

ASSESSING THE SUSTAINABILITY PERFORMANCE OF THE 2010 FIFA WORLD CUP STADIA USING THE SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT) FOR STADIA

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ABSTRACT

In 2010, South Africa will host Africa's first Fédération Internationale de Football Association (FIFA) World Cup. This will require the refurbishment and development of new stadia and an objective in this development is to continue with the Green Goal initiative developed for the 2006 FIFA World Cup. This is being addressed this by the *Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa* project commissioned the Republic of South Africa's Department of Environmental Affairs and Tourism (DEAT). This project is being undertaken by Green by Design (GbD), Paul Carew Consulting (PjC) and the South African Council for Industrial and Scientific Research (CSIR) and aims to review the sustainability initiatives that have been included in the 2010 FIFA World Cup stadia. It also aims to identify gaps in sustainability performance and provide recommendations on how these may be addressed.

Purpose of this paper – The purpose of this paper is to review the process undertaken by the review team in assessing the sustainability performance of the stadia with particular focus on the use of the Sustainable Building Assessment Tool (SBAT) for Stadia.

Methodology/Scope – The SBAT was adapted through the development of a set of indicators that would support the assessment of the sustainable performance of the 2010 FIFA World Cup™ stadia, and used in assessments.

Findings – This paper presents the initial findings of the process of assessing the 2010 FIFA World Cup™ stadia using the SBAT for Stadia as for the *Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa* project.

Value – The SBAT for Stadia enables not only the environmental issues to be considered but also ensures that socio-economic issues are included, as important local concerns.

Keywords: Environmental assessment tools, sustainable building assessment tool (SBAT), stadia, 2010 FIFA World Cup, sustainable construction.

1 INTRODUCTION

The Republic of South Africa is considered to be the most developed and modern country on the African continent. Since 1994, when the first democratic government was elected, South Africa has had positive economic growth (Knight, 2006). However, on the other side of this positive aspect is a country which still has major social and economic problems including poverty, inequality, unemployment, HIV/Aids and property and personal insecurity (Beall *et al*, 2005).

It was in light of these socio-economic problems that South Africa's bid campaign for the 2010 Fédération Internationale de Football Association (FIFA) World Cup promised that it would ensure *a lasting social legacy through the event and leverage the event to spread economic and social benefits beyond the borders of South Africa* (DEAT, 2005). In May 2004, South Africa was awarded the rights to host the 2010 FIFA World Cup event. Ten stadia are currently being constructed, upgraded or reconstructed for the event (FIFA, No date).

South Africa's hosting of the 2010 event presents an opportunity not only to run a successful event but also to achieve the political and social promises on which South Africa's bid campaign was based (Cornelissen, Swart 2006). In addition to fulfilling these promises, South Africa will take on the challenge of upholding the standards set by Germany during the 2006 FIFA World Cup event, which was carried out in an environmentally accountable way.

South Africa's Department of Environmental Affairs and Tourism (DEAT) has addressed this challenge by setting up the *Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa* project which is currently undertaken by Green by Design (GbD), Paul Carew Consulting (PjC) and the South African Council for Scientific and Industrial Research (CSIR). The project aims to review the sustainability initiatives.

In order to assess the sustainability performance of the stadia, the Sustainable Building Assessment Tool (SBAT) was adapted to create the *SBAT for Stadia*.

This paper reviews the process undertaken by the review team in assessing the sustainability performance of the stadia and presents the following research questions:

- Was the SBAT for Stadia an appropriate tool to use for the project given the direction that the greening of sporting event has taken and also considering the South African context?
- Was the process of using the tool for the *Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa* project successful?

This paper presents the initial findings of this *Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa* project review process using the SBAT for Stadia.

2 GREENING OF SPORTING EVENTS

The concept of sustainable development has been defined by the World Commission on Environment and Development (WCED) in their Brundtland Report as meeting *the needs of the present without compromising the ability of future generations to meet their own needs* (WCED, 1987). This was recognized as a balance between the *environmental protection, economic growth and social development* dimensions in 1992 at the Rio Declaration by the United Nations NGO Committee on Sustainable Development (UN, No date a).

Of the largest global sporting organizations, the International Olympic Committee (IOC) was the first to respond to the global concern on environmental concern. This was done by the Local Organising Committee (LOC) who incorporated environmental practices in the implementation of the Lillehammer 1994 Winter Games. Subsequent LOCs followed this example including the Nagano 1998, Sydney 2000, Salt lake City 2002, Athens 2004 and Torino 2006 (IOC, 2007). The most recent Olympics Games stand out because the Torino Organizing Committee (TOROC) pioneered the move to sustainability reporting based on the Global Reporting Initiative (GRI) guidelines (TOROC, 2005). This ensured that planning, implementation and monitoring incorporated the three sustainability dimensions recognized at the 1992 Rio Declaration which went beyond focusing on environmental issues.

It is evident from the preparation of the following three Olympic Games events, namely Beijing 2008, Vancouver 2010 and London 2012, that the respective LOCs have been influenced by the sustainability practices undertaken in the Torino 2006 Winter Games and will be addressing sustainability as a major concern (IOC, No date).

The 2006 FIFA World Cup LOC were inspired by the successes of Australia for the 2000 Summer Olympics in Sydney and submitted a chapter called *Environmental Concept* for the stadia as part of their bid campaign even before FIFA required any commitment to *Environmental Protection or Sustainable Development*.

The Green Goal initiative was developed by the 2006 LOC who worked with the Öko-Institut and the World Wildlife Fund (WWF) to develop guidelines and objectives for the event. Implementation of the initiative was difficult, mainly because construction of the stadia had already begun. The programme therefore only had a limited impact on the stadium planning (Öko-Institut, 2006).

Following Germany's successful hosting of the 2006 World Cup, FIFA (like the IOC following the Lillehammer Games in 1994) showed its support for environmental protection by adding a *Green Goal* chapter in its *Football Stadiums: Technical Recommendations and Requirements* (FIFA, 2007) manual and the incorporation of *Environmental Protection* in the host city agreement with the 2010 FIFA World Cup LOC and the host city (CoCT, 2006, pp 3). The host cities have been bound by this agreement to plan, implement and operate the 2010 stadia in an environmentally sustainable manner. South African legislation (which has been guided by global priorities encapsulated through documents like the Agenda 21, Millennium Development Goals and the Johannesburg Plan of Implementation (DEAT, 2006)) has provided additional guidance.

3 DEVELOPMENT OF THE SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT) FOR STADIA

3.1 Background on the tool

The SBAT was developed to support the development of a more sustainable built environment within South Africa's developing country context. The tool draws on international best practices and has been refined through use in South Africa that reflects the local context and policy. The tool provides a robust framework/methodology that assesses the sustainability performance of proposed designs and existing buildings. The framework/methodology includes five criteria in all three sustainability aspects, namely:

- **Economic** (local economy, efficiency, adaptability and flexibility, ongoing costs, capital costs);
- **Environmental** (water, energy, waste, site, materials and components); and
- **Social** (occupant comfort, inclusive environments, access to facilities, participation and control, education, health and safety) (Gibberd, 2001).

Each of the 15 criteria has a set of five sub-criteria linked to indicators that are used to measure the sustainability performance of a proposed design or existing building (see Table 1).

Table 1 The Structure of the SBAT

Sustainability aspect	Criteria	Sub-Criteria	Indicator
EC ECONOMIC	EC1 Local Economy	EC1.1 Local Labour	Use of local (from within 50km of the site) labourers
		EC1.2 Local Materials	Building material sourced from within the country
		EC1.3 Local Materials and Components	Material and components sourced from within the country
		EC1.4 Local Furniture and Fittings	Furniture and fittings sourced from within the country
		EC1.5 Maintenance	Maintenance and repairs can be undertaken by local SMMEs (turnover of <R5m)
3 Sustainability aspects in total	15 criteria in total	75 sub-criteria in total	75 indicators in total

3.2 Need for the development of a stadium specific tool

The review team proposed the use of the existing SBAT framework/methodology with adaptations to reflect the stadium building type. Table 2 outlines some differences between commercial buildings (for which the SBAT was originally intended) and stadium. This brief comparison shows

that the two building types cannot be compared and therefore a tool targeting one building type (i.e. commercial building) cannot be used to measure the sustainability performance of the other (i.e. stadium) without being biased to the other (i.e. stadium).

Table 2 Comparison between a commercial building and a stadium

	Commercial building	Stadium
Definition	A commercial building is a building type that is used for commercial use, including office buildings, warehouses, or retail (Wikipedia contributors, 2007).	A modern stadium is a predominantly outdoor place used for sports, concerts or other events. It consists of a field that is partly or completely surrounded by a structure designed to allow spectators to stand or sit and view the event (Wikipedia contributors, 2008).
Users	540 employees are accommodated in the building. At maximum capacity each employee has a space of 16,26m ² /occupant	50'000 spectators will seat on a structure that is open to most external element. Each spectator has a space of
Occupancy	Approximately 260 days/year for a minimum of 12 hours/day	A minimum of 30 days/ year for a minimum of 4 hours/event
Area Analysis	More than 50% of the floor space is used for commercial purposes (TeachmeFinance.com, No date).	More than 50% of the floor space is used for spectator seating, VIP and media facilities.

3.3 Development of the SBAT for Stadia

The literature review of existing environmental assessment tools suggested that there was no tool that had been developed specifically stadia. Some existing environmental assessment tools such as Leadership in Energy and Environmental Design (LEED) and Strategic Environmental Assessment (SEA) were used to measure the environmental sustainability of the Torino 2006 and Vancouver 2010 Olympic events, respectively. The British Research Establishment Environmental Assessment Methodology (BREEAM) was adapted to incorporate the social aspects that are usually excluded from the scheme for the sustainability design management of the London 2012 Olympic Games. However no tool specific to stadia had been developed.

The SBAT framework/methodology was therefore used as a point of departure for the development of the stadia tool. Only the indicators were reviewed and changed through the following process:

- Previous FIFA World Cup stadia were reviewed. This enabled the SBAT developers to identify key performance areas for the building type in order to add indicators to relevant criteria.

Table 3 Adaptation of the Day lighting sub-criteria for the SBAT for Stadia tool

	SBAT Office	SBAT for Stadia
Criteria: SO 1 Occupant Comfort	Occupant Comfort	For the SBAT for Stadia, this criteria is changed to <i>Spectator Comfort</i>
Sub-criteria: SO1.1 Day lighting	Day lighting	For the SBAT for Stadia, this sub-criteria is changed to <i>Shading</i>
Indicator	Percentage of occupied spaces that are within a distance 2H distance from a window (where H is the head height of the window)	Percentage of spectators shaded at midday

A wide range of indicators was developed from this review. Table 3 shows an example of how the indicator for the *Day lighting* sub-criteria was adapted from the original SBAT Office to reflect a stadia specific indicator measuring the comfort of the spectator by calculating the proportion of shaded spectator seating during midday.

- From the range of indicators developed, a selection of indicators was prioritised. This led to the elimination of the least appropriate indicators, in some instances with the assistance of a relevant specialist, resulting in a set of five indicators per sub-criteria.
- The remaining indicators then formed part of the SBAT for Stadia which was tested and refined through application on the first stadium assessed for the review project.

Aspects of the tool which require further refinement are the targets against which the ratings are measured. This is due to the limited information available on stadia in this regard. The majority of the targets currently used is based on international practice and may not necessarily be suitable for a South African context. It has, therefore, been difficult to gauge the success of the approach of the first two stadia assessed. Targets will be drawn from local best practice through the review as more stadia are assessed, enabling assessments to become more refined.

4 REVIEW OF THE GREENING STATUS OF THE 2010 FIFA WORLD CUP

The original terms of reference (ToR) for the proposal received from DEAT included the environmental assessment of water, energy, waste and transport issues as outlined in the Green Goal Report (iSeluleko Consulting, 2007). The review team's successful proposal to DEAT responded to these issues and included the suggestion that the SBAT be used to address some of the broader social and economic issues rather than solely focusing on environmental issues.

To date, two stadia and one training venue have been assessed. For the purposes of this paper, the focus will remain on the stadia for the event not on the training venue. The two stadia will be referred to as stadium A and stadium B in order of commencement.

The review of each stadium was undertaken in three stages (with stadia programmes staggered due to differing starting dates). The description of each review stage (Green by Design *et al*, 2007) is provided in the following sub-sections with an outline of the processes undertaken for the completion of an SBAT for Stadia assessment.

4.1 Stage 1: The Initial Workshop

The objective of the first stage was to review the existing sustainability initiatives and undertake an appraisal of additional opportunities that had not been explored.

During this stage, a full day workshop with the stadium authority and individual professional team members was held. This provided the review team with a broad scope of the sustainability initiatives initially being implemented in the stadium design. These included energy, water, waste, transportation, urban design and material selection.

Following the workshop, additional information was requested from the professional team, including technical documentation (i.e. a site plan, plans of all the levels, sections along both axes of the stadium) and any available and appropriate reports.

The information gathered from the workshop and from the professional team following the workshop was used to develop the first SBAT appraisal and the first draft of the stadium review report. The report consists of two parts namely, the general information and the stadium review. The general information presents the host city's activities regarding sustainable development and provides a contextual introduction of the stadium. The stadium review shows the results of the first SBAT appraisal and describes how the stadium design performs in terms of the environmental sustainability. Additional opportunities that have not been explored by the design team are incorporated into the report.

At the end of this stage, gaps in information were highlighted particularly with regard to the SBAT which could not be finalised without the missing data. The report, including the incomplete SBAT appraisal, was sent to the stadium authority who shared this with the professional team.

4.2 Stage 2: The Interim Workshop

The objective of the second stage was to assess the feasibility of each of the additional opportunities identified in the first draft report.

During this stage, a half day workshop with the stadium authority and selected professional team members was held. This provided the review team with an opportunity to present the first draft

report. Stadium A provided valuable feedback, however, too much time was spent discussing the SBAT rating. This drew attention away from discussion about the strengths and weaknesses of the approach and how gaps could be addressed. The rating figures were left out from subsequent reports for the stadia. This strategy seemed to be successful and guided the process away from a *point-scoring exercise* to constructive discussion on how to improve the sustainability of the stadium in a balanced and effective way. Following the feedback and SBAT discussion session, the shades of green decision-making matrix, developed by GbD, was drawn up to assist in allocating resources for the additional opportunities identified in the first draft report. Both of the stadia reviewed have reached this stage, however, stadium A has had an additional visit because required processes undertaken during the workshop were improved during the visit to stadium B.

Following the workshop, a SBAT questionnaire was designed to capture missing information. This specifically sought information that was not easily accessible from drawings, reports or other documents submitted. The questionnaire was sent to the stadia authorities who forwarded it to their respective professional teams. The questionnaire was then completed by one or more professional team members of stadium B. However, having previously provided some of the required information, the professional team members of stadium A were reluctant to take the time required to provide this information.

At the end of this stage, a second draft report including the revised SBAT and a shades of green matrix was sent to the stadium authority (with fewer gaps in information) for review and comment.

4.3 Stage 3: The Final Workshop

The objective of the third and final stage was to finalize and present the final report to the stadium authority and selected professional team members and to submit the final report to DEAT. Only stadium B has reached this stage, however, the presentation to the stadium team and submission of the report to DEAT still needs to take place.

During this stage, feedback received from the stadium teams is incorporated into the report to form a final report. A half day workshop with the stadium authority and selected professional team members will be held. This will provide the review team with an opportunity to present the final report incorporating all the comments received from the stadium authority and professional team.

The final report consisted of a completed SBAT appraisal with information used from the completed SBAT questionnaire. The SBAT diagram for the stadium B has been incorporated in the report without the rating figures and overall score (see Figure 1 for a sample of an SBAT report) below the radar diagram.

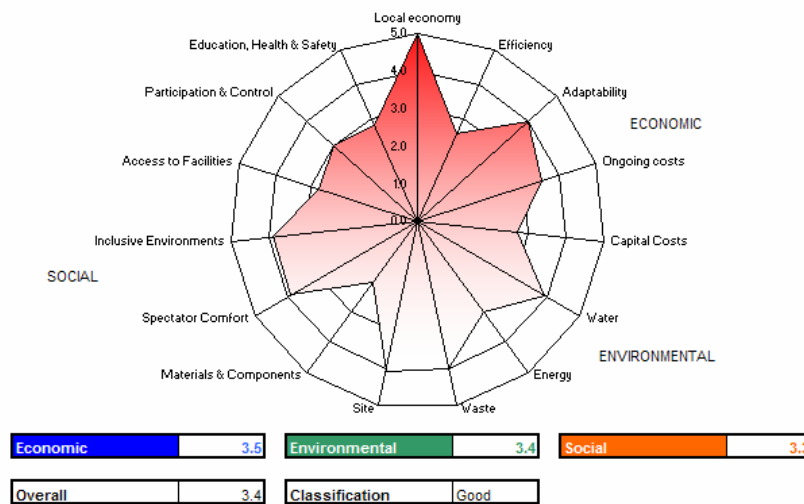


Figure 1 Sample SBAT Report presented as radar diagram

4.3.1 An Overview of the SBAT Performance

The SBAT report in Figure 1 indicates that the overall sustainability performance of the sample stadium is good and fairly well balanced across the three different sustainability areas. Relatively poor performing areas include efficiency, capital costs and materials and components rated just under a score of 3 (*Average*). Areas that appear to perform well include the local economy, adaptability and site rated well over 3 (*Good to Very Good*).

The overall rating of 3.4 (*Good*) indicates that the approach taken is robust and may lead to a *Very Good* sustainability performance through the adoption of sustainable technology and management techniques. The balanced performance (ratings vary from 3.3 to 3.5) within the three sustainability areas confirms that there has been an even and effective handling of the performance objectives and that one area (such as environmental issues) has not been allowed to eclipse the others. This balance is likely to have been achieved as a result of the experience of the professional team, the procurement policy and other policies being applied to the project.

5 FINDINGS

The paper presents the following findings:

5.1 Appropriateness of the SBAT for Stadia for reviewing the 2010 FIFA World Cup stadia

The 6th principle of the Rio Declaration on Environment and Development states that the *special situation and needs of developing countries...shall be given special priority...* (UN, No date b). This suggests that, as a developing country, South Africa needs to ensure that its social and economic issues are addressed before the environmental ones.

The review project aptly widened the scope from a purely environmental focus and acknowledged South African local concerns by using the SBAT which has been found to be the most suitable tool for a developing country context (Kaatz *et al*, 2002). However, since SBAT for Stadia is the first tool of its kind, it has been difficult to obtain local targets or benchmarks for the assessment of the sustainability performance of the stadia. These will be developed as new stadia are assessed.

The use of the tool was therefore appropriate for the review project as it incorporated all three dimensions of sustainability.

5.2 The execution of the SBAT for Stadia in the Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa project

The paper finds that the process undertaken using the SBAT for Stadia was initially ineffective, as opportunities such as the first workshop were not used to their fullest extent. The development of the SBAT questionnaire in the second stage (following the stadium A visit) resolved this issue, as the questionnaire provided an instrument for collecting information that is not readily available in a report or drawing. This will therefore be useful for future stadia assessed under the review project.

As with other environmental interventions, the SBAT for Stadia needs to be introduced during the early stages of the design phase to make the maximum impact on the environmental or sustainability performance of the building. Figure 2 shows this and further illustrates that when the design stage has passed, opportunities to influence the environmental sustainability lessen substantially (Department of Environment and Heritage, 2006). The ability to influence any of the 2010 FIFA World Cup stadia has lessened as construction is underway for most of them, however, the host city agreements signed and legislative guidance provided have ensured that environmental concerns are addressed. The SBAT for Stadia provides a framework/methodology that enables the review of not only environmental issues, but also the more urgent social and economic ones. Its use for the review process, although initially ineffective has in general been successful.

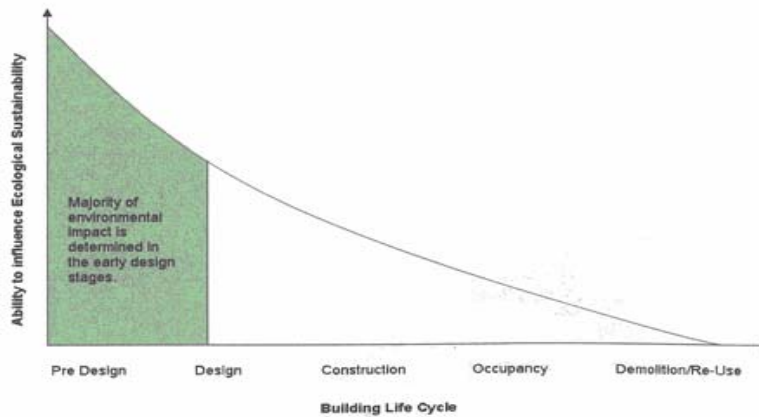


Figure 2 Influence on ecological sustainability by building lifecycle stage (Department of Environment and Heritage, 2006)

6 CONCLUSIONS

The use of the SBAT for Stadia has not made a significant impact on the design because the review project commenced seven months after construction had started. However, it provides a framework/methodology that is useful for assessing whether the economic and social issues, which were key objectives in South Africa's bid campaign, are addressed. The paper therefore finds that the SBAT for Stadia added value to the project by focusing on these issues which had initially not been part of the review project.

In addition, prior to the SBAT for Stadia, there were no assessment tools developed to measure the environmental or sustainability performance specific to stadia. The development of the SBAT for Stadia has resulted in a set of indicators and targets which have not been previously available. The development of the tool will be useful for assessing the sustainability performance of future stadia construction and major refurbishment projects.

7 REFERENCES

- Beall, J., Gelb, S. & Hassim, S. 2005. 'Fragile Stability: State and Society in Democratic South Africa'. *Journal of Southern African Studies*. vol. 31. no. 4. pp. 681-700.
- City of Cape Town (CoCT). 2006. *City of Cape Town and Western Cape Provincial Government – Drafting Greening Principles for the 2010 World Cup*. CoCT. Cape Town.
- Cornelissen, S. & Swart, K. 2006. 'The 2010 Football World Cup as a political construct: The challenge of making good on an African promise'. *The Editorial Board of the Sociological Review*. vol. 54. pp. 108-123.
- Department of Environment and Heritage (DEH). 2006. *ESD Design Guide for Australian Government buildings (Second Edition)*. DEH. Canberra. Available: <http://www.australia.gov.au/> [Accessed: 5/1/2008]
- Department of Environmental Affairs and Tourism (DEAT). 2005. *2010 Soccer World Cup Tourism Organising Plan Presentation*. South Africa. Pretoria.
- DEAT. 2006. *People - Planet - Prosperity: A Strategic Framework for Sustainable Development in South Africa*. South Africa. Pretoria.

- Fédération Internationale de Football Association (FIFA). No date. *FIFA.com*. Zurich. Available: <http://www.fifa.com/> [Accessed: 3/8/2007]
- FIFA (ed). 2007. *Football Stadiums: Technical Recommendations and Requirements (4th edition)*. FIFA. Zurich. Available: <http://www.fifa.com/> [Accessed: 3/8/2007]
- Gibberd, J. 2001. 'Building Sustainability: How Buildings can support Sustainability in Developing Countries'. In proceedings: *Continental Shift 2001 - IFI International Conference, Johannesburg, 11 – 14 September 2001*. Johannesburg. South Africa.
- Green by Design, Paul Carew Consulting & CSIR. 2007. *Review of the Greening Status of the Stadia for the 2010 World Cup in South Africa: Inception Work*. DEAT. Pretoria.
- International Olympic Committee (IOC). 2007. *Fact sheet: Environment and Sustainable Development*. IOC. England. Available: <http://www.olympic.org/> [Accessed: 12/9/2007]
- International Olympic Committee (IOC). No date. *The Official Website of the Olympic Movement*. IOC. England. Available: <http://www.olympic.org/> [Accessed: 12/9/2007]
- iSeluleko Consulting. 2007. *Review of the Greening of the RSAs Stadia for the World Cup, 2010: Terms of Reference*. DEAT. Pretoria.
- Kaatz, E., Barker, G., Hill, R. & Bowen, P. 2002. 'A Comparative Evaluation of Building Environmental Assessment Methods: Suitability for the South African Context'. In proceedings: *Sustainable Building 2002*, 23-25 September, Oslo, Norway. Published abstracts p.376, paper 4 on CD, pp.1-6.
- Knight, R. 2006. 'South Africa 2006: Challenges for the Future'. *South Africa Delegation Briefing Paper*. New York.
- Ndaba, D. 2007. 'World Cup 2010: Building for a Spectacular. A Progress Report Card on the Ten World Cup Stadia'. *Engineering News*. pp. 16, 17& 95.
- Öko-Institut 2006, *Green Goal Report*, Organising Committee, Frankfurt/Main. Available: <http://www.fifa.com/> [Accessed: 4/8/2007].
- TeachmeFinance.com. No date. *Definition of Commercial building*. Available: http://www.teachmefinance.com/Scientific_Terms/Commercial_building.html [Accessed: 3/6/2008].
- Torino Organising Committee (TOROC). 2005. *Sustainability Report 2004/05*. TOROC. Torino. Available: <http://www.torino2006.org/> [Accessed: 12/9/2007].
- United Nations (UN). No date a. *UN NGO Committee on Sustainable Development Sustainable Development Definitions*. UN. New York. Available: <http://www.unngocsd.org/> [Accessed: 3/4/2008].
- United Nations UN. No date b. *United Nations* [Homepage of UN]. Available: <http://www.un.org/english/> [Accessed: 12/12/2007].
- Wikipedia contributors. 2008. *Stadium* [Homepage of Wikipedia, The Free Encyclopedia]. Available: <http://en.wikipedia.org/wiki/stadium?oldid=196079126> [Accessed: 3/5/2008].

Wikipedia contributors. 2007. *Commercial building* [Homepage of Wikipedia, The Free Encyclopedia]. Available: http://en.wikipedia.org/wiki/commercial_building?oldid=120808133 [Accessed: 3/5/2008].

World Commission on the Environment and Development (WCED). 1987. *Our Common Future*. Oxford University Press. Oxford.