Leveraging on new knowledge and latest advances in science & technology to allow large communities of EU textile machinery SMEs to innovate their products & keep EU leadership in added value textiles

Energetic Labelling activity

“Document propaedeutic to understanding the Green Label and to using of computer tool for the generation of the same”

Table of Contents

1 Green Label project

One of the Nu-Wave objectives is to develop a new generation of textile machines characterized by:

- A reduced environmental impact;
- Smart exploitation of resources and energy;
- Improved life cycle sustainability.

In collaboration with D'Appolonia, ACIMIT has created a working group whose purpose is to identify the objective parameters to evaluate the characteristics of eco-sustainability of textile processes. The output is a "Green Label" that would be initially applied on the machinery produced by the associates of SME-AGs partners of the Nu-Wave project and possibly extended in the future to all other manufacturer users, as a reference.

Four main steps necessary to realize the "Green Label" have been concluded by the working group:

1. Technical-commercial survey, data collection/evaluation;
2. Identification of a set of indicators to be inserted in the label;
3. Identification of two front-runners (ACIMIT members) in order to perform pilot projects;
4. Creation of a tool that generates the Green Label - Green Label Realization.

All the steps have seen out successfully: in particular two companies members of ACIMIT, Flainox and Jaeggli-Meccanotessile Srl, have been identified by the working team as front-runners.
Calendar of meetings have been held between D'Appolonia, ACIMIT and company people in charge for this action, to assess correct parameters for the analysis, to evaluate and correct recovered data, to elaborate the results and to implement comments and observations emerged during the meetings.
The final output for these companies has been the evaluation of carbon footprint of a plant or a machine, representative of their product portfolio, through a tool, available and now usable by Nu-Wave SME-AGs members able to realize the Green Label with just few passages.

2 The Green label Tool

The tool is an instrument that has in its memory the set of indicators selected for the type of machinery (in textile area) and, on the basis of data entered, it is able to calculate the primary footprint of the machine or plant subject of analysis.
The tool is articulated in eight sections:

- Company info, where are reported information as company name, logo, reference person and contacts;
- Certification type, where, if present, is indicated the company compliance with specific environmental standards and certificate and certification agency logos are uploaded;
- Textile machinery association: name and logo of national textile machinery, which the company is affiliated to;
- Machine/Plant work cycle: brief description of process with indication of material processed and respective efficiency;
- Boundary conditions as geographical collocation of plant/machine and data reference year;
- Process parameters where are inserted various technical data (material and energy consumption, use of PPE, etc.), useful also for the CFP calculation;
- Carbon footprint calculator, obtained automatically by tool, with the possibility to insert CFP values of previous years, if available;
- Display of label, generated by the computer system.

The greenhouse gases emissions assessment method is the CML 2001 – Version Nov. 09, Global Warming Potential (GWP 100 years), developed by Institute of Environmental Sciences of Leiden University.
The CML is an impact assessment method to measure the environmental impacts in LCA. The CML 2001 baseline method elaborates the problem-oriented approach; the CML Guide provides a list of impact assessment categories grouped into:

- Obligatory impact categories (category indicators used in most LCAs, among them Global Warming Potential);
- Additional impact categories (operational indicators exist, but are not often included in LCA studies);
- Other impact categories (no operational indicators available, therefore impossible to include quantitatively in LCA).

GWP is measured in kg CO_2 equivalent: each greenhouse emission is normalized according its dangerousness compared with CO_2 one.

3 LCA analysis

According to SETAC (Society of Environmental Toxicology And Chemistry) the LCA – Life Cycle Assessment, is "*a process to evaluate the environmental burdens associated with a product system, or activity (process) by identifying and quantitatively describing the energy and materials used, and wastes released to the environment, and to assess the impacts of those energy and material uses and releases to the environment*".
The assessment includes the entire life cycle of the product or activity, encompassing extracting and processing raw materials, manufacturing, distribution, use, reuse, maintenance, recycling and final disposal, and all transportation involved. LCA addresses environmental impacts of the system under study in the areas of ecological systems, human health and resource depletion. It does not address economic or social effects.
In substance the LCA is a quantitative methodology that, in function of inputs (raw materials) and outputs (products and waste), is able to evaluate the environmental effects of a production cycle and to highlight critical points, on which the improvements to reach the objective of sustainable development will be focused.
Sustainable development is now on the political and business agendas. In Europe, many decision makers expressed forceful views about the significance of LCA in sustainable development. LCA would be essential in the transition to more sustainable lifestyles and products and they affirm that firms that are not well on the way to developing and selling sustainable products will be cut out of the market over the next 10 to 20 years.
In Figure 3.1 are shown the different phases of an LCA. The whole life cycle assessment also interacts with the direct applications. According to ISO 14044:2006 the life cycle assessment framework is described by four phases:

- goal and scope definitions,
- inventory analysis,
- impact assessment,
- interpretation.

The double arrows between the phases indicate the interactive nature of LCA: when doing the impact assessment it can become clear that certain information is missing which means that the inventory analysis must be improved, or the interpretation of the results might be insufficient to fulfil the needs required by the actual application which means that the goal and scope definition must be revised.

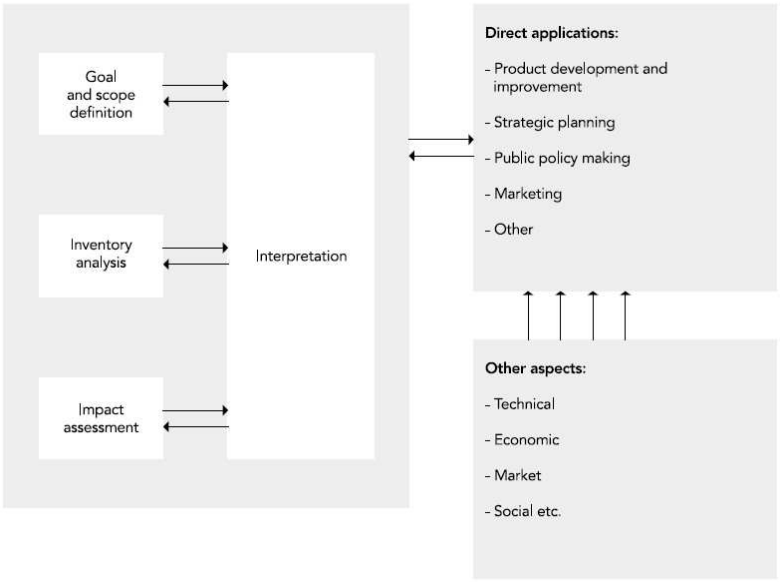

Figure 3.1: LCA Structure - Phases of an LCA

4 Carbon Footprint

The carbon footprint (CFP) is the measure of the impact that whatever type of activities has on the environment and in particular on climate change. The CPF is in fact directly related to the amount of greenhouse gases produced in our day-to-day lives, through burning fossil fuels for electricity, heating, manufacturing, transportation etc.
The carbon footprint represents the amount of all produced greenhouse gases and it is measured in tonnes (or kg) of carbon dioxide equivalent for a given time interval (usually either one year or the entire subject life) or for a mass unit of the product.
The concept name of the carbon footprint originates from ecological footprint discussion. The carbon footprint is a subset of the ecological footprint and of the more comprehensive Life Cycle Assessment (LCA), which is used to calculate it.
An individual's, process', product's, nation's, or organization's carbon footprint can be measured by undertaking a greenhouse gas (GHG) emissions assessment: the aim of this esteem is to give an objective parameter that evaluates the impact of a certain activity and on which one can set up a sustainable strategy to reduce it, e.g. by technological developments, better process and product management, changed Green Public or Private Procurement (GPP), carbon capture, consumption strategies, and others.
The mitigation of carbon footprints through the development of alternative projects, developing greener management solutions, represents one way of reducing a carbon footprint and is often known as Carbon offsetting. Moreover, the assessment of CPF and the efforts to reduce it often bring industry to an overall optimization of the whole production/distribution chain with important economic savings and improvement in logistics.

Various experiences over the globe have been addressed in order to evaluate carbon footprint in different cases, according to British Public Available Specification, PAS 2050, elaborated on behalf of DEFRA (Department for Environment, Food and Rural Affairs) and ISO standard 14064:2006.
ISO standard is subdivided in three parts:

- ISO 14064-1 "Greenhouse gases - Part 1: Specification for the quantification, monitoring and reporting of organization emissions and removals";
- ISO 14064-2 "Greenhouse gases - Part 2: Specification for the quantification, monitoring and reporting of project emissions and removals";
- ISO 14064-3 "Greenhouse gases - Part 3: Specification and guidance for validation and verification.

The carbon footprint of a product is made up of the sum of two parts, the ***Primary Footprint*** and the ***Secondary Footprint***:

- The ***Primary Footprint*** is a measure of the direct emissions of CO_2 from the burning of fossil fuels, including internal energy consumption and transportation (values easily controllable), during its normal functioning;
- The ***Secondary Footprint*** is a measure of the indirect CO_2 emissions caused by the product, associated with their manufacture and eventual breakdown.

The aim of the labeling is to use the ***Primary Footprint*** as a parameter of eco-friendlyness of the machines. Its calculation does not need the involvement of suppliers' or other third parties', being exclusively based on machine technical data. Moreover, the ***Primary Footprint*** can be also used as a marketing means of communication, being directly linked to consumption and thus interesting in the eyes of the customer both from an economic and environmental point of view.
In the reference industrial sectors, for the project purpose, the labeling is referred only to the primary carbon footprint.

5 The Green Label

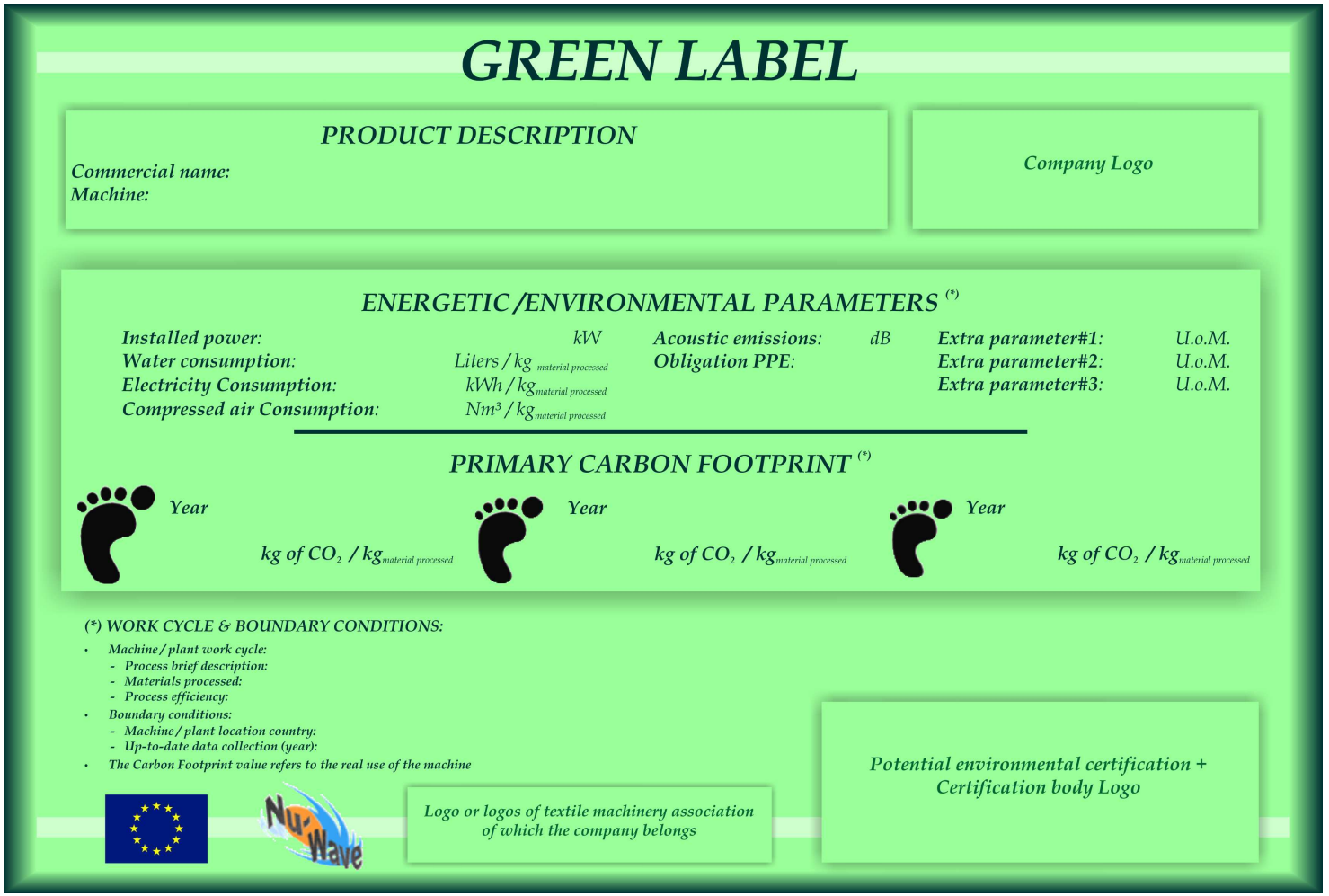

***Figure 5.1*: Green Label**

In Figure 5.1 a preliminary version of the Green Label is reported. The Green Label is divided primarily in six section:

1. *Product Description;*
2. *Company logo;*
3. *Energetic / environmental parameters;*
4. *Carbon Footprint;*
5. *Work cycle & boundary conditions*
6. *Potential environmental certification & certification body logo.*

The lower section of the plate is dedicated to logos representative of the energetic labelling, in particular there are:

- Logo of the European project in which the work was carried out (Nu-Wave);
- Logo of textile machinery association of which the company belongs.

Following, for each field of the Green Label a brief description is reported:

Table 5.1: *Product Description* section

Field	Description
Machine	Write here the machine category according to the ACIMIT directory.
Commercial name	Write here the commercial name according the catalogue.

Table 5.2: *Energetic / environmental parameters* section

Field	Description	Unit of Measurement
Installed Power	Installed power is the rate at which the electric energy is required by the machine.	kW
Water Consumption	All water in input at the process should be evaluated, considering also that there is the same quantity in output which is sent to waste water treatment.	Liters / $kg_{material\ processed}$
Electricity Consumption	All the energy requests have to be written in this cell.	kWh / $kg_{material\ processed}$
Compressed Air Consumption	Here is considered the contribution to green house gas emissions by production of compressed air. Commonly either screw-type-compressors or piston compressors are used. The electricity consumption of the compression depends mainly on the respective pressure stage. The commonly used pressure stages 7 bar, 10 bar and 14 bar are modelled.	Nm^3 / $kg_{material\ processed}$
Acoustic emissions	The value in decibel audio is requested to evaluate the noise produced by the machine.	dB
Obligatory PPE	Please indicate what are the used personal protective equipment.	--
Extra parameter #1	In this cell the company can include other relevant input that interests the process.	[free]
Extra parameter #2	In this cell the company can include other relevant input that interests the process.	[free]
Extra parameter #3	In this cell the company can include other relevant input that interests the process.	[free]

Table 5.3: C*arbon Footprint* section

Field	Description
Primary Carbon Footprint	Here will be indicated the year of the last value of the machine / plant Primary Carbon Footprint. If the company already did some measurement, these will be reported in “year -1” and “year -2” section.

Table 5.4: *Work cycle & boundary conditions* section

Field	Description
Process brief description	Define here the process which is under analysis highlighting the relevant passages (relevant process).
Materials processed	Write here the material processed by the machine / plant (e.g. cotton, wool).
Process efficiency [%]	Real production cycle / theoretical maximum production cycle rate (extension of cycle time due to, for example, load, unload, maintenance, product out of specification).
Machine / plant location country	Please indicate the country - area where the machine will be installed. The choice of the country is important to set geographically the plant and to identify the correct energetic mix (e.g. use of coal/oil, gas, nuclear, hydropower).
Up-to-date data collection (year)	Year of reference of data / measurement declared.