

**Building in accordance with nature. Criteria of ecocompatibility in the choice of building materials**

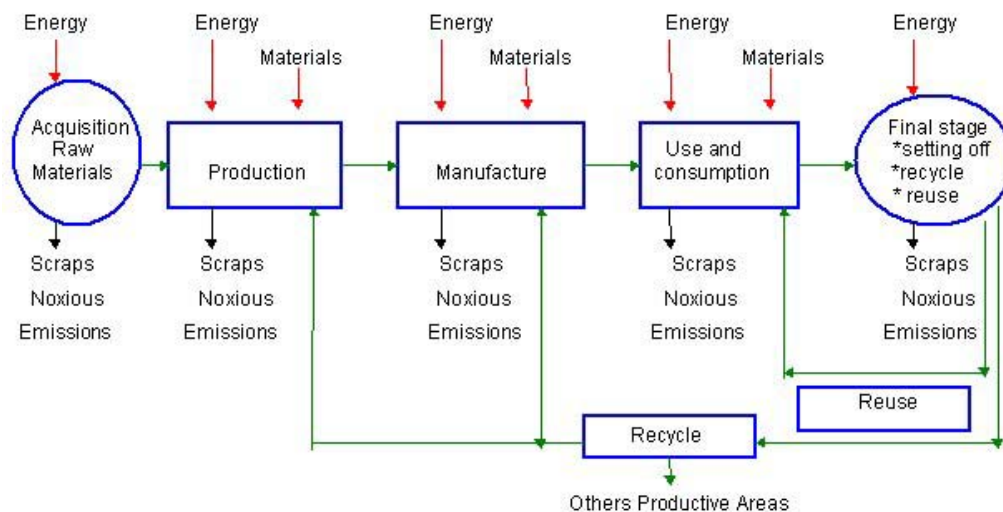
by Roberta Boero  
Tutor: Mario Grosso

This thesis, relative to technological field of architecture, starting from the observation of a vaste range of "bio", "eco" compatible products, analyses this phenomenon by objectively controlling of their characteristics, trying to understand their innovative role (if it exists), especially from the environmental point of view.

Study is worked out in two stages:

1. study about the present meaning of building with natural criteria and contribution supplied by Bioarchitecture to the new interest in the ecological aspect of building and in the use of new materials;
2. analysis of main characteristics of some buildings materials, defined as "ecocompatible" and comparison with the traditional materials.

Today, with the increase of research work about sustainable development and with the explosion of interest of public opinion for everything is ecological, planning is now done in an ecological way, pulling down environmental impact of buildings, maintenance expenses and resource wasting; nature is transformed in accordance with human requirements but without unbalancing the environment and life of the inhabitant of cities and houses (sick building syndrome) with polluting elements. Every plan, for a right evaluation of building products impact, must consider all their life cycle, not only the utilization stage, but even the extraction of raw materials, recycling or the final setting off.



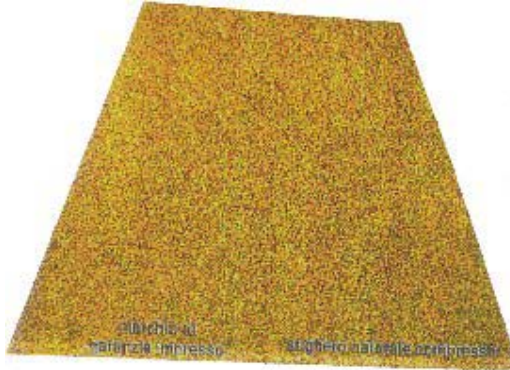
Life Cycle Analysis

This complete evaluation is done by computer programs, called "ecobalances"; they can determine the real cost of materials, considering production and environmental costs.

Recently, some Community Regulations have treated the environmental impact of products commercialized in Europe. For example, Directive EEC/89/106, gives six essential qualifications that building products must have and, for the first time, one of them is dedicated to "Hygiene, health and environment". This qualification analyses some themes relative to indoor air pollution, possible building products discharge and especially environmental damages caused by buildings.

To regulate the flourish of national marks of products ecological certification, Regulation EEC/880/92 has introduced a Community labelling system (Ecolabel) to inform consumers about the effects that products could have on human (sick building syndrome) or environment. Currently, in Italy; the competent Ministry has not made this mark active yet.

The second part of the thesis analyses six ecocompatible building products and compares their characteristics, their answers to Community qualifications, their price and main stages of LCA (Life Cycle Analysis) with traditional products. This analysis has been made possible by data directly supplied by producers and ecobalance computer program (Boustead) and it has been written in a table form for an immediate comprehension. The environmental impact of products has been valued assigning an alphabetic voting (A, B, ..) at the stages of their life cycle (preproduction, production, ..).



**Product name:** Lisolite

**Producer:** L.I.S. , Empoli (FI), Italy

**Product description:** Natural cork agglomerate without adhesive, used like insulator

**Constituent materials:** Bark of cork tree

**Process of manufacture:** The bark, shattered and milled, are extended with heat (380°C). In this stage cells are welded and the compound is treated with high frequency, compressed in a block and cutted in wished size

**Price:** 20000 £/m<sup>2</sup> approxintely

Wall insulation for cork panels:

### **ENVIRONMENTAL EVALUATION**

#### **Preproducton stage**

Raw materials - **B**

Environmental impact - **B**

#### **Production Stage**

Waste of energy - **n.r.**

Security - **A**

Transport - **C**

#### **Utilization stage**

Thermical characteristics - **B**

Acoustic characteristics - **B**

Toxicant - **A**

#### **Setting off**

Ricycle - **A.**

**A:** excellent/not dangerous

**B:** good/low risk

**C:** insufficient/high risk

**D:** heavily insufficient/avoid

### **SERVICES**

#### **Mechanical resistance and stability**

Resistance at compression: **50 Kg/m<sup>2</sup>**

#### **Security during fire**

Fire resistance: **n.r.**

Fire reaction: **class 1**

#### **Hygiene, health and environment**

Steam diffusion:  $\mu = 10$

Toxicity: **no toxicant**

**Security in use**

**n.a.**

**Noise protection**

Acoustic dejection: **31 dB**

**Energet. Saving and thermal insulation**

Energy for production: **n.r.**

Thermal conductivity: **0.040W/mK**

**n.a.:** not analysed

**n.r.:** not reached

In some of analysed cases, I might rediscount in bioecological products good general performances, an excellent environmental behaviour and a competitive price, but unfortunately at the currently italian situation lacks serious regulation, so the attention towards innocuos building materials is guided by merely businnes interests; consumers is addressed towards the purchase of ecological products (true or false), selling at an excessively elevated price for the real environmental performance supplied.

For further information, Roberta Boero, e-mail: [blmrctl@mail.chierinet.it](mailto:blmrctl@mail.chierinet.it)