep AG, Hauptstr. 111-113, 70771 Leinfelden-Echterdingen
Review type applied	Data set review against ILCD Data Network - Entry-level requirements
Date of review completion (DD/MM/YYYY)	21/04/2016
Reviewed against / Compliance system name	ILCD Data Network - Entry-level requirements

<b>Reviewer assessment:</b>			
<b>Aspect</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
Quality compliance (aspects of ISO 14040 & 14044) fulfilled (see table 2)	x		See table 2
Method compliance (as in ISO 14040 & 14044) fulfilled and documented in data set	x		See table 2
Nomenclature compliance (see table 3) fulfilled	x		See table 3
Documentation compliance (see table 3) fulfilled	x		See table 3
Review compliance (Independent external review OR independent internal review + review report) fulfilled	x		Independent internal review + review report
Overall compliance with ISO 14040 & 14044	x		Data set reviewed by two independent experts against ISO 14040 & ISO 14044
Overall compliance with "Compliance system"	x		Relates to ILCD Data Network - Entry-level requirements
Date, location, reviewer signature	21/04/2016, Leinfelden-Echterdingen  Dr. Thilo Kupfer  Viviana Carrillo		

**Table 2: Specific/detailed review reporting items for LCI data set: Quality compliance (ISO 14040 & 14044). Please note that for aggregated LCI result data sets, this includes key processes in the background system.**

ITEMs	Comments
<p>Time-related coverage/representativeness:</p> <p>“age of data and the minimum length of time over which data should be collected”</p> <p>“qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Good.</p> <p>Reference year: 2011</p> <p>The data set is representative for the state of technology in 2011 and considered to be valid for ten (10) years or until substantial technological changes in the production chain occur.</p> <p>The LCI is based on literature information dated between 2007 – 2013.</p>
<p>Geographical coverage/representativeness:</p> <p>“geographical area from which data for unit processes should be collected to satisfy the goal of the study”</p> <p>“qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Good.</p> <p>Geographical scope of the study has focused on an estimation of the global production mix, based on the two dominant regions of production, Malaysia and Indonesia. These countries were selected as major oil palm producing countries as they produce more than 80% of the global production volume of fresh fruit bunches, palm oil and palm kernel oil. In cases of missing process data for Indonesia, Malaysian data for cultivation and processing was adopted for Indonesia. Major cultivation parameters were available for Malaysian and Indonesian conditions (emissions from land use change, yield of fresh fruit bunches). Background data like energy profiles, diesel, electricity use etc. were adapted to the national boundaries. The global production mix consists of 47% Malaysian and 53% Indonesian products.</p>
<p>Technology coverage/representativeness:</p> <p>“specific technology or technology mix”</p> <p>“qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Fair.</p> <p>The global production mix consists of 47% Malaysian and 53% Indonesian products.</p> <p>Direct Land Use Change (dLUC) effects are considered and were accounted for following standards: GHG Protocol 2011, ILCD 2010, ISO 14040 2006 /ISO 14044 2006. Direct LUC, 20 years backwards (since 1990), was considered for above ground biomass, below ground biomass and soil organic matter.</p> <p>Cultivation on peatland results in emissions due to drainage of the peatland. These emissions are included in the study.</p> <p>Allocation by mass was applied for palm oil mills [palm oil, palm kernel], palm kernel oil mills [palm kernel oil, palm kernel meal], and palm oil refineries [refined product, palm fatty acid distillate].</p> <p>Agricultural production was modelled in a comprehensive manner including diesel, fertilizer and pesticide inputs and field emissions. The yield is a major cultivation parameter. Yield was modelled as 18.9 t FFB/[ha and year] for Malaysia and 13.4 t FFB/[ha and year] for Indonesia.</p>

ITEMs	Comments
	<p>Palm oil mills are mostly powered by incineration of co-products (fibers and shells). Empty fruit bunches are also brought back to the field and used as organic fertilizer. Palm oil mill effluent (POME) is run through open pond treatment (95 %) and digester tanks (5%). Digester tanks are used for capturing methane, which is then incinerated for energy feedback.</p> <p>Palm kernel oil mill, refinery stage and methyl ester stage: The palm kernel oil mill is located apart from the palm oil mill - so incineration of co-products to provide energy is not assumed at the palm kernel oil mill. The Malaysian electrical grid mix provides energy needed for the palm kernel oil mill. The refinery process is modelled identically for both palm oil and palm kernel oil, based on one single publication.</p>
<p>Precision/ Uncertainty of the information (e.g. data, models and assumptions):</p> <p>“measure of the variability of the data values for each data expressed (e.g. variance)”</p>	<p>Good.</p> <p>Based on various precision and uncertainty checks the likelihood of systematic errors in the dataset is low.</p> <ul style="list-style-type: none"> <li>- Check for plausibility of data sampling</li> <li>- Check of mass and energy balances</li> <li>- Cross-checks with other data sources and available data sets (LCIs)</li> </ul>
<p>Completeness:</p> <p>“percentage of flow that is measured or estimated”; assessed on level of process</p>	<p>Good.</p> <p>Cut-off rules for each unit process: Coverage of at least 95% of mass and energy of the input and output flows, and 98% of their environmental relevance (according to expert judgment).</p> <p>Excluded from the analysis are:</p> <ul style="list-style-type: none"> <li>- The construction of major capital equipment (infrastructure)</li> <li>- Maintenance and operation of support equipment</li> <li>- Human labor and employee transport and</li> <li>- Packaging of final products</li> </ul> <p>In addition, all 15 LCIA methods recommended by the Product Environmental Footprint (PEF Guide 4.0) can be evaluated.</p>
<p>Consistency:</p> <p>“qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis”</p>	<p>Very Good</p> <p>Foreground and background model are compliant with GaBi modelling principles and ISO 14040/14044, hence a consistent modelling approach is applied.</p>
<p>Sources of the data; Appropriateness of use primary/secondary data source</p>	<p>ERASM Surfactant Life Cycle and Ecofootprinting (SLE) Project GaBi databases</p> <p>The data set covers all relevant process steps / technologies over the supply chain of the represented cradle to gate inventory with a</p>

ITEMs	Comments
	<p>good overall data quality. It represents a production average based on the year 2011. The inventory is mainly based on latest literature data and is completed, where necessary, by expert judgement.</p> <p>25 years duration of plantation is assumed. Land use change is considered and mass allocation applied.</p> <p>Transportation was just considered for the main materials (covers about 90% of the mass of all inputs), other transportation was not considered. The data is based on the production of 1000 kg of product.</p>
Overall data quality rating according to PEF evaluation scheme.	<p>Good.</p> <p>Overall quality according to PEF validation scheme results in 2,3 interpreted into "good overall quality" in the PEF quality validation scheme.</p>
<b>Others</b>	None.

**Table 3: Specific/detailed review reporting items for LCI data set: Nomenclature and Documentation**

ITEMs	Comments
<b>Nomenclature</b>	
Correctness and consistency of applied nomenclature (Preferred use of ILCD flows etc.; Correct nomenclature of other flows; Exclusion of not permissible waste flows, sum indicator elementary flows etc.)	<p>Nomenclature of elementary flows is correct according to the flow check tool 1.2.1; no issues detected</p> <p>Elementary flows are compliant to ILCD nomenclature</p> <p>Product flows / correctness of product flows not verifiable as not standardized,</p> <p>Except of four (4) radioactive waste flows, all waste flows are modelled to the end of waste status</p> <p>Unspecific elementary flows are not used (e.g. VOC (air emission), heavy metals (unspecific emissions in water))</p>
<b>Documentation</b>	
Appropriateness of documentation (see Document "Documentation of LCA data sets")	<p>Documentation check tool applied, no issues detected.</p> <p>All mandatory and some optional documentation fields do contain supportive meta data about the setup of the LCI data set.</p>
Appropriateness / correctness of documentation form (ILCD Format)	Documentation of the dataset uses ILCD format provided by GaBi LCA software export