GENERAL PRINCIPLES FOR AN ENVIRONMENTAL COMMUNICATION ON MASS MARKET PRODUCTS

METHODOLOGY FOR THE ENVIRONMENTAL IMPACTS ASSESSMENT OF BICYCLES

BP X30-323-17 published in March 2013

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ADEME
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READING GUIDE

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Background

General background on environmental labelling

Article 54 of law No. 2009-967 passed on 3 August 2009 states that consumers shall be given objective environmental information on product characteristics (environmental impacts of the product/packaging pair).

Environmental labelling applies to all consumer products targeted at the end-consumer. Since spring 2008, AFNOR has been conducting work headed by ADEME to develop the methodologies assessing environmental impacts with the involvement of all stakeholders: professionals, but also based on input from civil society. **The AFNOR repository of best practices BP X30-323 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 methodology. 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.

Sector-specific work groups bring together professionals and other stakeholders concerned by a product family to discuss and propose calculation methodologies specific to a given product.

Specific background of the reading guide: work on bicycles

The scope covered by this repository extends to encompass any bicycle meeting the following definition:

"Exclusively or principally human-powered, pedal-driven vehicle, having at least two wheels."

The following key bicycle categories are **included in the scope:**

- children's bikes and toy bikes;
- tandems, tricycles and four-wheel bicycles;
- trial bikes.

But the following key bicycle categories are **excluded of the scope:**

- home exercise bikes and elliptical cross trainers, as they do not qualify as vehicles;
- monocycles, as they have only one wheel;
- balance bikes or kick scooters, as they are not pedal-driven;
- skibobs, as they do not have at least two wheels, if any.

Note that professional racing bicycles are also excluded from the scope of this repository, as well as Bicycle hire services.

Later versions of this repository are expected to extend to Electrically power-assisted cycles (EPAC or e-bikes). The modules specific to e-bikes (e.g. battery pack, electric motor, electronic control, charger, cabling, speed and torque sensor, handlebar-mounted throttle) will be tackled through other Working Groups.

Environmental labelling principles

In order to provide consumers with information that is representative of the main environmental impacts of products, the environmental labelling system is based on a key method for all work in the area: **life-cycle analysis** (LCA). This assessment makes it possible to identify and evaluate all the potential environmental impacts of a product at each stage of its life cycle: raw materials production or extraction, product manufacture, distribution, product use and the impacts associated with its end-of-life processing or disposal.

ISO 14040 and ISO 14044 [1] provide an international framework for this type of assessment. The standards have, however, left various methodological options open. The purpose of the cross-sector methodology annex and the sector-specific methodology annexes is to further specify these methodologies in order to ensure that **all calculations follow the same method and that the results included in the environmental labelling system are therefore comparable.**

Objective of the reading guide

The aim of this reading guide is to explain some of the concepts and requirements included in the repository of bicycles and make them accessible to a wider audience so that everyone can understand the choices made in the repository.

There is also a reading guide for the cross-sector methodology annex that is applicable to all products.

[1] www.iso.org

PRESENTATION OF THE PRODUCT COVERED BY THE REPOSITORY

Introduction

The work group on Sport Equipments (WG10S), jointly led by the Fédération Professionnelle des entreprises du Sport & des loisirs (FPS- professional federation for sports and firms) and ADEME, met on a regular basis between January 2009 and July 2012. Their work culminated in a repository for the "sport equipment: bicycle" products category, which was adopted by the general platform in October 2012. Works on bicycles have been carried out in 2011-2012 with the CNPC which regroups cycling professionals. Bleu Safran provided the technical expertise.

Functional unit

Determining the functional unit and the reference flow

Functional unit

The functional unit is the unit of measurement used to evaluate the service provided by the product. For bicycles, the functional unit chosen is: **"Bicycle use over its lifespan".**
The product under consideration in this repository is the product supplied 'as is' to the user, i.e. the bicycle and its packaging.

Reference flow

To meet the functional unit, the **"modules"** (or bicycles building blocks) to be factored are the following: frame, fork, wheels, tyres, drive system, saddle and seat post, handlebar stem and handlebars, brake system, mudguard, bell, luggage carrier, stabilizers, front and rear lights, reflectors (front, rear and side-facing), kickstand, basket. This choice has been made in correspond to the key components of a working bicycle.
Accessories are excluded and set to be covered under their own environmental communication repositories.

Reference products

The environmental evaluation of a bicycle is made for each **« model »** on a reference **« product »**.

- **Model definition**

Two bicycles are considered as different models if any one of their module (previously defined) is different. Frames that are only differentiated by size are not considered different models. Wheels that are only differentiated by size are not considered different models.
When the finish (e.g. paintwork) is the same, the colour (e.g. of the paint) does not constitute a differentiating factor (if there are several colour schemes, all are assigned to the same model).

- **Product definition**

For a same given model, the flows are to be calculated solely for the reference products defined below.

Type of bicycle	Frame height
Adult MTB	48 cm
Men's trekking bicycle and adult city bicycle	51 cm
Women's trekking bicycle	48 cm
Racing bicycle	57 cm
Adult BMX	24 cm
Children's bicycle	20 cm
Toy bicycle	17 cm

If a given model is not sold in the reference frame size stated in the above table, then the recommended guideline for the model concerned is to:

- select the product closest in size to the reference frame size;
- apply a correction factor for converting the results into a "reference frame size equivalent".

The correction factor shall be a percentage, based on mass weight comparison that the manufacturer will need to determine and be ready to substantiate.

Lifespan

The bicycle lifespan is a difficult issue and so far there is no definition. The fact is that lifespan does not depend only on the modules conception but also on use and maintenance. Several approaches have been discussed but they came to nothing (see box below). **Therefore the repository does not cover bicycle's durability in the environmental labeling calculation.**

Three approaches to take into account the bicycle durability have been discussed:

- The use of the warranty period proposed by the constructor at the bicycle scale or at a component scale. The issue is that correlation between warranty period and component life spin is not necessary proved.

– **The use of conception criteria** allowing to report differences between components' lifespan
Lifespan depends on the product conception and professionals of the sector provide their technical expertise to define criteria of difference.

– The normative tests' development allowing to evaluate the component lifespan by going to the breaking point. This approach was rejected because of costs and because of interrogations on technical feasibility of tests.

Bicycle life cycle and study scope

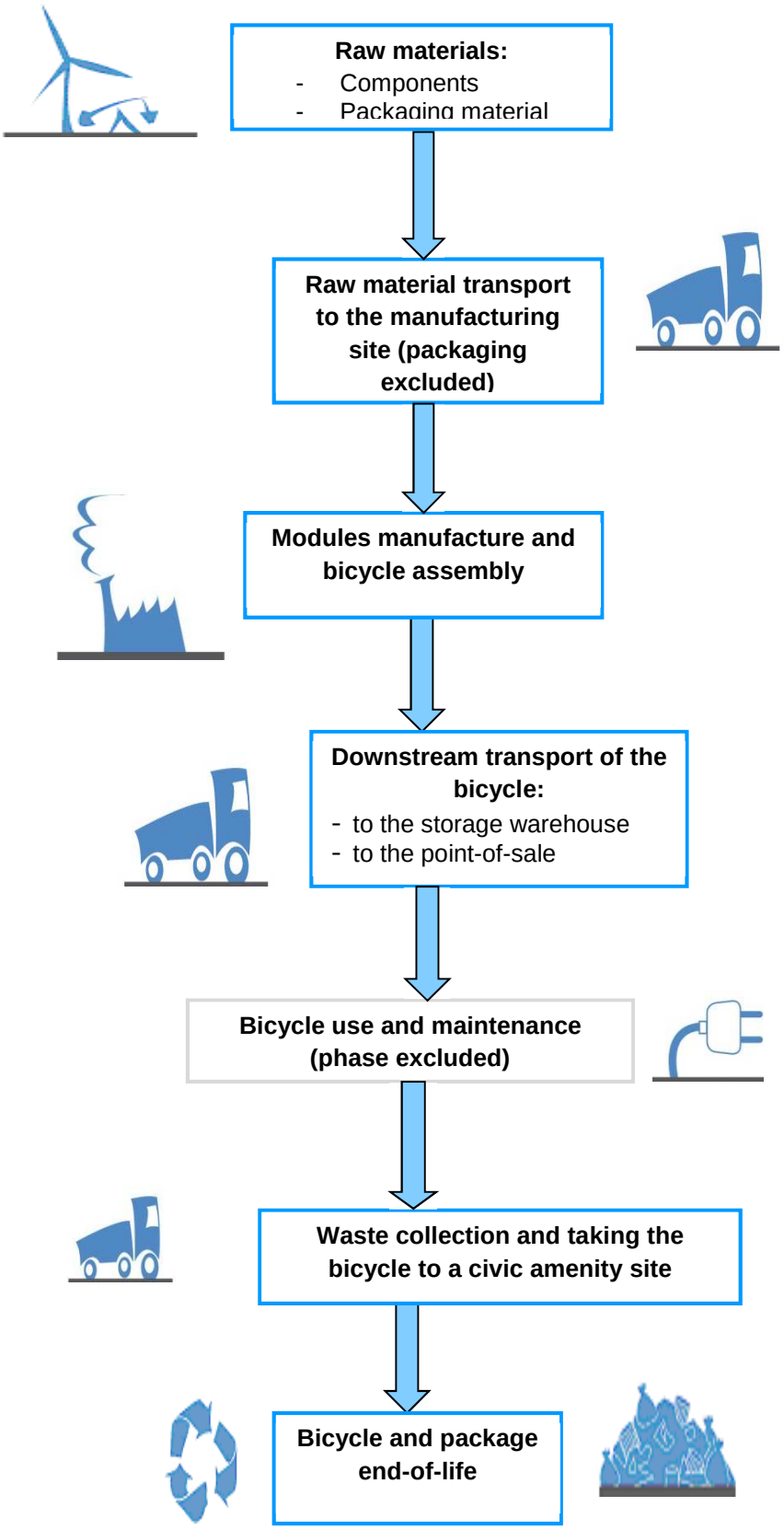
All the stages of the life cycle are taken into account. The only stages that are not counted are those:

- With **negligible impact** on the environmental balance of the seat:
  - o transport stages upstream of the packaging step
  - o utility consumption and waste production at logistics platforms and points-of-sale (but not waste from the bike packaging itself, which is accounted for)
  - o the pallets used for bicycle and bicycle module transport
- That are **excluded by the methodological repository BP X30-323** (consumer transport is not directly included in indicators).
- **Stages for which there little knowledge to model and characterize it.** Examples : the manufacturing processes for certain parts or part components, the use stage (see box below):

Use stage:

Maintenance operations (e.g. replacing a component) **and servicing operations** (e.g. cleaning, degreasing certain components, replacing hydraulic fluids) **are not taken into account** because the operations performed and their frequency are tightly dependent on how the bike is actually used. One way forward would have been to define a standard bike servicing scenario applicable to all types of bicycle, but this would have overcomplexified the approach without bringing in any new way to differentiate between bikes, and so was consequently ruled out as an option.

BICYCLE LIFE CYCLE



EXPLANATION OF METHODOLOGICAL CHOICES

Environmental issues and impacts

Environmental impact assessment

Used materials, manufacturing processes, bicycle end-of-life and transport generate a lot of impacts. **Some criteria have been identified as significant** for the overall environmental balance of the bicycle:

- **Greenhouse effect**

Manufacturing and end-of-life stages generate greenhouse gas emissions that drive climate change. **The Grenelle 2 laws and the requirements of BP X30-323 have made it mandatory to consider this issue.**

- **Natural resource depletion**

Manufacturing the various components of bicycle requires important use of non-renewable materials and resources (metals, fossil ressources). This indicator is distinguishing for a majority of products on the market, according choices on materials, manufacturing site and logistics systems.

- **Aquatic ecotoxicity**

This criterion, linked to metals and processes used for bicycle manufacturing, represents the effect of pollutants on aquatic ecosystems once they enter the environment, after wastewater treatment plant.
This criterion is taken into account because the manufacturing phase represents an extensive impact on the ecotoxicity, which distinguishes products among the chosen metals.

- **Air acidification**

Some gases (e.g. sulphur dioxide and nitrogen dioxide) released into the air by processes and transports become acids when they come in contact with humidity. These acids then fall back to the ground during rainfall events and modify the pH of rivers, lakes and soil. **This criterion was not taken into account for the environmental communication because it is redundant with the "greenhouse effect" indicator, however it is still calculated.**

Among the four possible indicators, **only three were selected to be included in environmental labelling communication**:

The choice of environmental indicators for the environmental labeling was made on several criteria:

- indicator relevance: importance of the impact and differentiation for a majority of market products (comparability)
- indicator ease of implementation: feasibility for the database and accessibility of the data for the firm
- indicator consistency: coverage of the whole life cycle scope and product packaging scope, consistency with other posted indicators
- indicator robustness and reliability: methodological recognition and robustness, reliable data.

Indicators retained for the environmental labeling:

- **Climate change**, expressed in kg CO_2 equivalent
- **Natural Resource Depletion**, expressed in kg Sb equivalent
- **Aquatic ecotoxicity**, expressed in CTUe (Comparative Toxic Unit for ecosystems)

(see the Unit glossary)

Data underlying impacts and articulation of specific and generic data

Type of data used for labeling

The work group shall specify which parts of the quantified data shall necessarily be specific data and which can or shall be generic data.

The data qualification depends on:

- the relative importance of this data for the overall balance,
- the availability of the data,
- the cost involved in obtaining the data

Data used to calculate impacts:

<u>Activity data</u>: data relating to the activity

- **Specific data**: data measured or calculated by the company. Example: nature and quantity of the packaging material.
- **Generic data**: averaged data used by all companies of a specific sector. Example: loss rate of a specific process.
- **Semi-specific data**: data that is proposed by default and that the company can replace with primary data.

<u>Inventory generic data sets</u>: data available in the ADEME database.
Example: impact factors of a material

The following table summarizes the choices made for bicycle modelling:

Phase	Activity data			Inventory generic data sets
	Specific data	**Semi-specific data**	**Generic data**	
Raw materials	- Module composition (specifying metal grade used for principal modules) - Packaging description	- Composition of the rubber used in the tyres and in the inner tube - Type of resin of the reflectors - Production of the metal materials - Metal grade used for certain modules		- Inventory of production of bicycle and packaging materials
Manufacture	- Principal modules' process list - Country of Manufacture of the modules - Country of assembly of the bicycle - Electric energy consumption for module assembly	- Production of electricity for unspecified zone	- Manufacture process list of semi-finished products (sheet, tube, extrusion profile) and some modules	- Inventory of production processes of semi-finished products and modules - Energy impacts, depending on the energy mix of the manufacturing countries
Transport	- Transport scenario of the modules and the assembled bicycle	- Transport of the materials and semi-finished products (distance and mode)	- Maximum payload of HGVs (this data can be specified for the transport of materials and semi-finished products) - Transport of bicycles from logistics platform to point-of-sale - Collection of packaging - Transport of used bicycles to the civic amenity site	- Kilometre impacts depending on the mode of transport
End-of-life		- End-of-life scenario of the bicycle	- End-of-life of process Scrap - End-of-life of the used packaging	- Impacts of end-of life processes for materials

Other methodological choices

Impact allocation of the formulation plant

A production process can generate several types of products.

- **Bicycle assembly stage :**

  As a rule, bicycle assemblers only produce bicycles. There are consequently no co-products. All the assembly site impacts are allocated to bicycle production, per unity produced.

- **Transport and packaging stages :**

  Transport and packaging impacts are allocated across several products transported together or between several products packaged together, based on mass.

- **The benefits of recycling :**

  The allocation rules governing the benefits and impacts of recycling between the producer of recycling material and the user of recycled material are the recommended rules set out in repository BP X 30-323-0 (cf. corresponding reading guide).

Note that as some allocations are specified in generic inventories of materials life-cycle and processes, there is no need to specify it in the repository.

Accounting for end-of-life

- **Bicycles**

At the time of writing, there is no bicycle-specific end-of-life collection and disposal channel. In the absence of specific data, the end-of-life scenarios to be factored in are the scenarios applicable to household waste collected at civic amenity sites. The recycling, landfilling and incineration rates shall be specified in the BPX-30-323-0.

Should a person responsible for market release be able to demonstrate another scenario, they can opt to integrate the material proportionally to the number of products involved in its production.

- **Packaging**

The packaging end-of-life has to respect the average national scenario for industrial packaging materials in France. Recycling, landfilling and incineration rates to use are provided by the BPX-30-323-0.

Data time validity and update frequency

Any modification in the production chain that increases the environmental impact of the entire functional unit by more than 20 % for any of the three indicators requires a new environmental communication.

Current changes in materials data are such that a time validity needs to be set. The update frequency for the environmental information is set at 5 years for the first communication and then every 10 years thereafter.

How data is validated

The company shall keep the information used in the calculations available for any subsequent inspection.

UNIT GLOSSARY

Indicator	Unit	Illustration
Greenhouse effect	kg CO_2 equivalent.	A vehicle emits 0,13kg of CO_2 per kilometer covered
Natural Resource Depletion	kg Sb equivalent	1 litter of unleaded petrol is equivalent to about 25g Sb equivalent
Aquatic ecotoxicity	CTUe	1 kg of toluene discharged to water is equivalent to 56 CTUe

ABOUT ADEME

The French Environment and Energy Management Agency (ADEME) is a public agency under the joint authority of the Ministry of Ecology, Sustainable Development and Energy, and the Ministry for Higher Education and Research. The agency is active in the implementation of public policy in the areas of the environment, energy and sustainable development.

ADEME provides expertise and advisory services to businesses, local authorities and communities, government bodies and the public at large, to enable them to establish and consolidate their environmental action. As part of this work the agency helps finance projects, from research to implementation, in the areas of waste management, soil conservation, energy efficiency and renewable energy, air quality and noise abatement.

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