Sustainable Innovation 2012
17th International Conference
29th – 30th October 2012
Alanus University
Bonn, Germany
www.cfsd.org.uk

The Centre for Sustainable Design®

For building materials with low embodied energy in their life-cycle

Martino Milardi, University "Mediterranea" of Reggio Calabria, Italy

The international debate on the impacts of the building industry about the planet's carrying capacity makes it clear how the field of *Material*s is a key factor in the increase of critical levels related to these impacts.

There is no doubt that the constantly increasing flows of energy required by production processes must now be considered as new "incorporated rates" which increase the environmental burden of any given product and which therefore constitute an additional quality to be taken into account in the decision-making procedure.

In this sense, studies which investigate the types and quantities of energy employed identify the *embodied energy* as a parameter for control, using it as a principal indicator in the most consolidated systems for the evaluation of energetic and environmental performance of production processes.

The quantification of embodied energy for any particular material is an inexact science, requiring a "long view" look at the entire life-cycle, and filled with a large number of potentially significant variables. Consequently, the complexity of obtaining accurate figures by embodied energy calculations is very difficult for the evaluation tools.
In order to simplify the complexity the present study has been conceived on the basis of protocol evaluation models or in any case which refer to the decision-making code, postponing to a later acquisition of data, the possibility to carry out more rigorous evaluations that may be translated into software and databases

The basic premise upon which the research procedure is construed is the undeniable complexity of the relevant scientific field. This complexity, which is often due both to the number of different sectors involved as well as the particular qualities of the significant elements, makes for a notable quantity of information which can act as an obstacle to a successful study. For this reason, the present study will refer to consolidated research practices which, in their rigorous definition of the objectives in the preliminary phase, provide a reliable guideline for the direction and development of the study.

Considering the particular "numerical¨ nature of the data and values which may influence the achievement of the objectives, the formulation of the results has been guided by a model which makes reference to the instrument for Protocols and Codes. The goal was to produce a Support Instrument for Decision-Making, split into various scales and phases in order to assist the different users in the different choosing processes.

The field of study has examined the following construction systems: 1. reinforced concrete 2. steel. All the sealing elements and their functional coatings have been considered with different material compositions. In particular, the study is currently experimenting with both traditional and innovative building materials such as cork, olive residues and PCM.

These materials were chosen as substitute products for an easier control on energy load and flows relating to the various phases if the cycles. As the experimentation is still *in itinere* we reserve the right to supply the numerical data in the period following the final validation.