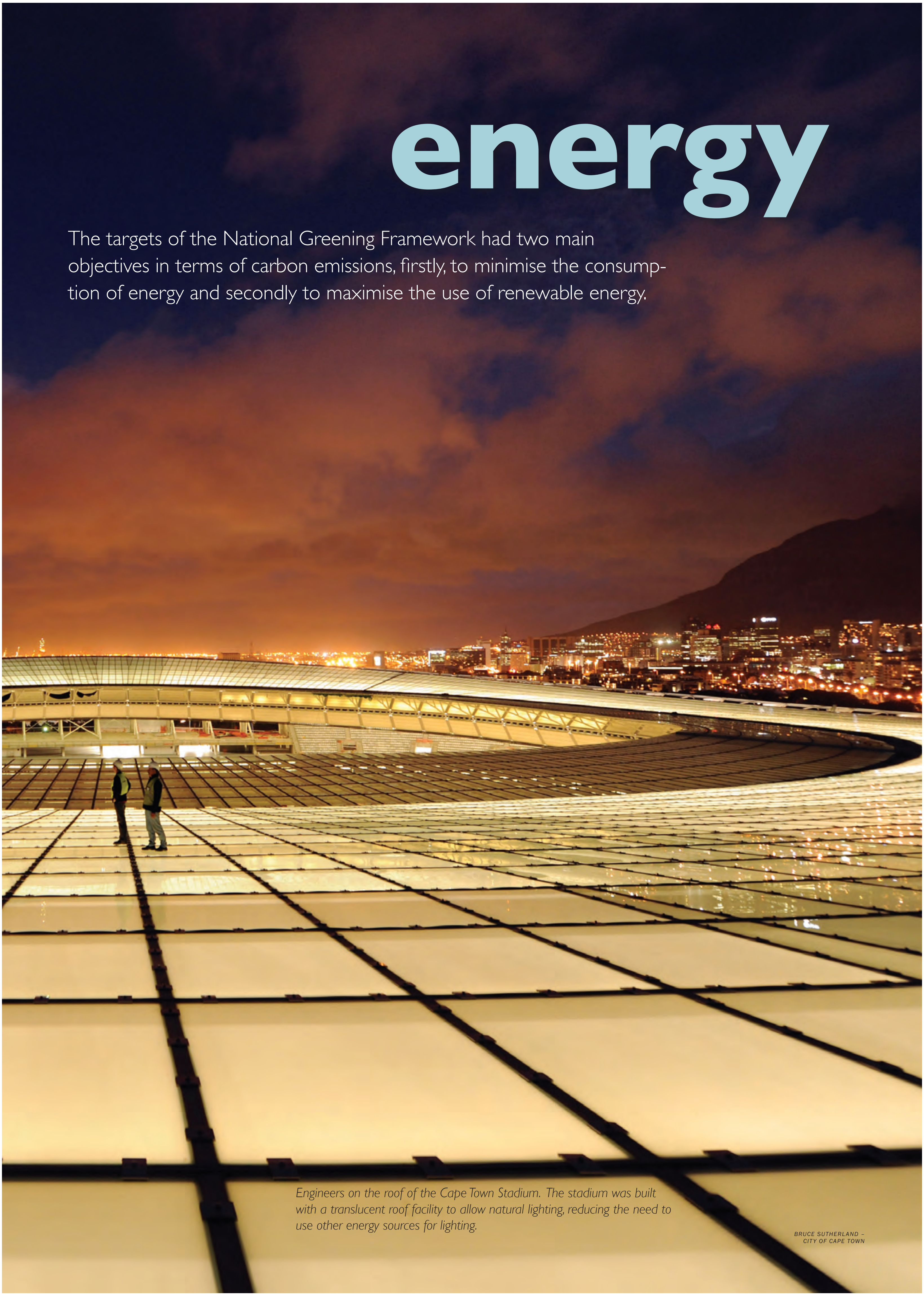
energy

The targets of the National Greening Framework had two main objectives in terms of carbon emissions, firstly, to minimise the consumption of energy and secondly to maximise the use of renewable energy.



Engineers on the roof of the Cape Town Stadium. The stadium was built with a translucent roof facility to allow natural lighting, reducing the need to use other energy sources for lighting.

BRUCE SUTHERLAND – CITY OF CAPE TOWN

Johannesburg's Soccer City Stadium.

4.1 Introduction

SOUTH AFRICA HAS BEEN IN THE GRIP of an energy crisis for some years now. A legacy of inadequate maintenance combined with political imperatives and a relentless pressure for development has kept the price of electricity artificially low for several decades. The result has been, amongst others, an influx of energy intensive firms into South Africa. Even more challenging is the fact that industrial, commercial and household users of electricity have had little incentive to use energy efficiently. These factors have led to ongoing pressure on the grid and contributed significantly towards the severe capacity shortfalls experienced in recent years.

With this in mind, the South African Government is taking action across the board, from implementing industrial energy efficiency programmes to directing the country's building regulations towards ensuring energy efficiency in new buildings. In the interim municipalities such as the City of Johannesburg and Tshwane are investigating the development of by-laws and incentive schemes to reduce energy consumption in their region. Another example is the South African Department of Trade and Industry, who have begun to phase out the sale of incandescent light bulbs.

ELECTRICITY SUPPLY PREPARATIONS:

- Securing regional networks and supplies to municipalities and key installations
- Optimising and integrating Eskom planning with the supply chain response capability planning of stadiums and surrounding regions, in the event of outages or operational emergencies
- Aligning consolidated risk profiles and treatment plans to help secure electricity supply chain from generation to distribution
- Forecasting capacity through municipal load control
- Accelerating 2010 demand-side management (DSM) initiatives
- Eskom capacity management
- Securing Southern African Power Pool member contributions
- Negotiating key customer (high-end consumer) capacity management
- Engaging with key business sectors (such as tourism) to improve energy efficiency by developing energy efficiency campaigns and messaging.

(Eskom, 2009)

4.1.1 Preparations and planning

The FIFA World Cup™ is the most widely televised sporting event globally. Thus, one of the main concerns on match days is to ensure the continuous and secure provision of energy. The FIFA World Cup™ Terms of Reference stipulated that the national energy provider, Eskom, guarantee an uninterrupted supply of energy for all 2010 games, and that generators capable of operating as primary energy sources be available at all stadiums. Preparations for Eskom's readiness for the event began as early as 2007 with the establishment of its Project 2010MW team, which worked in a broad-based partnership with local Host City Municipalities, the Southern African Power Pool and large industrial customers, to ensure a continuous supply of energy. All match events were supplied with electricity by local municipalities (which received their electricity from Eskom), with the exception of Rustenburg, which was supplied directly by Eskom (Eskom, 2010).

To guarantee an uninterrupted supply of electricity to key 2010 FIFA World Cup™ venues, Government fitted all ten stadiums with diesel-powered generators. This ensured undisturbed power supply during matches. Most of the stadiums were run

ENERGY AT A GLANCE FOR THE 2006 FIFA WORLD CUP™, GERMANY

Visitors: 3.4 Million
Average annual consumption of stadiums: 3.5 GWh
Total electricity consumption of stadiums and hospitality over WC period: 13 GWh
Average consumption per match: 170,000 kWh (0.17 GWh)

- A number of energy efficiency and energy saving technologies were employed to minimise electricity use in the stadium and precincts. 13 Million kWh of green electricity was purchased from a Swiss hydropower plant in Switzerland.
- Electricity accounted for carbon emissions of 2,490 CO_2e during the World Cup period.
- Mobile generators were used extensively – including diesel to ensure an uninterrupted supply to the stadiums. Diesel consumption was in the region of 660,000 litres.

Source: Öko-Institut 2006

directly from the generators during matches, with electricity from the grid only used as a back-up supply. Consequently, all 2010 World Cup stadiums were self-sufficient, placing little additional stress on the national power grid. The exception was the Peter Mokaba Stadium in Polokwane, which did use the national grid as its primary source.

With energy supply concerns aside, the Host Cities' next priority was to try ensure a low-carbon 2010 FIFA World Cup™. Two of the main aims of the National Greening Framework in relation to carbon emissions and energy were:

- To minimise the consumption of energy through energy efficiency measures, and;
- To avoid unnecessary carbon emissions and stress on the national grid, by maximising the use of renewable energy.

In line with its National Targets for Green Goal 2010 (DEA, 2008a), the LOC carried out baseline studies through a quantitative questionnaire for Vodacom Park Stadium, Loftus Versfeld (Tshwane), Royal Bafokeng (Rustenburg), Ellis Park (Johannesburg) and Newlands Stadium (Cape Town). Additional information was gained from three match day audits at Loftus Versfeld and Newlands. The baseline studies were used to develop a status quo for energy use at South African stadiums. The 2008 baseline study concluded that:

- None of the stadiums included in the study had energy management plans in place
- No active monitoring of energy was taking place
- None of the stadiums had any on-site renewable energy sources
- None of the stadiums had specific or detailed records of their energy usage (aside from municipal accounts)
- Most of the stadiums did not have comprehensive sub-metering of different facilities
- Most of the stadiums did not have energy efficiency programmes in place, although they were making use of energy saving lamps (CFLs) for general public lighting. Optimised management of lighting and HVAC (heating, ventilation and air-conditioning) was generally not carried out.

The study showed that what each of the stadiums needed was an operational energy management plan that specifically addressed energy efficiency and mechanisms for the monitoring of energy use. It was hoped that this would reduce the energy used at official venues by 15%.

Modern football stadiums are incredibly energy intensive to construct, operate and maintain. Floodlighting, air conditioning and lighting of the stadiums, and associated peripherals, such as media and catering facilities, are all highly energy intensive components of match day operations. FIFA stipulated an average pitch lighting level of 2,400 lux (a measure of light intensity or brightness) at camera level to meet the demands of modern high definition television viewing. This is significantly higher than the standard illumination level of 1,000 lux currently required for national televised games, represent a significant increase in energy usage.

MODERN FOOTBALL STADIUMS ARE **INCREDIBLY ENERGY INTENSIVE TO CONSTRUCT OPERATE AND MAINTAIN ...** FLOODLIGHTING, AIR CONDITIONING AND LIGHTING ... ARE ALL HIGHLY ENERGY INTENSIVE

As such, the installation of energy efficiency measures at new stadiums – and retrofitting of existing stadiums – was given high priority by Host City planning teams, as well as within the DEA National Greening Framework (DEA, 2008a). These interventions meant that not only would the stadiums be more energy efficient during the World Cup but also address their sustainability in the longer term.

4.2 Actions taken

THE TEN 2010 FIFA WORLD CUP™ STADIUMS vary in terms of size and specification, and therefore have varying levels of energy consumption (Table 9). A number of baseline studies were carried out in the run-up to the 2010 event. In the carbon neutral feasibility study (DEA, 2009a), the projected total electricity consumption of the Soccer City Precinct (expected to be the most energy intensive per match day) was a match-day consumption of 407 MWh and a total consumption of 3,257 MWh over the course of the World Cup. The Cape Town Stadium and Stadium Precinct consumption was estimated to be approximately 2,405 MWh for the duration of the World Cup event. In comparison, data captured during the 2010 event indicates that the Peter Mokaba Stadium in Polokwane consumed only 430 MWh of electricity during the same period.

Data received from the Host City of Rustenburg following the 2010 event indicates that total energy usage within the Royal Bafokeng Stadium and fan park was approximately 175 MWh per match. Of this, 53% was consumed by field lighting, making it by far the most energy intensive application. This was followed by air conditioning and ventilation (13%) and lighting (7.2%) (Figure 3).

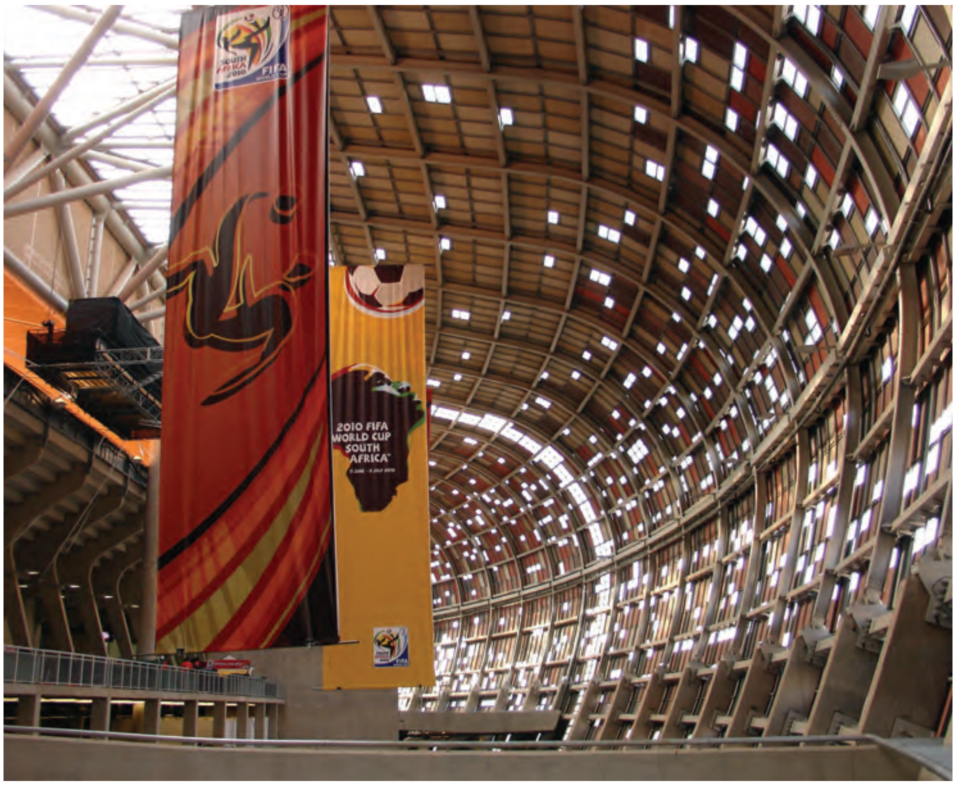
TABLE 9. ENERGY DEMAND ESTIMATES FOR WORLD CUP STADIUMS *(DEA, 2009a)*

Stadium/Host City	Seating capacity	Electrical cons. per match (MWh)	Electrical cons. total (MWh)	Emissions (tCO_2e)	Match days
Soccer City/Jhb	95,000	407	3,257	3,245	8
Ellis Park/Jhb	61,006	261	1,830	1,823	7
Moses Mabhida/Durban	70,113	194	1,358	1,353	7
Cape Town/Cape Town	68,000	301	2,405	2,397	8
Mangaung Stadium/Bloemfontein	48,000	212	1,273	1,269	6
Mbombela/Nelspruit	46,000	203	814	811	4
Nelson Mandela Stadium/P.E.	48,000	212	1,698	1,692	8
Loftus Versfeld Stadium/ Tshwane	50,000	22	1,327	1,322	6
Royal Bafokeng /Rustenburg	42,000	186	1,114	1,110	6
Peter Mokaba Stadium/Polokwane	46,000	203	814	811	4
International Broadcast Centre			807	804	
TOTALS			**16,696**	**16,637**	**64**

4.2.1 Energy Efficiency at the World Cup

DEVELOPING A TOOL FOR BEST PRACTICE IN STADIUM DESIGN

In 2007, the DEA commissioned (through the Urban Environmental Management Programme (UEMP) funded by the Royal Danish Embassy), a review of the greening status of five of the stadiums (official match stadiums and training venues) including Royal Bafokeng, Cape Town, Athlone, Moses Mabhida and Peter Mokaba stadiums. An adaptation of the Sustainable Building Assessment Tool (SBAT) (WSP GreenByDesign, 2010a-e) was created to assist with the design and operation of the stadiums. The aim of the assessments was to establish how sustainable the stadium designs were, and provide the design teams with the opportunity to further enhance the 'green' aspects of their designs. Energy efficiency was clearly an important criterion in the assessment of the overall sustainability of the stadiums.



Soccer City, Johannesburg, The hot climate of South Africa offers both significant challenges and opportunities for energy savings in terms of avoiding excessive levels of solar radiation to ensure spectator comfort, while maximising the use of natural lighting and ventilation.

The scale and expense of building such stadiums means that energy efficiency interventions are often now considered standard practice, particularly in consideration of potential cost savings. The hot climate of South Africa offers significant challenges and opportunities for energy savings such as avoiding excessive levels of solar radiation to ensure spectator comfort, while maximising the use of natural lighting and ventilation. A review of some of the interventions used in the stadiums is given below.

ENERGY BEST PRACTICE AT HOST CITY STADIUMS

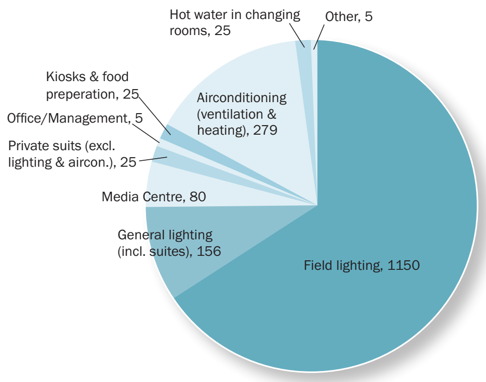
Passive design systems: day lighting and natural ventilation, solar control, and night time cooling in order to reduce reliance on electrical or electro-mechanical systems

- The external envelope of the Mbombela Stadium is cavity brickwork, which significantly reduces heat transfer through the wall. Most windows, particularly on the western façade of the stadium, were fitted with shading to reduce heat build-up.
- The mesh fabric cladding of the Cape Town Stadium allows 30% light through, and the white colour reduces thermal radiation. This means less energy is needed to cool the stadium environment.
- The Cape Town Stadium is built with a translucent roof to allow natural lighting, reducing the need to use other energy sources for lighting.
- Passive ventilation is aided through the design of open concourses at podium level between inner and outer façades to encourage natural air movement and reduce the need for cooling systems.
- In the Moses Mabhida Stadium, natural ventilation is facilitated by punched corrugated metal sheeting behind the façade. Natural lighting and a light-coloured roof reduce energy demand while the shade provided by the roof ensures spectator comfort.

Installation of energy efficient luminaries such as LEDs, fluorescent and compact fluorescent lighting reduces electricity consumption

- Moses Mabhida Stadium was fitted with energy-efficient LED lighting technology and T5 fluorescent lighting. Control gear such as electronic ballasts and timing controls for feature lighting were installed to help streamline energy usage.
- Compact fluorescent lights (CFL's) were installed in Soccer City Stadium. The use of CFL's has a lower energy demand than conventional lighting, reducing the amount of energy used.
- Nelson Mandela bay municipality has committed to installing motion sensors and compact fluorescent lights in the stadium offices and corridors.

FIGURE 3. MATCH DAY ENERGY USAGE AT THE ROYAL BAFOKENG STADIUM (SOURCE RUSTENBURG MUNICIPALITY)



Moses Mabhida Stadium, Durban

- The Royal Bafokeng Stadium employs the use of motion intelligent lighting systems to ensure that lighting is only in use when the zone is occupied.
- Cape Town Stadium's external lighting was designed to use high efficiency light sources, namely metal halide, fluorescent and LED lamp technologies. LED lighting on the façade provided high efficiency, long life, low maintenance illumination of the façade.

Installation of Building Management Systems (BMS) and creation of building zones allowing the control of individual zones and spaces and minimising unnecessary electricity consumption during low-use periods

- Soccer City, Cape Town, Moses Mabhida, Mbombela, Peter Mokaba and Nelson Mandela Stadiums were fitted with centralised BMS to control lighting and heating in the various building zones. This allows for an optimal management of ambient temperature (air conditioning) and lighting for each zone individually. The pumps and plants, heating and air conditioning in the Moses Mabidha Stadium are all controlled by a centralised BMS, minimising energy wastage.
- Results from BMS analytics and wastage assessments are being used in the post-world cup period to aid further rationing of electrical lighting and air conditioning systems. The Cape Town Stadium is currently undergoing sub-zoning to allow for separate zoning of emergency lighting.

Installation of energy saving measures for hot water geysers

- Many of the stadiums dispensed with hot water in the public sanitary facilities, making energy savings on electrical geyser systems.
- Tshwane and Mbombela Stadiums have installed solar water geysers to save on energy from intensive water heating and reduce operational costs.

GOING ABOVE AND BEYOND: SMART SYSTEMS WORK TO KEEP CONSUMPTION LOW

Mbombela Stadium (Nelspruit)

- Hot water is generated by waste heat from the air-conditioning plant and stored in an insulated tank in the plant for use during peak loads. Circulation pumps keep the hot water at the desired temperature as long as the air conditioning plant runs.
- A chilled water system was selected to serve 90% of the stadium due to its high efficiency and minimal use of refrigerant gasses. The plant is housed in an internal room with attenuated louvers to reduce noise pollution. The plant has been

configured to run at optimal efficiency under reduced load (i.e. no game) and peak load (during a game).

Moses Mabhida Stadium (Durban)

- Water was heated by heat pumps – a system that consumes as little as 35% of the energy of a direct heating system.
- The stadium's design stood out from the others in the promotion of energy efficiency in media and broadcasting & hospitality areas.
- The commitment to energy efficiency has produced a stadium projected to use more than 30% less electricity than Cape Town Stadium per match despite having a bigger seating capacity.

Cape Town Stadium

- A water-cooled, variable refrigerant volume cooling system – the first of its kind in South Africa – was used to cool small zones or systems efficiently.
- Ventilation fans in the parking garage of the stadium are activated when a certain level of carbon monoxide is detected. In certain times of low use the air supply system can be switched off altogether, leaving only the exhaust (outlet) system, which means significant savings in energy.

THE INSTALLATION OF FLOODLIGHTING CONTROLS IS ESTIMATED TO **SAVE AN AVERAGE OF 65% ON ENERGY CONSUMPTION** COMPARED TO THE STANDARD ALTERNATIVE

A CONSCIENTIOUS APPROACH: RETROFITTING AT TRAINING VENUES

While energy efficiency was a priority in the design of the Host City stadiums, it was also important that the existing training venues be improved. Funding from the Danish International Development Agency (DANIDA) was used to retrofit the electrical installations at the Princess Magogo, King Zwelethini and Sugar Ray Xulu Stadiums in Durban, and the Athlone and Philippi Stadiums in Cape Town. Beyond the FIFA World Cup™ these smaller venues will be used to host small scale sporting and community events. The changes made to the structures, including the replacement of ageing electrical infrastructure, will prove beneficial to future operating and maintenance costs of the venues as well as reducing their carbon footprint.

A summary of the Durban-based stadium interventions and estimated energy and cost savings is provided in Table 10 (Pennington & Asc. *et al*, undated). Four high-mast floodlights were installed at the Princess Magogo and Sugar Ray Xulu training venues. Three adjustable levels of operation mean that only the necessary illumination strength is used in different instances, for example 200 lux in practice, 600 lux for non-televised games and 1000 lux for televised games. The lighting system is controlled by a newly installed BMS to ensure even usage of lamps and minimal lamp replacement.

TABLE 10. ENERGY SAVINGS ACHIEVED AT TRAINING VENUES IN DURBAN

Interventions	Expected Average Annual Cost Savings (ZAR)	Expected Average Annual Energy Savings (kWh)*
Heat Pump	R 120,000	164,667
Motion Detection lighting	R 85,000	144,000
Timers & daylight switches	R 35,000	23,500
Flood lighting control	R 130,000	128,000
Building Management System	R 670,000	144,000

* Every 1,000 kWh saved off the national grid is equivalent to approximately a 1 tCO_2e reduction in carbon emissions

PITCH LIGHTING AT CAPE TOWN STADIUM: CASE STUDY

Metal halides are approximately five times more efficient than standard tungsten halogen lamp technology, and for that reason these lights were chosen to illuminate the Cape Town Stadium. Efficiency in the maintenance and operation of stadium luminaries was a key factor in the choice of which lights to use. The Cape Town Stadium consists of 360 separate 2 kW floodlights (each producing approximately 215,000 lumens of light output – or about the same light as 430 desktop lamps combined), so the effect of

Lighting at the Princess Magogo Stadium.

installing energy efficient lighting would be significant minimisation of the potential energy usage and thus operating costs of these lights. The total light output at the Cape Town Stadium was as per the FIFA stipulations for high definition television.

Since it will not always be required to illuminate the stadium for HD television, several different settings have been programmed into the floodlighting control system, so that lower levels of field illumination can easily be selected for non-televised events, practice/training sessions or for maintenance works at the stadium.

MANY OF THE MUNICIPALITIES RECOGNISED THE IMPORTANCE OF THE 2010 FIFA WORLD CUP™ **AS A CATALYST TO DRIVE DEVELOPMENTAL BENEFITS FROM INFRASTRUCTURAL UPGRADES**

SAFA HEADQUARTERS, JOHANNESBURG

The South African Football association (SAFA) headquarters, SAFA House, is situated next to Soccer City in Nasrec, south of Johannesburg. The building was also used as the headquarters of the Local Organising Committee (LOC) during the 2010 World Cup period. The building was proposed as a showcase opportunity for modern South African design. However aspects of the design meant that the building turned out to be hugely energy inefficient. Lighting was both inadequate and highly energy intensive, necessitating the installation of extra desk lamps and hence doubling the energy consumption. Ineffective energy controls and poor electricity zoning meant that lighting would often be left on permanently. In order to remedy the situation, funding received from the CEF was used to upgrade the building by replacing all existing halogen lamps with energy-saving compact fluorescent lamps (CFLs), and to install a system of motion sensors, which automatically switch off lighting in areas where no motion is detected for a set period of time. In addition, two solar water heaters have been installed to replace all electric geysers (CEF, 2010).

4.2.2 Improvements to infrastructure

CASE STUDY: POLOKWANE

Many of the municipalities recognised the importance of the 2010 FIFA World Cup™ as a catalyst to drive developmental benefits from infrastructural upgrades. The finance and trade opportunities created through the 2010 event were intended to be optimised to secure sustainable (social, economic and environmental) outcomes.

Extensive preparation and planning were done well in advance of the World Cup to ensure readiness of the electricity supply. At an early stage it was recognised that the existing grid infrastructure in Host City of Polokwane would be insufficient to supply the Peter Mokaba Stadium during the event. A total investment of R 78.6 million from the Department of Minerals and Energy (DME) and local municipality was used to purchase additional infrastructure to accommodate the electrical demands of the event. Upgrades were also made to the previously inadequate distribution system.

The infrastructural upgrades have already benefited the local community in the City of Polokwane, with installed capacity being used to supply a local hospital development. In addition, the electrical installations of the fan fest areas have been earmarked for use in future local cultural and music events (Potgieter, 2010).

TABLE 11. EXAMPLES OF ENERGY-RELATED LEGACY PROJECTS

HOST CITY	ENERGY
Cape Town	• Installation of various energy efficient technologies in stadiums and training venues, at fan-park, public viewing areas, and at the Athlone and Philippi training venues • Smart design and energy installations of the Cape Town Stadium to maximise energy efficiency • Installation of a small hydroelectric turbine at the Green Point Park (planned)
Durban (eThekwini)	• Carried out a post-hoc review of all aspects of energy procurement for stadium and stadium precinct to determine if other sources of green energy can be purchased or supplied • Review of stadium and precinct design and installations to maximise energy efficiency within Moses Mabhida Stadium and the Sugar Ray Xulu, Princes Magogo and King Zwelethini training venues • Developed Energy Efficiency Guidelines for all municipal infrastructure and installations for 2010, and the advocacy thereof
Johannesburg	• Implemented alternative interventions for cooking and/or heating purposes in two targeted areas in the City, and encouraged alternative cooking methods at stadiums on match days • Installation of energy-saving lamps within stadiums • Retrofitting of the LOC (SAFA) headquarters
Mbombela (Nelspruit)	• Maximised energy efficiency at the 2010 venue • Promotion of energy efficiency in private sector • Retrofitting of traffic lights and street lights • The installation of solar powered precinct lights at the Mbombela Stadium
Nelson Mandela Bay (Port Elizabeth)	• Installation of 50,000 energy efficient street lights • Replacement of geysers with solar water heaters, targeting 100,000 installations over five years • Supply of luminary replacements in around 75,000 households of previously disadvantaged communities • Motion sensors and CFLs in stadium offices and corridors
Polokwane	• Energy efficient design and installations at the stadium, and venues • Retrofitting of street lights, traffic lights and billboards
Rustenburg	• Maximised energy Eefficiency at 2010 venues, intelligent sensor lighting • Retrofitting of street lights, traffic lights and billboards
Tshwane	• Retrofitting of municipal buildings with energy efficient lights • Retrofitting of street lights, traffic lights, and billboards

4.2.3 Renewable energy

One of the key National Greening Framework objectives was to seek provision for renewable energy. In the run up to the World Cup, Eskom pledged that they would donate the "green portion" from hydro and wind (existing renewable energy) generated over the FIFA World Cup 2010™ period on behalf of South Africa, as part of its commitment to the National Greening Programme. The total amount of 'green' energy contributed by Eskom and the South African Power Pool between the 11th June to the 11th July 2010 was 2,418 GWh (COWG, 2010).

Although no major new renewable energy projects were brought online for the 2010 FIFA World Cup™, some small scale interventions were achieved. The 25 turbine Coega Windfarm in Nelson Mandela Bay, located a stone's throw from the stadium, is scheduled to be complete in 2012 and once complete, will supply the Nelson Mandela Bay Municipality with 4.5 MW of green electricity. The first 1.8MW turbine was erected prior to the kick-off of the World Cup, and was used to supply the Nelson Mandela Bay Stadium with around 574 MWh (Nelson Mandela Bay Municipality, 2010) of green electricity free of charge. Although the energy could not be supplied directly to the stadium and was fed into the national grid, it displaced the usage of conventional coal power electricity (25Degrees, 2010).

ONE OF THE MAJOR LEGACY PROJECTS OF THE 2010 FIFA WORLD CUP™ IS THE **GREENING OF STREET LIGHTS AND BILLBOARDS AROUND THE STADIUMS** OF THE SIX HOST CITIES

STREET GREENING

Supported by US$1 million in funding from the GEF, one of the major legacy projects of the 2010 FIFA World Cup™ was the greening of street lights and billboards around the stadiums of the six Host Cities, including the City of Tshwane (Pretoria), Nelson Mandela Bay Municipality (Port Elizabeth), Polokwane Municipality, Rustenburg Municipality and Mangaung Municipality (Bloemfontein). Ten billboards, five of the Host Cities' major traffic intersections and 65 street lights across the cities were retrofitted to run from solar power. These retrofits represent a monthly saving of approximately 306.6 tCO_2e from those powered by conventional electricity (UNEP, 2010). In addition, thirteen (120 W) CFL energy efficient street lights were retrofitted in Mangaung. Other energy efficiency lighting included the replacement of mercury vapour luminaires with solar powered lights, providing a monthly saving of 649,210 kwh or 668 tCO_2e, and the replacement of high pressure sodium luminaries with CFL lights, expected to provide a monthly energy savings of 685,277 kWh.

The Silica Substation in Polokwane was among the many electrical infrastructure upgrades in South Africa necessary to host the 2010 event

MBOMBELA SOLAR INITIATIVE

Mbombela Municipality has recently installed two solar PV panels at the northern side of the Mbombela Stadium precinct. The total energy output will provide 30 kWh each day and will be connected via conversion equipment directly into the stadium low voltage power grid. It is anticipated that the system will provide sufficient power to illuminate the security area lighting on the outside perimeter walkway of the stadium (Mbombela Municipality, 2010).

4.2.4 Community projects

Funding secured through the Greening Programme carbon mitigation projects was also used to extend the influence of existing projects. One such example was the installation of an additional 300 solar water heaters in the Darling housing community in the Western Cape. The installation was funded by DEA&DP and DANIDA, contributing amounts of R1 million and R1.6 million respectively. This funding went towards an existing project aiming to install 1,300 solar water heating systems across the Western Cape region.

Lessons from similar projects show that on average, each household saves at least 900 kWh for water heating per annum. Projects such as these will ensure that increased environmental awareness and a legacy of energy efficiency, sustainability and renewable energy can become established in communities throughout the Western Cape (DEA&DP, 2010).

TRAINING OF 100 YOUTHS ON ENERGY AUDITING

In recognition of a skills shortage and in line with recent legislative changes in South Africa on the phasing out of incandescent light bulbs, the DEA, through its Expanded Public Works Programme and in partnership with Indalo Yethu and GTZ, funded an energy auditor training initiative that has taken advantage of the momentum generated by the 2010 FIFA World Cup™. The programme will train 100 youths in the building sector of South Africa to audit the energy consumption of public buildings. Another aim will be to develop a successful network of training facilitators to replicate the training, and to develop and deploy these energy auditors throughout the country in a fully-fledged energy auditing programme. The government has earmarked around 100,000 public buildings to be audited in order to improve their energy consumption and decrease energy demand.

4.3 Outcomes

THE TARGETS OF THE NATIONAL GREENING FRAMEWORK had two main objectives in terms of energy, firstly, to minimise consumption of energy and, secondly, to maximise use of renewable energy. Table 11 presents a summary of energy saving projects implemented as a result of the 2010 World Cup.

The carbon footprint of the 2010 FIFA World Cup™ was projected to be among the highest of all large scale sporting events. International pressure to commit to carbon reductions and energy demand surplus in South Africa has resulted in the dual effect of creating incentives both to use less energy and to develop renewable energy systems to replace traditional coal powered electricity. The renewable energy market in South Africa is, however, still in its infancy, with solar and wind powered technologies in particular showing significant potential. Similarly there remains a great deal that can be achieved in South Africa through energy efficiency initiatives. The Moses Mabhida Stadium stands out as one example of what can be achieved through energy-efficient design.

The National Green Goal Targets (2008) initially aimed to achieve at least 15% reduction of energy used at official venues. The baseline study indicated that South Africa had a fair distance to travel in terms of conforming to the high standards expected from an event of this nature. Although the 15% reduction target was not rigorously monitored or enforced by the Host Cities, the energy efficiency interventions and cutting edge energy optimisation techniques employed within the stadiums – given the time and budgetary constraints – is notable. The benefits of investing in such technologies are now recognised as the future for South African building standards.

First Electrawinds Wind Turbine at Coega IDZ.