



**Western Cape
Government**

Environmental Affairs and
Development Planning

Western Cape Climate Change Response Implementation Framework

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EXECUTIVE SUMMARY

As outlined in the Western Cape Climate Change Response Strategy (WCCCRS), the Implementation Framework is the second of three phases in the development a Western Cape response to Climate Change; the others being – Phase 1: Development of the WCCCRS and Phase 3: Monitoring and Evaluation Framework.

The Strategy will be executed through an Implementation Framework which identifies both internal and external stakeholders and drivers, with a strong emphasis on partnerships. A key component of the Strategy is to encourage work in an integrated fashion across all departments in the WCG as well as with other stakeholders, including local authorities, other government departments, civil society, academia and research institutions, and business. Many external stakeholders have contributed to the development of the WCCCR Strategy, as much of the work being done in the climate change space occurs outside of government structures.

This document seeks to lay out the manner in which implementation of the WCCCRS will take place. It does this by breaking the Implementation Framework down into the focus areas as laid out in the WCCCRS and for each clarifies the priority programmes, enablers / opportunities, barriers / risks, key drivers, key stakeholders and the measurable impact.

The climate change focus areas, as identified in the WCCCRS, include:

- Energy Efficiency and Demand-Side Management
- Renewable Energy
- The Built Environment
 - Critical Infrastructure
 - Waste Minimization and Management
 - Human Settlements
- Sustainable Transport
- Water Security and Efficiency
- Biodiversity and Ecosystem Goods and Services
- Coastal and Estuary Management
- Food Security
- Healthy Communities

A number of overarching programmes that will feed into all the focus areas, include:

- Communication, awareness raising, capacity building and education;
- Financial models and mechanisms; and
- Job Creation.

The measurable impacts will be defined and the transition to a low carbon and climate resilient Western Cape Province tracked in the WCCCRS Monitoring and Evaluation Framework. The latter constitutes phase 3 to be developed in 2014/15.

INTRODUCTION

The Western Cape Climate Change Response Strategy (WCCCRS) identifies the urgent need to collectively contribute to global and national efforts to mitigate climate change and build resilience in our communities and province. These efforts will also ensure that the Western Cape reduces its own carbon contribution and reliance on fossil fuels, whilst enabling locally effective adaptation action to address the impacts of unavoidable climate change occurring now, and in future. The WCCCRS outlines a coordinated climate change response for the Western Cape Province that will guide the collective implementation of innovative projects as well as the search for opportunities that combine a low carbon development trajectory with increased climate resilience, enhancement of ecosystems and the services they provide, as well as economic growth and job creation. This response will be executed through the Implementation Framework outlined below which will seek to integrate climate action across all departments in the WCG and among other stakeholders, including all three spheres of government, civil society, business and industry, academia and research institutions. The Implementation Framework will guide the development of a Monitoring and Evaluation Framework for the implementation of the WCCCRS.

Approach

Although the Strategy takes a two-pronged approach to addressing climate change, the Implementation Framework seeks to combine climate change adaptation and mitigation in implementation where possible, utilising the cross-cutting programmes of communication, stakeholder engagement, awareness raising and community behaviour change, capacity building and education; financial models and mechanisms; and job creation as common threads that will allow for integrated and improved decision making. This integrated programmatic approach seeks to transform the economy, ecosystems, and communities of the Western Cape into a low carbon climate resilient sustainable province, by organising responses around geographic regions or particular themes as appropriate.

Structure of Implementation Framework

The Implementation Framework is structured according to the focus areas identified in the Strategy. These are supported by cross-cutting programmes and partnerships. The selection of the focus areas was a result of an extensive engagement process with a wide range of stakeholders across the province in the development of the Strategy and will be reviewed on a regular basis.

The focus areas include:

- Energy Efficiency and Demand-Side Management
- Renewable Energy
- The Built Environment, including Critical Infrastructure, Integrated Waste Management and Human Settlements
- Sustainable Transport
- Water Security and Efficiency
- Biodiversity and Ecosystem Goods and Services
- Coastal and Estuary Management
- Food Security
- Healthy Communities

The WCCCRS identifies priority programmes for each of the focus area and these are further detailed in the Implementation Framework. For each of the priority programmes, enablers and/or opportunities, barriers and/or risks have been captured. Enablers and opportunities talk to existing programmes, partners, and structures, as well as co-benefits of any such actions. Risks and barriers talk to the dangers of maladaptation, financial barriers, institutional barriers, acceptance barriers, and unanticipated failures of new innovative responses. It is important to recognise that communication across sectors, partners and geographical space is key in seeking to enhance enablers and opportunities, while reducing risk and removing barriers. This Implementation Framework therefore seeks to support the creation of an enabling environment whereby climate change can be

mainstreamed into the planning and decision-making of government, private sector, and civil society.

Partnerships are key to giving effect to such an integrated approach and to this end, the Implementation Framework identifies the stakeholder groups for each priority programme under the focus areas.

In order to initiate, co-ordinate, and reduce duplication within such a multi-scalar, multi-partner integrated programmatic approach, the Implementation Framework contains institutionally relevant information such as relevant structures, initiatives, policies and legislation that may already be in existence. Once again, this will facilitate co-ordination, co-ownership, and streamlining to avoid unnecessary duplication and inefficiencies.

A Monitoring and Evaluation Framework (M&E Framework) will be developed to accompany this Implementation Framework in order to assess the extent of progress towards achieving the objectives of the WCCCRS. The Implementation Framework is designed to link to the M&E Framework, through the inclusion of a number of fields that can be expanded into further detail in the M&E Framework. In addition, each priority programme identifies impact potential and/ or benefit which aims to identify, where possible, measurable quantifiable or qualifiable impacts.

The M&E Framework will aim to:

- provide a clear picture of the various climate change mitigation and adaptation responses
- assess the effectiveness of the individual response measures,
- measure the combined effectiveness and level of co-ordination of climate change responses across the Western Cape Province, and
- enable efficient participation and reporting into national and international climate change commitments and responses

FOCUS AREA 1 – ENERGY EFFICIENCY AND DEMAND-SIDE MANAGEMENT

The priority programmes highlighted under the Energy Efficiency and Demand Side Management focus area are:

- 1A – Development of fact-based energy efficiency targets for the Western Cape and relevant sectors;
- 1B – Implementation of building energy efficiency programmes and awareness raising, including improved energy efficiency of WCG's own building stock;
- 1C – Promotion and rollout of Solar water heaters (both low and high pressure systems)

Focus Area 1	Energy efficiency and demand-side management
Priority Programme 1A	Development of fact-based energy efficiency targets for the Western Cape and relevant sectors
Background	An energy consumption baseline was developed for the WC in 2012 (off 2009 data) and will be updated on a regular basis. The WCG is currently undertaking an energy and emissions scenarios exercise for the energy sector (also known as the Long Term Mitigation Scenarios exercise), which will allow for the development of quantified WC and sector targets. It is also necessary to understand the national mitigation interventions underway, including the work done under the Mitigation Potential Analysis, the Carbon Tax policy and the National Energy Efficiency Strategy.
Enablers / Opportunities	<p>Energy consumption baselines have been developed for the Western Cape, the Districts and sectors. These baselines are being used in the development of the Long Term Mitigation Scenarios process to develop fact-based targets for the sectors and identify key interventions.</p> <p>The National Energy Efficiency Strategy had developed sector-based targets that although voluntary, can be referred to in the development of the relevant sector targets for the Western Cape.</p> <p>The National Cleaner Production Centre runs the National Industrial Energy Efficiency Project, which holds information on energy consumption and reduction potential for the industrial sector. The National Business Initiative (NBI) has also undertaken the Private Sector Energy Efficiency Programme, which is supporting the private sector in implementation appropriate energy efficiency interventions in their activities.</p>
Barriers/ Risks	Access to data is one of the key barriers to the development of fact-based targets. Although a baseline has been developed for 2009, ongoing collection of data needs to take place in order to see progress towards achieving the targets over time. There are some difficulties in gaining access to data due to confidentiality and competition concerns.

	<p>The data is also housed by a number of different organisations, including municipalities, Eskom, South African Petroleum Industry Association (SAPIA) amongst others and the data is not collected according to the same geographical boundaries, which makes the analysis of the data difficult. It is particularly difficult for municipalities to get appropriate data from Eskom as Eskom's transition areas do not follow municipal boundaries.</p> <p>The ability to get reliable data on energy efficiency initiatives and then quantifying the impact of the initiatives on achieving the targets is difficult. A number of energy efficiency initiatives have been implemented in the private sector and some organizations are reluctant to share useful information due to competition concerns. The issues of confidentiality of specific user electricity consumption data needs to be addressed in order to allow for informed decision-making. It is difficult to make informed decisions without the specifics for sectors and sub-sectors.</p>	
Legislative / policy context (in addition to the WCCCRS)	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Long Term Mitigation Scenarios exercise – analysis of mitigation measures to develop trajectories to support emission reductions (2007). • National Energy Efficiency Strategy (2012) • National Integrated Energy Plan (2013) • National Integrated Resource Plan (2013) 	<ul style="list-style-type: none"> • WCG Departments of Environmental Affairs and Development Planning; Economic Development and Tourism; and Transport and Public Works • Eskom • National Departments of Energy and Environmental Affairs • National Cleaner Production Centre, National Business Initiative • Municipalities 	<ul style="list-style-type: none"> • Quantifiable targets for sectors and the Western Cape as a whole linked to time-frames and key activities (these need to be aligned with the national processes).

Focus Area 1	Energy efficiency and demand-side management
Priority Programme 1B	Implementation of building efficiency programmes and awareness raising, including improved energy efficiency of WCG's own building stock.
Background	The two key components of a building efficiency programme are (i) physical energy efficiency interventions and (ii) behavioral change strategies. Green building principles that drive efficiency improvements can be applied to both new buildings and to existing facilities through retrofitting. Interventions that facilitate the measurement and monitoring of energy use will be a significant driver of management practices, communication, awareness raising and behaviour change models that will bring about an overall reduction in energy demand from buildings.
Enablers / Opportunities	International and national carbon reduction commitments require a reduction in emissions from energy (either through a reduction in consumption or alternative energy sources). In addition, voluntary national energy efficiency targets exist that define what needs to be done in the building sector in order to achieve consumption reduction

	<p>targets.</p> <p>The Eskom Demand Side Management programme funds energy efficiency in the commercial and industrial sectors in terms of specific energy efficiency interventions, including lighting, solar water heaters, etc.</p> <p>The regulations in terms of Section 12L of the Income Tax Act (1962) on the allowance for energy efficiency savings also promote large scale energy efficiency interventions.</p> <p>The National Building Regulations Part XA “Energy Use in Buildings” and SANS 204 “Energy Efficiency in Buildings” both add to the energy efficiency requirements of new buildings.</p> <p>The increasing national electricity price has encouraged organisations and individuals to implement energy efficiency technologies in order to reduce their own consumption and therefore reduce costs spent on electricity.</p> <p>The Green Building Council of South Africa, has implemented a number of rating tools which guide the energy efficiency and other interventions that can be implemented in buildings.</p> <p>By implementing energy efficiency in its own buildings, the WCG can lead by example.</p>	
<p>Barriers/ Risks</p>	<p>The current national energy efficiency targets are voluntary, which makes it difficult to enforce energy efficiency actions at a national level. Although the business case for energy efficiency interventions is sound, there is reluctance by organisations to make the up-front capital investment in energy efficiency. For municipalities, the promotion of energy efficiency will negatively impact on municipal revenues from electricity sales, which impacts directly on their ability to undertake key service delivery.</p> <p>In terms of government buildings, barriers to implementation include procurement processes, which may restrict the use of innovative / untested technologies that may realize energy consumption reductions, the increased upfront costs or the unusual specifications that may be required.</p> <p>Although there is a perceived premium associated with green buildings, through additional upfront costs, the case for lower operational costs and most efficient resource use needs to be made. In many government building, the payment of utility bills does not place any responsibility on the department occupying the site, which means there is no incentive to reduce consumption. Poor maintenance of buildings can also cause problems as, in some cases, significant capital is required to upgrade the building before energy efficiency options are feasible.</p>	
<p>Legislative / Policy Context</p>	<p>Key Drivers / Stakeholders</p>	<p>Impact potential/ benefit (qualitative or quantitative)</p>
<ul style="list-style-type: none"> National Building Regulations, Part XA – Energy Use in Buildings and SANS 204 	<ul style="list-style-type: none"> WCG Departments of Environmental Affairs and Development Planning; 	<ul style="list-style-type: none"> Overall reduction in electricity consumed in

<ul style="list-style-type: none"> - Energy Efficiency in Buildings (2011) • Green Economy Strategy Framework (2013) • The National Energy Efficiency Strategy (2012) • National Climate Change Response Policy (2011) • Western Cape Infrastructure Framework (2013) • OneCape 2040 • Annual Department of Transport & Public Works (DTPW) Property Efficiency Report • National Department of Public Works Draft Green Building Policy (draft 3 dated 28 October 2013) 	<p>Transport and Public Works; Economic Development and Tourism</p> <ul style="list-style-type: none"> • Municipalities • Green Building Council SA • National Departments of Environmental Affairs, Energy and Public Works • Eskom • National Treasury • GreenCape • 110% Green 	<p>both WCG owned and rented buildings</p> <ul style="list-style-type: none"> • Improvement in overall energy efficiency of new and existing buildings through implementation of green building principles and targeted interventions to infrastructure and systems. • Improved energy efficiency and reduced consumption through (i) altered occupant behavior and (ii) entrenched management processes and systems that measure, monitor and manage energy use
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Focus Area 1	Energy efficiency and demand-side management
Priority Programme 1C	Promotion and rollout of Solar water heaters (both low and high pressure systems).
Background	<p>The large scale rollout of solar water heaters (SWH) – both high and low pressure systems – is a key intervention to support energy efficiency and address energy poverty. The roll-out of solar water heaters to date has been much smaller than planned due to technical and regulatory issues, The DoE still posts a national target of 1 million SWH by 2014/15 and the National Development Plan posts a national target of 4 million SWHs by 2030. To date 380 000 systems (305 000 low pressure and 75 000 high pressure) have been installed through government and Eskom programmes.</p>
Enablers / Opportunities	<p>The national government has highlighted the installation of low pressure SWH as a priority. R4.7 billion has been allocated from the fiscus for this purpose. Eskom and the DoE are developing a programme which will enable the supply, installation and maintenance of locally manufactured SWHs around the country.</p> <p>Due to the fact that most SWHs have been installed in Gauteng, KZN and the Western Cape to date, the intention is to redress the balance and supply proportionally more SWHs to the other provinces. Municipalities have been consulted in this process and a task team will shortly be set up to ensure that a collaborative systems is developed. Eskom continues to run the high pressure SWH rebate programme although this is currently under review.</p> <p>Awareness raising campaigns promoting the benefits of SWHs have been put in place by municipalities, Eskom and other stakeholders. The CCT is currently running a programme which accredits competent and professional SWH service providers and provides significant media support in promoting SWH and the accredited service providers to residents. This</p>

	<p>is expected to encourage the replacement of electric geysers with SWHs. The programme will extend to heat pumps once a SABS standard has been implemented. The Department of Trade and Industry has implemented local content requirements for solar water heaters (70% local content), to encourage the development of the solar water heater industry in South Africa. The local content requirements will only apply to government procured SWHs, but given the large fiscal allocation by government, it should ensure the growth of the local SWH manufacturing industry.</p> <p>The National Building Regulations Part XA requires that 50% of water heating in new buildings come from efficient sources – either solar water heaters or heat pumps, further supporting implementation in new buildings. .</p>	
<p>Barriers/ Risks</p>	<p>Low pressure systems: since the halting of the Eskom low pressure subsidy scheme and the DoRA funded DoE SWH rollout programme, there have been few opportunities for low income SWH rollout in the last two years. This has delayed the uptake of SWH as municipalities are unable to implement them without outside funding (either through the subsidy or other funding sources).</p> <p>Certain low pressure system rollouts have used inferior quality systems and poor installation, leading to systems failing and houses being damaged due to structural failures, roof and pipe leaks. This has created an unfair reliance on municipalities to address issues created by installers, which is outside the scope of the municipality's responsibility, and a general lack of trust of the technology amongst these communities.</p> <p>High pressure systems: The local high pressure solar water heater manufacturing market has been negatively impacted by both the inconsistent subsidy programmes and the influx of cheaper imports, which has led to a number of local manufacturers having to close operations. The new local content requirements for solar water heaters will assist local manufacturing companies participating in any government or Eskom driven programme, provided they are run well.</p> <p>High pressure systems are still considered to pose an expensive upfront cost when compared to a conventional geyser for mid-high income households. Home-owners are, therefore, reluctant to make the investment without some sort of subsidy or attractive finance schemes.</p>	
<p>Legislative/ Policy context</p>	<p>Key Drivers / Stakeholders</p>	<p>Impact potential/ benefit (qualitative or quantitative)</p>
<ul style="list-style-type: none"> • National target of 4M SWH installed by 2030 (1 million by 2014/15) in the NDP. • National Buildings Regulations Part XA (2011) • Green Economy Strategic Framework (2013) • National Climate Change Response Policy (2011) 	<ul style="list-style-type: none"> • National Departments of Energy, Environmental Affairs and Development Planning, Trade and Industry. Treasury • WCG Departments of Economic Development and Tourism; Environmental Affairs and Development Planning; Transport and Public Works; Human Settlements • GreenCape 	<ul style="list-style-type: none"> • Increased number of solar water heaters installed in the Western Cape. • Increased number of solar water heater manufacturers, installers and maintenance teams operating in the Western Cape. • Improved quality of life for the poor

	<ul style="list-style-type: none"> • Municipalities • Local and international finance and banking institutions 	<ul style="list-style-type: none"> • Growth of the low carbon economy
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FOCUS AREA 2 – RENEWABLE ENERGY

The priority programmes identified under the Renewable Energy Focus area include:

- 2A – Development of the renewable energy economy in the Western Cape, in terms of both the appropriate placement of utility scale renewable energy generation as well as manufacturing opportunities
- 2B – Development of waste-to-energy generation opportunities for both municipal and private (industrial and commercial) waste systems;
- 2C – Development of opportunities around small-scale renewable energy (embedded generation).

Focus Area 2	Renewable Energy
Priority Programme 2A	Development of the renewable energy economy in the Western Cape, in terms of both the appropriate placement of utility scale renewable energy generation facilities as well as developing local manufacturing opportunities.
Background	Renewable energy is a key focus for the Western Cape and forms a fundamental component of the drive towards the Western Cape becoming the green economy hub for Africa. The Western Cape has a role to play in supporting the development of a responsible renewable energy industry through promoting the appropriate placement of utility scale renewable energy facilities in strategic areas of the Western Cape as well as through supporting renewable energy manufacturing industries.
Enablers / Opportunities	<p>The realization of our national and international carbon emission reduction targets will require the generation and uptake of renewable energy. Renewable energy opportunities have been prioritized through the national targets set and energy mix proposed in the national Integrated Resource Programme (IRP) (2010). Procurement of utility scale renewable energy is taking place through the national Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).</p> <p>The national Department of Environmental Affairs is undertaking a strategic environmental assessment for the placement of wind and solar PV facilities in the country. This study will highlight key areas where the development of these facilities will be promoted and facilitated. The Western Cape Government has similarly developed a strategic environment assessment for the placement of wind energy facilities, which assesses environmental and planning considerations as well as wind resources to facilitate development in the most appropriate areas for wind energy facilities. .</p> <p>The Green Economy Strategy Framework states the Western Cape's aspiration of being the lowest carbon province in the country. There is</p>

	<p>therefore increased promotion of the opportunities around renewable energy, in terms of placement of large-scale facilities as well as the manufacturing of technology associated with renewable energy.</p> <p>The GreenCape (a special purpose vehicle under the WC Department of Economic Development) was established in late 2010 to promote the green economy, including the development of the renewable energy industry. GreenCape has worked closely with national government to lobby for increased locally manufactured content in the national REIPPP process.</p> <p>A renewable energy training centre is being developed at the Cape Peninsula University of Technology in Bellville, where training of wind and solar technicians will take place.</p>	
Barriers/ Risks	<p>Although the cost of some renewable energy options is higher than conventional coal based electricity, some technologies are reaching price parity with new coal. This is, however, still making it difficult for local companies in the energy space to actively participate in the energy market, again conventional energy sources, without international investment and support.</p> <p>Currently, the expertise around renewable energy in South Africa is limited, which has meant that many of the job opportunities have been taken up by foreign companies. There will, however, be increased job creation opportunities with REIPPPP and smaller locally driven commercial and residential projects, particularly in the installation and maintenance employment area.</p> <p>The placement of large-scale facilities is typically on agricultural or environmentally sensitive land. This inevitably gives rise to land-use and priority challenges (e.g. food security vs energy supply).</p> <p>The current national energy mix is strongly vested in coal, with natural gas and nuclear also seen as dominant energy sources, which has resulted in a smaller allocation to renewables.</p>	
Legislative / Policy Context	Key Drivers/ Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Development Plan (2012) • Integrated Energy Plan (2013) • Integrated Resource Plan (2013) • Integrated Energy Strategy (draft) (2014) • REIPPPP (2011) • Green Economy strategy Framework (2013) 	<ul style="list-style-type: none"> • National Department of Environmental Affairs, Energy, Trade and Industry and Science and Technology • WCG Departments of Environmental Affairs and Development Planning; Economic Development and Tourism • GreenCape • Municipalities • Renewable energy project developers and manufacturing companies. 	<ul style="list-style-type: none"> • Increased generation potential from renewables in the Western Cape. • Placement of renewable generation facilities that minimizes negative impacts • The promotion of skilled and unskilled job opportunities from the sector in the Western Cape. • Number of trainees from the energy training centre (CPUT).

Focus Area 2	Renewable Energy	
Priority Programme 2B	Development of waste-to-energy opportunities for both municipal and private (commercial and industrial) waste systems	
Background	Waste-to-Energy opportunities provide an alternative to the disposal of waste via landfill sites. There is a need to investigate the opportunities in order to facilitate large scale rollout. This includes an understanding of the most appropriate technologies for waste-to-energy projects as well as developing decision support tools for municipalities to implement waste-to-energy projects.	
Enablers / Opportunities	<p>Municipalities are currently experiencing significant waste volumes. Landfill sites are currently the main disposal method for waste in municipalities and there is a need for alternative treatment of waste. There is an abundance of potential technology service providers who are trying to access municipal solid waste in order to implement their systems.</p> <p>Waste-to-energy technologies provide an opportunity for municipalities to generate electricity for their own consumption.</p>	
Barriers/ Risks	<p>Waste-to-energy projects require a lengthy approval process as most will require the establishment of a Public Private Partnership in terms of the Municipal Finance Management Act. The lengthy process impacts on developer confidence.</p> <p>Although there is an abundance of technology service providers available in South Africa, most of the technology has not yet been tested in the South African municipal context. It is therefore difficult to make the business case for South African municipalities. Most municipalities also lack the expertise to make decisions about the most appropriate technologies for their waste streams. Furthermore, waste characterization exercises have not been completed, so the municipality will only have a general understanding of the composition of their waste streams. This can impact on the calculation of the calorific content of waste.</p> <p>The energy costs from waste-to-energy projects are currently higher than those at which the municipality purchases electricity from Eskom, making it difficult for the municipality to purchase directly from the private developer.</p>	
Legislative / Policy Context	Key Drivers/ Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Development Plan (2012) • National Integrated Energy Plan (2013) • Draft Western Cape 	<ul style="list-style-type: none"> • National Departments of Environmental Affairs, Energy • WCG Departments of Environmental Affairs and Development Planning; 	<ul style="list-style-type: none"> • Increased energy generation potential from waste. • Decrease in waste going to landfill.

Integrated Energy Strategy (2014) • Green Economy Strategy Framework (2013)	Economic Development and Tourism and Agriculture • GreenCape • Municipalities • Project Developers	• Skilled and unskilled job opportunities from the sector.
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Focus Area 2	Renewable Energy
Priority Programme 2C	Development of small-scale renewable energy (embedded generation) opportunities.
Background	Renewable energy is a key area of focus for the Western Cape, and forms a fundamental component of the drive towards the Western Cape becoming the green economy hub for Africa. Small-scale renewable energy facilities (e.g. rooftop PV) on residential, commercial and industrial facilities are starting to be implemented on a larger scale and there is an increasing demand for permission to push surplus energy generated into the national grid and to be recompensed.
Enablers / Opportunities	<p>The increasing cost of electricity, a lack of supply security and decreased costs of small scale renewable energy technologies has led to improved financial viability of and an increased demand for alternative energy technologies, including rooftop solar PV facilities for residential, commercial and industrial facilities. In many cases these facilities generate electricity for their own consumption.</p> <p>There is a drive in the Western Cape to promote a renewable energy manufacturing sector and there are opportunities around the development of small-scale renewable energy technology and the associated job creation opportunities.</p>
Barriers/ Risks	<p>Although the costs for these technologies are becoming more affordable, users are looking to feed excess electricity back into the grid in order to offset some of the costs.</p> <p>Technology exists that allows for feed-in systems but the regulatory framework needs to be tailored accordingly to ensure compliant and safe embedded generation. The impact on municipal revenue is, however, not yet fully understood. Municipalities will be required to develop appropriate tariffs for the purchasing of the excess electricity in a way that will not impact on their revenue models.</p> <p>The current legislation is not clear on whether users will be required to obtain a distribution license if they are generating for their own use. Storage systems for distributed renewable energy generation are currently prohibitively expensive. In many cases, users will therefore utilize the grid as a "storage" system i.e. they will "sell" the electricity to the municipality during the day (when the solar resource is available) and will then "buy" the electricity back from the municipality in the evenings when the electricity is used. This results in the municipality having to still provide maximum capacity at peak times of day. This has financial implications for both the users and the municipality.</p>

Legislative/ Policy context	Key Drivers/ Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Integrated Energy Plan (2013) • National Integrated Resource Plan (2013) • Green Economy Strategy Framework (2013) 	<ul style="list-style-type: none"> • National Department of Energy • Eskom • WCG Departments of Local Government; Environmental Affairs and Development Planning; Economic Development and Tourism • Municipalities • GreenCape 	<ul style="list-style-type: none"> • Increased installation of small scale distributed generation systems. • Increase in the number of municipalities implementing appropriate tariff structures to promote small-scale embedded generation.

FOCUS AREA 3 – THE BUILT ENVIRONMENT:

Focus area 3, The Built Environment, is divided into three programme areas which each have listed priorities. These three programme areas include:

- 3.1 Critical Infrastructure
- 3.2 Waste Minimization and Management
- 3.3 Human Settlements

Focus Area 3.1-Critical Infrastructure

The priority programmes under the Built Environment: Critical Infrastructure focus area include:

- 3.1 A - Development of appropriate planning tools to integrate climate change into decision-making;
- 3.1 B - Towards consideration and incorporation of climate change in Disaster Management Plans across the province ;
- 3.1 C - Mainstreaming of climate change into municipal and provincial spatial planning processes.

Focus Area 3.1	Critical Infrastructure
Priority Programme 3.1A	Development of appropriate planning tools to integrate climate change into decision-making
Background	The Western Cape Infrastructure Framework (2013) defines a new approach to coordinated and strategic infrastructure planning in the Western Cape. Climate change responses and impacts, including the need to reduce GHG emissions and the impact that extreme events and ecosystem degradation will have on the Western Cape have been integrated into the framework.
Enablers / Opportunities	The Western Cape Infrastructure Framework provides the context for embarking on the development of district level implementation plans, which may identify the need for decision support tools. This would be an ideal opportunity to develop such tools in partnership with the Department of Transport and Public Works and municipalities.
Barriers/ Risks	The development of tools doesn't always translate into the use of the tools. Tools tend to be generic and often involve behavior change, with the result that they aren't considered and business as usual prevails. To avoid this, municipalities need to be engaged with to understand what tools could support their needs. Maladaptation is always a concern, particularly when taking a sectoral view on responses to climate change. In light of the significant budgets and implications of implementing infrastructure changes, the decision support tools developed should be based

	on the principles of adaptability and flexibility.	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> Western Cape Infrastructure Framework (2013) 	<ul style="list-style-type: none"> WCG Departments of Environmental Affairs and Development Planning; Transport and Public Works; Local Government Climate Systems Analysis Group, UCT CSIR 	<ul style="list-style-type: none"> Climate change mainstreamed into medium to longer term infrastructure and spatial planning.

Focus Area 3.1	Critical Infrastructure	
Priority Programme 3.1B	Towards consideration and incorporation of climate change in Disaster Management Plans across the province	
Background	Climate related disasters often result in damage to critical infrastructure. This should be noted in risk assessments and disaster debriefings and risk reduction measures should be included in disaster management plans.	
Enablers / Opportunities	There is a strong risk reduction mandate contained in the National Disaster Management Act, and this should be included in provincial and district disaster management planning. This provides an opportunity to align infrastructure risk reduction measures with the provincial and district infrastructure frameworks and plans. The Act places the onus for rehabilitation and reconstruction of infrastructure on the organ of state responsible for maintaining such infrastructure (7.7.14 of National Disaster Management Framework). Therefore disaster management plans need to have a clear understanding of the climate change implications.	
Barriers/ Risks	Financing risk reduction remains a significant barrier to implementing identified risk reduction actions. Disaster damaged critical infrastructure is often just replaced in its previous form due to constraints such as lack of finance, EIA demands, lack of specialist studies and the lack of appetite to do things differently and the need to quickly resolve the problem.	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> Disaster Management Act (2002) Provincial Disaster Management Framework (2007) District Disaster Management Plans Provincial Disaster Management Plan Municipal Disaster Management Plans 	<ul style="list-style-type: none"> National Disaster Management Centre Western Cape Disaster Management Centre District and local disaster management centres WCG Department of Transport and Public Works National Treasury 	<ul style="list-style-type: none"> Risk reduction actions related to critical infrastructure included in relevant plans. Risk reduction gaps are identified. Climate risk to critical infrastructure decreased.

	• Provincial Treasury	
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Focus Area 3.1	Critical Infrastructure	
Priority Programme 3.1C	Mainstreaming of climate change into municipal and provincial infrastructure and spatial planning processes	
Background	<p>PSDF aims to put in place a coherent framework for the Province's urban and rural areas, by focusing on a transversal system of spatial governance, the sustainable use of the Western Cape's assets, opening up opportunities in the Provincial space-economy and developing integrated and sustainable human settlements.</p> <p>The Western Cape Infrastructure Framework (2013) defines a new approach to co-ordinated and strategic infrastructure planning in the Western Cape. The framework will be used to align existing infrastructure planning processes and outlines the strategic decisions and trade-offs that need to be made to achieve the provincial 2040 vision in a complex and changing environment. It will also identify and guide the planning and execution of major infrastructure interventions, mobilise and direct new investment and facilitate partnerships and collaboration. Climate change responses and impacts, including the need to reduce GHG emissions and the impact that extreme events and ecosystem degradation will have on the Western Cape have been integrated into the framework.</p> <p>Work is underway to identify critical infrastructure at risk of climate related hazards, and to develop risk reduction plans to secure these critical infrastructure hotspots. The WCG disaster risk management function is also working with a number of municipalities in the Western Cape to identify community-based risks and vulnerabilities and identify actions that need to be implemented to reduce these.</p>	
Enablers / Opportunities	<p>As part of the implementation of the Western Cape Infrastructure Framework, the Western Cape Department Transport and Public Works has initiated a process to develop district level infrastructure plans. This provides an opportunity to mainstream climate smart infrastructure planning into district level municipalities.</p> <p>There is also increasing mainstreaming of climate change into spatial planning, through comments into Spatial Development Frameworks (SDFs) and specialist studies. The WCGs Climate Change Directorate, in partnership with ICLEI, is developing a climate change baseline assessment tool for assessing municipal Integrated Development Plans and other strategic planning documents. This should assist in identifying gaps and working towards addressing these.</p>	
Barriers/ Risks	<p>Local municipalities are not taking climate change into account in their master planning, which is leading to inappropriate developments taking place that are / will be greatly impacted by extreme events and other climate change considerations.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit

		(qualitative or quantitative)
<ul style="list-style-type: none"> Provincial Spatial Development Framework (2014) District and local Spatial Development Plans Western Cape Infrastructure Framework (2013) 	<ul style="list-style-type: none"> WCG : Environmental Affairs and Development Planning; Transport and Public Works, Human Settlements, Local Government 	<ul style="list-style-type: none"> Risk reduction actions as applied to critical infrastructure is included in relevant plans. Climate risk to critical infrastructure decreased.

Focus Area 3.2 - Waste Minimisation and Management

The priority programmes highlighted in the Waste Minimisation and Management Sub-Focus area include:

- 3.2 A – Development of waste characterisation profiles for municipalities in the Western Cape
- 3.2 B – Promotion of the waste economy and identification of opportunities to reduce waste going to landfill

Focus Area 3.2	Waste Minimisation and Management
Priority Programme 3.2A	Development of waste characterization profiles for municipalities in the Western Cape
Background	<p>The average waste composition in Western Cape landfills is made up of 14 – 39% organics. The decomposition of waste, particularly that containing organic components, contributes to the total GHG emissions in the province. Although there has been a strong effort from DEA&DP to collate information on waste types (compositions) generated across the province through the Integrated Waste Management Plans (IWMPs), access to reliable data for planning purposes remains one of the biggest challenges in the solid waste sector. Some municipalities have undertaken detailed waste characterization exercises, with others still needing to undertake these. At this stage, the proportion of greenhouse (GHG) emissions is based on estimated waste volumes and characteristics, especially in smaller and rural municipalities, which hampers the ability to accurately report on total GHG emissions.</p> <p>National DEA also requires that municipalities and waste generators report regularly on the amount of waste generated online via the SA Waste Information System, but it is not clear to what extent all relevant stakeholders are reporting to it.</p>
Enablers / Opportunities	<p>There are a number of alternative (to landfill) waste treatment technologies currently available, but in order to identify the most appropriate options, municipalities require an accurate understanding of the characterization of their waste streams for planning purposes.</p> <p>There are a number of recycling programmes currently being</p>

	<p>undertaken in the Western Cape. However, these programmes have come a cost, which might be unsustainable if, not recovered through tariffs or the sale of recycles. Currently a limited number of waste streams have market value in South Africa. Although current legislation puts emphasis on increased landfill diversion through recycling, important considerations need to be given to create recycling models that are economically viable for municipalities. Also, much of the effort has focused on the diversion of recyclables from landfill and not organics which are the cause of GHG emissions. The WCG is implementing an Integrated Pollution and Waste Information System (IPWIS), which is focused on collecting information / data on waste activities in the Western Cape.</p>	
Barriers/ Risks	<p>Municipal landfill sites across the province are reaching capacity and alternative waste management treatment options need to be identified and implemented. Moreover at a national level, the NEM:WA and the NWMS have set ambitious targets to divert 20% of waste from landfill by 2019. There are only a limited number of municipalities who have undertaken waste characterization exercises, so it is very difficult to advise municipalities on alternative options if the waste stream is not understood. Moreover, the bulk of the IWMPs do not address the cost implications of some of the potential alternative treatment options, which will affect the tariff structure. Better planning will lead to improved integration between IWMPs and IDPs and can lead to better performing municipal solid waste functions.</p> <p>Data on waste collected and disposed of by municipalities and private waste management companies is not readily available or collected in a useful form, which makes decision-making in terms of waste management difficult.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> National Environmental Management Waste Act (2008) National Waste Management Strategy (2011) National Climate Change Response Strategy (2011) Provincial Integrated Waste Management Plan for the Western Cape (2010) Municipal Integrated Waste Management Plans 	<ul style="list-style-type: none"> National Department of Environmental Affairs WCG Department of Environmental Affairs and Development Planning Municipalities Private waste Contractors 	<ul style="list-style-type: none"> The number of municipalities that have undertaken waste characterization exercises The number of municipalities and private waste contractors who report on the IPWIS.

Focus Area 3.2	Waste Minimisation and Management
Priority Programme 3.2 B	Promotion of the waste economy and identification of opportunities to reduce waste going to landfill.

<p>Background</p>	<p>Waste decomposition is responsible for a proportion of the total GHG emissions for the Western Cape. The solid waste management challenges experienced by large and small municipalities differ. While larger municipalities are grappling with the costs associated with stringent targets for waste minimization and alternatives to landfill imposed by the National Environmental Management: Waste Act and the National Waste Management Strategy, rural municipalities are still battling with basic waste collection and landfill management.</p> <p>Municipal waste management officers in the Western Cape are faced with multiple challenges, including rapid growth in the volume of municipal solid waste generated, an increasingly stringent national policy environment and increasingly limited landfill space. In addition, they are being inundated with offers from a large number of parties - entrepreneurs, technology vendors and proponents of climate mitigation projects - offering a range of technologies to assist in waste management. There is a need to provide decision support to municipalities to assist them in determining the best approach to handling waste through appropriate integrated waste management systems (IWMSs), including, but not limited to, collection, sorting, recycling and waste to energy initiatives.</p>	
<p>Enablers / Opportunities</p>	<p>The National Environmental Management : Waste Act promotes the waste hierarchy, which is based on the following actions – prevent, reduce, reuse, recycle, recover, landfill</p> <p>The WCG is undertaking a Regulatory Impact Assessment for the waste economy in order to identify blockages and costs to business of legal compliance for waste project developers.</p> <p>GreenCape is also developing a decision-support tool that will guide both municipalities and project developers through the regulatory requirements depending on the technical type, waste streams and scale of waste economy projects.</p>	
<p>Barriers/ Risks</p>	<p>The regulatory environment is considered one of the barriers to the implementation of effective waste management programmes. In order to have an effective waste minimization programme, municipalities might partner with a private service provider who would require long term access to a municipal waste stream. This general requires a long approval process in terms of the requirements of the Municipal Finance Management Act for public private partnerships.</p> <p>Municipal solid waste collection costs are not fully recovered through tariffs, with the result that the remaining costs are recovered through general rates or national subsidies. This has a significant impact on the ability of municipalities to undertake waste minimization and management programmes as these require major investment in infrastructure, logistics and manpower.</p>	
<p>Legislative / policy context</p>	<p>Key Drivers / Stakeholders</p>	<p>Impact potential/ benefit (qualitative or quantitative)</p>
<ul style="list-style-type: none"> National Environmental Management Waste Act 	<ul style="list-style-type: none"> National Department of Environmental Affairs 	<ul style="list-style-type: none"> Completed Regulatory Impact Assessment for

<p>(2008)</p> <ul style="list-style-type: none"> National Waste Management Strategy (2011) Provincial Integrated Waste Management Plan for the Western Cape (2010) Municipal Integrated Waste Management Plans 	<ul style="list-style-type: none"> WCG Departments of Environmental Affairs and Development Planning; Economic Development and Tourism GreenCape Municipalities 	<p>the Waste Economy.</p> <ul style="list-style-type: none"> Increased number of municipalities who have implemented waste minimization programmes including recycling programmes.
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Focus Area 3.3 - Human Settlements

The priority programmes highlighted in the Human Settlements Sub-Focus area include:

- 3.3 A – Mainstreaming of climate change into human settlement developments, including informal settlements
- 3.3 B – Implementation of energy efficiency interventions in low income houses and communities

Focus Area 3.3	Human Settlements
Priority Programme 3.3A	Mainstreaming of climate change into human settlement developments, including informal settlements
Background	<p>Human settlements, in both the urban and rural context, face climate change challenges. Climate change may exacerbate the problems caused by poor urban management, e.g. increased storm intensity together with poor storm water management and urban-induced soil erosion could result in flash flooding. Cities are particularly vulnerable to climate change because they are slow to adapt to changes in the environment and they have entrenched dependencies on specific delivery mechanisms for critical services. South Africa's cities still reflect Apartheid planning with the poorest communities tending to live in far flung and often marginal locations not suited for development, where services are either non-existent or of a poor quality. These communities are the most vulnerable to climate change, a problem set to continue with burgeoning informal settlements remaining a characteristic of most urban areas in South Africa. It is imperative that climate change considerations be taken into account in any work on existing and planned low income and informal settlements to improve their resilience.</p> <p>Informal settlements are particularly vulnerable to floods and fires, exacerbated by their location in flood-prone areas and on sand dunes, inferior building materials, close proximity to one another and inadequate road access for emergency vehicles.</p>
Enablers / Opportunities	<p>Extensive research has been undertaken with regard to taking climate change consideration into account in low income new build. The National Buildings Regulations Part XA has placed requirements on new buildings in terms of the energy use of new buildings and components of this have been included in the</p>

	<p>requirements for subsidized low income houses.</p> <p>Many innovations are emerging around low income and informal housing, such as the i-Shack developed by the Sustainability Institute, and the Green Shack developed by Touching the Earth Lightly. There are also new methods being employed around reblocking after fires, etc. that have been piloted by Stellenbosch Municipality in Langrug. There is a lot of scope to utilize innovation to improve conditions in informal settlements.</p>	
Barriers/ Risks	<p>It is challenging to accept the poor living conditions in low income settlements and to focus on working around improving them, rather than the losing battle of trying to replace them with formal housing. The reality is that while formal housing is being provided, many people remain in informal housing for an extensive period of time while waiting for their house. There is therefore value in making informal housing more climate smart and liveable.</p> <p>Housing is currently provided in the fastest, most efficient way possible, which is not always the climate smart way. This can result in people living in flattened, sandy communities in homes with very little or no insulation. Climate change should be factored into the development stages of such developments. The setting up of a climate fund could be explored to top up the per house allocation to ensure that these houses are built in a climate resilient manner.</p> <p>Climate change is expected to increase the number of climate refugees. This will exacerbate the informal settlement situation within the province.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> National Building Regulations, National Development Plan (2012) Breaking New Ground: A Comprehensive Plan for the Development of Sustainable Human Settlement (2004) 	<ul style="list-style-type: none"> WCG Departments of Human Settlements; and Environmental Affairs and Development Planning City of Cape Town Department Human Settlements Stellenbosch University Sustainability Institute Western Cape Disaster Management Centre Informal Settlement Network Community Organisation Resource Centre 	<ul style="list-style-type: none"> Reduced climate risk in human settlements.

Focus Area 3.3	Human Settlements
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Priority Programme 3.3B	Implementation of energy efficiency interventions in low income houses and communities	
Background	The Western Cape suffers from the Apartheid legacy of segregated and poorly functioning spatial settlements that has proved extremely difficult to shift. The housing backlog is currently estimated at 510 000 households and is expected to increase in the short-to-medium term. The state's response to the housing demand has been in the form of a mass roll-out of subsidized housing. This subsidized housing has been in the form of a basic housing with access to minimum services. Energy efficiency interventions have largely not been considered in the design of these buildings or communities, resulting in poor quality of life.	
Enablers / Opportunities	The National Buildings Regulations Part XA has placed requirements on new buildings in terms of the energy use of new buildings and components of this have been included in the requirements for subsidized low income houses. The energy efficiency interventions include thick insulation and ceilings, plaster on the inside and outside of buildings and improved window quality. The budget for the subsidized housing has recently been increased in order to allow for these additional requirements.	
Barriers/ Risks	<p>Although the National Buildings Regulations include requirements around the installation of solar water heaters, this requirement has been excluded from the requirement for low income housing and would need to be covered by additional funding or subsidies.</p> <p>The quality of subsidized low income housing is still an area of concern, with houses becoming damaged over time due to poor quality building and materials. In many cases it is difficult to get repairs done as the contractors are no longer operating in the area.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Building Regulations Part XA (2011) • Enhancements to the National Norms and Standards for the construction of stand-alone residential dwellings and engineering services and adjustment of the housing subsidy quantum (2014) • Western Cape Infrastructure Framework (2013) 	<ul style="list-style-type: none"> • National Department of Human Settlements • WCG Departments of Human Settlements; Environmental Affairs and Development Planning • Municipalities • SALGA 	<ul style="list-style-type: none"> • The implementation of the enhanced norms and standards for low income housing by municipalities.

FOCUS AREA 4 – SUSTAINABLE TRANSPORT:

The priority programmes highlighted in the Sustainable Transport Focus area include:

- 4A – Promotion of public and non-motorised transport, including the development of appropriate infrastructure
- 4B – Investigation of opportunities for alternative transport fuels, including biofuels
- 4C – Awareness raising and behaviour change programmes around transport modes
- 4D – Government vehicle fleet efficiency programme

Focus Area 4	Sustainable Transport
Priority Programme 4A	Promotion of public and non-motorised transport, including the development of appropriate infrastructure
Background	<p>With transport being one of the biggest consumers of energy in the Western Cape and using significant portions of land, the sector has a role to play in responding to climate change. This response will be realized through promoting sustainable transport options that include promoting the move to public and non-motorised transport, more sustainable energy sources and more efficient vehicle technology. While large scale changes to the transport sector become visible over time, interventions are required in the short and medium term and sustained into the long term.</p>
Enablers / Opportunities	<p>The National government is promoting a public transport programme for lower-carbon mobility in metros and smaller cities across the country. The rollout of the Integrated Rapid Transport systems in Cape Town and George are linked to this programme.</p> <p>A large proportion of the population in the Western Cape is dependent on public transport or non-motorised transport. Walkways and cycle paths, including of landscaping, overhead lighting and infrastructure that promotes universal access, is required to provide access to public facilities (schools, clinics, hospitals) employment areas and public transport facilities.</p> <p>Revised spatial planning is required to enable shortening of distances by public and non-motorised transport. Higher densities are required along rapid public transport routes to increase the viability of public transport, thereby raising the standard of services provided.</p> <p>The increasing cost of liquid fuels (petrol and diesel) is encouraging people to make use of more sustainable forms of transport including public and non-motorised transport, however the alternatives are not always attractive to a shift in behavior due to availability, unreliability, security and cost issues.</p>
Barriers/ Risks	<p>Most cities and towns reflect Apartheid planning with the poorest communities tending to live far away from services and employment opportunities and being dependent on public or non-motorized transport. The poor quality and reliability of public transport often</p>

	<p>encourages people to purchase a car instead of using their income for more important households needs.</p> <p>The lack of maintenance of public transport infrastructure over the past decades has led to a situation where much of the infrastructure needs to be upgraded or replaced in order to meet the demands for the service. The costs and time required in order to complete these upgrades have significant impacts on the level of service offered.</p> <p>Non-motorised transport infrastructure (walkways and cycle paths) is currently not fully considered in transport planning and is located in an ad hoc fashion when funds are available. This does not promote a safe or optimal system.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Transport Master Plan (2010) • National Development Plan (2012) • Western Cape Provincial Land Transport Framework (2013) • Green Economy Strategy Framework (2013) 	<ul style="list-style-type: none"> • National Department of Transport • WCG Departments of Transport & Public Works; Environmental Affairs & Development Planning • Municipalities • NGOs (lobbying function) 	<ul style="list-style-type: none"> • The increased use of public transport by commuters in the main towns in the Western Cape. • The development and implementation of non-motorised transport plans in municipalities in the Western Cape. • Decreased provincial transport liquid fuel consumption. • Reduced vehicle emissions

Focus Area 4	Sustainable Transport
Priority Programme 4B	Investigation of opportunities for alternative transport fuels, including biofuels
Background	<p>The transport sector is dependent on liquid fuels (petrol and diesel) and electricity and is one of the biggest consumers of energy in most municipalities in the Western Cape. The transport sector accounts for 53% of energy consumed in the Western Cape. There is a need to look at alternative transport fuels that can replace the conventional fuels currently being used in order to achieve the target of being a low carbon province in an affordable and sustainable manner.</p>
Enablers / Opportunities	<p>Hybrid and electric vehicles are currently available for purchase and use in South Africa. Research is also underway into fuel-cell technologies.</p> <p>The South African biofuels strategy has set a target of 2% biofuels blend in SA liquid fuels by 2015, which should drive the development of the biofuels industry in the country.</p> <p>Opportunities are being explored for pilot projects outside of the national blending strategy to look at the use of biofuels for vehicle fleets. Opportunities related to the development of biofuels from 2nd</p>

	generation fuels, rather than from crops are being actively researched. These would both address waste management concerns as well as create job and business opportunities without threatening food security.	
Barriers/ Risks	<p>Current alternative transport fuels in the form of electric, hybrid and fuel cell vehicles are considered too expensive for mass roll-out and financial incentives would need to be put in place in order to encourage uptake of these.</p> <p>The biofuels strategy discussions have been controversial in South Africa for a number of reasons including concerns regarding the food vs fuel debate in terms of 1st generation biofuel crops, the focus on using emerging farming land only, the lack of clarification regarding the timing of the strategy implementation and the lack of clarification regarding future blending percentage requirements.</p> <p>The Biofuels Industry has not yet been established, although nine operating licenses have been allocated in terms of the National Biofuels Strategy. This could have significant impacts on meeting the 2% target for liquid fuel blending by 2015.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Biofuels Strategy (2007) • Position Paper on the South African Biofuels Regulatory Framework (2014) • Regulations regarding the mandatory blending of biofuels with petrol and diesel (2012) 	<ul style="list-style-type: none"> • National Department of Energy, Transport • GreenCape • WCG Departments of Economic Development and Tourism; Agriculture • SAPIA • Municipalities 	<ul style="list-style-type: none"> • Implementation of pilot studies on the use of biofuels in vehicle fleets. • Increased number of biofuels manufacturers operating in the Western Cape. • Contributions towards improving energy security

Focus Area 4	Sustainable Transport
Priority Programme 4C	Awareness raising and behavior change programmes around sustainable transport options
Background	A number of opportunities to raise awareness around sustainable transport and travel demand management options to support people making informed choices about transport modes currently exist.
Enablers / Opportunities	<p>The increasing liquid fuels prices are encouraging people to look for alternative modes of transport.</p> <p>Programmes, such as TravelSMART, which encourage sustainable transport behavior by the employees of large companies in the Cape Town CBD, have been implemented and will be supported for further roll outs.</p> <p>Public transport systems and non- motorised transport infrastructure</p>

	are being upgraded in order to provide a better service for those that utilize them and to encourage others to utilize the systems.	
Barriers/ Risks	<p>There are generally negative perceptions about the safety and security associated with public transport, which discourages people from using this form of transport.</p> <p>The convenience and status associated with owning and using a car is still much better / stronger than the benefits linked to using public transport and the marketing of owning private vehicles has been publicized much more extensively than the use of public transport.</p> <p>While a number of internal staff policy changes are required in order to facilitate any significant behavior change amongst employees, organisations are often reluctant to implement these. These may include:</p> <ul style="list-style-type: none"> • Staff parking policies (preferential parking for those who carpool) • Facilities management (provide bicycle parking, shower facilities, etc) • HR policies (flexible working programme) 	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Transport Master Plan (2010) • Provincial Land Transport Framework (2013) • Internal staff and travel policies 	<ul style="list-style-type: none"> • Public Transport Operators e.g. Passenger Rail Association of South Africa, Golden Arrow Buses, Integrated Rapid Transit systems • WCG Departments of Transport & Public Works; Environmental Affairs & Development Planning • Municipalities 	<ul style="list-style-type: none"> • Increased awareness amongst employees / public regarding sustainable transport options • Shift in travel behavior towards more sustainable options.

Focus Area 4	Sustainable Transport
Priority Programme 4D	Government vehicle fleet efficiency programme
Background	Good opportunities exist for the WCG, municipalities and other government stakeholders to play a role in promoting government vehicle efficiency, through putting in place efficiency standards for the purchase of new vehicles, promoting eco-driving by all users of the government fleet and putting in place a "smart" management and maintenance systems for vehicles.
Enablers / Opportunities	<p>New vehicles are mandated to include information on their fuel consumption and CO₂ emissions, which makes the purchasing of fuel efficient vehicles easier.</p> <p>Government has significant purchasing power, which it could use to put in place standards for improved energy efficiency and emissions</p>

	<p>of new vehicles, as has been done by the City of Cape Town.</p> <p>Government vehicles already include tracking software, which can also be utilized to encourage eco-driving through analysing fuel consumption and driving styles and by providing feedback to drivers where necessary.</p>	
Barriers/ Risks	<p>Procurement processes do not currently support the inclusion of "environmental" specifications in the tender documents, which can limit the ability to purchase efficient vehicles.</p> <p>High level buy-in and commitment is necessary in order to support the introduction of fleet greening initiatives such as SMART (eco) driving so that they are not undertaken on an ad hoc basis. Monitoring of interventions is essential to quantify savings.</p>	
Legislative / policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> National Climate Change Response Policy(2011) 	<ul style="list-style-type: none"> WCG: Government Motor Transport Municipalities 	<ul style="list-style-type: none"> Efficiency and emissions procurement specifications included in the purchasing of any new government vehicles. Eco-driving training implemented for staff utilizing the government vehicle fleet.

FOCUS AREA 5 – WATER SECURITY AND EFFICIENCY

The priority programmes under the Water Security and Efficiency focus area include:

- 5A - Invasive alien vegetation clearing
- 5B – Effective utilisation of irrigation water

Focus Area 5	Water Security and Efficiency	
Priority Programme 5A	Invasive alien vegetation clearing	
Background	<p>Invasive alien vegetation creates a threat to water security in the province and the country as a whole. Dense stands of invasive alien vegetation, particularly the Australian acacias and eucalypts with deep tap roots, out-compete the local flora and utilise significantly more ground and river water than indigenous vegetation. In addition, dense stands in riparian zones compromise the functioning of rivers, both in times of 'normal' flow and particularly during times of flood, where they provide additional highly damaging flood debris. The clearing of alien vegetation in these riparian zones is also problematic as the cleared land is exposed to soil erosion until rehabilitated.</p>	
Enablers / Opportunities	<p>As illustrated by many of the highly successful 'Working for' Extended Public Works Programmes, labour intensive alien vegetation clearing and follow up provides excellent job creation opportunities. In addition to this, numerous enterprise opportunities present co-benefits and potential alternative financial models to managing alien invasives. Examples of these include: nurseries aimed at re-habilitation and restoration of indigenous vegetation; wood products from cleared alien wood; wood chipping and associated products and uses; production of charcoal and biochar.</p>	
Barriers/ Risks	<p>Follow up clearing of alien vegetation regrowth is key to the success of any alien vegetation removal exercise. This often does not take place, or does not take place as often as required to ensure eradication.</p> <p>Using the vegetation cleared is important to reduce the risk of fire due to material being stacked in large piles and left in the veld to dry; and to reduce the risk of flood damage caused by flotsam left within the flood zone (30-100m from water's edge). Some form of re-vegetation or restoration is crucial to prevent further soil loss after clearing. Research has been conducted on the optimal methods for re-vegetation and restoration in various environments, and this should be consulted when designing new or reviewing existing clearing programmes.</p> <p>Partnerships need to be developed and responsibility of land owners defined to include maintenance of land minimize the growth of alien invasive species once cleared and rehabilitate the riparian zone.</p>	
Legislative/ Policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Water Act (1998) 	<ul style="list-style-type: none"> • National Department of 	<ul style="list-style-type: none"> • Reduced veld fire risk.

<ul style="list-style-type: none"> • NCCRP - Water Conservation and Demand Flagship Programme • Disaster Management Act (2002) • National Environmental Management: Biodiversity Act (2004) • National Development Plan (2012) 	<ul style="list-style-type: none"> • Environmental Affairs; • National Department of Water Affairs; • WCG Departments of Agriculture; Environmental Affairs and Development Planning; and Economic Development and Tourism • CapeNature; • SANParks; • Fynbos Fire Association; Western Cape Disaster Management; • GreenCape • Irrigation boards • Waster use associations 	<ul style="list-style-type: none"> • Reduced flood risk. • Improved riparian flow patterns. • Increased availability of water. • Reduced soil erosion. • Job creation. • Potential SMME enterprise development. • Expansion and conservation of biodiversity areas.
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Focus Area 5	Water Security and Efficiency	
Priority Programme 5B	Effective utilisation of irrigation water	
Background	The Western Cape is a water stressed province in a water stressed country, and with climate change projections pointing to a drying trend in the western part of the country, water security is a primary concern for the province. Agricultural activities utilize 55% of water used in the province. Improvements in water efficiency by this sector would therefore have a significant positive impact on the province's water reserves. This priority programme has strong linkages with Focus Area 8: Food Security.	
Enablers / Opportunities	<p>The Western Cape Department of Agriculture and many of the commodity-specific research groups conduct research into water efficient crops.</p> <p>With rainfall patterns changing, farmers are starting to see the negative effects on their crops of reduced water availability. This has encouraged them to engage with programmes such as Fruitlook.</p>	
Barriers / Risks	There are limited incentives for farmers to reduce their water consumption unless limited availability of water already constrains their agricultural outputs, limiting their profit margins.	
Legislative/ Policy context	Key drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Water Act (1998) • Western Cape Sustainable Water Management Plan (2012) • Conservation of Agricultural Resources Act 	<ul style="list-style-type: none"> • WCG Department of Agriculture • National Department of Agriculture, Forestry and Fisheries; Water Affairs and Sanitation • Irrigation boards • Catchment Management Agencies 	<ul style="list-style-type: none"> • More crop per drop.

	• Water User Associations	
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FOCUS AREA 6 – BIODIVERSITY AND ECOSYSTEM GOODS AND SERVICES

The priority programmes under the Biodiversity and Ecosystem Goods and Services focus area include:

- 6A – Prioritisation, valuation, mapping, protection, and restoration of ecological infrastructure that increases climate resilience;
- 6B – Development of relevant ecosystem goods and services (EGS) investment opportunities;
- 6C - Landscape initiatives / biodiversity corridors and identification of requirements for climate change adaptation corridors;

Focus Area 6	Biodiversity and Ecosystem Goods and Services
Priority Programme 6A	Prioritisation, mapping, protection, and restoration of ecological infrastructure that increases climate resilience
Background	Climate change poses a threat to the optimal ecological functioning of our ecosystems, which are key to sustaining life across the province. Through mapping, valuation, and prioritisation, gaps can be identified and the case developed for the protection and restoration of key ecological infrastructure.
Enablers / Opportunities	<p>The Western Cape Government's Green Economy Strategy has identified Smart Ecosystems as one of six key drivers towards a green economy. Towards this end, a project is under way to identify potential ecosystem goods and services investment cases across the province, which includes those related to catchment areas. There are other related initiatives under way, either focused on mapping and valuation (e.g. CSIR's Pro-Eco-Serve project) or landscape initiatives that involve optimising the sustainable utilisation of ecosystem goods and services in certain areas by multiple stakeholders (e.g. WWF Landscape Initiatives) or restoration projects, like the wetland restoration projects undertaken in the Southern Cape through partnerships between Working on Wetlands and other key stakeholders.</p> <p>Numerous opportunities therefore exist for knowledge and data exchange, sharing of best practice and research regarding restoration and rehabilitation methodologies, setting up of communities of practice, and partnerships around the protection of priority ecological infrastructure, as well as the research and monitoring component.</p>
Barriers / Risks	Increasing urban populations and the attendant development pressures pose a constant risk to the protection of ecosystem goods and services as conflicting land uses play out. The role that ecosystem goods and services play in providing for basic resource and infrastructure needs is often not recognized and supported. Biodiversity offsets, often seen as a win win solution in biodiversity / development disputes can result in critical ecological infrastructure being lost because it is not critically endangered from a biodiversity perspective, but may be critical from a climate resilience

	perspective.	
Legislative/ Policy context	Key Drivers/ Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • NEM: Biodiversity Act (2004) • Protected Areas Act (2003) • Nature Conservation Ordinance (1974) • Western Cape Green Economy Strategy (2013) • Integrated Coastal Management Act (2008) • Conservation of Agricultural Resources Act (1983) • National Water Act (1998) • LUPA (2013) 	<ul style="list-style-type: none"> • WCG Departments of Environmental Affairs and Development Planning; Economic Development and Tourism; and Agriculture • SANBI • CapeNature • SANPARKS • National Department of Environmental Affairs • City of Cape Town • Municipalities • CSIR • WWF • National Department of Water Affairs • Department of Rural Development and Land Reform 	<ul style="list-style-type: none"> • Risk reduction through improved landscape functioning (e.g. flood attenuation, barrier dunes reducing storm surge risk). • Increased availability of ecosystem goods and services (e.g. fresh, clean water, topsoil). • Climate critical ecosystem goods and services mapped and prioritized. • Better Informed land-use decision-making on municipal and provincial level in terms of where to farm, conserve and develop.

Focus Area 6	Biodiversity and Ecosystem Goods and Services
Priority Programme 6B	Development of relevant ecosystem goods and services (EGS) investment opportunities
Enablers / Opportunities	<p>This priority area (6B) follows on and links to the previous priority area (6A). The Western Cape Government's Green Economy Strategy is a key enabler to this priority area, having identified Smart Ecosystems as one of five key drivers of the green economy. As such, a project is under way to identify potential ecosystem goods and services investment cases across the province. The work assesses the current value lost through the deterioration of ecosystems and explores the leveraging of private sector investment into ecosystem goods and services. It identifies the needs of private sector investment to be able to invest in this space and the role of government in facilitating such investment.</p> <p>In addition, the working for programmes have experimented with the creation of enterprise development around ecosystem goods and services.</p>
Barriers / Risks	<p>There is currently little co-ordination across the initiatives underway. This has resulted in a wide range of methodologies being applied, non-standardisation of valuation criteria, and in some cases, high priority areas not receiving the focus they require. This is a work area that calls for a co-ordinated approach to facilitate lessons learnt and allow for possible upscaling of projects.</p>

Legislative/ Policy context	Key Drivers/ Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Bioprospecting, Access and Benefit sharing (BABS) regulations (2008) • NEM: Biodiversity Act (2004) • Protected Areas Act (2003) • Nature Conservation Ordinance (1974) • Western Cape Green Economy Strategy (2013) • Integrated Coastal Management Act (2008) • Conservation of Agricultural Resources Act (1983) • National Water Act (1998) • LUPA (2013) 	<ul style="list-style-type: none"> • WCG Departments of Environmental Affairs and Development Planning; Economic Development and Tourism; and Agriculture • SANBI • CapeNature • SANPARKS • National Department of Environmental Affairs • City of Cape Town • Municipalities • SAEON • CSIR • WWF • National Department of Water Affairs • Department of Rural Development and Land Reform 	<ul style="list-style-type: none"> • Ecosystem goods and services valued, mapped, protected, and restored. • Ecosystem Goods and Services investment opportunities identified. • Possibility for farmers to get tax relief/funding support to sign into stewardship agreements (conserving threatened biodiversity, securing critical biodiversity corridors) on their land or through partnership with neighboring farms. • Establishment of partnerships/learning from existing projects such as the Biodiversity and Wine Initiative (WWF).

Focus Area 6	Biodiversity and Ecosystem Goods and Services
Priority Programme 6C	Landscape-wide initiatives / biodiversity corridors and identification of requirements for climate change adaptation corridors
Background	<p>The landscape-wide approach to biodiversity conservation, through landscape initiatives including corridors and biosphere reserves provides for an appropriate scale at which to engage stakeholders in the promotion of both biodiversity conservation and sustainable development, maintain or restore connectivity across the landscape and build ecosystem-based resilience to climate change. Through such a systematic biodiversity planning approach process and pattern are factored in.</p> <p>The landscape approach draws together parcels of land under multiple forms of land use and ownership and encourages a collective approach to managing the biodiversity and all ecosystem goods and services on these land parcels.</p> <p>Biodiversity stewardship is about landowner/users being custodians of their land (including natural resources and biodiversity) through the sustainable use, management and protection of resources. The biodiversity on this land is secured through a biodiversity stewardship agreement and incentives may be provided to the owner/user to enable this to occur.</p>

<p>Enablers / Opportunities</p>	<p>The large scale landscape initiatives underway in the Western Cape support the bioregional programmes which include the Cape Action for People and the Environment (CAPE), the Succulent Karroo Ecosystem Programme (SKEP) and the Sub-Tropical Thicket Project (STEP). These programmes have achieved great results to date and co-ordinate the efforts of well over 40 partner organisations. Further landscape initiatives have been developed under each of these, with nine alone falling under the CAPE programme. The CAPE Implementation Committee (CIC) is the partnership and governance platform for the landscape initiatives and the other CAPE partners in the Western Cape.</p> <p>Biodiversity stewardship and Biodiversity Best Practice Initiatives are key support mechanisms for implementing landscape initiatives.</p> <p>Extensive collaboration across the landscape initiatives has allowed for knowledge transfer and pooling of resources where possible.</p> <p>The programmes have managed to raise significant funding, support a large number of civil society lead partnerships, create jobs and build capacity in the youth.</p>	
<p>Barriers / Risks</p>	<p>Accessing ongoing funding to support projects in the landscape programme is always a challenge.</p> <p>Capacity to support biodiversity stewardship and landscape conservation is limited, making any expansions of these programmes difficult.</p> <p>A number of land owners within the landscape initiatives still do not fully embrace the concept of biodiversity and ecosystem goods and services conservation. This can create conflict within landscape initiatives.</p> <p>Although a biodiversity land-cover map exists for the Western Cape this does not always provide the most up-to-date information for the province. This landcover map is crucial for the development of the bioregional plan for the WC, which lays out all critical biodiversity areas and connecting corridors.</p>	
<p>Legislative/ Policy context</p>	<p>Key Drivers/ Stakeholders</p>	<p>Impact potential/ benefit (qualitative or quantitative)</p>
<ul style="list-style-type: none"> • NEM: Biodiversity Act (2004) • Protected Areas Act (2003) • Nature Conservation Ordinance (1974) • Conservation of Agricultural Resources Act (1983) • National Water Act (1998) • LUPA (2013) • Bioregional Planning in the 	<ul style="list-style-type: none"> • WCG Departments of Environmental Affairs and Development Planning; Economic Development and Tourism; and Agriculture • SANBI • CapeNature • SANPARKS • National Department of Environmental Affairs • City of Cape Town 	<ul style="list-style-type: none"> • Increased area under conservation as a result of landscape initiatives. • Expansion of corridors contributing to long term survival of species. • Maintain/ improve species biodiversity. • Establish partnerships with organs of state such as WC Dept. of Agriculture and the LandCare Area

<p>Western Cape (2003)</p> <ul style="list-style-type: none"> • Municipal Systems Act (2000) • Western Cape Biosphere Reserves Act (2011) 	<ul style="list-style-type: none"> • Municipalities • WWF • National Department of Water Affairs • National Department of Rural Development and Land Reform • Conservation South Africa • Western Cape Biosphere Reserves Forum • CIC representing the Landscape Initiatives 	<p>Wide Planning program.</p> <ul style="list-style-type: none"> • Well-functioning governance structures and platforms that support coordinated and collaborative efforts for landscape initiatives. • Better managed land parcels in productive landscapes. • Provision of clear guidance as to areas provided for biodiversity, agriculture and development.
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FOCUS AREA 7 – COASTAL AND ESTUARY MANAGEMENT

The following priority programmes in the Coastal and Estuary Management Focus Area, include:

- 7A – Establishment of coastal hazard overlay zones and setback lines;
- 7B – Research on best practice regarding responding to repeated coastal inundation in high risk areas
- 7C – Protection and rehabilitation of existing dune fields as coastal buffers / ecological infrastructure
- 7D – Monitoring of possible linkages between climate change and the fisheries industry
- 7E – Ensuring Estuary Management Plans take cognisance of climate change

Focus Area 7	Coastal and Estuary Management	
Priority Programme 7A	Establishment of coastal hazard overlay zones and setback lines	
Background	In line with the requirements of the National Environmental Management: Integrated Coastal Management Act, 2008, coastal setback lines are currently being delineated across the province. This will assist in deterring future developments in areas at risk to the impacts of climate change and sea level rise. Any new infrastructure that is constructed in the coastal hazard overlay zone will need to adhere to specific development parameters/controls as indicated in the Standard Model Zoning Scheme By-law, implemented by the Local Municipalities, thus decreasing the risk in those areas.	
Enablers / Opportunities	Ecosystem-based adaptation is key to protecting the coastal zone giving rise to opportunities for rehabilitation programmes. Existing developments would require either hard or soft engineering protection providing for job creation opportunities.	
Barriers / Risks	Existing coastal infrastructure is already being inundated by storm surges. This is largely due to historically inappropriate development in high risk areas and the destruction of natural protection in the form of barrier dunes by coastal users , such as public access points, driving on the beach or public launching of vessels etc. Issues have been increasingly raised regarding responsibility for the funding of repairing damage. This risk has already increased and is set to increase further with the progression of climate change.	
Legislative/ Policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Integrated Coastal Management Act (2008). • Disaster Management Act • National Estuary Protocol (2013) • NEM: Protected Areas Act (2009) • NEM: Biodiversity Act (2004) • Establishment of Provincial Coastal Setback and Risk Zones 	<ul style="list-style-type: none"> • WCG Department of Environmental Affairs and Development Planning • National Department of Environmental Affairs • National Department of Forestry and Fisheries • City of Cape Town • District and Local 	<ul style="list-style-type: none"> • Decreased spend on infrastructure rebuild as a result of sea level rise and storm surges. • Decreased spend on coastal infrastructure maintenance. • Decreased disaster management

(in progress). <ul style="list-style-type: none"> • CCT Coastal Setback Lines • EIA Regulations (2010) • ORV regulations (2014) • Sensitive Coastal Areas regulations (1996) 	Municipalities (Coastal) <ul style="list-style-type: none"> • Municipal Coastal Committees • Western Cape Estuary Management Forums • Insurance industry 	expenditure. <ul style="list-style-type: none"> • Loss of biodiversity • Job creation through a focus on ecological infrastructure.
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Focus Area 7	Coastal and Estuary Management	
Priority Programme 7B	Research on best practice regarding responding to repeated coastal inundation in high risk areas	
Background	There has been an increase in the number of incidences relating to damage to coastal infrastructure as a result of storm surges. This is set to increase with the progression of climate change. These incidences demand urgent attention, as decisions regarding protecting properties are being taken, often in haste and without due consideration as to what may be best in the longer term. This priority programme seeks to better explore alternative management strategies in this complex space.	
Enablers / Opportunities	Opportunities exist for alternative management strategies such as habitat/ ecological infrastructure protection, public access to environmental and recreational resources and hazard mitigation.	
Barriers / Risks	Government is currently set on using hard engineering infrastructure to solve damage to coastal infrastructure and capacity building is still required to change mindsets in this regard. Research is necessary to showcase how alternative methods can be used that are more effective, more cost effective and create jobs.	
Legislative/ Policy context	Key Drivers /Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Integrated Coastal Management Act (2008). • Disaster Management Act (2002) • Establishment of Provincial Coastal Setback and Risk Zones (in progress). 	<ul style="list-style-type: none"> • WCG Department of Environmental Affairs and Development Planning • National Department of Environmental Affairs • National Department of Forestry and Fisheries • Municipal Coastal Committees • Western Cape Estuary management Forums • Cape Higher Education Consortium • CapeNature • SANBI 	<ul style="list-style-type: none"> • Increased research relating to sea level rise and storm surge risk. • Case studies and cost/benefit analyses outlining alternative forms of flood protection

Focus Area 7	Coastal and Estuary Management
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Priority Programme 7C	Protecting and rehabilitating existing dune fields as coastal buffers / ecological infrastructure	
Background	Ecosystem-based adaptation is key to protecting the coastal zone from storm surges, with dune fields providing the most effective barriers to coastal inundation. The maintenance and rehabilitation of this valuable ecological infrastructure will be prioritised where possible. Efforts will be made to assist municipalities in the mapping and prioritisation of these natural buffers.	
Enablers / Opportunities	Dune restoration can lead to an increased understanding and appreciation of a potentially threatened ecosystem. With an improved understanding of the role of sand dunes in coastal defense and with greater awareness of the ecological importance of sand dunes for coastal species, dune construction and rehabilitation is likely to become more popular. Benefits relating to dune restoration and the fact that they are less expensive and more aesthetically pleasing than some hard engineering solutions, is likely to find broader public support.	
Barriers / Risks	Governments currently follow traditional business as usual i.e. hard engineering approach to addressing the issue. Capacity building is required to assist with convincing the authorities of the need for alternative approaches such as dune construction or heightening. Conflicts of interest may also arise, especially where local landowners may be concerned about maintaining sea views.	
Legislative/ Policy context	Key Drivers /Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Integrated Coastal Management Act (2008). • Disaster Management Act (2002) • EIA Regulations (2010) • ORV regulations (2014) • Sensitive Coastal Areas regulations (1996) 	<ul style="list-style-type: none"> • WCG Department of Environmental Affairs and Development Planning • National Department of Environmental Affairs • National Department of Forestry and Fisheries • City of Cape Town • Municipal Coastal Committees • Research Institutions • CapeNature 	<ul style="list-style-type: none"> • Decreased coastal risk to sea level rise and storm surges. • Increased number of dune restoration projects. • Increased awareness raising around dune systems.

Focus Area 7	Coastal and Estuary Management
Priority Programme 7D	Monitor possible linkages between climate change and the fisheries industry
Background	The fisheries sector is one of the key economic sectors in the Western Cape and has significant socio-economic implications for smaller coastal communities such as on the West Coast. Fishery stocks are already at risk due to over fishing and unsustainable fishing practices and are set to be further stressed with the effects of climate change.
Enablers / Opportunities	Interdisciplinary research is currently being promoted, with scientists meeting periodically to exchange information on observations and results, and meeting with managers to ensure the proper interpretation

	of results and the relevance of research. Opportunities around aquaculture in the Western Cape are currently being explored.	
Barriers / Risks	There is great uncertainty in terms of the impact of climate change on the fisheries sector, but projections include shifts in species distribution, abundance and seasonal availability as well as coastal infrastructure damage. These, together with the likely social and economic costs of climate change on the fisheries sector need to be understood and assessed in greater detail. Some species will become extinct in particular areas. Predators and prey will move to different areas, disrupting food chains. There is an urgent need to try and build resilience and reduce the vulnerability to climate change of the marine fisheries sector.	
Legislative/ Policy context	Key Drivers /Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Integrated Coastal Management Act (2008). • Disaster Management Act (2002) • Marine Living Resources Act (1998) • Aquaculture policy (National DAFF and DEA) (2009) • DEADP and WCADI aquaculture development initiative 	<ul style="list-style-type: none"> • WCG Department of Environmental Affairs and Development Planning • National Department of Environmental Affairs • National Department of Agriculture, Forestry and Fisheries • City of Cape Town • Municipal Coastal Committees • Western Cape Estuary Management Forums • Research Institutions 	<ul style="list-style-type: none"> • Increased investment in climate change and fishery research, especially with regard to distribution and productivity. • Increased number of aquaculture initiatives. • Clear policy / guidelines on aquaculture. • Consistent or improved Total Allowable Catch for the various impacted fisheries. • Better allocation of Total Allowable Catches. • Increased number of small scale fishers (based on permitting). • Increased distance between fish landing processing areas. •

Focus Area 7	Coastal and Estuary Management
Priority Programme 7E	Ensure Estuary Management Plans take cognisance of climate change
Background	Estuary Management Plans are in the process of being drafted in terms of the requirements of the National Environmental Management: Integrated Coastal Management Act, 2008. Estuaries play an important role in the interface between the marine and terrestrial environments and are significant as areas of recreation and economic opportunities. Estuaries offer refuge for marine species from adverse conditions in the marine environment and are important nursery areas for exploited marine and estuarine species before they recruit into marine fisheries. It is imperative that climate change considerations be incorporated into estuarine planning as the expected temperature increases, changes in rainfall patterns and intensity, sea level rise and storm surges that are expected will all have a significant effect on estuaries and fish stocks. This work must focus on climate sensitive spatial planning, preservation and sustainable utilisation of estuarine

	ecosystem goods and services, while ensuring that economic benefit from recreation and tourism is optimised in a longer term sustainable and climate sensitive manner.	
Enablers / Opportunities	Estuary Management Plans identify assets, those elements that make the estuary such a unique and valuable ecosystem as well as the threats to these assets. Healthy functioning estuaries can enhance opportunities around aquaculture and improve biodiversity levels of species residing in or using estuaries as part of their lifecycle. Improved estuary mouth management can decrease impacts such as the flushing of fish eggs and larvae out to sea.	
Barriers / Risks	Poor estuary management practices can decrease the number of species able to live in these unique ecosystems and thus the nursery functioning of estuaries.	
Legislative/ Policy context	Key Drivers /Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Integrated Coastal Management Act (2008). • Disaster Management Act (2002) • Marine Living Resources Act (1998) • Aquaculture policy (National DAFF and DEA) (2009) • DEADP and WCADI aquaculture development initiative • 	<ul style="list-style-type: none"> • WCG Department of Environmental Affairs and Development Planning • National Department of Environmental Affairs • National Department of Agriculture, Forestry and Fisheries • Coastal Municipalities • SANParks • CapeNature • City of Cape Town • Municipal Coastal Committees • Estuary management forums • Western Cape Estuary Management Forums • CAPE Marine task team 	<ul style="list-style-type: none"> • Improved estuarine health. • Consistent or improved productivity level of estuaries. • Improved flow regimes of estuaries (reduced damming and abstraction).

FOCUS AREA 8 – FOOD SECURITY

The priority programmes under the Food Security focus area include:

- 8A – The promotion of climate smart agriculture
- 8B - Research on climate resilient and alternative crops and livestock applicable to the Western Cape
- 8C - Promoting food security at the municipal level

Focus Area 8	Food Security	
Strategy priority area 8A	The promotion of climate smart agriculture	
Background	The agricultural sector is key to the economy of the Western Cape, and yet is, by nature, highly sensitive to climatic changes. The sector is also the single largest user of water in the province. Climate smart agriculture therefore draws on efforts to reduce agricultural vulnerability to a changing climate, as well as looking at ways to reduce the carbon footprint of the sector.	
Enablers / Opportunities	<p>Existing programmes within the Western Cape's Department of Agriculture, such as Conservation Farming, Landcare programme, Fruitlook and experimental waste to energy initiatives on farms in the province create a solid base from which to take this work forward.</p> <p>The WC Green Economy Strategy Framework (2013) highlights smart agri-production as one of five drivers of the green economy in the province, and in so doing identifies the following amongst the priority areas:</p> <ul style="list-style-type: none"> • Sustainable labour intensive farming; • Farming practices that are in harmony with nature; • Water technologies that reduce consumption and increase efficiency <p>The Western Cape departments of Agriculture and Environmental Affairs and Development Planning will be developing a climate change response framework for the agricultural sector. The framework will identify the key climate change responses that need to be considered by the agricultural sector as well as develop an implementation framework that will support farmers in responding to climate change.</p>	
Barriers / Risks	<p>Awareness raising needs to be comprehensively undertaken to drive change from business as usual.</p> <p>The ability to make radicle shifts in farming techniques is hampered by available finance, knowledge and related farmer confidence in alternative approaches.</p>	
Legislative/ Policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)

<ul style="list-style-type: none"> • Western Cape Green Economy Strategy • Western Cape Agricultural Sector Climate Change Framework (under development) 	<ul style="list-style-type: none"> • WCG Departments of Agriculture; Economic Development and Tourism; and Environmental Affairs and Development Planning • Local Municipalities • Private Sector (farmers and agri-business) 	<ul style="list-style-type: none"> • Identification of climate resilient agricultural products and practices. • Identification of historical climate trends and projections for future climate per climate region in the WC. Identification of economic thresholds and appropriate timelines for implementing identified climate smart changes.
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Focus Area 8	Food Security	
Strategy priority area 8B	Research on climate resilient and alternative crops and livestock applicable to the Western Cape	
Background	Agriculture needs to be able to adapt to a changing climate and be ready to change if certain crops and livestock are no longer viable under changing conditions. Extensive research is being done on this issue by the National and Western Cape Departments of Agriculture, as well as by the various commodity research groupings and relevant tertiary institutions.	
Enablers / Opportunities	Extensive research is underway on alternative crops and livestock practices. In the Western Cape this is coordinated through the Department of Agriculture's Research Forum. New crops and livestock may open up new farming practices with as yet unknown opportunities. The WC Agricultural Sector Climate Change Framework is under development. Part of this will identify which commodities and homogenous farming areas will be under threat from climate change.	
Barriers / Risks	Key barriers include a lack of finance for research, the limited uptake of alternative crops, and the fact that changes to alternative crops takes time to introduce and has in the past often not been successful. Determining optimal thresholds for change in a highly dynamic system with many uncertainties and assumptions creates challenges. Risks also exist in possible confusion and responding to shorter term climate variability signals rather than longer term climatic changes.	
Legislative/ Policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Western Cape Agricultural Sector Climate Change Framework (under development) 	<ul style="list-style-type: none"> • WCG Departments of Agriculture and Environmental Affairs and Development Planning • Private Sector (Farmers and Agri-business) • Research bodies within commodity organisations 	<ul style="list-style-type: none"> • Identification of climate resilient agricultural products and practices and supporting farmers to make the required shifts where required • Identification of historical

	<ul style="list-style-type: none"> • Tertiary research institutions • CSIR • Agricultural Research Council • Climate Systems Analysis Group, UCT 	<p>climate trends and projections for future climate per climate region in the WC.</p> <ul style="list-style-type: none"> • Identification of economic thresholds and appropriate timelines for implementing identified climate smart changes.
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Focus Area 8	Food Security	
Strategy priority area 8C	Promoting food security at the municipal level	
Background	<p>Many Western Cape Departments have municipal support programmes, through which local food security can be addressed. The provincial Food Security Work Group provides a good co-ordination function, but has, to date, prioritised the establishment of food gardens and attendant feeding schemes centered around low income schools across the province. A number of specialist initiatives such as Stellenbosch University's Food Security Initiative, the African Food Security Network; and the Southern Africa Food Lab are in existence and need to be tapped into.</p>	
Enablers / Opportunities	<p>Following the global trend towards urban agriculture, there are moves afoot amongst NGOs and special interest groups, mostly within the major urban centers, to develop urban agriculture as a means to ensure food security. This is an area with a high potential for job and livelihood opportunities. There are also many SMME entrepreneurial opportunities associated with a shift away from large scale mono-culture towards smaller scale urban or peri-urban 'niche' agriculture.</p>	
Barriers / Risks	<p>There are many barriers to the uptake of new ideas and projects relating to food security, including ownership and protection of crops in urban areas, competing land uses and a lack of local markets.</p>	
Legislative/ Policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • Western Cape Agricultural Sector Climate Change Framework (under development) 	<ul style="list-style-type: none"> • WCG Departments of Agriculture; Education; and Environmental Affairs and Development Planning • Local Municipalities • Private Sector (Farmers and Agri-business) • NGOs • Retail sector 	<ul style="list-style-type: none"> • Identification of climate resilient agricultural products and practices. • Identification of historical climate trends and projections for future climate per climate region in the WC. • Identification of economic thresholds and appropriate timelines for implementing identified climate smart changes. • Improved food security in

		urban areas
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FOCUS AREA 9 – HEALTHY COMMUNITIES

Priority areas under Focus Area 9 include:

- 9A - Monitoring health trends in relation to climate trends, include the linkages between human health and climate change in the Western Cape context

Focus Area 9	Healthy Communities	
Strategy priority area 9A	Monitoring health trends in relation to climate trends, including the linkages between human health and climate change in the Western Cape context	
Background	<p>Monitoring health parameters in relation to changes due to climate change should allow for the development and implementation of timely interventions that assist with appropriate and effective adaptation responses.</p> <p>Climate related hazards such as extreme events characterised by floods and high winds, heat waves and cold snaps affect many residents of the province in adverse ways, least of all due to the already high burden of disease. The health related impacts associated with these kinds of weather events include heat stress, an increase in incidence of communicable diseases, and potential expansion of disease vectors. Further research needs to be undertaken to improve the understanding of the linkage between actual climate changes and the potential health impacts.</p>	
Enablers / Opportunities	<p>The focus on 'Climate Change and Human Health' in Phase 1 of the national Long Term Adaptation Scenarios identifies monitoring of health trends in relation to climate trends as important. This will provide an opportunity to work with national structures, such as the Epidemiology and Surveillance Directorate under the Department of Health to monitor these trends in the Western Cape.</p> <p>The Western Cape Disaster Management Centre have started doing community risk assessments in select areas. This will provide an opportunity to include area-specific community health vulnerability assessments, which will assist with interventions specifically aimed at community level vulnerabilities.</p> <p>The development of Community Health Workers in high risk areas can also be supported in this regard.</p>	
Barriers / Risks	<p>It is not simple to attribute health trends to climate trends.</p> <p>This is not a short term programme, and may take time to coordinate the necessary drivers and stakeholders into contributing towards a comprehensive monitoring programme.</p>	
Legislative/ Policy context	Key Drivers / Stakeholders	Impact potential/ benefit (qualitative or quantitative)
<ul style="list-style-type: none"> • National Long Term Adaptation Scenarios – 	<ul style="list-style-type: none"> • National Department of Health 	<ul style="list-style-type: none"> • The development of burden of disease indicators in order to

<p>Climate Change and Human Health (2013)</p> <ul style="list-style-type: none"> • HealthCare 2030 Report (2013) 	<ul style="list-style-type: none"> • Medical Research Council • WCG Department of Health • UCT School of Public Health • Climate Systems Analysis Group • CSIR 	<p>monitor the impact of climate change.</p> <ul style="list-style-type: none"> • Systems developed to report on the impact of climate related extreme events on health.
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