E C O H B N E W S L E T T E R

VOLUME 14, NUMBER 38, AUTUMN 2006

Main topic

Life cycle of building material

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deadline to receive articles **for NEWS LETTER 41** with the main topic: WATER POLLUTION, TREATMENT FOR SETTLEMENT is **30 August 2007**
deadline to receive articles **for NEWS LETTER 42** with the main topic: SOIL/EARTH BUILDING, WASTE RECYCLING is **30 November 2007**
deadline to receive articles **for NEWS LETTER 43** with the main topic: RENEWABLE ENERGIES is **15 January 2008**

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IMPRINT

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Contributions for this ECOHB NEWS LETTER **are welcome**, if clearly related to rigorously environmentally conscious and healthy building. All articles or reports submitted (max. 5 pages) should be typewritten and preferably mailed under subject
'Contribution for ECOHB NEWS LETTER XY' to info@imbuka.com,
Illustrations can be received via email: G_Pal@rocketmail.com or on a CD, to be sent to dr. ir. Heinz Frick, dipl. arch. FH/SIA, Soegijapranata Catholic University, Jalan Pawiyatan Luhur IV/1, Bendan Duwur, Semarang 50234, Indonesia.

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Heinz Frick


Lusika Yuliana


Peter Schmid


Gabriella
Pál Schmid

Editorial

President's Address: Material and Life Cycle

Dear Reader,

Although being a part of the material world, we often forgot and still forget that matter or material with its qualities is also an absolute pre-condition for building.

Dealing with material or matter means also dealing with energy since energy and matter are two different expression of a common basic phenomenon – as it is stated in physics. The truth of this proposition we practically can observe for example in the fact that energy, used for and in building always has a source of material nature, and when an envelop of a house is not made of efficient thick material, more energy is needed to keep it warm in the winter and cool in the summer. More over the movement of materials within a life cycle is only possible due to the impact of energy. Energy only makes movement possible.
If we look from a philosophical point of view – may be – we could also assume that there might be an original immaterial source of energy as the basic source of everything. However this is not the place to deepen those speculations now.

Nevertheless we go to concentrate on the material aspect of this very double phenomenon in this ECOHB NEWS LETTER.

- Building materials of biomass can be earned in the seasons they grow and in case of wood dependant on the lifetime of trees.
- Building materials which we can gain from the bodies (or excrements) of animals are produced in their generations.
- Building materials of a mineral or metallic nature came into existence in the geological history of earth.
- Building materials of these three types practically are more or less mixed with each other in order to fulfil the various functions in a building.

These observations bring us to an insight into the life cycles of these materials before they are used for building purposes. By gaining, digging, winning all the raw materials we go to influence their life cycles. And we go to continue this by the production and execution of the buildings. With the use of the so many, many materials in and within buildings new cycles start. Durability of the materials and compositions of materials play an important role. After all – including more or less reuse – the worn-out materials, components, and building parts will end up in our (natural) environment. There we can expect again another continuation of a life cycle.
Either the 'soft' materials can be absorbed soon or the 'hard' materials create disadvantages in the environment, even on the long run.
A Life Cycle Analysis - LCA can help – although hardly really complete, and often dated – to get some knowledge about the causes and effects of movement and use of materials, about exploitation and pollution, about health risks and health hazards all on short and on long term.

Figure 1. A.
The Porcupine

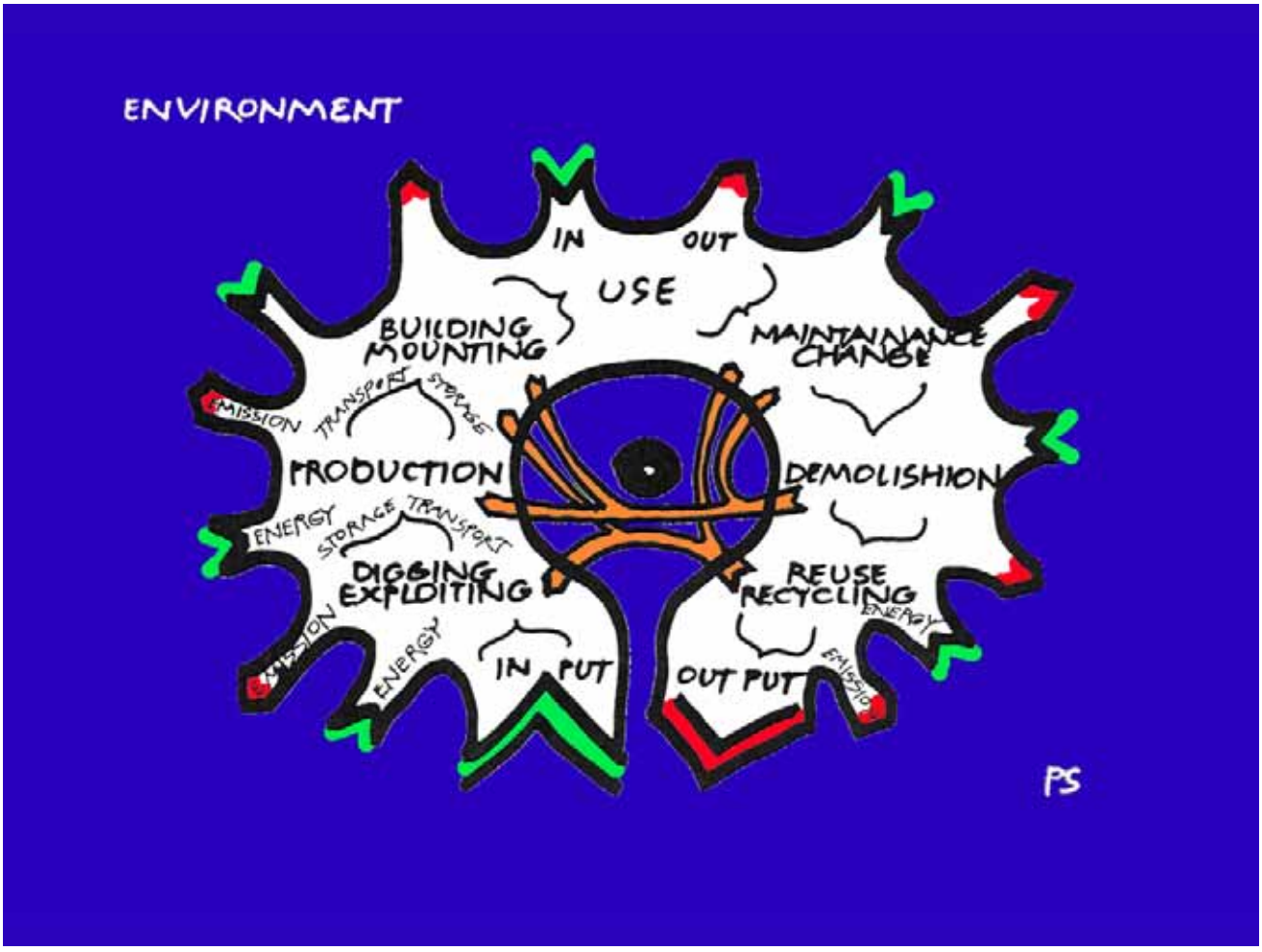


Figure 1. B.
The so-called Porcupine Diagram shows - in a simplified form –
the 'Life Cycle' of a building material from cradle to grave.
About all phases of this cycle we can conclude that energy is needed and
impact on the environment is unavoidable.
It is – of course in the light of human(e) and ecological building – the aim
to reduce both the use of energy and the impact on our environment to a minimum.

Raw materials can directly be used for building purposes in case of stone or loam,
Skins and leaves. In most of the cases actually raw materials have to undergo a processing to make them capable for our demands and wishes concerning a comfortable built environment. We roughly can distinguish between four gradually sophisticated impacts on raw materials to make them ready for different applications in building:

- Materials that can be applied in their natural sate, without or with very little processing;
- Materials that are the product of handicraft and light industrial processes;
- Materials that are the product of heavy industrial and energy-intensive processes;
- Synthetic materials that are the result of a structural change in matter.

With these two classifications of building materials, the one concerning their origin, the other concerning the impact of processing, we can draw a matrix, which we call the Material Choice Matrix – MCM.
With the criteria of environmentally-conscious and healthy building we easily can conclude that the lower a type of material can be found in the paragraph the more impact it will have on the environment and the higher the risk will be for our health.

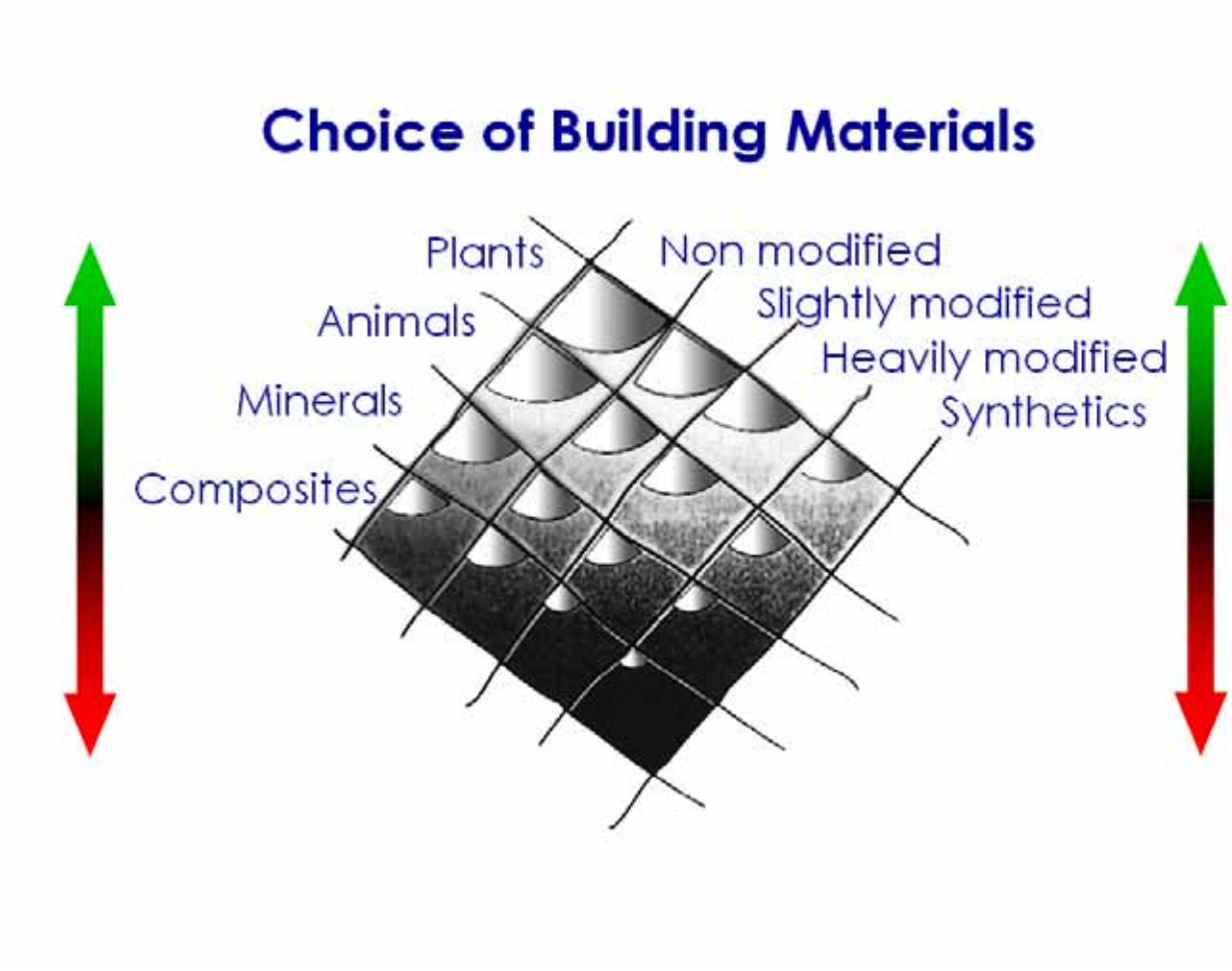


Figure 2
The MCM – Material Choice Matrix
Most buildings and architectural designs show a huge mixture of different building materials and components. This Matrix can help to make a responsible choice between the many possibilities marketed to the designers, decision-makers, clients, and suppliers. The more they make a choice of a material in the lower part of the matrix, the greater the risk of environmental damage as well as health hazards. The more choices, taken from the upper part of the matrix, the more chance we have generally to obtain healthy and environmentally sound results. Impact includes all treatment and handling, energy contents, transport, etc. of a material, product, component or building part from cradle to grave.

Very often we hear the comment that it would not be possible anymore to build with the so-called traditional materials. As an answer we would like to remind the reader for the last issue of the ECOHB NEWS LETTER - 37. There one can find as illustrations on innovative structural designs, a number of applications just of those materials, which we can find in the upper part of the Material Choice Matrix.

If it is allowed to compare kinds and qualities of building materials with kinds and qualities of (healthy) food, we can conclude, that the elementary types of food in form of grains, vegetable, fruit, and clean water, all without additives are never replaceable, certainly not by alienated or synthetic compositions. Even astronauts and cosmonauts came back to a 'traditional' food and diet. Similarly we can state, that also the second and third skin of human beings – cloths and buildings – have to answer the fundamental need for a human-body-related-material, what means that it has to be a part of the original natural context.
It is one of the most urgent tasks in research & development to investigate those relationships integrally and seriously.

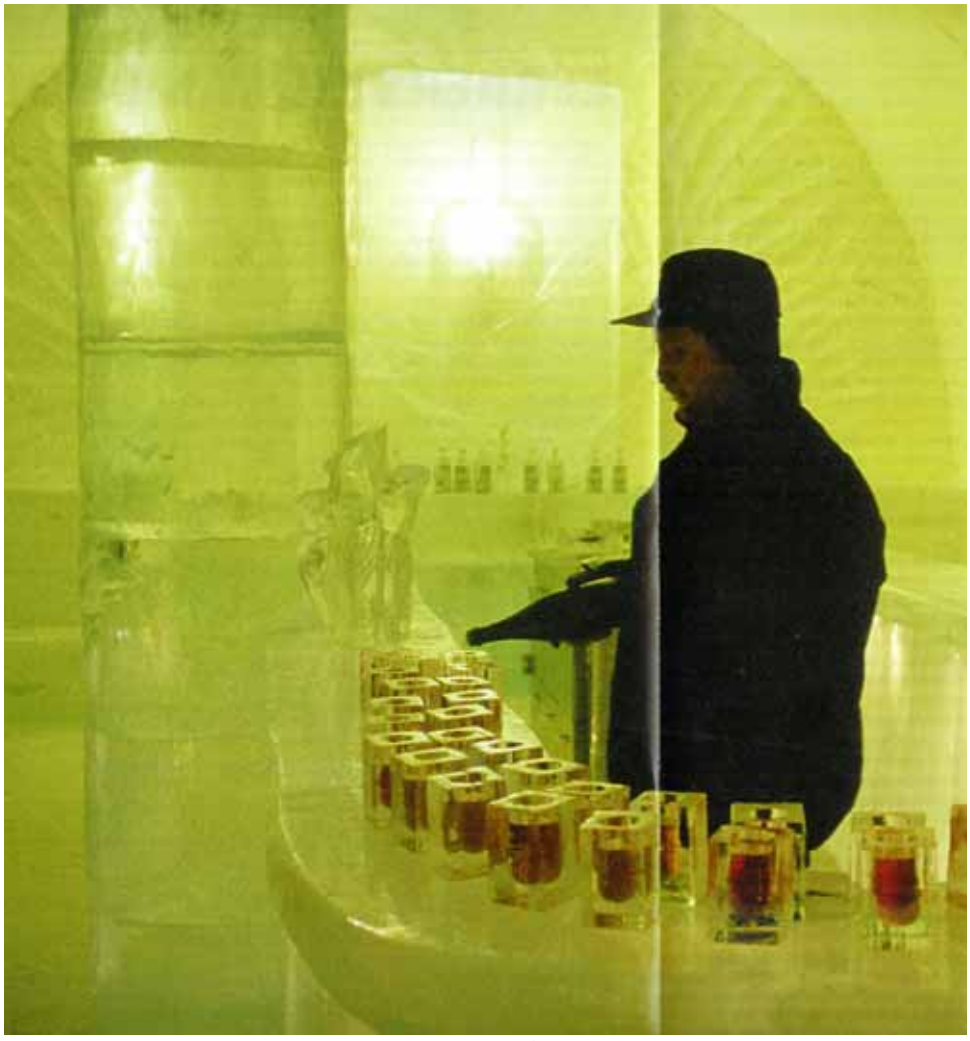


Figure 3
The North Swedish ice hotel is an extravagant, but excellent example for a fully environmentally-sound life cycle, using building material without exploitation and pollution.

We wish our readers much inspiration while reading and watching this ECOHB NEWS LETTER.

Peter Schmid
ECOHB – president

Articles

Life Cycle Assessment, 'Curriculum Vitae' of Material

Deterioration of buildings

Every man made building, from which building material ever, will grow old, deteriorate, and some day collapses and disintegrates to debris. This in contrast to constructions of nature which especially in the firs half of their life-cycle will develop more strength and grow to bigger size. Considering this different evolution gives us a picture about sustainable development and our responsibility to nature.
We have to be aware on the fact that 75% of the buildings worldwide have been erected after 1950. These buildings do not meet sustainability because they are not climate responsive, the ecological quality of their building material is low, and their energy consumption is high. Due to unsustainable town planning (with different places for working, schooling, shopping, sporting, etc.) they demand high mobility of the inhabitants, which also is energy consuming. Because of these circumstances most of these buildings cannot be rehabilitated but have to be destroyed. Every human building activity say exploitation of raw materials, producing building materials, build houses, maintain and renovate houses, as well as destroy them, always has an impact towards earth, human living quality, and natural environment.

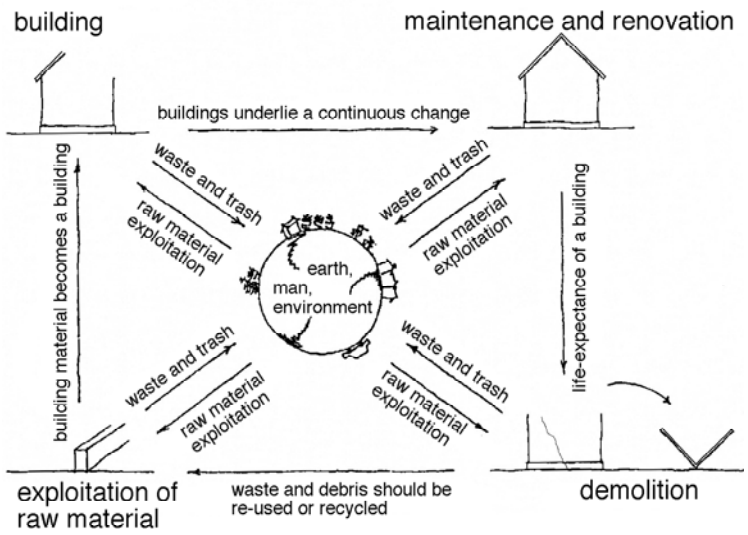


Figure 1: Correlation between earth, men, and environment as cycle (Hansruedi Preisig, Karl Viridén, Ökologische Aspekte des Bau-ens, SIA Dokumentation D0122 Zürich, 1995. p. 1-9)

The construction process alone in the UK annually creates some 70 million tonnes of waste (Brian Wilson, Minister for Energy and Industri, DTI 1996). These considerations make evident that an architect or building engineer in reality designs only waste. In this case, why not confess that we are waste designers and start to design intelligent waste; this would be real sustainable development.

Figure 2: Buildings as throw away goods

Sustainable development within the life-cycle assessment or the curriculum vitae of building materials has to consider first of all the use of not renewable energy (primary energy index = PEI) for the whole life-cycle of the building, further global warming potential (CO_2 equivalent) with a certain time horizon and the acidification potential (SO_x equivalent). The use of sustainability in building construction is not uniformly distributed within a buildings life-cycle. The earlier decisions on sustainable building construction are considered the higher its possible impact as seen in figure 3.

Figure 3:
Building material cycle

Natural material cycles in principle do not pollute air, water, and soil because they are more or less closed and interconnected to each other. Every human activity disturbs the natural cycles, producing exhaust fumes, sewage, and waste.
The building material cycle considering life-cycle assessment shows how severe these side-effects work on the environment. The grade of this influence depends on the respective life-cycle assessment of each building material. There are materials which have their most severe impact at the exploitation stage only, whereas others cause unsolvable disposal problems. The use and origin of energy has also to be considered. In Indonesia, for example, most of the electrical energy is generated by mineral oil, coal, and natural gas, which has an impact on the global warming and acidification potential.

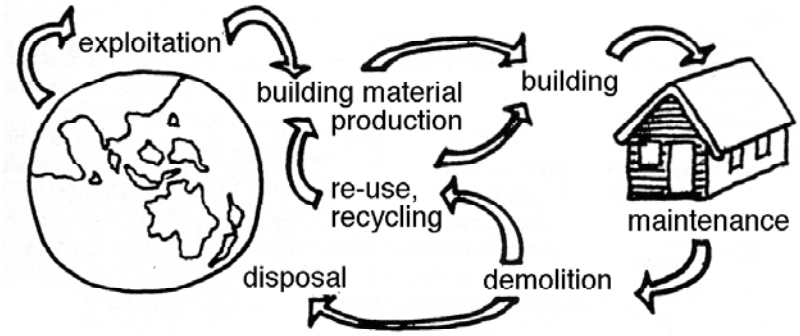


Figure 4:
Building material cycle

Every building erected by a certain amount of building materials has its own building curriculum vitae. If a building is built by simple ecological building materials, the respective live span is relatively easy to determine, but it becomes difficult if we use mixed and composite materials which cannot be separated anymore. The building material cycle which considers every stage of building material production, use, maintenance and disposal, their energy consumption and

environmental pollution, is called live-cycle environmental performance (Graham, Peter. Building ecology. Oxford: Blackwell, 2003. p. 26).
There are two different methods of life-cycle analysis, the qualitative and the quantitative method.
The qualitative method judges how severe the impacts are at every stage without attaching an actual value to the impact. It is a valuable method to compare materials to each other, but is always subjective.
The quantitative method assigns actual values to the environmental impacts. The total values can then be compared for different materials. A weighting factor can be used to account for more important stages in the lifecycle.
This method raises the problem of putting a cost on environmental impacts. Evaluations can be complex and the results vary, nevertheless this approach is sound in principle and a valuable basis for a more informal assessment for lay persons. (Kanuka-Fuchs, Reinhard. Sustainable home guidelines: Building materials. Waitakere City Council, 1998.)

Comparison of eco-building materials

It can be difficult to assess exactly how sustainable a product is and which materials are preferable to others. Producers' information's are often incomplete. As already stated, the qualitative method is more appropriate to compare building materials.

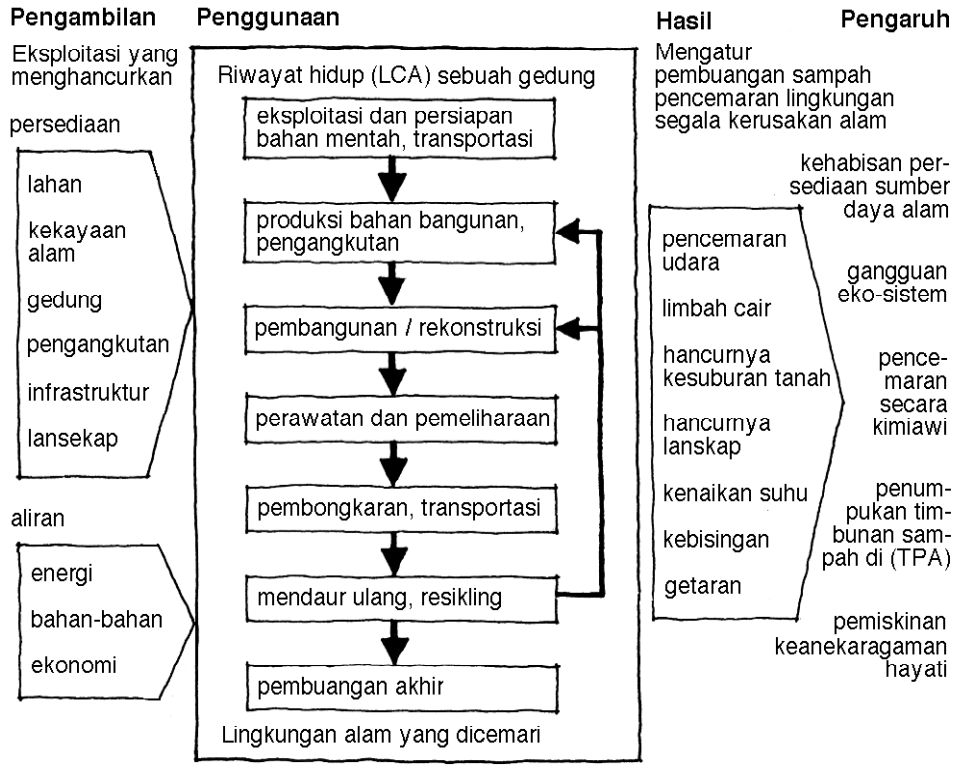


Figure 5:

For a realistic comparison of eco-building materials, which would be beyond the scope of this article I would like to refer therefore to the dissertation of Michiel Haas, TWIN-model - Milieu Classificatie-model Bouw, TU Eindhoven, 1997, as well as to Stephen Emmitt, John Olie and Peter Schmid, Principles of architectural detailing, Oxford: Blackwell, 2004.

Heinz Frick

Emotional Ties between Man and Building

Looking form the viewpoint of psychology, the use of terms in the field of material life cycle or building biography generally shows an analogy with the expressions used for existence of life or human biography.
This can be understood as representing of "emotional ties" between a human being and his building.
At the beginning, before human beings recognized the existence of God and still embraced animism, human beings have shown the existence of "emotional ties" towards surrounding objects assuming that they have spiritual powers represented by a tree, a mount, a stone or even a hill; and through this "emotional ties" human beings felt the need of protecting this power.
Now unintentionally human beings again believe into the immaterial power for example by occupying a dwelling, where the house actually represents a place of shelter and protection from the cold night, the heat of the sun, or the rain, so that human beings establish "emotional ties" with their building, like taking care of and repairing it in order to prevent deterioration. Through "emotional ties" human beings feel comfortable and protected against any enemies
Man-made buildings, based on "emotional ties", become beings instead of things. Therefore, terminology as building material-life-cycles, house biographies and so on, well-known terms used commonly only in connection to human beings, come into use and are accepted widely. How long and how far will it remain in terms, crossing the non-visible border between beings and things, it is an open question for the future.

Picture
Source Internet: Russia's Open! Concepts design, House with a face

Haryo Goeritno

Report

The *international meeting for sustainable architecture & ecobiology* in Silandro, Italy, was an extraordinary proper place for an ECOHB Annual Meeting of the European and Global Network of Organisations for Environmentally- COnscious and Healthy Building. *InterCab*, the international committee for sustainable architecture and ecobiology and ANAB, Associazione Nazionale Architettura Bioecologica was common host for both a presentation on the history as well as the current activities and projects of ECOHB and the annual meeting.
After its foundation as an international society according Belgian law 1992 in Desenzano del Garda, Italy, ECOHB was legally established as a European and Global Foundation in 2003 in The Netherlands. For its birth there were 12 organisations from 8 different countries responsible. The ECOHB MANIFESTO is the central guideline for all activities. Nowadays ECOHB has no members, but partners in 12 countries of four continents. Currently there are interested and potential partners in all over the world. Ad hoc working groups are active if necessary. Recently there were ten different project proposals made, ready to be taken for financing and execution as soon interested partners would like to join those promising actions and works. Likewise to the Silandro-congress in 2006, ECOHB gave its patronage or co-operation to a number of other meetings, conferences or symposia, as in Gmunden, Austria, 1992, Neubeuern, Germany, 1993, Genoa, Italy, 1995, Aberdeen, GB, 1995, Hamm, Germany, 1966, Winterthur, Switzerland, 1997, Bergdietikon, Switzerland, 1998, Straubing, Germany, Semarang, Indonesia, and Eindhoven, The Netherlands, all in 2000, Brussels, Belgium 2002, 's-Hertogenbosch, The Netherlands, 2003, Düren, Germany, 2004, and Semarang, Indonesia, 2005. ECOHB has a three monthly electronic periodical, the ECOHB NEWS LETTER, already in its Volume 14.
In the inspiring annual meeting ECOHB earned the serious interest of colleagues from Brazil, Greece, and Japan. Hence ECOHB could extend the number of its partners.
Still it is of importance to improve the search for more financial support for the execution of the many socio-cultural relevant activities and projects.

Snapshots from the Congress and the ECOHB meeting's participants in Silandro

Book reviews

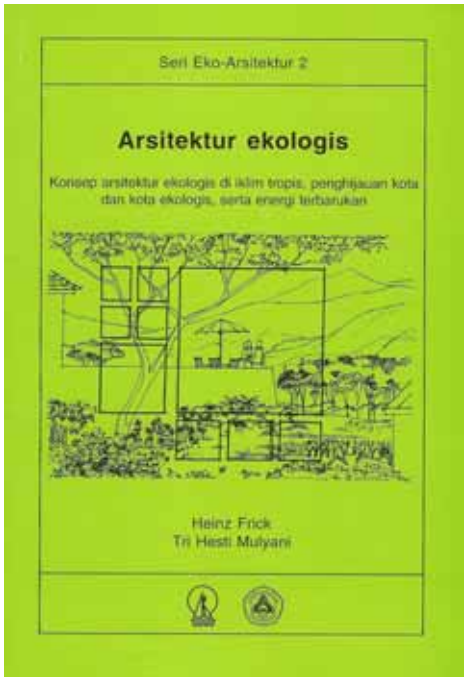
Heinz Frick, Tri Hesti Mulyani

Arsitektue ekologis
(**Ecological Architecture**)
In Bhasa Indonesian language

Konsep aesitektur ekologis di iklim tropis,
penghijauan kota dan kota ekologis,
serta energi terbarukan

Seri Eko-Arsitektur 2
ISBN 979-21-1298-7

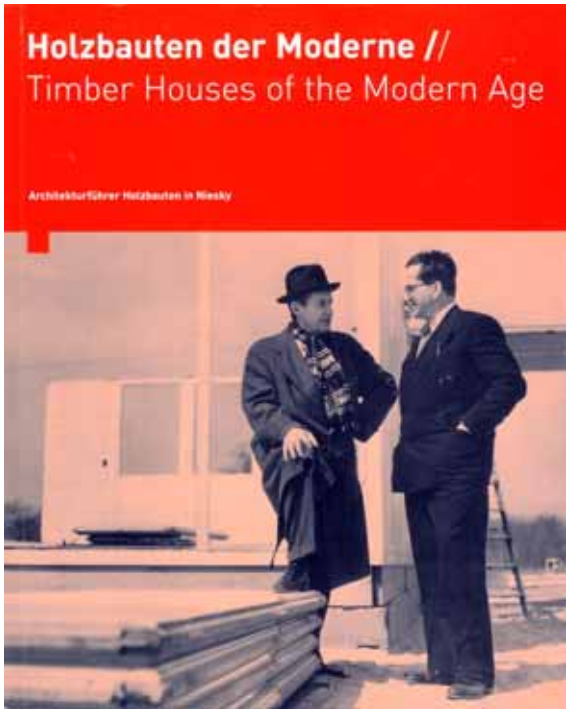
Penerbit Kanisius Yogyakarta,
Soegijapranata University Press
Semarang, Indonesia 2006



Claudia Klinkenbusch (concept, text), Heimatstuben (design), Dresden

Holzbauten der Moderne// **Timber Houses of the Modern Age**
Bilingual Architectural guide for timber houses in Niesky

Edited by Municipality Niesky, Museum Niesky, Niesky, Germany, 2006



Calendar

Friday, 3 November 2006

DDiA5 – Detail Design in Architecture 5,
Detail & Society
Velp near Arnhem, The Netherlands,
Info: Joint Origin, dr. John Olie, M.Sc.,
jointori@euronet.nl 0031(0)316 33 20 41

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