The 2005 World Sustainable Building Conference, Tokyo, 27-29 September 2005 (SB05Tokyo)

ASSESSING GREEN BUILDINGS FOR SUSTAINABLE CITIES

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Keywords: assessment, method, green, building, sustainable, development, urban, environment

Summary

Within the shift from building environmental assessment to sustainability assessment, this paper presents one possible approach from the perspective of developing countries. This approach considers that besides the global environmental assessment, the economic and social performance of a building can only be assessed if we relate it to a city that is the system to which that building belongs. Therefore, one way of assessing buildings for sustainability, is by measuring the contribution of a building to local/urban sustainability. At the same time, this paper suggests that, although direct transfer and application of assessment methods from developed nations to developing ones should not be prescribed, it is in the best interest of developing nations to use foreign tools based on international environmental building standards and adapt them to the local context in which those tools will be used.

As an example of the stated above, an analysis of the LEED® NC and the possible ways of adapting it to assess buildings' contribution to local sustainability in Cordoba, Argentina is presented. It indicates that it is possible to use internationally renowned assessment methods as a basis for buildings-for-local-sustainability assessment methods, provided each of the credits of that system is redirected to the new target to be assessed and its relative value be re pondered.

1. Introduction

The environmental awareness and concern that have fostered the green building movement in the industrialized countries are also in place in the developing countries, but the tools and techniques developed during the past decade in the industrialized world to systematically and reliably assess the buildings' environmental performance is missing in the developing world.

In highly urbanized countries of the developing world, like Argentina, which is here to be used as the subject of analysis, the development of building assessment methods is becoming necessary to diagnose the building-stock's performance and to encourage the building industry to get onto sustainable track. Faced with the need for the evaluation of buildings, some questions arise on adequately defining what is to be assessed and what kind of assessment method to be used.

This work is in its early stages of development. It is intended to stimulate the discussion of building assessment methods in the developing world as well as preparing for the design and implementation of a building assessment method that would help transform Cordoba in a sustainable city.

1.1 Developed nations' approach vs. developing nations' approach to sustainability and buildings

Given the fact that there are assessment methods already in place in diverse markets of the developed world, it is tempting to "borrow" one of those few, good assessment and rating tools and use it to assess buildings in Cordoba. The American LEED® or the British BREEAM™, are examples of building environmental assessment methods that are carefully developed, widely accepted in their home markets and that are fostering the transformation of those markets towards sustainability, at least as understood in the so called "developed market economies".

However, as UNEP affirms in "Energy and cities" (UNEP, 2003), "sustainable construction adopts different approaches and is accorded different priorities in different countries. It is not surprising that there are widely divergent views and interpretations between countries with developed market economies and those with developing economies. Countries with mature economies are in the position of being able to devote greater attention to creating more sustainable buildings by upgrading the existing building stock through the application of new developments or the invention and use of innovative technologies for energy and material savings, while developing countries are more likely to focus on social equality and economic sustainability". These differences suggest that, the direct transfer of assessment tools from developed countries to developing ones should not be prescribed.

Nevertheless, at the same time, the truth is developing countries lack the economic resources necessary to launch an assessment method from scratch, and they have even fewer resources to keep such a tool in place dynamically. There is the need for sincerity about the realities of the state of development if developing nations want to create tools that will help them overcome some of those development shortcomings. In doing so, developing nations could benefit from the knowledge and experiences accumulated in the North during the past 15 years and apply some of those assessment methods critically. Go to the essence of the creation of the tools, generate their own framework –one in accordance to their social and market realities-, and be able to adapt those tools to these realities. In addition, a common language can be shared, one that keeps the possibility of comparing advances in different parts of the world and thus fostering growth in a truly global market economy.

1.2 From environmental assessment to sustainability assessment

For the past 10 to 15 years, the emphasis of the environmental assessment methods released in some developed countries has been on the technical issues that indicated how much of the increasingly limited natural resources –including energy- a building consumed and how it performed in terms of its impact on the natural environment. More recently, an appreciation of the significance of non-technical issues has grown. It is now recognized that economic viability and social equality are important aspects of a society that are also affected by the built environment. This latter reflects more of a sustainability approach to buildings, one in which the environmental, the social and the economic aspects of a project are not weighed in isolation but in relationship to each other in the context of the built environment.

Argentina, as well as in other nations of the developing world, cannot afford to be looking at environmental performance only. The social and economic problems are at the top of our countries' agendas. Environmental degradation is often an effect of under development as much as it is of development. The impact of the construction industry on the environment is not dissociated from the economic and social realities of our countries.

2. from green buildings to Sustainable Cities

All the stated so far is well known by the building research community. The need to focus efforts on sustainability assessment. Sustainability assessment includes the environmental, the social and the economical impacts of our buildings on present and future generations as well as the synergies between these three spheres.

Now the question is how to define sustainable, sustainable construction, sustainable buildings…in the context of this paper? What is the framework of this assessment method? What I to be assessed?

Buildings are not sustainable. A "sustainable building" is an oxymoron. There is no such thing as a building that can sustain itself in time. Buildings are consumers of goods and only produce intangible value (shelter, comfort, quality of life..) Buildings need the interaction with infrastructure (transportation, water systems, sewage systems, power supply, etc.) and are part of a greater system of the built environment of a city or a region. The term "sustainable buildings" is used not to refer to self-sustaining buildings but to refer to buildings that contribute positively to sustainable development.

Sustainable development's great goal is to ensure the quality of life of present and future generations. Its great spatial delimitation is Mother Earth and its time frame is infinite. Now, operatively, sustainable development is defined by the scale of application, the scale of work. In general terms, there is the global sustainable development and there is the local sustainable development (urban, regional, and/or national). And there is the so called "glocal".

Buildings interact with their immediate surroundings in a direct and sometimes un-mediated way. Most of their impact is local. Building design determines public space in cities, buildings influence the urban systems contributing to the burden on infrastructure and metabolic systems; they redirect wind, cast shadows, produce garbage, etc. All impacts directly related to urban quality of life. Although we cannot forget that all local actions have impact on global systems, it can be said that most measurable impacts of buildings are on the local scale. Besides the environmental impacts, the economic and social performance of buildings can only be assessed if we relate them to a city that is the system to which those buildings belong. As stated in the Agenda 21 on Sustainable Construction (CIB 1999) "it is clear that the whole construction industry has a significant impact, both directly and indirectly, on achieving Sustainable Development in the *urban* environment".

Having said so, one way of defining a sustainable building is by its contribution to local sustainability, that is to say when a building reduces its negative impacts on the natural environment while enhancing the synergies that produce social and economic development. It can even be hoped for buildings to help mitigate local environmental problems.

At this point, it can be said that one way of assessing "how sustainable" a building is, is by measuring the building's contribution to local sustainability.

Local sustainability should be defined in terms of a specific city, or in terms of cities with similar development patterns. It could be said that some Latin American cities, for example, share development patterns. Most of them are the result of a colonial grid imposed on the natural environment –most of the time with little consideration for natural flows and environmental risks-. They have suffered migration waves without being able to absorb the immigrants and consequently generating slums. They suffer from political and economical instability and construction technologies are similar. Etc. These characteristics could make for a common profile on the construction industry and sustainable development. From there, we could build an assessment methodology that could be shared among Latin American cities, and that could then be tailored to specific goals a particular city may have; In a way, to generate a common and understandable language that will help us share advances towards the sustainability of the region, and that at the same time would give every city the freedom for customizing the tool.

This doesn't simplify the way to a building assessment method!. Quite on the contrary, it complicates it!

3. Buildings-for-local-sustainability Assessment method

3.1 Beginning the process

For the reasons described in the introduction, this paper proposes to begin the process of designing this new assessment method by analyzing the possibility of adapting another methodology that has already been tested elsewhere to assess environmental performance in buildings, and evaluate its ability to be modified to assess buildings' contribution to local sustainability in Cordoba, Argentina. Cordoba, is a 1.3 million inhabitant city located in the geographical center of Argentina, 700 km. away from Buenos Aires. It is the capital of the province also called Cordoba.

The method chosen for the first test is the LEED®. The LEED®, USGBC's Leadership in Energy and Environmental Design, is being widely used in the US as green building rating system. It's mission, as stated in its website is to "encourage and accelerate global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted standards, tools and performance criteria". Other assessment methods taken from different market conditions will also follow in future stages of this research: the regional versions of the GBC, the BREEAM™, etc., LEED® should be the first in a series of methods to be analyzed.

3.2 Using the LEED® -NC as the basis for a new buildings-for-local-sustainability assessment method

Only LEED® *for new construction is being used for analysis in this paper. It is not the intention of this paper to analyze and/or criticize the* LEED® *itself for what it has been conceived but rather to borrow its excellent content and reorganize it for an exercise on assessing building's local sustainable performance.*

The questions that will guide this adaptation test will be: How to refocus the indicators from the global issues to the local scale? How to add the social and economic impacts to the already stated environmental impacts of buildings? How to assess complexity and Synergy? (if at the same time we want to simplify the method to improve the possibilities of replicating the assessment?).

3.2.1 Adjust and re ponder each credit group's relative importance

The importance given to each of the 6 credit groups in LEED® has to be revised to the priorities of Cordoba. They would have to be redirected to Cordoba's sustainable development goals and re pondered to assess a building's contribution to that sustainable development. Few Examples are:

- The credit group that weighs the most in LEED® is "energy and atmosphere", taking 17 possible points - 25% of the possible points available- awarded to 6 credits and adding another 3 prerequisites for certification: "fundamental commissioning of the building energy systems", "minimum energy performance" and "CFC reduction in HVAC&R equipment". Only 4 of those 17 points are awarded to renewable energy and green power. Reducing energy *consumption* is not "the" priority in a city like Cordoba, in a country like Argentina. Like some other countries in the developing world, Argentina will have to increase its energy consumption to get into sustainability track, to be able to increase its production and balance its economic and social inequalities. At the same time, Argentina has a fair amount of energy resources, both from petroleum-based and renewable sources. The Province of Cordoba itself is an exporter of electricity. It produces electricity from fuel (50%), hydro-powered plans (40%) and one nuclear plan (10%). There are still additional hydro resources available for the production of more electricity to be harvested if needed (ICS 2004 pg 15). Argentina would need to take its extra share of energy, needed to pump up development, from clean sources instead of petroleum-based sources. Hypothetically, a building that only consumes energy from clean renewable sources (wind, solar, bio, etc.) could "waste" as much as wanted! In conclusion, the credits that encourage the use of renewable energy resources have to be given more relative value against the credits that encourage energy savings. In the reality of the actual Argentinean energy market, this would mean giving credits to solar and micro-wind produced energy until large commercial wind energy plants are in place (several projects have been analyzed by the National government none of which have been

realized). Credits that encourage savings will still be required but will be given a relative lesser value than credits that encourage the use of clean renewable energy.

- Water efficiency, builds up for 7 % of the credit points available in LEED® (5 out of 69). In a city like Cordoba, water is no minor issue. It has dry winters and hot summers that begin before the rains come. Cordoba relies on two sources of water only, for all the water the city consumes (lake San Roque and Los Molinos). Underground water sources are vastly contaminated (ICS, 2004 pg 32), mostly because of faulted septic systems and the city sewage system was designed to treat half of the system's current flow (ICS, 2004). Therefore, water efficiency and wastewater treatment deserves better consideration in Cordoba. To encourage action towards better water management, more points should be assigned to credits related to water use, treatment and reuse.

3.2.2 Stress the synergies

Some credit-awarded actions have more than one effect on urban sustainability. Stressing the synergies, or giving points for each of the positive effects such actions may have would encourage system thinking and complexity understanding. For example:

- Sustainable Sites credit 2: Development Density & Community Connectivity is awarded 1 point in LEED®. Whereas the intent stated in LEED® is to "channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources", this action has a variety of beneficial environmental, social and economical effects at the local scale. This action strengthens community ties, which at the same time makes for safer neighborhoods, and promotes the creation of neighborhood organizations that can obtain local political power and influence the city government on local political agendas, which at the same time induces concrete actions towards the improvement of the quality of life of local citizens, etc. Community connectivity also has impact on transportation, with beneficial effects on the reduction of car travel distances and time, which at the same time reduces the consumption of fossil fuels, the production of green house gases and provides time for alternative, more productive, use of that time (I include here leisure as a productive way to use one's time). Applied to the city here analyzed, some areas of Cordoba could greatly benefit from increased density whereas others would have infrastructure problems. In this case, justification of the benefits of increasing density in the proposed area would have to be submitted for credits to be awarded.

3.3 Pros and cons of buildings-for-local-sustainability assessment methods

Shifting the debate from assessing the environmental performance of a building to assessing its contribution to urban sustainability requires more social commitment. It is almost a debate on ethics and professional responsibility; on the civic duties of the design and construction industries. But it may be a tool for having the results there, in our cities where we can see them and replicate them. And the improvements will be shared by all citizens.

An assessment method that weighs the way a building contributes to a city's development would be an important tool to foster transformation of the built environment towards urban sustainability. However, one major problem local assessment methods can face is the lack of recognition within the construction industry. A local assessment tool will have trouble becoming a certification tool unless a prestigious national or international certification label homologates it. The scale of local recognition is small for some construction firms who would not want to invest what it takes to upgrade their construction methods to certify their buildings only in the local market. This problem could be overcome if a national or international certification entity homologates the local one.

4. Conclusion

This paper has presented a few analyses on the adaptation of foreign environmental assessment methods to buildings-for-local-sustainability assessment methods. It has justified the reasons why building assessment should also be considered in the local urban scale. So far, this paper has made a point for local sustainability assessment of buildings and sketched a methodology of work that has to be deepened and developed.

This work is at an early stage of development. Further research in the same direction is expected to take place during the next months.

References

LEED® 2004, Green Building Rating System for New Construction & Major Renovations (LEED® - NC) Version 2.2 First Public Comment Draft. December 2004

ICS. 2004. Iniciativa de ciudades Sostenibles (ICS). Canada/Cordoba. Visita Tecnica - Desarrolllo de Proyectos. Borrador del Programa.

CIB 1999. Agenda 21 on Sustainable Construction. Section Three. Pag 77. www.cibworld.nl