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Environmental management — Life cycle assessment — Requirements and guidelines for organizational life cycle assessment

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Environmental management — Life cycle assessment — Requirements and guidelines for organizational life cycle assessment

Management environnemental — Analyse du cycle de la vie — Exigences et lignes directrices pour l'analyse du cycle de vie organisationnelle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 207, *Environmental management*, Subcommittee SC 5, *Life cycle assessment*.

Introduction

In order to analyse the environmental performance of products, it has become standard to use a life cycle perspective to capture all impacts from resource extraction to the disposal of the product. The benefits and the potential of the life cycle approach are not limited to an application on products. While the Life Cycle Assessment (LCA) methodology was originally developed for products, its application at the organizational level is becoming more and more relevant. However, an Organizational LCA (OLCA) appears to be even more complex. There is more than one product life cycle to follow, as most organizations are engaged in many product life cycles to different degrees and a large part of environmental impact can reside outside the organization's gate, upstream and downstream of the value chain.

The present Technical Specification (TS) is dedicated to the application of LCA to organizations. It, therefore, extends the application of ISO 14040 and ISO 14044 to all the activities of the organization that means the reporting unit of the system allows coverage of different products and unit processes of any organization within the same LCA study.

The choice of goal and scope by the organization during its LCA study is key to assisting this organization in making the relevant choices according to the present TS, including the products and unit processes that are studied, the related system boundary, and the time frame which is covered.

This TS is applicable to an organization for a given time period.

This TS is applicable to all types of organizations. If properly justified, application of this TS to segments or selected companies of an organization is possible.

Environmental management — Life cycle assessment — Requirements and guidelines for organizational life cycle assessment

1 Scope

This Technical Specification (TS) provides additional requirements and guidelines for an effective application of ISO 14040 and ISO 14044 to organizations.

This Technical Specification details

— the application of Life Cycle Assessment (LCA) principles and methodology to organizations,

— the benefits that LCA can bring to organizations by using LCA methodology at organizational level,

— the system boundary,

— specific considerations when dealing with LCI, LCIA, and interpretation, and

— the limitations regarding reporting, environmental declarations, and comparative assertions.

This Technical Specification applies to any organization that has interest in applying LCA. It is not intended for the interpretation of ISO 14001 and specifically covers the goals of ISO 14040 and ISO 14044.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14040:2006, *Environmental management — Life cycle assessment — Principles and framework*

ISO 14044:2006, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO/TS 14071, *Environmental management — Life cycle assessment — Critical review processes and reviewer competencies: Additional requirements and guidelines to ISO 14044:2006*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
organization
person or group of people that has its own functions with responsibilities, authorities, and relationships to achieve its objectives

Note 1 to entry: The concept of organization includes, but is not limited to sole trader, company, corporation, firm, enterprise, authority, partnership, charity, or institution, or part or combination thereof, whether incorporated or not, public or private.

[SOURCE: ISO/IEC Directives, Part 1]

3.2
reporting unit
quantified performance expression of the organization under study to be used as a reference

Note 1 to entry: In the case of an OLCA, the reporting unit replaces the functional unit.

3.3
unit process
smallest element considered in the life cycle inventory analysis for which input and output data are quantified

[SOURCE: ISO 14044:2006, 3.34]

3.4
performance tracking of an organization
comparison of the performance of the same organization's products and unit processes over time, based on the same time period, system boundary, and reporting unit

3.5
environmental performance
measurable results of an organization's management of its environmental aspects

[SOURCE: ISO 14001:2004, 3.10]

3.6
facility
single installation, set of installations or production processes (stationary or mobile), which can be defined within a single geographical boundary, organizational unit, or production process

[SOURCE: ISO 14064-1:2006, 2.21]

3.7
competence
ability to apply knowledge and skills to achieve intended results

[SOURCE: ISO 14066:2011, 3.1.4]

3.8
Organizational Life Cycle Assessment
OLCA
compilation and evaluation of the inputs, outputs, and potential environmental impacts of the activities associated with the organization as a whole or portion thereof adopting a life cycle perspective

Note 1 to entry: The results of an OLCA are sometimes referred to as an organization's environmental footprint.

3.9
consolidation methodology
approach to be selected by the organization in setting organizational boundaries, for assessing the inputs, outputs, and potential environmental impacts of the activities associated with the organization

Note 1 to entry: Three distinct approaches are used: the operational control, or financial control, or the equity share approaches.

3.10
operational control
full authority to introduce and implement operating policies at the operation level

Note 1 to entry: Financial or insurance companies may apply this TS by dealing with their funding activities as if it was an operational control (ISO/TR 14069:2013, Annex E provides an example of guidance in the case of GHG).

3.11
financial control
ability to direct the financial and operating policies of the operation with a view to gain economic benefits from its activities

3.12
equity share
extent of the rights an organization has to the risks and rewards from an operation based on its equity interest

Note 1 to entry: Equity share is, therefore, the same as the ownership percentage.

4 General

The principles of ISO 14040 generally apply for the OLCA as well. They can be adapted to the organizational context.

This TS provides an explicit adaptation of the requirements of ISO 14040 and ISO 14044 to organizational context, where applicable (Annex A.3). An OLCA shall follow the requirements of Annex A.

This TS shall not be used for LCA studies intended to be used for comparative assertions between different organizations intended to be disclosed to the public (e.g. ranking among organizations).

This TS explains how to calculate the potential environmental impacts of the organization based on ISO 14040 and ISO 14044. The environmental aspects of an organization are generally addressed in ISO 14001. This TS can support the identification and quantification of relevant environmental aspects including those beyond the organizational boundaries.

5 Organizational Life Cycle Assessment

5.1 General

This TS provides requirements and guidelines for the type of information that is recommended to be used by organizations for assessing environmental impacts considering the life cycle perspective (see ISO 14040:2006, 4.1.2.), including their upstream and downstream supply chain.

The benefits that life cycle assessment can bring to organizations are the following:

— identify, evaluate, and interpret the significance of the environmental aspects related to the management systems as defined in ISO 14001;

— strategic tool for comprehensive environmental assessment, which can lead to management decisions;

— tool for decision making, in order to prioritize the actions aiming at reducing environmental impacts considering products and unit processes of the organizations;

— assist the performance tracking of an organization, and trace the “multi-criteria” environmental improvements of the organizations (see Annex C);

— reporting of the environmental impacts of an organization over a given period of time;

— identify burden shifting (e.g. through outsourcing, upstream and downstream, or between impacts);

— improve transparency, knowledge, control, and management of its supply chain.

Performance tracking of an organization between two periods of time can lead to the reporting of improvements.

NOTE Performance tracking is based on the same reporting unit. A given tolerance will be considered to state that two reporting units are "the same". This tolerance will be determined by the practitioner according to the goal and scope of his LCA study. This tolerance will be quantified and transparently reported in the LCA report.

5.2 Goal and scope definition

5.2.1 General

This chapter provides requirements and guidelines on how to

— model upstream and downstream supply chains and processes, and how to collect the appropriate data,

— determine the reporting unit for an organization in replacement of the functional unit which is used for product systems (see Annex A.3), and

— define the goal of an LCA.

In defining the goal of the LCA, the following items shall be unambiguously stated (see Annex A.3):

— the intended application (e.g. performance tracking);

— the reasons for carrying out the study;

— the intended audience;

— a statement that the results are not intended to be used in comparative assertions intended to be disclosed to the public.

5.2.2 System boundary

According to its goal and scope, an organization can develop *its OLCA based on defined* system boundaries (Figure 1).

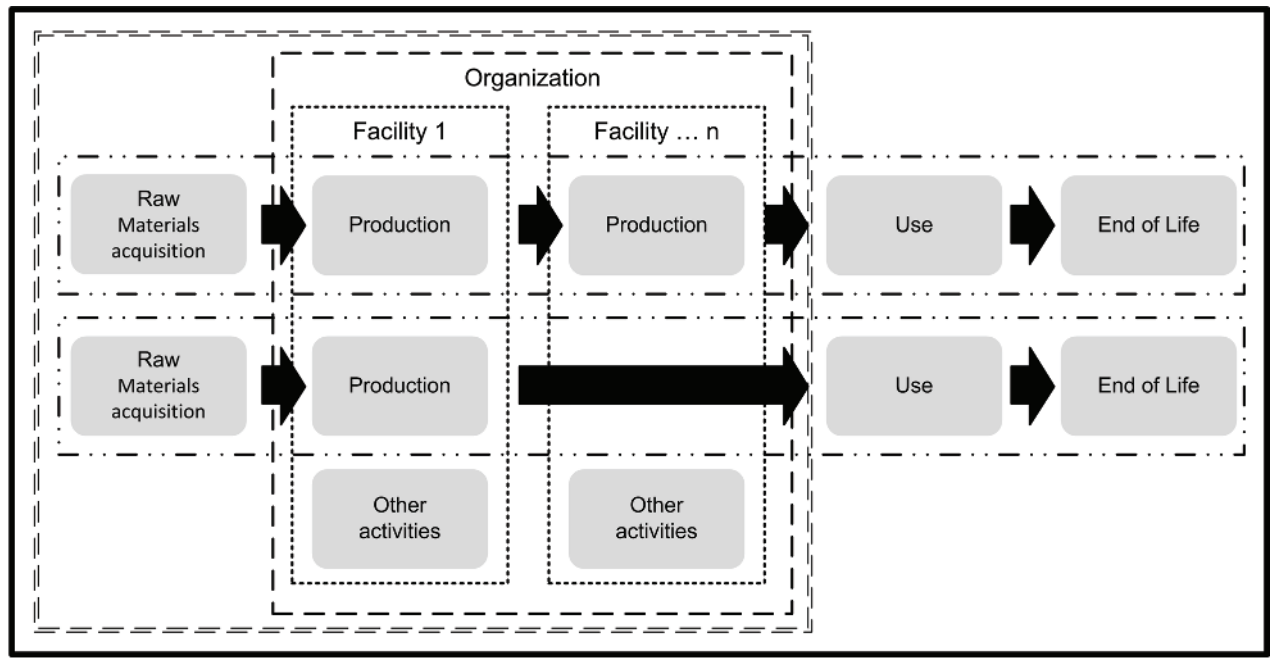


Figure 1 — Examples of different boundaries for inventory of organization

The organization shall consider the complete life cycle to cover all inputs and outputs related to the organization's activities and disclose and justify any exclusion.

A complete 'cradle-to-grave' assessment of an organization, as shown in Figure 1, includes the use and end-of-life treatment of sold products by the reporting organization in the reference period. This includes use stage emissions of sold products over their expected lifetime and the waste disposal and treatment of products sold by the reporting organization (in the reference period) at the end of their lives. Use stage flows should be included if products directly consume energy or generate emissions during use like e.g. automobiles, aircraft, power plants, buildings, etc. or indirectly consume energy or cause emissions during use like e.g. apparel (requires washing and drying), food (requires cooking and refrigeration), or soaps and detergents (require heated water).

Calculating input and outputs for the use stage typically requires product design specifications and assumptions about how consumers use products (e.g. use profiles, assumed product lifetimes, etc.).

If the organization has no influence on the use stage and the end-of-life stage of its products, e.g. through product design or recycling campaigns, which can occur e.g. for raw materials and intermediate products, it can select the "cradle-to-gate" boundary where the use and end-of-life stages are excluded.

According to ISO 14044:2006, 4.2.3.3, system boundary shall be documented and justified in relation with the goal and scope of the study. For organizations, system boundaries shall reflect the consolidation approach.

The system boundary is defined considering a process-based approach and the additional operations of the organization (see Figure 1).

The organization can include one or more facilities/sites whose inputs and outputs typically result in environmental impacts. The organization shall consolidate its facilities/sites by one of the following consolidation approaches:

a) operational control: the organization assesses impacts of processes and physical units from facilities over which it has operational control;

b) financial control: the organization assesses impacts of processes and physical units from facilities over which it has financial control;

c) equity share: the organization assesses impacts of processes and physical units from respective facilities according to its share of equity interest.

When a facility is controlled by several organizations, these should adopt the same consolidation methodology.

The part of the organizations, which are accounted as assets and depreciated in the OLCA, shall be identified. The calculation methodology of LCI of these parts shall be clear and documented.

— If the organization wholly owns and operates all its operations, its organizational boundaries are the same whichever consolidation methodology is used. In this case, the organization simply quantifies and reports all emissions from each of its wholly owned operations (ISO/TR 14069).

— For organizations with jointly owned operations, however, the organizational boundaries differ depending on the consolidation methodology used, control or equity share (ISO/TR 14069).

When assessing one organization, double counting shall be avoided.

In all cases, the organization shall document which consolidation methodology it applies. The organization shall explain any change to the selected consolidation methodology.

5.3 Specific considerations when dealing with LCI, LCIA, and interpretation

Some specific issues can occur when doing OLCA.

For an OLCA, it is usually not suitable nor recommended to aggregate the OLCAs of its supply chain, because organizations usually neither purchase the whole product spectrum nor the total production volume of a particular supplier. Therefore, inputs and outputs of suppliers shall be allocated to the basket of products purchased from suppliers. This shall be done by using the allocation procedures described in ISO 14044 or, if consistent with the goal and scope of the study, by using data representative for the products purchased.

In dealing with aspects of LCI and LCIA for the OLCA, the significant environmental impacts shall be defined, based on knowledge of products, resources required, and emissions. In order to develop the impact assessment, after the inventory calculation procedure as outlined in Annex D, the availability of data and the needs for the inventory shall be evaluated. In the interpretation phase, proper consideration and explanation of these issues shall be stated.

Figure 2 shows, as an example, an upstream supply chain composed of tier I, tier II, and tier III suppliers. Each tier produces a number of products for the following tier until the products are delivered to the reporting organization. As long as all products from tier I, II, and III are all completely involved in the reporting organization's product portfolio (grey shade), no allocation problems arise.

However, if some products are not delivered to the reporting organization (black shade) but are part of the supplier's products portfolio, they should not be accounted for. Hence, an allocation of the supplier's products portfolio should be performed in order to adjust to the products purchased by the organization.

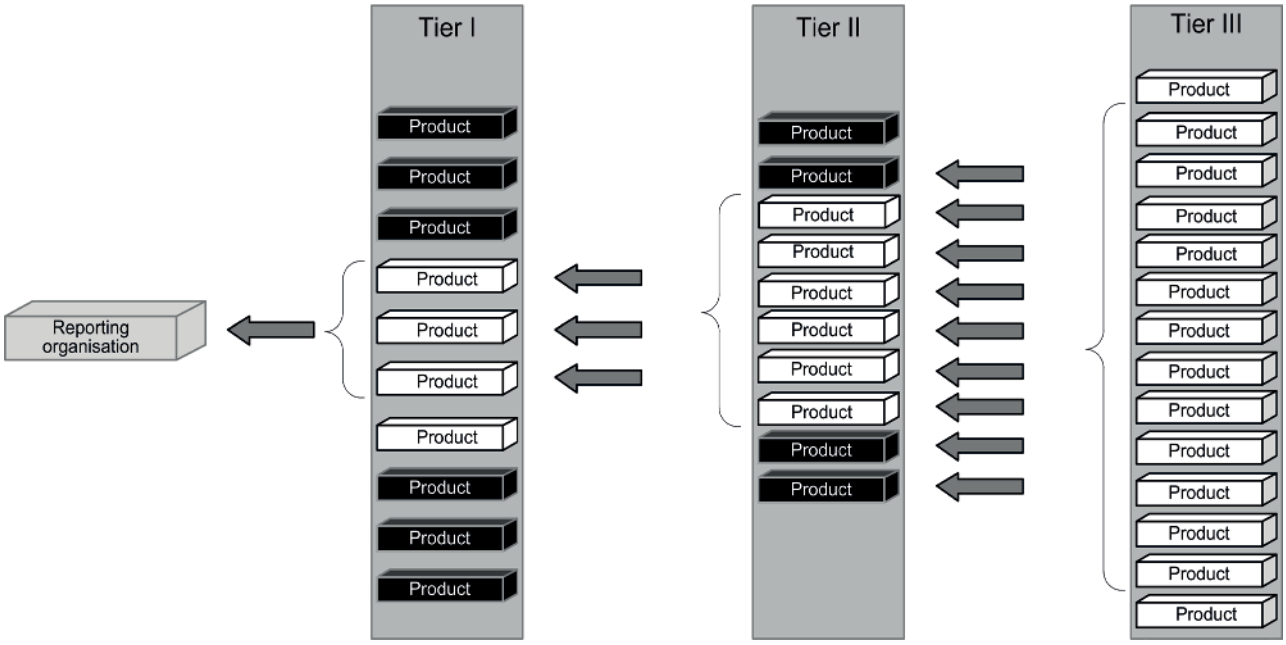


Figure 2 — Possible upstream supply chain composed of tier I, tier II, and tier III suppliers

Therefore, even for an OLCA, a product perspective (e.g. purchased products) shall be taken when assessing the supply chain. To do so, product level data should be used and this represents the interface to the domain of LCA as defined in ISO 14040 and ISO 14044. As a consequence, the (theoretical) advantage of OLCA of not having to cope with numerous product life cycles might not apply anymore. From a conceptual perspective, there is no OLCA without a product perspective. The organization can get an overview of the environmental burdens of the different products which it purchases by collecting generic product LCA data, e.g. from data providers. For those products and impacts which contribute significantly to the overall burden, the suppliers should be approached to gain access to their specific data for updating the profile and for identifying options to reduce impact by product or process optimization of the existing supplier or choosing an alternative supplier with better performance.

Time periods represented by the data collected shall be clearly stated in the study. In addition, the time period which is assessed by the study shall be clearly stated, such as a financial year, or a period which contains some activities of an organization (e.g. average or mid-term plan).

Any modifications of the reporting unit, reference period, or boundaries shall be clearly stated.

Data sources and data quality assessment together with uncertainty assessment (quantitative or qualitative) shall be carefully done when dealing with an organization:

— the influence of data quality on the interpretation shall be mentioned;

— the limitations associated with the uncertainty assessment shall be mentioned.

NOTE If financial information expressed in monetary unit regarding purchased products is used, a special care is expected when converting this financial information to physical flows due to the purchasing power parity (For example, see Annex E).

Allocation rules, according to the goal and scope of the study, shall be carefully documented and justified (For example, see Annex F).

If the OLCA is communicated to a third party, a critical review should be performed according to ISO 14044 and ISO/TS 14071.

6 Reporting

6.1 General requirements

The report content is described in Annex B.

6.2 The limitations regarding reporting

General requirements and guidelines for communication are outside the scope of this TS. This TS can be applied to prepare input for communication, especially for performance tracking of an organization.

This TS shall not be used for comparative assertions between different organizations intended to be disclosed to the public (e.g. ranking among organizations).

Annex A
(normative)

General requirements of ISO 14044 applicable or not applicable to this TS

A.1 General

This annex presents the

— requirements of ISO 14044:2006 which apply to organizations with no modifications, and

— requirements from ISO 14044:2006 that are adapted for OLCA.

A.2 Requirements of ISO 14044:2006 which apply with no modifications

The requirements contained in the following clauses and subclauses of ISO 14044:2006 apply with no modification.

4.1 General requirements
4.2.1 General
4.2.3.3 System boundary
4.2.3.4 LCIA methodology and types of impacts
4.2.3.6 Data quality requirements
4.2.3.8 Critical review considerations
4.3.2 Collecting data
4.3.3.1 General
4.3.3.2 Validation of data
4.3.3.4 Refining the system boundary
4.3.4.3 Allocation procedures for reuse and recycling
4.4.2.1 General
4.4.2.4 Calculation of category indicator results (characterization)
4.4.3 Optional elements of LCIA
4.5.2 Identification of significant issues
4.5.3.1 General
4.5.3.2 Completeness check
4.5.3.3 Sensitivity check
4.5.4 Conclusions, limitations, and recommendations

A.3 Requirements from ISO 14044:2006 that are adapted for OLCA

The following table contains the requirements from clauses and subclauses of ISO 14044:2006 adapted for OLCA.

Clause and subclauses	**4 Methodological framework for LCA** **4.2 Goal and scope definition** **4.2.2 Goal of the study** **4.2.3 Scope of the study** **4.2.3.1 General**
Adapted requirements for OLCA	In defining the goal of an LCA, the following items shall be unambiguously stated: — the intended application; — the reasons for carrying out the study; — the intended audience, i.e. to whom the results of the study are intended to be communicated; — a statement that the results are not intended to be used in comparative assertions intended to be disclosed to the public. In defining the scope of an LCA, the following items shall be considered and clearly described: — the organization to be studied; — if the study is intended for monitoring of environmental performances over time; — the reporting unit; — the products, unit processes, facilities, and sites of the organization included in the reporting unit; — the reference period considered (e.g. for performance tracking); — the system boundary; — allocation procedures; — LCIA methodology and types of impacts; — interpretation to be used; — data requirements; — assumptions; — value choices and optional elements; — limitations; — data quality requirements; — type of critical review, if any; — type and format of the report required for the study.

Subclause	**4.2.3.2 Products, unit processes and reporting unit**
Adapted requirements for OLCA	The scope of an LCA shall clearly specify — the products and unit processes of the organization and the reporting unit of the organization being studied. The reporting unit shall be consistent with the goal and scope of the study. One of the primary purposes of a reporting unit is to provide a reference to which the input and output data are normalized (in a mathematical sense). Therefore, the reporting unit shall be clearly defined and measurable, and — any exclusion of products and unit processes of the studied organization**.**

Subclauses	**4.3 Life cycle inventory analysis (LCI)** **4.3.3 Calculating data** **4.3.3.3 Relating data to unit process and reporting unit**
Adapted requirements for OLCA	An appropriate flow shall be determined for each unit process. The quantitative input and output data of the unit process shall be calculated in relation to this flow. The level of aggregation of the inputs and outputs shall be consistent with the goal of the study. In general, assets such as buildings, factories, and equipments are used over a time period which could be different from the time period fixed by the LCA. The calculation methodology of LCI of these assets should take into account the time period over which they are used. In that case, the calculation methodology shall be clearly justified and documented.

Subclauses	**4.3.4 Allocation** **4.3.4.1 General**
Adapted requirements for OLCA	The inputs and outputs shall be allocated to the different products and unit processes according to clearly stated procedures that shall be documented and explained together with the allocation procedure. The sum of the allocated inputs and outputs of a unit process shall be equal to the inputs and outputs of the unit process before allocation. Whenever several alternative allocation procedures seem applicable, a sensitivity analysis shall be conducted to illustrate the consequences of the departure from the selected approach.

Subclause	**4.3.4.2 Allocation procedure**
Adapted requirements for OLCA	The study shall identify the processes shared with other product systems or organizations, and deal with them according to the stepwise procedure consisting of three steps presented below. a) Step 1: Wherever possible, allocation should be avoided by dividing the unit process to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes.

	b) Step 2: Where allocation cannot be avoided, the inputs and outputs of the system should be partitioned between its different products or functions or unit processes or organizations in a way that reflects the underlying physical relationships between them; i.e. they should reflect the way in which the inputs and outputs are changed by quantitative changes in the products, functions, unit processes, or organizations delivered by the system. c) Step 3: Where physical relationship alone cannot be established or used as the basis for allocation, the inputs should be allocated between the products and functions, or unit processes, or organizations in a way that reflects other relationships between them. For example, input and output data might be allocated between co-products in proportion to the economic value of the products or financial or operational control. Some outputs can be partly co-products and partly waste. In such cases, it is necessary to identify the ratio between co-products and waste since the inputs and outputs shall be allocated to the co-products part only. Allocation procedures shall be uniformly applied to similar inputs and outputs of the system under consideration. For example, if allocation is made to usable products (e.g. intermediate or discarded products) leaving the system, then the allocation procedure shall be similar to the allocation procedure used for such products entering the system. Changes in the inherent properties of materials shall be taken into account. In addition, particularly for the recovery processes between the original and subsequent product system, the system boundary shall be identified and explained, ensuring that the allocation principles are observed as described in 4.3.4.2.

Subclauses	**4.4 Life cycle impact assessment (LCIA)** **4.4.1 General**
Adapted requirements for OLCA	The LCIA phase shall be carefully planned to achieve the goal and scope of an LCA study. The LCIA phase shall be coordinated with other phases of the LCA to take into account the following possible omissions and sources of uncertainty: a) whether the quality of the LCI data and results is sufficient to conduct the LCIA in accordance with the study goal and scope definition; b) whether the system boundary and data cut-off decisions have been sufficiently reviewed to ensure the availability of LCI results necessary to calculate indicator results for the LCIA; c) whether the environmental relevance of the LCIA results is decreased due to the LCI reporting unit calculation, system wide averaging, aggregation, and allocation. The LCIA phase includes the collection of indicator results for the different impact categories, which together represent the LCIA profile for the organization's activities. The LCIA consists of mandatory and optional elements.

Subclauses	**4.4.2 Mandatory elements of LCIA** **4.4.2.2 Selection of impact categories, category indicators, and characterization models**
Adapted requirements for OLCA	**4.4.2.2.1** Whenever impact categories, category indicators, and characterization models are selected in an LCA, the related information and sources shall be referenced. This also applies when new impact categories, category indicators, or characterization models are defined. Accurate and descriptive names shall be provided for the impact categories and category indicators. The selection of impact categories, category indicators, and characterization models shall be both justified and consistent with the goal and scope of the LCA. The selection of impact categories shall reflect a comprehensive set of environmental issues related to the organization being studied, taking the goal and scope into consideration. The environmental mechanism and characterization model that relate the LCI results to the category indicator and provide a basis for characterization factors shall be described. The appropriateness of the characterization model used for deriving the category indicator in the context of the goal and scope of the study shall be described. LCI results other than mass and energy flow data included in an LCA (e.g. land use) shall be identified and their relationship to corresponding category indicators shall be determined.

Subclauses	**4.5 Life cycle interpretation** **4.5.1 General**
Adapted requirements for OLCA	**4.5.1.1** The life cycle interpretation phase of an LCA or an LCI study comprises several elements as depicted in Figure 4 (in ISO 14044:2006), as follows: The results of the LCI or LCIA phases shall be interpreted according to the goal and scope of the study, and the interpretation shall include an assessment and a sensitivity check of the significant inputs, outputs, and methodological choices in order to understand the uncertainty of the results. Interpretation shall consider any modifications of the reporting unit, reference period, or boundaries. **4.5.1.2** The interpretation shall also consider the following in relation to the goal of the study: — the appropriateness of the definitions of the reporting unit and system boundary; — limitations identified by the data quality assessment and the sensitivity analysis. The documentation of the data quality assessment, sensitivity analyses, conclusions, and any recommendations from the LCI and LCIA results shall be checked.

Subclauses	**4.5.3 Evaluation** **4.5.3.4 Consistency check**
Adapted requirements for OLCA	If relevant to the LCA or LCI study, the following questions shall be addressed. a) Are differences in data quality along a studied system life cycle consistent with the goal and scope of the study? b) Have regional and/or temporal differences, if any, been consistently applied? c) Have allocation rules and the system boundary been consistently applied to all systems? d) Have the elements of impact assessment been consistently applied?

Annex B
(normative)

Reporting requirements of ISO 14044 applicable or not applicable to this TS

B.1 General

This annex presents the

— reporting requirements of ISO 14044:2006 which apply with no modifications, and

— reporting requirements from ISO 14044:2006 that are adapted for OLCA.

B.2 Reporting requirements of ISO 14044:2006 which apply with no modifications

5.1.1 The type and format of the report shall be defined in the scope phase of the study.

B.3 Reporting requirements from ISO 14044:2006 that are adapted for OLCA

Subclause	**5.1.2** In addition to the items in 5.1.1 and those listed in 5.2 c), the following items should be considered when preparing third-party reports:
Adapted requirements for OLCA	a) modifications to the initial scope together with their justification; b) system boundary, including — type of inputs and outputs of the system as elementary flows, and — decision criteria; c) description of the unit processes, including — decision about allocation, and — description about the consolidation methodology within the organization; d) data, including — decision about data, — details about individual data, and — data quality requirements; e) choice of impact categories and category indicators.

Subclause	**5.2 Additional requirements and guidance for third-party reports**
Adapted requirements for OLCA	When results of the LCA are to be communicated to any third party (i.e. interested party other than the commissioner or the practitioner of the study), regardless of the form of communication, a third-party report shall be prepared. The third-party report can be based on study documentation that contains confidential information that might not be included in the third-party report. The third-party report constitutes a reference document, and shall be made available to any third party to whom the communication is made. The third-party report shall cover the following aspects. a) **General aspects:** 1) LCA commissioner, practitioner of LCA (internal or external); 2) date of report; 3) statement that the study has been conducted according to the requirements of ISO 14044 and of this TS. b) **Goal of the study:** 1) reasons for carrying out the study; 2) its intended applications; 3) the target audiences; 4) a statement that the results are not intended to be used in comparative assertions intended to be disclosed to the public. c) **Scope of the study:** 1) reporting unit including i) statement of performance characteristics, and 2) reporting unit (specified time period), including i) consistency with goal and scope, ii) definition, and iii) result of performance measurement; 3) system boundary, including i) description of the consolidation methodology chosen, ii) omissions of life cycle stages, processes, or data needs, iii) quantification of energy and material inputs and outputs, and iv) assumptions about electricity production; 4) cut-off criteria for initial inclusion of inputs and output, including i) description of cut-off criteria and assumptions, ii) effect of selection on results, and iii) inclusion of mass, energy, and environmental cut-off criteria. d) **Life cycle inventory analysis:** 1) data collection procedures;

	2) qualitative and quantitative description of unit processes; or other operations according to goal and scope; 3) sources of published literature; 4) calculation procedures; 5) validation of data, including i) data quality assessment, and ii) treatment of missing data; 6) sensitivity analysis for refining the system boundary; 7) allocation principles and procedures, including i) documentation and justification of allocation procedures, ii) uniform application of allocation procedures, and iii) description about the consolidation methodology within the organization. e) **Life cycle impact assessment,** where applicable: 1) the LCIA procedures, calculations, and results of the study; 2) limitations of the LCIA results relative to the defined goal and scope of the LCA; 3) the relationship of LCIA results to the defined goal and scope, see 4.2; 4) the relationship of the LCIA results to the LCI results, see 4.4; 5) impact categories and category indicators considered, including a rationale for their selection and a reference to their source; 6) descriptions of or reference to all characterization models, characterization factors, and methodology used, including all assumptions and limitations; 7) descriptions of or reference to all value-choices used in relation to impact categories, characterization models, characterization factors, normalization, grouping, weighting, and, elsewhere in the LCIA, a justification for their use and their influence on the results, conclusions, and recommendations; 8) a statement that the LCIA results are relative expressions and do not predict impacts on category end points, the exceeding of thresholds, safety margins or risks and, when included as a part of the LCA, also i) a description and justification of the definition and description of any new impact categories, category indicators, or characterization models used for the LCIA, ii) a statement and justification of any grouping of the impact categories, iii) any further procedures that transform the indicator results and a justification of the selected references, weighting factors, etc.,
	iv) any analysis of the indicator results, for example sensitivity and uncertainty analysis or the use of environmental data, including any implication for the results, and v) data and indicator results reached prior to any normalization, grouping, or weighting shall be made available together with the normalized, grouped, or weighted results. f) **Life cycle interpretation:** 1) the results; 2) assumptions and limitations associated with the interpretation of results, both methodology and data related; 3) data quality assessment;

	4) full transparency in terms of value-choices, rationales, and expert judgements. g) **Critical view,** where applicable: 1) name and affiliation of reviewers; 2) critical review reports; 3) responses to recommendations.

New subclause	**New subclause: 5.4 Further reporting requirements for performance tracking over time**
Adapted requirements for OLCA	**5.4 Further reporting requirements for performance tracking within time** — Structural changes to the organization should be identified, and their effect on the results of the OLCA for the relevant time period explained (e.g.: merger and acquisition, BU sales, outsourcing, number of employees, etc.)

Annex C
(informative)

Example of application including performance tracking

C.1 General

OLCA of a Hotel Group: An application of life cycle approach to assess an organization's environmental performance.

C.1.1 The Hotel Group's background and ambition

An international hotel group operates in 90 countries with more than 4 000 hotels. The group is an owner, operator, and franchisor. This organization seeks to understand and improve its environmental performance from a life cycle perspective.

C.1.2 An innovative approach of an OLCA

The Hotel Group developed a customized approach to the assessment of the group's environmental impact that can be defined as "a multi-criteria measure of the environmental performance of an organization from a life-cycle perspective".

This approach has been largely inspired by the LCA principles and mainly guided by the following principles:

— life-cycle thinking perspective: impacts were investigated for the upstream suppliers (food suppliers, laundry cleaning contractors, construction, etc.), hotels on-site and headquarter activities and downstream suppliers (on-site waste treatment, end-of-life of buildings);

— multi-criteria approach: the assessment included all relevant environmental indicators associated with the Hotel Group's activities;

— relevance, completeness, appropriate sources, data, and methodology have been selected to assess the environmental footprint; the assessment includes as far as possible all relevant life cycle stages of the Hotel Group activities;

— transparency: due to the complexity of the study, all methodological choices have been discussed and results presented with limitations. A critical review has also been conducted to ensure the accuracy and reliability of the study.

C.2 Methodology

The methodological steps have been largely inspired by the phases described in ISO 14040, with the challenge to adapt it to the level of an organization.

C.2.1 Goal and scope definition

The Hotel Group's goal was to quantify metrics on its global environmental impacts led to build a specific methodology to provide accurate information about the real environmental issues of the Hotel Group's activity, beyond intuitions (not just CO_2, not focus on on-site activities), and thereby to build the best possible strategy to curb its impacts and generate value for the group.

The reporting unit was defined as: "Hosting all the clients of the Hotel Group during one year, over the world, considering all the basic services including restauration".

Defining the boundaries of the organization, major parts of the scope covered by the Hotel Group accommodation services (including franchised hotels, due to operational control) were assessed.

The system studied has been selected through a hotel life cycle perspective (raw materials, manufacturing, distribution, use, and end-of-life) and split into 11 activities, covering the Hotel Group's responsibility scope. Some exclusion (give examples) had to be made if there was not enough information or the contribution was negligible. The following scheme presents the 11 activities selected.

Figure C.1 — The 11 activities of the accommodation business covered in the study

All the inputs and outputs compiled at the organization boundaries have an impact on the environment. Environmental impact indicators studied for this environmental footprint have been selected according to

— their relevance to the accommodation services sector environmental impacts and the Hotel Group's environmental program priorities and their understandability, to raise the Hotel Group's stakeholders awareness on main results, and

— the availability of reliable assessment methodology.

Therefore, energy consumption (as primary resource), water use, ultimate waste production, climate change, and water eutrophication have been then selected for this study. The Hotel Group also have a major concern about the impact it could have on toxicity, eco-toxicity, and biodiversity; however, these impacts could not be evaluated due to a lack of available indicators.

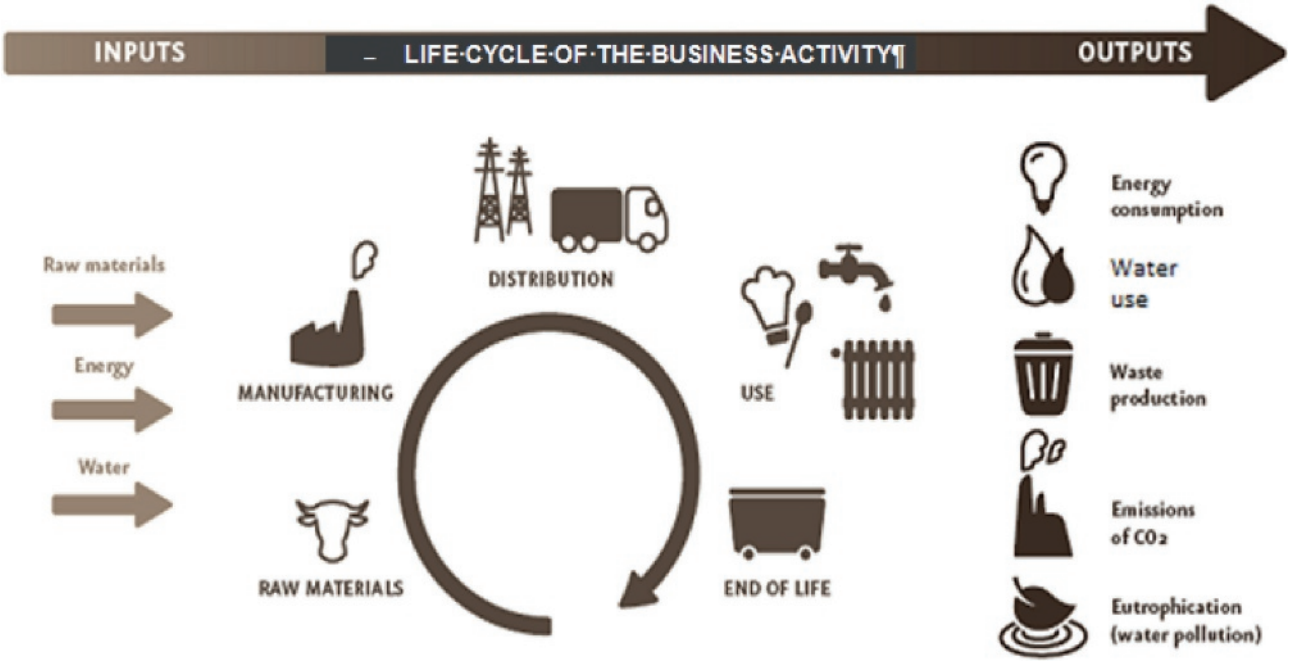


Figure C.2 — Goal and scope definition

C.2.2 Data collection

An important task of the study is to collect all the activity data, referring to all the flows involved in the Hotel Group's operation. The activity data are the quantified translations of the operation (such as amount of kWh of energy used). Two types of data were collected:

— Global data: Number of hotels, rooms, total area, number of meals and breakfast. These data are useful for extrapolations and allocations and were mostly obtained through corporate departments and the Hotel Group reporting system.

— Specific "activity data": These data were mostly obtained from procurement department, the Hotel Group environmental reporting system, hotel census, and specific suppliers data collection.

C.2.3 Compilation

Environmental impacts are calculated at the group level, using assumptions as needed.

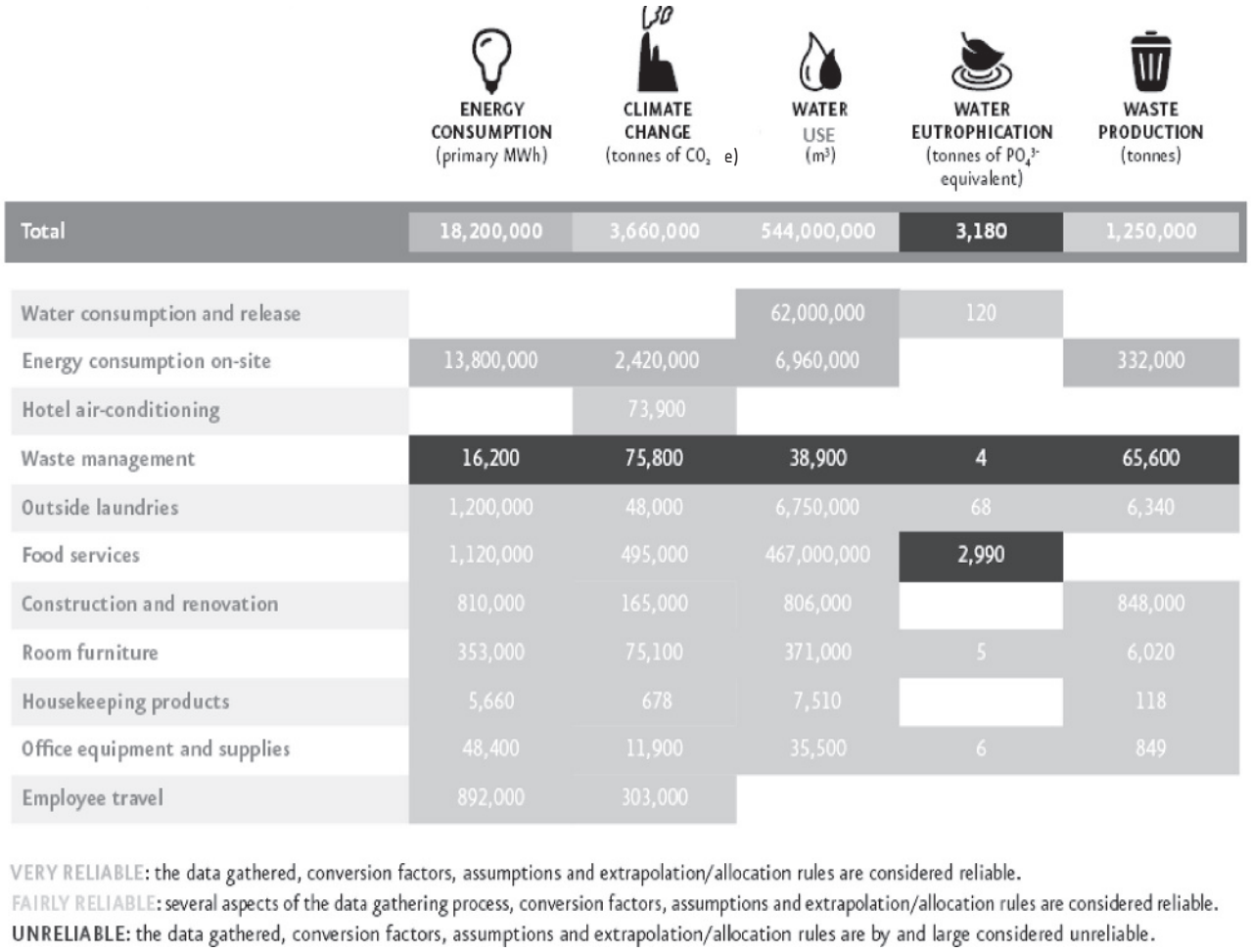
Considering that all the activity data were not available at the hotel level, some assumptions were made to aggregate the results. Especially, there is less accurate data available for franchised hotels. Also, extrapolations and allocations could be made on the basis of the number of rooms, the number of hotels, the area covered, the hotel brand, and the regional zones.

C.2.4 Critical review

An independent panel (two LCA specialists and one international hospitality industry expert) has been involved to ensure accuracy and transparency before the publication of results. A critical review report has been established following the guidelines and contents of product LCA critical review reports.

C.3 The results and key-learnings

Some parameters of environmental relevance have been presented, three on the inventory level (energy consumption, water use, and waste) and two on the impact level (climate change, water eutrophication).



	ENERGY CONSUMPTION (primary MWh)	CLIMATE CHANGE (tonnes of CO_2 e)	WATER USE (m^3)	WATER EUTROPHICATION (tonnes of PO_4^{3-} equivalent)	WASTE PRODUCTION (tonnes)
Total	**18,200,000**	**3,660,000**	**544,000,000**	**3,180**	**1,250,000**
Water consumption and release			62,000,000	120	
Energy consumption on-site	13,800,000	2,420,000	6,960,000		332,000
Hotel air-conditioning		73,900			
Waste management	16,200	75,800	38,900	4	65,600
Outside laundries	1,200,000	48,000	6,750,000	68	6,340
Food services	1,120,000	495,000	467,000,000	2,990	
Construction and renovation	810,000	165,000	806,000		848,000
Room furniture	353,000	75,100	371,000	5	6,020
Housekeeping products	5,660	678	7,510		118
Office equipment and supplies	48,400	11,900	35,500	6	849
Employee travel	892,000	303,000			

VERY RELIABLE: the data gathered, conversion factors, assumptions and extrapolation/allocation rules are considered reliable.
FAIRLY RELIABLE: several aspects of the data gathering process, conversion factors, assumptions and extrapolation/allocation rules are considered reliable.
UNRELIABLE: the data gathered, conversion factors, assumptions and extrapolation/allocation rules are by and large considered unreliable.

Figure C.3 — The Hotel Group's OLCA

Some of the key findings for the group were

— carbon and energy are the first points for progress for the group: on-site hotels energy consumption account for the 3/4 of the Hotel Group's energy footprint and affects the Group's carbon balance,

— food purchases account for most of the water consumed and contaminated: food services are where the Hotel Group consumes most indirect water and accounts for the bulk of the water eutrophication released (fertilizing and crop-protection products used in farms), and

— building sites are a critical link in the waste production chain: the Hotel Group generates more than a million tons of waste a year, 70 % comes from the demolition of the hotel at its end-of-life and the disposal of the inert waste.

The complete findings of this environmental footprint enabled to shape the new sustainable development strategy, "Planet 21", and the related action plan.

Annex D
(informative)

Inventory calculation procedures

Two main inventory calculation procedures can be used:

— bottom up, adding the different LCA of the products of the organization, weighted by the amount of products that are produced during the considered period of time, together with the associated utilities;

— top down, considering the organization as a whole, and adding upstream (cradle to gate) models for all inputs of the organization and downstream (gate to grave) models for all outputs. The individual LCA of products of the organization can be evaluated through allocations of the environmental impacts.

These procedures can be combined according to the situation and available data in a given organization.

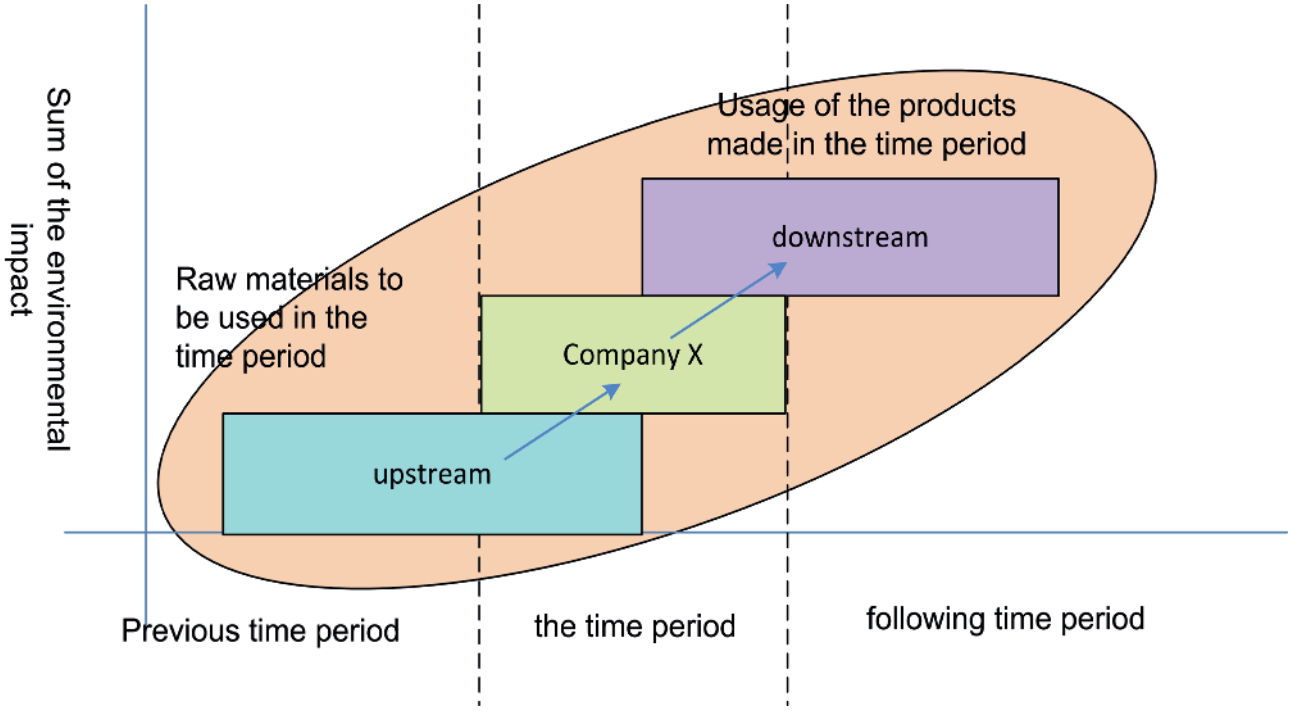


Figure D.1 — Calculation of the inventory for the organization over different time periods

Environmental data are managed through different perspectives at organization level.

A time period can be defined, such as a financial year, or a period which contains some activities of an organization (e.g. average or mid-term plan).

Annex E
(informative)

Converting financial information to physical flows

E.1 General

Organizations can manage their purchase information in a way that allows them to make a link with LCA data gathering through IT tools. Then, the issue of the conversion of financial information to physical flow rises.

Four main issues have been identified. The present annex proposes ways to cover them in the following subclauses.

E.2 Variation of the cost of purchased products during the considered time period

The price of products that the organization is purchasing varies over time. Therefore, the ratios vary along the time period, as for example "mass per unit of price". When assessing the amount of products corresponding to a given amount of money spent along the considered time period, the LCA practitioner should assess the influence of the price variation along the considered time period.

If this issue is not taken into account, the uncertainty of the LCA results can raise significantly.

E.3 Purchasing power parity

The parity variation between currencies over time introduces a variation of purchased products costs. The LCA practitioner should assess the influence of the variation when evaluating the amount of purchased product.

The uncertainty which would be introduced in the LCA results can be of the same order of magnitude as the variation between the currencies.

E.4 Variation of money value (actuary) over time

When background LCA data are available for a given period of time, the LCA practitioner who uses these data for another period of time should adjust the variation of money value between the two periods of time. This adjustment can lead to change the ratio that is considered for the study, e.g. mass per unit of price.

E.5 Combining different levels of details within the LCA calculation

When using background data available for a given level of detail, the LCA practitioner should take into account the differences that can occur when different levels of details are used.

EXAMPLE If a generic cost of steel per kilogram is used to match a consumption of a given alloy of steel with the generic steel production model, an adjustment might be needed to better reflect the reality.

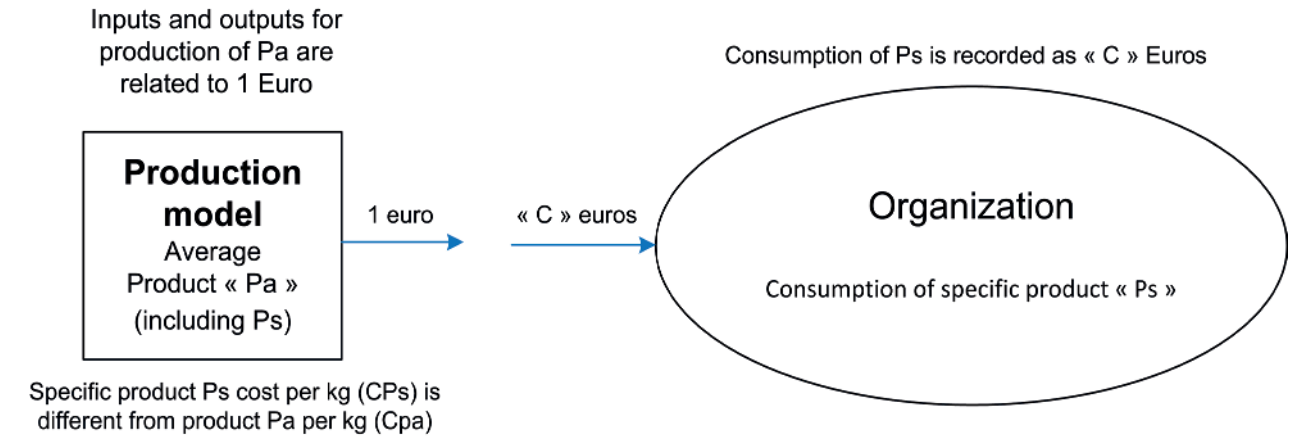


Figure E.1 — Using different levels of detail to calculate the OLCA

Annex F
(informative)

Allocation rules

F.1 General

In order to cover the improvement goal of the organization, the allocation of the organization impacts might be needed. As mentioned in ISO 14044:2006, 4.3.4.2, allocation should be avoided. Some data will only be available at the organization boundary.

Because of this allocation, it will be possible, for example, to identify which family of products of the organization needs to be improved first.

Therefore, the present annex lists some key issues that the LCA practitioner should cover during the OLCA.

F.2 The allocation practice and end of life issues should follow ISO 14044 recommendation

As mentioned in the core of this Technical Specification, the allocation practice and end-of-life issues should follow ISO 14044, including the hierarchy regarding physical and financial allocation rules.

F.3 Allocation should be done for families of products

Organizations can have a huge number of product references. Therefore, the allocation of the environmental impact of the organization to each single product might not bring any value to the organization and would represent a huge work. It is more relevant to identify families of products, which aggregate products references, to which the environmental impacts are allocated.

F.4 Allocation should be envisioned right from the beginning of the LCA study

The allocation of consumptions and emissions at the boundaries of the organizations to given families of products is facilitated when it is done at the data collection stage.

F.5 Uncertainties associated to allocations should be taken into account in interpretation

Since allocations are done at the level of families of products, uncertainties associated to these allocations are different from the uncertainties resulting from the allocation of impacts to a specific product. Therefore, the LCA practitioner should practice some specific uncertainty analysis when dealing with the interpretation of its LCA.

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