ENERBUILD

Result 6.1

Certification of energy-efficient public buildings - Summary of instruments in the Alpine Space

November 2009




Alpine SPACE
EUROPEAN TERRITORIAL COOPERATION
THIS PROJECT IS CO-FUNDED BY THE EUROPEAN REGIONAL DEVELOPMENT FUND
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Certification of energy-efficient public buildings

01 Introduction

ENERBUILD is a shortcut of a project from the EU alpine space program and stands for ENergy Efficiency and Renewable energies in the BUILDing Sector. The partnership consists of 13 partners from 6 countries. Their predominant role is to promote economic and environmental concerns. For the purpose of the project they create a network of specialized companies. The companies and the cross sectional approach is characterized by involving institutions ranging from universities, energy clusters, institutions for building physics, ecological construction, architects, handcraft associations, vocational training institutions in the public and private sector. The ENERBUILD-project is planed for a period of 3 years (2009 to 2012). The project is focused on strengthening SMEs in the building sector because of their great importance as employers in alpine valleys. New developments and changes concerning building techniques arise. To fulfil this requirements, cross-sectoral networks will be of importance.

The importance of the sector, the market and resulting requirements

SME sector: The small scale structure of businesses in the building sector in the Alps differs totally from the situation in the western and northern EU countries. For example in Switzerland 87% of all enterprises in the building sector employ less than 10 people. In South Tyrol 62% of all people are employed in SMEs. This situation can be transferred to the majority of the regions in the Alpine Bow. SMEs, which are a crucial part of the regional economy need to be supported, because the technological change demands high technology, precise construction methods, sensible handling of construction material and cross professional cooperation on the building site.

Energy efficient building sector: The following example should illustrate the importance of know how transfer and cooperation between SMEs in the near future: In 2006 there were 1.600 passive houses, while in 2016 the number will rise to 105.000. In 2020 an estimated number of 262.000 passive houses is predicted in Austria. This means that 185 million m^2 low energy living area will be put up until 2020. According to the study „Haus der Zukunft 2008" this will lead to an investment volume of 370 billion. Similar figures are available in Switzerland, North Italy and France. Rhonealps plans to have in 2020 90% of new buildings corresponding to the PH-standard.

The main goal of the ENERBUILD programme is therefore to strengthen local acting SMEs in the competition with the large scale industry and to ensure a growing share of the market in this sector.

The key topics of the project are:

Topic 1: Providing latest technical know-how for craftsmen and architects

The measures in the project are focused on know-how transfer to the SMEs in the sense of energy saving and producing buildings. This requires a highly sophisticated education system. To increase know-how and expertise of key actors in the building sector education modules and special trainings have to be created for architects, constructors and craftsmen, staff-exchange, workshops and joint R&TD activities. During the ENERBUILD project a „train the trainer„ concept will be created and established.

The main objective is to continually develop the human resources of SMEs and support them to maintain their leadership in the building sector.

Topic 2: Implementation tools for public builders as a decision guidance (topic of the workshop)

The ENERBUILD workshop 30.11.2009 deals with the use of different certifying system and the comparison of the different approaches. It's interesting to see that in different countries big affords are made to establish a standard guiding und evaluating system for energy saving and ecological buildings in parallel. The different certifying systems are mentioned in this brochure: EFFINERGY (Frankreich); DGMB (Germany), Minenergie (CH), Passive House (A), LEED (world wide) and CASA-CLIMA (I).

The discussion should find out differences, advantages of each system and should analyse how it could be adapted and implemented on local level.

There are tools in development, however alpine wide tested and accepted evaluation tools for ecological public buildings are still missing until now. They are not really implemented from the legal point of view (see competition rules). Cause of this inaccurate situation, political descision concerning ecological public buildings are constrained.

The question is: What are the measures to convince stakeholders using and implementing a certain kind of system?

After finishing the project initiative, suitable tools for the evaluation of energy efficient buildings will be used as a part of a public decision process. For the evaluation process there are certification bodies installed (in some regions). This structure empowers public decision makers

to design decision processes for establishing ecological public buildings in the Alpine Space.

To go in this direction the steps in the ENERBUILD project are:

1. Transnational comparison of instruments according to ecological evaluation of public buildings
2. Improvement and promotion of instruments for the construction of ecological end energy efficient buildings
3. Pilot testing of instruments and methods, e.g. evaluation of selected (public) buildings
4. Establishing an Advisory Service for certifying ecological public building

Topic 3: Assist customers concerning the energy production on buildings

The production of market oriented scientific studies about „Passive House killer arguments" and the study „Performance of Existing Buildings" should provide information about sources of problems with energy efficient buildings and recommendations for improvements. The results of such studies are used for education to strengthen innovation capabilities of SMEs.

The „Healthy dwelling study" provides new knowledge for decisions on building materials and helps architects and craftsmen to inform their customers on the subject.

An expert group will improve better conditions for investments in energy producing buildings with the promotion of financing instruments like solar roof stock exchanges, eco-power stock exchanges, sun loan and other innovative models.

In doing so, an analysis of the energy producing potential of buildings (e.g. scanning of rooftops, mini scaled heating solutions) will be made. Monitoring systems to stabilise the efficiency of small energy production plants are planed.

In general ENERBUILD will promote SME cooperation capacity and improve SME innovation capacity through transfer of environmentally friendly technologies and cooperation between research and development centres and SMEs. The project will strengthen value-added chains for energy efficient buildings based on the principle of proximity through the promotion of SME networks.

For more Information: www.enerbuild.eu

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General remark:
The organisation written next to the method description is responsible for their content.

France: Effinergie - Label for Energy Efficient Buildings

01 Effinergy Association

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1.1 History

From 2005, a national working party initiated an „effinergie" group, the objective of which was to repeat the successful Swiss and German initiatives with, respectively, «Minergie» and the «three-liter house». This committee is specifically adapted to the French requirements (construction methods, regulation, standards, climate, market,...).

Unlike the central and northern European countries, it is here impossible to stick to an unique standard that would not take into account the various climate changes in France. A construction on the French Riviera cannot meet the same energy standards than in the North of France or in the Alps. It is therefore necessary for the French regions to get involved in the project in order to co-ordinate the housing stock and its characteristics.

Since 2008, Effinergie is a non commercial association which groups together the building industry professionals and the local authorities.

1.2 Missions

The missions of the association:

1. to gather all the stakeholders of the construction sector for an energy optimisation of buildings: project managers, building companies, industrialists, banks, public local and national authorities
2. to share local initiatives, to underline the noteworthy projects and the field staff
3. to introduce a quality certification initiative that would enable to assess and qualify the performance of buildings from requirements. It would therefore be more visible and identifiable by all the stakeholders.

The association gives means of:

1. Managing and coordinating communication between the building industry professionals and the local stakeholders;
2. Managing a countrywide communication on actions and projects;
3. Gathering, around clear objectives, capacities and energies of all the stakeholders for an energy optimization of buildings: local authorities, professionals of the building, the environment and the training, industrialists, financial establishments.

1.3 Organisation

To answer these objectives, the association has set up transverse working groups, in which are invited all the members, each putting in the service of the collective its specific skills:

- Promotion and communication

  Objective: To set up and manage an internal and external communication to promote the actions of the association Effinergie.

The axis „Communication„ is translated by the publishing of guides and booklets, participation at conferences, the management of a web site, a database Projects.

- Interregional dynamic

  Objective: Value the local actions, facilitate the exchanges and allow the mutualization of the skills, the capitalization and the experience feedback. This axis is carried out by the Network group and made up of representatives of local and national authorities and of regional associations.
- Requirements

  Objective: to elaborate requirements of energy performance, adaptation of the regulation tools, analysis, prospecting and anticipation

This axis is carried out by the Requirements group, the technical centre of the association. It is made up of experts in the sector of the low consumption.

- Training

  Objective: Implementation and coordination of trainings. This axis is carried out by the Training group and made up of members of the association and the partners of the initial training and ongoing training.

2.1 Energy efficiency requirements for new buildings

One of the very first actions of Effinergie was to develop a first label for new buildings in partnership with the public authorities. This label was published in the Official Journal dated from May, 15th 2007. It is communicated in the sector under the name BBC - Effinergie.

Elementary requirements : In order to obtain the BBC – Effinergie label, the main requirement consists in not exceeding a consumption value of:

50 kWhpe per m^2 of NFA per year.

The calculation is made according to the Th-CE method, which is that of the Thermal Regulation 2005. The results are therefore displayed with the following rate: kWh of primary energy(1) per m^2 of Net Floor Area (NFA).

The consumption (that should not be exceeded) applies to the energy utilizations that can be actively influenced from the design of a building:

- Heating
- Hot water
- Auxiliary appliances for ventilation and heating
- Lighting (via natural lighting)
- Air-conditioning

It does not include the other utilizations of electricity (particularly the household appliances, audiovisual equipment,...) .

The diversity of climates is taken into account as this value of 50 is multiplied by a coefficient of climate harshness. As a consequence, the values of this requirement fluctuate between 40 and 65 kWhpe/m^2NFA/year according to the regions.

The coefficient of climate harshness is increased by 0.1 if the construction altitude ranges from 400 to 800m and it is increased by 0.2 if the construction altitude is higher than 800m.

This 50 kWhpe per m^2 of NFA per year are now the base of the future thermal regulation and will be applicated to public and tertiary building since January 2011 and to all buildings since January 2013.

Besides, the building airtightness must be measured and be under 0,6 $m^3/h.m^2$ for a detached house and under 1 $m^3/h.m^2$ for apartment buildings. This value quantifies the leakage flow going through the building envelope. It is stated as $m^3/h.m^2$ of building envelope, under a pressure differential of 4 Pascals, according to the RT 2005 Thermal Regulation. The measurement methodology and the list of agreed operators is published on the Effinergie website.

As one of the objectives consisted in a good thermal performance of the building, the local electricity production (photovoltaic, micro-wind energy,...) is only deducted from the energy consumptions up to a limit of 12 kWhpe/m^2.yr (this value represents the specific average proportion of electricity in terms of consumption stated in kWhpe/m^2.yr for a BBC – effinergie project).

2.2 Energy efficiency referencial for existing buildings

In 2008 and 2009 Effinergie has develop an efficiency label for renovation 'Effinergie Rénovation'. This label was published in the Official Journal dated from September, 29th 2009.

Elementary requirements: In order to obtain the BBC – effinergie renovation label, the main requirement consists in not exceeding a consumption value of:

80 kWhpe per m^2 of NFA per year.

As for new buildings, the calculation is made according to the Th-CE method, which is that of the Thermal Regulation 2005. The results are therefore displayed with the following rate: kWh of primary energy(1) per m^2 of Net Floor Area (NFA). The energy uses taken into account and the coefficient of climate harshness are the same as for new buildings.

The building airtightness must be measured and be under 0,8 $m^3/h.m^2$ for a detached house and under 1,2 $m^3/h.m^2$ for apartment buildings.

(1) The primary energy can take into account the energy loss during the transformation of energy. It corresponds to the energy bought to the energy distributor (named as final energy) which is multiplied by a coefficient equivalent to 2.58 for electricity, 0.6 for wood and 1 for other energies. This 2.58 coefficient for electricity takes into account the heat supplied by the power station. This heat is not used and it is evacuated in the natural surroundings (sea, river...).

France: Effinergie - Label for Energy Efficient Buildings

2.3 Prospection for an Energy producing building label.

The referential working group of Effinergie is now working on the producing building definition wich will be the thermal regulation objective for 2020.

2.4 Certification bodies: a guarantee of seriousness and quality

The effinergie association does not aim at delivering the BBC – effinergie label. It relies on four certification bodies recognized by the government and accredited by COFRAC that will use the label effinergie for the certification at a BBC level.

BBC-Effinergie Label is labelised as an option in the framework of multicriteria certifications.

Certification body	Type of construction	Certification label	Certification field	Further information
PROMOTELEC	Single houses, Apartment buildings	High Energy Performance Label BBC - effinergie issued in the framework of the performance label :	Granted operation after operation according to the energy performance	www.promotelec.com www.2idéesalafois.com or dial 3620, say promotelec www.labelperformance.promotelec.com
CERQUAL	Apartments buildings	High Energy Performance Label BBC - effinergie issued with the option of the QUALITEL and HABITAT & ENVIRONNEMENT certifications	Multicriteria certification granted per operation	For a private individual: www.bienvivrechezmoi.com For a professional www.cerqual.fr
céquami	Tertiary buildings	High Energy Performance Label BBC - effinergie issued in the framework of the certification NF High Environmental Quality Tertiary Buildings and to come NF Tertiary Buildings	Multicriteria certification granted per operation	www.certiviea.fr
CertiVéA	Detached houses on an isolated lot	High Energy Performance Label BBC - effinergie issued in the framework of the certifications NF Detached House and NF High Environmental Quality (HQE) Detached House	Granted to the builder for all its production for the NF label or NF ou NF HQE per operation for their BBC effinergie label	www.cequami.fr

In two years, more than 20.000 dwellings are in the certification process.

Certifications 2008

- 35 single houses / 18 collective housing

Certifications 2009

- 68 single houses / 53 collective housing (1.500 dwellings) / 1 tertiary building (3.000m2)

Certifications in progress 2009

- 2.573 single houses / 618 collectives housing (19.000 dwellings) / 50 tertiary buildings (580.000 m^2)

Renovation 2009

- 123 single houses / 27 collective housing (1.362 dwellings)

2.5 Efficient building data base

The last work done by Effinergie in 2009 with ADEME (French Energy and Environment Agency), CSTB (Building Scientifical and Technical Centre) and the French government is to set up an efficient Building data base. This data base has two objectives :

- make accessible for every body a large data base of efficient building examples
- make available statistics on technical datas and technologies in efficient buildings

2.6 Communication

During the last two years, Effinergie has published different guide lines and documents. All these documentation are available on the Effinergie website: www.effinergie.org

Synthesis of Effinergie Certification 03

Conctact	**www.effinergie.org**
Country	France
Labels	BBC-Effinergie for new buildings BBC Effinergie for exixting buildings
Certification	The 4 official certifiers are the french national certifiers
Target Buildings	CERTIVEA® CEQUAMI® PROMOTELEC® CERQUAL®
Energy consumption of new buildings	New Existing Residential Tertiary
Energy consumption of existing buildings	residential: 50 kWhEp/m²/an Tertiary: 50% of thermal regulation objectif residential: 80 kWh/m²/an Tertiary: 40% of thermal regulation objectif
Differenciation	Geographical and altitude coeficients
Consumption items taken into account in the calculation	Heating Hot Water Cooling Lighting Ventilation
Surface	Brut Area of the using part oft the building French SHON
Other exigences	Maximum Photovoltaic contribution: 12 kWhep/m² for residential building 25 kWhep/m² for tertiary buildings
Primary energy conversion factors	Gas/oil = 1 Electriity = 2,58 Wood = 0,6 Solar thermal = 0 Solar PV = -2,58
Calculation method	French thermal regulation method: THCE
Airtightness	Houses: I4<0,6m³(h.m²) (I4 not N50) Tertiary: I4<1,2m³(h.m²) (I4 not N50) Dwellings: I4<1 m³(h.m²) (I4 not N50) Renovation Houses: I4<0,8 m³(h.m²) (I4 not N50) Dwellings: I4<1,3 m³(h.m²) (I4 not N50)
Costs	Promotelec: 330 HT Euro/MI Cequami: Cerqual: 400,- to 900,- Euro/dwelling Certivea: >12.000,- Euro/building (2009)

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01 MINERGIE®: the standards

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MINERGIE® is a registered quality label for new and refurbished buildings. This trademark is supported by the Swiss Confederation, the Swiss cantons and the Principality of Liechtenstein along with trade and industry. The trademark is firmly protected against unlicensed use.

MINERGIE®

Within the framework of the MINERGIE® registered trade mark, several products are offered:

1.1. Looking after the regular MINERGIE®-Standard

for buildings is MINERGIE®'s main activity. The standard requires that general energy consumption must not to be higher than 75 % of that of average buildings and that fossil-fuel consumption mustnot to be higher than 50 % of the consumption of such buildings.

1.2 The MINERGIE-P®-Standard

defines buildings with a very low energy consumption, it is especially demanding in regard to heating energy demand. This standard corresponds to the internationally-known passive house standard.

1.3 The MINERGIE-ECO®-Standard

adds ecological requirements such as recyclability, indoor air quality, noise protection etc. to the regular MINERGIE®-Requirements.

1.4 MINERGIE®-Modules are building components

and building equipment elements which are certified as being exceptionally well-performing with regard to energy efficiency.

1.5 MINERGIE® offers a great variety

of information material, planning tools, seminars and conferences as well as training courses.

The following focusses on the regular MINERGIE®-Standard for domestic buildings. The detailed regulations (in German and French) can be downloaded free of charge from the MINERGIE® website.

Comfort is the central theme – the comfort of the users living or working in the building. This level of comfort is made possible by high-quality building envelopes and the systematic renewal of air. Specific energy consumption is used as the main indicator to quantify the required building quality. In this way, reliable evaluation can be assured. Only the final energy consumed is relevant. To maintain feasibility and general use the additional costs for MINERGIE® must not exceed 10 % of the building costs.

The MINERGIE®-Standard is widely accepted. There are many reasons for this, the most important being the objective-oriented approach: If builders and planners – in other words architects and engineers – can meet the standard, they have complete freedom both in their design and choice of materials and also in their choice of internal and external building structures. In 2007, 8.200 buildings with a total of more than 8.3 Million m^2 gross floor area have been certified as MINERGIE®-Buildings.

Apart from general requirements such as a ventilation system and moderate extra costs, a detailed quantitative proof of energy performance (for heating, hot water, ventilation and air conditioning) has to be delivered. This proof is the core of the MINERGIE®-Certification process. The appropriate forms for all projects applying for a certificate are verified and random tests on the building sites are performed. The following table shows an example of the principles behind the proof of the data.

Value in kWh/m2	Useful energy	Equipment efficiency	End use energy	Energy weighting factor	Primary energy
Heating energy (acc. SIA 380/1)	50 (A)				
Savings by ventilation heat recovery	-15 (B)				
Effective heating energy	35 (C)	0,85 (D)	41,2 (E)	1 (F)	41,2 (G)
Hot water	14 (H)	1	14	2	28,0 (I)
Electricity for ventilation			3 (K)	2	6
The energy performance value (EPV)				Total (L)	75,2 < = 38?

Table 1: The energy performance value (EPV) in kWh/m² of a single family house, heated by oil and domestic hot water produced with electricity.

Value in kWh/m2	Useful energy	Equipment efficiency	End use energy	Energy weighting factor	Primary energy
Heating energy acc. SIA 380/1)	50				
Savings by ventilation heat recovery	-15				
Effective heating energy	35	3,2	10,9	2	21,8
Hot water	14	2,9	4,8	2	9,6
Electricity for ventilation			3	2	6
The energy performance value (EPV)				Total	37,4 < = 38?

Table 2: The energy performance value (EPV) in kWh/m² of the single family house above, but with heating and domestic hot water provided by a heat pump.

2.1 Explanations to the calculation

Heating energy (A): The heating energy demand is calculated according to SIA-Standard 380/1 which is based on EN ISO 13790 (formerly EN 832). The result has to be less than 60 % of the limiting value of SIA 380/1.

Freeware (in German) for simple houses and Swiss climatic conditions can be downloaded at: www.ur.ch/de/bd/afe/gebaeudebereich-m705/.

Heat recovery (B): The standard calculation according to SIA 380/1 does not take ventilation heat recovery into account. Hence this has to be done separately to get the effective heating demand (C).

Effective heating energy (D): The heating energy demand (useful energy) is divided by the conversion efficiency (in this case of the oil furnace), leading to the end use energy (E).

The energy weighting factor (F): The end use energy is multiplied by an energy weighting factor, leading to the weighted energy use for heating (G). The energy weighting factor for fossil energies is 1.

Switzerland: The MINERGIE® - Standard for buildings

Hot water (H): The amount of energy consumption for hot water is given for single-family houses (14 kWh/m²), and for appartment-houses (21 kWh/m²). The same procedure using efficiency and energy weighting factor leads to the weighted energy demand for hot water (I). The energy weighting factor for electricity is 2 (reflecting the big share of hydropower in Switzerland).

Electricity for ventilation (K): The electricity consumption for ventilation is taken at the end use level and analogously processed to obtain the weighted energy demand.

Sum (L): The sum of all weighted energy demand components has to be compared to the limiting value, i.e. 38 kWh/m² for residential buildings.

2.2 Notes and remarks

The energy demand and limiting values are given as specific values in kWh/(m²a) whereby the m² represent the heated gross floor area, called the Energy Reference Area (ERA).

SIA 380/1 defines how to apply the energy balance algorithm for buildings, as defined in EN ISO 13790. In this way, any software referring to this European standard should deliver results comparable to those of SIA 380/1 and therefore be suitable as input data for MINERGIE® calculations.

The building stock is sectored into 12 categories with different uses. Some of them have differing limiting values and all of them have their own standardised input data, such as indoor air temperature, air change rate, specific electricity demand etc. For all categories, significantly less stringent limiting values exist for the MINERGIE® renovation standard (e.g. 60 kWh/m² for residential buildings).

Whereas the requirements on the heating demand (60% of SIA 380/1-limiting value) is just a barrier to ensure that the MINERGIE®-Standard is not reached with regular insulation standard by technical means (heat pumps or renewables) only, MINERGIE-P® requires a very good insulation standard. Typically, the insulation thicknesses are around 20-25 cm for MINERGIE® and 25-35 cm for MINERGIE-P®.

There is a set of default values available which may be used. Better performance has to be proven. For example, it is easily possible to use less energy than the given value of 4 kWh/m² for ventilation. But if so claimed, the technology used has to be defined and, also, installed.

The energy weighting factors represent a simplified approach for taking the conversion losses from primary to end use energy into account.

The example shown above obviously does not fulfil the MINERGIE®-Standard's limiting value. Various measures can be taken to improve the building (project) in order to reach the MINERGIE®-Standard: For example the heating energy demand can be lowered by improving the insulation, part of the hot water can be produced with solar-thermal collectors and heating and hot water can be provided by a heat pump. The latter is illustrated in the following table.

Table 3: Energy weighting factors according to MINERGIE®

[1] Incl. waste incineration and sewage treatment plants, industry

Energy weighting factor	
Energy carrier, energy source	Weighting factor
Solar and ambient heat	0
Biomass (wood, biogas)	0,5
Waste heat [1]	0,6
Fossil fuels	1
Electricity	2

Table 4: Standard values according to MINERGIE®

[1] Incl. waste incineration and sewage treatment plants, industry

The most important presets and default values		
Conversion efficiency		
	Heating	Hot water
Oil or gas furnacet	0,85	0,85
Oil, condensing furnaces	0,91	0,88
Gas, condensing furnaces	0,95	0,92
Wood-fired furnaces	0,75	0,75
Wood pellet furnaces	0,85	0,85
District heating [1]	1	1
Heat pumps:		
outside air monovalent	2,3	2,3
ground source	3,1	2,7

Standards and Solutions 03

In order to offer easy procedures to obtain MINERGIE®-Certification there is a possibility offered by the use of standardised solutions for buildings and building-technology equipment (limited to residential buildings). It is then sufficient to choose one of the five given accepted standard solutions for heating and hot water and to fulfil a few additional conditions.

The five standard solutions are:

1. Ground-source heat pump for heating and hot water (all year).
2. Wood-fired systems for heating and hot water in winter, thermal collectors for hot water in summer.
3. Automatic wood-fired systems for heating and hot water (all year), e.g. pellet-furnace.
4. Use of waste heat (industry, waste incineration and sewage treatment plants) for heating and hot water (all year as single source).
5. Air-to-water heat pump (outside air) for heating and hot water (all year).

Additional conditions consist of:

A fan-assisted balanced ventilation system (or comfort ventilation system as it is called by MINERGIE®) with a heat recovery unit with an efficiency of at least 80% has to be installed. The ventilation has to be driven by a DC- or AC-motor.

A set of U-Values for the building envelope must not be exceeded, e.g. 0,2 W/m^{2}K for walls, roof and floor, 1,0 W/m^{2}K for windows and 1,2 W/m^{2}K for doors.

Organisation and Implementation 04

MINERGIE® is a registered trade mark and therefore enjoys complete protection. The MINERGIE® label may only be used for buildings that actually meet the MINERGIE®-Standard. Apart from buildings, products and services can also conform to MINERGIE®-Standards. The same applies to building modules such as systems, components and materials. MINERGIE® is organised as an association and is registered in the Swiss Trade Register. A governing board of eight people is in charge of strategic decisions. There is a head office who is supported in operational decisions by the MINERGIE® Building Agency. The certification and all related contacts and support activities are executed by MINERGIE® Certification Units located at the administrations of the 26 Swiss cantons and the Principality of Liechtenstein. Hence there is a decentralised system of implementation.

Further Information

MINERGIE® is well documented on its website, though the information is only in German and French, www.minergie.ch. In particular, forms and tools for verification are offered for download free of charge.

Switzerland: The MINERGIE® - Standard for buildings

05 The MINERGIE®-Charter 2008

A contribution to sustainable development

Both in Switzerland and worldwide, know-how on sustainable building spreads much too slowly. The MINERGIE®-Charter aims to strengthen important basic principles involved in building for the future. www.minergie.com

Both in Switzerland and worldwide, know-how on sustainable building spreads much too slowly. The MINERGIE®-Charter aims to strengthen important basic principles involved in building for the future.

5.1 Aims

The most important aims for the construction of sustainable buildings which help to protect our climate are:

- Comfortable buildings that are also beneficial to health
- High energy-efficiency and drastic reduction of the use of fossil fuels such as oil, gas and coal
- Inexpensive systems providing high long-term value of buildings

5.2 Environment

Excessive CO_2 emissions are a significant cause of global warming. Climate change and the long-term availability of energy supply are two of the century's greatest challenges.

Sustainable development takes place in three dimensions: it has to be socially, economically and environmentally compatible. Correspondingly, buildings have to be built, renovated and operated to comply with these three dimensions. A building constructed to meet the criteria of sustainability has a considerably higher value, even more so in the long run. By promoting appropriate regional products and services, the generation of local added value is achieved and the outflow of funds for imported energy is reduced.

5.3 Strategy

MINERGIE® – with its high standards – is a powerful driving force in the renovation of existing buildings and in the construction of new ones.

MINERGIE® provides recommendations on concepts for sustainable construction, renovation and operation of buildings

MINERGIE® promotes regional markets for sustainable buildings, to create business opportunities for innovative builders, investors, enterprises and authorities. To this end, new products and services are continually being developed and put on the market.

5.4 Measures

Sustainable buildings in climates with hot and cold weather have a highly insulated, airtight building shell. This building shell is like a coat that completely encloses the heated or cooled interior. Thermal bridges and leaks are to be avoided. Solar irradiation is efficiently used by the inclusion of appropriate glazing elements. Adjustable shading systems guarantee the reduction of the energy demand for cooling in summer.

As far as interior air quality is concerned, heat-recovery ventilation allows a high level of user comfort during the whole year. The provision of fresh air is guaranteed and thus both comfortable and healthy conditions are assured – in particular as far as temperature, humidity, noise and pollutants are concerned.

Energy-efficient, simple and user-friendly building services guarantee low energy consumption for heating, cooling, hot water preparation, lighting and electrical equipment. The energy for heating and hot water preparation is mainly provided by renewable sources such as ambient heat, wood and the sun.

MINERGIE® buildings provide comfort, good health and inexpensive operation. Their users are living and working in a sustainable environment – be it in the office, in school or at home.

www.minergie.com

Competence Centre Energy and Building 06

Energy-efficient buildings involve a range of aspects, making it important to consider the building as a system. This means not primarily considering and optimising individual components such as its envelope, technical systems and energy supply, but focusing on the system as a whole in order to optimise the relevant interactions. These often involve many aspects, making the system complex. To this end, the CC Energy and Building often relies on simulations as a means of devising solutions to the range of problems it encounters. These include thermal building simulations, computational fluid dynamics (CFD) and finite element methods. In addition, we operate the only Minergie-P® certification office in Germanspeaking Switzerland. Besides our role in the actual certification work, we are also involved in developing the standard: we offer a range of support services and professional development courses. Furthermore, we produce studies and expertises in the fields of building technology, energy, thermal comfort and building physics.

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Building and Renewable Energies Network of Technology - brenet 07

brenet has been formed as a network of competencies in technology areas related to buildings and renewable energies. The network comprises Swiss university as well as industry partners.

brenet deals with buildings in a fully integrated manner considering all aspects of socio-economics and ecology. Our primary focus, however, concerns strategic challenges regarding sustainability, foremost energy and the environment.

berent is your professional partner in terms of applied research & development (R&D) as well as educational matters. Our clients comprise all sectors of the building industries, related expert associations an other groups operating in the energy and environment areas.

brenet is proud to focus on quality and leadership in education and R&D.

brenet's core competencies concern the areas:

- Optimisation of environmental performance of buildings (energy + ecology)
- Innovation in building design, materials and construction methods
- Building integration
- Solar thermal as well as photovoltaic technologies & systems
- Biomass
- HVAC technologies for commercial and services buildings

brenet's main actives include:

- Transfer of know-how and technologies
- Trouble-shooting for and in collaboration with SMEs
- Certification of ultra-low-energy buildings (Minergie-P®)
- Consulting and coaching related to building technologies and renewable energies
- Conduct of complex fieldwork and laboratory testing
- Primary as well as continuing education

The brenet partners maintain an exceptional degree of communication and collaboration among themselves and with their clients. Thanks to its broad basis of competencies and solid track-record as professional service organisation, brenet is proud to present itself as preferred innovation partner for your projects.

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Germany: Sustainable architecture -DGNB certificate at the example of the Solar Decathlon House

01 Preface

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The construction and real estate economy are in a state of change: energy efficiency, resource protection, residential and workplace health, value retention and risk mitigation are now in focus. General conditions and market interests are changing. Therefore, in the future buildings will be planned, built and operated differently. Against this background, the German Sustainability Building Council (DGNB) together with the Federal Ministry of Transport, Building and Urban Affairs (BMVBS) developed a voluntary certification system for sustainable buildings. It was developed by experts from the complete value chain of the construction and real estate sector and gives a clear orientation for this future-oriented economical sector.

DGNB
Deutsche Gesellschaft für Nachhaltiges Bauen e.V.

After the „Solar Decathlon„ has already been held in Washington for four times (2002, 2005, 2007, 2009), the „Solar Decathlon Europe„ 2010 is taking place for the very first time in the city of Madrid. The Solar Decathlon, which has been announced internationally by the U.S. Department of Energy and the Spanish Ministry of Construction, is a university competition. Its aim is the development and realization of a small, energy-autarchic and sustainable residential building (approx. 74 m²) operated exclusively by solar energy. An essential part of this competition is the formulation of a vision to define the building of the future. Within the framework of this competition, various universities from all over the world, as for example from the USA, Mexico, Brazil, Finland, England, France, Spain, Israel and Germany, will plan an energy autarchic solar and sustainable residential building and realize that concept, respectively. Thus, by summer 2010, each university will have completed an innovative building in cooperation with its scientific partners, innovative enterprises and sponsors.

02 THE GERMAN SUSTAINABLE CERTIFICATE (DBGN Certificate)[1]

Sustainable building means to build intelligently: The focus is on a comprehensive quality concept that serves the building and real estate sectors, as well as society in general. Sustainable properties are beneficial to the environment, conserve resources, comfortable and healthy for their users, and fit optimally into their socio-cultural surroundings.

In the same way, they stand for economic efficiency and long-term value-retention. Sustainable properties are cost effective due to their lower operation and maintenance costs. The manageable additional planning and construction costs will usually amortize in a few years.

The German Sustainable Building Certificate was developed by the German Sustainable Building Council (DGNB) together with the Federal Ministry of Transport, Building, and Urban Affairs (BMVBS) to be used as a tool for the planning and evaluation of buildings in this comprehensive perspective on quality. As a clearly arranged and easy to understand rating system, the German Sustainable Building Certificate covers all relevant topics of sustainable construction, and awards outstanding buildings in the categories bronze, silver, and gold. Six subjects affect the evaluation: ecology, economy, socialcultural and functional topics, techniques, processes, and location.

Figure 2: The Certificate: For the evaluation of the building's quality, five topics are considered. The quality of the location is presented separately.

The certificate is based on the concept of integral planning that defines, at an early stage, the aims of sustainable construction. In this way, sustainable buildings can be designed based on the current state of technology, – and they can communicate their quality with this new certificate.

The basis for the system was developed on the building type „New Construction of Office and Administration buildings". On this basis, further

Figure 1: The Seal is awarded in gold, silver, or bronze.

systems for completely different building types will be developed. As a second-generation certification system, the label excels with a high degree of flexibility. The basis of the evaluation, which was developed with a wide consensus, is a list of topics and the criteria for sustainable construction that are included within that list. These criteria are weighted differently, depending on the building type to be evaluated. Thus, each version of the system, hence each building type, has its own evaluation matrix. An example is the matrix for the evaluation of new office and administration buildings on figure 3.

Main Criteria Group	Criteria Group	No.	Criterion	Criterion Point		Weighting	Weighted Points		Fulfillment	Point Group		Fulfillment (Group)	Weighting (Group)	Total Fulfillment
				Achieved	Max. Possible		Achieved	Max. Possible		Achieved	Max. Possible			
Ecological Quality	impacts on global and local environment	1	Global warming potential	10	10	3	30	30	100%	173,5	195	89%	22,5%	86,4% Gold
		2	Ozone depletion potential	10	10	0,5	5	5	100%					
		3	Photocemical ozone creation potential	10	10	0,5	5	5	100%					
		4	Acidification potential	10	10	1	10	10	100%					
		5	Eutropication potential	7,1	10	1	2,1	20	21%					
		6	Risks to the regional environment	8,2	10	3	24,6	30	82%					
		8	Other impacts on the global environment	10	10	1	10	10	100%					
		9	Microclimate	10	10	0,5	5	5	100%					
	utilization of resources and waste arising	10	Non-renewable primary energy demands	10	10	3	30	30	100%					
		11	Total primary energy demands and proportion of renewable primary energy	8,4	10	2	17	20	86%					
		14	Potable water consumption and sewage generation	5	10	2	10	20	50%					
		15	Surface area usage	10	10	2	20	20	100%					
Econo-mical Quality	life cycle costs	16	Building-related life cycle costs	9	10	3	27	30	90%	47	50	94%	22,5%	
		17	Value stability	10	10	2	20	20	100%					
Socio-cultural and Functional Quality	Performance Health, comfort ans user satisfaction	18	Thermal comfort in the winter	10	10	2	20	30	100%	251,1	280	90%	22,5%	
		19	Thermal comfort in the summer	10	10	3	30	30	100%					
		20	Indoor Hygiene	10	10	3	30	30	100%					
		21	Acoustical comfort	10	10	1	10	10	100%					
		22	Visual comfort	8,5	10	3	26	30	85%					
		23	Influences by users	6,7	10	2	13	20	67%					
		24	Roof design	9	10	1	9	10	90%					
		25	Safety and risk of failure	8	10	1	8	10	80%					
	Functionality	26	Barrier free accessibility	8	10	2	16	20	80%					
		27	Area efficieny	5	10	1	5	10	50%					
		28	Feasibilty of conversion	7,1	10	2	14	20	71%					
		29	Accessibility	10	10	2	20	20	100%					
		30	Bicycle comfort	10	10	1	10	10	100%					
		31	Assurance of the quality of the design and for urban development for competition	10	10	3	30	30	100%					
		31	Art within architecture	10	10	1	10	10	100%					
Technical Quality	Quality of the technical implementation	33	Fire protection	8	10	2	16	20	80%	74	100	74%	22,5%	
		34	Noise protection	5	10	2	10	20	50%					
		35	Energetic and moisture proofing quality of the building's shell	7,7	10	2	15	20	77%					
		40	Ease of Cleaning and Maintenance of the Structure	7,1	10	2	14	20	71%					
		42	Ease of deconstruction,recycling and dismantling	9,2	10	2	18	20	92%					
Quality of the Process	Quality of the planning	43	Quality of the projects preparation	8,3	10	3	25	30	83%	188,6	230	82%	10%	
		44	Integrated planning	10	10	3	30	30	100%					
		45	Optimization and complexity of the approach planning	8,6	10	3	26	30	86%					
		46	Evidence of sustainability considerations during bicl invitation and awarding	10	10	2	20	20	100%					
		47	Establishment of preconditions for optimized use and operations	5	10	2	10	20	50%					
		48	Construction site, construction phase	7,7	10	2	15	20	77%					
		49	Quality of executing companies, prequalifications	5	10	2	10	20	50%					
	Quality of the construction activities	50	Quality assurance of the construction activities	10	10	3	30	30	100%					
		51	Systematic commissioning	7,5	10	3	23	30	75%					

Location is presented separately, and is not included in the overall grade of the object

Quality of the Location		56	Risks of the mircolocation	7	10	2	14	20	70%	93,3%	130	72%	
		57	Circumstances at the microlocation	7,1	10	2	14,2	20	71%				
		58	Image and condition of the location and neighbourhood	1	10	2	2	20	10%				
		59	Connections to transportation	8,3	10	3	24,9	20	83%				
		60	Vicinity to usage-specific facilities	9,7	10	2	19,4	20	97%				
		61	Adjoining media, infrastructure development	9,4	10	2	18,8	20	94%				

to be filled in
autom. calculated
fixed values

Grade	
1,0	95%
1,5	80%
2,0	65%
3,0	50%
4,0	35%
5,0	20%

Degree of Compliences	
80 - 100%	Gold
65 - 79,9%	Silver
50 - 64,9%	Bronze

Figure 3: Example of an evaluation matrix for a building that was awarded with a Gold certificate.

Germany: Sustainable architecture -DGNB certificate

03 Advantages of the Certification[1]

Active Contribution to Sustainability

The certificate demonstrates, in a quantifiable way, the positive effects of a building on the environment and on society.

Cost- and Planning Certainty

The certification process provides, in the early planning stage, a highdegree of certainty that the performance goals of a building can be reached at the time of completion. For example, it helps reduce the energy consumption and costs during operation.

Minimizes Risk

The certification process promotes integral planning during construction. This leads to more transparency and well-defined processes during planning and construction, opens up potentials for optimization, and minimizes the risks during construction, operation, renovations, and removal.

Praxis-oriented Planning Tool

The certificate was developed by practitioners for practitioners. It supports owners and designers in a goal-oriented way in developing sustainable buildings.

Focus on the Life Cycle

The certificate is based on the life cycle of a building, which is indispensable for an evaluation of the sustainability.

Made in Germany

The certificate is optimally adapted to the German and European building environment. This includes building codes and norms, as well as long-term market experience with energy efficient buildings etc.

Marketing Tool

The certificate serves as a communication tool for investors, owners, and users – it documents their commitment to sustainability. As a sign of quality, it supports export, and it enhances the attractiveness of the German real estate sector for investors.

Comprehensive Quality of a Property

The certificate enhances the chances for sale and rent. The certification makes the high quality of a building tangible for owners and users. Furthermore, it signals a performance-enhancing work environment as well as high user satisfaction.

The Performance is Key

The German certificate evaluates the building's performance and not merely single measures. Owners and designers are given a large leeway to achieve the targets.

More than „Green Building"

The certificate far exceeds the ecologic aspects of „green building" by also equally including the economic performance, as well as socio-cultural and functional aspects of buildings.

Flexibility

The certificate system can flexibly be updated. It can easily be adapted to technical, social, and international developments.

04 ROSENHEIMS's CONTRIBUTION to the competition SOLAR DECATHLON EUROPE 2010

Because the aim of the Solar Decathlon to develop and realize a small, energy-autarchic and sustainable residential building operated exclusively by solar energy, we have started the project by an integral planning phase. The complete process from the beginning of the project preparations until to the implementation phase is orientated at the general DGNB System.

Unfortunately it doesn't exist a special DGNB system for „New Construction and residential" now, we will work out only 35 criterias (table 1).

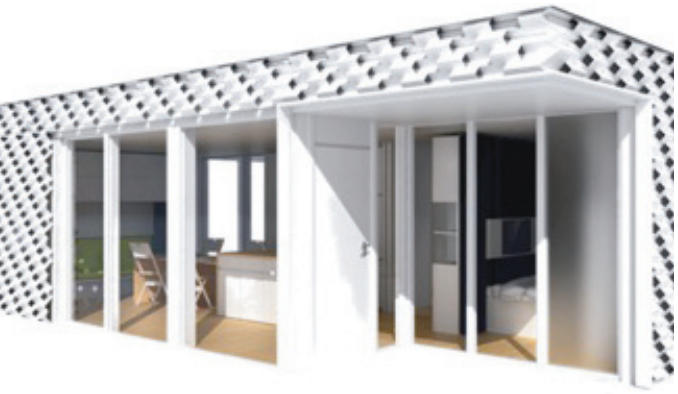
Nr.	Bezeichnung
1	Treibhauspotenzial (GWP)
2	Ozonschichtabbaupotenzial (ODP)
3	Ozonbildungspotenzial (POCP)
4	Versauerungspotenzial (AP)
5	Überdüngungspotenzial (EP)
6	Risiken für die lokale Umwelt
8	Sonstige Wirkung auf die Umwelt
10	Primärenergiebedarf nicht ern. Energien
11	Gesamtprimärenergiebedarf, Anteil erneuerbarer Primärenergie
14	Trinkwasserbedarf und Abwasseraufkommen
16	Gebäudebezogene Kosten im Lebenszyklus
17	Wertstabilität

18	Thermischer Komfort im Winter
19	Thermischer Komfort im Sommer
20	Innenraumhygiene
21	Akustischer Komfort
22	Visueller Komfort
23	Einflussnahme des Nutzers
25	Sicherheit und Störfallrisiken
26	Barrierefreiheit
27	Flächeneffizienz
31	Sicherung der gestalterischen u. städtebaulichen Qualität im Wettbewerb
32	Kunst am Bau
33	Brandschutz
34	Schallschutz

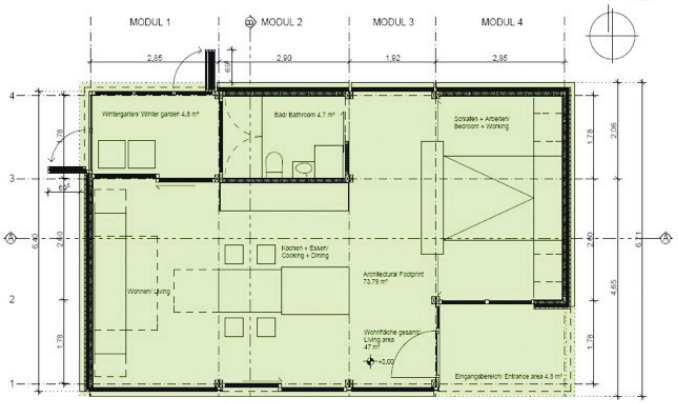
35	Energetische und feuchtetechnische Qualität der Gebäudehülle
40	Reinigungs- u. Instandhaltungs-freundlichkeit des Baukörpers
42	Rückbaubarkeit, Recycling- und Demontagefreundlichkeit
43	Qualität der Projektvorbereitung
44	Integrale Planung
45	Optimierung u. Komplexität der Herangehensweise in der Planung
47	Schaffung von Voraussetzungen für eine optimale Nutzung
48	Baustelle/Bauprozess
50	Qualitätssicherung der Bauausführung
51	Systematische Inbetriebnahme

Tabel 1: list of criterias for the SDE House

Competence Centre Energy and Building 05



Visualization of the final building concept, entrance area



The final floor plan of the building

Visualization of the alternative building concept, entrance area

The architecture of the house is characterized by a flexible and open floor plan as well as by an innovative facade design. The construction consists of four basic modules, through which not only a high degree of prefabrication is facilitated during the construction phase, but also an individual adaption of the floor plan with regard to its size is made possible.

The jagged design of the facade, enclosing the entire building, provides an immediate eye-catching effect. The sun protection and visual shields installed in front of the windows on the north side and in front of the big south-facing glass facades, can be adjusted as required. In their collapsed state, they vanish in the floor.

The facade's openings make it possible for the inhabitants to enjoy a connection to the exterior. In addition to that, exciting light effects are created inside the living space during daytime. Above all, the design of the interior spaces is characterized by a high degree of flexibility. So, for example, the size of the kitchen table integrated in the free-standing kitchen block can be adjusted for two to eight people.

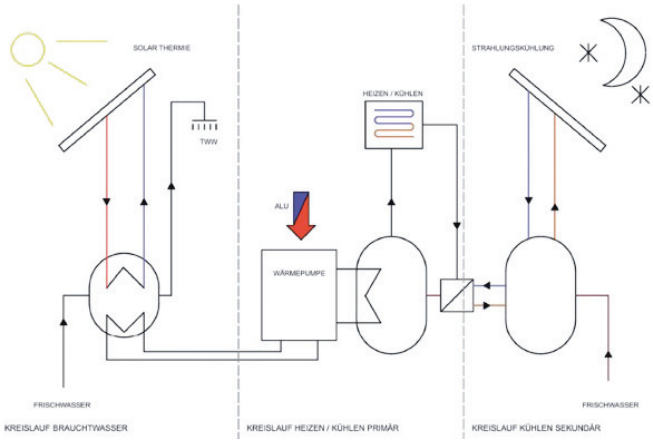
A slidable wardrobe element in the east provides a separation of the sleeping and working space from the living area. In order to enlarge the overall space, the element can also be moved towards the east wall.

Germany: Sustainable architecture -DGNB certificate

06 Building energy concept

In addition to achieving a high living comfort, the aim of the design is to save a maximal amount of energy. For this sake, energy generating and energy saving systems are optimally integrated into the design environment. By using high thermal insulation components for the building envelope and installing a controlled ventilation system with heat recovery, the energy requirements are reduced to a minimum.

For heating and cooling, a reversible thermal heat pump is planned. A cooling/heating ceiling is to be deployed as a back-panel system. The building envelope is equipped with various energy recovery systems. Thus, in addition to the necessary vacuum tube collectors, innovative modules comprising highly efficient mono-crystalline PV cells will be used in the roof area.



Schematic rendering of the building services

07 Competition in Madrid

In July 2010, the 20 solar houses will be built up in the heart of Madrid below the Royal Palace Garden. The actual competition week begins after a construction time of 8 days and following the subsequent security approval for the building.

At this time, it still remains to successfully satisfy the requirements for the 10 disciplines (see image 9) in the individual competitions (such as showering, cooking, dinner party, drying, temperature/humidity, jury tour, entertainment event, energy balance).

Besides the competitions themselves, numerous medial events such as the visit of José Manuel Durão Barroso (President of the European Commission) and the visits of various delegations from home and abroad is planned.

Vilar Solar and Construction site Madrid

AREA	CONCEPT	Objective points			Subjective points			Total	Innov.	Sust.
		Doc.	Trials	Total	Doc.	Trials	Total			
Architecture	Architecture	30		30	20	80	100	130	20	25
	Engineering & Construction	20		20	10	50	60	80	20	20
Solar	Solar systems	10	60	70		10	10	80	5	10
	Electric energy balance	20	110	130			0	130	0	10
Comfort	Comfort conditions	20	100	120		10	10	130	5	20
	Appliances	5	75	80				80	5	10
Social	Comm. & Social awareness	10	15	25	10	45	55	80	5	15
	Indust. & Market viability	25		25	25	30	55	80	20	20
Estrategy	Innovation			0			80	80		
	Sustainability			0			130	130		
				50%			50%	1.000		

10 competition disciplines

Technology transfer 08

Trade fairs

Subsequent to the events in Madrid, the building will be exhibited at the Bavarian Horticultural Exhibition in Rosenheim. Here, visitors can acquaint themselves with the design process and the development of the building concept, also including the used technologies. Sponsors will have the opportunity to demonstrate the installation of their products to interested principals, architects and planners.

The BAU 2011 will feature a SOLAR DECATHLON special exhibition. With the support of the Federal Ministry of Economics and Technology, all four German solar houses will be presented. The used technologies will be demonstrated to interested exhibition visitors in connection with lectures given as a part of the experts' symposium.

Research

In the period of 2009 to 2014, the research results of the Rosenheim Solar Decathlon house will be used and developed further in as many as four other research projects, which will be conducted in 6 neighboring European countries and which will have an estimated volume of 6.5 million euro. This will help to encourage technology transfer into the companies and also promote further education of the new generation of scientists - not only in Germany, but also internationally.

Visualization of the alternative building concept, entrance area

Austria: Passive House - Ecological building certificat

01 The certified Passive House

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www.energieinstitut.at

Passive Houses are buildings, in which a comfortable indoor climate can be reached both in winter an in summer - with an extremely low energy input.

The Passive House was developed by Univ. Prof. Dr. Wolfgang Feist in the 1980s. In 1989/90 during a first pilot project 4 row-houses were constructed as Passive Houses, in Germany, Darmstadt-Kranichstein.

Intensive long-term measurements showed that the heating requirement calculated with the PHPP (PassivHaus configuration package) matches perfectly with the actual consumption.

PHPP first appeared in 1998 and has been continuously developed since then. Core of the package are spreadsheets for heat budgets (heating time and monthly procedures), for heat distribution and -supply for electricity and primary energy demand.

New modules which are important for planning were successively added: calculation of window parameters, shading, heating load and summer behaviour.

PHPP is continuously validated and expanded on the basis of test data and new research findings.

In the meantime on over 300 objects measurement results were compared with calculation results - in the context of accompanying scientific research.

The CEPHEUS project in the context of the European Thermie program was of crucial importance. Settlements at 14 European locations and larger residential buildings in Passive House standard were built and scientifically supported. It was found that the thermal properties of buildings - even on Passive Houses – can be depicted with a surprisingly high accuracy concerning the energy program PHPP. This is particularly true for the new method for calculating the heating load.

PHPP is now also available in the following languages: English, Italian, Hungarian, Flemish, French and Swedish. The reasonably priced PHPP includes a user manual that is also a good source of information for the calculation of Passive Houses.

The Passive House is characterized by following criteria:

Passive Houses are buildings, which can reach a comfortable indoor climate both in winter and in summer with an extremely low energy input. High efforts concerning design, planning and execution are needed. Passive Houses can be tested and certified to ensure the quality. The existing certification criteria for residential buildings are described below.

Evaluation criteria for the certificate „Quality Approved Passive House„:

- Energy specific value thermal heat max. 15 kWh / (m2.a) or heat load max. 10 W/m2
- Pressure test air change n50 max. 0,6 h-1
- Energy specific value total primary energy max. 120 kWh / (m2.a) including household electricity

Reference (energy reference area TFA) is the net-living space within the thermal envelope calculated by the living space act (WoFlV).

Note: Because of the fact that calculation errors often occur regarding the calculation of the net-living space this part is one of the largest sources of error. As a benchmark some countries and / provinces use the heated gross floor area. Only out of this difference a different calculation result arises: from 15 kWh/(m^2.a) only 12 kWh/(m^2.a) arise.

Certification is also available for individual building components and construction products: prefabricated houses, walls and building systems, post-and-beam facades, facade anchors, perimeter insulation for the floor, window frames, glazing, doors, heat pump unit, ventilation systems, ...

There are certain limits for these building components and building products, which must be tested and proved. However, it is not absolutely necessary to incorporate certified products into Passive Houses. Only the above listed three evaluation criterias are essential.

Because of the fact that it has emphasised that customers want a higher level of security concerning the selection of consultants and planners a further certificate has been established: certified Passive House planners. There are two ways to become a certified „Passive House Planner„. Either by having a house certified or by passing the exam. The certificate must be renewed every three years.

Both certificates are appropriate, because they are the only way to ensure the qualitiy of the buildings. Unlike to most of the other denominations „energy-saving house, low energy, zero-energy house, eco-house, ...„, on the energetic level the Passive House concept has well-defined, repeatable and demonstrable values for all energy services in the house (warm rooms, hot water, cooled and frozen foods, power in appliances and pumps, artificial lighting, entertainment from television and radio, information from the computer and the Internet, ...).

By numerous measurement studies the Passive

House standard could also prove that the real energy consumption is consistent with the theoretical calculation.

In sociological surveys of hundreds of Passive Houses residents the standard was described as excellent, pleasant, and future-proofed. They described the standard as a standard which they do not want to miss any more.

The Passive House standard has now been applied on thousands of buildings and has proved itself in a different form for other uses such as kindergartens, schools, students- and old people's homes, community offices, office buildings, etc..

Internet addresses and sources:
http://www.passiv.de/ > Certification
http://www.passivhausplaner.eu

The Enerbuild-Tool for the evaluation of public buildings 02

The tool developed within the framework of the project Enerbuild will be used for the evaluation of the energetic and ecological quality of public buildings. It consists of criteria-lists for different types of public buildings (schools, administrative buildings, etc.) and detailed explanations for each criterion.

The catalogue is based on experience, among other things the Nena-tool, the housing subsidy Vorarlberg and the Austrian rating system TQB and „klima:aktiv haus„

The following short overview refers to the internal working version of november 2009 and should be a first overview of the basic structure and the evaluation scheme. The version which has to be elaborated during the project phase will be worked out of the working version. In the further development also the applying-experience out of the practice will flow into the tool.

The evaluation of buildings of a category is based on a catalogue which contains different weighted criteria in a point system, with a maximum of 1.000 points. The criteria are divided into five valuation categories:

- Quality of location and features
- Process and planning quality
- Energy and utility
- Health and comfort
- Building materials and construction

The approximately 40 individual criteria within the five assessment categories are distinguished in "Must" and "Optional" criteria. The Enerbuild-tool offers two versions of the criteria catalogue, which differ only in the rating category Energy and Utility:

- Criteria catalogue national building guideline Energy - in this version of the catalogue the certification of the energetic quality of buildings will be adduced by calculations of the energy specific values according to the national assessment guidelines (in Austria OIB-Guideline 6). The most important verification are the heating demand, the demand for cooling as well as the primary energy demand derived from the final energy demand.
- Criteria catalogue Passive House - in this version the verification of the energetic building quality will be adduced by calculating with the Passive House project configuration package (PHPP 2007). Proof sizes are the heating demand and total primary energy demand, additionally PV systems can be evaluated.

The pass mark for a building by rating it accordingly the national building guideline Energy amounts **700 points.**

The pass mark for a building by rating it accordingly (the energetic quality) PHPP amounts at least **900 points.**

Review and Assessment

With the current state of discussion it will be proposed that the declaration of buildings has to be carried out according to the proofed model of the Austrian „klima:aktiv haus„ within 2 steps:

1st Step: Declaration in the planning stage

2nd Step: Declaration after completion

At each step, the planner / developer / builder declares his building and encloses the necessary documents. Thereafter, a plausibility test by authorized inspectors is carried out. If the declaration and the validation is successfully completed, the project with achieved number of points will be published.

The detailed workflows of declaration and verification will be developed in the course of the project.

Austria: Passive House - Ecological building certificat

03 ENERBUILD - Catalogue of criterias for public buildings (Draft Version); internal workversion - as at 21.11.2009

Nr.			Title	Must criterias (M);	max. Points	reached Points
A			**Quality of location and facilities**		**max. 50**	
A	1.		Infrastructure		max. 25	
A	1.	1	Access to public transport network			
A	1.	2	Walking distance to village or city center			
A	2.		Security of the location		max. 10	
A	2.	1	Magnetic fields in the low frequency area (high-voltage lines, transformer stations ,...)			
A	3.		Quality of equipment		max. 20	
A	3.	1	Bicycle parking (sheltered, lockable, single storey)			
B			**Process and planning quality**		**max. 150**	
B	1.		Quality of process		max. 30	
B	1.	1.	Decision making and determination of goals (Checking the needs and alternatives (use of existing buildings and annex / extenison or demolition / new construction;) - investigate alternative sites (accessibility etc.), assessment of demand (space program)			
B	1.	2	Civic participation			
B	2.		Quality of planning		max. 150	
B	2.	1	Formulation of verifiable objectives for ecological measures, definition of a minimum standard as planning requirements (e.g. ecological program)	M		
B	2.	2	Implementation of competition			
B	2.	3	Independent planning support			
	2.	3.1	Standardized calculation of the efficiency	M		
	2.	3.2	Independent guidance on energy, environmental and legal aspects			
B	2.	4	Quality assurance and control of the success			
	2.	4.1	Quality Control Energy „Certification„ of the energetic quality (calculation) and line up building equipment as well as checking air tightness testing (?), Check the measurement concept (?)			
	2.	4.2	Quality Control Ecology (locally control eco)			
C			**Energy & Utilities**		**max. 500**	
C	1.		Energy needs and provision		max. 500	
C	1.	1	Code for the quality of the building envelope	M		
C	1.	2	Heating demand HWB	M		
C	1.	3	Cooling demand KB	M		
C	1.	4	Energy efficient lighting	M		
C	1.	5	Needs of pimary energy PEB	M		
C	1.	6	CO_2-Emissions			
C	1.	7	PV-Facility as an additional criterion			
C	1.	0.	or optional: Passive House according the requirements to PHI		max. 500	
C	1.	0.1	Heating demand HWB	M		
C	1.	0.2	Cooling demand KB	M		
C	1.	0.3	Needs of pimary energy PEB (definition PEB according PHPP (incl. lighting excl. enthalpy)	M		
C	1.	0.4	PV-facility as an additional criterion (k:a)			
C	2.		Water demand		max. 25	
C	2.	1	Water-saving plumbing devices			

Nr.			Title	Must criterias (M);	max. Points	reached Points
D			**Health and comfort**		**max. 150**	
D	1.		Thermal comfort		max. 50	
D	1.	1	Thermal comfort in summer			
D	2.		Indoor air quality		max. 75	
D	2.	1	Ventilation (comfort ventilation with heat recovery, natural ventilation - free night ventilation)			
D	2.	2	Product management: emission and low-emission construction and workmaterials (including VOC and formaldehyde measurements)			
D	2.	2.1	Low-emission laying materials			
D	2.	2.2	Low-emission flooring			
D	2.	2.3	Low-emission wood products			
D	2.	2.4	Low-emission ceiling and wall paint			
D	2.	2.5	TVOC measurements			
D	2.	2.6	Measurement Formaldhedyd			
D	3.		Exposure, lighting, shading and glare protection		max. 25	
D	3.	1	Daylighting / daylight factor			
E			**Building materials and construction**		**max. 150**	
E	1.		Environmentally friendly construction		max. 25	
E	1.	1	Recycling of construction materials on building site			
E	1.		Low-noise construction machinery			
E	1.	1	Low emission construction equipment			
E	1.	1	Low-dust construction site			
E	1.		Avoidance of critical materials		max. 50	
E	1.	1	Avoidance of HFC: insulation materials and installation foams	M		
E	1.	2	Avoidance of PVC: Water and sewage pipes in the building, supply and exhaust air pipes, electrical installations, seal membranes/films, floor coverings (including baseboards, wallpaper, windows, doors, shutters	M		
E	1.	2	Avoidance of PVC: electrical installations			
E	1.	3	Avoidance of VOC: Bitumen prime coat, solvent-free adhesives (not sourced indoor) (see product management)			
E	2.		Efficient use of resources		max 50	
E	2.	1	Use of regional products			
E	2.	2	Use of recovered or recycled / reused materials			
E	3.		Ecology of building materials and constructions		max. 100	
E	3.	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope alternatively OI3 of the total mass of the building)			
E	4.		Disposal		max. 25	
E	4.	1	Disposal indicator (recycling / thermal energy recovery / dumping) for selected components / constructions or alternatively: separability of the main constructions			
				Overall	max. 1.000	

Italy: LEED - Leadership in Energy and Environmental Design

01 The certification Programm

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„Nobody should ever build buildings again in America that don't meet LEED® standards." [1]

LEED® is a third party certification program and is an internationally accepted benchmark for the design, construction and operation of high performance green buildings. It was developed by the U.S. Green Building Council (USGBC) in 2000 and it serves as a tool for buildings. LEED® certification offers third party validation of a project's green features and verifies that the building operates how it was designed to.

LEED® certification is available for all building types including new construction, major renovation, existing buildings; commercial interiors, core and shell, schools, homes, neighborhood development, retail and healthcare.

LEED® is a point based system where building projects earn LEED® points for satisfying specific green building criteria (see the „seven categories" below). Within each of the seven LEED® credit categories, projects must satisfy particular prerequisites and earn points. The number of points the project earns determines the level of LEED® Certification the project: there are four levels of LEED certification depending on how many points a building earn.

There are seven categories in the new release of LEED® (LEED 2009) including:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy and Atmosphere (EA)
- Materials and Resources (MR)
- Indoor Environmental Quality (IEQ)
- Innovation in Design (ID)
- Regional Priority (RP).

Green Building & LEED Growth:

According to a research of RREF[2], based on USGBC data, „certifications of green buildings continue to accelerate. About 22 million square feet of building area was LEED certified in the first half of 2007, rising to 32 million in the second half and to 42 million square feet in the first half of 2008 (Figure 3 below). In total, the amount of space certified in the past 2,5 years alone is more than twice the amount certified in the prior six years combined."

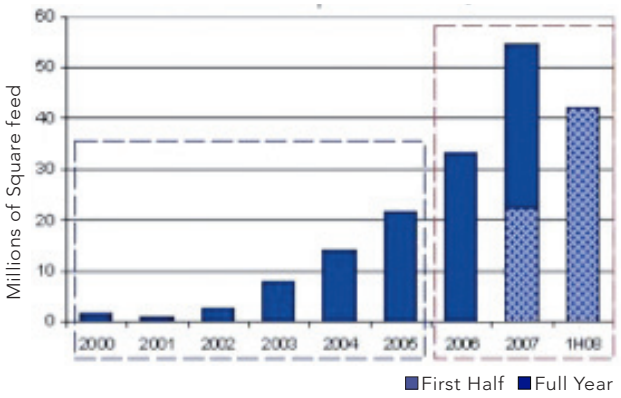

Figure 3: Annual New LEED -certified buildings

In addition, this research[2] shows how the amount of LEED-Certified buildings is growing (see the figure below).

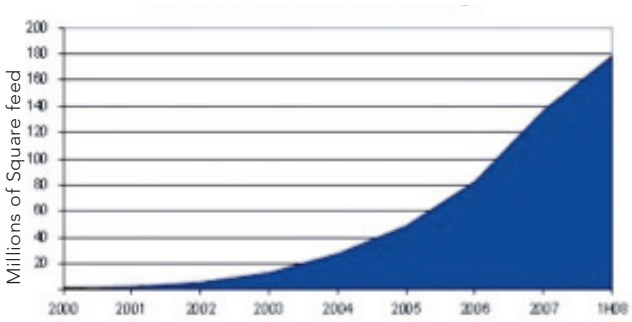

Figure 2: Cumulative Area of LEED-certified buildings

Green Buildings grows exponentially everywhere thanks to several factors like new researches in building materials or like new public/government initiatives.

There are projects registered for LEED Certification in many countries all over the world; in Italy there are more than 40 projects registered for LEED Certification and these projects are both new buildings (New Construction, Core & Shell, Schools) and existing buildings[3]

Sources:
[1] Bill Clinton, President of „Clinton Climate Initiative"

[2] RREEF Research, Number 70 - February 2009; www.rreef.com;

[3] http://www.gbci.org

[*] Information on LEED and U.S. Green Building Council
www.usgbc.org;
www.gbci.org

Italy: KlimaHaus, CasaClima, ClimateHouse

The brand 01

KlimaHaus®
CasaClima

The initiative aims to save energy and create a cultural change in the way people think - making ClimateHouse synonymous to health and wellbeing. The ClimateHouse (CasaClima-KlimaHaus) project was developed in 2002 to promote energy-efficient and sustainable buildings in South Tyrol, Italy. By applying clear rules, home owners have the opportunity to fulfil their building interests at a high standard. In addition, ClimateHouse impressively showed that the administration can substantially increase the awareness in society for reducing a building's CO_2-emissions.

After becoming a national success all over Italy, the first buildings abroad were recently certified. The certification model classifies buildings according to their annual space heat requirement (Gold: < 10 kWh/m².a; A < 30 kWh/m².a; B < 50 kWh/m².a), and is based on an on-line calculation system.

An important factor for the project's success was the public's adoption of ClimateHouse's guidelines, which initially happened on a voluntary basis. The positive image of a certified ClimateHouse convinced homeowners from the beginning to adopt the energy-saving construction style. Neither financial aid by the public administration nor legal rules were necessary to initiate the project successfully. A ClimateHouse certified building is characterised by lower energy costs and improved standards of living, as well as an active contribution to environmental and climate protection.

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Over 2.000 ClimateHouses 02

Image: ClimateHouse-plaque available for categories Gold, A and B. to befixed near the house door

Buildings with the ClimateHouse energy standard can be erected or renovated in every geographic area, because ClimateHouse is not limited by an architectural style, or a territorial restriction. Therefore, every architectural style is possible. As a result, in the course of a few years, the certification became popular not only in the region, but also in all of Italy, and abroad. More than 2.000 ClimateHouses built in Italy so far prove this fact!

The ClimateHouse standard was written into law by the Province of Bolzano, and other communities and provinces in northern Italy are in the process of substantially increasing energy efficiency and building sustainability. In the long term, the ClimateHouse project focuses on spreading the certified building standard not only to new buildings, but also to existing buildings.

The energy certificate with quality seal informs, in a simple way, about the house's heating requirements and total energy efficiency. The document aims to enhance decisions on buying or renting through transparent energy costs. The so-called ClimateHouse-plaque is available in categories Gold, A and B. Fixed near the house door; it is a visible symbol for the building's low energy need. It improves the image, and increases the property value.

Italy: KlimaHaus, CasaClima, ClimateHouse

03 The certification process

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04 ClimateHouse Gold: The maximum of savings

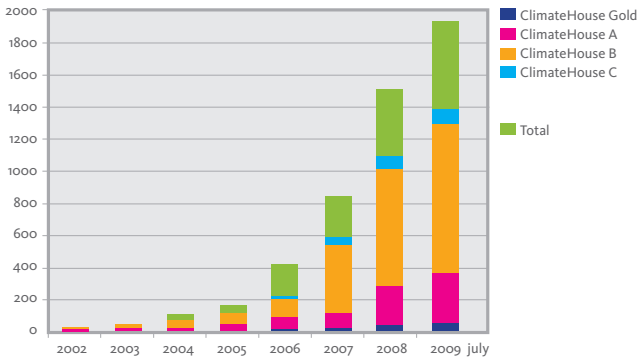

Image: 2.000 established Climate Houses since 2002 divided in categories

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The certification process guarantees a high energy efficiency level of both building and heating and cooling technology. In addition, it also guarantees a high standard of the construction process, which has to reach a documented standard. The physical parameters of the buildings are measured, using a defined on-line tool. The origin of the material used for construction is documented, and the total energy efficiency is determined. ClimateHouse's technical guidelines define the required construction standards.

Every project is monitored throughout construction to ensure the label criteria are being fulfilled. A network of auditors from all over Italy regularly monitors the process, and guarantees that quality standards are being met. Only after passing final inspections, are the certificate and plaque given to the owner. Designation of future ClimateHouses at an early stage of the certification process guarantees a high level of clearness, for both the construction company and potential buyers.

To qualify as the highest class Gold, an extremely well-insulated, possibly air-tight building surface is needed, which acts as an efficient heat and cold protection without loss of any energy. Solar radiation is used through optimised positioning of the windows. To prevent the rooms from over-

heating, a system of well-placed shades should be used.

The building is tested for being air-tight and must pass for getting the certification. This test is completed by using a Blower Door test for both wooden constructions and brick buildings. The highest flow rate accepted for a ClimateHouse Gold is n_{50}<0,6(-1).

ClimateHouse Nature 05

The sustainability of the material used for construction must be tested as well as the thermal efficiency of the building's envelope and heating technology. The so-called 'ClimateHouse nature' standard was developed in co-operation with IBO (the Austrian Institute for Building Biology and Ecology) The certification is based on the evaluation of all environmental-related consequences of a product. Crucial information includes possible impact on the greenhouse effect potential, acid rain potential, and the consumption of primary energy of non-sustainable resources.

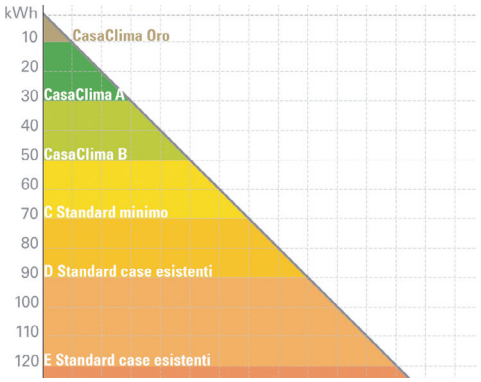
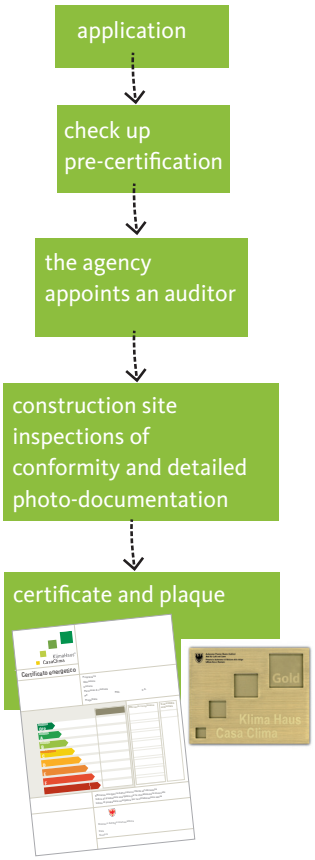


Image: Certification categories of the ClimateHouse

Spreading KnowHow on sustainable building 06



ClimateHouse agency's strategies for efficiency and climate protection are recognised in Italy and abroad. They are presented through a variety of training courses in Bolzano, and academic classes in Rome, and in the fair and conference „Klimahouse Bolzano" and „Klimahouse Roma." ClimateHouse aims to provide knowledge on energy performance of buildings in Italy and worldwide. In the past few years, interest in ClimateHouse training has steadily grown. So far, courses have been attended by more than 11.400 participants.

The ClimateHouse agency focus is to promote and expand its model to other regions. Many local government agencies have shown interest in the label's regulations, adopting and applying its standards throughout the construction process, and certifying energy levels with their own independent local ClimateHouse agencies.

The practical certification process was successful with planners and designers, and is especially popular among house owners. The label gets its strength through the independent examination of energy efficiency and building quality during different phases of construction. Therefore, ClimateHouse is an example of direct support and help for the consumer (building owners and inhabitants).

Image: Successful certification process among house owners

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