Advanced Building News

International Initiative for a Sustainable Built Environment

ABN 09, January 2006

Israel

iiSBE meeting

Israel Develops Green Standard

Israel is an active signatory on international treaties, which promote the reduction of greenhouse gases (GHG) and emissions caused by use of fossil fuels.

As one of the most densely populated countries in the world and a very high-energy consumer per capita, has convinced the decision-makers to look for alternative and sustainable energy sources.

In November 2005 the Israeli Standards Institute published the the standard SI 5281 under the title *Buildings with Reduced Environmental Impact (Green Buildings)*. It was prepared by a team of experts under the chairmanship of Yehuda Olander and approved by the Technical Committee 1204 made up of members from all walks of life representing Trade & Industry, Academics, Professional Bodies and Government (Ministries of the Environment and Construction.

The standard covers within its scope Residential & Office Buildings, including buildings with commercial areas, or undergoing major renovations.

It defines the Green Building concept and its requirement to comply with the 1965 Building Planning and Construction law and the minimum assessment points required and defined in detail in the Table of measurables where a "Green Building" scores between 55 to 74 points and an "Excellent Green Building" scores 75 or more within the following categories: -

- Energy saving (Thermal comfort, A/C, Central Heating, Natural Lighting, Thermal Insulation)
- Land Usage Population Density, Efficient Land Utilization, Flora & Fauna Preservation, Soil Contamination)
- Water Sewage & Drainage
- Other Environmental Subjects Waste, Air Quality/Ventilation, Noise, Radiation, Transportation, Building Materials)

Action is also being taken in the field. The Sakhnin Research and Education Regional Center project utilizes traditional Arab energy saving solutions in this new ecological building design, which incorporates eleven design elements. These 11 elements will be followed-up and economically analyzed during 3 successive years by researchers and students who will publish the results and bring them to the attention of the rest of the Professional community (designers, architects, municipality engineers) through yearly workshops, paper reporting and by Internet publications. It is expected that as a result of these publications and the actual activities relating to the project, the overall awareness of the professional community appertaining to the energy saving potential and to other advantages of the green building design, will significantly increase.

Yehuda Olander

iiSBE to meet in Wageningen

iiSBE will hold a two-day meeting in Wagening, Netherlands, during the period April 6-8. This will actually be a series of parallel meetings; one on Sustainable Education led by Peter Graham of Australia, another for potential organizers of SB07 regional conferences, as well as other sessions on technical and managament issues. For further information, contact:
Ronal Rovers at <naoro@iae.nl>) or
Nils Larsson at <larsson@iisbe.org>.

Green Building Council for the UK

In London this week a draft proposal is under consideration by major stakeholders to establish a UK Green Building Council to motivate an even greater united green building movement throughout the entire country.

The industry led proposal hopes to resolve one of the major problems identified by the Sustainable Buildings Task Group by providing a coalition of all the interested groups trying to reduce the environmental impact of buildings, instead of the overabundance of different organisations trying to engage with Government on reducing carbon emissions and the environmental impact of buildings.

The Sustainable Building Task Group recommended these groups should coalesce into a single entity that will provide not only a much better conduit for dialogue with government but also as a way of motivating the UK construction sector to start taking green buildings much more seriously.

The proposed structure of the organisation under discussion will be similar to the US Green Building Council. The USGBC has been highly successful in galvanizing all sectors of the construction industry, from architects to contractors, throughout the U.S..

The task of establishing the new UK Green Building Council has been handed to Dr David Strong, Managing Director of BRE Environment .

Dr Strong is hopeful the new Council will be formed in the near future. "We are in a much stronger starting position in the UK in that we have a very well established and robust environmental assessment method for buildings. There are now over 2000 trained assessors for BREEAM and EcoHomes across the country."

Once established the UK Green Building Council will join the ranks of the current World Green Building Council member countries of Australia, Canada, India, Mexico, Taiwan and the US.

For further information regarding the possible formation of the UK Green Building Council, or to register an interest in possible membership, please contact David Strong at BRE by email: bucklandj@bre.co.uk

Dutch-Chinese Activities

The work for the Sino-Dutch co-operation in Sustainable Building has continued, and new demonstration projects have been added to the process. The past year the issue of sustainable building has been upgraded in China to one of the top ten policy issues, and there have been many environmental directives from the central government, with strong pressure to establish results.

Many items from the joint Dutch-Chinese workshops last year have been taken up and research put in place, and the (draft) green building guide list (from Ministry of Construction) has many items added from our joint findings last year. As well as many other things: last year it was reported that 70 percent (600 million tonnes) of their huge cement production was produced by small size MSK units (Mechanised Shaft Kiln), with low energy efficiency and high emissions rate. Chinese colleagues report that it is now reduced to 60 percent. New production units have been developed and are operational, although the efficiency of the new production sites is not yet known.

Beijing (as well as other cities and the national government) has set “building a resource saving society” as a major goal in its draft of the 11th five-year plan (2006-2011). The Beijing municipality has already developed a adapted version of GOBAS (the rating system based on CASBEE that was developed for the Olympics) for local buildings assessment. And a Beijing newspaper reported that after few years of energy efficiency campaigning with mixed results, energy policing has been introduced: Inspectors will be controlling for excessive lighting in shopping malls and hotels, and the level of cooling in Summer, to ensure that 26 degrees is the lowest set point. I visited the Building Physics department at Tsinghua University Beijing, responsible for Olympics accommodations assessment, and I was told that designs for Olympic accommodations are being changed according to their findings from GOBAS assessments. Better late than never, but the budget will be exceeded…

In our co-operation with large project developers we noticed a great interest and willingness to consider sustainability in their projects, and to adopt new strategies and ways of management to continue this for their portfolios. Of course, many problems remain to be solved.

One of the main problems at the moment is that, due to the time pressure, sustainable building in mainstream practice results in add-on measures, and is not yet integrated in conceptual approach and analyses. Other issues are the wide spread adoption of western and US architecture and methodologies, not fitted for local climate and culture.

Nevertheless, we are impressed by the ongoing developments, and in a couple of years or so we may go there to learn from their experiences. .

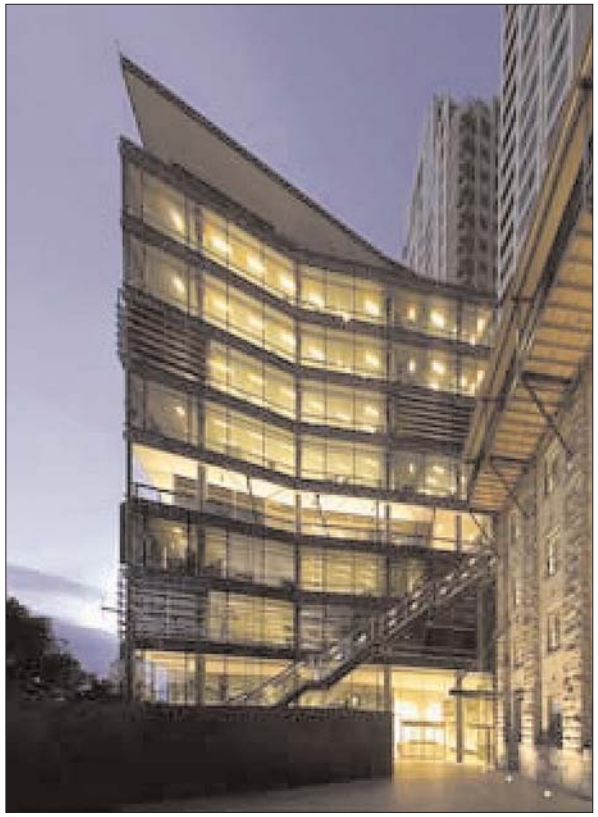
Ronald Rovers

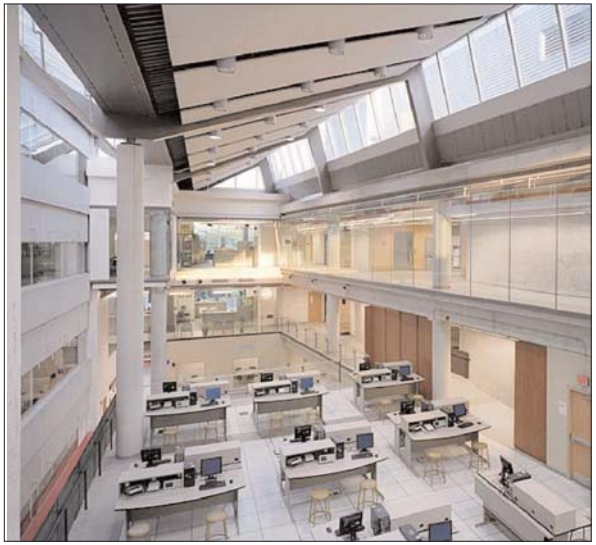
Summary of Case Study Assessment Sessions at SB05

As part of the preparations for the SB05 Tokyo Conference, the conference organizers issued a call for Case Study Assessment projects in October 2004. The request for proposals stated that applicants could use any building environmental assessment tool(s);

The Case Study sessions were organized as two parallel workshop streams within the overall conference. This aspect of the conference represented a continuation of a conference feature introduced at the GBC'98 conference in Vancouver, and continued at SB2000 in Maastricht and SB02 in Oslo. The original purpose, in 1998 and 2000, was to display projects that were assessed using the GBTool rating system. Other rating systems were included in 2002 and in the SB05 Tokyo event, but the purpose remained the same: to display and to discuss high-performance buildings that have been assessed using available rating systems. This implies that presentations should provide a balance between a discussion of the building and its design features, the process of assessment, and the nature of the rating system itself. As the field has matured and rating systems have become better known, emphasis on explanation of the rating system has diminished in importance, but a balance between design features and the assessment process (including possible adaptations of the rating system) has remained important.

At SB05, the projects selected for presentation consisted of 49 buildings, including 8 multi-unit housing projects, 3 houses, 18 office buildings and 4 educational buildings. The remaining 16 projects span a wide variety of types, including institutional buildings, cultural centres, an airport, and a theme park. 7 rating systems that result in scores were used, 2 others that provide other forms of results, and one project that used a broad-spectrum set of assessment tools of a somewhat different nature. Of the 49 projects, 29 were assessed using GBTool, CASBEE was used to assess 16 projects, and other systems were used in a smaller number of cases.





Left: The Bond, a building combining style and performance in Sydney, Australia;
Above: The Queen's Integrated Learning Centre in Kingston, Canada:
Below: San Sebastian apartments, Spain

Text continued on page 15

Summary of Building Performance Rating Scores for SB05

20-Jan

Team / location	Building / project	Building type	Scores for various rating systems							Comments
			GBTool	Casbee	LEED	Verde	Eco-Effect	GOBAS	Green Star	
Australia, Bovis Lendlease	Assessment of The Bond	Office building							5 star	Green Star, Australian system, was used
Brazil	Natura plant	Industrial and office	3.0							
Canada	Queens University ILC	Education	2.4							Assessments included use of GBTool, Green Globes and Athena (for embodied energy).
	Mountain Equipment Coop	Retail	3.2							
	TOHU cultural building	Culture, Public	2.7							
Chile	Temuco airport	Airport	2.3							GBTool used.
China, Tsinghua	GOBAS assessments	Gymnasium						1.8		GOBAS C
		Office building A						4.4		GOBAS A
		Office building B						6.0		GOBAS A
		Residential						4.0		GOBAS B
China, HK Government, Ove Arup	CEPAS assessments	Commercial building								CEPAS provides ratings at three stages but no scores
		Laboratory								
China, Shanghai	SRIBS research office	Office	4.3							For Design Phase
	SRIBS research office	Office	4.2							For Operating Phase
Germany, Kohler et al	Passive House (one single family, one multi-family, 2 office buildings, one school)		LEGEP was used to show results for various parameters; no overall scores provided.							
Italy	Freire Nursery School	School	1.3							All project were assessed using adapted versions of GBTool.
	Olympic Village housing	Housing	2.0							
	Environment Park Head Office	Office	2.0							
	Mediapolis	Theme park	2.0							
Japan	Tamagawa Renaissance City	Office	2.4	3.6						All were assessed using CASBEE; all except Aoyamagakuin University Complex were also assessed with GBTool.
	Marunouchi Kitaguchi	Office	2.8	3.3						
	Kansai Electric Power building	Office	2.8	4.0						
	Keio University South Building	Institutional	3.0	3.6						
	Takenaka Corp. Main Office	Office	2.6	4.9						
	Aeon Chikusa Eco-Store	Retail	2.1	2.8						
	Shiodome Tower	Office	2.7	3.6						
	Aoyamagakuin University Complex	University		3.9						

Summary of Building Performance Rating Scores for SB05

20-Jan

Japan, Takeyama and Nagata	Egg of the Earth	Research centre		4.3						CASBEE was used
Japan, Takeyama	Earth Designing School House	School		4 .1						CASBEE was used
Japan, PS Company	IDIC building	Multi-purpose building		3.5						CASBEE was used
Korea	Seoul Central Post Office	Institutional	2.5							All were assesses using adapted version of GBTool.
	Kolon Institute of Technology	Office	2.6							
	I'Park Samsungdong	Housing	2.4							
Mexico Green Building Council	Torre HSBC Mexico	Office building			39.0					Used LEED 2.1 to make estimate
Sweden	Holmen housing block, Hammarby	Housing	3.3	3.5			3.6			Approximate scores, based on equal weighting of categories
Taiwan	Kaohsiung Housing	Housing	1.7							Adapted version of GBTool was used.
	NCKU Research HQ	Office	1.5							
Spain	CENER Office and labs in Pamplona	Office and labs	2.3	2.1		2.5				Assessment systems used include GBTool, CASBEE and VERDE 1.0
	Trasluz Office in Madrid	Office	2.4	2.0		2.9				
	San Cristobal apartment building	Housing	2.2	2.1		3.2				
	Apartment building in Barcelona	Housing	2.5	2.5		3.0				
Spain, Pablo La Roche	Sustainable dwelling in Tenerife	House			71.0					Unofficial use of LEED for Homes resuled in Gold score. CODYBA was used to assess performance of shading devices
Switzerland, FIDIC	Project Sustainability Assessment	School	FIDIC's system gives results by category but no scores							
UK, Fionn Stevenson	Optimising the use of unfired clay products in rural housing	House	Multi-format assessment including buildability, durability, thermal performance, RH, air tightness, acoustic performance and POE. Embodied energy calcs were carried out.							
USA	Alfred Arraj Courthouse	Public Building	2.0		34.0					LEED 2.0 was used, Silver rating

VERDE Assessments of Spanish Projects at SB05

In preparing for the Tokyo SB05 conference, the Spanish team decided to assess its four case-study projects using three rating systems: the international GBTool system, the Japanese CASBEE and the Spanish VERDE tool.

Bases for comparison

The GBTool was adjusted to the Spanish conditions, and benchmarks and weights were modified according to the building typologies and climatic conditions for Spain. For reference values (benchmarks) the National standard and regular building practice were used

The CASBEE tool was applied with no modification of the weights, scoring criteria, etc. Some criteria, not applicable to the National conditions such as Earthquake-resistance and Seismic Isolation, and these were excluded from the evaluation. Building thermal loads and efficiency in building services were evaluated using the Japanese Energy conservation standard, but the actual climatic condition for the building location was used.

Description of the evaluated buildings

The Trasluz Building, Madrid.

- Building type : Office
- Site area : 3.596 m2
- Construction Area : 1.133 m2
- Gross floor area : 13.762 m2
- Net floor area : 11.967 m2
- Number of Floors : +9, -2
- Completion : January 2005

Relevant building features include the following:

- Use of night purge ventilation by incorporate concrete alveolar slabs that become ducts of the air conditioning
- Use of natural light from an atrium and large window facade
- Use solar energy: PV Plant 20 kWp, vacuum-type solar collector for DHW, heating and absorption cooling and passive solar
- High solar control (Automatic mobile blind) on east and west facades and fixes on south to avoid solar load in summer and to avoid glare problems

Left: The Trasluz Building;

Below: The Cener Building

- High level of insulation performance on the envelope
- Use of rainwater.
- Use of Eco-materials and finaly,
- The structure and finishing materials can be separated easily.

VERDE Assessments of Spanish Projects at SB05

Cener - New seat of the National Centre for Renewable Energy. Sarriguren, Navarra.

- Building type : Office and Labs.
- Site area : 14.927 m2
- Construction Area : 1775 m2
- Gross floor area : 5.621 m2
- Number of Floors : +3, -1
- Completion : March 2005

Some relevant building features:

- Use of natural light
- Use solar energy: PV Plant 12 kWp, vacuum-type solar collector for DHW, heating and absorption cooling and passive solar
- Timber from sustainable managed forests supplies 100% of timber usage
- Use of rainwater (30 m3 tank), green roof
- Good adaptability of facilities
- Formation of semi-outdoor and intermediate space
- High sound Insulation performance of openings

Multiresidential Building in San Cristobal. San Cristobal de los Ángeles, Madrid.

- Building type : Low rise apartment
- Site area : 671 m2
- Construction Area : 608 m2
- Gross floor area : 3.756 m2
- Net floor area : 2.601 m2
- Number of Floors : +6, -1
- Completion : 2004

Some building features:

- Solar Chimney connected to "galleries for natural cooling", located in living areas
- Use solar energy solar collector for DHW
- Use of sunspace for heating at the south and south-east flats
- Provision of bicycle parking space for building users
- High service life of components
- High adaptability of facilities

Multiresidential Building in Pau Claris. Barcelona

- Building type : High rise apartment
- Site area : 2.725 m2
- Construction Area : 1.095 m2
- Gross floor area : 9.114 m2
- Net floor area : 7.890 m2
- Number of Floors : +7, -4
- Completion : 2003

Some building features:

- Use of natural ventilation
- Use of solar thermal collector for DHW
- Use of daylight device
- High level of insulation performance

Left: The San Cristobal Apartments under construction;

Below: The Pau Claris in Barcelona

VERDE Assessments of Spanish Projects at SB05

- Temperature and humidity control
- Selection of low-noise equipment types
- Use of rainwater (roof rainwater reservoir)
- High service life of components
- High allowance for story height (3 m+)

An Overview of VERDE

Weighted sustainable building issues within the three major areas of environment, social and economic. For the purposes of this comparison, assessments were carried out for the environment area only

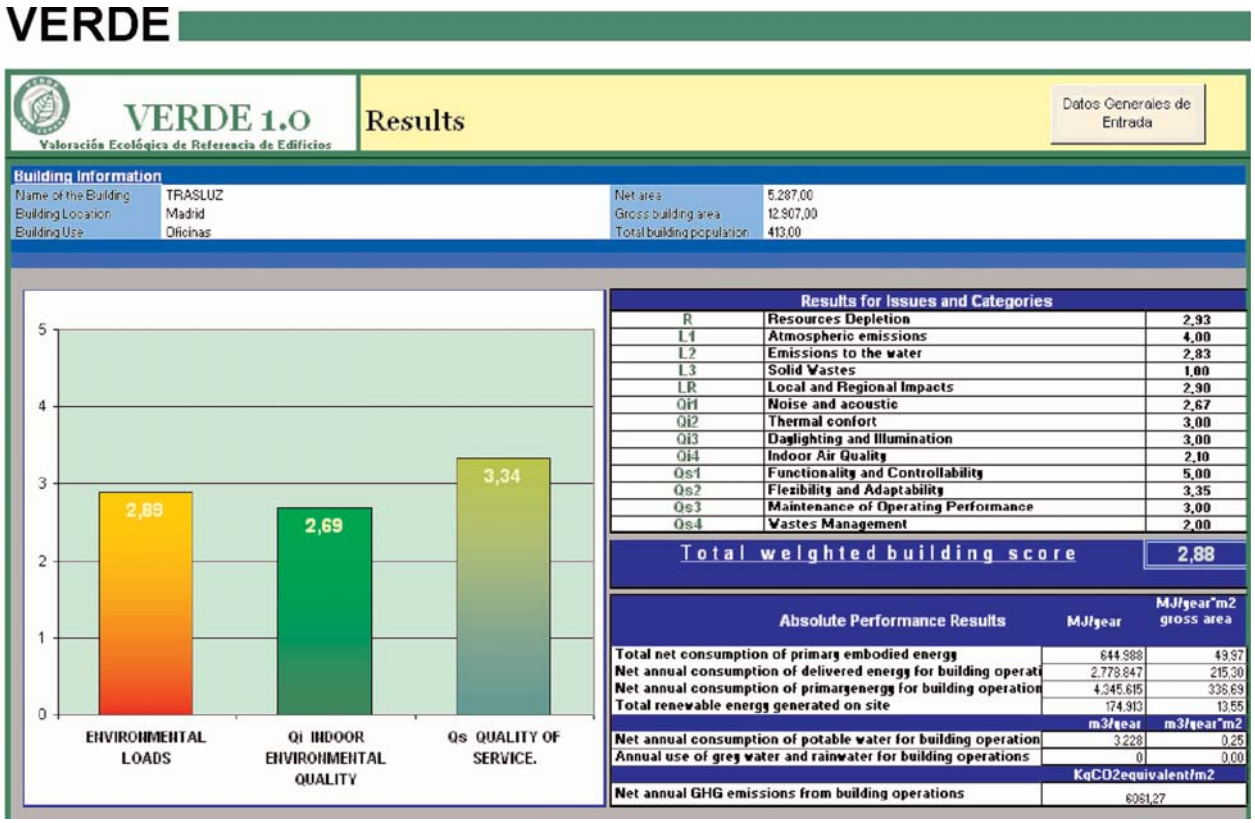
Scope

- Handles new (Tools HV1 and HV2) and existing buildings (HV3)
- Typologies included are: Residential, Offices, Commercial, Hotel, Hospital and Education buildings.
- Building complex which combine two or more types is calculated as an aggregated average of assessment results for each type of the building according to the ratio of floor area of each type.

Tools(Phases)

- HV1, the Pre-Design phase assessment intended to indicate the future potential sustainable performance of the project, based on the information available at the end of the Pre-Design phase.
- HV2, the Design and Construction phase assessment is intended to indicate the future potential sustainable performance of the project, based on the information available at the end of the Design phase or at the end of the construction and commissioning phase, but before occupancy.
- HV3, assessment during the Operation phase is intended to provide an objective and factual indication of the Actual performance of the project, and the results may be useful for certification purposes.

For the purposes of the comparison, assessments were carried out using the Design and construction phase settings.



Areas and Categories

Environmental Loadings

- Resources exhaustion
- Emission to air, water and solid wastes
- Local and regional impacts

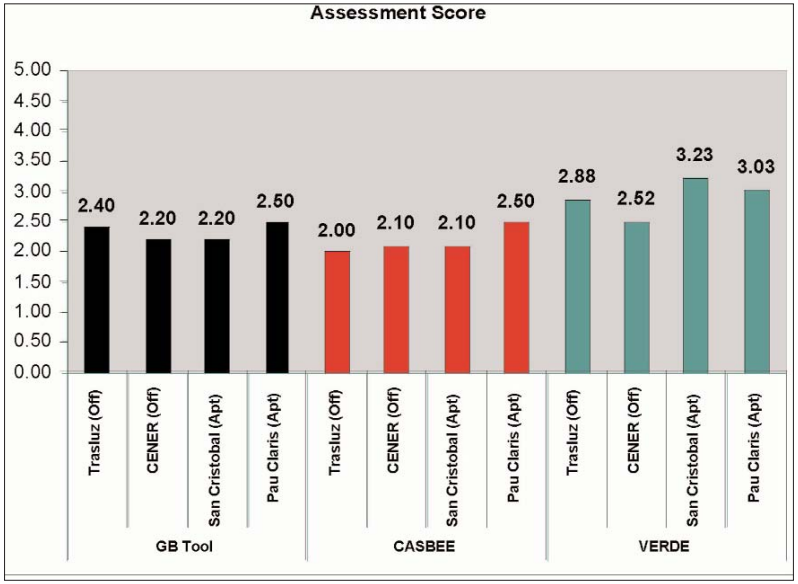
Factors affecting building environment

- Indoor environment quality and
- Quality of service

VERDE Assessments of Spanish Projects at SB05

Scoring criteria

- Assessment on a six scale, 0 to 5 with 0 as reference score
- Performance values are related to a scale that ranges from 0 to +5, with Interpretation as follows, 0 as the reference scale, minimum acceptable performance and 5 best practice, maximum achieved using the best available technology with an affordable cost
- In the case of numeric parameters, the evaluation is done by setting two numeric values at the 0 and +5 levels, which then defines the slope of a line that sets the values for the (reference value, 0) and (optimum value, 5) performance levels.
- For text-based parameters the evaluation consists of defining performance conditions that appear to be appropriate for each performance score.



Weighting of Issue areas

AREA	Residential %	Office%
Environmental	60	60
IEQ	30	25
Quality of Services	10	15
Social & Economic	0	0

Methodology for Environmental Loads evaluation

a) Resource Depletion

- Depletion energy resources: By evaluating embodied energy, transport, construction and energy use during building operation
- Depletion raw materials: By evaluating % of re-use salvaged material, % of recycled material used, % of material prepared for been reusable, % of material prepared for recycling and % of material goes to manufacturing secondary products, all indicators weighted accordingly.
- Water use and water management: By evaluating measures for reducing potable water use and rain water and grey water reuse

b) Emission to air

- By evaluating emissions from energy use and ODL gases

c) Emission to water

- By evaluating the discharge of nutrient to the water used for building operation and building material manufacturing

d) Solid wastes

- By evaluating hazardous and not hazardous waste during building operation and building material manufacturing

e) Local and regional impacts: Text parameters

- Impact of building on access to daylight or solar energy potential of adjacent properties
- Heat island effect
- Atmospheric light pollution

f) Methodology for evaluation criteria affecting IEQ -- text-based parameters

Indoor environment

- Noise and acoustics
- Thermal comfort
- Lighting
- Air Quality
- Quality of service
- Functionality and controllability
- Flexibility and Adaptability
- Durability and maintenance
- Waste management

Assessment Results

Results for total weighted score for the Spanish buildings are presented in the Figure above, which shows total weighted score for the four Spanish building typologies using GBTool, VERDE and CASBEE

Manuel Macias, Spanish GBC Team

Building Context Issues in Assessing Performance – District, Off-Site, and Non-Traditional Energy Sources

This article, written by one of Canada's foremost energy efficiency experts, is intended to start a discussion on some fundamental and complex issues related to the relationship between buildings and their surroundings in carrying out simulations or assessments. The context is North American, but the principles are universal. We hope to have a second artiucle on this subject that will include some practical approaches.

Ed.

Building environmental and energy performance rating systems, particularly in the North American context, have to date concentrated on the building and site. Issues beyond the site are only considered indirectly, if at all. LEED, GBTool, Green Globes, and government programs such as the Canadian Commercial Building Incentive Program (CBIP) are examples of systems primarily focused on the building, and this is especially true with respect to energy. Essentially a "boundary" is defined around the building site, and only what occurs within this boundary is considered in the energy performance evaluation. Off-site energy processes, while they may service the building, apply to both the Design and Reference buildings. Therefore any performance impacts associated with these energy processes or sources are rendered neutral in the comparative evaluation. To a great degree this is a function of the fact that the energy assessment in systems such as LEED and CBIP are based on standards such as ANSI/ASHRAE/IESNA 90.1 and the Canadian Model National Energy Code for Buildings (MNECB). Both of these standards "neutralize" and effectively disregard off-site energy sources and their associated impacts at the building level and beyond.

The historical reasons for this approach are arguably not without merit. First, it focuses attention on the performance of the building itself, which is the primary mandate of the assessment systems under discussion. Second, it avoids the potentially overwhelming technical challenges associated with developing quantitative evaluation frameworks for off-site energy sources and processes. And third, it avoids the broader policy and political issue of geographical location and circumstance relative to energy sources and processes. Having said this, the advent of district energy systems (DES) and site-to-site linking of energy processes is now compelling LEED and CBIP to actively consider energy beyond the site boundary, and develop frameworks to reward and therefore encourage environmentally beneficial initiatives and decisions in this respect.

The relevance of the issue should be seen within the context of credits that are given for design decisions by the MNECB or ASHRAE 90.1, by incentive programs such as CBIP and, more indirectly, by labeling programs such as LEED and Green Globes. In all cases, design decisions are compared to embedded design decisions that represent benchmarks of acceptable behaviour. In the case of the MNECB or ASHRAE standards, a pass/fail decision is at stake; in the case of CBIP, it is incentive funding, while labeling systems provide the market reward of a label for appropriate design decisions.

This is very complex proposition from both technical and policy perspectives, and it is unlikely that perfect solutions can be achieved. Venturing into this area can be likened to maintaining a firm foothold on what is potentially a very slippery slope. The USGBC Energy & Atmosphere Technical Advisory Group (TAG) has produced a framework that will shortly be released, which addresses district Combined Heat and Power (CHP) as applied to the LEED US system. This initiative constitutes a first step onto the slippery slope. It required several months of intensive discussion, debate, and iteration. The framework is now providing the conceptual basis for the development of a broader off-site energy assessment framework for LEED Canada, and a similar parallel effort is being undertaken by CBIP. These discussions are ongoing at the time of writing. The outcomes will invariably affect GBTool and Green Globes since these systems use essentially the same energy evaluation frameworks as LEED and CBIP. Broad issues, questions, and situations to be considered include:

1. On the surface it would appear reasonable to grant credit to a building for the performance of a DES or other off-site energy source if the building and DES/source owner are one in the same (eg. university campus). However, is this credit due if the DES/source is owned by a third party? If so, to what extent? What constitutes "effort" worthy of reward as opposed to simply subscribing to an existing and readily-available energy service? Moreover, not all ownership or

financing models are easily categorized. What are the criteria for characterizing such relationships?

2. At what point does a DES or other off-site energy source become a "utility", and at what point are we placed in the position of making quantitative, or at least qualitative judgments about utilities and their energy sources and efficiencies? By extension, at what point are awarding buildings for locating in a "favorable" utility jurisdiction? Setting aside political implications, are we even able to make such distinctions from a technical perspective?
3. At the other end of the scale, how do we deal with third party ownership of single-building or small off-site energy sources?
4. In its discussions, the CaGBC TAG task group assigned to this issue has defined the term Non-Traditional Energy (NTE) to encompass energy sources which go beyond conventional fossil fuels and grid electricity, but fall short of "renewable" in the technical sense, and in particular as it is defined by LEED. Examples include biomass, landfill gas, industrial waste heat, ground or lake water cooling, and (possibly) geothermal heat pumps. In simple terms these NTE sources are generally treated as "other" energy by ASHRAE 90.1 and the MNECB, and as such they are performance-neutral in that they apply to both Design and Reference. However, in many cases NTE has demonstrable environmental benefit. Should NTE be given special consideration, and if so, how should this be accomplished? If credit is given, how do we balance the energy performance of the building itself relative to its energy source in terms of awarding credit, and/or in what situations is this a concern? Should we allow an unremarkable or even inferior building to realize a large amount of credit by virtue of its energy source? These questions pertain not only to district or off-site NTE sources, but also to systems installed within the building. Overlaying this is the above-described questions regarding ownership of the system.
5. In addition to all of the above questions and issues is the fact that LEED uses energy cost as opposed to energy consumption to award credit. However, it is becoming painfully clear that energy cost is not a strong indicator of environmental impact. Using energy cost skews any energy assessment framework, but in particular it can grossly distort the evaluation of NTE. To take the discussion to the next logical step, is energy consumption an acceptable indicator of environmental impact or should assessment systems be looking further eg. greenhouse gas emissions?
6. How do we maintain consistency in the treatment of off-site externalities throughout an assessment system, or is this even important? For example, LEED awards credit for locating a building in close proximity to public transit, regardless of whether or not this was a conscious design decision. Other site-related credits are similar in nature. In this regard many credits are often more "fortuitous" than consciously pursued, but nonetheless are still awarded. Should this same liberal approach apply to off-site energy, essentially answering many of the questions raised in point 1 above? Should a building be awarded because it happens to be fortuitously located in a favorable DES jurisdiction? Or conversely should it be indirectly penalized because it is not? Again, what constitutes "effort" worthy of reward?
7. At what point do building rating systems lose their building focus and become more concerned, intentionally or otherwise, with broader macro concerns? Is this desirable direction? What do we want these assessment systems to achieve? What can they reasonably achieve?

The next installment of this article in a future edition of ABN will examine these technical and policy questions in greater detail and report on the outcomes of the LEED and CBIP deliberations and the rationale for any assessment frameworks which emerge.

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iiSBE

The Kolon R&D Institute of Technology

In response to the recent oil price hike, the implementation of the Kyoto protocol, and society's demand for well-being, the necessity for environment-friendly building has increased sharply. Companies are developing in-house construction technologies that utilize renewable energy and other environment-friendly building treatments. This study reviews examples of technological verification in 100% geothermal heat-pump system, building integrated photovoltaic system (BIPV), and double-skin façade system applications.

Overview

Kolon R & D Institute of Technology was established in October 1992 at the group's Central Research Institute (founded in 1985) in Yongin-Si, Gyeonggi-Do. This expansion and reorganization of the Technology Development Department is committed to developing and advancing construction technologies and securing international competitiveness. The Institute's Construction Environment Research Team develops and implements core technologies and the Research and Planning Team supervises overall planning work for the institute. These personnel work in close cooperation with the front office and with experts from the academic community to complete in-house tasks and state-supported projects.

In October 2004, a new building for the Institute was completed in Yongin-Si, Gyeonggi-Do. This facility reduced energy costs and research expenses in construction, civil engineering, the environment and energy by more than 50%. The building has since been awarded the top grade in the Korean system of Green Building certification.

Since its establishment, our institute has conducted many research and development activities in construction, civil engineering and the environment as exemplified by blasting demolition techniquesa, slip-form engineering methods,a tunnel ventilation design system, geothermal and solar energy systems, and 'environment-friendly building element' technology. The Institute has completed registration of 15 new technologies and 102 intellectual property rights.

Research was concentrated on proactively responding to the recent social demand for well-being, increasing regulations, obligation to use renewable energy, and the need for technology that can reduce building maintenance costs. The ultimate goal of these technologies is creation of an easy-to-maintain, inexpensive space where humans can live harmoniously with nature.

The Eco-Research Team and the construction design office made preliminary selections of highly applicable items. Further examination and review of application area and scope narrowed the possibilities.

Although the site was not favorable, the building was designed to maximize its positive characteristics. For effective use of natural energy (geothermal and solar energy), the space was divided into service, mediating, and residential areas. The design maximized the efficiency of daylighting and natural ventilation.

Renewable Energy

Geothermal Heat-Pump System

The Institute uses a geothermal heat-pump system as the sole means of temperature control. Since completion of the building, system efficiency has

Capacity	Cooling & heating, quick hot water: 51 RT (Satisfies 100% of building's needs)
Composition	Heat source: geothermal heat exchanger; air conditioning: duct cool & hot air
Heat exchanger	Vertical type: 200 m 6 units; pile-type: 4m 4 piles
Heat pump	For cooling & heating: 11 units (Ceiling-type, 50 RT) For quick hot water (Machine room-type, 1.5 RT) 1 unit
Auto control	Operation control by room, DDC system

been continuously monitored and the result is better than anticipated. The illustration shows an overview of the system.

A pile-type heat exchanger, developed with in-house technology, contributes to building temperature control. The system enables a 60% reduction in building maintenance cost compared to similar-sized buildings, is easy to operate, and provides a pleasant living environment.

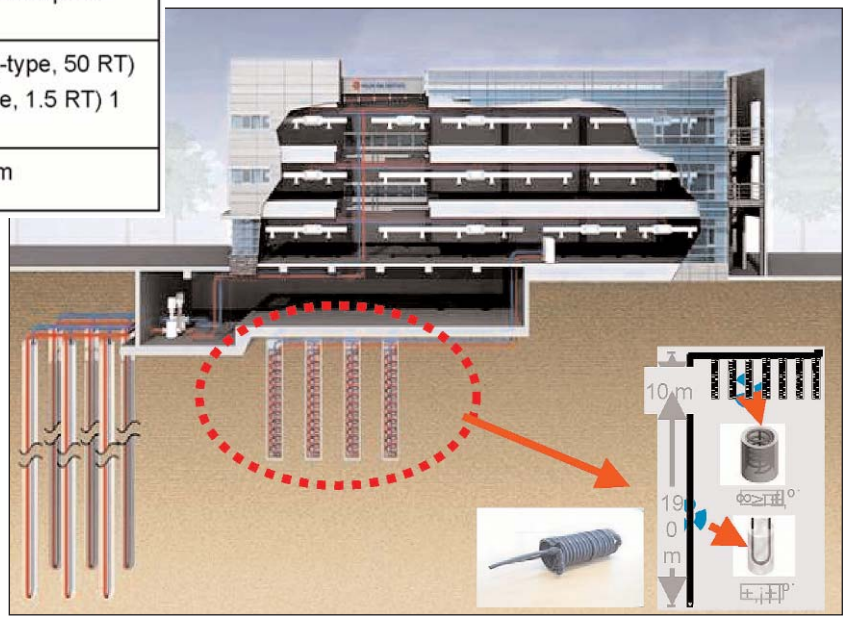
BIPV (Building Integrated Photovoltaic)

The BIPV system functions as both an exterior structure and electricity generator Installation is on a southeast-facing vertical wall covered with 45m2 of glass-type solar cells. Reinforced glass on 10m2 of the corner surface on both sides allows evaluation of constructability and performance.

The system produces 6 kW, which is enough electricity to light 120 fluorescent bulbs so it has great potential for use as a building exterior finishing material. Kolon E& C plans to distribute the system after further performance verification.

Energy Saving System

The environment-friendly, energy saving exterior skin system applied to the institute is the first of its kind in Korea. It consists of an interior double-skin system, manually operated exterior blades, and light shelf. The most striking feature of this system is that while installing the interior double-skin (divided in box type by layer and section), light shelf and storage space are simultaneously mounted; therefore, reducing installation costs by 75% over existing double-skin systems and maximizing space utilization. When performance results for the double-skin system were compared for two weeks, the average temperature differential between areas with and without the double-skin exceeded 3 deg.C. In an ordinary double-skin system, additional expense vis-à-vis the existing building is rather high, making it difficult for wide distribution. In this regard, the installation effect is about the same as the exterior type. The new double skin system is vastly superior in terms of appearance with only a minimal cost increase. The system also saves energy by blocking direct rays of light through switchable sun blades and indirect daylighting and adjustment of the amount of incidence through light shelf.



Top left and Left: Overview of GSHP system;

Below: Overview of BIPV system characteristics

Item	Specifications	Remarks
Capacity	2.2 kWp	120 fluorescent lights
Solar cell	Amorphous module	PV module for construction materials
Frame	SPG frame	
Connection method	Synchronous generator type	Produced electricity is sent to the KEPCO grid

Above: Exterior of "Sun Blade" system

Utilizing Natural Environment

Natural Ventilation

To enhance natural ventilation efficiency, the institute uses a rectangular design for a limited site, which enables the headwind to pass through the building between the north and south. The central atrium creates an upward draft for enhanced ventilation.

Solar Tube System

Korea's first indirect daylighting device was installed on the 3rd floor of the institute. It utilizes a solar tube system, which is twice as cost effective as alternatives. The system consists of light collecting, light distributing, and illumination sections. The well-polished 3-meter-long cylindrical distributing section enhances reflection rate and has a light-distributing film attached for optimum light transmission. Illumination is provided by a 2.5 m long half-cylinder with a prism film attached to disperse light. System performance can be enhanced through the attachment of additional light distributing film after installation.

Below: the green roof

Environment-Friendly Exterior Space

Rooftop Landscape and Biotope

Ordinary rooftop landscapes with shrubs planted in 80 cm of soil often create overweight situations that require larger frames, making it difficult to manage and too costly to prepare. Kolon R & D Institute of Technology 's rooftop landscape uses only 20cm of soil and hardy, easy-to-care-for ground cover plants. This landscape not only provides a recreation space with a small eco-system, but also insulates the building to reduce cooling and heating energy requirements. The resulting biotope contributes to the natural environment and restores the harmony between nature and humans.

High-Performance Concrete

Environment-friendly performance concrete with microcapsules is used in exterior walls and parts of the building. High-performance concrete has anti-bacteria and anti-fungus functions, eliminates odors, prevents oxidation, shortens the construction period, and ensures longer lasting structures. The microcapsules provide a pleasant living environment with their anti-abrasion, anti-shock, and odor removing effects. To verify the continuance of the effects, experiments were carried out at national certification organizations.

Modified Asphalt

Increases in traffic volume and specifically the number of large and heavy vehicles have caused premature aging of road pavement. Kolon E & C has developed an asphalt modifier that when added to a crumble of rubber made from discarded tires extends the lifespan of asphalt road surfaces.

The parking lot in front of the institute building is paved with this material and the test results are very positive. Performance exceeds ordinary asphalt or concrete pavement and maintenance costs are significantly lower. Additional research should confirm these initial findings and open the way for entry to the domestic road and pavement construction market.

Vision of the Kolon R & D Institute of Technology

The Kolon R & D Institute of Technology 's objective is to achieve the goals of Vision 2010. These guidelines, established in 2004, reflect the mid- and long-term company plan to develop proprietary technologies and build a solid foundation for Kolon E & C's growth.

Seong-jin Lee / Team Leader,
Kolon R & D Institute of Technology

Two brief announcements from iiSBE:

1. If you have an interest in launching a local iiSBE organization, contact Andrea Moro at andrea_moro@envipark.com. A chapter of iiSBE (iiSBE Italia) has already been established, and local organizations are being planned in Poland, the Czech Republic, Chile and Portugal.

2. iiSBE has launched a *Sustainable Education* working group, with an international membership. For details contact Peter Graham at PeterG@fbe.unsw.edu.au.

Continued from Page 3

More detail on the projects and assessment results are shown on Pages 4 and 5, but readers should be cautioned that the resulting scores are not easy to compare, since each rating system covers somewhat different parameters with different weightings. In this regard, it should be noted that GBTool is a generic framework that requires users to establish weights and benchmarks to suit their own regions before ratings are carried out. GBTool scores are therefore also somewhat non-comparable between different regions.

More information can be found in the individual project reports, which are available on the SB05 website at <www.sb05.com>..

Nils Larsson, iiSBE

SB07 Conferences Being Organized

At the forthcoming iiSBE meeting in Wageningen, Netherlands, one of the sessions will be devoted to discussions between proponents of SB07 conferences. None have committed yet, but it looks as if there will be SB07 conferences held in Seoul, Hong Kong, Kuala Lumpur, Glasgow, Belfast, Torino, Toronto, a location in Portugal, and a location in Switzerland.

The purpose of these events is to lay the groundwork for the global SB08 conference, to be held in Melbourne, Australia in November, 2008. The 2007 events will result in a large number of interesting papers and case studies that will be tabled at SB08 Melbourne.

Nils Larsson, iiSBE

Above: 21st Century roofscape (courtesy Tatsuo Oka)

SBIS

If youy have not used the Sustainable Building Information System (SBIS), you will find it very useful for background research. The Documents file of SBIS contains 1,200 downloadable PDF documents from various conferences, a very valuable reference at no cst.

Go to www.sbis.info

Joining iiSBE is cheap at $75 Canadian(about 50 Euro) per year, and only half of that for students of residents of developing countries. For that low cost, you help to support our GBC project and the ABN newsletter, get access to downloads on our database at <www.sbis.info>, and you also will be able to subscribe to the refereed journal *Building Research & Information* (BRI) at a saving which is greater than your membership cost!

There is now a new reason to join iiSBE: our Skills Registry database. You can browse at http://www.sbis.info:8101/iisbeRegistry, but you have to be a member to register. This resource should be a useful way of establishing contacts between project managers and specialists in various aspects of SB.

To join iiSBE, download a PDF form from http://www.iisbe.org.

Story contributions and letters to the Editor sent by sane and coherent people are always welcome !

ABN is a publication of iiSBE, the *International Initiative for a Sustainable Built Environment.* ABN specializes in information related to sustainable building, and is distributed freely. To join, see http://www.iisbe.org or contact <membership@iisbe.org>

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http://www.iisbe.org

Rethinking Sustainable Construction 2006: Next Generation Green Buildings

Sarasota, Florida, USA — 19-22 September 2006

Rethinking Sustainable Construction 2006 (RSC06) is an international conference being organized to develop a vision for future green buildings and it will be held in Sarasota, Florida, USA in September 2006. Although this is a Call for Papers, a wide variety of delivery methods is envisioned for RSC06, from research papers by academics, to building models by design professionals, policy papers by public sector representatives, Power Point presentations from industry, and other effective means of communicating ideas. The organizers anticipate that this flexibility will encourage a dynamic interchange among the participants and help add sorely needed direction and energy to the international sustainable construction and green building movement. Please be sure to note your desired means of presentation in your abstract. :

Website: http://www.treeo.ufl.edu/rsc06