

# 2010

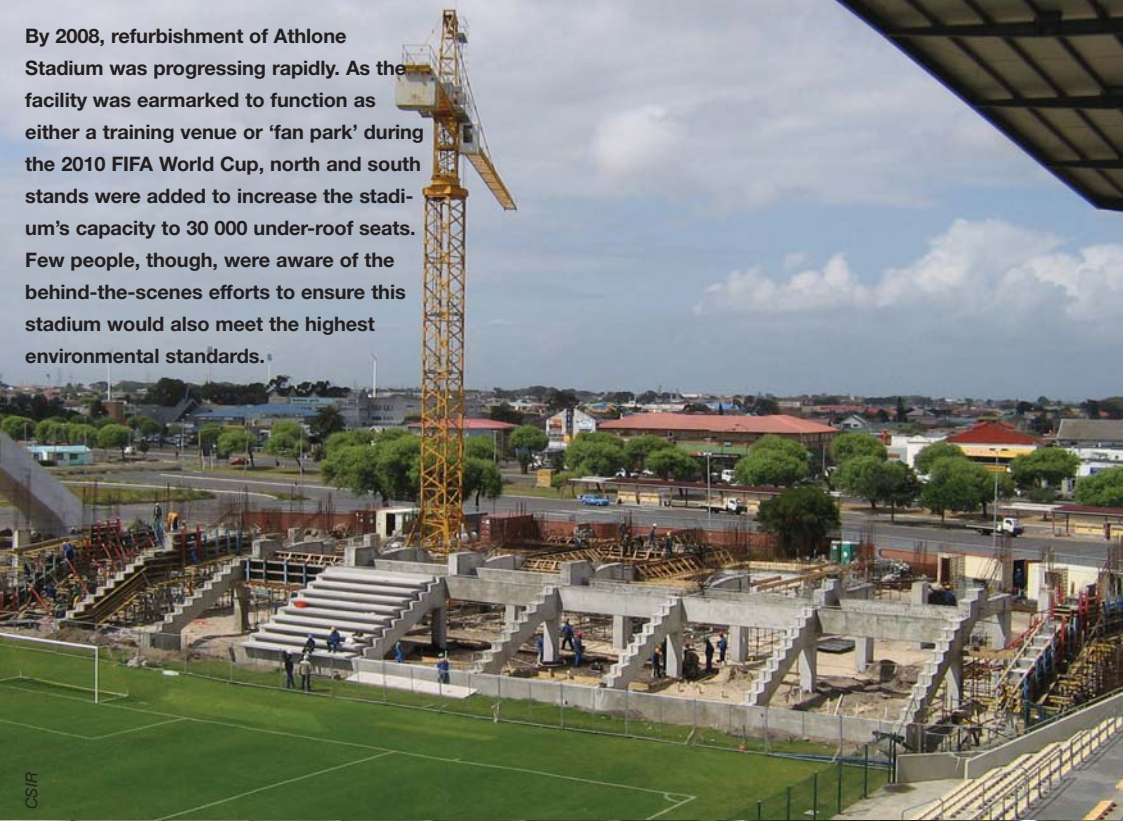
## FIFA World Cup

Athlone Stadium

Environmental performance enhanced



By 2008, refurbishment of Athlone Stadium was progressing rapidly. As the facility was earmarked to function as either a training venue or 'fan park' during the 2010 FIFA World Cup, north and south stands were added to increase the stadium's capacity to 30 000 under-roof seats. Few people, though, were aware of the behind-the-scenes efforts to ensure this stadium would also meet the highest environmental standards.



**A**s one of South Africa's 2010 FIFA World Cup training venues, Athlone Stadium is an impressive structure. Its arch-supported roofs create an iconic image. As is the case with all 2010 match and training venues, members of the project team for Athlone Stadium have gone to great lengths to ensure the refurbished facility boasts cutting-edge and environmentally-appropriate features. But are these stadia meeting best environmental performance standards? Have they been designed in line with "green building" principles?

To answer these questions, the South African Department of Environmental Affairs, through the Urban Environmental Management Programme (UEMP), which is funded by the Royal Danish Embassy, commissioned a review of the greening status of the FIFA World Cup stadia (the official match stadia and training venues). Not only would this establish how green the stadium designs were, it would also give the design teams the opportunity to enhance some green aspects of their designs. At the same time, this review would summarise the lessons learned for the benefit of other stadium designers and operators.

Five of South Africa's FIFA World Cup match and training venues participated in the review:

1. Green Point Stadium (Cape Town)
2. Moses Mabhida Stadium (Durban)
3. Athlone Stadium (Cape Town)
4. Royal Bafokeng Stadium (Rustenburg)
5. Peter Mokaba Stadium (Polokwane)

***This booklet tells the story of  
Athlone Stadium***

# Athlone Stadium goes green



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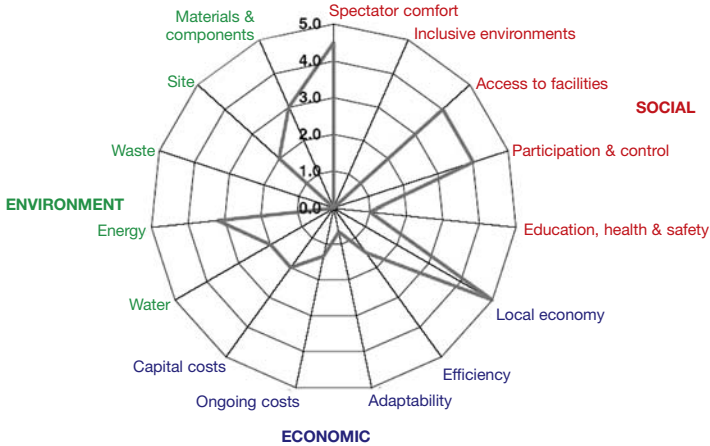
Bruce Sutherland/City of Cape Town

## Key issues **explored**

Following an extensive review of the environmental performance of Athlone Stadium, the sustainability review team concluded large interventions would not be possible. This was because most of the refurbishment was already under way at the time of the review. However, they stated, smaller interventions and improvements in the management of the facilities could play a large role in greening the stadium. Key issues that could be explored in this regard ranged from training and incentives for facilities-management staff and

construction workers, monitoring the stadium's social and economic impact, specifically the local economy, and enhancement or safeguarding of pedestrian paths.

The sustainability review team utilised the Sustainable Building Assessment Tool (SBAT) and a “shades of green” analysis process to determine whether or not Athlone Stadium met sustainability performance benchmarks. These tools were, in turn, used to identify the key interventions required for the stadium to become truly green.



### Triple-bottom-line approach

In terms of the SBAT, the performance of Athlone Stadium was measured in relation to social, economic and environmental criteria. In certain aspects, the sustainability performance of the stadium was found to be good (especially in terms of local economy and spectator comfort). However, as would be expected of an existing and already established stadium, the sustainability performance was unbalanced with lower scores awarded in terms of adaptability, waste management and the establishment of an inclusive environment.

## Stadium performance assessed

To reach their conclusions, members of the review team assessed Athlone Stadium in accordance with the CSIR's Sustainable Building Assessment Tool (SBAT). As sustainability deals not only with environmental performance but also social and economic issues, the SBAT tool embraces the triple-bottom-line approach. This is significantly different from the approach followed in 2006. Germany's Green Goal initiative for the 2006 FIFA World Cup exclusively focused on environmental issues then.

## SBAT criteria

The key performance areas measured against the SBAT tool comprised:

Economy:	Environment:	Social:
<p><b>local economy</b> Local labour, local building materials, local components and fittings, local furniture, as well as maintenance.</p> <p><b>efficiency</b> Capacity, occupancy, space per occupant, shared parking and multiple use.</p> <p><b>adaptability</b> Alternative uses, external space, services, as well as media and suite flexibility.</p> <p><b>ongoing costs</b> Water and energy consumption, cost centres, maintenance and cleaning, and facilities management.</p> <p><b>capital costs</b> Training, labour intensity, support of small, medium and macro enterprises, sustainable technology, and private-sector funding.</p>	<p><b>water</b> Rainwater, water efficiency, run-off, greywater and planting.</p> <p><b>energy</b> Location, passive environmental control, energy efficiency, control and building-management system, and renewable energy.</p> <p><b>waste</b> Waste-management facilities, waste minimisation, demolition and construction waste.</p> <p><b>site</b> Brownfield site, neighbouring buildings, vegetation, construction process and landscape inputs.</p> <p><b>materials and components</b> Roof, concrete, roof efficiency, superstructure efficiency and hazardous materials.</p>	<p><b>occupant comfort</b> Shading, ventilation, large screen and crowding, proximity.</p> <p><b>inclusive environments</b> Transport, 'way finding', space, toilets and distribution.</p> <p><b>access to facilities</b> Accommodation, banking, pedestrian and cycle routes, and food and drink.</p> <p><b>participation and control</b> Environmental control, role players, social spaces, sharing access and local community.</p> <p><b>education, health and safety</b> Education, website, health, safety and security.</p>

# Water consumption minimised

## **Interventions implemented**

**Positive water-saving features incorporated initially at**

**Athlone Stadium included:**

- dual-flush toilets in VIP facilities;
- only the pitch is irrigated;
- no additional landscaping;
- most hand-wash basins in public facilities supplied with cold water only; and
- stadium design allowing for the installation of water meters without having to redo the plumbing.

## **Additional interventions proposed**

**Additional water-saving interventions proposed by the sustainability review team included:**

- proper commissioning, monitoring and maintenance of fixtures such as dual-flush toilets and metering valves;
- intelligent irrigation for the pitch;
- sub-metering to monitor consumption of different sections and functions;
- placing the responsibility of water consumption on the facilities manager – the bills go directly to the municipality and do not leave an incentive to save water locally; and
- educating stadium visitors about water efficiency by making the metering visible in the stadium.

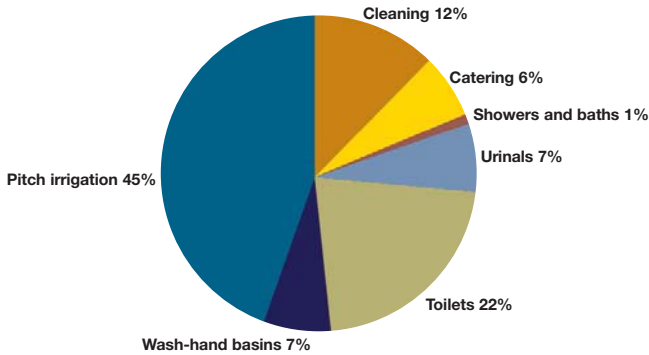
## Water model assumptions

The baseline scenario for a stadium with capacity to host 40 000 spectators predicts annual water consumption of 23 580 m<sup>3</sup>/year.

### Water consumption by:

Pitch irrigation	10 530 m <sup>3</sup> /year	44,66%
Wash-hand basins	1 656 m <sup>3</sup> /year	7,02%
Toilets	5 154 m <sup>3</sup> /year	21,86%
Urinals	1 615 m <sup>3</sup> /year	6,85%
Showers and baths	225 m <sup>3</sup> /year	0,96%
Catering	1 500 m <sup>3</sup> /year	6,36%
External landscaping	0 m <sup>3</sup> /year	0,00%
Cleaning	2 900 m <sup>3</sup> /year	12,30%
<b>Total water consumption</b>	<b>23 580 m<sup>3</sup>/year</b>	<b>100,00%</b>

### Water consumption baseline



### Significant water consumers

In the case of Athlone Stadium, pitch irrigation accounts for 45% of total water use, the toilets 22% and cleaning 12%.



## Water consumption: final findings

Because Athlone is an existing stadium and construction of the new stands was progressing rapidly at the time of the sustainability review, it was not possible to implement major interventions, such as rainwater harvesting, reuse of greywater, permeable paving or more efficient sanitary fixtures.

Significant water savings could be achieved, in future, if artificial turf is installed on the pitch. However, as training venues for the 2010 FIFA World Cup, all the stadiums have to use the standardised natural pitch specified by FIFA.

In the meantime, the water efficiency would depend on the operation of the stadium. In order for the facility manager to operate the stadium efficiently, monitoring of water consumption would be crucial. Water meters and sub-meters should, therefore, be installed throughout Athlone Stadium and linked to the building-management system. In addition, the facilities manager should be furnished with operation and management guidelines; detailing aspects such as cleaning (use air blow-down cleaning rather than water blow-down), ongoing metering and monitoring, routine check-ups (fixing leaks, broken pipes or fixtures), as well as education and awareness among employees and visitors.



CSIR

Dual-flush toilets help reduce water consumption at Athlone Stadium.

## Shades of green

Water-saving initiatives at Athlone Stadium can be categorised as cutting-edge (representing new thinking and technologies), best practice (initiatives implemented elsewhere and now a desired standard) and good practice (methods used widely for many years).

### Best-practice interventions

- Dual-flush toilets for VIP facilities**  
 Water consumption is reduced during sporting events
- Self-closing metering valves**  
 Additional water savings are achieved during sporting events
- Low-flow shower heads**  
 Fitting of all showers with low-flow heads (10 l/minute) and flow regulators (9 l/minute) results in a further reduction of potable water consumption during events.

# Energy efficiency achieved

## Interventions considered

**Positive energy-saving features being considered or already implemented at Athlone Stadium include:**

- As an open stadium, ventilation is natural (wind-driven) while natural light penetrates the stands.
- Different floodlighting levels for training and actual matches.
- A generator is hired to power the floodlights during matches.
- As hot water is sourced from individual geysers, water heating could be isolated or timed. Geysers only need to be switched on when and where they are needed.
- Hot water is not provided for spectators' ablutions.
- Compact fluorescent light bulbs should be fitted in all internal spaces.
- Feature lighting is linked to a timer or light sensor.
- The stadium is wired to facilitate load shedding. Geysers and non-essential lighting circuits can be switched off if the load reaches maximum capacity.
- The large roof expanse could be exploited for a photovoltaic installation.

## Additional interventions proposed

**Additional energy-saving interventions proposed by the sustainability review team included:**

- Passive, night cooling should be encouraged. Rather than ceilings for the new stands, exposed thermal mass is recommended.
- Equipment should be better controlled through timers on all geysers and motion sensors on lights.
- Sub-meters for each of the distribution panels in the individual stands.
- Installation of a central building-management system (BMS) with individual control of electrical components, such as lights and air-conditioning, would preclude the facilities manager having to go to each individual distribution board or into the VIP boxes to switch systems off.
- All electricity bills go to head office. Copies should be sent to the facilities manager so that he can monitor energy-consumption patterns effectively.

## Energy savings: final findings

Although the stadium manager is able to switch electricity supply off on entire floors and thus save energy, this arrangement is not sufficiently flexible. It would be more effective if the facilities manager was able to turn individual systems off from a central point rather than having to walk to the specific zone. As a sports stadium is only used intermittently, the most significant energy savings can be achieved by reducing the running hours of systems. In addition, it is essential to monitor consumption patterns to determine whether or not the implemented energy-saving methods are effective. Athlone Stadium would benefit from a centralised BMS if the stadium manager has centralised control over the various electrical systems.

## Shades of green

As is the case with water-saving practices (see page 9), energy-saving initiatives at Athlone Stadium can be categorised as cutting-edge, best practice or good practice.

### Best-practice interventions

- **Varying floodlighting levels**  
By allowing for different levels of floodlighting during training and actual matches, electricity consumption is reduced
- **Feature lighting on timer/daylight sensor**  
By reducing the running time of feature lights and through staged switching, significant energy savings can be achieved.
- **Time switches for feature lighting**  
By reducing the running time of feature lights and through staged switching, significant energy savings can be achieved.
- **Centralised-chiller air-conditioning system**  
Through central control, efficient compressors and pumps, additional energy is conserved.
- **Gas as energy source for cooking in kiosks and kitchens**  
This is a more efficient energy source for cooking.
- **Variable speed drives or soft starts on motors**  
With these technologies, it is possible for motors and pumps to draw only as much power as they need without reduced efficiency.

### Good-practice interventions

- **No hot water for basins in rest rooms**  
No energy-consuming geysers are required for spectators' ablutions.
- **Lighting systems enable localised control**  
Areas that are not being used can be switched off to save energy.
- **Central control room**  
All electrical systems can be managed from a central location, which facilitates effective management.

# Waste minimised

## Interventions considered

It was recommended that the Athlone Stadium professional team and contractors kept detailed records of construction waste recycled and sent to landfill. Record-keeping would encourage the minimisation of waste.

## Additional interventions proposed

**Additional waste-management interventions proposed by the sustainability review team included:**

- Separate bins for different types of waste throughout the stadium and the catering facilities.
- Development of “house rules” for waste management that would involve the packing industry’s recycling initiatives as well as the municipality.

## ‘Shades of green’

As is the case with water- and energy-saving practices (see pages 9 and 11), waste-management initiatives at Athlone Stadium can be categorised as cutting-edge, best practice or good practice.

### Best-practice interventions

- **Management of construction waste**  
Waste sent to landfill is minimised.

# Public transport encouraged

## Interventions implemented

- Railway infrastructure is being upgraded including “park and rail” facilities.
- Nearby Athlone Railway Station (1.7 km-away) is being upgraded .
- Non-motorised transportation systems upgrades in the vicinity of the stadium include the Klipfontein Corridor (R330-million), Athlone Stadium facilities (R4-million), a pedestrian bridge over the N2 linking Athlone to Langa (R12-million).
- Creation of public transport corridor and services includes the development of the N2 bus and minibus-taxi (BMT) lanes (R23-million) and the Klipfontein public transport corridor (R330-million).
- Visitors to Cape Town will make carbon-offset payments to help render the World Cup a carbon neutral event.

## Additional interventions proposed

- Detailed design and implementation of local streetscaping and landscaping along the Klipfontein Corridor to ensure that routes from public transport nodes to the stadium are comfortable and safe. Particularly issues such as weather protection (for example, bus shelters), environmental access (dropped kerbs and ramps) and capacity (to accommodate the numbers of people leaving/arriving at the stadium) should be considered.
- Existing pedestrian routes (informal paths) should be safeguarded.

## Shades of green

As is the case with water-, energy- and waste-management practices (pages 9, 11 and 12) public-transport initiatives at Athlone Stadium can be categorised as cutting edge, best practice or good practice.

### Cutting-edge

- **Carbon-offsetting programme**

### Best-practice interventions

- **Integrated ticketing system**

### Good-practice interventions

- **Upgrading of existing rail infrastructure**
- **Developing public transport corridor services**
- **“Park and rail” facilities**
- **Non-motorised transportation systems**
- **Various options (bus, mini-bus taxi, ‘dial-a-ride’)**



Cape Town's economy is boosted by the use of local materials in the construction of Athlone Stadium.

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# Appropriate materials specified

## Interventions implemented

For the construction of the additional stands at Athlone Stadium, local materials were used as far as possible, while concrete used in the construction of the stands contained 30% granulated blast-furnace slag.

## Additional interventions proposed

Additional interventions regarding the use of materials proposed by the sustainability review team:

- Finishes such as paints with low volatile organic compounds.
- Thorough accounting and recording of sources and quantities should be pursued.

## 'Shades of green'

As is the case with water-, energy-, waste-management and public transport (pages 9, 11, 12 and 13), material specifications can be categorised as cutting-edge, best practice or good practice.

### Best-practice interventions

- **Use of local materials**

Through the use of mostly local materials, the local economy is boosted while transport costs and the resultant carbon footprint are reduced.

# Additional interventions recommended

**Following the review of the existing Athlone Stadium and the design of the additional stands, making use of the SBAT, 'shades of green' and modelling studies, the sustainability review team recommended some crucial interventions.**

## **National programmes needed**

As the stadium would only be used for a few hours at a time, it would be difficult to recover additional capital spent on improving efficiencies. So most of the worthwhile additional interventions would fall outside the construction and refurbishment of the stadium and relate to national programmes, such as sustainable transport and carbon offsetting.

## **Energy-efficient lighting**

Further installation of energy-efficient equipment and lighting would help reduce energy consumption at Athlone Stadium – compact fluorescent lights are already used. As feature lighting is often the highest annual consumer of electricity in any stadium, this is an area where significant savings could be achieved – for instance, by installing a control system that allows for the lighting to be staged. Technology, such as LEDs, could also enhance energy efficiency.

## **BMS**

The installation of a building-management system (BMS) would help the facility manager achieve more efficient energy and water use as it would be possible to operate only the parts of the stadium in use at any given time.

## **Hybrid pitch**

If a hybrid pitch was installed, the requirement for irrigation would be at least 40% lower than in the case of a completely natural pitch. Although the capital costs to install this sort of pitch would be high, the potential savings in water and maintenance could be significant.

## **Water and energy sub-metering**

Meters would assist the facility manager in efficient monitoring of water and energy consumption.

# The professional design team

## **Client:**

City of Cape Town

## **Professional team:**

**Architect:** MLH Architects & Planners

**Civil engineer:** Asch Consulting

**Structural engineer:** Axis

**Electrical engineers:** L Thompson & Co and Johardien & Associates

**Mechanical engineer:** Basil Nair & Associates

**Quantity surveyor:** LDM

## **Contractors:**

**South stand:** Group Five

**East, west and north stands:** Vusela Construction

## **The sustainability review team:**

GREEN by DESIGN WSP

PJ Carew Consulting

CSIR

## **Funding:**

Royal Danish Embassy

## **Publication of this booklet by:**

Brooke Patrick Publications, publisher of *Urban Green File*, *Architechnology* and *JFM Sports Facilities* magazines and e-mail bulletins, among others.

**This booklet is the third in a series of six covering five participating 2010 FIFA World Cup stadia and training venues, including an executive summary.**

**A booklet on lessons learned relating to the greening of the stadia, as well as the Sustainable Building Assessment Tool is also available.**

## **For a copy of this booklet:**

Visit the UEMP website: [www.uemp.org.za](http://www.uemp.org.za)

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*Bruce Sutherland/City of Cape Town*

**The fruits of the labour are becoming visible.  
By March 2009, the first of the additional stands had  
been completed.**



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