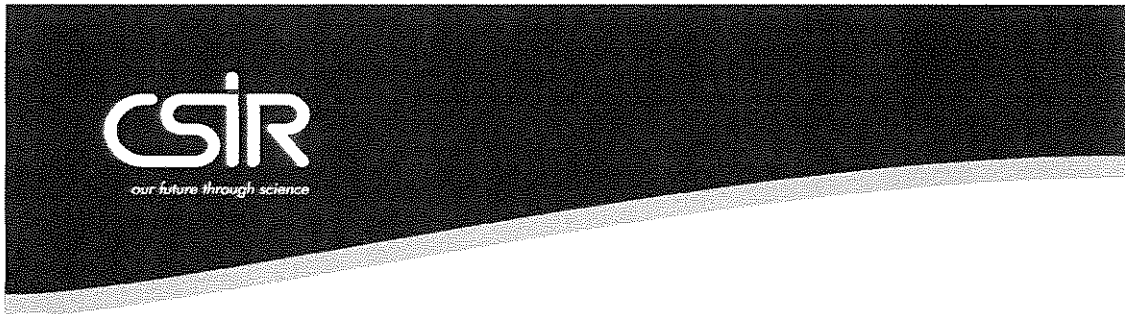


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Towards A Green Building Policy Framework: First Draft .V2

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Introduction by the Minister

There is, as far as we know, no other planet like Earth in the cosmos. Yet this significantly old and large spheroid planet, surrounded by a colossal emptiness of space, supports life forms in a surprisingly thin slice of its structure commencing from just less than 5000m below the surface and extending to 8100m above. Beyond these boundaries, human life requires artificial support to survive, while birds and insects die far below these confines. For all the immensity of space, it is to all intents and purposes, lifeless beyond this 13000m thick incubating layer. It is from this womb-like layer that the 6 billion people and millions of other living species inhabiting Planet Earth draw the resources needed to sustain life, and into which they discharge their waste. Over time, this process of consumption and disposal has accelerated in response to human population growth.

This unprecedented environmental transformation may well sterilise our supporting womb, bringing a premature end to the complex and subtle process of evolution. This realisation has given birth to the concept of sustainable development.

Emphasis on sustainable development – meeting the needs of the present without compromising the ability of future generations to meet their own needs – has become a theme within international organisations, national governments and civil society. It influences investment destinations and consumer decisions. Over the past decade, the focus of sustainable development programmes has shifted from a green-centred approach to a people-centred agenda, largely in response to alleviating global poverty.

The built environment, as a people-centred domain, has only recently received the same consideration as the green-centred agenda. As a lead infrastructure government department, the Department of Public Works understands that construction activities consume raw materials and cause monumental waste: the product which it delivers requires resources such as energy and water to operate over its entire life-cycle, a period measured in decades, and often in centuries. Throughout this process, construction activities often result in environmental degradation and social dislocation.

Property and construction industry participants must therefore take their role as potential agents of change, whose decisions can constrain, alter, guide or enhance the future decisions of others.

Buildings and infrastructure can no longer be assessed within the narrow definition of Gross Fixed Capital Formation (GFCF): their impacts extend into the depth of our social fabric and breadth of the earth's limited natural resources.

The South African government is a signatory to various historic environmental and sustainable development declarations, which further find expression in national socio-economic development policies such as the New Growth Path and the Industrial Policy Action Plan II, which identify the need for scientific entrenchment of labor-intensive low-carbon Green Economy, which broadly limits Greenhouse Gas emissions and supportive of national imperatives of an inclusive and cohesive society.

I hereby extend an invitation to all stakeholders to engage this Green Building Framework and make certain that it reflects our collective views to ensure that it provides a broad Green Building assessment template and tool for public buildings and further contributes to the creation of Green Jobs and emerging Green Contractors through Green Building Programme.

Special thanks go to the dedicated Policy Unit and the Green Building Task Team at the Department of Public Works who worked in partnership with the Centre for Scientific and Industrial Research's (CSIR) Built Environment Unit in producing this Framework.

Glossary of Acronyms

BBBEE – Broad-based Black Economic Empowerment
BEE – Black Economic Empowerment
BEP – Built Environment Professionals
CBE – Council for the Built Environment
CDM – Clean Development Mechanism
CI – Construction Industry
CiDB – Construction Industry development Board
CO₂ – Carbon Dioxide
CSI – Corporate Social Investment
CSIR – Council for Scientific and Industrial Research
DSM – Demand-side Management
DEAT – Department of Environmental Affairs and Tourism
DoL – Department of Labour
DME – Department of Minerals and Energy
DHS – Department of Human Settlements
DPLG – Department of Provincial and Local Government
DPW – Department of Public Works
DST – Department of Science and Technology
DTI – Department of Trade and Industry
DWA – Department of Water Affairs and Forestry
EIA – Environmental Impact Assessment
EMP – Environmental Management Plan
EMS – Environmental Management System
EPWP – Expanded Public Works Programme
FDI – Foreign Direct Investment
FET – Further Education and Training
GDFI – Gross Domestic Fixed Investment
GDP – Gross Domestic Product
GHG – Greenhouse Gas
GNP – Gross National Product
IAQ – Indoor Air Quality
IEQ – Indoor Environmental Quality
IDC – Industrial development Corporation
IDP – Integrated Development Plan
IEM – Integrated Environmental Management
IPCC – Inter-Governmental Panel on Climate Change
Kg – Kilogram
LTMS – Long-Term Mitigation Strategy
MDG – Millennium Development Goals
M&E – Monitoring and Evaluation
MTEF – Medium Term Expenditure Framework
MTSF – Medium Term Spatial Framework
NBSAP – National Biodiversity Strategy and Action Plan
NEMA – National Environmental Management Act
NERSA – National Energy Regulator of South Africa
NFSD – National Framework for Sustainable Development
NGO – Non-Governmental Organisation
NGP – New Growth Path
NSDP – National Spatial Development Plan
NSDS – National Skills Development Plan
NWA – National Water Act
OECD – Organisation of Economic Co-operation and Development
PVP – Photovoltaic Panels

R&D – Research and Development
RD&I – Research, Development and Innovation
RE – Renewable Energy
SABS – South African Bureau of Standards
SADC – Southern African Development Corporation
SAEO – South African Environmental Outlook
SBC – Sustainable Building and Construction
SD – Sustainable Development
SEA – Strategic Environmental Assessment
SETA – Sector Education Training Authority
SOE – State-Owned Enterprise
SoE – State of the Environment
SoER – State of the Environment Report
SRI – Social Responsibility Index
Stats SA – Statistics South Africa
UN – United Nations
UNCED – United Nations Conference on Environment and Development
UNDP – United Nations Development Programme
UNFCCC – United Nations Convention on Climate Change
URP – Urban Renewal Programme
VOCs – Volatile Organic Compounds
WSSD – World Summit on Sustainable Development

Glossary of Terms

Affected environment – “Those parts of the socio-economic and biophysical environment impacted on by the development.”¹

Alternatives – “A possible course of action, in place of another, that would meet the same purpose and need (of the proposal)”². Alternatives can refer to any of the following but are not limited thereto: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and materials. In IEM the so-called ‘no action’ alternative may also require investigation in certain circumstances.

Bills of Quantity – means the document in which is set out the description and quantity of the work included in the contract. Such bills shall be deemed to be drawn up in accordance with the Standard System of Measuring Building Work unless another measuring system is stated in the schedule. The contractor shall have priced the Bill to reflect the contract sum.

Building – “construction works that has the provision of shelter for its occupants or contents as one of its main purposes; usually partially or totally enclosed and designed to stand permanently in one place.”³

Built Environment – “means that environment which comprises urban design, land use and the transportation system, and the patterns of human activity within this physical environment”⁴

Built Environment Professionals – means the professions regulated by the professions’ Acts.

Building Performance – “ability of a building to fulfil its required functions under the intended use conditions”.⁵

Construction Industry – means the broad conglomeration of industries and sectors which add value in the creation and maintenance of fixed assets within the built environment.

Construction Industry Development Board – means the Construction Industry Development Board established by section 2 of the Act (Act 38 of 2000).

¹ DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria.

² Ibid.

³ ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

⁴ Hardy, S., Boarnet, M., Ewing, R., (1982). How the built environment affects physical activity: views from urban planning.” In *American Journal of Preventative Medicine*, **23** (2S): 64-73.

⁵ ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

Construction Works – means the provision of a combination of goods and services arranged for the development, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling or demolition of a fixed asset including building and engineering infrastructure.

Consultant – means any person appointed to provide professional or specialist services on any aspect of the project.

Contract Documents – means all the documents relating to the project issued by, or through or with the approval of the principal agent including the drawings, specifications, schedules, bill of quantities, project programmes, and any amendments thereto approved by the principal agent.

Contractor – means any person or body corporate under contract to the client to undertake the construction, installation and/or supply of the construction works or part thereof, and includes any subcontractor to whom any part of the construction works has been sublet by the contractor.

Cumulative Impact – “An action that in itself is not significant but is significant when added to the impact of similar actions.”⁶

Development – “The act of altering or modifying resources in order to obtain potential benefits.”⁷

Ecological deficit – the amount by which the Ecological Footprint of a population exceeds the biological capacity of the space available to that population. The national ecological deficit measures the amount by which the country’s footprint (plus the country’s share of biodiversity responsibility) exceeds the ecological capacity of that nation.

Ecological footprint – a measure of how much productive land and water an individual, a city, a country or humanity requires to produce all the resources it consumes and to absorb all the waste it generates, using prevailing technology. This land could be anywhere in the world. The Ecological Footprint is measured in ‘global acres [hectares]’.

Economic aspect – “aspect of construction works, parts of works, processes or services related to their life cycle that can interact with economic conditions.”⁸

Embodied energy – the energy expended for production and transportation plus inherent energy at a specific point in the life cycle of a product.⁹

⁶ DEA (1992). *Integrated Environmental Guidelines Series*; Pretoria.

⁷ DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria.

⁸ ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

Emission – means a gas, particle, or liquid released into the environment.¹⁰

Employer – means the party appointing the consultants to perform the professional and/or specialist services or any part thereof for the project.

Environment – “Environment means the surroundings within which humans exist and that are made up of –

- i) The land, water and atmosphere of the earth;
- ii) Micro-organisms, plant and animal life;
- iii) Any part or combination of (i) and (ii) and the inter-relationships among and between them; and
- iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.”¹¹

Environmental aspect – “aspect of construction works, parts of works, processes or services related to their life cycle that can interact with environmental conditions.”¹²

Environmental Impact Assessment (EIA) – “A detailed study of the environmental consequences of a proposed course of action. An environmental assessment or evaluation is a study of the environmental effects of a decision, project, undertaking or activity. It is most often used within an Integrated Environmental Management (IEM) planning process, as a decision support tool to compare different options.”¹³

Environmental Implementation Plans and Environmental Management Plans – In terms of the National Environmental Management Act (No. 107 of 1998), these plans are to be prepared by provincial and national government departments. The purpose of environmental implementation and management plans is to coordinate the environmental policies, plans and programmes and decisions of various government departments at a local and provincial level, which exercise functions which effect the environment. The aim is to minimize the duplication of procedures and to provide consistency in the protection of the environment across the country as a whole.

⁹ Mendler, S., and Odell, W., (2000). *The HOK Guidebook to Sustainable Design*, John Wiley and Sons, New York.

¹⁰ Ibid.

¹¹ DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria

¹² ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

¹³ DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria

Environmental Management System – A system which provides a structured process for continual improvement and which enables an organization to achieve and systematically control the level of environmental performance that it sets itself. In general, this is based on a dynamical cyclical process of “plan, implement, check, and review.”¹⁴

Environmental Resources – “Goods, services or environmental conditions that have the potential enhance social well-being.”¹⁵

Environmental responsibility – as outlined in Agenda 21 is: *“the responsible and ethical management of products and processes from the point of view of health, safety and environmental aspects. Towards this end, business and industry should increase self-regulation, guided by appropriate codes, charters and initiatives integrated into all elements of business planning and decision-making, and fostering openness and dialogue with employees and the public”*.¹⁶

Impacts – “The outcome of an action, whether considered desirable or undesirable.”¹⁷

Indicator – the “quantitative, qualitative or descriptive measure.”¹⁸

Infrastructure – means “the basic physical assets of a country, community or organization. These assets are usually referred to as fixed assets (e.g., buildings, highways, bridges, roads, pipelines, water networks, rail tracks, signals, powers stations, communication systems, etc.) and moving assets (e.g., aircraft, train rolling-stocks, defence equipment, buses, etc.).”¹⁹

Inspection – means such periodic visits to, or in conjunction with, the works by the consultants as are necessary to determine whether the works is proceeding generally in accordance with the contract documents and to provide on-site clarification and further information to the contractor during the progress of the works.

Integrated Development Plan – “Integrated Development Planning is a process through which a municipality can establish a development plan for the short, medium and long term.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ UN (1992). Agenda 21, online <http://www.un.org/esa/dsd/agenda21/>

¹⁷ DEA (1992). *Integrated Environmental Guidelines Series*; Pretoria.

¹⁸ ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

¹⁹ CIRIA (2007). Online <http://www.ciria.org/>

It integrates planning across different government sectors and identifies and sets priorities for delivery."²⁰

Integrated Environmental Management (IEM) – “A philosophy which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process in order to achieve a desirable balance between conservation and development.”²¹

Interested and affected parties (I&APs) – “Individuals and groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, workforce, customers and consumers, environmental interest groups, and the general public.”²²

Land Development Objectives (LDO) – “Land Development Objectives are developed in terms of the Development Facilitation Act (No. 67 of 1995). LDOs provide for a new system of urban management at local government, which is aimed at transforming the systems and procedures and facilitate integrated, efficient and coordinated service delivery. The LDOs will essentially link public expenditure to a new development vision and strategies that have been prioritized in conjunction with communities and other major stakeholders.”²³

Life cycle – incorporates the use of and alterations to the facility throughout the whole life of the facility.

Life cycle assessment – is a technique to assess the environmental aspects and potential impacts associated with a product, process or service.²⁴

Overshoot – the situation when human demand exceeds nature’s supply at the local, national or global scale. According to William Catton, it is “growth beyond an area’s carrying capacity, leading to crash.”²⁵

Plan – “A purposeful, forward-looking strategy or design, often with coordinated priorities, options and measures that elaborate and implement policy.”²⁶

²⁰ DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria.

²¹ DEA (1992). *Integrated Environmental Guidelines Series*; Pretoria.

²² DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria.

²³ Ibid.

²⁴ EPA, (2006). “Life Cycle Assessment”, *United States Environmental Protection Agency*. Online: <http://www.epa.gov/nrmrl/std/sab/lca/> Retrieved January 11, 2011.

²⁵ Catton, W., (1982). *Overshoot: The Ecological Basis of Revolutionary Change*, University of Illinois Press, Illinois.

Policy – “A general course of action or proposed overall direction that is being pursued and which guides ongoing decision-making.”²⁷

Precautionary Principle – “The essence of the precautionary approach is given in Principle 15 of the Rio Declaration²⁸, which states; “*where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation*”.

Principal Agent – means the person or entity appointed and empowered by the employer who shall have the authority to bind the employer, issue contract instructions and receive notices on behalf of the employer.

Programme – “A coherent, organized agenda or schedule of commitments, proposal instruments and/or activities that elaborate and implement policy.”²⁹

Project – means the development for which the consultants and the contractor are appointed and shall not necessarily be limited to the works.

Resilience – Resilience can be described as the ability to revert back to an original state after an event or impact.

Scoping – “A procedure for narrowing the scope of an assessment and ensuring that the assessment remains focused on the truly significant issues or impacts.”³⁰

Screening – “The classification of proposals.”³¹

Site – means the land or place on, over, under, in or through which the works is to be executed.

Social aspect – “aspect of construction works, parts of works, processes or services related to their life cycle that can interact with social conditions.”³²

Strategic Environmental Assessment (SEA) – “There is no universal definition for SEA, however, it is referred to in the White Paper on Environmental Management Policy for South

²⁶ CSIR (1997). *A Protocol for Strategic Environmental Assessment in South Africa: Draft Discussion Document*, CSIR Report ENV/S-1 97043C; Stellenbosch.

²⁷ Ibid.

²⁸ UN Rio Declaration

²⁹ CSIR (1997). *A Protocol for Strategic Environmental Assessment in South Africa: Draft Discussion Document*, CSIR Report ENV/S-1 97043C; Stellenbosch.

³⁰ DEA (1992). *Integrated Environmental Guidelines Series*; Pretoria.

³¹ Ibid.

³² ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

Africa (1998), as a process to assess the environmental implications of a proposed strategic decision, policy, plan, programme, piece of legislation or major plan."³³

Sustainability – “The concept of sustainability related to the maintenance and enhancement of environmental, social and economic resources, in or to meet the needs of current and future generations.”³⁴

Sustainable Building and Construction – means that “the principles of sustainable development are applied to a comprehensive construction cycle from the extraction and beneficiation of raw materials, through the planning, design and construction of buildings and infrastructure, until their final deconstruction and management of the resultant waste.”³⁵

Sustainable Building and Construction Activities Management Plan – means a project-specific plan developed to ensure that all actions identified in the Plan to manage sustainable construction activities are implemented by the consultants and the contractor(s).

Sustainability Criteria – sustainability objectives reflecting the economic, social and environmental context of the project.

Sustainable Development Policy – “provides the structure by which the built environment develops across the world requiring, in the process, a range of innovative economic, social and environmental, technological and ecological attributes, as well as a raft of strategic political, strategic and legislative instruments.”³⁶

Sustainability Framework – the assembly of the parameters, objectives, criteria and indicators that are used to guide the project development and/or measure the development of the concept.

Sustainability Indicators – “signposts that point the way to sustainable development.”³⁷

Sustainability Parameters – principles or guidelines that direct the outcome of the project towards achieving the sustainable development objectives.

Waste factor – the ratio between the quantity of prime resource compared to the quantity of output.

Whole building – represents a “method of siting, design, equipment and material selection, financing, construction, and long-term operation that takes into account the complex nature

³³ DEAT (1998). *EIA Regulations: Implementation of sections 21, 22 and 26 of the Environment Conservation Act, Guideline Document*, Pretoria.

³⁴ Ibid.

³⁵ CIB (2002). *Agenda 21 for Sustainable Construction in Developing Countries*, CIB/UNEP/CIDB/CSIR, Pretoria.

³⁶ Strong, W., and Hemphill, L., (2006). *Sustainable Development Policy Directory*, Blackwell Publishing, Oxford.

³⁷ UNCSD (1999). *From Theory to Practice: Indicators of Sustainable Development*, UNCSD, New York.

of buildings and user requirements, and treats the overall building as an integrated system of interacting components.³⁸



³⁸ Aitken, D., (1998). *Whole Buildings*, Union of Concerned Scientists, Cambridge, Massachusetts.

Introduction

The built industry, which comprises both the building (residential and non-residential) and civil engineering sectors, plays an indispensable role in the South African economy contributing about 35% to GDFI³⁹. The construction industry conceptualizes, delivers and maintains the physical infrastructure which is fundamental to the country's economic and social development.

Much of the current construction spend is occurring in infrastructure development and in previously disadvantaged areas where the activity not only contributes to an improvement in the quality of life of the inhabitants, but also offers job opportunities. Property development activity therefore affects the lives of every South African on a daily basis.

However, construction activity requires a substantial resource contribution resulting in almost 50% of all resources consumed globally, 45% of all energy consumed, 40% of all potable water consumed, 60% of prime agricultural land consumed, and 70% of all timber products consumed being consumed in the construction and maintenance of the built environment⁴⁰.

Many of the resources consumed by the built industry are currently sourced from non-renewable resources: given the demand for construction products (it is projected that future infrastructure investment could result in the built industry's contribution to GDFI doubling over the next decade) considerable pressure is being placed on existing resource sources. In addition, the raw materials required by the industry are often supplied by the extraction industries which have its own consequences on environmental conservation and management. Manufacturing construction materials and products often too results in the generation of emissions, including GHGs, which are harmful to the inhabitants of both the natural and built environments.

Thus, in order for the built industry to continue, and even accelerate, the construction and maintenance of the built environment, significant interventions are required in the manner in which the construction industry sources, uses, and maintains the materials it requires.

The property and construction sectors are therefore highly important for sustainable development because:

- It is a key sector in national economies;
- The built environment represents a large share of the economic assets of individuals, organisations, and nations;

³⁹ DPW (undated). *White Paper on Creating an Enabling Environment for Reconstruction, Growth and Development in the Construction Industry*, Department of Public Works, Pretoria.

⁴⁰ Edwards, B., (2002). *Rough Guide to Sustainability*, Royal Institute of Architects, London.

- It is one of the single largest industrial sectors, with all the consequential aspects of employment, economic importance, and environmental impact;
- Proper housing and infrastructures are key elements in determining quality of life. As such, they are important factors in the appreciation of the quality of the environment in which society lives and works.

All property development activities take place within the legal and regulatory as well as the administrative framework present within South Africa. As a result, aspects of governance are also relevant to sustainable development, in addition to those aspects related specifically to building construction.

While the challenge of sustainability is global, the strategies for addressing sustainability in property development are local. These strategies must reflect the context not only in the built and natural environment, but also in the social environment. This social environment includes cultural issues, legislation and regulation, as well as the needs and concerns of all the users and the interested and affected parties involved.

Applying the principles of sustainability in property development, including all related processes and activities, requires the direct and responsible involvement of all interested parties. While their legal responsibility and liability is subject to national regulation, individual commitment and responsibility is voluntary. Nevertheless, this commitment is a basic principle of the application of sustainable development, including application in the building construction sector.

Applying the concept of sustainability to buildings and other construction works requires an holistic approach bringing together the global and local concerns and goals of sustainable development and the demands and requirements for product functionality, efficiency and economy. Different target audiences will have a different perspective on these challenges and the preferred solutions.

Consideration of the sustainability of property development can be undertaken at several scales, including the whole industrial sector, an enterprise, a community, a building stock, a group of buildings, or an individual building construction works.⁴¹

This National Framework for Green Buildings in South Africa sets out a framework aimed at creating an collaborative enabling environment for the construction and operation of sustainable building construction activities by the public and private sectors in South Africa.

⁴¹ ISO (2006). *Sustainability in building construction – General principles*, International Standard ISO/DIS 15392, International Organisation for Standardisation, Geneva.

1 Problem Statement

Sustainable building and construction, more generally known as 'green building', is a sub-set of sustainable development: sustainable development is about meeting the needs and aspirations of people – especially the poor – in a manner that does not impede future generations from being able to meet their own needs and aspirations. Inter-generational and social equity together with environmental stewardship is a central tenet of sustainable development. It is, first and foremost, an ethical position adopted by society towards the existence and growth of all current and future species.

With regard to sustainable building and construction or green building, the problem can be stated as follows:

To create an enabling environment in which the construction industry can deliver and maintain a resilient built environment where the

- *exploitation of resources*
- *direction of investments*
- *conservation of species*
- *orientation of technological development and*
- *institutional change*

is all in harmony and enhance both current and future potential to meet human needs and aspirations.

1.1 Definition

Depending where one looks you will find various definitions aimed at describing 'sustainability' in a manner most favourable to the users' point of view. Earlier definitions were driven by egocentrics who viewed economic growth as incompatible with environmental protection and predicated solutions based on minimal resource exploitation and organic agriculture. In contrast, the cornucopian techno-centrists argued for the operation of free market forces as this would lead to a general improvement in the quality of life, lower birth rates and a concomitant decrease in population growth and therefore in resource depletion. These two opposing views have given way to a new view that the world's resources are in principle sufficient to meet long-term human needs. However, this optimistic view is predicated on the resolution of a number of key areas.

Poverty is recognised as an important cause of environmental degradation and therefore economic development has a crucial role to play in contributing to poverty alleviation. The critical issues on which the debate has come to focus are, therefore, the uneven spatial

distribution of population relative to natural carrying capacities, international interdependencies in resource utilisation and the extent as well as degree of inefficient or irrational use of environmental resources. The global intervention required to redress this imbalance has to do with managing the utilisation of natural resources correctly. This management requirement has come to be termed sustainable development.

Its objectives are quite concrete: development only takes place if the resource harvest rates are at levels no higher than managed or natural regeneration rates permit, and the use of the environment as a waste sink occurs only on the basis that waste disposal rates should not exceed managed or natural assimilation capacity of the environment.

Sustainable development was defined by the United Nations World Commission on Environment and Development in the 1987 Brundtland Report as "*those paths of social, economic and political progress that meet the needs of the present without compromising the ability of future generations to meet their own needs*".

A more recent – and broader – definition is the following of 1996⁴²:

Sustainability

The concept of sustainability relates to the maintenance and enhancement of environmental, social and economic resources, in order to meet the needs of current and future generations. The three components of sustainability are:

- *Environmental sustainability* – which requires that natural capital remain intact. This means that the source and sink functions of the environment should not be degraded. Therefore, the extraction of renewable resources should not exceed the rate at which they are renewed, and the absorptive capacity to the environment to assimilate wastes should not be exceeded. Furthermore, the extraction of non-renewable resources should be minimised and should not exceed agreed minimum strategic levels.
- *Social sustainability* – which requires that the cohesion of society and its ability to work towards common goals be maintained. Individual needs, such as those for health and well-being, nutrition, shelter, education and cultural expression should be met.
- *Economic sustainability* – which occurs when development, which moves towards social and environmental sustainability, is financially feasible.

With sustainable development as the goal of economic, social and environmental policy, what is needed is the redirection of economic activity in order to detach it from environmental and social degradation. Once this has been achieved there will no longer be a conflict between economic growth and environmental protection.

⁴² Gilbert, R., Stevenson, R., Girardet, H., & Stren, R., (1996). *Making Cities Work*, Earthscan, London.

Sustainable building and construction or green building means “applying the principles of sustainable development to a comprehensive construction cycle from the extraction and beneficiation of raw materials, through the planning, design and construction of buildings and infrastructure, until their final deconstruction and management of the resultant waste”⁴³.

In this context green building is a holistic process aiming to restore and maintain harmony between the natural and built environments while creating settlements that affirm human dignity and encourage economic equity.

1.2 Context

South Africa is a country in dynamic change. Its development challenges are daunting: socio-economic backlogs created by apartheid policies of the past, ongoing socio-economic imbalances and inequalities, population growth, urbanisation, skill shortages, and poor service delivery, among others, all hamper economic and social transformation.

Creating sufficient decent employment opportunities lies at the heart of the New Growth Path (NGP): at the same time traditional patterns of trade and investment have changed with increased globalisation resulting in the emergence of new trade opportunities, trading conditions and trading partners. Government is now required to develop new strategies to meet these threats and seize the opportunities created.

Central to this repositioning is the recognition of the threat of climate change and the interventions this will demand in terms of the development of alternative economic growth models and the development of technologies required to support those alternative models.

Envisioning a world where cities would provide a sustainable environment for people to live, work and play becomes more challenging every day as the urban population increases. More of the world's people now live in urban areas than in the rural areas: South Africa is already urbanised.

1.3 Need

South Africa's numerous global environmental commitments, including those that encompass sustainable development, require implementation strategies and actions plans to be effective. The global commitments require countries to adopt bold, goal-oriented policies and strategies supported by the necessary actions to meet the various targets set, including, for example, the MDGs.

The NGP, in particular, challenges South Africa to develop a growth paradigm that will facilitate the emergence of a “more developed, democratic, cohesive and equitable economy

⁴³ CIB (2002). *Agenda 21 for Sustainable Construction in Developing Countries*, CIB/UNEP/CIDB/CSIR, Pretoria.

and society over the medium term, in the context of sustained growth"⁴⁴. The NGP strategy sets out critical markers for employment creation and growth and identifies where viable *changes in the structure and character of production*⁴⁵ can generate a more inclusive and greener economy over the medium to long term.

The NGP notes that joint action will be required to change the character of the South African economy. The NGP notes that this path requires a step up in the integration of national, provincial and local policies and collaboration around implementation of developmental policies and programmes. It stresses the need for work to be done in aligning growth and development strategies adopted by different spheres of government and to establish knowledge-sharing and collaboration across the state.

To this end the NGP targets housing and public works construction including operation and maintenance; manufacture of inputs; improved competitiveness; natural resource management and construction in the short to medium term; renewable energy construction and manufacture; and green technologies.

The construction industry needs to ensure that it complies with the minimum standards relating to health and safety and environmental protection. The White Paper on the Construction Industry includes a strategy aimed at ensuring the implementation of an appropriate programme to improve health and safety and environmental protection. Section 4.1.4 of the White Paper records that "measures to promote compliance with minimum standards need to be reinforced to protect the environment, the workforce and the public at large"⁴⁶.

1.4 Objectives and Benefits of the Framework

The objectives of this Framework is to ensure that the activities of the construction industry actively supports the Green Economy and improves the quality of the natural and built environments by, for example, reducing the consumption of raw materials both during construction and in use, improving the performance of the asset, reducing the impact of construction activities on the natural and built environments, enhancing social well-being, creating new and decent jobs, and facilitating the reuse of the materials and elements at the asset's end-of-life stage.

The main benefits of the Framework are that it:

- Pro-actively informs the development of plans and programmes;

⁴⁴ The Presidency, (2010). *New Growth Path*, The Presidency, Pretoria.

⁴⁵ The emphasis is by the author.

⁴⁶ DPW, (Undated). *White Paper on Creating an Enabling Environment for Reconstruction, Growth and Development in the Construction Industry*, Department of Public Works, Pretoria.

- Identifies the opportunities and constraints which the environment places on development;
- Identifies key strategic areas;
- Has the ability to integrate the principles of green building across areas, regions or sectors;
- Improves the way in which cumulative effects can be realised, for example, climate change adaptation and mitigation strategies and black economic empowerment;
- Focuses on the maintenance and enhancement of a chosen level of environmental and social quality, rather than on minimising individual impacts.

The fundamental benefit of this Framework is that it aims to integrate the concept of sustainability into the immovable asset formation in South Africa.

1.5 Purpose

The purpose of this Framework is to enunciate South Africa's national vision for sustainable building and construction also known as 'green building' and indicate strategic interventions to re-calibrate South Africa's construction industry, particularly with regard to the environmental and social manner in which it forms immovable assets, with *A National Framework for Sustainable Development in South Africa (1998)*⁴⁷.

The Framework aims to define shared perceptions of the long-term environmental impacts of fixed assets creation and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the natural and built environments.

This Framework does not propose detailed strategies or actions, but describes a national vision, principles, trends, strategic priority areas and a set of implementation measures that will enable and guide the development of the national strategy and action plan.

It drafts in broad terms how a Framework can calibrate South Africa's immovable asset formation with national imperatives and strategies, including the move toward a green economy, a sets out implementation measures and instruments to achieve inter-departmental alignment and coordination within government.

This Framework provides the basis for a long-term process of integrating sustainability as a key component of the discourse regarding the construction of the built environment and confirms South Africa's re-commitment to the principles of sustainable development agreed

⁴⁷ DEAT (2008). *National Framework for Development in South Africa*, Department of Environment Affairs and Tourism, Pretoria.

to at international summits and conferences in the economic, social and environmental fields, including the 2002 World Summit on Sustainable Development (WSSD).

1.6 How the Framework will be used

The Framework is intended to be used by all organs of state and social partners within the national, provincial and municipal spheres to progressively refine their policies, programmes and action plans in order to establish a coherent and mutually supportive national system promoting green building.

This process will need to be supported by the development of a:

- National set of Green Building Indicators;
- National Green Building Standards;
- National Green Building Guidelines;
- National Green Building Action Plans;
- Green Building skills development and training programmes;
- Green Building Information and Technology Systems;
- Green Building R&D capacity; and
- Green Building Centres of Excellence

2 Framework Development Process

The development of this Framework arose out of a decision by the Policy Unit of the Department of Public Works (DPW) to develop a National Framework for Green Building in South Africa in September 2010. The CSIR was appointed to assist DPW in the drafting of such a Framework.

The project to develop a “National Framework for Green Building in South Africa” arose out of a request by the National Department of Public Works (NDPW) addressed to the CSIR to assist in the development of such a national policy. The request comes against the background of a growing awareness of green building in South Africa, the emerging electricity crisis in South Africa, and the launch of a Government initiative aimed at promoting the concept of a “green economy”. Government has identified the Green Economy as one of the key elements in the *New Growth Path* and well as the *Industrial Policy Action Plan*. Key to this consideration is the exploration of the green economy to create large numbers of “green jobs” across many sectors of the economy, and becoming an engine of development. With this in mind a summit – *Towards a resource efficient, low carbon and pro-employment growth path* – was held from the 18-20th of May 2010 in Johannesburg.

The NDPW thus sees this as an opportunity to explore the inter-relationships of a green economy to green building, and with that in mind, develop a policy that can guide the NDPW and Government to align the construction industry and Government's own property portfolio – the National Estate – towards a resource efficient, low carbon and pro-employment direction.

2.1 Background Research

The CSIR undertook background research to establish whether green building could support national imperatives and what interventions have been adopted internationally by national and/or regional authorities that could inform the drafting of this Framework.

3.1.1 National Imperatives

The research found that there can be little doubt that the construction industry is undergoing close scrutiny in terms of both its current contribution to global warming through the use of fossil fuel-based energy, and its potential to reduce that contribution by switching to clean sources of energy and improving energy efficiency. The industry can expect to experience increasing pressure from host nation governments and international organisations to introduce global warming adaptation and mitigation measures as a matter of urgency.

There can also be little doubt that the green building movement is increasingly seen as one of the vehicles for pursuing these strategies. Thus the development of a Green Building Policy for South Africa is both timely and relevant.

The report suggested that the challenge is to develop a Framework that is equally timely and relevant. For this to be the case, this report recommended that a Framework be based on the following principles:

- Address the needs and aspirations of people, especially the needs of the poor;
- Recognise the limitations imposed on the environment by the state of technology and social organization;
- Recognise that the environment is held as a proxy for social equity between generations and communities;
- Acknowledge that sustainability is pro-development provided that it involves the progressive transformation of economy and society;
- Advocate and actively promote ecological restoration (as compared to the 'do least harm' approach);
- Target known and relevant environmental challenges (including global warming, environmental impact reduction, and biodiversity enhancement);

- Advocate and actively promote building social cohesion by reinforcing those cultural and traditional characteristics that unite, not distinguish, communities;
- Introduce and reward Green Building Best Practice;
- Be synchronised and support other Best Practice initiatives (including cidb's Contractor Best Practice Recognition Scheme and Register of Projects);
- Drive design and construction behaviour through regulation and standards;
- Be calibrated in a manner that enables the statistical methodology of *P5041: Building Plans Passed and Building Completed* as issued by Statistics South Africa to be used to construct status reports of the contribution of green buildings to South Africa's environmental challenges over time; and
- Be calibrated in a manner than facilitates the inclusion of and contribution to national environmental accounting methodology (including projected energy use, CO₂ emissions, biodiversity loss)

The inclusion of sustainable development imperatives into the delivery of infrastructure in South Africa is critical if the deployment of scarce resources is to be used to enhance both the natural environment and human development. The preparation of a national sustainable construction strategy aims to equip the construction industry to address this challenge. The establishment of key concepts and elements to be applied consistently over all projects will introduce an element of consistency into construction delivery. Benchmarking the project-specific responses will furthermore lead to a situation where a balanced scorecard for sustainable construction activities in South Africa can be introduced.

This strategy breaks new ground with regard to the manner in which the South African construction industry delivers its products. It is certain that this strategy will need further refining as it is contemplated and evaluated. However, it is equally certain that the implementation of a national sustainable construction strategy will lead to a substantial improvement in the ability of the construction industry in South Africa to play its part in promoting and achieving a balance between growth and ecological capital consumption while delivering a sustainable built environment that enhances the quality of life of all our inhabitants.

3.1.2 International Precedent

The following recommendations were made based on the review of actions other countries have taken to improve their own sustainability. For purposes of the study, countries that were included in the literature search were the United States of America, the United Kingdom, the European Union, Australia, and New Zealand. Additionally, the unique aspects of South Africa were also considered. Such aspects should be considered for inclusion within the National Framework for Green Building in South Africa.

- Energy performance standards for residential and office buildings
- Water performance standards for commercial buildings
- Requirements for the use of solar hot water geysers within residential dwellings where appropriate
- Information awareness campaigns educating the public and contractors on any changes to the building code and any new requirements
- Information awareness campaigns on the use of renewable energy technologies
- Energy-performance standards for energy-using products, domestic and commercial
- Water-performance standards for water using products, domestic and commercial
- Government buildings should lead by example, excelling in water and energy performance and lead the market forward
- Development of a commissioning protocol for Government buildings
- Development of an environmental operational protocol for Government buildings
- Development of environmental standards for Government vehicles
- Development of an environmental procurement protocol for Government departments
- Development of a financial assistance methodologies to provide capital to households which can be used on cost-effective energy-saving interventions
- Development of financial assistance methodologies and incentives to provide capital for buildings for cost-effective energy-saving interventions wherein the owner is not a tenant
- Development of financial incentive models to encourage the improvement of energy efficiency within buildings across the country
- Strategies to ensure thermal comfort within all residential environments across the country

- Strategies to ensure thermal comfort within commercial work environments
- Develop specific environmental standards for repetitive building typologies, schools, hospitals, clinics, libraries and museums
- Identify individuals as responsible persons for the implementation of any governmental policies

3.2 Drafting the Framework

The research obtained as described in 3.1 above was used to inform the preparation of this draft document the structure of which largely follows other governmental framework documents.

The draft document was discussed internally within DPW and its agencies, and with the CSIR.

3.3 Stakeholder Participation

The draft document will be subjected to extensive stakeholder participation before being submitted to the Minister.

In addition, the framework will need to be reviewed periodically for relevance and responsiveness to changing national priorities and contextual circumstances. The framework should, however, be robust enough to reflect these changes without denigrating its fundamental principles and objectives.

4 Strategic Context

The purpose of this chapter is to identify the key strategic commitments and policies of government and to align this Framework with those strategic objectives wherever possible. Doing this will ensure that the Framework ultimately supports government's vision for South Africa.

Economic, social and environmental sustainability are at the very core of government's vision: the principles of sustainability are ultimately enshrined in the Constitution, in legislation, and in policy. Since green building is located within the sustainable development paradigm, it should be possible to ensure that the objectives of green building match and support the principles of sustainable development that government is bound to by the Constitution, and has already committed itself to through legislation, policy and international conventions and agreements. Doing this will ensure that implementing a green building strategy will not deliver the performance benefits to be gained through green building, but also contribute to meeting government's national and international commitments.

4.1 National Legislative and Policy Commitments

South Africa has a significant history of environmental conservation, and the protection of the environment is enshrined in the Constitution. There is also a significant body of legislation protecting the environment, although the focus has historically been on the natural environment. Sustainable development features directly in the policy domain specifically through the National Framework for Sustainable Development although the key principles of sustainable development are in evidence in many of government's other policies.

4.1.1 Constitution

Government in South Africa is charged with respecting, protecting, promoting and fulfilling the rights in Chapter 2: Bill of Rights as contained in the Constitution (Act 108 of 1996); the Bill of Rights makes specific reference to rights associated with the natural and built environment.

Section 24 grants everyone the right to an environment that is not harmful to their health or well-being, and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

4.1.2 Legislation

As stated above, environmental legislation has, up to now, tended to focus on the natural environment although some of the environmental legislation impacts on the built environment

in general and construction activities in particular. There is also other legislation governing the economy in general and the construction industry in particular. In addition there is legislation governing land use.

A list of legislation impacting on the construction industry is attached as Appendix 1.

4.1.3 Policies

As stated above, the principles of sustainable development feature in many of government's policies. The main policies and their reference to the principles of sustainable development are described briefly below.

4.1.3.1 Outcomes

Government has adopted the outcomes approach to planning their work: this involves choosing a few outputs per outcome that are measurable and have targets and for which Government has identified key activities that best contribute to achieving the targets. At the Cabinet Lekgotla held from 20 to 22 January 2010, Government adopted 12 Outcomes that reflect Government's mandate and derive from the Medium Term Strategic Framework. They are:

1. Improved quality of basic education
2. A long and healthy life for all South Africans
3. All people in South Africa are and feel safe
4. Decent employment through inclusive economic growth
5. A skilled and capable workforce to support an inclusive growth plan
6. An efficient, competitive and responsive economic infrastructure network
7. Vibrant, equitable and sustainable rural communities with food security for all
8. Sustainable human settlements and improved quality of household life
9. A responsive, accountable, effective and efficient local government system
10. Environmental assets and natural resources that are well protected and continually enhanced
11. Create a better South Africa and contribute to a better and safer Africa and World
12. An efficient, effective and development oriented public service and an empowered, fair and inclusive citizenship

The five priorities identified in the manifesto of the ruling party correspond with the first seven outcomes while Local Government and Human Settlements have been added as priorities.

4.1.3.2 Green Economy

Cabinet has adopted the Green Economy as an economic and environmental policy to guide its future investments and strategic decision-making.

A green economy can be defined as a “*system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks or ecological scarcities.*”⁴⁸

The green economy refers to two inter-linked developmental outcomes in South Africa:

- Growing economic activity (which leads to investment, jobs and competitiveness) in the green industry sector.
- A shift in the economy as a whole towards cleaner industries and sectors with a low environmental impact compared to its socio-economic impact.

Green jobs can be defined as work in:

- Agricultural, manufacturing, research and development, administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials and water consumption through high efficiency strategies; de-carbonise the economy; and minimize or altogether avoid generation of all forms of waste and pollution.
- Greater efficiency in the use of energy, water, and materials is a core objective i.e. achieving the same economic output (and level of wellbeing) with far less material input.

The document developed by the Green Economy Core Group (GECG 2010) includes green building in its identification of key sectors with a potential for driving a green economy.

4.1.3.3 MTEF

The Medium Term Strategic Framework (MTSF) is a statement of intent identifying the development challenges facing South Africa and outlining the medium-term strategy for the improvements in the condition of life of South Africans and for South Africa's enhanced contribution to the cause of building a better world⁴⁹. The MTSF is meant to guide planning and resource allocation across all spheres of government.

⁴⁸ GECG (2010). *Green Economy Summit Resolution*, Green Economy Core Group. Online: <http://www.green-economics.info/wp-content/uploads/2010/05/Summit>

⁴⁹ The Presidency (2010). *Medium Term Strategic Framework*, The Presidency, Pretoria.

The central objective and mission is to set the country on a higher and sustainable growth trajectory by the end of the mandate period (2014) with an expanded and more diversified economic base, with unemployment and poverty been halved (compared to 2004) and with greater equity and social cohesion.

The strategic priorities can be summarized as follows:

- Speed up economic growth and transform the economy to create decent work and sustainable livelihoods
- Massive programme to build economic and social infrastructure
- Comprehensive rural development strategy linked to land and agrarian reform and food security
- Strengthen the skills and human resource base
- Improve the health profile of society
- Intensify the fight against crime and corruption
- Build cohesive, caring and sustainable communities
- Pursue regional development, African advancement and enhanced international co-operation
- Build a developmental state including improvement of public services and strengthening democratic institutions

Critically the MTSF notes that central to its approach is a constant search for new and more effective ways of doing things. It calls for determined and consistent implementation of the strategic elements so that current and future challenges are met with a new resolve.

4.1.3.4 National Framework for Development in South Africa

The purpose of the Framework is to enunciate South Africa's national vision for sustainable development and indicate strategic interventions to re-orientate South Africa's development path in a more sustainable direction⁵⁰ (DEAT 2008). Key components of the Framework are a *Vision, Principles, Trends, Priority Areas of Strategic Intervention, and Making It Happen*.

The five priority areas of the Framework for action and intervention are:

- Enhancing systems for integrated planning and implementation
- Sustaining our ecosystems and using resources sustainably

⁵⁰ DEAT (2008). *National Framework for Development in South Africa*, Department of Environment Affairs and Tourism, Pretoria.

- Investing in sustainable economic development and infrastructure
- Creating sustainable human settlements
- Responding appropriately to emerging human development, economic and environmental challenges

4.1.3.5 Industrial Policy Action Programme

The Department of Trade and Industry (Dti) has prepared a three-year rolling industrial development-related roadmap for the Medium-Term Expenditure Framework (MTEF) period aimed mainly at formulating policies and actions that will help build South Africa's industrial base in critical sectors of production and value-added manufacturing.

The analysis undertaken in the Industrial Policy Action Plan⁵¹ (IPAP2) indicates that seven sets of policies are critical in order to achieve an upscaled industrial policy and a shift towards strengthening the productive side of the economy in general. The seven sets are:

- Stronger articulation between macro- and micro-economic policies;
- Industrial financing channeled to real economic sectors;
- Promotion of public and private procurement to raise domestic production and employment in arrange of sectors. This includes the alignment of B-BBEE and industrial development objectives, and influence of private procurement;
- Developmental trade policies that deploy trade measures in a selected and strategic manner, including tariffs; enforcement; and Standards, Quality Assurance, Accreditation and Metrology (SQAM) measures;
- Competition and regulation policies that lower costs for productive investments, and for poor and working-class households;
- Skills and innovation policies that are aligned to sectoral priorities; and
- Deployment of these policies in general and in relation to more ambitious sector strategies, building on work already done.

While IPAP does not include construction as one of its targeted sectors, 'green' and energy-saving industries – which is directly linked to construction – is included.

⁵¹ The Presidency (2010). *2010/11 – 2012/13 Industrial Policy Action Plan*, Economic Sectors and Employment Cluster, The Presidency, Pretoria.

4.1.3.6 National Spatial Development Perspective

The National Spatial Development Perspective⁵² (NSDP) is a critical instrument for policy coordination with regard to the spatial implications of infrastructure programmes in national, provincial and local spheres of Government.

The NSDP provides:

- A set of principles and mechanisms for guiding infrastructure investment and development decisions;
- A description of the spatial manifestations of the main social, economic and environmental trends that should form the basis for a shared understanding of the national space economy; and
- An interpretation of the national spatial realities and the implications for government intervention.

Given government's objective of growing the economy, creating jobs, addressing poverty, and promoting social cohesion; the NSDP assists government in confronting three fundamental planning questions:

- I. Where should government direct its investment and development initiatives to ensure sustainability and maximum impact?
- II. What kinds of spatial forms and arrangements are most conducive to the achievement of the objectives of democratic nation-building and social and economic inclusion?
- III. How can government as a whole capitalize on complementarities and facilitate consistent decision making and move beyond focusing on integration and coordination procedures to establishing processes and mechanisms that will bring about strategic coordination, interaction and alignment.

The NSDF has five key principles:

- 1) Rapid economic growth that is sustained and inclusive
- 2) Government has a constitutional obligation to provide basic services
- 3) Government's spending on fixed investment should be focused on localities of economic growth and/or economic potential in order to gear up private-sector investment
- 4) Efforts to address past and current inequalities should focus on people not places

⁵² The Presidency (2001). *National Spatial Development Perspective*, Minister in the Presidency for National Planning, Pretoria.

- 5) Future settlement and economic development should focus on activity corridors and nodes that are adjacent to or that link the main growth centres.

The NDSP principles are aimed specifically at focusing government action and investment.

4.2 International Conventions and Agreements on Environmental and Humans Settlement Issues

South Africa, as a responsible member of the world community, is a signatory to a number of international agreements, dealing with issues such as human settlements, marine conservation and pollution, the atmosphere, fauna and flora, Antarctica, whaling and the conservation of wetlands.

These conventions place specific environmental impact management requirements and obligations on the South African Government in complying with the aims and objectives of these conventions. In cases where the proposed undertaking of an identified activity may influence or affect compliance to these conventions or is likely to have a significant detrimental effect across South Africa's international boundaries, special procedures and EIA requirements may be required.

South Africa is a signatory to the following environmental conventions, (a full listing is provided in Appendix B):

- Ramsar Convention
- Convention on Biological Diversity
- UNCDD (Convention to Combat Desertification)
- World Heritage Convention
- INFCCC (United Nations Framework Convention on Climate Change)
- Basel Convention (Convention on the Control of Transboundary [sic] Movements of Hazardous Wastes and their Disposal)
- Stockholm Convention on Persistent Organic Pollutants
- Montreal Protocol (on substances that deplete the ozone layer)

The Department of Environment Affairs and Tourism is responsible for administering and implementing these environmental conventions.

In addition, a number of these commitments and conventions impact in the area of sustainable human settlements and, by implication, on sustainable building. These include:

- Johannesburg Declaration on Sustainable Development 2002
- Johannesburg Plan of Implementation 2002

- Millennium Declaration 2000
- Millennium Goals and Targets 2000
- Earth Summit +5 1997
- Habitat Agenda (Habitat II) 1996
- Istanbul Declaration on Cities and other Human Settlements 1996
- Agenda 21 (Rio Earth Summit) 1992
- Vancouver Declaration on Human Settlements 1976
- Declaration of the United Nations Conference on the Human Environment 1972

4.2.1 Earth Summit

The 1992 Earth Summit challenged humanity to reduce its impact on the earth. The assembled leaders signed the Framework Convention on Climate Change and the Convention on Biological Diversity; endorsed the Rio Declaration and the Forest Principles, and adopted Agenda 21 for achieving sustainable development. The Commission on Sustainable Development (CSD) was created in December 1992 to ensure follow-up and to monitor and report on implementation of the Earth Summit agreements at the local, national, regional and international levels.

The main thrust of Habitat II was to address two themes of equal global importance: *“Adequate shelter for all”* and *“Sustainable human settlements development in an urbanizing world”*⁵³. The second theme combines economic development, social development and environmental protection or what is commonly referred to as the triple-bottom-line approach. Recognizing the global nature of these issues, the international community has decided that a concerted global approach could greatly enhance progress towards achieving these goals.

Of interest to this framework is the Way Forward suggested by the Habitat conference. The following supports the notion of green building:

6. Encourage the revision and/or modification of existing building codes to take account of improved technologies in materials and construction without compromising safety standards.

8. Provide training programmes in building skills – particularly for building co-operatives, women, the unemployed and other economically marginalised groups to enable contributions in labour “capital” to lower levels of affordability.

10. Embark on active research into modern rapid construction methods and new materials that evolved in response to recent natural disasters.

⁵³ UNCHS (1996). *The Habitat Agenda*. Online <http://habitat.unchc.org/english/hagenda/index.htm>

4.2.2 Istanbul Declaration on Human Settlements

Of those objectives identified in the *Istanbul Declaration on Human Settlements*⁵⁴, the following goals are areas in which development professionals could play a direct and substantial role:

- *Unsustainable patterns of production and consumption, particularly in industrialized countries;*
- *Environmental degradation;*
- *Social and economic inequality;*
- *Inadequate resources;*
- *Lack of basic infrastructure and services;*
- *Lack of adequate planning;*
- *Increased vulnerability to disasters.*

Paragraphs 10 & 11, in particular, are highly relevant in this regard.

Paragraph 10 reads as follows:

"In order to sustain our global environment and improve the quality of living in our human settlements, we commit ourselves to sustainable patterns of production, consumption, transportation and settlements development; pollution prevention; respect for the carrying capacity of ecosystems; and the preservation of opportunities for future generations."

Paragraph 11 reads:

"We shall promote the conservation, rehabilitation and maintenance of buildings, monuments, open spaces, landscapes and settlement patterns of historical, cultural, architectural, natural, religious and spiritual value."

4.2.3 Agenda 21

Agenda 21, adopted at Rio de Janeiro, addresses the pressing environment and development problems of today and also aims at preparing the world for the challenges of the next century in order to attain the long-term goals of sustainable development. Agenda 21 is a "comprehensive plan of action to be implemented globally, nationally and locally by organisations belonging to the United Nations in every area in which humans impact on the environment."⁵⁵

⁵⁴ UN (1996). *Istanbul Declaration on Human Settlements*, UN-Habitat. Online: <http://www.unhabitat.org/content.asp>

⁵⁵ UN (1992). Agenda 21, online <http://www.un.org/esa/dsd/agenda21/>

The document establishes an agenda for sustainable development in four sections, namely the social and economic dimension; the conservation and management of resources for development; strengthening the role of major groups; and means of implementation. Objectives, activities and means of implementation are set out for a number of programme areas. The report sets out in its Sections A to C strategies for accelerating progress towards sustainable development. The objectives that are of particular relevance to the development professions are the following:

- A. Integration of economic, social and environmental objectives
- B. Changing consumption and production patterns
- C. Making trade and environment mutually supportive
- D. Sustainable human settlements
- E. Fresh water
- F. Forests
- G. Energy
- H. Transport
- I. Atmosphere
- J. Toxic chemicals
- K. Sustainable tourism
- L. Transfer of environmentally sound technologies
- M Capacity building
- N. Education and awareness

The Resolution of the General Assembly in June 1997 reaffirmed that *Agenda 21* remains the fundamental programme of action for achieving sustainable development. It also recognised that the achievement of sustainable development requires the integration of its economic, environmental and social components. Extensive efforts need to be made to integrate environmental, economic and social objectives into decision-making by elaborating new policies and strategies for sustainable development or by adapting existing policies and plans.

One such effort is the UNEP *International Declaration on Cleaner Production*.

Agenda 21, Chapter 7, (G), 'Promoting sustainable construction industry' is a programme area that deals specifically with the role of the construction industry in promoting sustainable

human settlement development. Of particular relevance to the construction industry are the following recommended activities:

- a. *Establish and strengthen indigenous building materials industry, based, as much as possible, on inputs of locally available natural resources;*
- b. *Formulate programmes to enhance the utilisation of local materials by the construction sector by expanding technical support and incentive schemes for increasing the capabilities and economic viability of small-scale and informal operatives which make use of these materials and traditional construction techniques;*
- c. *Adopt standards and other regulatory measures which promote the increased use of energy-efficient designs and technologies and sustainable utilisation of natural resources in an economically and environmentally appropriate way;*
- d. *Formulate appropriate land-use policies and introduce planning regulations specially aimed at the protection of eco-sensitive zones against physical disruption by construction and construction-related activities;*
- e. *Promote the use of labour-intensive construction and maintenance technologies which generate employment in the construction sector for the underemployed labour force found in most large cities, while at the same time promoting the skills in the construction sector;*
- f. *Develop policies and practices to reach the informal sector and self-help housing builders by adopting measures to increase the affordability of building materials on the part of the urban and rural poor, through, inter alia, credit schemes and bulk procurement of building materials for sale to small-scale builders and communities.*

The chapter continues by suggesting that, in addition, all countries should:

- a. *Promote the free exchange of information on the entire range of environmental and health aspects of construction, including the development and dissemination of data bases on the adverse environmental effects of building materials through the collaborative efforts of the private and public sectors;*
- b. *Introduce legislation and financial incentives to promote recycling of energy-intensive materials in the construction industry and conservation of waste energy in building materials production methods;*
- c. *Promote the use of economic instruments, such as product charges, to discourage the use of construction materials and products that create pollution during their life cycle;*

- d. *Promote information exchange and appropriate technology transfer among the countries, with particular attention to developing countries, for resource management in construction, particularly for non-renewable resources;*
- e. *Promote research in construction industries and related activities, and establish and strengthen institutions in this sector.*

4.2.4 Johannesburg Declaration on Sustainable Development

The Johannesburg Declaration on Sustainable Development concluded the World Summit on Sustainable development held in Johannesburg from 2 to 4 September 2002. This summit followed on from the Stockholm Conference held in 1972, and the United Nations Conference on Environment and Development held in 1992, the Rio Declaration on Environment and Development.

The delegates confirmed, amongst others, that 'poverty reduction, changing consumption and production patterns and protecting and managing the natural resource base for economic and social development are overarching objectives of and essential requirements for sustainable development'.⁵⁶ Delegates also agreed to strengthen and improve governance at all levels for the effective implementation of Agenda 21, the Millennium Development Goals and the Plan of Implementation of the Summit.

4.2.4.1 Johannesburg Plan of Implementation

The Johannesburg Plan of Implementation (PoI) represents a commitment of delegates to undertaking concrete actions and measures at all levels. The PoI addresses, among others, poverty eradication, changing unsustainable patterns of consumption and production, protecting and managing the natural resource base of economic and social development, sustainable development in a globalising world, and health and sustainable development. The following actions are of particular relevance to this Framework:

- a) Identify specific activities, tools, policies, measures and monitoring and assessment mechanisms, including, where appropriate, life -cycle analysis and national indicators for measuring progress, bearing in mind that standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries;
- b) Adopt and implement policies and measures aimed at promoting sustainable patterns of production and consumption, applying, inter alia, the polluter-pays principle described in principle 16 of the Rio Declaration on Environment and Development;

⁵⁶ UN (2002). *Johannesburg Declaration on Sustainable Development*, World Summit on Sustainable Development, Johannesburg. Retrieved 24 January 2011. Online: http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POI_PD.htm

- c) Develop production and consumption policies to improve the products and services provided, while reducing environmental and health impacts, using, where appropriate, science-based approaches, such as life-cycle analysis;
- d) Develop awareness-raising programmes on the importance of sustainable production and consumption patterns, particularly among youth and the relevant segments in all countries, especially in developed countries, through, inter alia, education, public and consumer information, advertising and other media, taking into account local, national and regional cultural values;
- e) Develop and adopt, where appropriate, on a voluntary basis, effective, transparent, verifiable, non-misleading and non-discriminatory consumer information tools to provide information relating to sustainable consumption and production, including human health and safety aspects. These tools should not be used as disguised trade barriers;
- f) Increase eco-efficiency, with financial support from all sources, where mutually agreed, for capacity-building, technology transfer and exchange of technology with developing countries and countries with economies in transition, in cooperation with relevant international organizations.

4.2.5 United Nations Millennium Declaration

The Millennium Development Goals (MDGs) arose out of a resolution of the General Assembly of the United Nations in September 2000 in recognition of the challenges the world faces at the dawn of a new millennium. Among the resolutions is 'Protecting our Environment' that re-affirms previous resolutions of the United Nations.

4.2.5.1 The Millennium Development Goals

The Millennium Declaration was adopted along with the Millennium Development Goals that now serves as a universal framework for development. There are 8 goals in all of which Goal 7: Environmental Sustainability, is most relevant to this Framework. There are four targets to this goal, of which target 1 speaks directly to the purpose of this Framework, namely to 'Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources'.⁵⁷

4.3 Summary

Economic, social and environmental sustainability is an integral component of government's vision for South Africa. To this end, Government has passed legislation protecting the environment and the health and safety of people in buildings, incorporated sustainability into its policies, and signed international conventions and agreements committing itself to

⁵⁷ <http://www.un.org/millenniumgoals/environ.shtml>

advancing the principles of sustainability in its work programmes. Sustainable human settlements and protecting South African environmental assets and natural resources in particular are objectives that are consistently contained in key strategic policies. Government's call for a shift to a green economy is predicated on improving human well-being through an economic shift towards cleaner industries and sectors, in which the construction industry is specifically noted, with a low environmental impact.

South Africa's international conventions and agreements include numerous commitments to achieving sustainable human settlements and protecting natural assets and resources. Actions and programmes specifically identified include adopting appropriate codes and standards; improving building skills; supporting building construction R&D; shifting to sustainable patterns of consumption and production; preventing pollution; respecting cultural heritage and national monuments; enhancing the development of local materials; promoting labour-intensive technologies; identifying specific activities, tools, policies, measures and monitoring and assessment mechanisms, promoting awareness; and increasing eco-efficiency.

A National Framework for Green Building must therefore ensure that these commitments are included and that successful implementation will contribute toward achieving South Africa's vision and meeting its national and international obligations.

5 Building Impacts, Trends and Pathways

5.1 Building Impacts

The following section covers the impact of humans and their buildings on the natural and built environments.

The pursuit of sustainable development brings the construction industry, and specifically the building industry component thereof, into sharp relief. The built environment is a major component of contemporary life: half the world's population is now urbanized and by 2050 that proportion will have reached two-thirds.⁵⁸ The urban population of South Africa was already at 56 per cent in 2001.⁵⁹

Construction constitutes more than half of total national capital investment in most countries, and construction can amount to as much as 10 percent of GDP. It is estimated that the industry employs about 111 million people globally, and accounting for almost 28 percent of

⁵⁸ UN (2008). *State of the World's Cities 2008/09: Harmonious Cities*, United Nations Human Settlements Programme, Earthscan, London.

⁵⁹ StatsSA (2006). *Migration and Urbanisation in South Africa*, Report No. 03-04-02, Statistics South Africa, Pretoria.

all industrial employment, is the biggest industrial employer worldwide. Construction accounts for 7 percent of total employment with 75 percent of all construction workers found in developing countries. Typically over 90 percent of workers are employed in micro firms with fewer than 10 persons.⁶⁰ In fact, internationally, small and medium-sized enterprises (SMEs) constitute 97 percent of all construction firms, with 95 percent of firms being micro firms having ten or fewer employees. This is equally true of the developed countries: even in France and Germany there are fewer than ten large national contracting firms having thousands of employees.

The industry exerts a significant multiplier effect on the economy as a whole: it is considered that one job in construction gives rise to two further jobs elsewhere in the construction sector and other sectors of the economy. On this basis, as much as 20 percent of all employment can be ascribed to construction activities in some way.⁶¹

Buildings and structures form and alter the nature, function and appearance of the natural and built environment: they impact on rural areas, villages, towns and cities. They are known to have a long life: many of the buildings still in use around the world are many hundreds of years old. Their construction, use, repair and maintenance and demolition consume energy and resources and generate waste in excess of any other industrial sector. Construction activity is a consumer of materials and scarce resources (water and energy), is a significant contributor to greenhouse gasses (including CO₂ from the burning of fossil fuels), contributes to air pollution (smoke and dust pollution), generates vast quantities of waste, contaminates the soil, and destroys existing vegetation.

Yet buildings are a crucial part of governments' strategy to improve the quality of life: they constitute the infrastructure through which health care, education and housing are provided. The economic, social and environmental benefits that may result from a more efficient and sustainability-led industry are not difficult to imagine. Achieving a 10-20 percent reduction in consumption and waste patterns will have a significant and ongoing societal benefit.

Building activity varies significantly between developed and developing countries: whereas more of the building work in developed countries is orientated around renovation and maintenance (33 percent and rising in Europe), activity in developing countries has more to do with new construction. Both activities must recognise that buildings are resources that must be adapted rather than demolished.

⁶⁰ CICA (2002). *Industry as a partner for sustainable development*, Confederation of International Contractors' Associations, United Kingdom.

⁶¹ EU (1997). COM 1997 (593).

The impacts of construction activities are described more fully below and are aligned to be responsive to the UN indicators. The impacts are categorised in accordance with the triple-bottom-line approach, i.e. economic, social and environmental sustainability. Each one of these categories has a corresponding number of themes and sub-themes.

5.1.1 Economic Prosperity

The themes of economic prosperity include economic structure and consumption and production patterns.

The economic performance of a building has traditionally been perceived as the initial costs of the development and the return over a fixed period of time. However, current thinking includes other costs and opportunities, such as human and SMME development, life-cycle costs, material costs and impacts, energy costs, waste generation and removal costs, transportation costs and impacts, and efficiency costs.

5.1.1.1 SMMEs

Given the economic structure of the global industry and the ability of SMME development to overcome poverty, construction is one industry most able to enhance SMME development. Efforts are therefore focused on increasing the participation of SMMEs in both the construction and subsequent maintenance of buildings.

5.1.1.2 Life Cycle Assessment

Life-cycle methodologies are increasingly used to improve environmental performance for products and for construction works. One must not assess construction products on a stand-alone basis, because some products may use materials with an initially relatively high environmental load but which will significantly off-set that use over the life-cycle of the building. Construction products must be assessed in terms of their performance throughout the lifetime of the construction works and what happens to them when deconstruction or demolition takes place.

5.1.1.3 Consumption and Production Patterns

One of the key objectives of the Habitat Agenda is to alter consumption and production patterns: clearly this is crucial to stopping the depletion of the natural capital of the earth. As the construction industry is a huge consumer of natural resources, it behoves the designers of industry products to accept their leadership and ethical responsibilities in this regard.

As much as 50 percent of all materials extracted from the earth's crust are transformed into construction materials and products. Issues to be considered go beyond the aesthetic requirement of materials. Consideration must be given to the impact of extraction, manufacturing, transporting, assembling, repairing, disassembling, recycling and final

disposal. The selection and use of material must generate the greatest benefit over the longest time.

In South Africa the operation of non-residential and residential buildings accounts for about 23 per cent of total emissions of South Africa with the non-residential sector accounting for about 10 per cent of this total.⁶² In addition, it is estimated that the manufacture of building materials accounts for about 5 per cent of total emissions.⁶³

Of the total electricity used in a typical office building in Pretoria miscellaneous equipment (43.8 per cent) constitutes the highest electricity consumption, followed by heating, ventilation and air conditioning (30.7 per cent); lights (19.2 per cent); external miscellaneous (3.9 per cent) and the remainder made up by heating water (0.9 per cent), pumps and miscellaneous (0.4 per cent) and external lights (0.6 per cent).⁶⁴ Achieving a comfortable working environment thus rates as a substantial consumer of energy. It is noteworthy that the electricity consumed for heating water in an office building constitutes an insignificant amount.

The Rocky Mountain Institute believes that a fourfold improvement in material productivity can be achieved without consuming further resources. This will require the use of leaner technologies, greater use of recycling, better design and improved management.⁶⁵

5.1.1.4 Waste Generation

Apart from accounting for almost 50 percent of all materials extracted, these same materials constitute some 50 percent of all waste generated prior to recycling, reuse or final disposal.⁶⁶ Construction waste has emerged as a larger waste stream than demolition waste and constitutes the largest waste stream by weight in the EU. Disposing of these waste materials is presenting increased difficulties in many parts of the world. Increased emphasis needs to be placed on waste minimisation through the use of such strategies as waste-prevention planning and design, recovery-orientated construction, reparability (design for disassembly and repair in the factory) and recyclables (used products to be returned to their producer) and reuse.

⁶² CIDB (2009). *Greenhouse Gas Emission Baselines and Reduction Potentials from Buildings in South Africa*, Construction Industry Development Board, Pretoria.

⁶³ Ibid.

⁶⁴ Energy Cybernetics (2010). *Evaluating the energy use in the new Anslow building for Green Star accreditation purposes*, Energy Cybernetics, Pretoria.

⁶⁵ Edwards, B., (2002). *A Rough Guide to Sustainability*, Royal Institute of Architects, London.

⁶⁶ DETR (2002). *Building a Better Quality of Life*, DETR, London.

Significant opportunity exists to recycle and reuse construction and demolition waste as aggregates in road construction for sub-base layers in concrete. Several countries are recycling up to 85 percent in this way.

5.1.1.5 Transportation

Compact towns and cities that are well-served by public transport systems are appreciably more energy efficient than cities that have a relatively low urban density displayed as urban sprawl. The continued reliance on fossil fuels as the primary energy source requires that we develop compact urban settlements that do not demand automobile use in order to access the social infrastructure.

5.1.1.6 Efficiency of Use

The quality and efficient operation of buildings and infrastructure are fundamental to achieving urban sustainability.

5.1.2 Social Well-being

Themes of social well-being include cultural heritage and health.

5.1.2.1 Cultural Heritage

Concern about lost local traditions and customs is one of the positive spin-offs of globalisation: in a world where choice has been accelerated by instantaneous exposure to all possible choices throughout the world, many individuals begin to feel alienated and bewildered by the subjugation of their culture by the global tidal wave of taste.

A secondary definition of social well-being is social cohesion: the glue that keeps communities together regardless of the impacts that pull them apart. That social cohesion is built on social and community values, carefully articulated and thoroughly understood. Everything we build reflects and embodies the values and policies of our institutions. If the institution and its architecture are based on sustainability and life- and community-enhancing values, it will hold a place in our hearts and contribute positively to the energy of the community.

5.1.2.2 Health

The World Health Organisation (WHO) defines health as *a state of complete physical, mental and social well-being*. As buildings influence this state, it follows that buildings have the capacity to significantly impact upon the health of their users. Health and safety are primarily the reasons that some countries regulate the built environment professions and legislate certain minimum standards.

However, the early concerns of health have given way to a much broader concern that places personal well-being higher than ventilation rates and lighting as a percentage of floor area. Any health costs that are related to harmful environmental exposures are unnecessary

and can be prevented. The American Lung Association issued a smog report card in May 2000 indicating that 132 million Americans live in cities that failed the smog test. Included in this number were 29 million young people and 16 million elderly.⁶⁷

Making an investment in indoor environmental health in developing countries, where resources are already scarce and need to be aimed at disease containment, is therefore critically important. Strategic planning and careful design can assist this process in a significant way.

5.1.2.3 Indoor Environmental Quality

The quality of the internal environment of a building is an essential element in the health of its occupants. Problems caused by damp and mould can be avoided through good building practices. Bio-climatic considerations and good ventilation can also reduce or even eliminate the need for air-conditioning in the summer months.

Improving the indoor environment also has a significant impact on the productivity of the people using the facility. It costs an employer from 72 to 100 times as much per square foot of conditioned space to pay for the employee as it does to pay for the energy to condition and light the space for that employee. Any action aimed at improving the quality of that space, such as natural daylight illumination, natural ventilation, locally controllable thermal and lighting settings and which yields as little as a 1 percent improvement in employee productivity or reduction in absenteeism provides benefits equal to saving from 70 percent to 100 percent of the cost of the energy involved.

Statistical information gathered in this field confirms that low energy and day-lit building designs reduce employee absenteeism, increase retail sales, and improve the performance of students in schools. Furthermore these improvements are in the order of 5-15 percent. A 10 percent improvement in employee productivity can be equal to the entire first cost of the building over a ten-year period. Calculated over a 40-year period, the same employee productivity increase can be worth four times the entire first cost of the building, which by then is only 2 percent of the costs of owning and operating the building and supporting the employees inside it. Obviously these kinds of benefits are of critical interest to building owners, employers and even schools and parents.

5.1.2.4 Security

Buildings can exclude or include, and select whom they wish to exclude and include. In the process, wittingly or unwittingly, they undermine some and benefit others. Buildings can enhance the security of the users and adjoining neighbours by paying attention to the needs

⁶⁷ ALA (2000). *State of the Air Report*, American Lung Association, online: http://www.lungusa.org/about_us/publications

of the local community. Establishing community security measures and programmes and integrating them into the building programme will offer the highest security return to the development. Ensuring that areas are overlooked – without being voyeuristic – is one way to extend the neighbourhood presence. Another is to ensure adequate lighting, not only of the facility, but of the adjoining areas.

Creating a friendly environment will create a friendly building. People are one of the greatest elements of wealth and energy in a community. Investment in enriching existing local skills, traditions, values, sense of their ability to achieve, and community self-esteem on the human level, should be a prime goal in achieving a secure and safe environment.

5.1.3 Environmental Stewardship

Themes of environmental stewardship include atmosphere, land, fresh water and biodiversity.

5.1.3.1 Atmosphere

The earth has a protective layer consisting of carbon dioxide, methane, chlorofluorocarbons (cfc's) and nitrous oxides known as the troposphere just 15 kilometres above its surface, which is responsible for ensuring a life-sustaining temperature on earth. However, as production of global warming gases increases the quantity already in the troposphere increases resulting in an increase in the amount of the solar radiation trapped under it, resulting in global warming. Put simply, mankind is burning plant material (fossil fuel) buried and compressed underground for millions of years for its energy, in the process releasing large amounts of gas which get trapped in the troposphere.

In South Africa, 79 per cent of its electricity is generated through the burning of coal, generally considered to be one of the dirtiest means of generating electricity. The Climate Analysis Indicators Tool (CAIT) (2008) ranks South Africa at number 17 among the world's top greenhouse gas emitters⁶⁸. The residential and non-residential building sectors account for around 23 per cent of South Africa's total emissions⁶⁹.

5.1.3.2 Climate Change

Transport and buildings are the single greatest source of greenhouse gas emissions in the world: the Intergovernmental Panel on Climate Change (IPCC) has highlighted the important role of buildings in climate change stating in its fourth assessment that the building sector

⁶⁸ Leadership (2010). 'Green Economy – part one', *Leadership Intelligence Bulletin*, online: <http://www.leadershiponline.co.za/articles/environment/> Retrieved 30 November 2010.

⁶⁹ Cidb (undated). *South African Report on Greenhouse Gas Emission Reduction Potentials from Buildings: A Discussion Document*, Construction Industry development Board, Pretoria.

has the largest potential for significantly reducing greenhouse gases while being relatively independent of the cost per ton of CO₂-eq achieved⁷⁰.

It is estimated that the potential exists to reduce emissions from buildings by at least 30 percent in Europe. This would be more than sufficient to meet the European Kyoto target of an 8 percent reduction between 2008 and 2012. Not only would this create a safer environment, but also it would generate an additional 300,000 permanent jobs in retrofitting construction over a period of 10 years.

The direct and indirect use of energy accounts for 35 percent of US carbon emissions, 47 percent of its SO₂ emissions, and 22 percent of Nitrogen Oxides emitted. As Brian Edwards puts it: "The relationship between global warming, land use and architecture is one which society needs to understand quickly".⁷¹

Recent severe weather in several countries has caused significant delays resulting in financial loss to the housing industry in those countries. The continued effects of climate change will lead to more of these and other incidents with the potential of major impacts to the built environment. Hot summers, for example, will lead to an increase in the frequency of subsidence occurring, resulting in movement to foundations, cracking of walls and subsequent collapse; delayed curing of concrete; more UV damage to stored material; increased levels of internal discomfort resulting in greater use of air conditioners; and increased effects resulting from storms. By contrast, wet and windy winters could result in more frequent storms; increased rain penetration; increased dampness with associated mould growth problems; and more frost damage.

One of the world's largest re-insurance firms – Munich Re – has warned that climate change could cost the world more than \$300 billion dollars each year.⁷² They estimated that loss of land as a result of rising sea levels, and damage to fishing stocks, agriculture and water supplies due to more frequent tropical cyclones, could annually cost an estimated \$304.2 billion. Many countries can expect this loss to impact on their gross domestic product each year, ranging from a few tenths in some cases to a few percent in others. The small island states, in particular, could face losses far exceeding 10 percent. Some of the biggest losses are likely to be in the areas of energy and water infrastructure.

⁷⁰ IPCC (2007). *Climate Change 2007; 4th Assessment Report*. Intergovernmental Panel on Climate Change. Online <http://www.ipcc.ch/>

⁷¹ Edwards, B., (2002). *A Rough Guide to Sustainability*, Royal Institute of British Architects, London.

⁷² MunichRe (2000). *Review of Natural Disasters 1999*, Munich Reinsurance, Report 2946-M-e.

5.1.3.3 Ground Level Ozone

Smog does not just hurt the lungs: even moderate smog may induce sudden death in people with existing heart problems. This threat is particularly severe for older people who suffer from arrhythmia, a condition marked by irregular heartbeat.

Apart from carbon dioxide emissions, there are other gases – such as methane – that increase the greenhouse effect. Methane depletes atmospheric chemicals that are responsible for breaking down other greenhouse gases. So, as some pollutants that are easier to control are reduced, ozone dominates as the source of unhealthy air. The number of days that unhealthy air days are attributable to ozone is rising in the USA. The American Lung Association estimates that particles of ozone and other emissions account for more than 50,000 deaths a year in the United States alone, indicating a significant correlation between Emergency Resuscitation (ER) visits and high levels of ozone in the air.⁷³

Focussing on ozone therefore brings with it a variety of other health-improving benefits, since reducing ozone also decreases oxides of nitrogen, hydrocarbons, fine particulate matter and acid rain. About 60 percent of particulate matter comes from combustion sources such as automobiles and power plants. The remaining 40 percent comes from construction, agriculture and road-related pollution such as minute pieces of brake linings and tyres.

Setting emission standards for diesel engines of new trucks and buses is one method of reducing smog. Diesel tractors, construction equipment and other non-road vehicles should also be included and/or their use curtailed. One of the strategies employed by the Texas Natural Resource Conservation Commission places limits on the times when construction crews can operate heavy equipment. Other strategies include switching over from coal consumption to other clean sources of energy and minimising motor vehicle usage.

5.1.3.4 Air Quality

Legislation to improve air quality is increasingly being introduced by legislatures as awareness increases of the relationship between air quality and health. Air pollution caused by toxic emissions from multiple sources, such as factories, vehicles and materials, is leading to a rapid rise in respiratory diseases. Recent studies have indicated that levels of pollution downwind of freeways and busy roads can be four to ten times higher than upwind, leading to increased incidence of asthma, respiratory diseases and cancer. Locational influences are therefore increasingly likely to determine whether certain facilities, such as schools, will be approved for construction or not. Similarly, the cumulative effect of specific facilities will also determine whether additional facilities are permitted.

⁷³ ALA (2000). *State of the Air*, American Lung Association, online http://www.lungusa.org/about_us/publications

The content of volatile organic compounds (VOCs) in decorative paints and varnishes is another source of air pollution. The European Commission is proposing to reduce the VOC content in paints and varnishes by 50 percent per year. VOCs in high enough concentrations can impair human health and can damage forests, vegetation and crops, reducing yields.

Long-term exposure to fine particulate pollution is likely to be as dangerous as passive smoking. Children, with their developing bodies and brains, are far more vulnerable to ingested toxins than adults. Primarily particulates result from the combustion of fossil fuels or biomass and some industrial processes. They include petrol and diesel exhausts, wood stoves and fireplaces, land clearing, wild land prescribed burning, and wild fires. Sources of primary particulates include fugitive emissions from paved and unpaved roads, dust from ore processing and refining, and to a lesser extent, crusted material from construction activities, agricultural tilling and wind erosion. Coal burning power plants produce large amounts of mercury and other toxic substances, known as developmental toxins, whilst exhaust from diesel buses and other vehicles contains polycyclic aromatic hydrocarbons (PAHs) that have been linked to increased risk of certain cancers in some studies.

5.1.3.5 Land

Sprawling cities are fast becoming unmanageable according to the "State of the World's Cities" report of the United Nations Centre for Human Settlements (UNCHS) completed in June 2000. It found that the existing institutions governing the administration of cities are not adequate to control sprawling urban centres. The UNCHS defines a sustainable city as one that has a lasting supply of the natural resources on which its development depends and a lasting security from environmental hazards which may threaten development achievements.

In the United Kingdom the net change from rural to urban land use is in the region of 6,500 hectares per annum. Globally, agricultural land accounts for 38 percent of all land: this is the resource that is to ensure food production for the world's population.

Biologically productive areas of the planet

The earth has a surface area of 51 billion hectares, of which 36,6 billion are ocean and inland waters and 14,4 billion are land. Only 9,1 billion hectares of land and 2,3 billion hectares of water provide economically useful concentrations or resources to be considered biologically productive. The remaining 39,6 billion hectares are marginally productive or unproductive for human use, as they are deep oceans, are covered by ice, or lack fertile soils and accessible water.

The pressure of the world's 6,2 billion people is slowly turning productive land into desert on every continent. Desertification affects up to one-third of the earth's land area and impacts on more than 1 billion people in 110 countries.

5.1.3.6 Freshwater

Water is essential to life: the human body is about 75 percent water, with up to 85 percent of brain cells liquid. About 71 percent of the planet is covered in water, but 97,5 percent of it is salt water, and of the remaining 2,5 percent, some 70 percent is frozen in the polar caps and around 30 percent is present as soil moisture or in underground aquifers, so that less than 1 percent is accessible for direct use by humans, animals and plants. Consequently, an estimated 1 billion people around the globe lack clean drinking water and about 3 billion do not have adequate sanitation. Humankind is currently using about 40 percent of the available freshwater. It is anticipated that by the year 2050 this will have risen to 90 percent, leaving only 10 percent for animals and plants.

Yet 40 percent of the water used globally is for sanitation and other uses in buildings. The operation of buildings thus places a strain on raw water reserves, while wastewater and sewage needs to be treated before being returned to watercourses.

5.1.3.7 Biodiversity

Four organisations – the World Bank, the U.N. Development Programme, the U.N. Environmental Programme and the World Resources Institute – collaborated on the most ambitious study of global ecosystems ever undertaken. The first results of this project, called a *Pilot Analysis of Global Ecosystems*, were presented to a special sitting of the United Nations in 2001.

The goal of the investigation was to answer the most important question of the century: What is happening to Earth's capacity to support nature and humankind? The report divided its conclusions into assessments of five major types of ecosystems – forest, freshwater systems, coastal/marine habitats, grasslands and agricultural lands, all of which are showing signs of deterioration. The answer: half the world's wetlands have been lost in the past century; 58 percent of coral reefs are imperiled by human activity; 80 percent of grasslands are suffering soil degradation; 20 percent of dry lands are in danger of becoming deserts; and groundwater is being depleted almost everywhere.

Construction industry participants create habitats, and instead of creating artificial or alien habitats that are fashionable, they can assist in rehabilitating and enlarging local and national biodiversity through their projects.

5.1.3.8 Trees

Trees and planting modify air cooling in summer and air warming in winter. They provide shade to buildings and landscape surfaces thereby reducing the 'heat sink' effect. They stabilise ground conditions, preventing soil erosion. They absorb groundwater and slow the movement of rainwater across the ground surface. More specifically, they absorb CO₂ emissions from the air. It is estimated that 15 trees are required to convert the carbon

emissions over a year of a typical car and about 40 trees for a house. An examination of the scale of conversion quickly illustrates why we have such a problem globally.

5.1.3.9 Soft Landscaping

Soft landscaping, such as by means of trees, performs a valuable function at many levels. It supports biodiversity, especially if it is indigenous species that are planted. Grasses and shrubs are as effective at converting CO₂ as are trees. Soft landscaping has the added advantage of attenuating the movement of groundwater to minimise erosion. The use of natural bio-systems can make it possible to deal with many of the consequences of groundwater management without making it someone else's problem.

5.1.3.10 Hard Landscaping

Hard landscaping, such as by means of paving, has at least two negative environmental impacts; it collects and reflects heat, requiring additional cooling capability, and it speeds up the movement of rainwater, placing an additional burden on disposal systems and times.

Landscaping should rather attenuate climatic conditions: alternative materials and responses should be applied if heat build-up is problematic, and to slow down the rate of rainwater disposal, thereby allowing groundwater replenishment. There are many design devices that can be used, such as retention ponds, to assist in this matter.

5.1.3.11 Brownfield Development

Developing on Brownfield sites presents a number of positive advantages to a developer: it saves the cost of installing bulk services, it will be well-served by transport networks, it will be accessible for workers and users, the urban quality of the adjoining area is established (no rude surprises later), and more often than not local authorities will offer handsome financial incentives for the rehabilitation of such sites.

Practitioners must however take particular care in investigating what remedial actions are required. Depending upon the previous use(s) of the site, remedial work may involve major work to remove polluted soils, for example. A thorough inspection of the site together with an in-depth investigation of the previous land uses will be the minimum requirement to reaching a fuller understanding of what may lurk below the surface.

5.1.3.12 Greenfield Development

There is widespread recognition that legislation must change its paradigm for land use planning from a purely development-motivated scheme to one that is ecologically based. The continued consumption of undeveloped open land for urban expansion is creating a vicious circle of greater demand and increased supply. The continued consumption of land, and in particular productive agricultural land, must be viewed in the same light and with the same concern as the consumption and production of goods. Urban expansion depletes food

production areas, demands expensive infrastructure installation, increases motor vehicle usage, undermines public transport systems, increases pollution, increases the unmanageability of cities, and isolates communities from each other.

5.1.3.13 Pollution

The leaching of chemicals into the soil is one of the most severe environmental impacts that a development can have on a site. Asbestos – now banned in many countries – can remain in the soil for hundreds of years, practically freezing the use of such soils for many generations. In the past, environmental legislation – and awareness – of these impacts was non-existent, leading to widespread environmental devastation. Pollutant run-off to rivers killed fish and poisoned the water, impacting on the watershed structure for many kilometres downstream. Fortunately there is a better knowledge and legislative environment in place now and the interrelationships between things are better understood. However, even small-scale chemical leaching, such as the disposal of turpentine used to clean paintbrushes, must be avoided.

5.1.3.14 Stormwater

The uncontrolled – and sometimes even the controlled – management of stormwater can result in devastation to a very large area. In urban areas, the propensity of large hard surfaces causes stormwater volumes to become enormous and unmanageable very quickly. Collecting all the surface run-off and discharging it through one pipe will create eventual havoc at the final point of disposal. Every effort must be made to absorb as much rainwater onto the site as possible, so that the collective responsibility for dispersal is shared.

Secondly, simple discharge carries the risk of single-point pollution discharge as well. Any chemical spillage will, in terms of the former strategy, result in maximum impact at the final point of disposal. Dealing with such risks by elimination in the first instance, proper management in the second, and several points of control, third, will reduce the impact of spillage and resultant pollution enormously.

5.2 Trends

In developing a National Framework for Green Building in South Africa cognizance must be taken of key trends informing the way forward for green buildings globally and impacting on both the public and private sectors. Some of these trends have been sourced from various writers such as Athens⁷⁴ and Layton⁷⁵ while others originate from Foresight studies undertaken by the CSIR^{76 77}.

⁷⁴ Athens, L., (2010). "7 Trends That Will Shape the Future of Green Building". *Seattle Daily Journal of Commerce*, Online <http://www.dic.com/new/en/12015060.html>

- 1) **Certification** – simple, clear, recognizable and credible certification and labelling will be required to clearly set out the criteria for green buildings and green products so that marketplace and consumer confusion is avoided. The market needs an unbiased third-party assessment to remove self-proclaimed achievements.
- 2) **Precautionary principle** – although the ‘do-least-harm’ approach is not new, its implementation in developments have not been normal practice. Some commentators have noted that whereas science and technology developments were accepted without question in the past, there is increasing evidence that science and technology will have to demonstrate that they are free of unintended consequences before acceptance in the future.
- 3) **Traceability** – recent legislation in the US is requiring all players in the country’s food supply chain to be able to quickly trace from whom they received a food product and to whom they sent it. While this particular intervention is aimed at pinpointing the source of national outbreaks of food-borne illness, it is highly likely that tracing the components of products from cradle to grave – the life cycle assessment procedure – will become normal practice in the future, including the building construction sector, as a means of verifying producer claims.
- 4) **Price signals** – as the shift towards a low carbon economy gets underway, significant price signals will reinforce an increased focus on green building. It is increasingly clear that demand for products with a large greenhouse gas footprint may reduce, as could investments that could be impacted by climate disruption side effects such as rising sea levels. In addition, developers will see energy efficiency and carbon offsets as part of their overall investment strategy, which will make them financially competitive with other investment options.
- 5) **Focus on existing buildings** – many of our existing buildings are in need of upgrades to bring them in line with required standards of health and efficiency. Renovations and refurbishment of historic and existing buildings in order to address energy efficiency and climate disruption is a challenging puzzle that also represents great opportunities.
- 6) **Workforce training** –people will be needed to repair aging buildings and infrastructure with a green focus in order to rebuild a more resilient country. One of the gaps that continues to exist in the green building industry is workforce

⁷⁵ Layton, L., (2011). “Traceability rule represents big adjustment for food industry”, *Washington Post*, Online http://www.washingtonpost.com/wp_dyn/content/article/2011/01/24

⁷⁶ Van Wyk, L., (2006). *Foresight – South African Construction 2014*, CSIR, Pretoria.

⁷⁷ CSIR,(2008). *South African Construction Industry Technology Foresight Study: Summary report of desk top study*, Report Number CSIR/BE/SRM/ER/2008/0063/B, CSIR, Pretoria.

development of skilled construction and maintenance workers to build and manage contemporary facilities.

- 7) **Fixing infrastructure** – to date public works infrastructure, have not received much attention in the green building dialogue, and green buildings rating tools do not currently apply to them. Long an ignored problem, the challenge of repairing our country's ailing infrastructure is receiving focus. Traditional water, energy and transportation systems use vast amounts of energy and have large greenhouse gas footprints. Many green infrastructure solutions occur at the site level or tie together benefits from multiple municipal service areas, defying the way we traditionally plan and design infrastructure systems. Some of the most promising approaches include community energy systems that may utilize warm or cool water via thermal piping networks, on-site water treatment systems such as membrane bioreactors, sewer heat recovery that recaptures energy from domestic use, and natural drainage solutions that keep stormwater from causing combined sewer overflows.
- 8) **Saving water** – climate change is likely to intensify water problems by raising temperatures and decreasing snowpack in Lesotho. Shortages may relate not only to drinking water but also to irrigating our food supply. The solutions to these problems do not lie only in tightening regulations. Rather, we must recalibrate our thinking about how we use water and our relationship to it.
- 9) **Urban agriculture** – many thought leaders now recognize local food supply as a security risk related to massive food importation. The recent term “food deserts” typically refers to low-income neighbourhoods without access to fresh, healthy foods. We should see more urban food projects, as well as food security policies and changes in land use codes, to remove barriers and create incentives for growing more of our own food in urban areas.

5.3 Summary

The pursuit of sustainable development brings the construction industry, and specifically the building industry component thereof, into sharp relief. The built environment is a major influence on contemporary life, and the construction of the built environment results in a significant contribution to economic growth and job creation, especially among SMMEs and unskilled workers.

However buildings also have a significant impact on the environment: these impacts commence at the sourcing of raw materials and continue along the entire value chain into operation and maintenance and final disposal.

Buildings are intended to improve quality of life, whether it be in the form of simple shelter, places of work, places of education, places of worship, or places of recreation. In this role buildings describe a society, and in this way buildings contribute to social cohesion and nation-building.

Actions and programmes aimed at improving the contribution of buildings to economic feasibility, social well-being and environmental stewardship include strengthening the role of SMMEs in construction, introducing LCA, changing consumption and production patterns, reducing waste generation, reducing the impact of transportation through improved material mobility, improving efficiency of use, enhancing indoor environmental quality and security, reducing environmental impacts on the atmosphere, land and resource extraction, and contributing to biodiversity through landscape restoration.

Some trends in green building are already emerging including requirements for certification, application of the precautionary principle, material and product traceability, price signals as an instrument of driving change, a focus on retrofitting, a growing need for workforce training, reinstating and greening infrastructure, saving water and energy consumption, and introducing food production into the built environment.

A National Framework for Green Building must therefore ensure that these impacts and opportunities are included and that successful implementation will contribute toward improving human well-being and enhancing South Africa's natural assets and resources.

6 Towards a National Vision for Green Building

The term "Green Building" is used so generally now that it covers almost any kind of building attempting to address one or other characteristic of sustainable building and construction activity. Most commonly "green building" is used to describe a building that is likely to use less energy, water and materials and improves IEQ.

However, a green building within the context of a sustainable building and construction paradigm is required to conform to more principles than energy, water and material consumption and IEQ.

The emphasis on sustainable development – meeting the needs of the present without compromising the ability of future generations to meet their own needs – has become a theme within international organisations, national governments and civil society. It influences investment destinations and consumer decisions. Over the past decade, the focus of sustainable development programmes has shifted from a green-centred approach to a people-centred agenda, largely in response to alleviating global poverty.

The built environment, as a people-centred domain, has only recently received the same consideration as the green-centred agenda. Construction activities consume raw materials

and cause monumental waste: the product which they deliver requires resources such as energy and water to operate over its entire life-cycle, a period measured in decades, and often in centuries. Throughout this process, construction activities often result in environmental degradation and social dislocation. Construction industry participants must therefore take their role as potential agents of change, whose decisions can constrain, alter, guide or enhance the future decisions of others.

The economic performance of construction products has traditionally been perceived as the initial cost of the development and its return over a fixed period. Current thinking, however, includes other costs and opportunities, such as the potential for SME development, minimising life-cycle costs, reducing material consumption rates, minimising energy consumption and waste generation together with the disposal costs, factoring in transportation costs and impacts, and measuring efficiency.

Social well-being assessment criteria include respect for local culture and tradition, the health of the inhabitants, the quality of the indoor environment, and the security offered by the facility.

Environmental stewardship assessment criteria include the protection of the atmosphere, the reduction of global warming gases, protecting the ozone layer, improving air quality, conserving biodiversity, protecting fresh water and groundwater sources, limiting the consumption of land (especially food-producing land), planting trees and reinstating indigenous landscapes, reducing the extent of hard landscaping, encouraging the reuse of brown-field sites, prohibiting the leaching of pollutants, and controlling and harvesting storm water.

Buildings and infrastructure can no longer be assessed within the narrow definition of Gross Fixed Capital Formation (GFCF): their impacts extend into the depth of our social fabric and breadth of the earth's limited natural resources.

Two critical discourses of the 1960s must be used to inform the construction of a policy framework: the first is the book *Silent Spring* (1963) by Rachel Carsons, and the second is the book *Urban Society* (1966) by Kingsley Davis.

Rachel Carsons was instrumental in highlighting anthropological impact on ecosystems: while her work was focused on the use of insecticides and pesticides, it drew attention to the contribution of ecological services to the well being of mankind.⁷⁸ Thus Rachel Carsons argued that our impacts on ecosystems would eventually destroy the very ecosystems we depended on.

⁷⁸ Carsons, R., (1966). *Silent Spring*, Houghton Mifflin Company, New York.

Kingsley Davis, considered by many to be the father of sociology as a science, collated research done into the sociological impacts of urbanization, and raised critical questions arising from that review including the following:

“Can the anonymity, mobility, impersonality, specialization, and sophistication of the city become the attributes of a stable society, or will the society fall apart?”⁷⁹

At the time he concluded that the answer was not clear. Some 44 years later the answer is still not clear, but indications are that the characteristics of the city have not been able to become the attributes of a stable society thus far.

These two discourses substantial form the platform from which to draft a national policy, namely planetary impacts, societal impacts and the interaction of the two. This field of study that is concerned with the interrelationships among people in their spatial setting and physical environment is called *human ecology*.⁸⁰

Thus this promise of transformation and societal change is not captured in current green building rating tools as described above and represents, in the author’s view, the fault line between green building theory and green building practice. Essentially green building theory does not address human ecology.

The achievement of sustainable human settlements and the protection of environmental assets and natural resources – often referred to as people/planet/prosperity – is not a once-off occurrence and its objectives cannot be achieved by a single action or decision. It is an ongoing process that requires a particular set of values and attitudes in which economic, social and environmental assets that society has at its disposal, are managed in a manner that sustains human well-being without compromising the ability of future generations from to meet their own needs and aspirations.

6.1 Overview of Green Building

Twenty-four years ago, in 1987, Dr. Gro Harlem Brundtland released the Brundtland Report, also known as Our Common Future. Dr. Brundtland was Chair of the World Commission on Environment and Development (WCED) convened by the United Nations in 1983, also widely referred to as the “Brundtland Commission”, and developed the broad concept of sustainable development in the course of extensive public hearings that were distinguished by their inclusiveness. Published by an international group of politicians, civil servants and experts on the environment and development, the report provided an iconic statement on sustainable

⁷⁹ Davis, K., (1966). *Human Society*, The MacMillan Company, New York.

⁸⁰ Schaefer, K., (1994). “Site design and planning for sustainable construction.” *Proceedings: First International Conference of CIBTG16 on Sustainable Construction*, November 6-9, 1994, Tampa, Florida.

development that alerted the world to the urgency of making progress toward economic development that could be sustained without depleting natural resources or harming the environment. The iconic statement defines sustainable development as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.⁸¹

The statement is based on five key concepts, namely:

- 1) The concept of ‘needs’, in particular the essential needs of the world’s poor, to which overriding priority should be given;
- 2) The concept of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and futures needs;
- 3) The concept of generational responsibility, in particular the notion that the environment is held as a proxy for social equity between generations;
- 4) The concept of sustainability being ‘pro-development’ provided that development “involves a progressive transformation of economy and society”; and
- 5) The concept that free environmental goods and services, such as air and soil, are also resources and that any and all impacts on environmental resources should be accounted for.

Thus the report states that the critical objectives for developmental policies that flow from the concept of sustainable development include:

- Reviving growth;
- Changing the quality of growth;
- Meeting essential needs for jobs, food, energy, water, and sanitation;
- Ensuring a sustainable level of population;
- Conserving and enhancing the resource base;
- Re-orientating technology and managing risk; and
- Merging economic and environment in decision making.⁸²

Working with the latest and final statement of the Smart-ECO⁸³ programme as funded by the EU, high performance green buildings need to address the following key considerations:

⁸¹ WCED (1987). *Our Common Future*, World Commission on Environment and Development, United Nations, New York.

⁸² Van Wyk, L., (2008). “Do green building assessment criteria meet sustainability imperatives: A critical Analysis”, *Proceedings of the 3rd Built Environment Conference*, ASOCSA, 6-8 July, 2008, Cape Town.

1. Apply the general principles of sustainability (ISO 15392:2008): these are Continual improvement; Equity; Global thinking and Local action; Holistic approach; Involvement of interested and affected parties; Long-term consideration; Precaution and risk; Responsibility; and Transparency.
2. Result from the involvement of all interested parties and be designed to meet its occupants needs individually and collectively. The occupants' needs must be consistent with collective social ones.
3. Be complexly integrated into the relevant local building, town-planning or environmental planning schemes and infrastructure. The building must comply with the local laws applicable to it and connect into the existing services, networks and urban or suburban fabric of its environment.
4. Be designed or refurbished from a Life Cycle perspective. The life cycle covers planning, design, construction, operation and maintenance, renovation and end of life. Evaluation of performance at each phase includes taking into consideration all other phases.
5. Have its environmental impact minimised over the estimated or remaining service life. This takes into account regional and global requirements, resource consumption (ecological goods and services) and waste and emissions to air, water and soil.
6. Deliver economic value over time. To assess economic value over time requires a life cycle cost approach, taking account future costs of operation, maintenance, refurbishment and disposal.
7. Provide social and cultural value over time and for all. A high performance green building must provide a sense of place for its occupants (permanent or occasional), and be seen as a means of work status improvement for the workers. A high performance green building should relate to the local environment and wider regional culture. Moreover, a high performance green building is a key point for satisfying social affordability.
8. Be healthy, comfortable, safe and accessible for all. Health criteria include indoor air quality and comfort criteria include acoustic, thermal, visual and olfactory comfort. Full access allows every one to use the facilities of the building. A high performance green building must enable safe working conditions for the workers during construction and its service life. "For all" means for permanent and occasional, private and professional occupants.

⁸³ CIB (2009). "Fourth Project Report – the Final Vision", CIB News Article, November 2009, *International Council for Research and Innovation in Building and Construction*, Rotterdam.

9. Be designed to be user-friendly, simple and cost effective in operation, with measurable technical and environmental performance over time.
10. Be designed or refurbished to be adaptable throughout the service life, with an end-of-life strategy. The building allows adaptation to changing performance and functionality requirements in accordance with new environmental constraints, and taking into account particular regional requirements.

6.2 Current Status of Green Building in South Africa

Green building has been under consideration in South Africa for longer than a decade with the CSIR as the early market leader through the development of its Sustainable Buildings for Africa (SBfA) project, and its later Sustainable Building Assessment Tool (SBAT). Although some property developers implemented the SBAT system, its development was probably premature in terms of market readiness. Nonetheless, it did much as a trail-blazer in South Africa.

The CSIR was also at the forefront of sustainable building and construction research and produced a number of research papers addressing various components of sustainable building and construction. Three notable publications include *Agenda 21 for Sustainable Construction in Developing Countries* (2002), *A Review of the South African Construction Industry: Part 2 – Sustainable Construction Activities* (2004), and *An Architect's Guide to Designing for Sustainability* (2006).

6.2.1 Public Sector Interventions

A number of strategies are currently in place in South Africa: again, time limitations have not enabled a thorough search to be undertaken so that this list should not be viewed as conclusive.

6.2.1.1 Regulation

The design and erection of buildings is controlled by the National Building Regulation and Standard Act (Act 103 of 1977). The South African Bureau of Standards (SABS) and the National Regulator for Compulsory Specifications (NRCS) are currently finalising the addition of energy efficiency regulations into the current building regulations.

These regulations will make it compulsory for building owners to demonstrate that the proposed building complies with the requirements of the Act which, inter alia, sets the maximum electricity usage for a building.

The section under which the energy regulations fall deals with environmental issues related to buildings and is titled 'Environmental Sustainability': it is therefore intended that the section will be expanded over time to encompass all the environmental impacts of buildings.

6.2.1.2 Standards

The SABS has, in support of the proposed energy regulation, prepared an energy efficiency standard, known as SANS 10400-XA:2010. This part of SANS 10400 provides deemed-to-satisfy requirements for compliance with Part XA (Energy usage) of the National Building Regulations.

It is therefore intended that as the Regulations are expanded to include other building-related environmental impacts, appropriate standards will be provided in support of those regulations.

6.2.1.3 Policies

The Government of South Africa has a number of policy and strategy documents related to sustainable development including:

- *National Strategy for Sustainable Development (2005)* – however this document does not directly address green buildings;
- *Energy Efficiency Strategy of the Republic of South Africa (2005)* – this strategy does address the role of buildings;
- *National Climate Change Response Strategy for South Africa (2004)* – this strategy does address the role of buildings;
- *A Strategic Framework for Sustainable Development in South Africa (2006)* – however this framework does not specifically address the role of buildings; and
- *A National Framework for Sustainable Development in South Africa (2008)* – this framework does address the impact of buildings on the environment.

As can be seen from above, while Government has addressed sustainable development across all the economic sectors in general terms, the fuller implications of sustainable building and construction activities have not been fully explored.

6.2.1.4 State Agencies

Green building construction initiatives by State Agencies are largely dominated by the work of the CIDB and the CBE.

The CIDB was established to provide leadership to stakeholders and to stimulate sustainable growth, reform and improvement of the construction sector for effective delivery and the industry's enhanced role in the country's economy. The CIDB, in collaboration with UNEP, has produced a Discussion Document *Greenhouse Gas Emission Baselines and Reduction Potentials from Buildings in South Africa (2009)* in which they highlight the important role of buildings in climate change and calls for the following:

- Prioritization of the building sector

- A national focus on the building sector
- Translating intent into action
- Focusing on retrofitting
- Providing leadership by example
- Establishing economic instruments

The CBE was established to improve stakeholder relations and create partnerships to improve service delivery; intervene in improving the performance of the skills delivery pipeline; and ensure alignment of the activities of the CBE and the BE professional councils with national imperatives and initiatives. The CBE is currently developing a policy to determine its role and guide its participation in the climate change debate.

Agreement South Africa is mandated to enable the introduction of innovation into markets, and to minimize the associated risks, if any through certifying that the products and/or systems are fit-for-purpose. Part of their assessment methodology includes the evaluation of the thermal performance of products and/or systems.

6.2.2 Private Sector Interventions

6.2.2.1 Green Building Council of South Africa

In 2007 the South African Property Owners Association (SAPOA) agreed to fund the establishment of a green building council. This council, known as the Green Building Council of South Africa (GBCSA), was established in 2007 as a Section 21 Company (not for profit). It has a Board of Directors drawn from the construction and property sectors.

In 2008 the GBCSA released an assessment tool for office buildings, known as Green Star SA Office V1. A pilot version of an assessment tool for retail buildings was released in March 2010 and the final version is scheduled for release in November 2010.

The assessment methodology addresses the following categories of environmental impact:

- 1) Management
- 2) Indoor Environmental Quality
- 3) Energy
- 4) Transport
- 5) Water
- 6) Materials
- 7) Land Use and Ecology

8) Emissions

9) Innovation

Each category has a number of sub-categories and points are scored for each sub-category. Weightings are also applied to the points since some areas are more environmentally significant than other: thus energy points are more heavily weighted than management points for example.

6.3 International Precedent

Significant progress has been made in other countries with regard to preparing national strategies for sustainable development.

For example, the United Kingdom Government in 1999 produced a document entitled "*Sustainable Development, the UK Government's approach*". The Federal Government of Germany adopted a national sustainability strategy in 1992 under the heading "*Prospects for Germany*". The E.U. Parliament, in preparation for the World Summit of 2002 adopted a "*Strategy for sustainable development*". President Clinton, during his term of office, established "The President's Council on Sustainable Development" that in 1999 produced a national strategy for the United States under the heading "*Towards a Sustainable America*".

Some countries have extended their national strategies for sustainable development into a national strategy for sustainable construction.

For example, the United Kingdom's Department of the Environment, Transport and the Regions in April 2000 produced a strategy entitled "*Building a Better Quality of Life, A Strategy for more Sustainable Construction*". The Federal Government of Germany launched their "*Building Culture in Germany*" initiative in 2000 that, inter alia, aims to integrate the principles of sustainable construction with the enhancement of social cohesion.

Within certain countries, agencies – both public and private – have developed their own strategies aimed at sustainable development supported by a variety of policies, programmes and action plans. Examples include the Environmental Protection Agency (EPA) in the United States, work undertaken by the OECD, the United Nations Environmental Programme (UNEP), and the World Business Council on Sustainable Development (WBCSD), among others.

The WBCSD's Urban Infrastructure Initiative (UII) brings together a diverse group of companies that are collaborating to help urban authorities develop realistic, practical and cost-effective sustainability strategies. The project draws on the expertise of individual companies who already work with urban planners and engineers to provide services and solutions to urban sustainability challenges.

City authorities are often forced to tackle individual challenges in a piecemeal way, with priorities influenced by short-term financial and political considerations. But sustainability requires an integrated approach, taking a system-wide view of the interlinked challenges.

Working with authorities in key cities, the UII will help create transformation plans and translate strategic concepts into a feasible landscape solution for sustainable urban development. Companies can provide the research and analysis that will inform strategy, but crucially also bring the mindset and the ability to make things happen on the ground.

Of critical significance to the development of a South African Framework are two recent initiatives, namely the development of a sustainable building construction standard by the International Organisation for Standardisation (ISO) in 2008, and the development of International Green Construction Code by the International Code Council (ICC) in 2010.

The ISO, a worldwide federation of national standards bodies (ISO member bodies), has released an international standard, ISO/DIS 15392 called "*Sustainability in building construction – General principles*" that presents general principles for sustainability related to buildings and other construction works. These principles form the basis for a suite of standards intended to address specific issues and aspects of sustainability relevant to building and civil engineering of construction works.

The ICC, in collaboration with a number of associated parties, has developed the *International Green Construction Code* for adoption and implementation in the US. Standards are developed for Site Development and Land Use; Material Resource Conservation and Efficiency; Energy Conservation, Efficiency and Atmospheric Quality; Water Resource Conservation and Efficiency; Indoor Environmental Quality and Comfort; Commissioning, Operation and Maintenance for new buildings, existing buildings and existing building site development.

The significance of these two initiatives is the shift away from voluntary assessment systems to compulsory building regulation supported by the appropriate and relevant standards.

Other international agencies are adopting strategies aimed at influencing investors and investment patterns. The World Bank Group has aligned its funding approval in accordance with a guideline document titled "*The Equator Principles*" aimed at guiding investment of the world's largest banks in a manner supportive of sustainable development. The United Nations launched their Global Compact in 1999, an initiative consisting of 1,500 enterprises focusing on good corporate citizenship and embracing nine principles including the reduction of greenhouse gas emissions. The United Nations Environment Programme launched an initiative aimed at working with the major institutional investors to develop a set of globally recognized principles for responsible investment.

Within the construction sector, institutions such as the Confederation of International Contractors' Associations (CICA), the International Labour Organisation (ILO), the European Construction Industry Federation (FIEC), the International Council for Research and Innovation in Building and Construction (CIB), the European Council for Construction Research, Development and Innovation (ECCREDI), the Sustainable Construction Task group in the UK, the UK-based Construction Industry Research and Information Association (CIRIA) and the Union of International Architects (UIA) are all pursuing the development of strategies aimed at promoting and implementing sustainable development within their sectors.

A consistent feature in all the strategies mentioned above for both sustainable development and sustainable construction is the use of legislation, regulation, policies, programmes, targets, toolkits, best practices, indicators, measuring, monitoring, evaluating and reporting.

6.4 Meeting South Africa's Development Imperatives

At the outset it must be emphasised that the environmental aims and objectives of the green building movement are not unique: in many ways they are derived from and echo the broader aims and objectives of many global organisations having a strong environmental mandate (among others the United Nations, the Commonwealth, the World Bank, and the World Business Council for Sustainable Development) and numerous global agreements (among others Habitat, Agenda 21, the Millennium Development Goals, the Global Compact, the Montreal Protocol, the Kyoto Protocol, and more recently the Bali Agreement) as well as the non-binding Copenhagen Accord. A careful matching of environmental objectives, measuring instruments and indicators could therefore enable the green building movement to make a direct and measurable contribution to these global and national programmes.

Careful targeting of resource usage can enable green buildings to make a direct contribution to the consumption of scarce resources: from the projected supply analysis of infrastructure material inputs, the most sensitive infrastructure material inputs that could present supply shortfalls in South Africa are carbon steel products, cement, timber, aggregate and sand, and bitumen.⁸⁴ Specific interventions include the use of recycled steel, adding fly ash and other cement replacements to cement-based materials, using recycled timber, using marginal aggregate materials and using bitumen supplements.

The green building movement can also make secondary contributions in a wide range of spheres, most notably with regard to host nation infrastructure development. Infrastructure is taken to cover all the main common-user services – energy and water supply, transport and telecommunications, sanitation and waste facilities, flood protection and drainage, and other

⁸⁴ The Presidency (2010). *New Growth Path*, Department of Economic Affairs, The Presidency, Pretoria.

general-purpose urban facilities including irrigation. This coverage corresponds to what is sometimes called 'economic infrastructure' as compared to 'social infrastructure' which includes facilities such as schools, hospitals and cultural centres.

Economic infrastructure provides services to a wide range of users and also structures the environment in which people live and work, both limiting and expanding choices. Infrastructure is thus the connective tissue that binds the built environment together.

The large gaps in access to basic infrastructure services in developing countries partly reflect inadequate levels of investment. Low-income countries as a group spend approximately 3 – 3.5% of GDP on the maintenance of and investments in their infrastructure. This contrasts starkly with the roughly 6.5 – 7.5% of GDP that is required to adequately maintain these assets, expand access through new investments, and enable economic activity to support projected levels of economic growth.⁸⁵

South Africa spends about 2.8% of GDP on infrastructure investment and it is thus not surprising that South Africa's infrastructure is rated fair, poor or very poor (SAICE 2006).⁸⁶ Local authorities do generally not pay any attention to demand reduction, largely because of the income produced from municipal services consumption. By careful targeting of green building criteria green buildings can reduce demand on trunk/bulk-supply installations and local distribution/collection networks and thereby contribute toward the redistribution of limited infrastructure services to the least developed urban areas. Specific interventions include small-scale water and wastewater systems, sustainable urban drainage systems (SUDS), and renewable energy generation.

Thus a Green Building Strategy could contribute directly and indirectly to the achievement of these global and national objectives by assisting government:

- To achieve their commitments in terms of global environmental agreements;
- To introduce climate change adaptation and mitigation strategies in the construction sector;
- To reduce the sector's demand for scarce materials;
- To move towards a low-carbon, green economy;
- To create jobs and develop skills;
- To build social cohesion;

⁸⁵ Fay, M., and Yeppe, T., (2003). *Investing in Infrastructure – What is needed from 2000-10?* In: World Bank Policy Research Working Paper No. 3102.

⁸⁶ SAICE (2006). *The SAICE Infrastructure Report Card for South Africa*, The South African Institute for Civil Engineers, Midrand.

- To improve the viability of local authorities by reducing the demand for municipal infrastructure and services;
- Through the provision, operation and management of infrastructure to redistribute and improve municipal services to the least developed urban areas; and
- Assist businesses in supporting the principles of the UN Global Compact, especially the environmental principles 7, 8, & 9⁸⁷.

6.5 Elements for a Green Building Vision for South Africa

A key milestone in achieving green buildings in South Africa will be the adoption of a green building vision. It needs to be developed into a consensual vision of what should be green building in the short to medium term, having regard to the starting point in South Africa. The vision can then be translated into supporting requirements, and lead to suggested tools for measuring how the requirements are being fulfilled. The vision will also serve as a point of reference for the identification and discussion of the technology and process innovations needed for full realisation of the vision.

To inform the development of a Vision for Green Building in South Africa key elements from initiatives developed in other countries and those in South Africa have been identified. Based on the above the objectives a national green building vision should seek to ensure that during the planning and construction phase of facilities and infrastructure, provision is made to:

- Deliver buildings that reflect holistic thinking throughout the entire value chain;
- Incorporate a life-cycle inventory-based approach;
- Deliver buildings that reflect the adoption of the precautionary principle and the avoidance of risk;
- Adopt a delivery process that is transparent, i.e., the presentation of information is done in a manner that is open, comprehensive and understandable and, like the underlying data, is traceable and verifiable;
- Adopt a delivery process that is morally responsible in addition to the legal and financial obligations;

⁸⁷ Principle 7 – Businesses are asked to support a precautionary approach to environmental challenges; Principle 8 – to undertake initiatives to promote greater environmental responsibility; and Principle 9 – to encourage the development and diffusion of environmentally friendly technologies.

- Adopt a delivery process that involves the participation of affected and interested parties relative to their respective areas of responsibility and timing of their involvement;
- Adopt a delivery process that clearly demonstrates the notion of intergenerational and interregional equity;
- Adopt an implementation approach based on continual improvement;
- Use environmentally-friendly construction materials that for example, reduce the embodied amount of energy and material, have low emissions in use, are repairable and recyclable, and limit the depletion of non-renewable resources generally;
- Deliver buildings that are energy efficient and maximise the use of renewable energy resources;
- Restrict the generation of construction waste through emphasising waste minimisation, reuse, and recycling;
- Conserve water through minimising the consumption of water and maximising the harvesting and reuse of rainwater and grey water;
- Deliver buildings in a manner that protects the health and safety of the workforce during construction, and that provides healthy indoor environments that are natural lit and ventilated and are free of damp, moulds and volatile organic compounds (VOCs);
- Ensure that construction activity supports and improves the quality of the natural environment for example, by ensuring that materials are used in a sustainable manner, that construction activity does not threaten biodiversity and the reproductive capacity of the ecosystem, that soil contamination is avoided;
- Limit the contribution of construction products both during construction and in use to global warming emissions (including CO₂ from the burning of fossil fuels) and air pollution (smoke and dust pollution);
- Construct buildings to relatively high densities and that support the creation of a sustainable and efficient public transport system;
- Construct buildings and infrastructure that are of a high quality, are efficient to operate and will be adaptable to use changes over time;
- Integrate the delivery of buildings and infrastructure in a holistic manner that supports the enhancement of the overall quality of the built environment within a given urban context;
- Improve the societal impacts arising from construction activities and the built environment through its contribution toward the enhancement of social cohesion, job creation, skills development, black economic empowerment and regional economic development; and

- Ensure that the entire delivery process is undertaken with probity and in accordance with good corporate governance requirements.

The incorporations of these objectives will assist the construction sector to:

- Raise the quality of the built environment;
- Protect and enhance the national heritage;
- Reduce environmental impacts, particularly as concerns global heating gas (GHG) emissions;
- Create worthwhile jobs;
- Promote social cohesion; and
- Encourage communities and decision-makers to appreciate the value of the built environment and how to respect and maintain it.

6.6 Summary

From the above elements the following draft vision statement can be constructed:

The vision is of a building construction sector capable of conceptualising and delivering high performance green buildings that protects natural assets and resources, creates decent work to construct and operate, are efficient and effective, requires less municipal services, creates healthy indoor environments, strengthens local culture and heritage, and enhances the natural and built environments for the benefit of the current and future owners, occupants and communities in which they are located.

7 Strategic Focus Areas for Intervention

The effective implementation of green building in South Africa requires the identification of key strategic intervention focus areas. Each of the focus areas will have to be supported by programmes and action plans. The identification of the key strategic focus areas is based on the analysis of government policies (especially government's 10 priority areas), international commitments relating to sustainable development imperatives (especially climate change and sustainable human settlements), and key economic, social and environmental drivers, as set out in this document. In this way the move toward green building will respond to South African needs, priorities and targets.

The key strategic interventions required are grouped into the following critical "pillars": these "pillars" constitute the strategic focus areas for action and interventions that are necessary to reach the desired outcome, namely the delivery of sustainable buildings in South Africa. The focus areas and their associated actions and interventions reflect a systematic and

integrative approach which will need to transcend traditional divisions and sectors to be effective.

Pillars for Green Building

- Adopt green building regulations, standards and best practice
- Enhance the building sector's performance
- Enhance systems for integrative planning and implementation
- Promote new green building sector capacity
- Develop the capacity and role of the public sector

Strategic interventions are required in each of these pillars to achieve the green building vision. In order to do so it will be necessary to identify clear goals and targets on which all interventions and actions are based. These will be used to guide decisions as to how green building is advocated and implemented across all organs of state and the private sector.

7.1 Description of Five Strategic Pillars

This section briefly describes the main focus of each pillar and explains why it has been identified as a strategic focus area for intervention. In some instances recommendations reinforce existing interventions and actions, while in other instances new interventions and actions are proposed to be initiated and implemented.

7.1.1 Adopt Green Building Regulations, Standards and Best Practice

- **Building regulations and standards** – deals with environmental stewardship and aims to avoid indoor and outdoor environmental degradation. Adopt new building regulations and standards which promote the increased use of resource efficient designs and technologies, sustainable utilisation of natural resources in an economically and environmentally appropriate manner, and enhances indoor environmental quality. Encourage the revision and/or modification of existing building standards to take account of improved technologies in materials and construction without compromising safety standards.
- **Code for Green Building** – deals with economic sustainability (LCC), social sustainability (well-being), and environmental sustainability (LCA); social and economic equity; and promotes the design, construction, maintenance, and alteration of buildings that respects the conservation of monuments, open spaces, landscapes and settlement patterns of historical, cultural, architectural, natural, religious and spiritual value.

- **Energy performance standards** – establish a national system for energy performance, measurement, auditing, and reporting.
- **Water performance standards** – establish a national system for water performance in building construction, measurement, auditing, and reporting.
- **Design guidelines** – prepare and make readily available design guidelines aimed at assisting the building construction sector to deliver green high performance building.
- **Best practice** – introduce green best practice requirements into the cidb *Best Practice Project Assessment Scheme*.

7.1.2 Enhance Industry Performance

The delivery of high performance green building will not be possible without an improvement in the performance and capacity of the South African construction industry. To do this will require that the industry aim beyond most current building construction technologies, solutions and delivery methods.

Interventions and actions that focus on improved industry performance include:

- **Prioritise the building sector** – the adoption of a Framework for Green Building must be accompanied by the prioritisation of the building sector as a tool for driving sustainable development.
- **Human-resource development:** Embark on a targeted education and training programme for participants in building construction sector
- **Lean Construction:** Contemporary production processes are aimed at reducing production waste (efficient production, reduce waste and pollution) in what is known as Lean Construction⁸⁸. Lean Construction changes the way work is done throughout the delivery process. Lean Construction extends from the objectives of a lean production system - maximize value and minimize waste - to specific techniques and applies them in a new project delivery process. As a result the facility and its delivery process are designed together to better reveal and support customer purposes; positive iteration within the process is supported and negative iteration reduced; and work is structured throughout the process to maximize value and to reduce waste at the project delivery level. Efforts to manage and improve performance are aimed at improving total project performance because it is more important than reducing the cost or increasing the speed of any activity.

⁸⁸ LCI (2011). "What is Lean Construction?" *Lean Construction Institute* (LCI), Online: <http://www.leanconstruction.org/> Retrieved January 19, 2011.

- **Procurement strategies to effect best practice standards** – The public sector can promote the implementation of high performance green building through its procurement policies, strategies and mechanisms. Procurement can be used to drive new green building construction and delivery as well as green retrofitting.
- **Financial Incentives** - Government as a fixed asset investor and occupier of fixed assets (both its own and private sector fixed assets) can use its investment strength to structure building contracts and lease agreements to facilitate the uptake of green building technologies. Green buildings can place an additional cost premium on building contracts: however, payback periods are favourable in almost all cases. Thus the initial capital cost to the developer/landlord can be offset through lease periods that coincide with payback periods. Financial incentives can also drive the uptake of green building technologies, specifically in those services sensitive to price signals such as electricity charges. In many instances the introduction of green building technologies can offer substantial savings over typical bulk service installations as undertaken by local authorities.
- **Certification of green contractors and products** - In markets where green building uptake is ahead of South Africa's the building construction sector has realised the "value" of being recognised as a credited green building practitioner, contractor or supplier. The CIDB already has a Contractor Recognition Scheme in place facilitating the introduction of such a category fairly readily. Further certification and/or accreditation systems require to be put in place, including a green construction product certification possibly through Agreement South Africa.
- **Encourage innovation** - Green buildings require the application of new construction materials, products and methods. Government can encourage investment in research, development and innovation (RD&I) directly and indirectly through its capital investment programme and lease agreements. Government can also assist in the uptake of new innovative technologies through developing partnerships to prototype and implement innovations in its portfolio.
- **Information awareness** - embark on an information awareness and sharing campaign to educate the building construction sector on any changes to the building regulations and standards, and the implementation of best practice.
- **Indigenous materials** – Establish and strengthen indigenous building materials industry, based, as much as possible, on inputs of locally available natural resources;
- **Technical support** – Formulate programmes to enhance the utilisation of local materials by the construction sector by expanding technical support and incentive

schemes for increasing the capabilities and economic viability of small-scale and informal operatives which make use of these materials and traditional construction techniques.

7.1.3 Enhance Systems for Integrative Planning and Implementation

This pillar is cross-cutting and aims to address the many governance and institutional challenges that may impede the achievement of the vision. The integrative nature of green building as described in the vision and the scale and complexity of the building sector's value chain means that the structures of governance (policy, laws, institutions and strategies) must be recalibrated. Cooperative governance is crucial to the implementation of green building policies, programmes and actions. Integrating economic, social and environmental concerns into the design, construction, operation, maintenance, reconstruction, and deconstruction of immovable assets will be a key challenge for effective governance for green building. Monitoring and reporting on economic, social and environmental performance will require specific structures to be put in place. These requirements emphasise the need for permanent institutional arrangements which are outlined in Chapter 9.

Interventions and actions that focus on improved integration and implementation include:

- **Inter-governmental coordination** - To ensure the national vision for green building is pursued across government and to promote its successful uptake by the public sector, it is important that green building imperatives are holistically embedded into the working of all intergovernmental structures in all three spheres.
- **Policy integration** - It will be necessary to put into place policy integration structures to harmonise built environment public policy problem identification, policy design, implementation and evaluation capacity in government, especially with regard to agencies such as the Construction Industry Development Board, the Council for the Built Environment, Agreement, and the Industrial Development Corporation.
- **Planning of public sector green buildings** - To ensure the successful implementation by the public sector it is important that the approval of capital funds for public buildings be tied to the principles of Better Public Buildings and its associated improved service delivery. Multi-attribute decision-making tools. Integrated consideration of qualitative and quantitative information. Life cycle of the building construction works in terms of service life and performance requirements, life cycle cost assessment, life cycle environmental assessment, inclusion of use-phase concerns in project planning. Product and process view. Perspectives of interested parties and governance issues. Urban planning. Risk management.

- **Monitoring and evaluation of green building performance** - It will be necessary to establish a baseline of building typology performance, formulate an appropriate set of national indicators, measure progress in building performance, measure compliance to annual targets, and to project a trajectory toward meeting national goals, especially in areas such as greenhouse gas reductions.
- **Development and dissemination of data bases** - To promote the free exchange of information on the entire range of environmental and health aspects of green building, including the development and dissemination of data bases on the adverse effects of some building materials through collaborative efforts of the private and public sectors.

7.1.4 Promote New Green Building Industry Capacity

One of the biggest opportunities green building presents to the economy is the development and application of green technologies to create new green jobs. This is the central tenet of governments green economy strategy, and one of the reasons that building construction has been targeted as a suitable industrial sector.

- **Building a local green manufacturing capacity** - Green building technologies are, by definition, new. Thus many of the green technologies associate with green buildings are not yet readily available in South Africa, or are uncompetitively priced due to foreign exchange rates or importation costs.
- **Strengthen indigenous building materials industry** - Based, as much as possible, on inputs of locally available natural renewable resources
- **Emerging sector** - Enhance the utilisation of local materials by the construction sector by expanding technical support and incentive schemes for increasing the capabilities and economic viability of small-scale and informal operatives which make use of these materials and traditional construction techniques. Develop policies and practices to reach the informal sector and self-help housing builders by adopting measures to increase the affordability of green building materials and technologies on the part of the urban and rural poor, through, inter alia, credit schemes and procurement strategies for building materials for sale to small-scale builders and communities.
- **Green decent jobs** - Provide training programmes in green building technologies and skills particularly for the unemployed and economically marginalised groups to enable entry to new markets and jobs. Promote the adoption of new green construction and maintenance technologies which generate new green jobs for the underemployed while at the same time promoting new green skills in the building sector.

- **Recycling capacity** - Introduce legislation and financial incentives to promote recycling and reuse of materials in the building sector.
- **Green leases** – Government leases should be tied to green building design, construction, and operation and maintenance. To this end a Green Operational Protocol should be developed to guide building owners to meet the requirements of Government. A tenant guide, distributed through
- **Green facility management (FM)** – Government should develop and implement a tenant guide, distributed by building managers, which encourages tenants to identify and implement no-cost and low-cost alternatives to operating in a standard indoor office environment.
- **Green R&D** - Promote research in construction industries and related activities, and establish and strengthen institutions in this sector
- **Promote the use of economic instruments** - Such as product charges, to discourage the use of building materials and products that create pollution during their life cycle
- **Retrofit Government buildings** – Embark on a programme to systematically retrofit the national estate as a way of deriving immediate performance improvements, creating a stock of case studies, and enabling the emergence of green contractors and service providers.

7.1.5 Develop the Capacity and Role of the Public Sector

As noted in the White Paper⁸⁹, government is already involved in the affairs of the construction industry by fulfilling its role as regulator, facilitator, investor and client. These functions are exercised by various departments and in all spheres of government.

As regulator government is obliged to protect the public interest in terms of health and safety. Government also facilitates the achievement of socio-economic objectives in compliance with the electoral mandate. Government can exercise this role in the construction industry through the way it procures building construction services and the location of its investment. It is in the interests of government as an investor to take the necessary steps to ensure that it is getting value-for-money in terms of building construction outputs, including the social and environmental aspects. Government also seeks to undertake nation-building and reconciliation in the light of past political policies and practices: a significant challenge in this

⁸⁹ DPW (undated). *Creating and Enabling Environment for Reconstruction, Growth and Development in the Construction Industry*, White Paper, Department of Public Works, Pretoria.

domain is to promote equity. Ultimately as government is a significant investor in the building construction sector it is well-placed to influence the sector's growth and performance.

- **Lead by example** – Government buildings should lead by example and be exemplars of effective use, human well-being, and resource efficiency and restoration.
- **Improve public-sector capacity** - Implement an appropriate human resource education and training programme at all tiers of Government.
- **Enhance internal systems for integrating planning and implementation** – Put in place a review that will lead to a rationalisation of public sector procedures concerning building design, construction, operation and maintenance, and final disposal.
- **Green procurement** – Government can substantially drive behaviour through its procurement system. To this end Government should develop and implement a Green Building Construction Procurement protocol to guide both the public and private sectors on how procurement will be used to drive the implementation of green buildings.
- **Sustainable consumption and production policy** – Develop a sustainable production and consumption policy and action plans to improve the products and services provided by the building construction sector while reducing environmental and health impacts, using, where appropriate, science-based approaches, such as life cycle assessment (LCA).
- **Effective monitoring and evaluation** – Establish an effective monitoring and evaluation protocol to track the progress of measures taken in order to enable continuous refinement to policy and implementation.
- **Partnerships** – Enter into partnerships with Government agencies and public organisations (e.g. Government Agencies, research institutions, and higher education institutions) to obtain support for the planning and implementation of actions and programmes.
- **Specialist development** – In conjunction with higher education institutions develop specialist training programmes aimed at creating a suitably trained cadre of professionals versed in green building practices across the building construction sector.

8 Implementing the Vision

The proposals included in this framework document identify a wide range of interventions required of both the public and private sector if the green building vision is to be realised.

However, an institution needs to take 'ownership' of the process, and this, in turn, will require some key institutional arrangements to be put in place, primarily by government, to create an enabling 'green building' environment.

To ensure the rollout and successful implementation of the NFGB it is imperative that the process is simple and clearly defined, well structured. Properly coordinated and managed, and meets certain criteria. Experience from similar initiatives has shown that it is important:

1. To identify the appropriate existing institutional mechanism or mechanisms, to facilitate cross sectoral, interdepartmental and multi-stakeholder participation in the process;
2. To have a clear action plan for implementation which clarifies the division of responsibilities and follow-up mechanisms as concrete as possible to avoid large-scale, lengthy implementation processes that do not achieve the objectives and targets;
3. To prioritise actions and interventions and focus attention on those that will have the best effect with the least effort in respect of meeting objectives and targets;
4. To allow for a phased approach to implementation rather than tackling all interventions and actions simultaneously;
5. To integrate and align efforts to implement the NFGB with related and complimentary programmes to avoid a situation where the NFGB is pursued as a separate issue;
6. To integrate the implementation of the NFGB into the budgetary process;
7. To implement all interventions and actions with and through the appropriate partnerships but to coordinate efforts and monitor and evaluate results nationally;
8. To base all actions on a participatory process that engenders the sharing of responsibility for implementation.

To give effect to the NFGB a process comprising a phased approach and ongoing communication and consultation with stakeholders is required.

This chapter sets out a roadmap for achieving the vision and describes the mechanisms that are needed. Implementation rests on two pillars, namely effective use of the framework, and an action plan for implementation.

8.1 Institutional Framework

In order to successfully implement the National Framework for Green Buildings and achieve the vision for green buildings a robust institutional framework that works within the existing policy context must be established; partnerships with stakeholders must be established; and

all participants must reach agreement on how to cooperate and add value to each other's contributions, rather than duplicate or compete with one another. The successful roll out and implementation of the Framework requires collective action by multiple stakeholders both within and outside Government.

Within Government it clearly requires the involvement of all three spheres and every public entity acting as a customer of building construction. Government's strategic partners fall within three broad categories, namely labour, business and industry, and civil society. Particular attention will need to be given to the role of local authorities and the state agencies involved in building construction particularly the CIDB, CBE, and Agreement.

The role and function of Government is governed by the Constitution whereas the roles and functions of its strategic partners are determined by the manner in which civil society and the economy are structured and operate. The Constitution not only allocates functional competencies between the three spheres of Government but also describes the principles which are fundamental to the manner in which the country is governed. Government is tasked with achieving global and national goals and targets and for coordinating the activities of its agents, providing leadership, and leading by example, monitoring and evaluating performance, and reporting to the global community and South African society on progress.

Established mechanisms that facilitate and promote engagement and interaction between government, its agencies, and its social partners do exist. Furthermore, government agencies mandated to advise government on the building construction sector also exist. The challenge will be to establish a lead agent for the implementation of the NFGB.

The Department of Public Works, as the department responsible for the management of the national estate, will serve as the focal point. At a technical level DPW will set up a steering committee consisting of various stakeholders to guide the required implementation phases and, using the various mechanism and existing structures, undertake to facilitate the development and drafting of the various policies, programmes, and action plans stipulated in the Framework.

8.2 Action Plan

A three phased approach is envisaged, namely:

- 1) Visioning and systems
- 2) Preparing and planning for action
- 3) Rollout, monitoring and evaluation

Each phase is described briefly below, and communication and consultation are dealt with under a separate heading.

8.2.1 Phase 1: Visioning and Systems

This Framework represents the culmination of the first five steps of Phase 1. It provides a common understanding of, and practical approach to, the national vision for green building, and its implications.

To give momentum to the implementation of the NFGB certain current initiatives could be supported in the meantime. These include:

- ESKOM's Demand-side Strategy
- Government's New Growth Path strategy
- Review of the National Building Regulations
- Local economic development initiatives especially around the rollout of energy efficiency instruments and programmes

Inclusion of these and other similar initiatives could serve to mobilise wider understanding of, and support for, a national strategy for green building.

Once Phase 1 is finalised and Phase 2 commences, the process of converting the current NFGB into an actionable **national strategy** (NSGB) will have commenced.

8.2.2 Phase 2: Preparing and Planning for Action

A key step is to formalise the national strategy on the basis of this Framework and develop a **detailed action plan** for implementation. The action plan must be developed through a participatory process to ensure responsibility for implementation is shared by government and its strategic partners.

Part of the exercise of developing an action plan should involve the review of existing policies, programmes and targets and aligning these with NSGB objectives. This will ensure that the NSGB forms part of the mainstream of economic, social and environmental activity in this country and is not viewed as a separate or parallel initiative. Through this review and the development of an action plan, common national development priorities, targets, time frames and deadlines to elaborate on the identified set of strategic interventions will emerge. The development of an action plan will provide opportunity to review the implications of the various international, regional and national targets in the context of national priorities; compare existing legal instruments and implementation programmes with international goals and targets to identify gaps and areas requiring synergy; and generate a set of specific interventions and actions that support attainment of the high level goals and targets of the NSGB. Ultimately the action plan will be the 'road map' for implementation and will coordinate:

- Government priorities in the Medium-Term Strategic Framework and Programme of Action, and the New Growth Path's sector strategies;
- Business commitments and partnerships for achieving green buildings;
- Civil society programmes and actions; and
- Implementation plans and strategies for achieving the Millennium Development Goals, the Johannesburg Plan of Implementation and other international and regional commitments for achieving sustainable human settlements and green buildings.

The Department of Public Works, its provincial counterparts and agencies have an important role to play in guiding the process of institutionalising the national vision of green building within the National Framework for Sustainable Development and assisting sector departments and municipalities in achieving this integration.

A core factor in the successful implementation of the NFGB entails mobilising the necessary resources and means of implementation. This includes leveraging funds, technology and human resource capacity at all levels, and within all sectors, so as to realise the NSGB. The following actions are envisaged as part of this role:

- The financial aspects of implementing the NFGB and the NSGB will have to be taken into account as part of Government's ongoing budget process and medium term expenditure framework. This will provide opportunity for more detailed assessment of the cost implications of objectives and implementation plans of specific programmes; and may require reprioritisation or sequencing over time;
- To further investigate feasibility and implications of introducing economic and fiscal instruments for green building by conducting a thorough impact analysis and engaging in comprehensive stakeholder consultations;
- To review the capacity of existing and proposed structures to coordinate and implement the NSGB action plan;
- To "expand the envelope" for NSGB implementation by leveraging financial support from other sources, including the private sector and CDM;
- To develop a national Human Resources and Skills Strategy that supports the green building vision and objectives, especially with regard to its contribution to the green economy, with particular emphasis given to ensuring that youth, gender and development issues are also addressed;
- To develop a National Science and Technology for Green Building Strategy to ensure that the country's knowledge infrastructure is capable of providing solutions;

It is important to distinguish between the costs associated with developing, finalising and rolling out the NSGB, and the costs associated with implementing operational interventions and actions identified in the action plan. The latter cannot be accurately quantified at this stage, and it may well be that many of those costs would fall within existing departmental budgets and the budgets of government's strategic partners. The costs associated with developing and finalising the NSGB and the governance mechanisms required to guide its implementation are limited and includes some developmental costs (related to refining the strategy and filling gaps); public participation costs; costs for communication and marketing the NSGB; and institutional costs associated with establishing an administrative support for the NSGB political champion and the national coordinating mechanism.

8.2.3 Phase 3: Rollout and Monitoring and Evaluation

Once the action plans are in place, and the process to mobilise resources has commenced, it will be possible to rollout the NSGB. It is envisaged that this will take place in a phased manner in accordance with priorities and time frames set in the action plan and in line with government priorities in the MTSF and Programme of Action. This phase should include implementing the "low hanging fruit" and pilot projects that demonstrate the commitment to achieving green building by example.

Monitoring and evaluation are both necessary to provide government with the management information it needs to conduct quality assurance on its performance in respect of sustainable development; measure the country's construction sector's progress toward developing in a more sustainable direction against targets; and to ensure real transparency. In order to do this it is crucial to develop and apply a set of indicators. The state of the environment, both natural and built, and environmental trends and challenges will change over time. Thus the process of indicator identification and calibration will have to be subject to robust review from time to time.

For monitoring and evaluation to be effective it is necessary first to identify specific activities, tools, policies, measures and monitoring and assessment mechanisms, including, where appropriate, life cycle assessment and national indicators for measuring progress. This will include:

- Engaging in sector policy reviews with the aim of identifying gaps and opportunities in the current policy and improving the performance of the state through streamlining various cooperative governance structures;
- Ensure that monitoring and evaluation processes are established at the outset of each initiative so that progress with achieving green building objectives and targets can be both quantified and qualified. This will entail:

- Strengthening the Government-wide Monitoring and Evaluation System (GWM&ES) by incorporating green building indicators;
- Developing a range of tools to measure green building (for example to include organ's of state's performance in terms of green building targets in financial audits);
- Improving capacity to gather and assess statistics, including building statistics, to ensure that decision-making is better informed;
- Developing and testing indicators and benchmarks for measuring green building on a continued basis;
- Generating a green building 'score card' for measuring performance of social partners and Government;
- Developing building construction sector programmes and projects to measure and report on their impact in achieving the objectives set in the NSGB; and
- Continuously and periodically reviewing the NSGB.

9 Communication and Consultation

The main message of the green building vision is the promotion of constructing the buildings which constitute our human settlements in a manner that is sustainable: this requires core changes in attitudes about resources and certain practices and behaviours. Information and communication on the national vision and NSGB to all stakeholders is important and necessary to ensure that all understand and support its purpose, message and content. Information dissemination and communication techniques are essential tools in spreading and sharing experience and knowledge about green building and sustainable building construction. Hence it is important that a communication strategy, with a strong and coherent message and information plan, be developed and implemented.

It is envisaged that an intensive stakeholder participation process be undertaken to communicate the NSGB and to consult on the development of the action plan. Such a process will serve not only to broaden understanding of the NSGB, but also to elicit support for, and input into, the implementation of the NSGB and action plan. The participation process need to promote broad involvement of civil society, organised labour, the business and industry sector as well as experts to ensure it is effective in obtaining long-term buy-in from all stakeholders into the green building and sustainable building construction trajectory. For this reason it is important that communication of the NSGB include a marketing aspect.

To successfully communicate the NSGB, and ensure effective participation by stakeholders, the following actions will be required:

- Strengthen existing forums to facilitate participation and ensure ongoing dialogue and debate, especially with regard to the CIDB, CBE, and Agreement;
- Establish mechanisms and networks to disseminate information and provide feedback to stakeholders;
- Run a marketing campaign to optimise the concept of sustainability among consumers;
- Generate products to popularise the underlying messages and content of the NSGB;
- Develop a knowledge network to facilitate knowledge transfer through mobilising experts; and
- Develop appropriate feedback mechanisms and provide regular feedback.

The promotion and consultation across all spheres of government, and within all levels of society, is needed to obtain the attention of the nation on these issues, and to the promotion of the vision that puts sustainability at the core of our endeavours.

10 Conclusions

There can be little doubt that the construction industry is undergoing close scrutiny in terms of both its current contribution to global warming through the use of fossil fuel-based energy, and its potential to reduce that contribution by switching to clean sources of energy and improving energy efficiency. The industry can expect to experience increasing pressure from host nation governments and international organisations to introduce global warming adaptation and mitigation measures as a matter of urgency.

There can also be little doubt that the green building movement is increasingly seen as one of the vehicles for pursuing these strategies. Thus the development of a National Framework for Green Building in South Africa is both timely and relevant.

Working with the latest and final statement of the Smart-ECO programme as described earlier, high performance green buildings need to address the following key considerations:

1. Apply the general principles of sustainability (ISO 15392:2008): these are Continual improvement; Equity; Global thinking and Local action; Holistic approach; Involvement of interested and affected parties; Long-term consideration; Precaution and risk; Responsibility; and Transparency.
2. Result from the involvement of all interested parties and be designed to meet its occupants needs individually and collectively. The occupants' needs must be consistent with collective social ones.

3. Be complexly integrated into the relevant local building, town-planning or environmental planning schemes and infrastructure. The building must comply with the local laws applicable to it and connect into the existing services, networks and urban or suburban fabric of its environment.
4. Be designed or refurbished from a Life Cycle perspective. The life cycle covers planning, design, construction, operation and maintenance, renovation and end of life. Evaluation of performance at each phase includes taking into consideration all other phases.
5. Have its environmental impact minimised over the estimated or remaining service life. This takes into account regional and global requirements, resource consumption (ecological goods and services) and waste and emissions to air, water and soil.
6. Deliver economic value over time. To assess economic value over time requires a life cycle cost approach, taking account future costs of operation, maintenance, refurbishment and disposal.
7. Provide social and cultural value over time and for all. A high performance green building must provide a sense of place for its occupants (permanent or occasional), and be seen as a means of work status improvement for the workers. A high performance green building should relate to the local environment and wider regional culture. Moreover, a high performance green building is a key point for satisfying social affordability.
8. Be healthy, comfortable, safe and accessible for all. Health criteria include indoor air quality and comfort criteria include acoustic, thermal, visual and olfactory comfort. Full access allows every one to use the facilities of the building. A high performance green building must enable safe working conditions for the workers during construction and its service life. "For all" means for permanent and occasional, private and professional occupants.
9. Be designed to be user-friendly, simple and cost effective in operation, with measurable technical and environmental performance over time.
10. Be designed or refurbished to be adaptable throughout the service life, with an end-of-life strategy. The building allows adaptation to changing performance and functionality requirements in accordance with new environmental constraints, and taking into account particular regional requirements.

The challenge now is to develop a National Strategy and Action Plan that will set in place those interventions, actions and programmes capable of delivering buildings in compliance

with the 10 points stated above. For this to be the case, this Framework is based on the following principles:

- Address the needs and aspirations of people, especially the needs of the poor;
- Recognise the limitations imposed on the environment by the state of technology and social organization;
- Recognise that the environment is held as a proxy for social equity between generations and communities;
- Acknowledge that sustainability is pro-development provided that it involves the progressive transformation of economy and society;
- Advocate and actively promote ecological restoration (as compared to the 'do least harm' approach);
- Target known and relevant environmental challenges (including global warming, environmental impact reduction, and biodiversity enhancement);
- Advocate and actively promote building social cohesion by reinforcing those cultural and traditional characteristics that unite, not distinguish, communities;
- Introduce and reward Green Building Best Practice;
- Be synchronised and support other Best Practice initiatives (including cidb's Contractor Best Practice Recognition Scheme and Register of Projects);
- Drive design and construction behaviour through regulation and standards;
- Be calibrated in a manner that enables the statistical methodology of *P5041: Building Plans Passed and Building Completed* as issued by Statistics South Africa to be used to construct status reports of the contribution of green buildings to South Africa's environmental challenges over time; and
- Be calibrated in a manner than facilitates the inclusion of and contribution to national environmental accounting methodology (including projected energy use, CO₂ emissions, biodiversity loss)

The inclusion of sustainable development imperatives into the delivery of infrastructure in South Africa is critical if the deployment of scarce resources is to be used to enhance both the natural environment and human development. The preparation of a national sustainable construction strategy aims to equip the construction industry to address this challenge. The establishment of key concepts and elements to be applied consistently over all projects will introduce an element of consistency into construction delivery. Benchmarking the project-

specific responses will furthermore lead to a situation where a balanced scorecard for sustainable construction activities in South Africa can be introduced.

This Framework aims to break new ground with regard to the manner in which the South African construction industry delivers its products. It is certain that strategies arising out of the framework will need continual recalibration as it is evaluated. However, it is equally certain that the implementation of a national green building framework will lead to a substantial improvement in the ability of the construction industry in South Africa to play its part in promoting and achieving a balance between growth and ecological capital consumption while delivering a sustainable built environment that enhances the quality of life of all our inhabitants.



Appendices

Appendix A: Full Compendium of Legislation Impacting on the Construction Sector

Information sourced from the website of the Department of Environmental Affairs and Tourism on 24 January 2011. Online: <http://www.cidb.org.gov/>

Act Name	Act Number and Year	Responsible Ministry	Category
National Qualifications Framework Act, 2008	Act 67 of 2008	Department of Education Department of Labour	Directly Impacting the Construction Industry
Construction Industry Development Board Act, 2000	Act 38 of 2000	Public Works	Specific to the Construction Industry
Estate Agency Affairs Act, 1976	Act 112 of 1976	Housing	Specific to the Construction Industry
Housing Act, 1997	Act 107 of 1997	Housing	Specific to the Construction Industry
Housing Consumers Protection Measures Act, 1998	Act 95 of 1998	Housing	Specific to the Construction Industry
Rental Housing Act, 1999	Act 50 of 1999	Housing	Specific to the Construction Industry
Sectional Titles Act, 1986	Act 95 of 1986	Housing	Specific to the Construction Industry
Abolition of Certain Title Conditions Act, 1999	Act 43 of 1999	Housing	Specific to the Construction Industry
Housing Development Schemes for Retired Persons Act, 1988	Act 65 of 1988	Housing	Specific to the Construction Industry
Architectural Profession Act, 2000	Act 44 of 2000	Public Works	Specific to the Construction Industry
Project and Construction Management Professions Act, 2000	Act 48 of 2000	Public Works	Specific to the Construction Industry
Engineering Profession Act, 2000	Act 46 of 2000	Public Works	Specific to the Construction Industry
Landscape Architectural Profession Act, 2000	Act 45 of 2000	Public Works	Specific to the Construction Industry
Property Valuers Profession Act, 2000	Act 47 of 2000	Public Works	Specific to the Construction Industry
Quantity Surveying Profession Act, 2000	Act 49 of 2000	Public Works	Specific to the Construction Industry
Council for the Built Environment Act, 2000	Act 43 of 2000	Public Works	Specific to the Construction Industry
National Building Regulations and Building Standards Act, 1977	Act 103 of 1977	Trade and Industry	Specific to the Construction Industry
Development Facilitation Act, 1995	Act 67 of 1995	Trade and Industry	Specific to the Construction Industry
Property Time Sharing Control Act, 1983	Act 75 of 1983	Trade and Industry	Specific to the Construction Industry
Share Blocks Control Act, 1980	Act 59 of 1980	Trade and Industry	Specific to the Construction Industry
Harbour Construction Act, 1972	Act 28 of 1972	Transport	Specific to the Construction Industry

Act Name	Act Number and Year	Responsible Ministry	Category
Town and Regional Planners Act, 1984 (Repealed)	Act 19 of 1984	Legislation that has been repealed	Specific to the Construction Industry
Physical Planning Act, 1991	Act 125 of 1991	Land Affairs	Specific to the Construction Industry
Municipal Property Rates Act, 2004	Act 6 of 2004	Provincial and Local Government	Specific to the Construction Industry
Municipal Structures Act, 1998	Act 117 of 1998	Provincial and Local Government	Specific to the Construction Industry
Preferential Procurement Policy Framework Act, 2000	Act 5 of 2000	Finance	Directly Impacting the Construction Industry
Competition Act, 1998	Act 89 of 1998	Trade and Industry	Directly Impacting the Construction Industry
Unemployment Insurance Act, 2001	Act 63 of 2001	Labour	Directly Impacting the Construction Industry
Unemployment Insurance Contribution Act, 2002	Act 4 of 2002	Labour	Directly Impacting the Construction Industry
South African Qualifications Authority Act, 1995	Act 58 of 1995	Education	Directly Impacting the Construction Industry
Compensation for Occupational Injuries and Diseases Act, 1993	Act 130 of 1993	Labour	Directly Impacting the Construction Industry
Explosives Act, 2003	Act 15 of 2003	Safety and Security	Directly Impacting the Construction Industry
Occupational Health and Safety Act, 1993	Act 85 of 1993	Labour	Directly Impacting the Construction Industry
Public Finance Management Act, 1999	Act 1 of 1999	Finance	Directly Impacting the Construction Industry
Basic Conditions of Employment Act, 1997	Act 75 of 1997	Labour	Directly Impacting the Construction Industry
Employment Equity Act, 1998	Act 55 of 1998	Labour	Directly Impacting the Construction Industry
Labour Relations Act, 1995	Act 66 of 1995	Labour	Directly Impacting the Construction Industry
Skills Development Act, 1998	Act 97 of 1998	Labour	Directly Impacting the Construction Industry
Skills Development Levies Act, 1998	Act 9 of 1999	Labour	Directly Impacting the Construction Industry
Broad-Based Black Economic Empowerment Act, 2003	Act 53 of 2003	Trade and Industry	Directly Impacting the Construction Industry
State Tender Board Act, 1968	Act 86 of 1968	Legislation that has been repealed	Directly Impacting the Construction Industry
Local Government Transitional Act, 1993	Act 209 of 1993	Provincial and Local Government	Directly Impacting the Construction Industry
Mineral and Petroleum Resources Development Act, 2002	Act 28 of 2002	Minerals and Energy	Directly Impacting the Construction Industry
Fencing Act, 1963	Act 31 of 1963	Land Affairs	Directly Impacting the Construction Industry
Planning Profession Act, 2002	Act 36 of 2002	Land Affairs	Directly Impacting the Construction Industry
Professional and Technical Surveyors' Act, 1984	Act 40 of 1984	Land Affairs	Directly Impacting the Construction Industry
Environment Conservation Act, 1989	Act 73 of 1989	Environmental Affairs and Tourism	Directly Impacting the Construction Industry

Act Name	Act Number and Year	Responsible Ministry	Category
National Environmental Management Act, 1998	Act 107 of 1998	Environmental Affairs and Tourism	Directly Impacting the Construction Industry
Land Affairs Act, 1987	Act 101 of 1987	Land Affairs	Directly Impacting the Construction Industry
Prevention of Illegal Eviction from Unlawful Occupation of Land Act, 1998	Act 19 of 1998	Housing	Directly Impacting the Construction Industry
National Roads Act, 1971	Act 54 of 1971	Transport	Directly Impacting the Construction Industry
Communal Land Rights Act, 2004	Act 11 of 2004	Land Affairs	Directly Impacting the Construction Industry
Communal Property Associations Act, 1996	Act 28 of 1996	Land Affairs	Directly Impacting the Construction Industry
Deeds Registries Act, 1937	Act 47 of 1937	Land Affairs	Directly Impacting the Construction Industry
Extension of Security of Tenure Act, 1997	Act 62 of 1997	Land Affairs	Directly Impacting the Construction Industry
Land Administration Act, 1995	Act 2 of 1995	Land Affairs	Directly Impacting the Construction Industry
Land Survey Act, 1997	Act 8 of 1997	Land Affairs	Directly Impacting the Construction Industry
Municipal Demarcation Act, 1998	Act 27 of 1998	Provincial and Local Government	Directly Impacting the Construction Industry
Municipal Systems Amendment Act, 2003	Act 44 of 2003	Provincial and Local Government	Directly Impacting the Construction Industry
Regional Services Councils Act, 1985	Act 109 of 1985	Provincial and Local Government	Directly Impacting the Construction Industry
Scientific Research Council Act, 1988	Act 46 of 1988	Arts Culture Science and Technology	Directly Impacting the Construction Industry
Conversion of SASRIA Act, 1998	Act 134 of 1998	Justice	Indirectly Impacting the Construction Industry
Hazardous Substances Act, 1973	Act 15 of 1973	Environmental Affairs and Tourism	Indirectly Impacting the Construction Industry
Municipal Finance Management Act, 2003	Act 56 of 2003	Finance	Indirectly Impacting the Construction Industry
Prevention and Combating of Corrupt Activities Act, 1994	Act 12 of 2004	Justice	Indirectly Impacting the Construction Industry
Public Protector Act, 1994	Act 23 of 1994	Justice	Indirectly Impacting the Construction Industry
National Water Act, 1998	Act 36 of 1998	Environmental Affairs and Tourism	Indirectly Impacting the Construction Industry
Water Services Act, 1997	Act 108 of 1997	Environmental Affairs and Tourism	Indirectly Impacting the Construction Industry
National Forests Act, 1998	Act 84 of 1998	Environmental Affairs and Tourism	Indirectly Impacting the Construction Industry
Atmospheric Pollution Prevention Act, 1965	Act 45 of 1965	Environmental Affairs and Tourism	Indirectly Impacting the Construction Industry
National Health Act, 2003	Act 61 of 2003	Health	Indirectly Impacting the Construction Industry
Companies Act, 1973	Act 61 of 1973	Finance	Indirectly Impacting the Construction Industry
Business Act, 1991	Act 71 of 1991	Trade and Industry	Indirectly Impacting the

Act Name	Act Number and Year	Responsible Ministry	Category
			Construction Industry
Close Corporations Act, 1984	Act 69 of 1984	Finance	Indirectly Impacting the Construction Industry
Protection of Businesses Act, 1978	Act 99 of 1978	Trade and Industry	Indirectly Impacting the Construction Industry
Credit Agreements Act, 1980	Act 75 of 1980	Trade and Industry	Indirectly Impacting the Construction Industry
Expropriation Act, 1975	Act 63 of 1975	Trade and Industry	Indirectly Impacting the Construction Industry
Designs Act, 1993	Act 195 of 1993	Trade and Industry	Indirectly Impacting the Construction Industry
Income Tax Act, 1962	Act 58 of 1962	Finance	Indirectly Impacting the Construction Industry
South African Revenue Service Act, 1997	Act 34 of 1997	Finance	Indirectly Impacting the Construction Industry
Value Added Tax Act, 1991	Act 89 of 1991	Finance	Indirectly Impacting the Construction Industry
Consumer Affairs (Unfair Business Practices) Act, 1988	Act 71 of 1988	Trade and Industry	Indirectly Impacting the Construction Industry
Insider Trading Act, 1998 (Repealed)	Act 135 of 1998	Trade and Industry	Indirectly Impacting the Construction Industry
Medical Schemes Act, 1998	Act 131 of 1998	Health	Indirectly Impacting the Construction Industry
National Small Enterprise Act, 1996	Act 102 of 1996	Trade and Industry	Indirectly Impacting the Construction Industry
Short Term Insurance Act, 1998	Act 53 of 1998	Finance	Indirectly Impacting the Construction Industry
Mine Health and Safety Act, 1996	Act 29 of 1996	Minerals and Energy	Indirectly Impacting the Construction Industry
Promotion of Access to Information Act, 2000	Act 2 of 2000	Justice	Indirectly Impacting the Construction Industry
Promotion of Administrative Justice Act, 2000	Act 3 of 2000	Justice	Indirectly Impacting the Construction Industry
Promotion of Equality and Prevention of Unfair Discrimination Act, 2000	Act 4 of 2000	Justice	Indirectly Impacting the Construction Industry
Constitution of the Republic of South Africa, 1996	Act 108 of 1996	Justice	Other Relevant Legislation
Bill of Rights - Constitution of the Republic of South Africa (Chapter 2), 1996	Act 108 of 1996	Justice	Other Relevant Legislation
Sales and Service Matters Act, 1964	Act 25 of 1964	Trade and Industry	Other Relevant Legislation
Usury Act, 1968	Act 73 of 1968	Finance	Other Relevant Legislation
Business Names Act, 1960	Act 27 of 1960	Trade and Industry	Other Relevant Legislation
Copyright Act, 1978	Act 98 of 1978	Trade and Industry	Other Relevant Legislation
Counterfeit Goods Act, 1997	Act 37 of 1997	Trade and Industry	Other Relevant Legislation
Merchandise Marks Act, 1941	Act 17 of 1941	Trade and Industry	Other Relevant Legislation

Act Name	Act Number and Year	Responsible Ministry	Category
Patents Act, 1978	Act 57 of 1978	Trade and Industry	Other Relevant Legislation
Trade Marks Act, 1993	Act 194 of 1993	Trade and Industry	Other Relevant Legislation
Adult Basic Education and Training Act, 2000	Act 52 of 2000	Education	Other Relevant Legislation
Further Education and Training Act, 1998	Act 98 of 1998	Education	Other Relevant Legislation
General and Further Education and Training Quality Assurance Act, 2001	Act 58 of 2001	Education	Other Relevant Legislation
Higher Education Act, 1997	Act 101 of 1997	Education	Other Relevant Legislation
National Education Policy Act, 1996	Act 27 of 1996	Education	Other Relevant Legislation
Protected Disclosures Act, 2000	Act 26 of 2000	Justice	Other Relevant Legislation
Immigration Act, 2002	Act 13 of 2002	Home Affairs	Other Relevant Legislation
National Heritage Resources Act, 1999	Act 25 of 1999	Arts Culture Science and Technology	Other Relevant Legislation
Board on Tariffs and Trade Act, 1986	Act 107 of 1986	Trade and Industry	Other Relevant Legislation
Convention on Agency in the International Sale of Goods Act, 1986	Act 4 of 1986	Trade and Industry	Other Relevant Legislation
Export Credit and Foreign Investments Insurance Act, 1957	Act 78 of 1957	Customs and Excise	Other Relevant Legislation
Import and Export Control Act, 1963	Act 45 of 1963	Customs and Excise	Other Relevant Legislation
International Convention for Safe Containers Act, 1985	Act 11 of 1985	Trade and Industry	Other Relevant Legislation
Measuring Units and National Measuring Standards Act, 1973	Act 76 of 1973	Trade and Industry	Other Relevant Legislation
Standards Act, 1993	Act 29 of 1993	Trade and Industry	Other Relevant Legislation
Trade Metrology, 1973	Act 77 of 1973	Trade and Industry	Other Relevant Legislation
Industrial Development Act, 1940	Act 22 of 1940	Trade and Industry	Other Relevant Legislation
Manufacturing Development Act, 1993	Act 187 of 1993	Trade and Industry	Other Relevant Legislation
National Empowerment Fund Act, 1998	Act 105 of 1998	Trade and Industry	Other Relevant Legislation
South African Citizenship Act, 1995	Act 88 of 1995	Home Affairs	Other Relevant Legislation
Identification Act, 1997	Act 68 of 1997	Home Affairs	Other Relevant Legislation
South African Passports and Travel Documents Act, 1994	Act 4 of 1994	Home Affairs	Other Relevant Legislation
Public Holidays Act, 1994	Act 36 of 1994	Home Affairs	Other Relevant Legislation
Conventional Penalties Act, 1962	Act 15 of 1962	Justice	Other Relevant

Act Name	Act Number and Year	Responsible Ministry	Category
			Legislation
Arbitration Act, 1965	Act 42 of 1965	Justice	Other Relevant Legislation
Reconstruction and Development Programme Fund Act, 1994	Act 7 of 1994	Without Portfolio	Other Relevant Legislation
State Land Disposal Act, 1961	Act 48 of 1961	Land Affairs	Other Relevant Legislation
Customs and Excise Act, 1964	Act 91 of 1964	Customs and Excise	Other Relevant Legislation
South African National Roads Agency Limited Act, 1998	Act 7 of 1998	Transport	Directly Impacting the Construction Industry

Appendix B: International Conventions and Agreements on Environmental, Fisheries and Tourism Issues

Information sourced from the website of the Department of Environmental Affairs and Tourism on 24 January 2011.

http://www.environment.gov.za//PolLeg/Agreements/conv_00082002.htm

Convention and Long Title	Description	Present Status and diary dates	Implications for South Africa
<p>Convention on International Trade in Endangered Species of Wild Fauna and Flora</p> <p>Signed: 3 March 1973 Ratified: 15 July 1975</p>	<p>The main objectives of this convention are the protection of endangered species prominent in international trade through appropriate trade control measures and monitoring the status of such species.</p>	<p>This convention has a high profile in South Africa as well as internationally.</p> <p>South Africa participated in the 1973 Washington Conference during which the convention was drafted, and ratified the convention in 1975.</p> <p>Next Conference: CoP 12 November 2002, Santiago, Chile</p>	<ul style="list-style-type: none"> - Regulation of trade in endangered species. - Keeping in touch with conservation of endangered species with interaction between parties worldwide. - Conference of the Parties discusses and decides on new and old resolutions adopted by the parties as well as up listing and down listing of species-active participation. - Under the convention South Africa has adopted measures to combat smuggling of species to protect its biodiversity. - Sustainable utilisation of species by trading and hunting.
<p>Convention on Wetlands of International Importance especially as Waterfowl Habitat</p> <p>Signed: 12 March 1975 Ratified: 12 March 1975</p>	<p>The broad aims of this convention are to stem the loss and to promote wise use of all wetlands. The convention addresses one of the most important issues in South Africa, namely the conservation of the country's water supplies, for both the use of the natural and the human environments.</p> <p>South Africa has designated 16 sites to the List of Wetlands of International Importance. A number of others are under consideration.</p> <p>A Wetland Conservation Bill has been proposed which will help South Africa to meet the aims of the convention. This</p>	<p>COP7 was held in 1999 in San Jose, Costa Rica.</p> <p>Dr G.I. Cowan was elected one of the African representatives on the Scientific and Technical Review Panel for the triennium. This meets annually.</p> <p>COP8 is scheduled for November 2002 in Valencia, Spain Biodiversity Planning</p>	<p>Wetlands provide a range of services, functions, and products that have direct social, economic and cultural value and are integral to the survival and well being of almost all South African communities. These systems have indispensable ecological value, being repositories of biodiversity and providing essential life support for a range of plant and animal species.</p> <p>The conservation and wise use of all wetlands is therefore in the national interest. The convention encourages the conservation of wetland habitats, and provides a framework for international cooperation for wetland conservation.</p> <p>Wetlands are systems that frequently transcend international boundaries, with many wetland species being migratory, and as such, there is a need for international cooperation in order to effectively conserve wetlands and their biota.</p>

	will be integrated into the Biodiversity Bill to be tabled shortly.		
Signed: June 1993 Ratified: 2 November 1995	<p>The principal objectives of the Convention are the conservation and sustainable use of biological diversity, and the fair and equitable sharing of benefits arising from its utilisation.</p> <p>The Convention translates its guiding objectives of conservation, sustainable use and equitable sharing of benefits into binding commitments in substantive provisions contained in Articles 6 to 20. These article contain key provisions on, among others, measures for the conservation of biological diversity, both in situ and ex situ; incentives for the conservation and sustainable use of biological diversity, research and training; public awareness and education; assessing the impacts of projects upon biological diversity; regulating access to genetic resources; access to and transfer of technology; and the provisions of financial resources.</p>	<p>The sixth meeting of the Conference of the parties to the Convention on Biological Diversity wash held at the Hague, 7-19 April 2002. South Africa participated in this meeting.</p> <p>Next meeting of the Conference of the Parties is in 2004 -- hosting party/ venue still to be determined.</p> <p>Priority themes for the seventh meeting of the Conference of the Parties are: mountain ecosystems; protected areas; and transfer of technology and technological cooperation.</p> <p>13-21 June 2002 Geneva, Switzerland --Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (Third Session) -- organiser is WIPO</p> <p>25-27 June 2002 Geneva Council for Trade-Related Aspects of Intellectual Property Rights -- Organiser WTO</p> <p>26-4 September 2002 -- Johannesburg, South Africa -- the World Summit on Sustainable Development --</p>	<p>The white paper on the conservation and sustainable use of South Africa's biodiversity was published in July 1997. This has led to the cross-sectoral coordination and implementation of aspects relating to biodiversity conservation.</p> <p>Sustainable development: South Africa's policies and programmes recognise that the conservation of biodiversity has to go hand in hand with meeting social and economic needs (RDP, ISRDS NEPAD).</p> <p>National Biodiversity Legislation is key to the implementation of the Convention. South Africa is in the process of developing such legislation.</p> <p>National Biodiversity Strategies and Action Plans: In order to mainstream biodiversity into planning South Africa is in the process of developing its National Biodiversity Strategy and Action Plan as required by Article 6 of the Convention.</p> <p>Cartagena Protocol on Biosafety: South Africa still has to accede to the CPB adopted in January 2000, to strengthen institutional capacity to address potential risks posed by living modified organism and ensure an adequate level of protection in the transfer, handling and use of living modified organisms resulting from modern biotechnology. The GMO Act is in place.</p> <p>Strengthen institutional and regional collaboration: Implementation of CBD require collaboration and cooperation among national and provincial and local spheres of governments and among with civil society and communities. The National Biodiversity Committee was established to promote national collaboration.</p>

		<p>organiser UN</p> <p>21-28 September 2003 -- The 5th World Congress on Protected Areas -- Durban, South Africa -- organiser: IUCN</p>	<p>Strengthening synergies and collaboration among biodiversity related convention at national level is key to achieving the objectives of sustainable development and ensuring efficiency.</p>
<p>Convention on the Conservation of Migratory Species of Wild Animals</p> <p>Acceded: December 1991</p> <p>The Agreement on the Conservation of Albatrosses and Petrels</p>	<p>The convention was a response to the need for nations to cooperate in the conservation of animals that migrate across their borders. These include terrestrial mammals, reptiles, marine species and birds. Special attention is paid to endangered species. South Africa is a major partner in this convention as it is the terminus for many of the migratory species, both to the Palaeoarctic (birds) and the Antarctic species (whales and birds).</p>	<p>COP5, which was held from 10 to 16 April 1997 in Geneva, Switzerland, elected South Africa the alternate member of the Standing Committee for the Africa region.</p> <p>COP6 was held in South Africa in November 1999.</p> <p>Next Conference: COP7 in Bonn from 18-24 September 2002</p> <p>Biodiversity Conservation</p>	<p>A trilateral agreement is currently being negotiated between Namibia, Botswana and South Africa for the conservation of sand grouse. This agreement will ensure the survival of the species and enhance cooperative regional conservation efforts.</p> <p>South Africa has set in motion the procedures for ratification of the African-Eurasian Migratory Waterbird Agreement. (AEWA) As a very important range state of migratory waterbird, we can make a significant contribution in the global conservation efforts of these birds and their habitats (wetlands).</p> <p>Proposals for the inclusion of 11 migratory bird species in the appendices of the AEWA have been submitted to the secretariat for discussion at the forthcoming meeting of the parties.</p> <p>Cabinet has approved South African signature of Agreement on the Conservation of Albatrosses and Petrels (ACAP) on 23 January 2002 (decision no. 29). The South African High Commissioner in Canberra signed the Agreement on behalf of the South African Government. The agreement was tabled in Parliament for ratification in June 2002.</p>
<p>Convention to Combat Desertification</p> <p>Signed: 9 January 1995</p> <p>Ratified: 30 September 1997</p> <p>Acceded: June</p>	<p>Convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa.</p> <p>The UNCCD seeks to engage local communities and their associations,</p>	<p>COP5 was held from 1-12 October 2001 in Geneva, Switzerland.</p> <p>Africa Regional conference preparatory to the first session of the Committee for the Review of the Implementation of the Convention is</p>	<p>Environmental advantages include improved productivity, land-use, agriculture and forestry, rehabilitation of land and water resources and positive effects on trade related to the environment. This will have a big impact on poverty reduction in rural areas.</p> <p>Socio-economic advantages include opportunities for income generating activities for</p>

<p>1994</p>	<p>NGOs, researchers and experts, legislators, developed countries' parties as well as financial and technical cooperation agencies in a new partnership to tackle environmental degradation (land degradation, deforestation, loss of biodiversity and global warming) as a cross-sectoral concern and as an integral part of policies, programmes and strategies for sustainable long-term development.</p>	<p>scheduled for the 15-19 July, Namibia.</p> <p>Committee for the Review of Implementation of the Convention (CRIC) is scheduled for 18-29 November, Bonn.</p>	<p>"survivalists", especially women who are the main agriculturalists in the rural areas.</p> <p>Financial advantages include immediate access to funding available from developed country parties. Political advantages include full participation in negotiations as a party and voting of our scientists and other officials to the various ad hoc groups of the Committee on Science and Technology. It will also enhance our political stance in the G77 and Africa groups. The CCD is also a main focus for the WSSD.</p> <p>As signatories to the UNCCD, the country is obliged to develop the National Action Programme. South Africa will now through the currently developed NAP promote policies and strengthen institutional frameworks which develop cooperation and coordination between donor community, government at all levels, local populations and community groups, and facilitate access by local populations to appropriate information and technology and help them control the resources in their areas.</p>
<p>Convention concerning the protection of the world cultural and natural heritage</p> <p>Ratified: 10 July 1997</p>	<p>The convention aims to promote cooperation among nations to protect natural and cultural heritage, which is of such outstanding universal value that its conservation is of concern to all people. UNESCO adopted the convention in 1972. At present 144 countries are Parties to it.</p>	<p>Three new South African sites have been added to the World Heritage List namely:</p> <ul style="list-style-type: none"> - St Lucia - Cradle of Humankind (Sterkfontein) - Robben Island - Ukhahlamba-Drakensberg <p>List of proposed sites:</p> <p>Next meetings:</p>	<p>International funding, technical and training assistance for protection and management of heritage sites now accessible.</p> <p>The convention enhances recognition of South Africa's outstanding heritage sites, hence encourages increased tourism and creation of employment opportunities for communities living in the vicinity of these sites. Prestige of these heritage sites are enhanced once they are inscribed on the World Heritage List and they receive equal international protection as World Heritage sites.</p> <p>South Africa's commitment and role as a member of UNESCO, towards the protection of the World Cultural and Natural heritage, will be recognised by</p>

			other members of the international community.
<p>United Nations Framework Convention on Climate Change</p> <p>Signed: 15 June 1993 27 August 1997</p> <p>Ratified: 29 August 1997</p>	<p>154 governments in Rio de Janeiro signed the United Nations Framework Convention on Climate Change during the United Nations Conference on Environment and Development (UNCED) in June 1992. The convention addresses the threat of global climate change by urging governments to reduce the sources of greenhouse gases. The ultimate objective of the convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system of the world.</p>	<p>South Africa has approved the accession to the Kyoto Protocol and the instrument of accession is being prepared by the Department of Foreign Affairs. Accession should happen before WSSD.</p> <p>The sixteenth sessions of the subsidiary bodies took place in Bonn Germany from 5-14 June 2002.</p> <p>COP8 will be held in India from 23 October to 1 Nov 2002 It is expected that Parties will be negotiating the further implementation of the Convention and the Kyoto Protocol provisions.</p>	<p>South Africa is now able to influence current international negotiations, which will directly affect its own economic and environmental interest.</p> <p>Eligible for Global Environment Facility (GEF) as well as financial assistance from industrialised countries.</p> <p>Access to financial, technological and information resources will facilitate meaningful participation by all stakeholder groups in the national climate change policy development process.</p> <p>The energy sector has several programmes in place to improve the efficiency of the coal-fired thermal-power systems. The convention enhances international recognition and support for these and other commitments towards greenhouse gas control.</p>
<p>Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal</p> <p>Ratified: May 1994</p> <p>Acceded: 5 April 1994</p>	<p>The main objectives of the convention are the reduction of the production of hazardous waste and the restriction of transboundary movement and disposal of such waste. It also aims to ensure that any transboundary movement and disposal of hazardous waste, when allowed, is strictly controlled and takes place in an environmentally sound and responsible way. Locally, the Waste Management Bill is under preparation, and this bill will enact the Basel Convention. South</p>	<p>Next Conference: COP 6 is in December 2002.</p>	<p>Improved international cooperation has resulted in better control of hazardous waste movements and complete transparency in cases where such movements do occur. The ban on hazardous waste movements from OECD countries to non-OECD countries for final disposal and recycling became effective in 1998, but has not been ratified by a sufficient number of parties.</p>

	Africa hosts the Basel Convention Regional Centre for English Speaking African countries. The centre is located in Vista University, Pretoria.		
Convention on Prior Informed Consent Signed: Not signed	<p>In March 1998, after two years of negotiations, 95 governments including South Africa finalized the text of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. The text of the convention was adopted and opened for signature at a Diplomatic Conference in Rotterdam in September 1998. South Africa didn't sign the Convention.</p> <p>The Convention represents an important step towards ensuring the protection of citizens and the environment in all countries from the possible dangers resulting from trade in highly dangerous pesticides and chemicals. It will save lives and protect the environment from the adverse effects of toxic pesticides and other chemicals. It will establish a first line of defense against future tragedies by preventing unwanted imports of dangerous chemicals, particularly in developing countries. By extending to all</p>	<p>A final text for the Convention was negotiated in March 1998. South Africa will be acceding to the Convention in 2002.</p> <p>Next Conference: INC 9 Geneva September 2002</p>	<p>The convention will ensure obligatory detailed information exchange between countries on hazardous chemicals and pesticides allowing informed decision-making on the national use of such chemicals. It is not yet clear how large the additional administrative burden will be on the government. Chemicals controlled include:</p> <p>Pesticides: 2,4,5-T, aldrin, captafol, chlorobenzilate, chlordane, chlordimeform, DDT, dieldrin, dinoseb, 1,2-dibromoethane (EDB), fluoroacetamide, HCH, heptachlor, hexachlorobenzene, lindane, mercury compounds, pentachlorophenol and certain formulations of methyl-parathion, methamidophos, monocrotophos, parathion, phosphamidon.</p> <p>Industrial chemicals: crocidolite, polybrominated biphenyls (PBB), polychlorinated biphenyls (PCB), polychlorinated terphenyls (PCT), tris (2,3 dibromopropyl) phosphate.</p>

	<p>countries the ability to protect themselves against the risks of toxic substances, it will have "leveled the playing field" and raised global standards for protection of human health and the environment.</p> <p>In short, the Convention will enable the world to monitor and control the trade in very dangerous substances. It will give importing countries the power to decide which chemicals they want to receive and to exclude those they cannot manage safely. If trade does take place, requirements for labeling and provision of information on potential health and environmental effects will promote the safe use of these chemicals.</p>		
	<p>The objective of the Convention is to protect human health and the environment from the effects of chemical pollutants commonly known as persistent organic pollutants (POPs). 12 persistent organic pollutants (POPs) have been targeted for immediate action in the POPs finalized text and were selected on the basis of irrefutable evidence gleaned from decades of acceptable scientific research that these chemicals are capable of doing enormous harm to</p>	<p>A final text of the Convention was finalised in South Africa in December 2000. South Africa signed the Convention in May 2001 and will be ratifying the Convention in 2002. The Next meeting is INC-6 that will be held in June 2002, Geneva.</p>	<p>These chemicals are: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCBs, dioxins and furans.</p> <p>South Africa applied for an exemption for the use of PCBs in transformers and DDT for pest control until an effective alternative has been found.</p>

	humans, wildlife and the environment.		
<p>Protocol on Substances that Deplete the Ozone Layer</p> <p>Ratified: 15 January 1990</p> <p>Acceded: 15 January 1990</p>	<p>The protocol is aimed at ensuring measures to protect the ozone layer. South Africa also ratified the subsequent London Amendments to the protocol on 12 May 1992 designed to restrict the use of chlorofluorocarbons (CFCs) and halons. Parliament has approved ratification of the Copenhagen Amendments to the Protocol and the necessary steps are now being taken for the instrument for ratification to be deposited. South Africa has however acted in full compliance with these amendments.</p>	<p>Agreed upon in September 1987.</p> <p>Until recently, South Africa was regarded as a developed country under the Montreal Protocol. This entailed earlier phase-out dates for ozone-depleting substances as well as an annual contribution of about R3 million to the Protocol's Multilateral Fund.</p> <p>At the September 1997 Meeting of the Parties in Montreal, Canada, and South Africa undertook to honour all commitments undertaken as a developed country. The Montreal Amendments to the Protocol (1997) still have to be ratified. COP 10 was held in Cairo, Egypt from 17 to 27 November 1998.</p> <p>Next Conference: Will be held from 29 November - 3 December 1999 in Beijing, China.</p>	<p>If there had been no Montreal Protocol and the world consumption of ozone depleting substances kept on growing, we would in due course have reached the point when the ozone layer was depleted to such an extent over non-tropical areas of the world that life as we now know it would not be possible.</p> <p>As the ozone layer absorbs harmful UV-rays from the sun, damage to the ozone layer means that these harmful rays will penetrate to the surface of the earth where they may cause skin cancer, blindness and damage the immune system in humans. They also have a negative effect on crops, plankton and animals.</p> <p>Ratification of the Montreal Protocol by most of the countries of the world will lead to the phasing out and eventual disappearance of ozone depleting substances. In years to come the already damaged ozone layer will be repaired and the potential problems mentioned above would have been averted.</p> <p>This will, however, only happen if all countries cooperate by complying with the requirements of the Montreal Protocol.</p>
Not applicable to built environment			
Not applicable to built environment			
Not applicable to the built environment			
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Appendix C: United Nations Division for Sustainable Development – Indicators of Sustainable Development

CSD Theme Indicator Framework		
Economic		
Theme	Sub-theme	Indicator
Economic Structure (2)	Economic Performance	GDP per Capita
		Investment Share in GDP
	Trade	Balance of Trade in Goods and Services
	Financial Status (33)	Debt to GNP Ratio
Total ODA Given or Received as a Percent of GNP		
Consumption and Production Patterns (4)	Material Consumption	Intensity of Material Use
	Energy Use	Annual Energy Consumption per Capita
		Share of Consumption of Renewable Energy Resources
		Intensity of Energy Use
	Waste Generation and Management (19-22)	Generation of Industrial and Municipal Solid Waste
		Generation of Hazardous Waste
		Management of Radioactive Waste
Waste Recycling and Reuse		
Transportation	Distance Travelled per capita by Mode of Transport	
Social		
Equity	Poverty (3)	Percent of Population Living below Poverty Line
		Gini Index of Income Inequality
		Unemployment Rate
	Gender Equality (24)	Ratio of Average Female Wage to Male Wage
Health (6)	Nutritional Status	Nutritional Status of Children
	Mortality	Mortality rate Under 5 Years Old
		Life Expectancy at Birth
	Sanitation	Percent of Population with Adequate Sewage Disposal Facilities
	Drinking Water	Population with Access to Safe Drinking Water
	Healthcare Delivery	Percent of Population with Access to Primary Health Care Facilities
Immunization Against Infectious Childhood Diseases		
Contraceptive Prevalence rate		
Education (36)	Education Level	Children Reaching Grade 5 of Primary Education
		Adult Secondary Education Achievement Level
	Literacy	Adult Literacy Rate
Housing (7)	Living Conditions	Floor Area per Person
Security	Crime (36, 24)	Number of Recorded Crimes per 100,000 Population

Population (5)	Population Change	Population Growth rate
		Population of Urban Formal and Informal Settlements
Environmental		
Atmosphere (9)	Climate Change	Emissions of Greenhouse Gases
	Ozone Layer Depletion	Consumption of Ozone Depleting Substances
	Air Quality	Ambient Concentration of Air Pollutants in Urban Areas
Land (10)	Agriculture (14)	Arable and Permanent Crop Land Area
		Use of Fertilizers
		Use of Agricultural Pesticides
	Forests (11)	Forest Area as a Percent of Land Area
		Wood Harvesting Intensity
	Desertification (12)	Land Affected by Desertification
	Urbanisation (7)	Area of Urban Formal and Informal Settlements
Oceans, Seas and Coasts (17)	Coastal Zone	Algae Concentration in Coastal Waters
		Percent of Total Population Living in Coastal Areas
	Fisheries	Annual Catch by Major Species
Fresh Water (18)	Water Quantity	Annual Withdrawal of Ground and Surface Water as a Percent of Total Available Water
	Water Quality	BOD in Water Bodies
	Water Quality	Concentration of Faecal Coliform in Freshwater
Biodiversity (15)	Ecosystem	Area of Selected Key Ecosystems
		Protected Area as a % of Total Area
	Species	Abundance of Selected Key Species