FEASIBILITY STUDY FOR A CARBON NEUTRAL 2010 FIFA WORLD CUP IN SOUTH AFRICA

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NORWEGIAN EMBASSY

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Executive Summary

This report presents the findings of a feasibility study commissioned by Norad, and updated by the Norwegian Embassy in South Africa, to estimate the carbon footprint of the FIFA 2010 World Cup, identify measures underway to reduce those emissions, and recommend what type of institutional regime for carbon offsets is required to make the World Cup a "carbon neutral" event.
The principal findings are as follows:

The FIFA 2010 World Cup will have the largest carbon footprint of any major event with a goal to be "climate neutral". The estimated carbon footprint of the 2010 FIFA World Cup is 896,661 tonnes of carbon dioxide equivalent (tCO_2e), with an additional 1,856,589 tCO_2e contributed by international travel, as shown in **Table ES 1**. The footprint excluding international travel is more than eight times the estimated footprint of the 2006 World Cup in Germany.

Table ES 1: Summary carbon footprint for FIFA 2010 World Cup

Component	Emissions (tCO_2e)	Share (%)
International transport	1,856,589	67.4
Inter-city transport	484,961	17.6
Intra-city transport	39,577	1.4
Stadia constructions and materials	15,359	0.6
Stadia and precinct energy use	16,637	0.5
Energy use in accommodation	340,128	12.4
Total excluding international transport	**896,661**	
Total including international transport	**2,753,250**	**100**

International travel is 67% of the carbon footprint, followed by inter-city travel and energy use in accommodation at 18% and 12%. The Green Goal 2006 carbon footprint did not include the emissions from international air travel, nor did the 2006 Commonwealth Games, but events with fewer participants (e.g. G8 Gleneagles, 2002 World Summit on Sustainable Development) have done so. The large share for international transport is expected, given South Africa's distance from most world centres, and the fact that almost all international visitors must fly to South Africa.

The larger carbon footprint compared to the 2006 World Cup is related to South Africa's geography and infrastructure, as well as the modelling approaches used for this study. For inter-city transport, which is the largest component after international transport, distances between matches in South Africa are much greater than in Germany, and the lack of high speed rail links means the most visitors will fly multiple times between matches, leading to much higher transport emissions. For intra-city transport, much of this travel will still be in passenger cars or small buses over long distances, rather than light rail as used in Germany. Energy use in accommodation is higher than for the 2006 analysis, but the assumptions used in this analysis are more realistic.

Proposed greening measures and environmental standards can reduce the carbon footprint, but will only affect the smaller components of the carbon footprint. The National Greening 2010 Framework and Minimum Environmental Standards for Green Goal 2010 include many measures that have the potential to reduce the carbon footprint. The measures, however, only impact the emissions from stadium and precinct energy use and intra-city transport, which in total make up only 9% of the domestic carbon footprint. So while these interventions are important for raising public awareness and entrenching best practices at a local level, they will not have a significant impact on the size of the carbon footprint.

Decisions about the implementation of the Carbon Offset Programme should be taken early to ensure the maximum contribution of the programme to public awareness and local action. The opportunity of the 2010 World Cup to raise awareness of climate change, and sustainability challenges more broadly, among a wide range of stakeholder groups and the general public must not be missed. This context should frame the decisions on how to implement the programme, since decisions on the institutional structures, project types, project criteria, and marketing all influence the success of the programme in increasing public awareness. The less time that is available to implement the carbon offset programme, the more activities and responsibilities that will have to be outsourced in order to have some offsets projects running by the time of the World Cup.

The Carbon Offset Programme needs clear FIFA and LOC support, as well as a credible, effective institutional home. Offsetting the domestic carbon footprint of the 2010 World Cup could cost between $5.4 and 9.0 million, while offsetting international travel would, on its own, be double this amount. This money needs to be secured as soon as possible for some offsets projects to be underway by 2010. Securing the funds necessary to offset the emissions is probably only possible if the supporters of the Green Goal 2010 carbon offset programme get exposure and marketing in the World Cup. For this reason, the support of FIFA and the LOC, and their agreement that FIFA or Green Goal brand can be used for marketing by offset sponsors, is probably essential for the success of this programme. In addition, marketing a credible programme to funders requires an institutional home with both credible skills in the carbon market and transparent, robust accounting and reporting procedures.

While national and local government should play a strong oversight role in the carbon offset programme, the implementation of the programme should be outsourced to a Carbon Offset Provider using a reputable voluntary carbon market standard. The maturity of the voluntary carbon market, and the large number of experienced international companies in this field, provide an opportunity to keep the administration costs and overheads low and international credibility high by outsourcing most of the implementation of the programme to a Carbon Offset Provider. Stakeholders would still provide input on the TOR for this provider, guidance on the project types, desirable development impacts, and geographic location, to ensure that national sustainable development priorities are met. The Carbon Offset Provider should have international standing, a proven track record, and be recognised by industry experts as providing offsets with high environmental integrity and development benefits. In addition, using a well-established and recognised international standard, such a the Voluntary Carbon Standard (VCS), Gold Standard Voluntary Emissions Reduction Standard (GS VER), or Clean Development Mechanism (CDM), will provide credibility and integrity for the programme, as well as keeping overhead costs lower than creating a "home grown" standard.

To maximize the contribution to public awareness, the carbon offset projects should be visible during the 2010 FIFA World Cup. For many international "climate neutral" events, the offsets projects are not implemented until well after that event has occurred. By ensuring that at least some of the offset projects for the 2010 FIFA World Cup have started implementation by 2010 and are in areas that are visible to local and international spectators, the offset projects will contribute to raising public awareness. Technology and project types that are easy for the general public to see, and possibly even replicate, should be given highest priority.

Financial support for development and management of the carbon offset programme is a critical enabling activity for the success of the programme. While substantial funds will be needed to pay for the costs for the actual carbon offsets, the main barrier facing the Carbon Offset Programme is funding for the management and administration – particularly a project management office - and the technical expertise to set up the programme. Specific tasks include developing the TOR for the Carbon Offset Provider and preparing a monitoring and evaluation plan to measure the carbon footprint ex-post. Financial support for these functions will catalyze the much larger funding sources from the private sector that would contribute to the actual costs of the carbon offsets.

Follow up on this study should provide significant value added for Host City and national government stakeholders. Given the limited time frame and budget of this study, only input from three of the largest Host Cities has been included. A process to engage other Host Cities in measuring their footprint during the World Cup and offsetting some of their emissions should start as soon as possible. In addition, capturing the lessons from this study, as well as the calculation tools, for future international sporting events should become part of the legacy of 2010 for the region and for the sporting world more broadly.

Abbreviations

AC	Air conditioning
BAU	Business As Usual
CBD	Central Business District
CC	Climate Change
CDM	Clean Development Mechanism
CEF	Central Energy Fund
CER	Certified Emission Reduction
CNG	Compressed Natural Gas
CO2	Carbon Dioxide
DBU	Deutsche Bundesstiftung Umwelt
DEAT	Department of Environmental Affairs and Tourism
DEFRA	Department for Environment, Food and Rural Affairs (UK)
DME	Department of Minerals and Energy
DNA	Designated National Authority
DWAF	Department of Water Affairs and Forestry
EB	Executive Board
ERC	Energy Research Centre (University of Cape Town)
EU	European Union
FIFA	Fédération Internationale de Football Association
GEMIS	Global Emission Model of Integrated Systems
GHG	Greenhouse Gas
HVAC	Heating, ventilation and air conditioning
ILC	Ibhola Lethu Consortium
JCL	Johannesburg Climate Legacy
km	Kilometres
kVa	Kilovolt-ampere
kW	Kilowatt
kWh	Kilowatt hours
LED	Light-emitting diodes
LOC	Local Organising Committee
LPG	Liquefied petroleum gas
MWh	Megawatt hours
NMT	Non-motorized transport
PDD	Project Design Document
PIN	Project Information Note
PV	Photovoltaic
SA	South Africa
tCO_2	Tonnes carbon dioxide
tCO_2e	Tonnes carbon dioxide equivalent
TDM	Transport Demand Model
UK	United Kingdom
UNDP	United Nations Development Programme
US(A)	United States (of America)
VER	Voluntary Emission Reduction
WSSD	World Summit on Sustainable Development

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Our apologies if we have left out anyone.

1 Introduction

"The vision of Green Goal 2010 is to promote sustainable development principles, shift people's thinking accordingly and encourage local initiatives in a pro-active manner, which will reduce the negative impact of the 2010 FIFA World CupTM and enhance the short and long-term environmental, social and economic benefits of the event." - *Green Goal 2010 Vision, Principles, Aims and Objectives*

South Africa's hosting of the 2010 FIFA World Cup will be one of the most important recent events in Southern Africa. The Green Goal 2010 initiative seeks to ensure that this event also has a long term sustainable development impact on the country and region.

The Department of Environmental Affairs & Tourism (DEAT) in South Africa initiated a process with the local UNDP office to design, mobilize resources for and initiate a programme to make the FIFA 2010 World Cup a "carbon neutral' event. UNDP developed a draft Terms of Reference for the overall carbon neutral programme, which highlights the particular importance of offsetting the transport related greenhouse gas (GHG) emissions from the World Cup.

The Norwegian Embassy in Pretoria and Norad then decided to conduct a feasibility study that will both provide a critical input to the Green Goal 2010 programme and also form the basis for possible Norwegian assistance to the programme for a carbon neutral 2010 World Cup. Econ Pöyry was commissioned to conduct the feasibility study and prepare this report of the findings and recommendations.

This report is divided into two main sections: Part I presents the detailed findings on the carbon footprint for the 2010 World Cup, including the key assumptions and modelling approaches used for these estimates. Part II then explores how to make the 2010 World Cup "carbon neutral" by developing a "Carbon Offset Programme" to offset the greenhouse gas emissions from the event by investing in local climate change mitigation projects.

Part I
Carbon Footprint for 2010 FIFA World Cup

2 Carbon Footprint Methodology

2.1 System boundaries for carbon footprint analysis

There are no international standards for how to set system boundaries for carbon footprint calculations of major sport events. The first FIFA World Cup for which the carbon footprint was estimated and offsetting of emissions was attempted was the 2006 World Cup in Germany. These efforts were part of the programme known as the "Green Goal".

The Green Goal 2006 programme and analysis of the carbon footprint was conducted by the Öko-Institut in Germany. For this earlier study, the system boundaries only included emissions sources within the control of the organizers or the host country. The carbon footprint for 2006 therefore covered the following emissions sources: energy use for accommodation; energy use at stadia and stadia precincts; embodied emissions in stadium construction and materials; inter-city transport and intra-city transport. Emissions from international transport to and from Germany were not included.

Durban's part of the 2010 World Cup carbon footprint was assessed in a study commissioned by FutureWorks! and conducted by Econ Pöyry (Econ, 2007). This study largely followed the system boundaries set for the Green Goal 2006 for Germany and did not include international travel, because it is not attributable to South Africa's greenhouse gas (GHG) emissions inventory.

At the request of the stakeholders engaged during the process of this study, the present footprint analysis includes GHG emissions from tournament-related international travel. Nor surprisingly, international transport is the largest component of the footprint. International transport is, however, only partly within the control of host country and World Cup event organizers. This is because the LOC has some influence over international travel by the "FIFA family" group (e.g. teams, officials, LOC and FIFA), although very little influence over the resulting emissions.

The presentation of this complete footprint is not meant in any way to pre-judge the policy decisions on what portion of that footprint will be offset. The purpose of this analysis to assist the stakeholders in understanding the sources and magnitude of the emissions, as the basis for assessing what should be offset.

As with the Green Goal 2006, the carbon footprint from generation of waste is not covered by this analysis[1].

[1]In some Host Cities, waste is dumped at landfills which may cause generation of landfill gas and emissions of GHG including methane. Disposal of biodegradable waste from the World Cup venues may therefore be a source of GHG-emissions. Assuming that an equivalent volume of degradable waste as the volume collected from the 2006 World Cup tournament in Germany is going to landfills with no capture of landfill gas, GHG-emissions volumes over a 10 year period are estimated to be 3,500 tCO_2e. Even if volumes of degradable waste are higher than in Germany, where the Green Goal managed to reduce waste amounts with 17%, it would still be a very small component of the footprint. The waste targets for 2010 Green Goal are 20% reduction of total waste and 50% reduction of waste going to landfills.

Table 1: Components of carbon footprint estimations related to 2010 World Cup

	Carbon Footprint Study for 2006 FIFA World Cup	Durban 2010 World Cup Carbon Footprint study	Present Carbon Footprint for 2010 FIFA World Cup
Carbon Footprint Consultant	Öko-Institut	Econ Pöyry	Econ Pöyry
Carbon Footprint components			
International transport	Outside system boundary	Outside system boundary	Emissions from all travel in and out of South Africa for the tournament
Inter-city transport	Emissions from spectators' travel between cities during the tournament were included.	Emissions from all ticket holders' inter-city travel to Durban	Emissions from inter-city travel for ticket holder and some non-ticket holders, where this is attributable to the World Cup
Intra-city transport	Emission from visitors intra-city travel	Emissions from visitors' intra-city travel for accommodation and matches. Average of 6 trips per ticket holder	Emissions from intra-city travel for ticket holder and some non-ticket holders, where this is attributable to the World Cup
Stadia constructions and materials	Embodied emissions distributed over lifetime of stadia and allocated according to World Cup match days	Embodied emissions distributed over lifetime of stadium (in Durban) and allocated according to World Cup match-days	Embodied emissions distributed over lifetime of stadia and allocated according to World Cup match-days
Stadia and precinct energy use	Emissions estimated for the overall World Cup match days	Emissions estimated for the overall World Cup match days (in Durban)	Emissions estimated for the overall World Cup tournament period
Energy use in Accommodation	Assuming one over-night stay per ticket	Assuming 2 overnight stays per ticket holder	Emissions from overnight stays for ticket holder and some non-ticket holders, where this is attributable to the World Cup

2.2 Calculation tools and data sources

In principle, the footprint calculations follow the GHG Protocol Corporate Accounting Standard, except for areas not covered by this accounting standard (e.g. embodied emissions in construction materials). For stadium construction and materials, the emission factors are based on life cycle analysis. The Global Emission Model of Integrated Systems (GEMIS) is a life cycle analysis model and database that was developed by the Öko-Institut in Germany and is widely used for life cycle energy and emissions analysis (www.gemis.de).

For emissions from stadia construction and materials and stadia and precinct energy use, a bottom-up approach is taken to calculations:

- Embodied emissions are calculated from stadia construction material volumes for the major stadia and emissions factors given by the GEMIS database, customized for the South African electricity generation mix.
- Stadia and precinct energy use is calculated from estimated energy demand by specific stadia, as per the match schedule, and from the electricity average emissions factor for the South African grid.

For inter-city and intra-city transport, the activity level estimates are based on a mix of top-down and bottom-up approaches. A Transport Demand Model (TDM), commissioned by the Department of Transport and developed by Richard Gordge (Transport Futures) provides the basis for almost all of the trip numbers between various cities. Using the TDM ensures consistency across Host Cities, since the flow of all visitors to the country is tracked from city to city. The distances for the TDM trips are taken from standard travel distance tables, while the emissions factors per passenger-km are taken from the GHG Protocol. The TDM also provides estimates of the number of overnight stays in different cities, which is basis for energy use in accommodation in the footprint.

Table 2: Primary calculation tools and main data sources

Emissions source	Emissions calculation approach	Main data sources
Transportation	GHG Protocol	• TDM for travel demand data
		• GHG Protocol for emission factors
Stadia construction and materials	GEMIS	• Durban, Cape Town and Jhb Host Cities for materials inventories
		• GEMIS for emission factors
Stadia and precinct energy use	GHG Protocol	• Host Cities for energy use (Durban, Cape Town, Jhb)
		• Eskom for electricity emission factor
Energy use in accommodation	GHG Protocol	• TDM for number of overnight stays
		• Survey of South African hotels for average energy use
		• Eskom for electricity emission factor

2.3 Key assumptions and parameters

2.3.1 Time frame of event and emissions

This study uses the Transport Demand Model (TDM) (see previous section) to estimate inter-city travel and the number of overnight stays. The model includes data on projected overnight stays and travel demand for each day of the entire World Cup period by international visitors (ticket holders and non-ticket holders) and South Africans (primarily ticket holders). The overall World Cup period considered by the TDM is from 12 days prior to the tournament through to 13 days after the final match. The duration of the tournament is 30 calendar days (from opening match on June 11th to the final on July 11th). The entire World Cup period considered by the TDM is thus 55 days. The carbon footprint in this study does not include any travel activity by FIFA staff prior to the 55 day period, due to lack of data.

2.3.2 Categories of attendees

To set the system boundary for accommodation and in-country transportation (inter- and intra-city transport) properly, it is necessary to distinguish between different categories of attendees. This will then exclude emissions during the overall World Cup period that are not attributable to the World Cup event itself.

This analysis distinguishes between two main visitor groups:

- **Spectators** including ticket holders, non-ticket holders and visitors to fan parks and public viewing sites
- **Special Travel Groups** (STG) including the FIFA family (teams, referees and officials, FIFA and LOC delegations, invited VIPs), Partner and Supplier Hospitality, Commercial Hospitality, Sponsors, Media, Official Broadcasters, Non-rights holders, Participating Member Associations, and Tour Operator Programmes.

Accommodation and transportation of the spectator group only included the period from one day before the tournament to one day after final, or 32 days in total. Any accommodation or transportation by spectators prior to or later than this period are considered not to be attributable to the World Cup event. The reason for this is that travel and accommodation prior to the World Cup month would be for holiday in South Africa, rather than participating in the World Cup.

For the Special Travel Groups, the footprint includes their accommodation and in-country transportation during the entire 55 day period considered in the TDM. This is because some of these special groups may have additional responsibilities or tasks before and after the tournament and their entire stay is likely to be linked to FIFA World Cup activities.

2.3.3 Tickets and ticket-holders

According to the Department of Transport's "Initial Transport Operational Plan for the 2010 FIFA World Cup", the total number of tickets (3.3 million) is distributed between Special Travel Groups and Spectators as shown in the table below. Information on the corresponding number of attendees by the visitor groups was not included in this planning document, so the table shows the assumptions used in this study.

Table 3: Assumptions for visitor and ticket numbers

Category of attendee	Number of people	Tickets	Ticket per ticket holder	Overnight stays	Overnight stay per ticket
Special Travel Group (STG)	**145,000**	**1,145,000**		**4,681,269**	**4**
International	**145,000**				
National	Unknown				
General Spectators*	**1,205,000**	**2,155,000**		**6,980,468**	**3**
International					
Ticket holders	**215,000**	850,000	4		
Non ticket holders	**340,000**				
South African					
Ticket holders	650,000	1,305,000	2		
Non ticket holders	>650,000				
All attendees (excluding SA non-ticket holders)	**1,350,000**	**3,300,000**		**11,661,773**	**3.5**
Total international visitors (shown in bold)	**700,000**				

**total for general spectators excludes South African non-ticket holders.*

Source: Initial Transport Operational Plan for the 2010 FIFA World Cup (Department of Transport, 2008) and the study team's own calculations. Note: The number of South African ticket holders is estimated by dividing the total number of South African tickets by 2 tickets per person. Non-ticket holders are likely to be greater than ticket holders, given the price of tickets, but no estimates are available for these numbers.

From the number of tickets allocated as above and projected overnight stays by the TDM, the average number of overnight stays for spectators and Special Travel Groups is 3.5, with the Special Travel Group at 4 overnight stays per person and spectators at 3 overnight stays per person. Note that because some non-ticket holders from South Africa are also included in the TDM, the average nights per person may be somewhat lower.

2.4 Greenhouse Gases included in the carbon footprint

Carbon dioxide is the predominant greenhouse gas emitted from the sources included in the carbon footprint analysis. Combustion of fossil transport fuels like kerosene, diesel and petrol (gasoline) also cause emissions of nitrous oxides and methane, but emissions of other greenhouse gases are insignificant[2] compared with carbon dioxide.

The grid electricity emission factor in terms of tCO_2 per unit of electricity consumed is calculated from Eskom's reported CO_2 emissions from combustion of coal at electricity generation facilities connected to the grid divided by total electricity sales by Eskom. Total electricity sales include the small amount of electricity generated by Independent Power Producers (IPPs) regardless of type of power plant. The calculated emission factor thus takes into account not only losses at the power generation plants, but also losses in electricity transmission and distribution. It does not, however, take into account emissions of other greenhouse gases than CO_2 from combustion or upstream emissions (e.g. from mining, transportation and storing of coal). Based on Eskom's reported emissions and IPCC emission factors, nitrous oxide would only add 0.04% to the emissions factor, the coal mine emissions 1.26%, so these have not been included.

2.5 Defining the baseline or "business-as-usual" scenario

There are two steps to achieve carbon neutrality: first, reducing the carbon footprint through mitigation interventions and, second, offsetting the remaining emissions. Offsetting means investing in projects and measures that reduce GHG emissions (or enhance carbon sinks) from sources outside the system boundaries. The Green Goal 2010 programme deals with both types of measures: internal reduction measures and offsetting. Many of the measures proposed in the greening strategy documents and guidelines would reduce the carbon footprint from what is estimated in this report. For example, the guideline documents include proposed standards for energy savings at the stadia and precincts. These minimum standards would require the cities to purchase "green electricity" to cover part of its electricity demand during the tournament.

The "Minimum Environmental Standards for Green Goal 2010" requires Host Cities to offset 5% of the city's carbon footprint, but does not define what is to be included in a city's carbon footprint. The Minimum Standards allow for offsetting by local mitigation projects. If these measures reduce emissions sources covered in the carbon footprint (e.g. energy use at stadia), then, in terms of the methodology applied in this study, these measures would be regarded interventions to reduce the carbon footprint rather than traditional "carbon offsets".

The carbon footprint analysis estimates emissions from a "business-as-usual" (BAU) scenario. Many of the local greening initiatives undertaken by cities as part of the Green Goal 2010 programme will be beyond BAU, so they would potentially reduce the carbon footprint.

[2] The default values in IPCC 2006 Guidelines for National Greenhouse Gas Inventories show that methane and nitrous oxides together constitutes following shares of overall GHG-emissions: 2.5% for gas/diesel oil, 2.6% from motor gasoline, 0.3% for bituminous coal and 0.3% for Jet Kerosene. (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy).

2.5.1 Transport

To provide the transport services required to meet the demand estimated by the Transport Demand Model (TDM), certain infrastructure investments are needed, in particular public transport investments. Since the modal split and passenger volumes given in the TDM form the basis for our calculations, this carbon footprint assumes that public transport systems will be sufficient to handle the traffic projected by the TDM. The interventions identified in the Transport Action Plans from the Host Cities and national government are assumed to be beyond business as usual and therefore would reduce the carbon footprint.

2.5.2 Stadia

Among the ten stadia hosting World Cup matches, five are newly built and the other five existing stadia are undergoing major or minor upgrades to prepare for the World Cup. Stadium designs have already been decided and the construction and upgrades are well underway. We therefore assume that further interventions to reduce the carbon footprint from stadia embodied emissions would not be realistic, except for interventions to change the source of energy supply used for the stadia and precincts.

Energy demand by stadia is largely decided as well. This analysis relies on data collected from Durban, Cape Town and Johannesburg, as it was not possible to obtain similar detailed data and information by stadia in other Host Cities.

In Durban, cost effective measures for improving energy efficiency were incorporated in the design of the new stadium, resulting in a 30% savings in energy use compared to standard buildings in South Africa. The "Stadium Baseline Report for Green Goal 2010" (22 August 2008) suggests an energy saving target of 15% compared with standard building designs in South Africa. Though energy data for Durban stadium is used as basis for the footprint analysis for many of the stadia, we have assumed that the additional measures discussed in the Stadium Baseline Study could further reduce the carbon footprint.

As mentioned above, the "Minimum Environmental Standards for Green Goal 2010" require Host Cities to purchase "green electricity" from sources registered with the South African Tradable Renewable Energy Certificate programme to cover the electricity demand of stadia and stadia precinct during the tournament. However, this standard does not appear to refer to new and additional generation facilities that will be operational at the time of the tournament. Because the former customers of the existing renewable power plants would have to now buy electricity from Eskom, this will not reduce the carbon footprint of the event.

2.5.3 Accommodation

The "Green Goal 2010 Greening Measures for Implementation of Minimum Environmental Standards" includes recommendations related to energy use in accommodation, but these are not mandatory. In addition, DEAT and the Tourism Grading Council of South Africa (TGSA) are expected to develop National Minimum Standards for Responsible Tourism to be implemented before the tournament. If implemented, the standards may help reduce water and energy demand from accommodation.

3 International transport

3.1 Methodology

All international transport in and out of South Africa by any attendee during the 55 day period is considered to be attributable to the World Cup. Air and land transport are both considered. Travel to South Africa by sea has not been considered as a mode of international travel, because this is excluded from the TDM, and not a common means of reaching South Africa in any case.

To calculate emissions related to international air travel, the origin (continent) of the spectators has been defined according to FIFA ticket sales. The number of spectators from each continent has been multiplied with an average distance per continent and an overall average emission factor for long haul flight distances. Additionally, we assume that international visitors will have on average one additional short haul connecting flight within their continent of departure. The average distance of 1000 km for this connecting flight is then multiplied with an average emission factor for short haul international flights.

3.2 Key assumptions

According to Initial Transport Operational Plan for the 2010 FIFA World Cup (Department of Transport 2007), 700,000 international spectators are expected to come to South Africa during the World Cup. 400,000 visitors will arrive and depart by international air flights. The TDM projections for international air arrivals and departures also match this, with an average of 406,311. The remaining 300,000 are non-ticket holders from African countries travelling by land. However, the TDM does not estimate the modal split of these 300,000 non-ticket holders from Southern African countries. Therefore, the emission calculations are dependent on the assumptions of the modal split and average distances made for land-based international travel.

We have assumed that the country of origin of the 406,311 international guests arriving by plane is based on regional ticket sales. Tickets are distributed according to which teams qualify for the World Cup. From each continent only a certain number of teams may qualify for the World Cup, and this is the basis for allocating tickets. This same share is used to estimate the regional origin of international spectators. Furthermore, the same share is applied for international non-ticket holders. The resulting visitor numbers are shown in **Table 5**.

Table 4: Assumed FIFA ticket sales and regional shares

Region	Number of teams	Share of total (%)
Europe	13	40.6
Asia	5	15.6
North America	4	12.5
South America	5	15.6
Africa	5	15.6
Total	**32**	**100.0**

Source: www.fifa.com

Table 5: Number of visitors per continent of origin and assumed distances

Region	Number of visitors	Average distance (kilometres)
Africa	63,486	3,500
EU	165,064	9,000
Asia	63,486	9,500
South America	63,486	7,000
North America	50,789	13,500
Total	**406,311**	

As mentioned earlier, the TDM does not specify the modal split for the 300,000 international visitors from neighbouring Southern African countries using land transport. For this analysis, we have assumed that the modal split would be the same modal split given by the TDM for the travel between Host Cities and "regional home"[3], excluding any air transport.

Table 6: Modal split for land-based international travel

Luxury Coaches	Rail	Road Coach	Road Independent
4%	6%	15%	75%

Source: TDM inter-city travel results

For travel distances of land-based international travel, we have assumed an average distance of 1200 kilometres. This is a population weighted average of distances between Johannesburg and cities of Maputo, Gabarone, Harare, Lilongwe, Lusaka, Maseru, Manzini/Mbabane and Windhoek.

The air travel emission factors for short and long haul flights are the weighted average values for all cabin class categories.

Table 7: Emission factors for air transport

Flight	Emission factor	Unit
International long haul flight	0.229	kg/passenger km
International short haul flight	0.204	kg/passenger km

Source: GHG Protocol 2006a & 2006c; Guidelines to DEFRA's GHG Conversion Factors, Annexes updated April 2008[4]

To account for the uncertainty over the non-CO_2 climate change effects of aviation (i.e. for water vapour, contrails, NOx, etc.) an indicative scaling factor has been applied. This factor is highly uncertain, but has been estimated by the IPCC in 1999 to be in the range of 2 to 4. With current best scientific evidence, DEFRA has suggested a factor of 1.9, which the GHG Protocol Corporate Accounting Standard has also adopted. In this report, calculations follow the GHG Protocol as much as possible, so the air travel emissions factors have a scaling factor of 1.9. Obviously, the carbon footprint for air transport would increase from more than 50% if the scaling factor was increased from 1.9 to 3[5].

[3]The TDM indicates both arrivals and departures for the category called "Regional homes" from/to other Host Cities. "Regional homes" covers SA visitors coming from their home. For the calculation of the modal split, it is assumed that both average figures for arrivals and departures of this regional home category will be applied and the total average will be calculated.

[4]http://www.defra.gov.uk/environment/business/envrp/pdf/ghg-cf-guidelines-annexes2008.pdf

[5] The emission factor for short haul flights would be 0.321 kg/pass-km, and for long haul flights it would be 0.361 kg/pass-km.

For the calculations of the carbon footprint for international visitors travelling by land, GHG Protocol emissions factors are used.

Table 8: Emissions factors for land based international transport

Mode	Emission factor ($kgCO_2$/ pass-km)	Comment
Rail - intercity	0.119	
Diesel Bus - inter city	0.049	Bus (diesel)- long distance
Passenger Car	0.190	Medium sized petrol engine
Luxury rail	0.148	Assumption: 25% higher than normal inter- city rail
Luxury coach	0.061	Assumption: 25% higher than normal coach

Source: GHG Protocol; Note that for the "Luxury" categories it has been assumed that the emissions factor is 25% higher than the normal category of the same transport mode

3.3 Carbon Footprint

The carbon footprint from international travel is 1,856,589 tCO_2, of which air travel is 1,741,728 tCO_2 and land-based transport is 114,861 tCO_2. As shown in **Table 3**, 145,000 of the international visitors will be part of the Special Travel Groups. Using the same split of regional origin for flights, international air transport emissions for these STGs would be 725,335 tCO_2.

Table 9: Carbon footprint for international air transport

Flight	Emissions (tCO_2)
Connecting flights-International Short haul	165,775
International Long haul flights	1,575,953
Total	**1,741,728**

Table 10: Carbon footprint for international land transport

	Modal Split (%)	Number of Passengers	Distance, one way (km)	Emissions (tCO_2)
Luxuary Coaches	4	12,000	1,202	1,748
Luxuary Rail	0	0	1,202	0
Rail	6	18,000	1,202	5,130
Road Coach	15	45,000	1,202	5,245
Road Independent	75	225,000	1,202	102,738
Total	**100**	**300,000**		**114,861**

Source: TDM model, author's calculations

4 Inter-city transport

4.1 Methodology

The basic approach for estimating the carbon footprint of inter-city transport is to apply travel distances between the cities to the number of travellers. The resulting volumes of passenger-km are multiplied by the emissions factor of the relevant transport mode. Inter-city travel is the travel between Host Cities or between host city and Gauteng Hub. The TDM presents inter-city travel numbers by air, luxury rail, rail, luxury coaches, road coaches and independent road.

Whereas international travel of any spectators going to and from South Africa is attributable to the tournament, certain inter-city travel is outside the system boundaries. The reason for this is that some spectators may be travelling as part normal holidays and not specifically related to attending tournament matches. As discussion in Chapter 3, for Special Travel Groups (which includes FIFA Family), all inter-city travel and accommodation during the entire 55 day period is included in the system boundaries, because their activity in South Africa is likely to be almost all related to the World Cup.

4.2 Key assumptions

The TDM projects a total of 3 million arrivals in Host Cities and the Gauteng Hub. These projections include inter-city travel by international non-ticket holders for public viewing events and fan-fests, as well as some inter-city travel by South African non-ticket holders as well.

Total passenger kilometres are the product of inter-city distances, shown in **Table 11** and **Table 12**, and the number of trips, as shown in **Table 13**.

Table 11: Inter-city distances for road and air travel (km)

	Bloem-fontein	Cape Town	Durban	Johannes-burg	Nel-spruit	Polo-kwane	Port Elizabeth	Pretoria	Rusten-burg	Hub
Bloemfontein	-	997	628	398	757	727	677	456	440	398
Cape Town	997	-	1606	1393	1741	1736	765	1464	440	1393
Durban	628	1606	-	566	676	929	984	618	710	566
Hub	398	1393	566	20	358	331	1075	50	120	-
Johannesburg	398	1393	566	-	358	331	1075	58	120	20
Nelspruit	757	1741	676	358	-	315	1434	322	445	358
Polokwane	727	1736	929	331	315	-	1393	273	375	331
Port Elizabeth	677	765	984	1075	1434	1393	-	1133	1105	1075
Pretoria	456	1464	618	58	322	273	1133	-	105	50
Rustenburg	440	1385	710	120	445	375	1105	105	-	120

Source: http://www.sa-venues.com/traveldistances.htm and http://www.drivesouthafrica.co.za/distance-chart-south-africa.php

Table 12: Inter-city distances by rail (km)

	Bloem-fontein	Cape Town	Durban	Johan-nes-burg	Nel-spruit	Polo-kwane	Port Eliza-beth	Pretoria	Rusten-burg	Hub
Bloemfontein	-	997	638	398	757	727	677	456	440	398
Cape Town	997	-	1981	1519	1902	1872	1067	1586	440	1519
Durban	628	1981	-	720	830	1050	1485	618	874	720
Hub	398	1519	720	20	386	356	1106	50	120	-
Johannesburg	398	1519	720	-	386	356	1106	70	120	20
Nelspruit	757	1902	830	386	-	494	1464	355	460	386
Polokwane	727	1872	1050	356	494	-	1393	273	370	356
Port Elizabeth	677	1067	1485	1106	1464	1393	-	1150	370	1106
Pretoria	456	1586	618	70	355	273	1150	-	111	50
Rustenburg	440	440	874	120	460	120	370	111	-	120

Source: http://www.transnetfreightrail.co.za except from following for which road distances are applied: Bloemfontein – all cities; Rustenburg – Cape Town, Johannesburg, Polokwane, Hub; Pretoria-Durban, Polokwane; and Port Elisabeth-Polokwane.

Note that "Hub" refers to Gauteng, and is considered 50 km from Pretoria and 20 km from Johannesburg. The total number of inter-city arrivals, as shown in **Table 13**, is more than 3 million, while the total passenger-kilometres, as shown in **Table 14**, is more than 2.1 billion.

Table 13: Total number of inter-city arrivals for all transport modes

From/ To	Bloem-fontein	Cape Town	Durban	Johan-nes-burg	Nel-spruit	Polo-kwane	Port Eliza-beth	Pretoria	Rusten-burg	Hub	Total
Bloem-fontein	-	20,384	28,384	51,374	3,928	5,617	10,273	11,440	4,632	86,716	222,748
Cape Town	19,309	-	44,642	72,668	16,569	16,097	73,773	35,393	13,321	48,149	339,921
Durban	20,072	40,563	-	90,245	12,409	9,549	73,906	14,335	16,139	58,661	335,879
Johan-nesburg	43,020	91,972	107,123	-	50,203	53,406	57,740	88,375	26,813	-	518,652
Nelspruit	3,958	13,776	12,995	44,348	-	4,953	20,292	34,331	4,192	75,741	214,586
Polo-kwane	7,137	11,996	11,894	40,306	3,305	-	5,638	3,954	11,288	76,992	172,510
Port Elizabeth	14,189	74,012	20,999	99,840	17,555	5,016	-	17,798	8,073	78,061	335,543
Pretoria	22,743	22,681	15,184	72,880	5,170	3,699	28,795	-	43,833	-	214,985
Rusten-burg	6,264	14,920	16,718	42,779	10,951	3,176	10,509	6,795	-	96,362	208,474
Hub	87,241	21,360	47,546	-	90,425	59,336	61,045	-	72,277	-	439,230
Total	**223,933**	**311,664**	**305,485**	**514,440**	**210,515**	**160,849**	**341,971**	**212,421**	**200,568**	**520,682**	**3,002,528**

Table 14: Passenger-km from inter-city travel (km)

The passenger kilometres are distributed across transport modes based on the projections by the TDM. For the final calculation of carbon footprint the emissions factors shown in **Table 15** are used.

From\To	Bloem-fontein	Cape Town	Durban	Johannes-burg	Nelspruit	Polokwane	Port Elizabeth	Pretoria	Rustenburg	Hub	Total
Bloemfontein	-	20,230,220	17,635,298	19,223,298	2,973,496	3,893,347	6,954,821	4,924,075	2,038,080	31,170,625	109,043,260
Cape Town	19,185,337	-	71,174,132	100,702,340	28,813,713	27,716,840	55,811,827	50,986,007	5,861,240	65,564,897	425,816,333
Durban	12,545,024	64,795,188	-	50,890,619	8,435,146	8,897,157	71,818,076	8,859,030	11,477,915	32,767,555	270,485,710
Hub	31,281,913	29,032,692	26,638,574	-	29,188,004	17,744,381	64,323,893	-	7,850,831	-	206,060,288
Johannesburg	16,235,856	126,850,120	60,217,383	-	16,844,407	16,354,511	61,701,129	4,889,074	3,217,560	-	306,310,040
Nelspruit	2,996,206	24,065,482	8,840,984	15,009,123	-	1,520,340	28,604,447	10,047,452	1,865,440	24,534,371	117,483,845
Polokwane	4,846,653	20,836,897	11,049,313	12,515,351	1,041,075	-	7,853,734	1,079,442	3,908,604	22,926,607	86,057,676
Port Elizabeth	9,549,845	55,978,210	21,035,259	105,648,984	24,783,718	6,987,288	-	19,911,091	8,920,665	82,177,595	334,992,655
Pretoria	9,480,828	32,947,062	9,383,712	4,123,261	1,664,740	1,009,827	32,031,796	-	4,177,507	-	94,818,733
Rustenburg	2,693,822	20,172,763	11,890,935	4,927,967	4,547,371	1,191,000	11,549,898	713,475	-	10,423,658	68,110,889
Total	**108,815,484**	**394,908,634**	**237,865,590**	**313,040,943**	**118,291,670**	**85,314,691**	**340,649,621**	**101,409,646**	**49,317,842**	**269,565,308**	**2,019,179,429**

Table 15: Emissions factors by transport mode for inter-city travel

Mode	Emission factor (kg CO_2/pass-km)	Comment
Air	0.363	Domestic flights (note that this is different than international short haul flights in the previous section)
Rail - intercity	0.119	Inter-city rail
Inter-city bus	0.049	Long distance bus. Diesel fuelled. Taken to represent the TDM category of "Road Coach"
Passenger Car	0.190	Medium sized petrol engine. Taken to represent the TDM category of "independent car"
Luxury rail	0.148	Assumed to have 25% higher emissions factor per passenger kilometre than normal inter-city rail
Luxury coach	0.061	Assumed to have 25% higher emissions factor per passenger kilometre than normal coach

Source: GHG Protocol (2006a and 2006c) and author's calculations

4.3 Carbon Footprint

The carbon footprint for inter-city travel is 444,821 tCO_2. Of this total, spectators account for 246,451 tCO_2 and STGs account for 171,119 tCO_2.

Table 16: Carbon footprint for inter-city travel

Mode	Passenger-kilometre	Emissions factor (kg CO_2/ pass-km)	Emissions (tCO_2)
Air	909,249	0.36	330,057
Rail	18,231	0.12	2,162
Luxury rail	33,202	0.15	4,922
Road Coach	633,554	0.05	30,727
Luxury Coach	29,278	0.06	1,775
Road Independent	395,666	0.19	75,176
Total	**2,019,179**		**444,821**

The total shown above does not include travel between Host Cities and "regional home" by South Africans. Regional home refers to points of departure/arrival in South Africa outside the Host Cities or the Gauteng Hub. The total number of arrivals and departures over the entire World Cup period is 181,702 according to the TDM, of which 90% is from the day before to the day after the tournament. Since the TDM does not allow sorting data of regional home travel by categories of attendees, it is not possible to exclude holiday related travel for spectators. As a conservative approach, all "regional home" travel during the entire World Cup period is attributable to the World Cup. Assuming an average distance of 600 km for regional home travel and the modal split derived from the TDM, the carbon footprint of these travels is calculated to be 40,140 tCO_2. This must be added to the total given in the previous table.

Table 17 Carbon footprint for travel from "regional home" to major cities

Mode of travel	Total distance (pass-km)	Emissions factor (kg CO_2/ pass-km)	Emissions (tCO_2)
Air	40,627,200	0.363	14,748
Rail	3,857,400	0.119	457
Luxury rail	10,586,400	0.148	1,569
Road Coach	51,097,800	0.049	2,478
Luxury Coach	2,852,400	0.061	173
Road Independent	109,021,200	0.190	20,714
Total	**218,042,400**		**40,140**

5 Intra-city transport

5.1 Methodology

Intra-city travel is travel within Host Cities and the Hub. Intra-city transport modes include bus, coaches, minibus/taxi, private cars and trains. In general, local transport includes all travel within the Host Cities. This will include daily travel of spectators from accommodation/arrival point to accommodation and venues plus movements among different World Cup venues. To be consistent with accommodation, intra-city transport more than one day before the opening match and one day after the final by spectators are not attributable to the World Cup, whereas any intra-city travel by Special Travel Groups are.

Emissions from intra-city transport are calculated in three components. First, all people arriving in the city (through inter-city transport) will travel from arrival point to their accommodation and back to a departure point at the end of their stay. Second, for all tickets available, ticket holders will travel from accommodation to the stadium and back. Third, each spectator (ticket holders and non-ticket holders) will visit two additional World Cup events within the city. For all trips, the average distances, the modal split and emission factors per transport mode have been applied to calculate the total emissions.

5.2 Key assumptions

A total of 3 million arrivals in Host Cities and Gauteng Hub are projected by the TDM. As with inter-city travel, this includes international non-ticket holders, and some South African non-ticket holders attending other World Cup venues.

The assumptions of numbers of visitors and ticket numbers shown in **Table 3** earlier. Also as discussed earlier, general spectators have only been included during the 32 days from the day prior to the tournament to the day after the tournament, while Special travel Groups are included for all 55 days.

Host City transport operations plans are the basis of local transport emissions. However, the reports do not follow a standardized format, so they vary in their level of detail and relevance for the footprint calculations. For this study, we have applied the same average data on travel distances and modal split for all host cities, based on the most detailed plans. Travel distances and modal splits are derived from the Cape Town and Pretoria Host City Transport Plans, which have the most detailed data. In future, further investigation may be taken on the other cities as well, to find more suitable data on the specific conditions of each city.

A visitor is travelling on average 3 different routes within a city:

1) Arrival point to accommodation and back to departure point
2) Accommodation to Stadium and return
3) From one World Cup venue to two others

Beside the stadium, other World Cup venues may be practice venues, fan parks, public viewing sites or other fan areas. The estimated average distances are shown in **Table 18**, while the modal split is shown in **Table 19**.

Table 18: Travel distances for intra-city transport

Trip	Distance (km)
Accomodation – stadium	20
Airport – accomodation	20
Central hub/central station – accommodation	10
Visit of two more event places	5

Source: City of Cape Town 2008; City of Tshwane 2008

Table 19: Modal split for intra-city transport

Mode	Modal split for airport routes (%)	Mode	Modal split for other routes (%)
City bus	9.0	City bus	34.0
Tourbus	11.5	Coach	15.0
Hotel shuttles	11.5	Car	7.0
Minibus	9.0	Minibus	17.0
Private Car	41.5	Metrorail	28.0
Rental car	17.5		

Source: City of Tshwane 2008

The above modal split includes 28% of trips by intra-city rail. This figure may be too high for smaller Host Cities, where coach, private car and bus may be used instead of rail. Less use of rail increase the average emission factor. However, the modal spits are taken from the City of Tshwane Host City Transport Operation Plan, which is one of the most detailed plans available, so this was the best estimate for the modal split.

Arrival points can either be the central railway station, central bus station or the airport. **Table 20** shows the arrivals for the entire World Cup, based on the TDM.

Table 20: Number of arrivals for all Host Cities

General spectators		Sub-total
by air	by rail/road	
548,349	1,082,938	1,631,287
Special travel Groups		**Sub-total**
by air	**by rail/road**	
452,078	813,334	1,265,412
Total all groups		**2,896,699**

The TDM includes a portion of non-ticket holders as well, since the general spectators without tickets who accompany international ticket holders have been included in modelling. If we combine the earlier estimates of South African ticket holders (650,000) with all international visitors (700,000), this would mean 1.35 million travellers within South Africa, excluding any non-ticket holders. In other words, the model predicts that the average visitor during the World Cup will arrive in two different cities during their stay, excluding the initial arrival from overseas. This is reasonable, since many South African's may only visit one other city than their home, and some will not travel at all, while international visitors may visit 3 or 4 cities.

The emissions factors are shown in **Table 21**.

Table 21: Emissions factors for intra-city transport

Mode	Emissions factor (kg CO_2/ pass-km)
Rail – intracity	0.0997
Diesel Bus - inter city	0.0485
Diesel Bus - urban	0.1870
Small Bus/Taxi	0.1900
Passenger Car	0.1900

5.3 Carbon Footprint

Total emissions from intra-city transport are 39,577 tCO_2, as shown in the table below.

Table 22: Carbon Footprint from intra-city transport

Mode	Emissions (tCO_2)
City bus	12,989
Coach	6,358
Car	4,786
Minibus	9,973
Intra city rail	5,472
Total	**39,577**

[7] *These emissions factors exclude the energy used to transport the materials to the building site, which is negligible in comparison to the energy used to make the materials.*

6 Stadia construction and materials

6.1 Methodology

The materials used in the construction of the stadia require significant amounts of energy to be produced. In addition, some of the materials (e.g. cement) also result in direct greenhouse gas emissions from their manufacturing processes. The combination of the energy use and process emissions is the "embodied emissions" in the materials. The approach taken here is a "life cycle" approach to emissions. This means that it takes into consideration all of the energy and material inputs upstream from the production of the construction materials.

To estimate the life cycle emissions factors for different construction materials, this study uses the GEMIS life cycle emissions database[6], which was also used in the 2006 World Cup carbon footprint study. For this study, the material process chains are customized for South Africa by replacing the grid electricity inputs with the mix of power plants used in the South African grid.
For the footprint calculation, embodied emissions are distributed over the entire useful lifetime of the stadia. This approach assumes that the newly built stadia – as well as the upgrades of existing stadia undertaken to prepare for the FIFA World Cup -- would have been needed for other events as well, and so were not built solely for the purpose of the 2010 World Cup. In other words, because the stadia are used for multiple events over many years, the emissions related to the construction should be allocated across all these events, not just the World Cup matches. This same approach was taken in the Green Goal 2006 and the Durban carbon footprint study.

By the same principle, even if a stadium is not renovated for the World Cup, the carbon footprint should include a share of the embodied emission in that stadium, regardless of when it was originally constructed. Because historical data on materials use is not available, the best proxy for this would be to use the materials consumption for the new World Cup stadia, scaled to the appropriate size of the existing stadia.

The carbon footprint analysis of embodied emissions therefore considers all 10 stadia included in the tournament match schedule. The system boundaries could also include practice stadia, but due to lack of data materials and seating capacity of these practice stadia, they are not included in the present analysis. In addition, because of their much smaller size and lower technology of building materials, the emission from these venues would be much smaller than for the main stadia.

6.2 Key assumptions

Three cities provided detailed materials inventories for new stadia: Durban (Moses Mabhida), Cape Town (Green Point) and Johannesburg (Soccer City – major upgrade). In addition, estimates of the material usage for the minor upgrades at Ellis Park in Johannesburg and Loftus Versfeld in Pretoria were also provided by those Host Cities. The materials inventories for these stadia is shown in **Table 23**. The materials estimates for the Ellis Park and Lotfus Versfeld upgrade are only 11,797 and 8,400 t CO_2, respectively, which is why we use new stadia to estimate the total construction materials actually present in these stadia as well.

Table 23: Construction material use for new stadia

Material	Soccer City	Moses Mabhida	Green Point
Cement	136,700	4,900	87,130
Concrete	188,089	8,900	250,800
Steel reinforcement	10,300	5,040	21,152
Glass	1,410	5,300	1,393
Aluminum	15	1,370	80
Clay Bricks	44,722	14,500	55
Ceramic ware	210	50,000	320
Roof Steel	8,068	6,900	7,307
Membrane	26	40,000	29
Bitumen	18,959	1,900	118
Aggregate stone mix	167,399	22,300	183,000
Fiber Cement Cladding	1,041	-	-
Plastic/Polycarbonate Sheeting	602	-	219
Precast concrete	19,603	-	-
Total GHG Emissions	**244,135**	**189,836**	**188,355**

Source: City of Johannesburg, City of Durban, City of Cape Town

The total greenhouse gas emissions in the table above are the product of the life cycle emissions factors for construction materials shown in **Table 24** and the mass of construction materials. For the other stadia that did not provide detailed material inventories, the Durban stadium data are scaled by seating capacity to estimate the embodied emissions.

[6] *The Global Emission Model of Integrated Systems (GEMIS) is a life cycle analysis model and database that was developed by the Öko-Institut in Germany and is widely used for life cycle energy and emissions analysis (www.gemis.de).*

Table 24: Emissions factors for building materials[7]

Material	Emissions Factor (tCO_2e/t material)
Cement	0.9910
Concrete	0.1749
Steel reinforcement	1.8231
Glass	1.1345
Aluminum	22.9981
Clay Bricks	0.2096
Ceramic ware	0.5957
Roof Steel	1.8231
Bitumen	1.1950
Aggregate stone mix	0.0090
Fiber Cement Cladding	0.9910
Polycarbonate sheeting	3.5900
Plastic	3.5900
Precast concrete	0.1749

Source: GEMIS database, modified for South African electricity grid

As discussed earlier, the embodied emissions should be allocated across all of future events over the life of the stadia. Durban, Cape Town and Johannesburg (Soccer City) estimated the annual number of events days in future years as 46, 30 and 211, respectively. Not all of these events will be 100% capacity events like the World Cup matches, so we must adjust the event days by the capacity of each event to estimate "100% capacity equivalent" event days. This calculation is based on an analysis provided by Mbomela stadium in Nelspruit. The City of Mbomela estimated that, of the 70 event days annually, 30% would have at least 50% utilisation of the seating capacity and 70% would have less than 25% utilisation. Assuming that the first category averages 75% utilisation and the second category averages 15% capacity utilisation, this means that 100 event days would be equivalent to 32 "100% capacity" event days (i.e. 0.30 x 0.5 + 0.70 x 0.15). This conversion factor is used for all of the stadia to arrive at "100% capacity" event days.

For the distribution of embodied emissions across events over the entire 30 year lifetime of the stadia, **Table 25** presents the assumptions. The same lifetime was used in the Green Goal 2006 study. Total embodied emissions of the smaller stadia were scaled from the totals for Moses Mabhida, adjusted for seating capacity.

[7]These emissions factors exclude the energy used to transport the materials to the building site, which is negligible in comparison to the energy used to make the materials.

Table 25: Assumptions on future use of stadia

	Number
Number of event days over lifetime of stadia	
Soccer City, Ellis Park	6,330
Moses Mabhida	1,380
Green Point	900
Seat capacity from 42,000 to 50,000 [1])	2,100
Number of "100% seating capacity-equivalent" event days over lifetime of stadia	
Soccer City, Ellis Park	2,051
Moses Mabhida	447
Green Point	292
Seat capacity from 42,000 to 50,000 [1])	675
Economic lifetime of stadia, in year	**30**

Notes: [1]) Manguang stadium; Mbomela; Nelson Mandela stadium; Loftus Versfeld; Royal Bafokeng; and Peter Mokaba stadium.

6.3 Carbon Footprint

Given the seating capacity and number of World Cup event-days by stadium as presented in **Table 26**, the overall carbon footprint from embodied emissions of stadia construction is 15,539 tCO_2e.

Table 26: Carbon footprint for stadia construction and materials

Stadium	Seating Capacity	Embodied Emissions in stadia (tCO_2e)	Emissions per event day over lifetime (tCO_2e)	World Cup event days	Emissions for World Cup 2010 (tCO_2e)
Soccer City/ Johannesburg	95,000	244,135	119	8	952
Ellis Park / Johannesburg	61,006	189,836	119	7	833
Moses Mabhida /Durban	70,113	189,836	425	7	2,972
Green Point Stadium / Cape Town	68,000	188,355	646	8	5,167
Mangaung Stadium / Free State, Bloemfontein	48,000	129,963	193	6	1,155
Mbomela/Nelspruit	46,000	124,548	185	4	738
Nelson Mandela Stadium/ Port Elizabeth	48,000	129,963	193	8	1,540
Loftus Versfeld /Pretoria	50,000	135,379	201	6	1,203
Royal Bafokeng /Rustenberg	42,000	113,718	168	6	1,011
Peter Mokaba Stadium / Polokwane	46,000	124,548	185	4	738
Total		**1,326,147**		**64**	**15,359**

7 Stadia and precinct energy use

7.1 Methodology

The basic approach to calculate the carbon footprint of energy use at stadia and stadia precinct is to apply the relevant emissions factor to estimated energy demand. Three cities provided detailed energy demand for new stadia: Durban (Moses Mabhida), Cape Town (Green Point) and Johannesburg (Soccer City – major upgrade). In addition, the City of Cape Town provided an estimate of the number of hours each energy using system would operate during the entire World Cup period, rather than annual electricity consumption or consumption during a match only. This estimate of operational hours has been applied to all the stadia for consistency. For the other stadia, energy demand is estimated by scaling the Green Point stadium estimate by the seating capacity of other stadia.

The tournament comprises 64 matches distributed over 10 stadia. The carbon footprint including energy demands at the 10 stadia and the stadia precinct (such as parking facilities). As with embodied emissions, the analysis does not include energy use at other venues.
All electricity demand is assumed to be covered by electricity supplied from the national grid. While many of the stadia do have diesel generators, and may even use these as the primary energy supply source, the emissions factors of these generators would be similar to grid electricity in South Africa, and it is difficult to predict how much they will actually be used.

7.2 Key assumptions

The energy demand estimates provide by Cape Town, Durban and Johannesburg are shown in the table below. The Durban estimates reflect interventions that have already saved roughly 30% of the expected electricity consumption from these services.

Table 27: Estimated electricity demand in major stadia

Building service	Electricity demand (kVa)[8]			Hours during WC
	Green Point	Moses Mabhida	Soccer City	
Air conditioning	1400	1520	800	336
Lifts	300	120	80	336
Playing field lighting	1000	1200	1210	72
Internal lighting	1000	293	2250	1,008
External lighting	100	469	400	504
Feature lighting	100	30	250	504
Media	500	100	2321	72
Catering	1200	600	700	108
Mechanical services	1000	0	157	135
Electronic services	900	100	200	252
Water heating	250		198	504
Retail	0	500	2000	-
Cable Car, etc		250		
Total	**7750**	**5182**	**10566**	

Source: City of Johannesburg, City of Durban, City of Cape Town

In addition, the LOC has estimated that the International Broadcast Centre will have a electrical demand of 5,602 kW. The IBC will run 24 hours per day from 2 weeks prior to the start of the tournament and will close immediately after the tournament. The electricity consumption would therefore be 807 MWh during the World Cup.

[8]The power rating for this demand in kW is the kVa times the power factor, which was estimated at 90% by the City of Durban stadium analysis (e.g. 7 kVa x 0.9 = 6.3 kW).

7.3 Carbon footprint

Given the seating capacity and number of World Cup event days by stadium, the overall carbon footprint for energy use by stadia and precinct, including the International Broadcast Centre, is estimated to be 16,637 tCO_2.

Table 28: Carbon footprint for stadia and precinct energy use

Stadium/Host city	Seating Capacity	Elec Cons per match (MWh)	Elec 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
Green Point Stadium / Cape Town	68,000	301	2,405	2,397	8
Mangaung Stadium /Free State, Bloemfontein	48,000	212	1,273	1,269	6
Mbomela/Nelspruit	46,000	203	814	811	4
Nelson Mandela Stadium/ PE	48,000	212	1,698	1,692	8
Loftus Versfeld /Pretoria	50,000	221	1,327	1,322	6
Royal Bafokeng /Rustenberg	42,000	186	1,114	1,110	6
Peter Mokaba Stadium / Polokwane	46,000	203	814	811	4
International Broadcast Centre			807	804	
Total			**16,696**	**16,637**	**64**

[8] The power rating for this demand in kW is the kVa times the power factor, which was estimated at 90% by the City of Durban stadium analysis (e.g. 7 kVa x 0.9 = 6.3 kW).

According to the proposed Minimum Environmental Standards for Green Goal 2010, "green electricity" should be purchased to meet the electricity demand of the stadia and precinct. This standard does not specify new and additional renewable generation facilities, however, which means that this requirement will not necessarily reduce emissions. This is because the former customers of the existing renewable energy plants would have to now buy electricity from Eskom if the Host Cities purchased this "green electricity"

8 Energy use in accommodation

8.1 Methodology

The main emissions source from accommodation is from energy consumption. Emissions are calculated from the average energy use per person per overnight stay, the total number of overnight stays during the tournament, and the grid emissions factor for electricity. The TDM was used for the number of guests expected to require accommodation during the World Cup. The model includes data on projected overnight stays for each day of the entire 55 day period. Note that this period commences 12 days before the opening match and ends 13 days after the World Cup final. As with inter-city transport, the system boundary for accommodation differs between different groups of World Cup attendees to exclude accommodation that may not be attributable to the World Cup.

8.2 Key assumptions

Average energy consumption per person per day for hotel energy is estimated to be 29 kWh per person-day, based on a recent study by Energy Resource Optimizers CC that monitored energy consumption in 47 hotels in South Africa. Accommodation will, of course, include types of lodging other than hotels (e.g. hostels, guest houses, lodges, camping, country houses etc.) and some of these may have lower electricity demand per person-day than an average hotel. There was no data available on energy use in other forms of accommodation, however, so the hotel energy consumption has been used for all overnight stays. **Table 29** below shows the other studies with estimates of hotel energy use, while **Table 30** shows the total number of overnight-stays, summarized for each city.

Table 29: Studies on energy consumption in hotels

Value	Unit	Source
31	kWh/ person-night	World Summit on Sustainable Development (WSSD) carbon footprint (2002)
39.8	kWh/night	H. Hamele, S. Eckardt 2006, “Umweltleistungen europäischer Tourismusbetriebe”, Ecotrans e.V., Saarbrücken, Germany, December (Life Umwelt Programm EU, DBU)
40	kWh/night	Durban footprint study: earlier study by Energy Resource Optimizers CC
7.6	kWh/ person-night	Green Goal 2006, Germany: Legacy Report (electricity and heat)
29.27	kWh/ person-night	Energy Resource Optimizers CC (2008)

Table 30: Overnight stays per city

	Overnight stays Spectators	Overnight stays Special travel Group	Total overnight guests
Bloemfontein	293,247	158,616	451,863
Cape Town	1,240,967	944,108	2,185,075
Durban	1,050,431	834,960	1,885,391
Hub	426,030	168,963	594,993
Johannesburg	1,745,806	1,272,724	3,018,530
Nelspruit	214,878	140,726	355,604
Polokwane	185,823	113,849	299,672
Port Elizabeth	940,532	541,548	1,482,080
Pretoria	613,320	364,716	978,036
Regional Home	0	0	0
Rustenburg	269,434	141,059	410,493
Total	**6,980,468**	**4,681,269**	**11,661,737**

Source: TDM

In the Green Goal 2006 study, the carbon footprint for accommodation was calculated from an average of one overnight stay per ticket, while the present analysis assumes 11.6 million overnight stays and 3.3 Million tickets, corresponding to 3.5 overnight stays per ticket. This total is more than three times as high as the 2006 estimate. One obvious explanation is that, because South Africa is so far from the point of origin for the teams, visitors are more likely to stay in the country for a longer period.

8.3 Carbon Footprint

Table 31 below shows the carbon footprint from accommodation split by Host City. The total is 340,128 tCO_2, with Special Travel Groups making up 136,535 tCO_2, or 40% of the total.

Table 31: Carbon footprint for energy use in accommodation

City	Emissions (tCO_2)
Bloemfontein	13,179
Cape Town	63,730
Durban	54,990
Hub	17,354
Johannesburg	88,039
Nelspruit	10,372
Polokwane	8,740
Port Elizabeth	43,227
Pretoria	28,526
Rustenburg	11,973
Total	**340,128**

9 Summary of footprint and conclusions

Table 32 below shows the summary of the carbon footprint for the 2010 World Cup, with and without emissions from international transport. Because international travel is 67% of the total emissions, the decision about whether to include this in the amount of emissions to be offset is critical. These emissions were not included in the Green Goal 2006 carbon footprint, nor were they offset in 2006.

Table 32: Summary carbon footprint for FIFA 2010 World Cup

Component	Emissions (tCO_2e)	Share (%)
International transport	1,856,589	67.4
Inter-city transport	484,961	17.6
Intra-city transport	39,577	1.4
Stadia constructions and materials	15,359	0.6
Stadia and precinct energy use	16,637	0.6
Energy use in accommodation	340,128	12.4
Total excluding international transport	**896,661**	
Total including international transport	**2,753,250**	**100**

After international transport, the largest components for the footprint by far are inter-city transport and energy use in accommodation.

If we exclude the estimate of emissions from international transportation, the carbon footprint estimate for entire 2010 World Cup is considerably higher than the Green Goal 2006 footprint, which was 91,700 tCO_2, and higher than what would be expected from the earlier Durban carbon footprint study.

The Durban study estimated that Durban's 2010 World Cup emissions, including a share of the inter-city travel during the tournament, were just under 50,000 tCO_2. Durban's matches represent 1/8th of the total, although Durban would be expected to have a larger share of accommodation and inter-city transport emissions than this, since it will be a destination for many of the international visitors. The Durban study did not have access to the Transport Demand Model, however, and so only considered single flights to and from Durban for all spectators and a 2 night stay. What the TDM explains is that visitors are likely to have multiple trips to multiple cities during their stay, and also be in the country for many days, so it is reasonable that the travel emissions would be much higher than estimated using the Durban study assumptions.

Why is the carbon footprint so much bigger than for the 2006 World Cup? There are number of obvious reasons that reflect the geography and infrastructure of South Africa. For inter-city transport, which is the largest component after international transport, distances between matches in South Africa are much greater than in Germany, and the lack of high speed rail links means the most visitors will fly multiple times between matches, leading to much higher transport emissions. For intra-city transport, although major efforts are being made to upgrade public transport options, the reality is that much of this travel will still be in passenger cars or small buses over long distances, rather than light rail as used in Germany. For energy use in accommodation, estimated energy consumption per night for South Africa (29 kWh/person-night) is much higher than what was used in Green Goal 2006 (7.6 kWh/person-night). This may reflect differences in climate and lower building energy efficiency. However, the Öko-Institut has indicated that more recent studies show Germany in the 30-40 kWh range as well. The average number of days stay per person is also much higher because most guests are coming from countries far away. Overnight accommodation for the 2010 World Cup, based on the TDM, is almost 12 million, while for 2006 the estimate was around 2 million. The 2006 estimates were simply one night per ticket, whereas the TDM considers the full stay in the country. South Africa is also a more greenhouse gas (GHG) intensive economy than many European countries, which increases the emissions per unit of electricity consumed.

The carbon footprint calculation is highly dependent on the data inputs, which had to be estimated in many cases where detailed city-specific data was not available. One major uncertainty is the country or origin for international visitors, as well as the transport mode of international visitors from neighbouring countries.

The Transport Demand Model (TDM), commissioned by the Department of Transport and developed by Richard Gordge (Transport Futures), was the most important source for inter-city transport, overnight accommodation, and much of intra-city transport. Unfortunately, detailed data from Host Cities on the transport modes and distances for intra-city transport was very limited. Although most Host Cities have Transport Operations Plans, few contained enough detailed information to inform the carbon footprint, and most were not easily comparable to the more detailed reports from Tshwane and Cape Town. Refining the local components of the footprint requires a more standardised process for data collection and structured reporting from the Host Cities.

The challenge with reducing the carbon footprint of the event is that more than 65% is from international travel, where visitors do not have other options than air travel for long distances, and 17% is from inter-city transport where there are also few alternatives for long distance travel in South Africa. The provision of high quality private and public coach service will take some burden from the air transport system, although it is not clear if this is included already in the Transport Demand Model used to estimate transport emissions.

For the smaller components of the footprint, including local transportation, stadium energy use, and energy use in accommodation, there are more opportunities for emissions reductions, but most of these are already captured in the Minimum Environmental Standards and the 2010 Green Goal Business Plans in the Host Cities. The most important opportunities for emissions reductions are likely to come from information sharing among the Host Cities, because some cities have prepared more detailed assessments of opportunities to reduce emissions than others have. The consultant employed by DEAT to assist some of the smaller municipalities with their Business Plans could also perform part of this information sharing role, as should the 2010 Green Goal reviews being conducted for transport, accommodation, and stadium energy use.

Part II
Developing a carbon neutral World Cup

10 Institutional issues for a carbon neutral event

This chapter outlines what sort of regime should be put in place to ensure that the 2010 World Cup will achieve the goal of being carbon neutral. This includes what role the major stakeholders will play in this event, and the institutional and governance issues related to setting up the Carbon Offset Programme. This section goes through the major decisions that must be taken, and explores three different models for an institutional structure.

11 Context

11.1 Objective the carbon offset process

The vision for the Green Goal 2010 Programme is to:
"...to promote sustainable development principles, shift people's thinking accordingly and encourage local initiatives in a pro-active manner, which will reduce the negative impact of the 2010 FIFA World CupTM and enhance the short and long-term environmental, social and economic benefits of the event."
The Green Goal 2010 vision and principles document goes on to state that:

"The primary aim of Green Goal 2010 is to ensure the 2010 FIFA World CupTM is a carbon neutral event and that other negative environmental impacts of the event are minimised through implementing event greening principles such as sustainable procurement, energy efficiency, waste avoidance and water conservation."

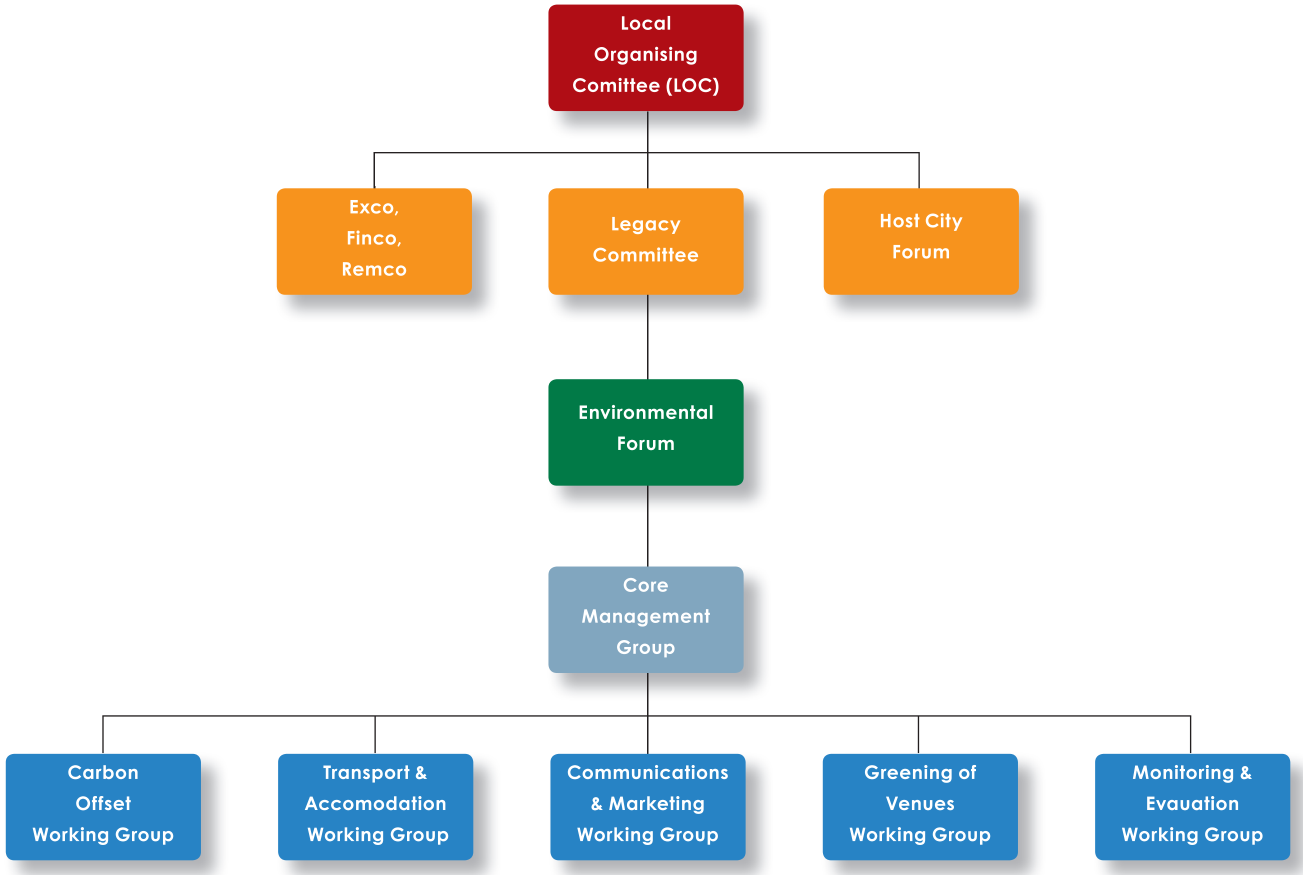
This means that whatever institutional arrangements are set up before, during and after the event must ensure that the goal of a carbon neutral event is achieved. More importantly, it means that one of the most important outcomes of the carbon neutral programme must be to raise awareness about climate change and sustainability among South Africans. All of the decisions about how the programme should be implemented, therefore, should be evaluated against how the programme creates awareness and action in South Africa, not just whether the programme satisfies the international standards for being "carbon neutral". This objective has important implications for many of the choices on how to implement the programme, which are elaborated throughout this chapter.

11.2 Existing institutional structures

The African Legacy Programme was established by the Board of the Local Organising Committee (LOC) in November 2006, as one of the four main priorities of the 2010 FIFA World Cup. The Legacy Sub-Committee of the LOC Board has, in turn, established the Greening 2010 Environmental Forum (2010 EF) in late 2007. This Forum is chaired by the LOC, and included representatives of DEAT, DWAF, DOT, DME and all nine Host Cities. The Forum has met several times since 2007 and coordinates all of the Green Goal efforts, which is possible because of the presence of all the major stakeholders.

The Forum has, in turn, set up functional Working Groups tasked with developing specific areas of the Green Goal 2010 programme. The four Working Groups set up to date are: Carbon Offsets, Communications & Outreach, Transport & Accommodation and Greening of Official Venues. A fifth Working Group on Monitoring & Evaluation will also be constituted with a member from each of the other four Working Groups. The Working Groups play a technical advisory role to the Forum, and are led by the Forum member. The Carbon Offsets Working Group (COWG) is led by Dr. Jenitha Badul (DEAT) and consists of a core group of the LOC, DEAT, UNDP, Eskom, DME, CEF as well as invited parties with particular skills and expertise, such as SANERI. These institutions are shown in Figure 1.

Figure 1: Organization structure for FIFA 2010 World Cup Greening Programme



Source: DEAT (2008) National Greening 2010 Framework. 1 Sep 2008 Draft.

As part of the COWG, DEAT and UNDP commissioned a "Draft Terms of Reference for the Preparation of a Project Document for the 2010 FIFA World Cup offset project". This document outlines all of the areas that needs to be addressed in a carbon offsets regime, starting with the selection of a Project Manager who would provide overall technical and financial management for the Carbon Offset Programme.

11.3 Constraints

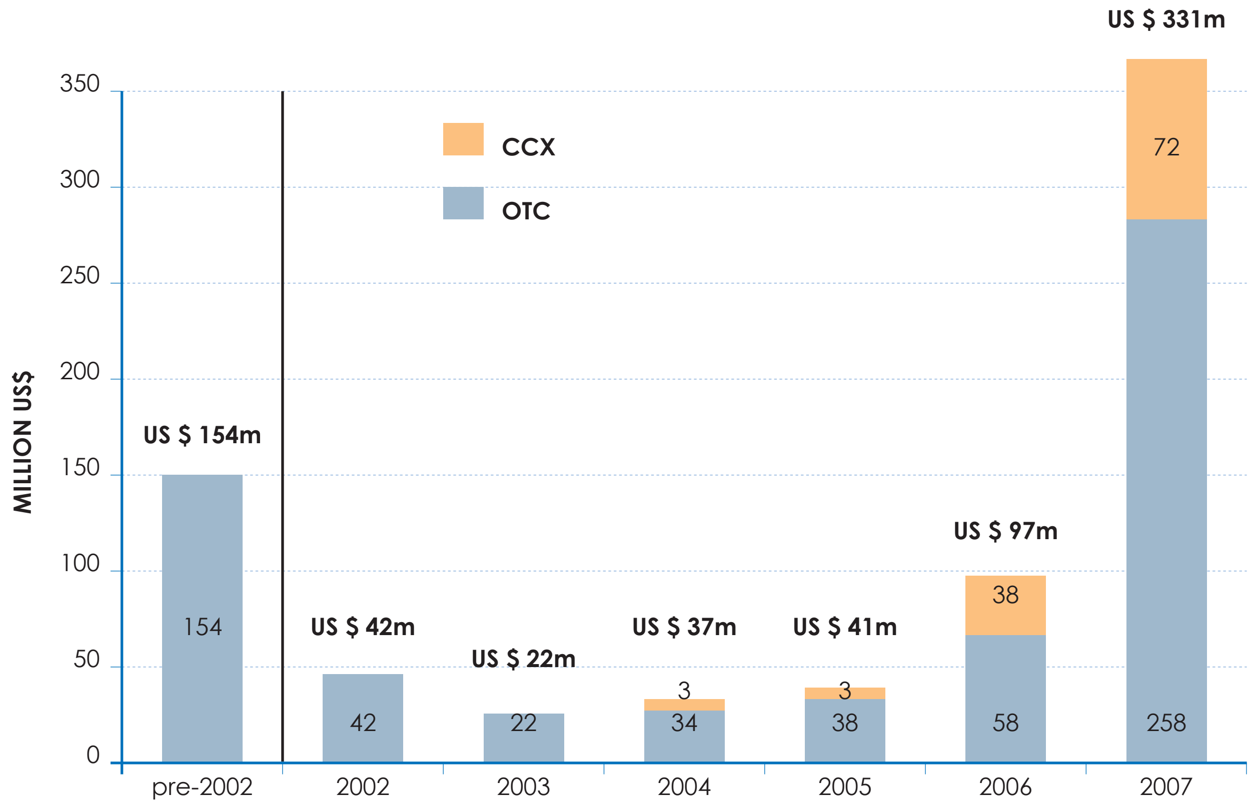
The decisions on how to implement a Carbon Offset Programme for the 2010 World Cup should take into consideration not only the objectives of Green Goal 2010 and the existing institutional structures, but also the real constraints faced by key stakeholders. The most important of these constraints are the limited time available to develop the offset process and the limited institutional capacity within the COWG and 2010 Environmental Forum members. The members of both of these groups have a multitude of responsibilities outside of the Green Goal 2010 programme, and they also have limited budgets and staff to support this process. This means that maximum use of existing international and national expertise should be made, and use of existing international carbon offset standards, certification systems, and administration systems (e.g. carbon offset registries). In terms of timing, developing a carbon offset regime from scratch and developing offset projects could take longer than the remaining time available prior to the World Cup, as shown from experience in the Johannesburg Climate Legacy Programme in 2002. Finally, a Carbon Offset Programme needs to minimize the "transaction costs", in other words, the administration and overhead costs other than the actual costs of the carbon offsets. This is because most donors and corporate sponsors are likely to be more willing to fund the actual offset projects themselves, rather than pay the costs of government overheads in administering those programmes.

11.4 Growth of the voluntary carbon market

South Africa's first major entry in the field of carbon neutral events was for the World Summit on Sustainable Development (WSSD), where the Johannesburg Climate Legacy (JCL) trust was created to manage the carbon neutral programme, as well as the constituent offsets projects. This is discussed in more detail later in this section, but the most important point to make here is how much the world of carbon offsets has changed, particularly the voluntary carbon market, since 2002.

As Figure 2 shows, the voluntary carbon market has grown from $42 million in transactions in 2002 to $331 million in 2007, which is an average annual increase of more than 50%.

Figure 2: Growth of voluntary carbon market



Source: Ecosystem Marketplace & New Carbon Finance 2008.

Furthermore, the voluntary market is only one portion of the much larger global carbon market that reached $66.4 billion in 2007, or $16.3 billion outside of the European Union's Emissions Trading Scheme (see **Table 33**). In other words, in 2007 carbon purchasers spent $16.3 billion buying the rights to emissions reductions credits in the regulated and voluntary markets outside of Europe, primarily through the Clean Development Mechanism (CDM) under the Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC).

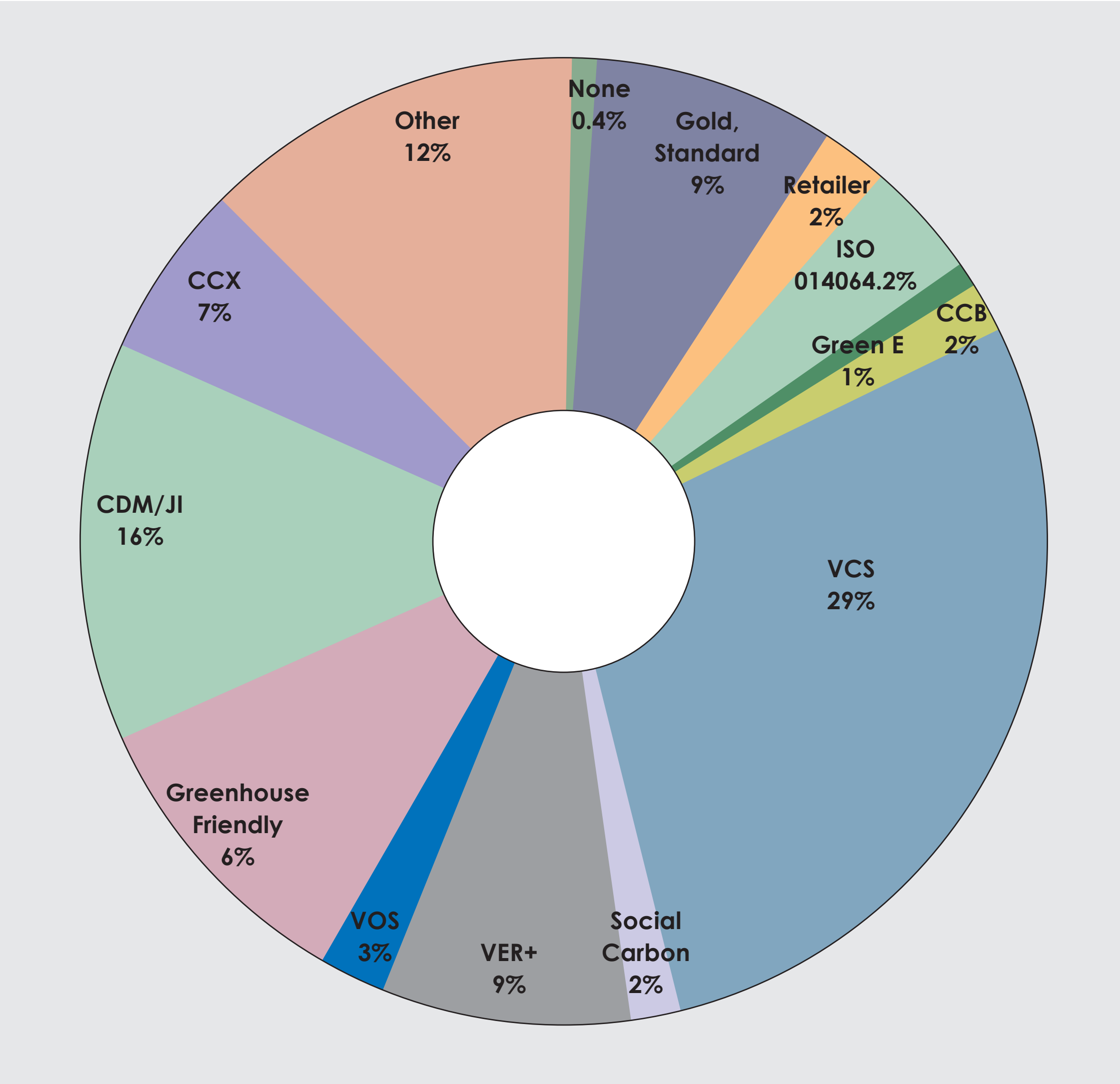
Table 33: Volume and value of global carbon market

	Volume ($MtCO_2e$)		Value (US $ million)	
Markets	**2006**	**2007**	**2006**	**2007**
Voluntary OTC Market	14.3	42.1	58.5	258.4
CCX	10.3	22.9	38.3	72.4
Total Voluntary Markets	**24.6**	**65.0**	**96.7**	**330.8**
EU ETS	1,1044	2,061	24,436	50,097
Primary CDM	537	551	6,887	6,887
Secondary CDM	25	240	8,384	8,384
Joint Implementation	16	41	141	495
New South Wales	20	25	225	224
Total Regulated Markets	**1,702**	**2,918**	**40,072**	**66,087**
Total Global Market	**1,727**	**2,983**	**40,169**	**66,417**

Source: Ecosystem Marketplace and New Carbon Finance 2008

At the same time, the popularity of carbon neutral branding for major events has also increased dramatically, with the Olympics (2006 Winter), FIFA World Cup (2006), Commonwealth Games (2006) and countless global conferences, concerts, and meetings making the commitment to offset their emissions. This has catalysed the development of internationally accepted standards and certification systems for carbon offsets projects in the voluntary market, as shown in Figure 3. In addition to projects that use the CDM standard in the voluntary market, the most widely used standards are the Voluntary Carbon Standard (VCS), Gold Standard (GS), and Voluntary Emissions Reduction + (VER+) Standard.

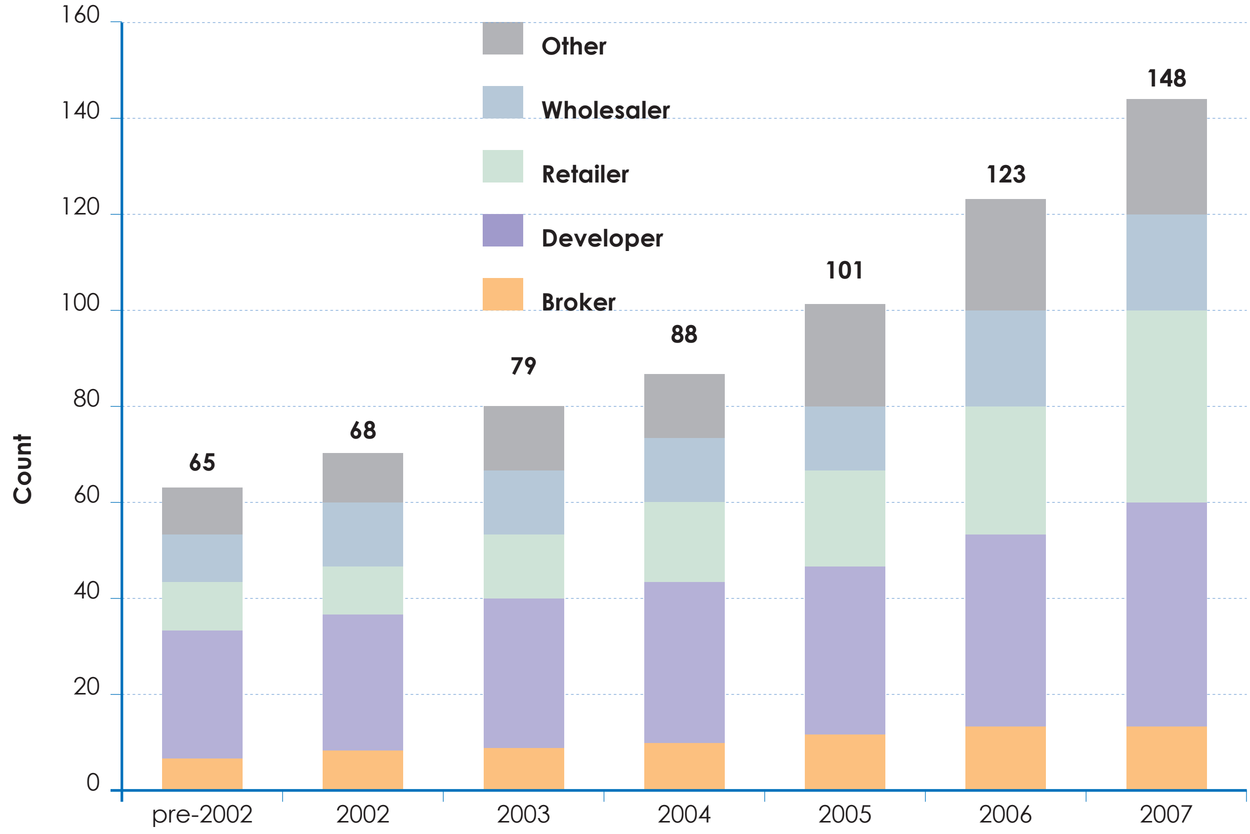
Figure 3: Standards used by voluntary market projects (% projects)



Source: Ecosystem Marketplace and New Carbon Finance 2008

This means that offset projects, rather than being evaluated, monitored and verified by the organisation that is hosting the event, are subject to internationally recognized third-party verification. This external verification provides much greater assurance that the offsets projects result in real, measurable emissions reductions. Figure 4 shows the growth in the number of Carbon Offset Providers in the voluntary market, according to the type of provider. The most important categories of providers are: Project Developers, who develop GHG emissions reduction projects and may sell carbon to aggregators, retailers, or final customers; Aggregators/ Wholesalers, who only sell offsets in bulk and often have ownership of a portfolio of credits; and Retailers, who sell small amounts of credits to individuals or organizations, usually online, and have ownership of a portfolio of credits. Brokers, who do not develop or purchase project portfolios but match up potential buyers and sellers, are also increasingly active in the voluntary market.

Figure 4: Growth of voluntary Carbon Offset Providers



Source: Ecosystem Marketplace and New Carbon Finance 2008

One general point about carbon offsets projects and the voluntary market is that the projects must be **"additional"** to business as usual activities to qualify as carbon offsets. In other words, an offset project should be a new project that would not have happened without the additional revenue from carbon credits. The reason for this is simple. Projects and activities that are already underway would be implemented whether or not an event was carbon neutral, so funding these projects as "carbon offsets" does not produce any real emissions reductions to offset the substantial emissions from the event. From the point of view of the global atmosphere, for an event to be carbon neutral there must be real reductions in business as usual emissions from another source that are at least as great as the actual emissions from the event.

In addition, activities that reduce the carbon footprint of an event would not be considered offsets. Carbon offset projects are activities outside of the project boundaries that reduce greenhouse gas emissions. This also means that activities that reduce the projected footprint do not need third party verification if they are not being certified as carbon offsets.

11.5 Lessons from WSSD

In preparation for the World Summit on Sustainable Development (WSSD), the Johannesburg Climate Legacy (JCL) was set up as part of a broader "Greening the WSSD" initiative. JCL was tasked to estimate the carbon footprint, evaluate and select offsets projects, manage the flow of funds from donors and individuals to those projects, and monitor the implementation of those projects. This was at a time when the CDM and voluntary markets were immature, so it was necessary to create much of this system locally.

JCL was established as an independent trust chaired by IUCN with Board of Trustee representation from DEAT, UNDP and key stakeholders. The JCL also included a Technical Working Group (TWG) that estimated the carbon footprint and evaluated the offset projects. This Working Group included local experts on climate change mitigation, and also KPMG and Future Forests (now The CarbonNeutral Company), a leading retail Carbon Offset Provider. The funds for JCL were managed through a separate, dedicated account, initially held by DBSA and later by IUCN.

The JCL Technical Working Group evaluated more than 20 potential projects to offset the estimated 290,000 tCO_2 that would be created by WSSD. This required extensive technical and administrative effort from the TWG, because many of the potential project developers did not have sufficient capacity to analyse their projects accurately, or to secure the underlying financing. The TWG even ran three training workshops for potential project developers. At the same time, much of the fundraising was done on a voluntary basis (e.g. from government and corporate donors, through soliciting individuals at the conference, through the Future Forests website), and only $300,000 was secured in the end. Almost half of this money was used to pay the large overheads, primarily the costs of the international consultant, leaving only $150,000 to cover the offsets projects. At a typical market value of $7/$tCO_2$, this would only be 21,000 tCO_2, or less than 10% of the carbon footprint. Even this could not be achieved, however, because the offsets projects stalled due to lack of expertise, financing, or technology to implement the underlying projects. In other words, while the projects may have potentially reduced emissions, the underlying investment was not viable, even with the added revenue stream from carbon credits.

Interviews with key role players in the JCL suggest that there are several key lessons from this event:

- The major funding sources for the offset programme must be secured up front, with an emphasis on several large funders (e.g. donors, corporates, government agencies), to ensure that the programme is feasible and to reduce the overhead costs involved in managing the funding
- Establishing an "in-house" system for developing, evaluating and supporting offsets projects is very time consuming and costly
- Managing the funds for the offset programme needs to be through a dedicated, audited account that meets the transparency requirements of potential funders
- Marketing of the offset programme is critical, to secure funding and "buy in" from stakeholders, and so that the offset programme raises awareness more broadly about the need for climate change mitigation
- Offsets projects need to be in place early enough to have an impact during the event on public awareness
- Managing the offset programme through an independent organisation, with strong government oversight, provide much more flexibility, transparency, and effective management than housing it completely within government structures.

11.6 Green Goal 2006

The Green Goal 2006 programme was the first major effort to make the FIFA World Cup a carbon neutral event. The Öko-Institut in Germany was commissioned to estimate the carbon footprint for the event and also to refine this footprint using data collected during the tournament. The Institute also contributed to the monitoring plan for the offsets projects and recommended to the LOC a company to manage the entire carbon offset process – 3C Climate Change Consulting GmbH (3C). 3C was the project manager, and received and disbursed the funding for the offsets, drew up contracts with the offset projects providers, and monitored progress of the projects, together with the selected carbon offset providers. The offset projects were one community scale biogas project in Tamil Nadu, India, develop by the BASE Foundation (Basel), and two projects in South Africa developed by the Swiss MyClimate Foundation. One of these projects was a coal to biomass fuel switch project at a fruit farm near Kruger National Park, while the other was a municipal wastewater methane capture and power generation project in Sebokeng. The Öko-Institut and 3C have continued to monitor progress of these projects, and the Institute also recalculated the carbon footprint several times before and after the event, as better data became available.

The funding for the Green Goal 2006 carbon offsets was from FIFA, the German Football Association and two private sponsors (Plastics Europe and Deutsche Telekom). The total budget for offsets was €1.2 million for 100,000 tCO_2e.

12 Overall institutional model

Based on the previous sections and our survey of other climate neutral events, there are three main options for the institutional model of the Carbon Offset Programme. These are as follows:

- "complete outsource" – The COWG would prepare a Request for Proposals for Carbon Offset Providers that would specify the amount of offsets required, but no other criteria about the projects or standards that would be used to offset the emissions from the event
- "home grown" – As in the JCL, the COWG could raise funds for and oversee a complete process for developing, evaluating, choosing, implementing and monitoring the projects that would offset the emissions from the event, using a standard developed specifically for this event.
- "outsource with oversight" – The COWG would still outsource the project selection and verification process, but would provide direct guidance on the type of projects, location of projects, standard to be used, and the sustainable development criteria to be applied to the project selection.

The main advantages of the "complete outsource" model is minimal overheads and speed of implementation. As long as a reputable organisation was selected, the COWG would not need to devote time and resources to managing the offset projects at all, but would only work on the fund raising for the Carbon Offsets Programme. The disadvantage, however, is that the choices of projects by the offset provider might not reflect the priorities of the COWG, and the 2010 Environmental Forum more broadly. The members of the COWG have made it clear that, because the Carbon Offset Programme is part of the Legacy Programme for 2010, the offsets projects need to support the communication, awareness, education, and sustainable development objectives of this event.

The "home grown" model provides the most input by local stakeholders and experts into the process for project development, evaluation and verification. Like the JCL, the expertise for the offset programme would be entirely local. The two main disadvantages, on the other hand, are the very high overhead costs and also the lack of a recognised standard that provides international credibility for the offset programme. As JCL showed, the overheads associated with an entirely "home grown" process, as well as how long it would take to get this process underway, can outweigh the advantage of more input from local experts. In addition, many major donors (e.g. development agencies and bilateral aid programmes) may be unwilling to invest in an offset programme that is not run according to accepted international standards.
The "outsource with oversight" model tries to incorporate the advantages of the other two, while minimising the disadvantages. It would still provide adequate input on local sustainable development and other priorities, because the specification for the Carbon Offset Provider would include issues such as sustainable development criteria and screening, types of projects to be priorities, which standards are acceptable to local stakeholders, etc. The COWG would still need a Project Manager to oversee the offsets programme, but the time required for the offset project side of the programme would be much smaller than in the "home grown" option, leaving this person free to devote more time to fund raising and developing partnerships with major donors. The overheads for this option would therefore be much lower than for the "home grown" option. Many of the items presented in the DEAT/UNDP TOR for the Carbon Offset Programme would be handled by the Carbon Offset Provider. The less time that is available to implement the carbon offset programme, the more activities and responsibilities that will have to be outsourced in order to have some offsets projects running by the time of the World Cup. This is important for current planning within DEAT and the LOC, because any further delays in launching this programme could mean more of the programme must be outsourced.

The rest of this chapter further explores the "outsource with oversight" model, and how it could be implemented within the existing institutional context of the 2010 World Cup.

13 Key decisions for the Carbon Offset Programme

Starting from the assumption that the "outsource with oversight" model is the most cost effective way to implement the objectives of the Green Goal 2010 carbon neutral theme, this section highlights the important decisions on how to implement that model.

13.1 Institutional home for Carbon Offsets Programme

While the COWG is the logical channel for oversight of the Carbon Offsets Programme, the Project Manager, funding accounts, and other administration need a clear, long term institutional home that provides for transparency, appropriate oversight by the COWG, flexibility and quick response. This could take the form of a new independent trust, administration by an existing trust or non-profit organisation, or administration by a development agency (e.g. UNDP). Housing the programme entirely within a government department could present problems in terms of administration, flexibility and speed. To be effective, this institutional home should have in-house expertise in the carbon project development and management – not because they will manage the actual offsets projects but so that they can oversee the contracts with the Carbon Offset Providers and ensure the long term sustainability of the programme.

13.2 Initial Role of Project Manager

The most important next step is to identify the person who, as Project Manager, will oversee the Carbon Offsets Programme, and liaise between the COWG and the Carbon Offsets Provider. One of the first tasks of this post would be to prepare a detailed Terms of Reference for the Carbon Offsets Provider, as the basis of an open, public tender. This TOR should incorporate, among other things, the type of projects, location of projects, international standard(s) to be used, sustainable development criteria, etc, and explain how the Carbon Offsets Provider would communicate with the COWG. Some of the elements of this TOR can be taken from the existing draft TOR for the offsets programme prepared by DEAT and UNDP. The specific elements are discussed in more detail in subsequent sections.

Many of the leading carbon offset providers established the International Carbon Reduction and Offset Alliance (ICROA) in 2008, which is harmonising the principles and practices used in the sector. The Code of Practice promulgated by ICROA will also ensure that VERs certified under different standard all have a high level of environmental integrity. In addition, there are several recent reports which rate different Carbon Offset Providers.

13.3 Funding sources for overheads

Even though the "outsource with oversight" model will minimise the transaction costs associated with the Carbon Offsets Programme, there will still be some project management and administrative costs. The JCL experience showed that many private sponsors and donors did not want their carbon offsets funding to be used to cover overheads and administration, so it may be necessary for these costs to be covered by the South African Government, the Local Organising Committee, or a special grant.

It is difficult to estimate the cost of the overheads without doing a detailed TOR for all of the tasks of the carbon offset programme. The Öko-Institut noted that their work on the footprint and evaluation of projects was 5-6 person months, but, because 3C (the company that managed the offsets projects) had a separate contract with the LOC, their costs are not known. The BASE Foundation and MyClimate Foundation bore the costs of project development and some of the marketing, but primarily provided the offsets under contract to 3C.

13.4 Funding sources for offsets

One of the most important tasks for the COWG and the Project Manger, as well as the LOC, is to source the funding for the carbon offsets as early as possible.. The JCL experience showed that relying on voluntary contributions and contributions from many individuals was not sufficient to raise funds for the entire offsets programme. The 2006 Green Goal carbon offsets programme, in contrast, was entirely funded by FIFA, the German Football Association and two corporate donors. Given the huge investment being made by many corporate sponsors of the FIFA 2010 World Cup, every effort should be made to secure the entire fund raising requirements of the Carbon Offsets Programme well in advance of the event. The reason for suggesting a smaller number of large funders is to keep the overheads and administration costs to a minimum. Funding sources could include different levels and departments of the South African government, development agencies from donor governments, carbon funds, international and local private sector organisations (including airlines), non-profit foundations, international and local non-governmental organisations, and individuals.

Another funding alternative would be to approach South African Airways and other major airlines to sponsor the offsetting of international (and possibly national) air travel. Getting a commitment from the airlines to cover the costs of these offsets would be preferable to having a voluntary system for passengers to purchase offsets when they paid for their ticket, because only a small portion of travels may voluntarily participate and the funding stream would be highly uncertain.

One of the urgent issues that must be settled is how the sponsors contributing to the Carbon Offsets Programme – particularly those providing funding for offsets – can be part of the marketing of the programme. Buy in from FIFA and the LOC to the carbon offset Green Goal 2010 is therefore probably essential, because it would severely restrict contributions to the Carbon Offset Programme if there is no branding or publicity connected to the FIFA 2010 World Cup.

How much funding is needed depends both on what portion of the carbon footprint the decision makers in South Africa decide to offset, and also on the price per tCO_2e of the offsets. For the price of offsets, there is a tension between higher prices, which help project developers and are more likely to create viable offset projects, and lower prices, which make it less expensive to offset the footprint. For 2006 Green Goal, the total cost of the offset projects was €1.2 million for 100,000 tCO_2e, or €12/tCO_2e. Prices in the CDM market vary according to the level of risk borne by the buyer, with early stage projects (e.g. prior to third party verification) ranging from €6-9/tCO_2e and registered projects €10-14/tCO_2. The average price in the voluntary market is considerably lower. For example, the New Carbon Finance's Voluntary Carbon Index in July/August was $6.32. This is only an average price, however, and the prices for small scale projects, renewable energy projects and methane reduction projects, and project in Africa are all above this average. At a price range of $6 to $10, the cost of offsetting of footprint excluding international travel would be $5.4-9.0 million, while international travel would add another $11.1-18.6 million.

13.5 Managing the funding

Each of the contributors to the costs of the overheads and the costs of the offsets may have their own requirements in terms of accountability and reporting, so appropriate systems to manage and report on the uses of this funding is critical. JCL addressed this by having an independent trust with government oversight, which provided the transparency and necessary reporting.

For the offsets funding, the Carbon Offset Provider may provide this service as part of their overall offering, or this could be included in the Terms of Reference. The alternative would be for the institutional home for the offsets programme (see section 5.3.1) to handle the reporting and management of the funds, or an external financial institution under contract to this entity. This would depend on the where the Carbon Offsets Programme was housed and the legal requirements for managing the funding. In addition, the funds for overheads would have to be managed according to standard South African government or donor requirements, whether these were managed as an account within government or through an independent organisation.

The portion of the funding related to offsets should be paid in instalments to the project developers as the carbon offsets are realised through the implementation and ongoing operation of the offsets projects. In other words, while the entire funding for the offsets needs to be secured in order to enter into a contract with a Carbon Offset Provider (and for them to enter into contracts with individual project owners), the payments for the offsets should be based on actual project performance.

13.6 Offset project characteristics

In the Terms of Reference for the Carbon Offset Provider, the COWG and other stakeholders may wish to prioritise certain project types or characteristics. An example would be to focus on renewable energy and energy efficiency, to focus on projects above or below a certain size, as well as to decide how many total offsets projects should be in the offsets projects portfolio. In terms of technologies and sectors, the question is which type of projects will have the greatest impact in terms of public awareness, local development, and promoting sustainable development principles. In some cases the carbon standard chosen will determine project characteristics. The Gold Standard, for example, only covers renewable energy and energy efficiency, while the Plan Vivo and CCBS only apply to forestry activities (see Appendix A for an explanation of the voluntary carbon market standards).

In terms of how many projects should be in the offset portfolio, the balance is between keeping the transaction and administrative costs manageable, which points toward fewer projects, versus trying to cover many geographic areas or provide more opportunities for education and awareness, which would suggest a larger number of smaller projects. Green Goal 2006 will have three offsets projects to cover the entire emissions budget, although only one of those has been implemented so far. One option that could be explored is to have one large programme that addresses both poverty and climate change mitigation, such as a large scale energy efficient low income housing programme incorporating solar hot water heaters, energy efficient lighting, and thermally efficient houses. This programme could be implemented in multiple locations in the country using the same basic technologies and offset characteristics. The tourism sector will have high visibility during 2010 as well, but creating an emissions reduction project in that sector that is of sufficient scale for a carbon offsets projects could be difficult, unless it was a "programmatic" intervention across many hotels or similar venues.

Given that offsetting even the domestic carbon footprint will require almost 900,000 tCO_2e of offsets, the project portfolio will necessarily include some larger scale projects as well as smaller scale ones. Some projects that would be highly visible, and rely on labour intensive technologies with significant community involvement, may only have emissions reductions of 5,000 to 10,000 tCO_2e per year. Even taken over 10 years, it would take 8 to 16 projects of this size to offset the domestic footprint, and another 13 to 26 projects to offset emissions from international travel. One large industrial fuel switching project or landfill gas capture project, however, might generate 40,000-80,000 tCO_2/year in carbon offsets.

One way to reduce the risk of projects not performing, or under-delivering on carbon offsets, is to include a certain percentage of "buffer credits" – in other words, to contract 5-10% more carbon offsets than are necessary for the footprint. In the 2006 Green Goal programme, for example, the carbon footprint was estimated at 92,000 tCO_2e, but 100,000 tCO_2 of carbon offsets were procured.

A final consideration for projects is their geographical location. Most of the previous international sports events and conferences that sought carbon neutral status were in the highly industrialised countries in the OECD. For this reason, many of these events choose to invest in carbon offset projects in other countries, particularly in developing countries where the offsets projects could have a higher development impact. For the 2010 World Cup the priority will obviously be to invest in projects within South Africa, and possibly projects within the SADC region. Given that eight of the nine provinces include Host Cities for the World Cup, and so will benefit most directly from the influx of visitors, investing in projects in the Northern Cape, which does not have a Host City, may also be a priority. In addition, give the large size of the carbon footprint and the imperative for an African legacy from the event, it may make sense to invest in projects in more than one country.

13.7 Timing of project implementation and emissions reductions

The time frame for implementing the projects and the time frame for producing the credits will have a major impact on how much the carbon offset programme contributes to awareness and action among the public in South Africa. For Green Goal 2006, there were three projects chosen for offsetting the carbon emissions. One of the projects is a registered CDM biogas project in India, the second in South Africa has a Project Design Document (PDD) but has not been validated, while the third only has a Project Information Note (PIN). This means that almost none of the emission offsets has been realised yet, even though the event finished more than two years ago. For JCL, as well, there are projects that are only now nearing implementation 6 years later.

In addition, if the emissions offsets occur significantly later than the emissions, then the emissions have already started to have an impact on global climate change. In other words, emissions savings in the future have less impact than emission savings now. This has to balanced, however, against the need for carbon revenue to make a significant contribution to the economics of the offsets project – to ensure that the projects are "additional" (i.e. go beyond business as usual). If revenue from emissions reductions is only available for a few years, then it is very unlikely that this revenue would actually be required to make the projects viable. This would increase the risk that the offsets projects would have happened anyway, and are not additional. Allowing the projects to generate emissions reductions over 10-20 years means that the carbon revenue impact will be significant, and can catalyse projects that would not have happened without the sale of carbon credits.

At least some of the offsets projects should be underway by 2010, so that they can have an impact on public awareness during the actual event and when the general public will be focusing so much attention on the World Cup. Having all of the projects underway, however, is probably unrealistic, given that the large number of potential projects and the long lead times for most carbon projects.

13.8 Selection of offset projects

One of the advantages of the "outsourcing with oversight" model for the Carbon Offset Programme is that the COWG does not have to do their own evaluation of the projects. This can be time consuming and expensive, particularly because the key issue for many projects is not whether they reduce carbon but whether the underlying investment is technically, financially and institutionally sound. If project proponents do not have the necessary experience, financial backing, or technical knowledge, no amount of potential emissions reductions will make the project viable. In this institutional model, the Carbon Offset Provider (or individual project proponents) would contract third party verifiers to perform the due diligence, and then present these results to the COWG, or similar body, for approval. This means that the COWG could focus their time on choosing the best projects on the basis of development priorities and impact on public awareness, not on conducting detailed evaluations of the technical and financial merits of the projects. The Project Manager for Carbon Offset Programme would liaise with the Carbon Offset Provider to make sure all of the relevant information was made available to the COWG or other policy makers. Once the decision on the projects were made, no further analysis would be necessary from the COWG.

13.9 Choosing a carbon offset standard

As discussed earlier, during the JCL process, and even in 2004 when Green Goal 2006 was under development, the global carbon market was still relatively under-developed, particularly the voluntary market. The voluntary market was fragmented and there were very few international standards outside of the retail providers. The market has changed dramatically in the last few years, with the emergence of several widely accepted standards and complete certification systems (e.g. Gold Standard VER, VCS, VER+). The key decision is therefore to select the existing standard that fits the needs for Green Goal 2010 most appropriately.

The reason for suggestion a voluntary market standard rather than using CDM projects for offsets is two fold. First, it is not necessary to have CDM approval for credits that will be "retired" rather than used for compliance purposes, although one of the projects that offset the 2006 World Cup did go through the CDM approval process. Secondly, the CDM system is generally more time consuming and expensive than the voluntary market systems, because of the higher costs of validating and verifying the emissions reductions. On the other hand, the CDM is the most robust and well developed carbon mitigation project certification system.

The discussion with the COWG during this study indicated a strong interest in using the Gold Standard VER standard. This has the advantage of including a comprehensive, well tested, and credible sustainable development screening process for projects, as well as a public participation process. MyClimate, who was one of the carbon offset providers for the 2006 Green Goal programme, uses the CDM, Gold Standard CDM, and Gold Standard VER standards for their offsets projects.

However, the disadvantage of the Gold Standard is that the transaction costs are likely to be much higher, because of the special publication participation and sustainable development screening requirements. Given that the COWG will still need to approve each offset project, it might be more cost effective to use a standard with lower transaction costs and have the COWG take the responsibility of assessing the project's contribution towards sustainable development. A further advantage of using another standard, such as the Voluntary Carbon Standard, is that VCS allows the use of ISO14065 certified auditors and not just CDM-certified Designated Operational Entities (DOEs). This could significantly reduce the transaction costs, if South Africa ISO-certified auditors could undertake the verification rather than having an international DOE play this role.

Using an existing international standard would also mean that it would not be necessary to set up a new registry for the carbon offset projects, since these standards generally have their own registries.

13.10 Third party verification of projects

The carbon standards also specify what type of third party verification is required for offsets projects. This was a challenge during the JCL, because the project verification was done by local consultants, who had to be paid from the JCL funding and also did not form part of any internationally recognised verification body. Most of the carbon standards utilise the carbon auditors approved under the CDM (Designated Operational Entities – DOEs) and Joint Implementation (Accredited Independent Entities – AIEs). The Gold Standard VER also includes a less expensive process of review by their internal technical advisory board for "micro-scale" projects that reduce less than 5000 tCO_2/yr. As discussed above, the Voluntary Carbon Standard (VCS) allows the use of ISO14065[9] auditors as well.

Even using voluntary market standards, however, the cost of verification will still be $7000-$15,000 per project, which is why it is important to consider a smaller number of larger projects. Another possibility would be to approach a DOE or AIE and ask them to donate their time for the project verification in return for media exposure and marketing during the event as a Green Goal partner.

13.11 Developing the offsets projects

In the run up to WSSD, the JCL Technical Working Group devoted considerable time and energy to capacitating potential project developers and assisting them in preparing their project documentation. Most of the overheads and administrative costs in the JCL were associated with project development and evaluation. The carbon market landscape in South Africa, however, has changed dramatically since then. There are more than a dozen local consultancies and research organisations working in the CDM industry, as well as branch offices of most of the major international carbon project developers. There is even a South Africa CDM Industry Association (SACDMIA), which includes many of the carbon project developers and consultancies. This means that it is not necessary for the COWG or the chosen Carbon Offsets Provider to be directly involved in project development. The Carbon Offsets Provider can rather use a tender process, under the guidance of the COWG, to solicit proposals from the many active stakeholders in the country and region in the carbon market. If the COWG or other stakeholders want to build capacity with particular groups or project developers, so that they can be part of the tender process, then this should be done outside the Terms of Reference for the Carbon Offset Provider, and should be done with care so as not to show favouritism within this growing and dynamic industry.

[9]*ISO 14065:2007 Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition*

13.12 Monitoring the footprint *ex-post*

The carbon footprint that is used to determine the amount of carbon offsets required to make the 2010 World Cup a carbon neutral event will necessarily be based on a large number of assumptions, and will be subject to significant uncertainty. The Department of Transport, for example, acknowledges that the estimates of number of guests, and their country of origin and length of stay, is only an educated guess at this stage based on the best information currently available. For this reason, the COWG should consider whether and how the carbon footprint could be refined prior to the event or by monitoring during the event period itself. For example, in Green Goal 2006, the Öko-Institut had access to the postal codes where the match tickets were sent, so they could estimate actual travel distances for individual matches and spectators. Information was also provided by the police, municipalities, national railway and public transport companies. For the stadia, energy consumption was monitored and reported. As part of the role of the Project Manager for the Carbon Offsets Programme, a monitoring system should be put in place as early as possible.

13.13 Marketing the Carbon Offsets Programme

Because part of the objective of a carbon neutral event is to raise the awareness of all participants and stakeholders about the importance of climate change, the marketing of the Carbon Offsets Programme is of paramount importance. This marketing will take many forms and many channels. The Carbon Offset Provider would already have in place many channels to promote the carbon neutral event internationally, since this is one of the main roles of these organisations. The 2010 Environmental Forum also has a Communications and Outreach Working Group that should also be engaged with this Programme as early as possible. Finally, information on the Carbon Offsets Programme must be integrated with the overall FIFA Communication & Media department so that the FIFA branding and communication includes the carbon neutral message. Because one of the main priorities is to raise awareness and inspire action by average South Africans, the communications strategy must ensure that the general public is informed about the Carbon Offsets Programme and the Carbon Offsets Projects that are part of that programme.

14 Conclusions and recommendations

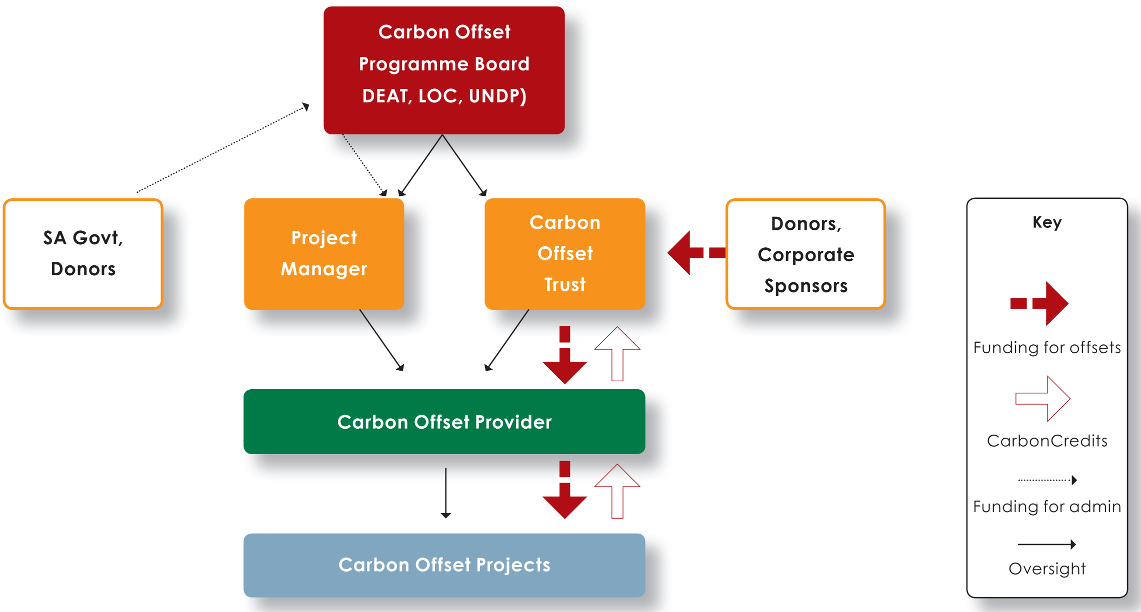
14.1 Institutional structure of carbon offsets programme

The discussion with key stakeholders, research on other carbon neutral events, and interviews with key people involved in the Johannesburg Climate Legacy all suggest that the most effective institutional model for the carbon offsets programme is a "outsourcing with oversight", as described in Section 5.2. This model is shown graphically in Figure 5 below. The basic premise is that the key policy and decision makers that are leading the Greening 2010 Environmental Forum should provide the guidance on the projects selected for the Carbon Offset Programme, but the implementation of the programme, including project evaluation, verification and monitoring, should be outsource to a component, specialised Carbon Offset Provider. The Carbon Offset Provider will utilise an internationally recognised standard, such as the Voluntary Carbon Standard (VCS) or Gold Standard VER. As discussed above, further delays in launching the programme will mean that more activities and roles must be outsourced.

The Carbon Offsets Programme should target a relatively small number of high profile projects in South or Southern Africa that can be implemented quickly and achieve the required emissions reductions over 10-20 years. Having a least some projects underway by 2010 is essential for the Programme to have the desired impact on public awareness and action to mitigate climate change.

The next step for this Programme would be to hire a Project Manager, and have that person prepare a Terms of Reference for the Carbon Offsets Provider tender.

Figure 5: Schematic diagram of possible institutional structure for Carbon Offset Programme



14.2 Potential areas of support in the Carbon Offset Programme

The TOR for this study also includes assessing the role that funders could play in the Carbon Offset Programme for a carbon neutral 2010 World Cup. This support could come in several forms, including technical assistance, funding for the project management of the programme, and funding for the carbon offsets.

- Technical assistance: With the proposed institutional structure for the Carbon Offset Programme, the Project Manager will still need some technical support. This most important tasks could include:
  - preparing the detailed TOR for the Carbon Offsets Provider, including specifications for project evaluation criteria, standards to be applied, and time frame of implementations and emissions reductions
  - assisting the project manager with the process of evaluating the offers from Carbon Offset Providers and selecting a Provider
  - preparing a monitoring plan to track actual emissions from the World Cup.

A rough estimate of this support would be 3-4 person-months of consulting time.

- Funding for Programme administration: Support for the overheads and set up costs of this programme. This could be through financial support to the institutions that will house the Carbon Offset Programme, whether this is within a government department or an outside entity supervised by the government, or by providing in-kind staff support to assist to the Project Manager (e.g. through a part time resident advisor). Estimating these costs is difficult without input from more of the key players in the Green Goal 2006 programme, but this is likely to be 2-4 full-time equivalent person years.
- Funding for carbon offsets: Provide funding for the carbon offsets projects. These VERs would be retired in the process of making the event carbon neutral, and coming from voluntary market projects, they could not be used for compliance purposes. The cost of the credits would depend on both the underlying projects and the contract between the COWG/DEAT/LOC and the Carbon Offsets Provider. As mentioned above, at a price range of $6 to $10, the cost of offsetting of footprint excluding international travel would be $5.4-9.0 million, while international travel would add another $11.1-18.6 million.

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Appendix A: Voluntary Carbon Market Standards

Reprinted from Ecosystem Marketplace 2008

The California Climate Action Registry's Climate Action Reserve
The California Climate Action Registry (CCAR) was established by California statute as a non-profit voluntary registry for GHG emissions. Over the last four years, CCAR has also begun to develop project protocols that allow for the quantification and certification of GHG emission reductions. These protocols now serve as a "verifiable" quasi-standard for voluntary carbon offsets. CCAR currently has approved reduction protocols for livestock and landfill methane projects in the US and forest carbon sequestration in California. CCAR recently launched the Climate Action Reserve, co- developed with APX Inc, which will create more project protocols and also serves as a registry for credits verified to the CCAR protocols.

The CCAR protocols became particularly relevant in the US voluntary carbon market in 2007, when the California Air Resources Board, directed by California's Assembly Bill (AB) 32 to design a mechanism for reducing emissions, formally endorsed CCAR's forest sector project protocols as eligible carbon offset project types.

Carbon Fix Standard
The CarbonFix Standard (CFS) was launched in late 2007 and only pertains to forestry projects. Adherence to the CFS requires third party certification from CFS-approved auditors. CFS emphasizes sustainable forestry management and ensures that CFS carbon credits are derived from projects maintained in such a manner. The CFS operates in a transparent manner, posting all documents online except for financial calculations and the prices of CO2 certificates sold. CFS also provides customers with a way to purchase CFS certified credits on its website directly from project developers, charging a fee of 3% of the sales price.

Chicago Climate Exchange Offsets Program
The Chicago Climate Exchange (CCX) has its own standards for offset projects accepted into the voluntary cap-and-trade system. To screen applicants, the exchange has standardized rules for seven different types of projects: agricultural methane, landfill methane, agricultural soil carbon, forestry, renewable energy, coal mine methane, and rangeland soil carbon management. Requirements for each project type are outlined on the CCX website. One screening criteria, for instance, is project start date; agricultural methane or soil carbon projects initiated after 1999 or forestation projects initiated after 1990 may qualify as approved offsets. Projects that meet initial screening criteria may submit proposals to the CCX Committee on Offsets for review and preliminary approval. After approval, all project developers must obtain independent third party verification from an approved verifier before registering offset credits on the exchange.

Climate, Community, and Biodiversity Standards

The Climate, Community, and Biodiversity Standards (CCB Standards) are a set of project-design criteria for evaluating land-based carbon mitigation projects and their community and biodiversity co-benefits. These standards can be applied to CDM or voluntary market projects. The development of the CCB Standards was spearheaded by the Climate, Community, and Biodiversity Alliance (CCBA), an international partnership of corporations, research institutions, and non-governmental organizations such as Conservation International, The Nature Conservancy, Weyerhauser, Intel, and CATIE. As a "project design" standard, CCB Standards can be used at the project-design phase for third party validation that the project has the potential to produce not only emissions reduction credits, but also community and biodiversity benefits. The CCB Standards also provide a means of verifying these benefits once a project is being implemented, but they do not include their own carbon accounting standard at this time. The CCBA therefore recommends that the CCB Standards be applied on top of an existing standard designed for carbon accounting, such as the CDM or the Voluntary Carbon Standard.

Greenhouse Friendly

Greenhouse Friendly is the Australian government's voluntary carbon offset program for encouraging GHG emissions reductions at several levels, including "providing businesses and consumers with the opportunity to sell and purchase greenhouse-neutral products and services." The initiative provides two different services: Greenhouse Friendly Abatement Provider (offset project) certification and certification of "carbon neutral" products and services.

Criteria for Greenhouse Friendly project certification include: being Australia-based, generating "additional, permanent and verifiable greenhouse gas emission reductions or sequestration," and "clearly demonstrating that the abatement generated is additional to business as usual." Greenhouse Friendly "carbon-neutral" accreditation requires the preparation of an independently verified life cycle assessment, an emissions monitoring plan, annual reports, and the use of Greenhouse Friendly approved carbon offsets.

The Gold Standard for VERs

The Gold Standard seeks to define the high-end market for carbon credits arising from renewable energy and energy efficiency projects that contribute significantly to sustainable development. The standard specifically excludes forestry and land-use projects. The Gold Standard was an initiative of the World Wildlife Fund (WWF) and developed with a variety of other NGOs, businesses and governmental organizations who believed that the CDM did not adequately screen projects for their contribution to sustainable development. While the Standard was originally created to supplement CDM projects, it now also certifies voluntary offset projects. In 2008, the Standard joined forces with the private firm APX to develop and manage the Gold Standard VER registry.

ISO 14064 Standards

The ISO 14064/65 standards are part of the International Organization for Standardization (ISO) family of standards. The protocol currently includes four components:

- **Organization Reporting:** guiding organization's quantification and reporting of GHG emissions (ISO 14064 Part 1);
- **Project Reporting:** guiding project proponents' quantification, monitoring, and reporting of GHG emissions reductions (ISO 14064 Part 2);
- **Validation and Verification:** guiding the validation and verification of GHG assertions from organizations or projects (ISO 14064 Part 3);
- **Accreditation of Validation and Verification Bodies:** guiding the accreditation or recognition of competent GHG validation or verification bodies (ISO 14064 Part 4).

Much like the World Resource Institute (WRI) /World Business Council for Sustainable Development's (WBCSD) GHG Protocol, the ISO standards were not created to support a particular GHG program, but were instead designed to be "regime neutral" so that they could be used as the basis for any program. Unlike the WRI/ WBCSD GHG Protocol, which specifically includes tools and accounting methods, ISO 14064 does not spell out the exact requirements. Also, ISO does not certify or register GHG emissions or credits.

Plan Vivo

Plan Vivo is a standard specifically designed for community-based agro forestry projects that describes itself as "a system for promoting sustainable livelihoods in rural communities, through the creation of verifiable carbon credits." The system was created eight years ago by the Edinburgh Center for Carbon Management (ECCM) and is now managed by the non-profit organization BioClimate Research and Development (BR&D). Plan Vivo currently has three fully-operational projects in Mexico, Uganda, and Mozambique that are producing carbon for the sale of Plan Vivo carbon offsets. According to the organization's web site, the Plan Vivo system aims to ensure that its projects deliver the following benefits: social benefits, biodiversity benefits, transparency, additionality, foundations for permanence, an ethical operation, and scientific and technical partnerships.

Social Carbon
The Social Carbon methodology and certification program is created and owned by the Brazilian NGO Ecológica. The methodology is based on a sustainable livelihoods approach focused on improving "project effectiveness by using an integrated approach which values local communities, cares for peoples' potential and resources, and takes account for existing power relations and political context." The methodology was first created to ensure "higher quality Kyoto Protocol carbon projects." However, the program methodology is now also used for voluntary market projects. The Social Carbon methodology has been used for hydropower, fuel switching, and forestry projects in Latin America and Portugal since 2000. Recently, the NGO also launched the for-profit Social Carbon Company, which donates a percentage of its profits back to Ecológica. While the company was created to develop and sell credits from Social Carbon projects, the Social Carbon standard is still designed to remain a third party standard that can be licensed by any project developer.

Voluntary Carbon Offset Standard
In June 2007, a group of more than 10 banks and financial institutions organized under the European Carbon Investor Services (ECIS) and including ABN Amro, Barclays Capital, Citigroup, Credit Suisse, Deutsche Bank, and Morgan Stanley announced they were creating a standard for carbon credits in the voluntary markets. The voluntary offset standard is aimed at bringing "the voluntary market up to the level of the regulated and standardized procedures of the compliance market." The standard is broadly very similar to the CDM and JI, only it applies methodologies to an "eligible geographical area beyond those countries that have ratified the Kyoto protocol" and is focused largely on the United States and Australia's pre-compliance markets. Notably, it excludes carbon credits arising from the destruction of industrial gases such as HFC-23.

VER + Standard
In May 2007, project verifier TÜV SÜD announced the launch of its VER+ Standard, which will certify both carbon neutrality and carbon credits from voluntary offset projects. The standard will be based on CDM and JI methodology. Martin Schröder of TÜV SÜD describes the standard as "streamlined" Kyoto. In tandem with VER+, TÜV SÜD also created the Blue Registry, which aims to be a platform for managing verified emission reductions from a variety of other standards, including the CCX and Voluntary Carbon Standards.

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