section 3: greening strategies

This section of the guidelines provides an introduction to strategies intended to facilitate the achievement of some of the key Greening Objectives of the DEAT 2010 Greening Business Plan. These include:

- Climate Change and Energy
- Waste Reduction and Management
- Water Conservation and Management
- Sustainable Procurement
- Biodiversity Conservation
- Transport
- Design and Construction
- Other related areas:
  - Accommodation
  - Health and Wellbeing

For each issue there is an **overview** of background information, a list of more specific **objectives** and strategies, and recommendations on **monitoring**.

3.1 Climate Change and Energy Efficiency

OVERVIEW

Global energy supplies are currently based primarily on fossil-fuels such as oil, gas and coal. Not only are these resources non-renewable, but burning them gives rise to significant levels of pollution, including greenhouse gases such as carbon dioxide[2], which in turn are the cause of climate change. Reducing energy consumption, improving energy efficiency and including renewable energy in our energy mix are therefore an important component of climate mitigation strategies.

The South African economy is predominantly driven by fossil fuels with coal being used to generate most of the country's electricity (90%) as well as a significant portion of its liquid fuels. The remaining 10% of the country's electricity comes from nuclear power (about 5%) and hydroelectric schemes (a further 5%)[3]. As a result, South Africa emits more greenhouse gases per person than many industrialised countries[4].

Despite this, electricity supplies have been insufficient to meet demand. Therefore this has highlighted the need for energy conservation and energy-efficiency, making energy security a national priority.

South Africa has made international commitments to reduce its greenhouse gases by ratifying the UNFCCC and the Kyoto Protocol. Nationally, there are a number of policies intended to deal with energy issues (see the information box below). The National Energy Efficiency Strategy, 2005 sets a national target for energy-efficiency improvement of 12% by 2015. Some cities, such as Cape Town, have developed Energy Strategies with specific targets for energy-efficiency and the use of renewable energies e.g. renewable energy to comprise 10% of total City energy used by 2020[5].

Energy Legislation and Policy

- Ratification of UNFCC and Kyoto Protocol
- White Paper on the Energy Policy of South Africa (December 1998)
- Integrated Energy Plan for South Africa (March 2003)
- White Paper on Renewable Energy 2004
- Draft National Energy Efficiency Strategy 2005
- NER Regulatory Policy on Energy Efficiency and Demand Side Management.

Sporting events and Energy

Sporting events clearly require significant amounts of energy for their planning, staging and operation, although the level of consumption is dependent on the type and range of sports facilities required and the duration of the event(s).

For major international events, the long distances travelled by spectators are, for example, a major source of carbon emissions, and are increasing as air travel, in particular, becomes cheaper and more accessible to a broader cross-section of the public.

In stadiums, arenas and in-door facilities electricity for lighting and cooling are typically required. In outdoor events the demand for electricity is not as great, but is required for sound systems, catering and media broadcast centres.

Additionally, certain types of sporting events have specific energy demands, such as liquid fuel consumption for motor racing.

There is a wide range of opportunities for energy savings and improvements of efficiency, but these need to be considered in the early planning stages of sporting events to achieve results.

Major sporting events are increasingly adopting programmes to compensate for the carbon emissions arising out of the events (e.g. FIFA World Cup 2006, Helsinki Athletics 2005, Torino Winter Olympics 2006, London 2010). Where carbon emissions cannot be avoided, they can be compensated for through projects that remove carbon from the atmosphere or reduce carbon emissions below conventional baselines.

These projects employ the mechanisms of the Kyoto Protocol to fund 'carbon offset' projects – for example, the HECTOR programme associated with the Torino games in 2006.

OBJECTIVES

The key objectives with respect to climate change and energy are:

1. Conservation of energy and improved energy efficiency
2. Reducing the carbon footprint of the event
3. Maximising the use of renewable energy resources
4. Promotion of behavioural change

TORINO 2006 HECTOR PROGRAMME

The HECTOR (HEritage Climate TORino) programme was launched to create awareness of the problem of climate change and to compensate for the emission of greenhouse gases produced during the period of this Olympic event. The total amount of CO^2 emissions was 120,000 tonnes of carbon dioxide equivalent. The programme included actions to reduce emissions as well as to offset remaining emissions through the generation of carbon credits from new energy-efficiency projects and renewable energy sources. Close to 70 per cent of the greenhouse gas emissions generated by the 2006 Winter Olympics were offset, by both local and international projects.

Objective 1:
Conservation of energy and energy efficiency

Using less energy and preventing the wasteful use of energy is the fastest, least expensive way to reduce carbon emissions, while having the added advantage of reducing energy costs. Due to increased demands for electricity supply in South Africa, all sectors have a responsibility to reduce energy consumption so as to ensure a secure basic electricity supply across the country.

Energy efficiency can be improved firstly by passive means that often do not bear a capital cost, such as maximising the use of natural light, natural ventilation, and passive heating and cooling in buildings, and promoting behavioural change. The next step is the implementation of active strategies, such as the installation of energy-efficient equipment and technologies.

Objective 2:
Reduction of the carbon footprint of an event

The carbon footprint of a sporting event can be reduced by minimising the use of fossil-fuel derived energy and materials. The first step towards this would be to measure the known and potential carbon emissions of all the activities associated with the event. This should include both activities that directly comprise the sporting event itself, as well as indirectly related activities such as procurement, contractors, and accommodation.

The modes of transport to be used by the athletes, the spectators, the officials, staff and even security guards and police, is a key area for intervention. The greater use of hotel shuttles and public transport will reduce air pollution and traffic congestion, as well as cutting the amount of fossil fuel used. The embodied energy of materials for facilities, temporary structures and even packaging should also be considered. The Green Building Council of South Africa should be consulted about means of improving the design, construction, operation of such facilities. (Refer to the section on Design and Construction)

Those carbon emissions that are unavoidable should be compensated for through projects that remove carbon from the atmosphere or reduce carbon emissions below conventional baselines using mechanisms of the Kyoto Protocol, as was done in the Torino Winter Olympics. Compensation projects should also meet the requirements of the "Gold Standard" developed by WWF and IIEC, namely that projects specifically promote renewable energy sources and efficient technologies and that they involve local interest groups in their planning and realisation.

The procurement of goods, dealt with in Section 3.4 on Sustainable Procurement emphasises that catering supplies should also be guided by the principle of reducing emissions.

The 2006 FIFA World Cup™ was the first football World Cup with a comprehensive climate protection project. After efforts to reduce emissions, the event produced 92,000 tonnes of unavoidable emissions, which are being compensated for by projects in India and South Africa which satisfy the Gold Standard. In India around 900 families in a region laid waste by the tsunami in 2004 are being provided with simple biogas generating units for cooking purposes. In South Africa, the coal furnace at a citrus fruit farm was replaced with a new boiler that runs on sawdust. A second project in South Africa is at a sewage plant close to a township near Johannesburg, where climatically harmful sewage gas is being collected and used for the generation of electricity.

2 IPCC, 2007 Climate change 2007: Synthesis Report, Summary for Policymakers

3 GCIS South African Yearbook, 2006/ 2007

4 DEAT, 2006 South African Environment Outlook

5 City of Cape Town, 2006 Energy and Climate Change Strategy

6 Embodied energy is the energy used in the aquisition, processing, manufacturing and transportation of a material.

Objective 3:
Maximising the use of renewable energy resources

South Africa has abundant renewable energy resources. It has some of the highest levels of solar radiation in the world and good wind power generation potential in many parts of the country. The national Government has set a target of 4% renewable energy of total energy demand by 2013[7]. Provinces and cities may support further levels of renewable energy use through provincial and local by-laws while companies and private individuals will be encouraged to increase their use of these resources. The use of renewable energy will also contribute towards the diversification of electricity supply and thus enhance energy security.

Renewable energy technologies such as photovoltaic (PV) panels have the advantage of being a highly visible commitment to environmental and energy responsibility that may increase support for the sporting event. Although a constraint currently exists in the supply of such technologies, this may improve in the short term as a result of the current energy supply crisis in the country. It is likely that the national government will introduce incentives to promote the use of certain technologies - for example, solar water heaters.

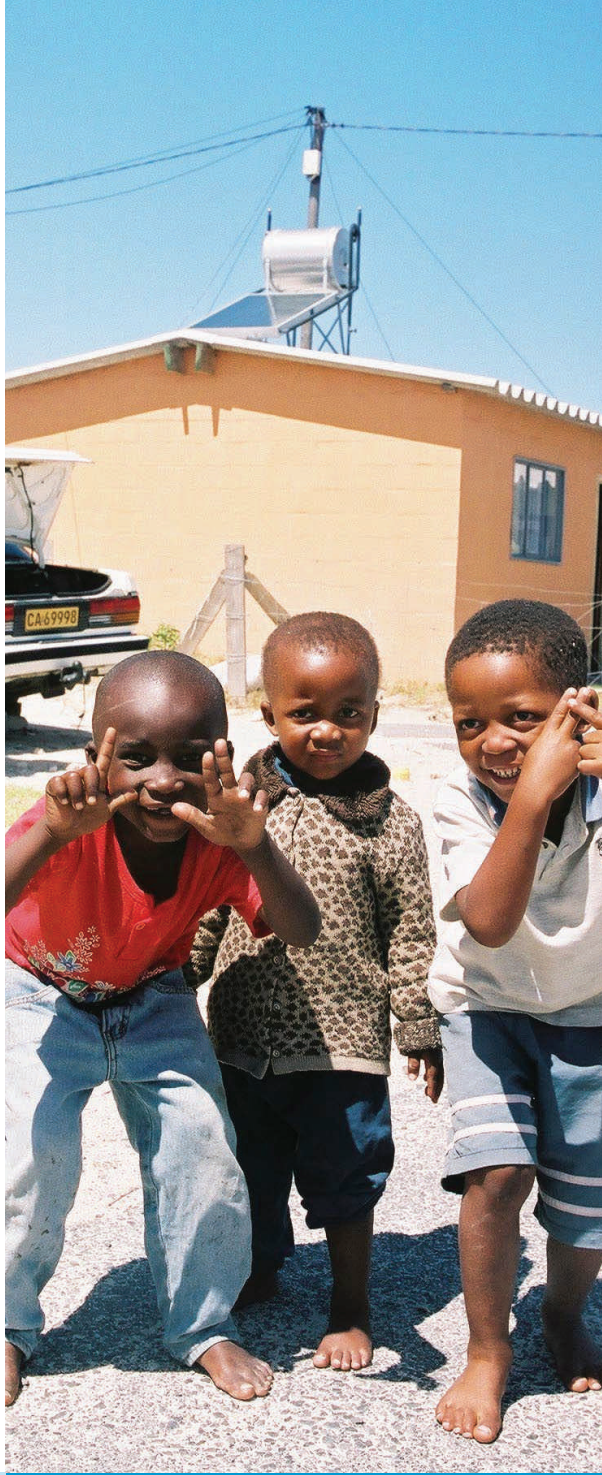
Electricity can already be purchased from renewable energy sources by using Green Energy Certificates. The premium on green electricity can be funded by a sponsor. Both the WSSD in 2002 and the ICLEI World Congress in 2006 in Cape Town purchased green electricity through TREC's (see Box on page 14), with the premium being funded by sponsors, USAID and BP respectively.

Objective 4:
Promotion of behavioural change

Consumer behaviour is key to reducing energy demand, especially in countries where energy efficient technologies and appliances may not be available.[8] A Communications Strategy should be developed to provide information to officials, staff and participants about the need to conserve energy and ways in which to do so. This should include the publication of data providing feedback on the success of the energy efficiency strategies.

The challenges of changing behaviour amongst the suppliers and contractors for event venues and during the staging of the event can be addressed by giving preference to service providers that have energy efficiency plans in place.

[7] DME, 2004 White Paper on Renewable Energy
[8] IUCN, 2002 Leaving a Greening Legacy: Guidelines for Event Greening



Green Energy Certificates

Green energy certificates - or Tradable Renewable Energy Certificates (TRECs) - enable electricity consumers to purchase electricity generated from renewable sources (green electricity), thereby supporting these alternatives. These certificates can be bought to cover all or part of energy used, and make it possible to access green energy without having to build on-site infrastructure or make changes to supply arrangements.

The concept behind the certificates is to produce renewable energy where it is cost effective and reduce the losses from the transmission of electricity. Green electricity may be generated from biomass wastes in the sugar, wood and paper industries; from micro-hydro plants; with further plans for wind and solar energy currently under investigation.

Solar water heating

STRATEGIES

Strategies for each of the listed objectives are outlined below, based on national, provincial and local climate change and energy policies, plans and strategies.

1. Conservation of energy and energy efficiency

An Energy Conservation and Efficiency Strategy should be developed for each major sporting event, according to the following steps:

- Identification of opportunities for energy conservation or improvements in efficiency:
  - Conduct energy audits of venues to identify where energy can be conserved or used more efficiently,
  - Identify activities and facilities which can be either directly or indirectly controlled or managed, e.g. sports facility versus spectator accommodation.
- Incorporate energy efficiency design into the construction or remodelling of relevant facilities:
  - Use passive heating, cooling and ventilation in the design of buildings,
  - Utilize night temperatures to cool buildings,
  - Maximise the use of natural light in facilities e.g. light wells used in underground parking,
  - Ensure that thermal performance of facilities meets accepted national standards.
  - Select materials with low embodied energy for facilities, temporary structures, and catering equipment (food containers),
  - Insulate all hot water cylinders and pipes in venues,
  - Optimise lighting management including T5 lamp technology, lighting sensors and time switches to reduce periods of illumination,
  - Use Building Management Systems (central computerised systems) to ensure that only areas in use are lit, ventilated or heated,
  - Design the operating systems for buildings (cooling and heating, power and water delivery, lighting and waste disposal) to minimise energy use e.g. combine space and water heating; insulate pipes; minimise distance travelled by water by locating tanks close to point of use.
- Select low carbon/energy efficient IT (Information Technologies) e.g. TV screens, LED screens and laptops.
- Incorporate green design features for office facilities for the organising committee, such as natural and efficient lighting and efficient air-conditioning systems, efficient office equipment and emphasize best practice energy practices in office management.[9]
- Promote energy efficient forms of travel, such as walking, cycling, and public transport.
- Use gas for catering kiosks for cooking.

[9] Proposed Green Rating system of the Green Building Council for South Africa, currently under development.

and hot water supply.

- Maintain all facilities and equipment regularly according to an agreed maintenance schedule and/or procedures.

2. Maximising the use of renewable energy resources

- Use renewable energy sources to provide power to event-related facilities:

- Purchase Green Energy certificates,
- Set a target of 20% on-site renewable energy sources,
- Install renewable energy systems into the sports facilities and related buildings – for example, photovoltaic panels, solar water heating or small wind turbines,
- Use street lighting with integrated solar panels,
- Install Biogas plants to produce energy - for example, a Biogas generator to convert sewage into methane gas for cooking,
- Feed solar power from the PV system back into the grid, where possible,
- Use solar water pumps in the urban parks.

- Use alternative fuel sources in vehicles. Consider electric-diesel hybrid, electric, hydrogen or solar powered vehicles for staff, participants and public transport.

3. Reduction of the carbon footprint of the event

- Define and measure the carbon footprint of the event.
- Aim to achieve a target percentage (for example 15%) of carbon dioxide emission reductions in permanent venues, including the embodied energy in materials (based on baseline studies).
- Locate new facilities close to transport hubs.
- Maximise the use of public transport to reach venues during the games by, for example, including the cost of public transport into tickets for the events.
- Use rail for transport of construction materials and waste.
- Select low-carbon vehicles and fuels for the fleet of the organising committee and athletes.
- Develop and implement an **Energy Management Plan** that continually explores opportunities to reduce energy consumption / greenhouse gas emissions via periodic audits of buildings, vehicles, and which includes checks on metering.

- Monitor daily energy consumption of each building and facility for the sporting event and report to the relevant manager(s).

Undertake any adjustments, modifications and repairs required to lower the energy consumption of various activities.

- Use the media to highlight climate change and energy issues.
- Launch programmes to create awareness of the problem of climate change and increased energy consumption to compensate for the emission of greenhouse gases produced during the period of the event.
- Identify, develop and implement verifiable carbon offset projects. Where possible, obtain sponsorships for these using the mechanisms of the Kyoto Protocol.

4. Promotion of behavioural change

- Develop and implement an **Environmental Communication Strategy** that provides information about climate change, the energy saving initiatives and carbon-offset projects to staff, participants and the public.

- Provide information and tips on how individuals can conserve energy and achieve energy efficiency through behavioural change.
- Encourage the athletes, officials and spectators to commit to using public transportation and to conserving energy wherever possible.

- Provide regular feedback on energy used and saved during the event using the media and the official event website.
- Work with suppliers and contractors to measure and report their carbon emissions. Give preference to those suppliers and contractors who have a programme in place to address energy and climate change issues.

- Promote energy conservation and efficiency at the accommodation venues for athletes, officials, visitors and spectators to the event. Partner with established 'Green Stay' initiatives, where possible.

Offsetting the Carbon Footprint at WSSD, 2002

Delegates and organisations attending the WSSD were asked to offset their carbon emissions by purchasing climate legacy certificates. Funds raised were invested in carbon reducing sustainable development projects in South Africa. The goal was to fully offset the emissions produced by the Summit.
The carbon footprint was calculated based on travel to and from the event, operating venues and event activities. Due to limited time and funds for the marketing initiative, the whole footprint was not offset. However, two carbon-reducing projects were implemented and awareness was raised about climate change. Expertise was also gained in implementing climate change mitigation projects.

IUCN, 2003 "Leaving a Greening Legacy: Guidelines for Event Greening"

WSSD, Johannesburg

MONITORING

Indicators to evaluate the success achieved in relation to each objective will need to be identified for each specific event. The relevant data should then be collected at appropriate intervals and reported to the relevant authorities:

· Department of Minerals and Energy
· DEAT and Department of Sport and Recreation

The information should also be provided to the media and should be considered as part of the overall awareness campaign on energy and climate change. Examples of potential indicators for Energy and Climate Change objectives as well as possible targets, are provided in Table 3.1.1, which also shows the anticipated content of a monitoring and evaluation report.

TABLE 3.1.1: Sample Climate Change and Energy Monitoring and Evaluation Indicators

OBJECTIVE	INDICATOR	TARGET	RESULT	COMMENT RE SUCCESS
Reduce energy consumption	% reduction in energy use from baseline study before event	30%	35%	Very successful due to enthusiastic public participation
Maximise the use of renewable energy	% of renewable energy (built into event facilities) of total used for the event	20%	15%	Moderate success Challenge: Lack of capital funding
	% of total energy from renewable sources (off-site), e.g. TRECs	20%	20%	Easy to impliment
Reduce the carbon footprint	% of event-related carbon emissions offset within 5 years	100%	75%	Some projects are still running but due for completion within the year
Promote behavioural change	% of respondents/staff who reported having changed behaviour as a direct result of advice provided	50%	20%	Lack of funding for communication campaign hampered this project

Calculating greenhouse gas emissions

Calculating greenhouse gas emissions for an event will require time for research and data compilation as well as organisational support to track the emissions throughout the duration of the event. Detailed guidance on measuring and reporting greenhouse gas emissions can be obtained by referring to the guiding principles of the GHG Protocol (www.ghgprotocol.org). Due to the complexity of such projects, consultants provide specialist services for calculation and monitoring greenhouse gases of events and planning offset projects.

The emissions inventory must be planned by making a list of the event's sources of emissions and their quantities and by setting the boundaries for the inventory, deciding which of the venues, events and activities will be part of the evaluation e.g. construction, energy, travelling, cooling, overnight stays.

The CO_2 emissions are calculated in metric tons using the formula:

activity data x emissions factor = CO_2 emissions

For each emission source in the inventory, the activity data and emission factor is required. Activity data quantifies an activity in units used in the calculation e.g. kilometres travelled or litres of fuel. The emissions factors convert activity data into emissions values. Examples of typical values for transport in Helsinki are as follows:

CO_2 EMISSION FACTOR	VALUE and UNIT
Airplane short, medium and long haul	0.15 $kgCO_2$/pkm 0.12 $kgCO_2$/pkm 0.11 $kgCO_2$/pkm
Train (long distance)	0.024 $kgCO_2$ /pkm
Car	0.165 $kgCO_2$/pkm
Bus (long distance)	0.05 $kgCO_2$/pkm
Public transport in City of Helsinki	0.013 - 0.070 $kgCO_2$/pkm

pkm = passenger kilometre; $kgCO_2$ = kilograms carbon dioxide

Planting trees to off-set emissions

The Plant-a-Tree-Today Organisation has calculated that the average tree absorbs and stores 20.3kgs of carbon dioxide per annum. Furthermore, it is assumed that the average tree will live for 40 years. In the developed world the average person's carbon emissions in their lifetime amounts to 9.675 tonnes which translates into 477 trees.

To calculate the number of trees needed to achieve carbon neutrality, one needs to know the emissions factor for the activity in question, the total kilometres travelled and the amount of carbon a tree can absorb. The emissions factor is

then multiplied by the total kilometres travelled to determine the total carbon emissions in kilograms. One then divides the kilogram amount of carbon by the amount one tree can absorb to determine the number of trees required to off-set carbon emissions.

Carbon trading

The monetary value of carbon credits is calculated on a project by project basis with the relevant stakeholders. One notable project in South Africa entailed the selling of 3.8 million tonnes of certified emissions reduction credits for $15 million.