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READING GUIDE
FOR THE METHODOLOGY ANNEX
OF BP X30-323-0

Contents

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Introduction

Background

In article 54, law No. 2009-967 passed on 3 August 2009 states:

> Consumers must be given sincere, objective and comprehensive environmental information, covering the overall characteristics of the product/packaging pair, and offered affordable environmentally-friendly products. France will support European-level recognition of these requirements.
> Information on the environmental impacts of products and services, in addition to price labels, will progressively be phased in, including at community level, along with labelling and providing information on traceability and the social conditions under which products are produced at the sales site. The methodology associated with the assessment of these impacts will be determined through dialogue with the relevant professionals.

Environmental labelling applies to all consumer products targeted at the end-consumer. Since spring 2008, AFNOR has been conducting work headed by the ADEME to develop the methodologies involved in assessing environmental impacts with the help of professionals, but also based on input from civil society. **The AFNOR repository of best practices BP X 30-323 is the framework document that sets out the general principles** so that companies who wish to initiate environmental labelling can do so on the basis of a common foundation. The repository has established that the indicators should allow products belonging to the same category to be compared. It is therefore necessary for the indicators to be calculated in the same manner. For this reason, and as an extension of this repository, work groups have met to specify calculation methods.

- **A cross-sector group** has developed a general methodology annex that specifies the assessment points that are common to all products. This annex was adopted by the general platform in July 2009, then revised in January 2011. It primarily addresses issues related to system boundaries or accounting rules, but also various points on greenhouse gas emissions (CO_2 equivalents) as this indicator is common to all product categories. This guide aims to facilitate understanding of some of the choices made in the cross-sector methodology annex.

- **Sector-specific work groups** will propose annexes on aspects specific to their product families: the choice of indicators other than greenhouse gas emissions, the calculation methods, the articulation of generic data and specific data, etc. A product family contains several product categories. For example, the "electric and electronic goods" family contains the "television", "toaster" and "camera" categories.

Objectives of the reading guide

The repository of best practices and its methodology annexes are technical documents targeted at environmental assessment specialists. The aim of this reading guide is to make the requirements of the cross-sector methodology annex accessible to a wider audience so that everyone can understand the choices it makes. Explanations will also be illustrated with examples in order to be as clear as possible.

It is important to note that companies will need to use a software programme to calculate environmental labelling data; such programmes will incorporate the rules specified in the repository or methodology annexes. Companies will therefore not need to use these documents themselves.

Some companies will develop their own software. **The ADEME will provide its own software that all companies who wish to do so will be able to use.** It will be a version of the Product Assessment tool that is currently available on the ADEME website. It will also be made available online.

These software programmes will be set to a database of so-called generic data because anyone will be able to use this data without needing to recalculate everything. This database will provide impact information on raw materials such as steel, cement, cardboard and glass, as well as on frequently-used processes.

The ADEME has been appointed to develop this public database so that all companies use the same default data.

How should the company proceed?

The company using a software programme shall:

Characterize its product

- Identify all the items it is composed of;
- Identify the processing steps used;
- Identify the elements that make it possible to characterize use, such as power level (electrical products), washing temperature (textiles).

Trace input flows to the company

- Purchasing: raw materials and energy use;
- Upstream logistics: distance between the plant and the supplier warehouse, means of transport used.

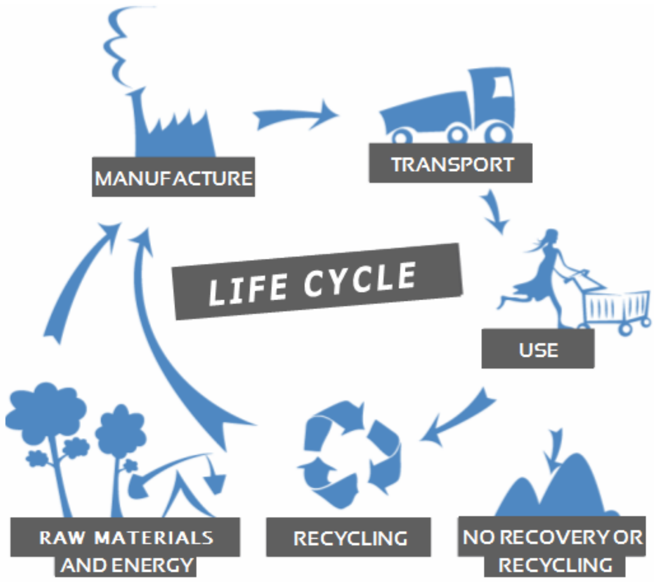
Trace output flows from the company

- Sales: end-product weight, number of end-products;
- Downstream logistics: distance between the plant and the purchaser warehouse, means of transport used, identify and characterize product items and identify the technical processes used.

Entering this in/outflow data in the relevant software programme will make it possible to calculate labelling data.

A data collection sheet example is provided in BP X30-323.

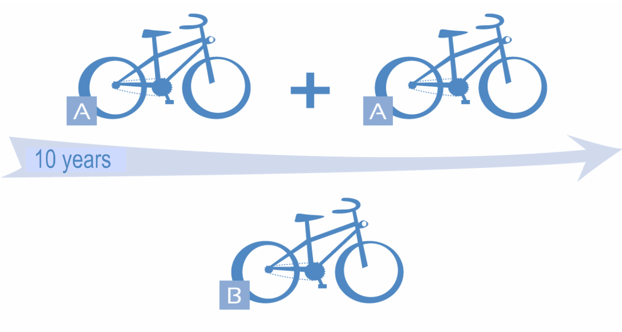
The assessment of a product's environmental impacts includes its environmental impacts at each of the following stages: raw materials production or extraction, product manufacture, distribution, product use and the impacts associated with its end-of-life processing or disposal. This sequence of stages makes up the product life cycle. The diagram below provides an illustration of the various stages of a product's life cycle.



ISO 14040 and ISO 14044 provide an international framework for this type of assessment. The standards have left various methodological options open. The purpose of the cross-sector methodology annex was to specify these choices in order to ensure that everyone calculates impacts in the same way.

Vocabulary: functional unit

The functional unit is the unit of measurement used to evaluate the service provided by the product. Just as a consumer must calculate the price of a kilo in order to compare the price of two pieces of fruit, in order to compare the environmental impacts of two different products, the impacts must be calculated on the basis of a common unit of measurement.



The functional unit is often expressed for a given lifespan. If bike A generates half as many environmental impacts as bike B, but bike A must be replaced after 5 years while bike B will last 10, the impacts of bike A must be multiplied by 2 in order to compare them to impacts from bike B. The actual impacts associated with the two bikes are equivalent.

Functional unit examples:

- Pen: cover a 20 km length of writing;
- Light bulbs: provide 40 W of light for 1,000 h;
- Mobile phone: use for 11 minutes per day for 2 years;
- Apples: consume one kilogram of apples;
- Jeans: wear a pair of trousers for one day.

Explanation of the general rules in the methodology annex

Environmental indicators

Environmental indicator selection

The environmental labelling of fast-moving consumer products will not include an exhaustive list of environmental indicators. Only the most relevant will be selected by the sector-specific working groups, who will use an analytical grid to justify their choices.

This grid is based on criteria associated with the relevance, implementation and feasibility, coherence, robustness and reliability of these indicators.

For example, one environmental impact is global warming; its impact indicator is the global warming potential, expressed as CO_2 equivalents.

Impact indicators

Impact indicators are preferred to flow indicators.

Water use is an exception: there is no impact indicator to date that accounts for water stress. Only net water use is thus counted. An ISO standard on "water footprinting" is currently being drafted in order to take other factors into account and, once it is published, it may be taken into account for future revisions of this annex.

The methods that yield characterization factors, i.e. factors that are able to transpose various flows (material use, atmospheric emissions) into potential environmental impacts, are referenced in Annex D of BP X30-323.

Greenhouse gases

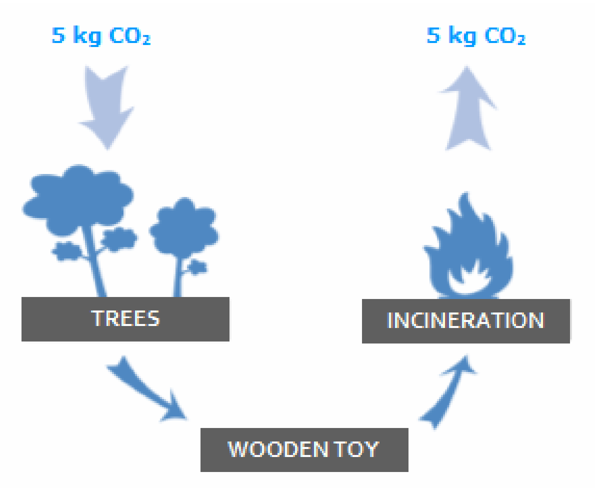
Some gases are identified drivers of the greenhouse effect. The environmental balance of a fast-moving consumer product must incorporate all the gases for which impacts on the greenhouse effect over 100 years can be characterized using data provided by the Intergovernmental Panel on Climate Change (IPCC).

Greenhouse gas flow accounting

Accounting is carried out for all flows: those that generate positive flows of atmospheric pollutants and the negative flows that remove them.

Flows that captures pollutants from the atmosphere involve CO_2, i.e. biomass carbon capture through photosynthesis. Accounting for such processes can be carried out for forests, which guarantee the sustainability of this capture over time.

To assess the CO_2 emissions of a wooden toy, for example, one must count the emissions associated with the various stages of the life cycle, and subtract the carbon captured during the tree growth cycle.



In the diagram above, we hypothetically consider that a tree provides the raw material for manufacturing one wooden toy. This tree captures 5 kg of CO_2 from the atmosphere during its growth cycle. When the toy is burned, it releases 5 kg of CO_2 into the atmosphere. Over this life cycle, CO_2 emissions are - 5 + 5 = 0 kg.

Greenhouse gas emissions time lag

Not all the emissions associated with a product life cycle take place at the same time. As greenhouse gas impact is assessed over 100 years, when emissions are significantly delayed (in relation to product manufacture), they generate fewer impacts on greenhouse gases over this 100 year timescale. Sector-specific working groups decide whether or not this time lag should be considered.

If a group decides emission time lag should be accounted for, emissions are weighted with a coefficient determined based on the lifespan of the product and the lifespan of the greenhouse gas (GHG). Given that the global warming potential (GWP) is conventionally calculated on a 100-year basis, the coefficient applied amounts to subtracting from this 100 year baseline the amount of time during which the GHG is not present in the atmosphere.

If a wardrobe has an estimated lifespan of 40 years, the emissions to include in the accounting are:

Emissions to be counted = Emissions * (100-40)/100

For gases that have a lifespan that is shorter than the new reference period (100-40) (i.e. methane), emissions are not weighted with a correction factor.

Land use modification

One speaks of direct land use modification when a forest is cut down to obtain agricultural land.
Where this occurs, the carbon contained in the soil (in organic matter) is released, thereby producing greenhouse gas emissions.

These emissions must be accounted for when the flow balance is assessed.

Indirect land use modifications (modification of one area that leads to modification of another area) will be assessed as soon as an internationally recognized method has been developed.

Exclusions

The following elements are excluded from the environmental balance of the product of interest:

- Carbon offsetting operations;
- Flows associated with R&D;
- Flows associated with transporting employees from their home to their workplace and with business travel;
- Flows associated with services connected to a product or system, such as advertising, business development and marketing;
- Flows associated with transportation of customers to the sales location (this information is, however, made available to the customer, but in an indirect way through labelling or some other form of information that does not give rise to a compulsory indicator in this guide).

Cut-off rules

In order to simplify the data collection stage, it is possible to ignore certain flows, provided they simultaneously fulfil three conditions. To illustrate these various conditions, we will focus on an example: two aluminium cases connected by two steel screws.

- **Condition 1**

The flows or processes with a total mass below 5% of the mass of product used to complete the functional unit can be ignored.

Here is the mass data:

	Mass	Total product mass	Mass contribution of the element
Upper case	100 g	254 g	39%
Lower case	150 g	254 g	59%
Steel screw x2	2 x 2 = 4 g	254 g	2%

As the two screws only make up 2% of the total product mass and given this cut-off criterion, they could therefore be ignored during the data collection phase.

- **Condition 2**

The flows or processes with a total energy content below 5% of the energy content of the product used to complete the functional unit can be ignored.
The energy content of a material is the energy required to produce it. This data is supplied in the generic database.

Here is the energy content data:

	Energy content	Total energy content of the product	Energy contribution of the element
Upper case	50 MJ	145 MJ	35%
Lower case	60 MJ	145 MJ	41%
Steel screw X2	2 x 17.25 = 35 MJ	145 MJ	24%

As the two screws make up 24% of the total energy content of the casing, they cannot be ignored in the environmental balance.

- **Condition 3**

The flows or processes with total environmental impacts below 5% of the environmental impacts of the product used to complete the functional unit can be ignored. For clarity's sake, environmental impacts in this example are based solely on CO_2 equivalent emissions, but the environmental consequences must be assessed in the same way for all the impacts selected in the assessment.

	CO_2 eq. emissions	Total CO_2 eq. emissions	CO_2 eq. emissions contribution of the element
Upper case	70 g CO_2 eq.	200 g CO_2 eq.	35%
Lower case	80 g CO_2 eq.	200 g CO_2 eq.	40%
Steel screw x2	2 x 25 = 50 g CO_2 eq.	200 g CO_2 eq.	25%

Each condition which is not met is individually sufficient for flows not to be ignored: in the example, the mass criterion could lead us to ignore the flows associated with the screws, but since the steel screws are responsible for 25% of greenhouse gas emissions and make up 24% of the casing energy content, they will not be ignored.

Co-product allocation rules

A single manufacturing process can generate two or more products. These products will be purchased by one or more customers. In this case, the environmental impacts of the processes that made it possible to generate these products must be distributed among them.
Each work group decides how to distribute impacts among co-products, where they occur during the lifespan of the product categories of interest. The group considers the following options:

- **Distribute based on distinct processes**

This solution is valid only when the process that generates the product and co-product can be divided into several sub-processes, each of which is attributed to one or the other co-product.

Example: a company that produces washing powder and fabric softener that go through two different production lines. The company knows its overall energy use, but will nevertheless know how to attribute to the washing powder and to the fabric softener the energy used by their own specific production line.

If this is not possible, the assessor must:

- **Distribute based on the physical relationships (mass, energy) associated with the functional units of the product**

Example: if one single process yields 200 litres of one paint and 400 litres of a second paint, one third of the flows will be attributed to the first paint and two thirds to the second.

If this is not possible, the assessor must:

- **Distribute by extending system boundaries and including the co-product function when it is possible to assess impacts avoided by co-product production.**

Example: a textile company manufactures clothes and sells its fabric scraps to serve as seat padding. The seat manufacturer has the option to buy these fabric scraps or else synthetic fibres. To assess the impacts of the clothing, it will be necessary to calculate the total impacts of the manufacturing site and the rest of the clothing life cycle and subtract the impacts that would have been generated by the production of the synthetic fibres that would have been used instead of the fabric scraps.

If this is not possible, the assessor must:

- **Distribute based on the economic value of the co-products.**

Example: if one of the products is sold for 10 Euros and the other for 20 Euros, one third of the flows will be attributed to the first product and two thirds to the second.

If this is not possible, the assessor must:

- **Distribute based on several of the above rules.**

Requirements of the various life cycle stages and models to be used

Energy models (electricity use)

The public generic database will give mean impact data (over the last 3 years) to produce one kWh, based on the various national electricity production modes.

Where relevant, the database will give data on materials or processes by incorporating the mean European impact to produce one kWh.

If a company organizes its work schedule to use electricity during "off-peak" periods (when the electricity network is not highly solicited, and therefore produces less carbon than on average) and can prove it (with a contract), it can claim lower greenhouse effect impacts for its electricity use.

If a company produces electricity from renewable resources (solar and wind power) for its own use, it can use the energy model that applies to its specific electricity production system.

If a company buys electricity produced using renewable resources (solar and wind power), it must nonetheless use the mean impact for producing one kWh in the country where it is located, averaged over the last three years, since the national mean calculation already takes into account the "green" energy that a country purchases. Taking it into account for the company would result in double counting.

Since environmental labelling is targeted at French consumers, the impacts associated with the electricity consumed to use the product and at the end-of-life stage must be calculated on the basis of the impact mean to produce one kWh in France, averaged over the last three years. These impacts will be found in the public generic database.

The energy mix is the distribution of the various sources of energy that go to produce a country's electricity. Since each energy source generates its own environmental impacts, the impacts of the mean mix are calculated based on the environmental impacts of these different sources, depending on how they are distributed. It is a mean because, for any given network, it is impossible to precisely trace the electricity and identify its source. This can only be achieved in a closed-loop circuit.
As an example, the French energy mix in 2008 was:

Electricity balance in 2008	Amounts in TWh	CO_2 e impacts
Nuclear	418.3	418.3 a
Standard thermal	56.9	56.9 b
Hydraulic	68.1	68.1 c
Wind and photovoltaic	5.7	5.7 d
Net production	549.1	418.3 a + 56.9 b + 68.1 c + 5.7 d

Source: SOES [French observation and statistics service], Energy balance

a, b, c, d: greenhouse gas emissions associated with producing one TWh by nuclear, thermal, hydraulic, or wind/photovoltaic power plants respectively.

Transport

Transport impacts, be they associated with raw materials transportation or end-product distribution, are determined based on the following parameters:

- Distance travelled;
- Means of transportation and transport equipment used;
- Fuels used;

- Mean fill factor of the means of transportation used;
- Mean empty backhaul rate of the means of transportation used.

The empty backhaul rate is defined as the ratio between the distance travelled when empty, after delivery, and the distance travelled when loaded.
The public generic database will supply data on common means of transportation and their associated energy use.

The fill factor given is a default mean value that manufacturers can further specify if they have their own data.

The impacts associated with air freight will be those associated with fuel consumption.

Distribution phase

The allocation of impacts associated with the product distribution centres in relation to products makes a distinction between several product categories (see the following table). This allocation depends on the limiting factor among those specified in the table and without taking into account product turnaround time at the distribution centre.

Limiting factors	Distinctions between products
- volume - mass - surface area	- room-temperature products - fresh products - frozen products

Use phase

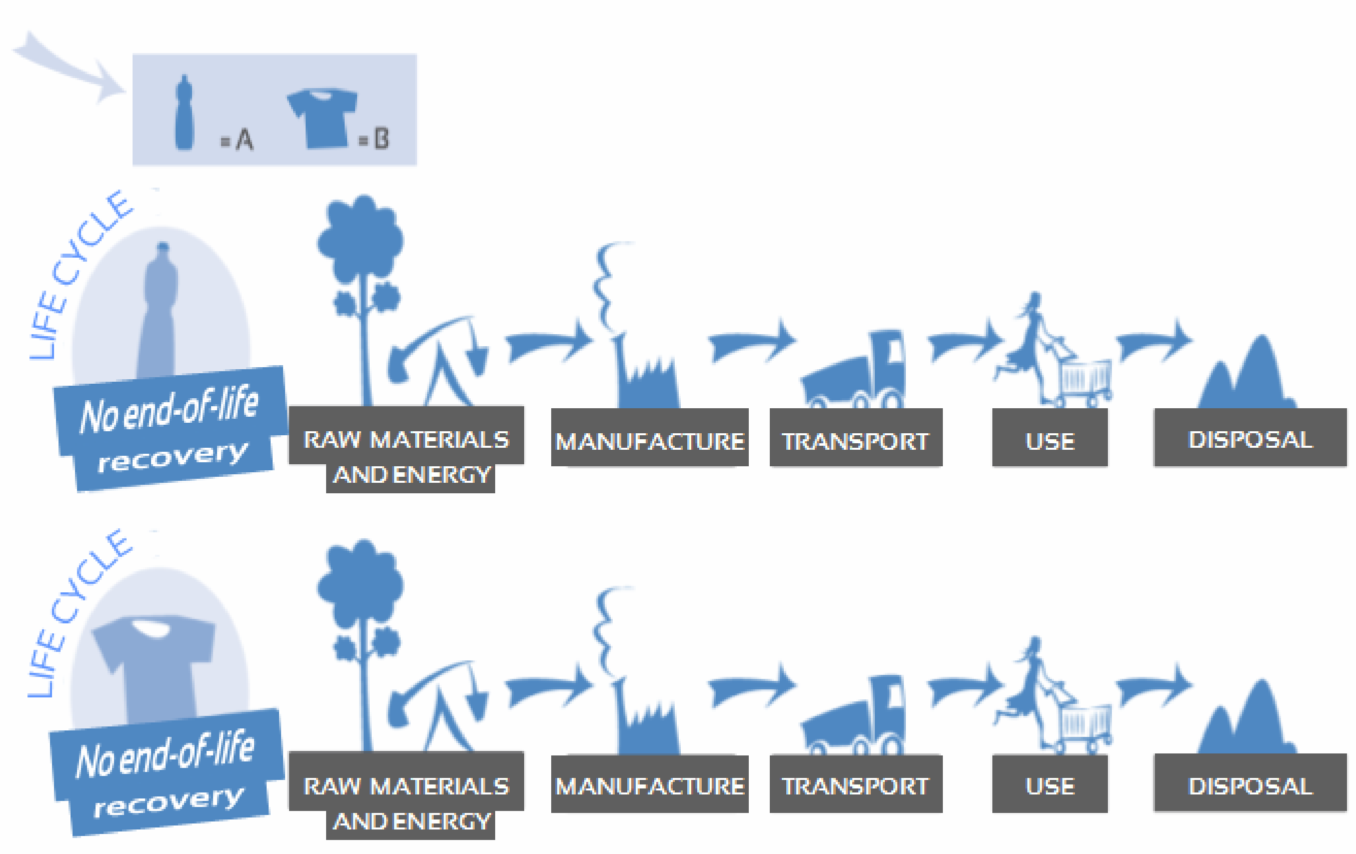
Sector-specific annexes will specify use scenarios depending on product categories. They must therefore be referred to.

These scenarios may be based on harmonized standards like NF EN 50242 that explains how to calculate how much electricity a dishwasher uses. They may also be based on manufacturer or federation recommendations, such as washing temperatures for textiles for example. Consumer studies may also provide valuable elements, such as daily television use times for the French population. Finally, the use scenarios may also be developed through consensus in order to determine the proportion of cooked to raw vegetables consumed, for example.
Similarly, consumables requirements (e.g. ink cartridges for a printer) will be given in the use scenarios established.

End-of-life phase

At the end of its lifespan, a product can be recycled, incinerated, or turned over to a waste disposal centre (managed landfill).

If there are no recycling operations (diagram below), the impacts associated with such operations are nil. The environmental balance for the two materials adds up the impacts associated with the two distinct life cycles (from raw materials extraction to the end-of-life phase).



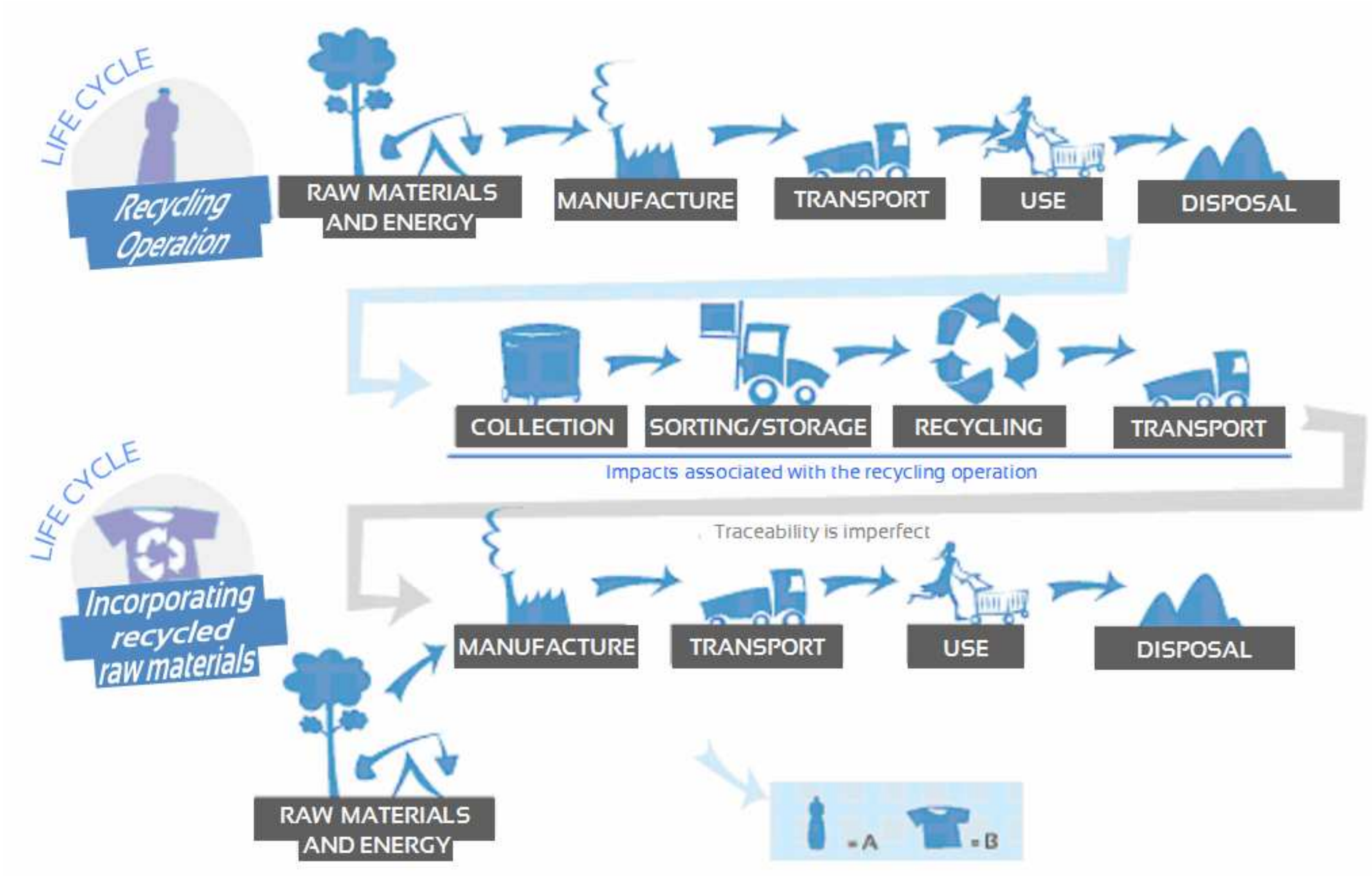
Recycling

A recycling operation sets up a link between two materials, material A that is recycled at the end of its lifespan, and material B produced by the recycling operation. Each material has its own distinct life cycle. The environmental impacts associated with the recycling operation (e.g. sorting process, collection, recycling) must be distributed between the two materials. When a recycling operation takes place (diagram below), material B incorporates recycled material from A, which produces a direct link between the two materials. The environmental balance for both materials adds up:

- The impacts associated with the upstream life cycle of material A (raw materials extraction, manufacture, distribution and use),
- The impacts associated with product disposal in landfills, for the portion that is disposed of,
- The impacts associated with collecting, sorting and storing the material at the end of its lifespan and processing it to produce recycled raw materials,
- The impacts associated with the downstream life cycle of material B (raw materials, manufacture, distribution and end-of-life phase).

The difference between the environmental balance of the two life cycles without recycling (bottle and T-shirt) and the environmental balance including recycling must be distributed between the two materials.
This difference accounts for the decrease in total impacts achieved by recycling.

Note: for clarity's sake, disposal only covers landfill disposal here. Energy recovery associated with incineration is covered in the next section.



The methodology annex makes a distinction between:

- Closed-loop cases (i.e. paper is recycled at the end of its lifespan to make new paper) in which material B incorporates material A from the same application with actors that are therefore the same. Allocation complies with the actual recycled raw material incorporation rate and the actual national recycling rate for this material at the end of its lifespan;

- Open-loop cases (i.e. a PET bottle recycled to produce textile fibres) in which materials and products are different from one another and the chosen allocation rule will therefore be more advantageous for certain actors. The issue is whether to give the advantage to the manufacturer who uses recycled materials or to the manufacturer who makes recyclable products. It has been decided to have the choice depend on the market conditions for the raw material under consideration:

  - Markets in which there is a demand for the secondary raw material but its use can lead to some additional technical constraints for those who use it. In this case, the advantage shall be evenly split between the manufacturer who uses recycled materials and the manufacturer who produces a recyclable product: 50/50 allocation (case of plastics).

  - Raw materials markets are very tight (supply is lower than demand) and therefore must insert as much secondary raw materials as possible. There shall be an incentive for the manufacturer of recyclable products: 100/0 allocation (case of steel, aluminium, glass and cardboard packaging).

Each time the methodology annex is revised, the work group will discuss how to approach open-loop systems in order to take into account market changes and conditions for each material.

IMPORTANT REMARK

The formulae apply to materials, yet the impacts calculated are those associated with the products, even though materials must be used to obtain products. If two materials are permanently assembled (glued), the following accounting rules must be complied with to select the recycling rate:

- The materials are compatible, e.g. two mixed plastics that can be recycled together to yield a new plastic: the recycling rate will be that of the channel in which the materials are recycled.
- The materials are not compatible, e.g. inseparable metal and plastic components: the recycling rate is nil.

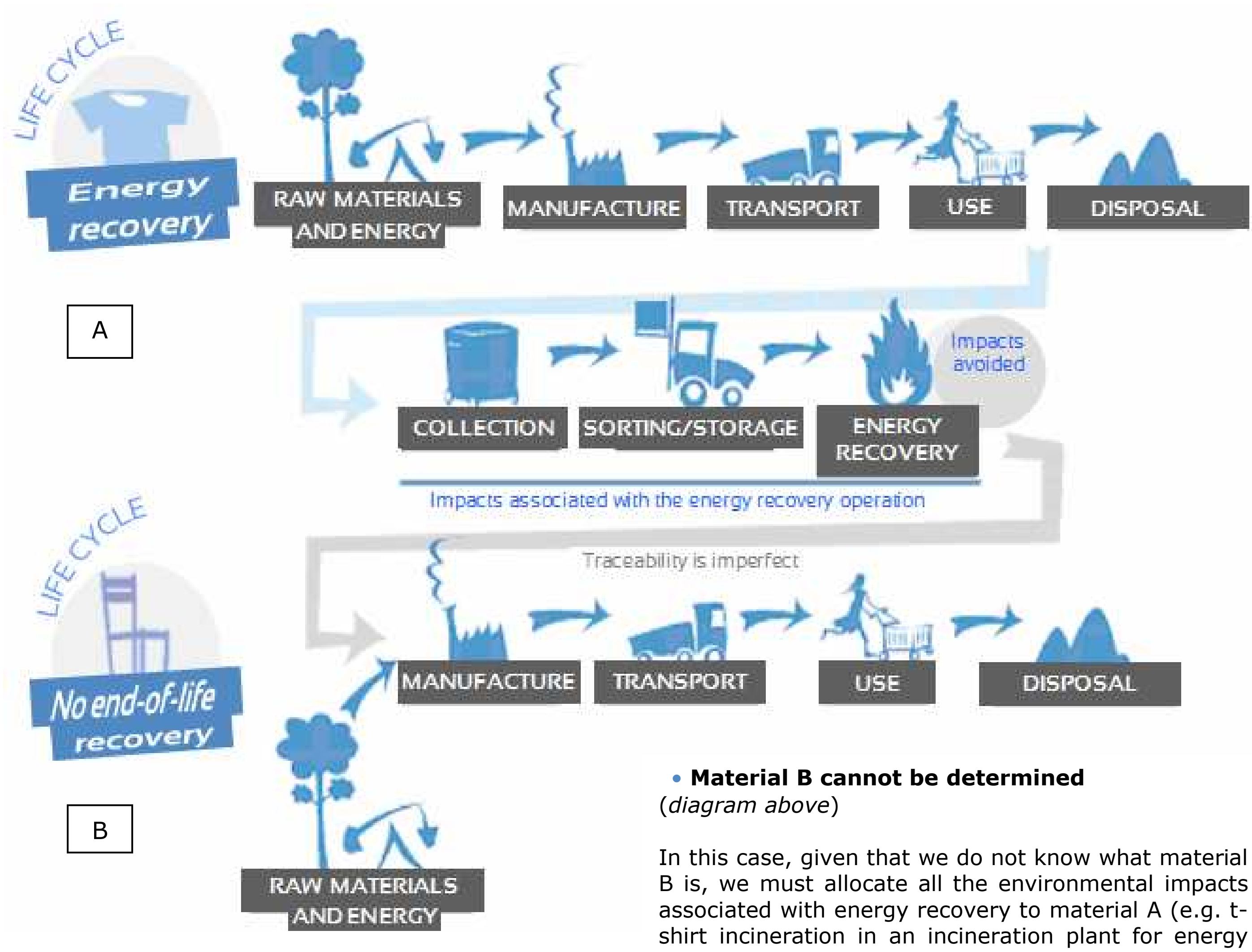
Energy recovery

The methodology annex of the repository of best practices also lays out the requirements for energy recovery. These requirements are explained in this section. Like recycling operations, energy recovery produces impacts associated with collection, sorting and storage, but it also makes it possible to avoid producing heat or electricity.

In the first case, in which there is no energy recovery, calculation of the environmental balances for the two systems can be completely separate.

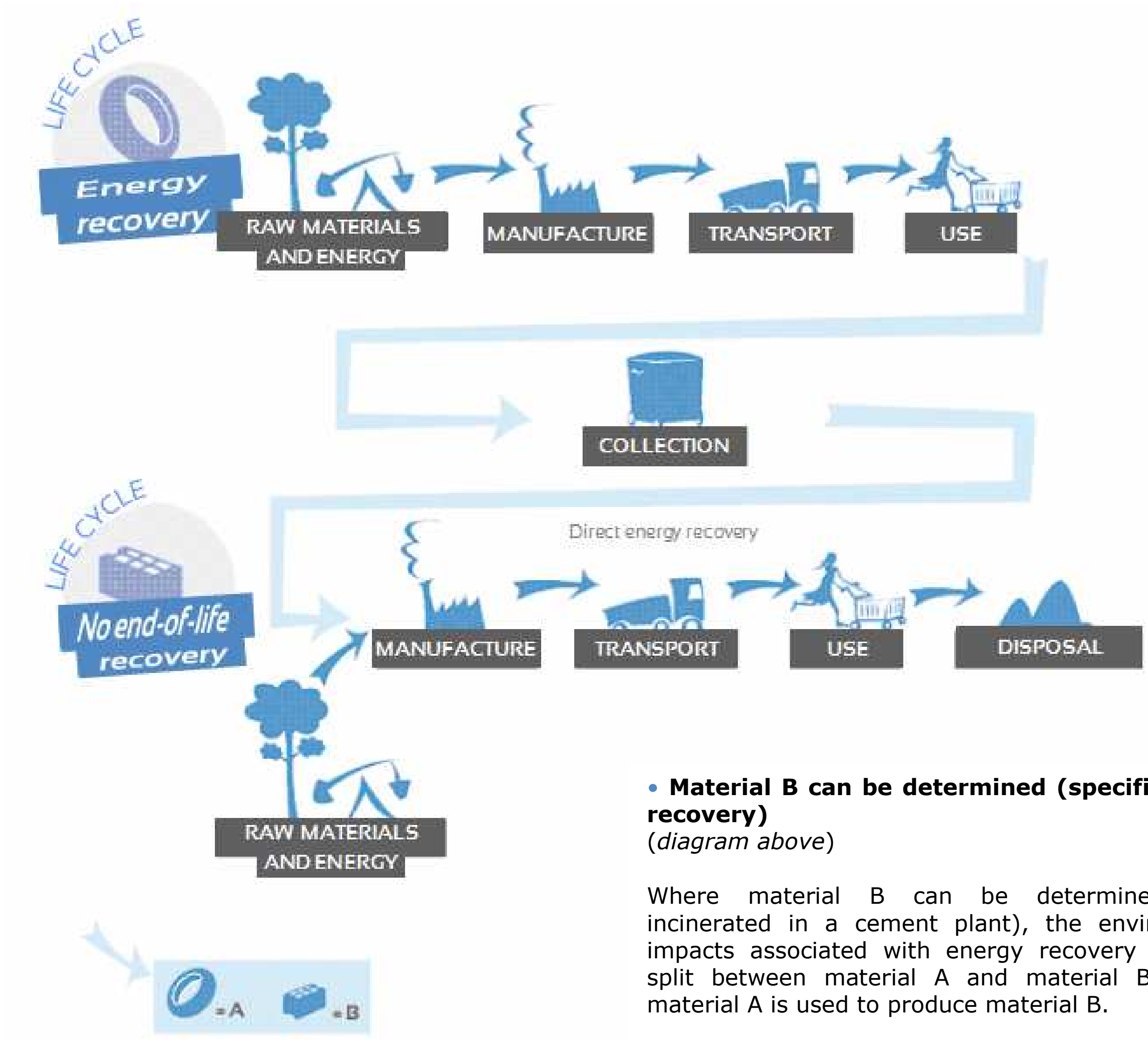
In the second case, in which recovered energy is used, the environmental impacts associated with the end-of-life phase must be split between material A and material B.

There are two possible scenarios to determine how impacts are allocated:



- **Material B cannot be determined** (*diagram above*)

In this case, given that we do not know what material B is, we must allocate all the environmental impacts associated with energy recovery to material A (e.g. t-shirt incineration in an incineration plant for energy recovery).
In this example, the impacts avoided by energy production are allocated to the t-shirt, but so are the additional impacts associated with collection, sorting and storage. This scenario applies to household waste.



• **Material B can be determined (specific energy recovery)**
(*diagram above*)

Where material B can be determined (tyres incinerated in a cement plant), the environmental impacts associated with energy recovery are fairly split between material A and material B because material A is used to produce material B.

In this example, the tyre and the cement manufactured with the energy produced by energy recovery from the tyres share the impacts.

IMPORTANT REMARK

The formulae included in the methodology annex simultaneously incorporate recycling and energy recovery. In this reading guide, we dealt with each aspect separately to facilitate understanding. These mathematical models will be incorporated in the software mentioned in section "Objectives of the reading guide".