ECOLOGIC CONSTRUCTION MATERIALS
INTRODUCTION

This brochure introduces selected aspects of ecologic construction materials. It can provide you with some ideas and inspirations where ecologic construction materials can be used and what makes them ecologic. Choosing such materials can help you improving your indoor climate and reducing the environmental impact of your house. However, before making a decision on ecological materials, we strongly recommend you to think about the energy consumption of your house as a first step. The energy efficiency of your house will have the biggest impact on the environment – the less energy you use for heating, the less you pay and the less carbon dioxide you will emit.

MODERN ENERGY-EFFICIENT HOUSES AND ECOLOGIC ASPECTS

When thinking about building a new house each future house owner wonders what his or her future home shall look like. Many different aspects need to be considered, starting from the general appearance of the house from outside until the tiniest details of where the sockets and light switches should be placed. Apart from design principles, two other aspects are steadily gaining importance for the future house owner too: these are environmental and health aspects. Both aspects can increase the building quality and the comfort for the inhabitants. There are many environmental aspects during the construction or a major renovation of a building. The one that comes first to mind is an adequate thermal insulation which helps saving money through less heat consumption and emitting less CO₂ because in a well insulated house the energy consumption is lower than in badly insulated houses. Besides the
insulation there are also many aspects that are less apparent. Before the building materials reach the construction site they are produced in many different ways. Some products need a lot of energy for their production, for example cement. Others need little energy, such as massive wood beams or straw. However, if the tree is felled illegally in tropical rainforest the little energy demand is counteracted by the bad ecologic impact.

After the construction or reconstruction phase ecologic aspects continue to play a role. The right selection of materials can have a positive influence on the interior climate, for example through a regulation of the indoor air humidity or by avoiding emissions from certain materials. Furthermore, the longevity of the components of a house has an environmental effect. Materials that last longer and need to be repaired or exchanged less often decrease the demand for spare parts. This saves money and protects the environment.

During the last years, an increasing number of engineers and architects think about the use of building and building elements after the building has fallen out of its originally planned use. Not only do we think about the recycling of glass bottles nowadays but also about the recycling of houses and conversion of houses for new purposes. Our global resources are limited and we should use them as economical and efficiently as possible. Certain construction principles make the use of a building more flexible and allow for examples a change of walls, when new floor plans are needed. To save material and effort, construction elements should be designed in a way that its parts are easy to assemble during construction and easy to disassemble for recycling and reuse. Such possibilities are seldom influenced by the private house owner, but it is nonetheless worthwhile to keep these aspects in mind when discussing house designs with the architect or engineer. Taking into account all aspects of a building from the production of its element until the recycling of its part or its demolishing is also called a cradle-to-grave approach.
WHAT ARE ECO-MATERIALS AND WHERE ARE THE ENVIRONMENTAL PROBLEMS?

Ecologic materials are materials that reduce the impact of extracting, processing, using, recycling and disposing on our environment. They should furthermore not compromise our health and contribute to a better indoor climate. The overall environmental impact of materials depends on many factors and they may differ from place to place.

Energy

The energy that is consumed during production of the construction material, the transport and the erection process has been considered as negligible in the past. The modern scientific literature tells us that between 10 and 25% of the total energy consumption of a building during its lifetime depend on the choice of materials used. For advanced low-energy houses the figure increases up to 50%. Thinking about future near zero-energy or even plus-energy houses, the role of energy used before living in the house becomes central to the overall energy balance of the house. Plus energy houses are houses that produce more energy e.g. from wind or sun than they consume themselves through heating and electricity consumption.

Materials that we use for construction, such as bricks or mortar or cement, must be gained or produced from natural resources by using energy. Red bricks must be burned; for the production of cement, limestone must be extracted. Other materials occur in nature and can be used without much effort, such as timber, clay or straw. This explains why different materials “contain” already certain amounts of energy when we use them for construction. Architects and engineers talk of different “embodied energies” as a measure of the energy intensity during extraction, production and transport. The embodied energy of different materials is a useful measure for the initial energy consumption. It is typically given in megajoule or kilojoule per mass.
or volume unit – either kilogram or cubic metre. In some cases, such as windows or paints, also values in kJ/m² or MJ/m² can be found. It should be taken into account that these values may differ by author and for different locations.

**Table 1. Embodied energy – Overview on selected insulation and construction materials (combined data from various sources, see links at the end of the brochure)**

<table>
<thead>
<tr>
<th>Material</th>
<th>Embodied energy [MJ/kg ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation materials</td>
<td></td>
</tr>
<tr>
<td>Extruded Polystyrene (XPS) insulation</td>
<td>102-104</td>
</tr>
<tr>
<td>Expanded Polystyrene (EPS) insulation</td>
<td>95-98</td>
</tr>
<tr>
<td>Hemp/Flax plates</td>
<td>31-41</td>
</tr>
<tr>
<td>Glass wool</td>
<td>25-50</td>
</tr>
<tr>
<td>Stone wool</td>
<td>14-25</td>
</tr>
<tr>
<td>Sheep wool</td>
<td>15</td>
</tr>
<tr>
<td>Cellulose flakes</td>
<td>4-8</td>
</tr>
<tr>
<td>Wall constructions</td>
<td></td>
</tr>
<tr>
<td>Certified solid construction wood, massive wood beams (larch, pine, fir or spruce)</td>
<td>10</td>
</tr>
<tr>
<td>Calcium Silicate bricks</td>
<td>8</td>
</tr>
<tr>
<td>Timber – planed, technically dried</td>
<td>4-9</td>
</tr>
<tr>
<td>Sand-lime brick</td>
<td>1-3</td>
</tr>
<tr>
<td>Concrete</td>
<td>1</td>
</tr>
</tbody>
</table>

It is important to remember, that the ecologic properties and the embodied energy should be evaluated on the basis of the final construction and not just by comparing single materials. Some materials, which have a high embodied energy per kg but which are used only in small quantities, can have the same ecologic impact as a material which is uses in large quantities and which has a small embodied energy per kg. However, it makes sense to compare the values of two different materials if the one can be substituted by the other. Finally, transport to the construction site has not been taken into consideration in the
table above. Obviously, local products have a clear advantage over products which need to be transported for long distances. The weight of the product plays a role, too.

**Pollution**

Apart from the energy consumption, the production or extraction/harvesting of natural materials causes emissions. Such emissions are relevant, because the production or manufacturing emits greenhouse gases and gases that contribute to the acidification (through acid rain).

![Cement production requires a lot of energy causing CO₂ emissions.](Image: © Hermann | PIXELIO.DE)

Among relevant greenhouse gases is CO₂ which forms during burning and production processes. But also other, much more potent greenhouse gases can result from the production, use and disposal
of building materials. Insulation foams may emit hydrofluorocarbons (HFCs) gases for example, and older double pane windows contained sulphur hexafluoride gas (SF₆) between the panes – both compounds have greenhouse warming potentials which are hundreds of times of that of CO₂. In total, 7 to 9% of all emissions of greenhouse gases in Western Europe can be attributed to the production and transport of building materials. As a rule of thumb, you should avoid products that contain CFCs (chlorofluorocarbons) and rather look out for those with HCFCs (hydro chlorofluorocarbons) or HFCs which are usually less harmful to our climate. The best option is of course to avoid such substances altogether.

 Lifetime and renovation

Considerations about ecology of houses do not end with the construction of houses. To make a sound ecologic assessment of buildings, the service life of construction parts should be taken into account. The typical lifetime differs by construction elements, but they are around 75-100 years for bearing structures and 25-50 years for windows (depending on material, wood 25-40 years, aluminium 40-50 years). Quality of the construction, maintenance and stress are additional influence factors which increase or decrease the typical service life of a building part. Thus, not only the choice of materials, but also their maintenance and proper installation plays an important part in reducing costs and environmental impacts when the material or construction parts needs to be exchanged. Some construction parts, such as wooden windows, need higher maintenance efforts as comparable elements made from other materials.
Disposal and recycling

Disposal and recycling are two aspects that play a role in assessing the ecology of a construction as well. Thinking about recycling and disposal starts with the waste that is produced when extracting raw materials and producing construction materials. The packaging of products is the next step where waste can occur. Using regional products might be a possibility to avoid additional efforts for packaging.

When parts of a building need to be exchanged, the old parts need to be disposed or recycled. While some materials can be re-used with little effort, such as cellulose flakes or clay/stone roof tiles, the majority of materials cannot be re-used in construction as such. These materials are usually downcycled or deposited. Gravel from crushed bricks is for example used for roads. Heat and electricity which is generated from incinerating used construction materials is a final option to make use of old construction parts.
WHERE ARE ECOLOGIC CONSTRUCTION MATERIALS USED?

Ecologic materials can be used in various ways in constructions or they can replace old parts during the renovation. The focus of this brochure will be floors and walls, including structural elements, insulation and plaster or paint. Further possibilities to think about ecologic alternatives which are not covered in this brochure are windows, roofs and furniture.

Walls

Timber

Wood as a renewable resource has been used for centuries for construction (think of old truss constructions) and is moving again into the focus of house owners, architects and engineers. Wood is easy to process, can bear heavy loads, is visually appealing and can contribute to a pleasant interior climate. Wood is a very ecologic material in terms of climate impact. Timber as such is a carbon neutral product and its impact on our environment is determined by the energy used in forestry, processing and transport. If treated properly, wood can be a very durable material and can be used also after it has been used as a structural material. Wood causes very little waste and only heavily treated wood cannot be re-used or burned and must be landfilled. It is beneficial to the environment if regional wood is used and long transport routes are avoided. The FSC (Forest Stewardship Council) label is found on certified wood and ensures that this wood comes from socially and environmentally responsible forestry.

Timber needs little to no chemical treatment if the construction is properly done and a few rules for working with wood are kept in mind. Timber treated with aggressive chemicals should be used only if it cannot be avoided by using an alternative construction and should not be used inside the house. There are several types of wood products
which are used in construction, among them solid timber, plywood, glued laminated timer, fibreboards and oriented strand boards (OSB). Wood boards that consist of several layers of wood or wood chips contain glues. There are several glues used in the wood processing industry and many of them are based on formaldehyde. However, just some of these glues also emit formaldehyde after the wood board has been glued, especially urea-formaldehyde resins. The exposure to formaldehyde from wood products depends on the kind of material used, how it has been glued and how many emitting construction parts are inside the house. Coated and sealed boards can reduce the emissions, but the surface should not be damage afterwards, e.g. by drilling. Besides that, wood products which are free of formaldehyde emissions come with an environmental label in some countries.

**Insulation**

When it comes to insulation there are several possibilities to use more or less ecologic materials. These ecologic materials form an alternative to conventional, mostly synthetic materials. Although they have generally good insulation properties, there are several concerns to use synthetic materials. Firstly, the energy demand to produce these substances is high, usually more than twice the energy needed to produce ecologic alternatives. Second, some of these products, such as polystyrene products or polyurethane (PUR), rely on petroleum or natural gas which is a limited resource. Third, some materials are produced from base products which are not free of concern. To produce for example PUR foams, noxious isocyanates are needed. Last but not least, although synthetic materials have the same fire resistance as many comparable ecologic materials, they have the significant disadvantage that they produce toxic fumes and thick smoke in case of fire.

**Mineral wool insulation**

The most commonly chose material is mineral wool (stone wool or glass wool). Mineral wool is made from natural resources, but due to the fact
that it is produced at temperatures of more than 1400 °C it is energy intensive. To save resources, up to 60% of the base materials can be replaced by old glass for glass wool or remains from the production for stone wool. Additionally it contains organic resins for shape retention and hydrophobic agents. Mineral wool can be only partly recycled and not composted. Mineral wool can emit small synthetic mineral fibres during handling. These fibres can cause mechanical skin irritations. Mineral wool which is sold in Europe nowadays has biosoluble fibres and is usually classified as non-carcinogenic. However, some uncertainties remain and preventive safety measures (wearing gloves etc.) are recommended. Thanks to its very good insulation properties, mineral wool is a comparatively sustainable choice, especially if a part of the product originates from recycled materials. However the large initial energy demand during production has a negative environmental effect.

Fig. 3. Application of stone wool on the attic.
Source: Deutsche Rockwool Mineralwolle GmbH & Co. KG OHG.
Cellulose insulation is commonly available in two forms: as loose flakes or as fibreboards. Both can be used for insulation of e.g. wooden frame constructions and rafter insulations, flakes are suitable to fill small cavities which other less flexible insulation systems can not reach. Cellulose products are produced from shredded recycled paper and require thus a small amount of energy during production. Cellulose insulation flakes and boards contain fire retardants and fungicides up to a third of the mass. Most commonly boric salts (borax) are added, which is problematic when the cellulose material shall be disposed – it cannot be composted. Borates are classified as reprotoxic and slightly hazardous to water as they seep into the ground water. Therefore certain protection should be worn when applying cellulose insulation, such as a mask for mouth and nose.
As borates do not evaporate, this material is safe for inhabitants nonetheless once the insulation layer is closed off. Furthermore, first borate free cellulose materials are already available on market in some countries (e.g. Germany). In these products, borates are substituted by other, less harmful agents. The additives do however not impair the possibilities of recycling and re-using cellulose flakes. It is worth mentioning that cellulose flakes should be blown into cavities only by certified craftsmen because the inappropriate insulation process can set free hazardous small dust particles, e.g. by not properly closing the gap around the opening in the insulation layer and tube which is used for blowing the insulation into the wall construction. Cellulose fibreboards are safe for handling by the customer and do not require special precautions. Once installed, all cellulose materials are safe and do not emit any gases.

**Fig. 5.** Blowing of cellulose flakes into the wall construction. Source: Dämmstatt W.E.R.F. GmbH
All in all cellulose insulation is generally an ecologic alternative to conventional materials and borate free products are very sustainable products, as they are produced from abundant resources with little energy input and little environmental impact.

Sheep wool

Sheep wool can be used as insulation material for inside walls and inside ground plates, rafter insulation, and for wood frame constructions. It is sold as fleeces. The sheep wool insulation which is produced in Europe is made from leftovers of processing the wool for other purposes. This is also the reason, why it has a low environmental impact. European sheep wool usually comes from non-intensive farming. If the wool is imported from New Zealand or Australia, the environmental impact of the transport and the more intensive farming in these countries must be taken into account. Sheep wool products can contain additives, such as borates, and synthetic support fibres. Unprotected wool is susceptible to moth infestation. To make sheep wool products mothproof, insecticides - usually sulcofuron which is toxic to marine organisms - are necessary. However, the additives are unproblematic for humans.

Sheep wool insulation has good ecologic properties and furthermore very good fire protection ratings. However moth protection is necessary and additional provisions should be made, to make the insulation wind and airtight to keep larvae away from the insulation.

Hemp and flax insulation

Flax and hemp insulation are based on fibres from flax or hemp which can grow in almost all regions of Europe. Although not very widespread in many countries today, hemp and flax where once two very common cultures, for example in the Baltic States in the 1920s. During the past decades these materials fell out of use and have been almost forgotten. In last years a small renaissance of these plats can
be observed. Fields of industrial hemp (sort with very small amounts of the substance THC which is responsible for the intoxicating effect) and linen do not require more than usual effort for growing crops. Both plants are rather undemanding but as with any other culture their crop yields depend on the weather. As regional products hemp and flax can help to reduce transport efforts.

Fig. 6. Hemp fibreboards and hemp fleeces
Source: Hock (Thermo-Hanf).

Hemp and flax can be used as insulation materials in wood beam constructions, as rafter insulation, interior insulation of the outside walls, or between suspended ceiling and the supporting structure above. Hemp and flax are sold as fibreboards or fleeces; hemp is also available as loose fibres. Loose hemp fibres they should be blown into
the wall by an experienced company as the handling sets free a lot of dust. In some hemp and flax insulation materials, support fibres made from polyester are added. These fibres are the reason the insulation may not be composted after it has been removed. Similar to cellulose flakes or sheep wool, borates are sometimes added as well; in some products soda is used. The future perspective for growing these materials is rather good from a sustainability point of view. This local material has a high potential to reduce transport efforts and to contribute to local economies.

Wood fibreboard insulation panels

Fig. 7. Installing Wood fireboards on a roof. | Source: PAVATEX
Wood fibreboard insulation panels, either flexible or stiff, are versatile insulation materials that can be used in different constructions. They are produced from pressed wood off-cuts either by wet or dry processing, parts of the product can originate from recycled material. In wet processing, polyvinyl acetate can be used to glue thicker layers into plates. Sometimes fungicides or additives to increase fire resistance are added, but these shares are relative small. Some fibreboard panels are coated with bitumen or latex if they are used in water resistant layers of wood frame walls or inside roof constructions. Transport efforts can be reduced, if the wood used is collected close to the place of production. Wood fibreboard is usually not reused and recycled only to a limited extend. Uncoated panels without certain additives or impurities (e.g. without polyvinyl acetate) can be composted. An incineration with energy generation is possible. Wood is an ecologic material with similar insulation properties as other ecologic materials, however processing the wood chips is rather energy-intensive. Therefore wood fibreboard insulation has a higher embodied energy as for example cellulose flakes.

**Perlite insulation**

Perlite is a mineral that forms through the hydration of obsidian, which is a natural product of volcanic eruptions. By heating small perlite grains quickly to 1000 °C the chemically-bound water is released and perlite expands by 15 to 20 times its size. The resulting product is use as insulation filler in walls, roofs and ceilings; also perlite boards are available. Perlite does not rot and is resistant to weather and vermin. Perlite can be made hydrophobic by coating it with silicon resins or bitumen. Furthermore, supporting fibres can be added in perlite boards. Perlite products can be handled without precaution measures, just masks should be worn if using filler insulation causes dust. Re-using the filler insulation is easy and possible with little effort. If not reused, the insulation must be disposed of on a landfill site. However, products treated with bitumen might require special treatment.
Perlite is mostly produced in Southeast Europe and requires transport considerable efforts to more remote regions. Additionally the high temperatures needed for processing are energy intensive and have an impact to the environment as well. However, being a natural product, perlite is still considered as an ecologic choice in comparison to synthetic insulation materials.

Fig. 8. Straw bales — an ecologic material with low primary energy. Image: © Rainer Sturm | PIXELIO.

Straw

Straw is a natural dried fibre from crops or other fibre plants, such as hemp or flax. It is a light-weight material which is practically everywhere available in Europe. Straw is thus a material which requires minimal energy for transport. Straw is delivered in bales of different sizes which are built into the wall and then compressed. The most common use nowadays is in straw bale buildings, where straw is used as an insulation material inside a wood frame construction. As an insulation material, straw can be used as an
outside insulation, on the ground plate or as rafter insulation. In few cases it is also used as a structural, load-bearing material, however, this is not always permitted by the building law. As straw is binding carbon and only little carbon is released during harvest, drying and transport, it is an excellent climate-friendly material, with a very low embodied energy. However, it should be also said that straw is not a material that is suitable for the mass production of houses and the industrialisation of building. Using straw is very time and manpower consuming and will thus not become a mainstream product for mass markets. It is an interesting alternative for those who are willing to put a lot of own work into their future home.

Flooring

Different flooring types

There are several options for flooring: carpets made from natural (jute, wool, cotton, coconut fibre) or synthetic fibres, elastic flooring from linoleum, polyvinyl chloride (PVC) or cork, or hard flooring such as laminate, wood parquet or stone. The amount of renewable base materials differs between the various flooring. Laminate, wood parquet, linoleum and natural fibres contain a high share of renewable resources. All options for flooring have a range of use and their advantages and disadvantages. From an ecologic point of view, special attention should be given to additives, the durability of the flooring and the recycling potential.

A word on PVC

For the sake of the environment you should avoid PVC in your home and look for more environmentally friendly alternatives. PVC as such is very resistant to chemicals and sunlight once it is produced, but the base chemicals from which PVC is made are toxic. Furthermore, PVC can contain plasticizers and heavy metal stabilizers which are not chemically bound to PVC and which are released from the plastic over time. Hard PVC itself is chemically stable and does not rot which makes it problematic as it accumulates on dumping side. When PVC waste is incinerated, highly toxic dioxins and other dangerous substances are formed.
Additives: Carpets from natural or synthetic fibres may contain additives to make them moth proof. Such additives are for example isothiazolones or permethrin which are not free of concern. Wood parquet and laminate can be sources of formaldehyde and other volatile compounds which are emitted from the glue and the sealing. However, ecologic alternative which use less problematic glues and sealing are available. Linoleum flooring may emit volatile gases that cause odour some time after installation. Rooms should be aired regularly and heated in colder seasons during that time. PVC flooring can contain up to 20% plasticizers, stabilizers and other additives. While usually very stable and resistant, PVC floors emit highly toxic substances when it catches fire.

Durability: The durability of different materials depends on the individual material properties. Carpets from natural or synthetic fibres do usually last 10 years, linoleum 25-30 years, PVC 25 years, wood parquet up to 60 years, stone even longer.
The recycling potential of flooring depends not only on the type of flooring used but also on the fact if it is glued to the underground or not. Glued flooring is usually more difficult to remove without damaging the material and also more difficult to recycle. PVC, linoleum can be recycled or downcycled. Flooring from synthetic fibre cannot be recycled; recycling of flooring from natural fibres is not yet common although possible. In both cases, flooring made of fibres can be burned using the heat. Wood parquet and laminate can be theoretically re-used, if they can be removed without being damage. Parquet and laminate can be also burned using the heat.

**Fig. 10.** Cork is a sound absorbing material for flooring
Image: © Martin Schemm | PIXELIO
Cork

Cork is a natural, renewable material which is gained from the bark of the cork tree. The cork which is used to produce materials for buildings is a waste product from the production of bottle cork. Cork can be used as flooring but also as insulation material in form of granulate or expanded granulate. Cork is a not only suitable as for thermal but also for sound insulation. It is a resistant and durable material and does not need additional treatment, but should be protected from permanent exposure to humidity. Cork used as flooring is either used as tiles or as parquet and it gives a soft and warm feeling to the feet. Cork tiles can be sealed or contain glues which impairs their environmental performance slightly. Furthermore, it is a limited resource and the overwhelming amount of cork is harvested in Portugal. Given these facts and its high price, cork will not become an alternative for the mass market.

Plaster and paints

Clay plaster

Clay is an ancient construction material that has been used for millennia. As a construction material applied to outside surfaces, it can be used in hot, arid climate zones only, e.g. Northern Africa, because clay is water soluble. However, using it inside the house has become an interesting application during the last years. From an ecologic point of view clay is a favourable material, as the embodied energy is very low. Unburned clay can be fully recycled and reused; it is durable and contributes to a positive indoor climate. Clay can absorb much more humidity than other materials and can regulate the indoor humidity and thus contribute to the health of the inhabitants. Clay plaster is available as ready-to-use powder which is mixed with water on site and applied directly onto a reinforcement grid. The plaster is available in different earth tones.
Paints and colours

When thinking about the ecology of houses, many people think about colours and paints first. However, it should be kept in mind, the colours and paints contribute only little to the overall ecology of houses. Basically, paints consist of four groups of ingredients which also determine their ecologic properties: pigments, fillers, solvents, and additives. Fillers are usually made from stone and unproblematic. Pigments in colours can be either organic (made from oil products) or mineral (metal compounds). While the production of organic pigments is usually energy and material intensive, mineral pigments are often produced by using strong acids which must be recycled in energy-intensive procedures. Solvents are usually organic compound which are in most cases responsible for the indoor air pollution and odours which the paint emits (“smell of fresh paint”). The last component of additives contains everything else what is in the paint. This can be compounds which are absolutely harmless, but also very problematic toxic substances, such as drying agents (so-called siccatives). As there is such a large variety of paints, it is recommended to consult your local retailer and ask about different alternatives and its advantages and disadvantages. For many applications, ecologic paints are available which are emission-low, are made from natural pigments or which do not contain problematic additives. Many of them come with an environmental label. Ecologic paints can be purchased in practically every desired colour nowadays.
HOW CAN ECOLOGIC MATERIALS CONTRIBUTE TO A MORE COMFORTABLE LIVING?

There is a number of ways how ecologic materials can contribute to better comfortable living. There are several factors to which ecologic materials can contribute: indoor temperature, humidity, pollutants in the indoor air and noise protection.

The right choice of insulation material can help to regulate the indoor temperature. Not only does a well selected material keep the heat inside in winter but also slows down heat coming in from the outside in summer. Each material has a characteristic time which is needed to transport the outside heat into the building. A well selected insulation construction has a delay of 8-12 hours, so that the heat reaches the inside in the evening. The humidity inside the house can be regulated for example by clay plaster. The upper layer of the plaster can take up excess humidity and release it again when the air is drier. Ecologic materials can contribute to a better interior climate if emission-low materials and paints are selected. Wooden materials and flooring should not contain glue that emits formaldehyde or other volatile organic compounds. Furthermore, non-textile flooring is more health-friendly for people who are allergic to mites. Last but not least, cork for example can contribute to sound isolation.

HOW DO I SELECT ECOLOGIC MATERIALS?

Ecologic construction materials can be a benefit to the comfort and contribute to smaller environmental impacts caused by building the house. Nowadays a variety of ecologic alternatives to conventional materials is available on the market. However, such materials should not be used for the sake being environmentally friendly only. Their properties and range of application should be carefully studied just as with any other material. The thermal properties, meaning the conductivity and the specific heat capacity, should
be compared and fire resistance or noise protection properties of materials should be kept in mind. If the materials are used for both heat and sound isolation, then the properties for both uses should be considered together. Due to different resistance to water and humidity, some materials have a limited range of application or should be installed with a special vapour barrier. Ask your architect and engineer about possible options.

For many product categories, environmental labels exist. For organic food or energy efficiency classes there are even an EU-wide labels. For building products the situation is different. Besides the general CE-mark which all building products should have, there is a confusing variety of labels across Europe. When buying labelled materials, salesperson should be asked about the meaning of the label and the criteria for awarding. Searching the internet or asking the local consumer advice centre for country specific labels is also recommended in case of doubt.

For smaller products such as flooring, paints and colours, or furniture it is safe to make an informed decision as a customer. Due to the variety of these products it is nevertheless recommended to consult the local salesperson or to get an overview in the internet or in customer advice centres if available. Stores specialized on ecologic construction materials might be located in the nearest larger town.

When deciding for things like insulation of even construction materials for a house to be built, it is always necessary to discuss with an architect or engineer about feasible and economic options. It is important however, to see the costs of the building in the long run and not only during the time of constructions. Certain options might appear more costly in the beginning but they might save money after some time. It is easy to understand how energy efficiency measures pay-off because of lower energy consumption and thus less costs. However, thinking about ecologic materials it makes sense to think about the lifetime of materials. Wood parquet for example may appear very expensive, but might save 3 or 4 times re-carpeting.
GENERAL GUIDELINES WHEN SELECTING MATERIALS

It is rather difficult to provide you with one advice for the best product. All materials have advantages and disadvantages and these are often in the eye of the beholder. The following recommendations are for you if you want to have a healthy indoor climate by paying attention to the environmental impact of your house:

1. Prefer natural materials over plastics.
2. Avoid PVC.
3. Look out for environmental labels.
4. Buy local products.
5. Prefer wooden parquet or linoleum over laminate, or use low-emission laminate.
6. Use colours that are designated as emission-low
7. Pay attention to your energy and water consumption. The most ecologic material will not decrease the environmental impact of your house if you waste water and electricity and your house is badly insulated.
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