SHAPING THE FUTURE OF THE TRANSPORT SECTOR IN THE WESTERN CAPE

A review of policy, frameworks, plans and initiatives in the Western Cape which promote climate change mitigation and adaptation in the transport sector

Report prepared by:

Mikhail Manuel and Herrie Schalekamp

Centre for Transport Studies

University of Cape Town

cfts.uct.ac.za

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Environmental Affairs and Development Planning: Climate Change Directorate

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ABBREVIATIONS

CCP – Cape Town Climate Change Plan

CCT – City of Cape Town

CCTTD – CCT Transport Directorate (formerly Transport & Urban Development Authority)

CfTS – Centre for Transport Studies

CITP – Cape Town Comprehensive Integrated Transport Plan

DTPW – Department of Transport and Public Works

EV – electric vehicle

GESF – Western Cape Green Economy Strategy Framework

GHG – greenhouse gas (e.g. carbon dioxide, methane and nitrous oxide)

GTS – Green Transport Strategy for South Africa

ICE – internal combustion engine

IPTN – Integrated Public Transport Network (public transport improvement programme)

LPG – liquid petroleum gas

MBT – minibus-taxi

NCCR – National Climate Change Response White Paper

NDP – National Development Plan

NMT – non-motorised transport (e.g. cycling and walking)

NSSDAP - National Strategy for Sustainable Development and Action Plan

PSDF – Provincial Spatial Development Framework

TOD – transit-oriented development

UCT – University of Cape Town

UWC – University of the Western Cape

WCCCRS – Western Cape Climate Change Response Strategy

WCG – Western Cape Government

WCG : EA&DP – Western Cape Government : Environmental Affairs and Development Planning

WCIF – Western Cape Infrastructure Framework

WCSP – Western Cape Strategic Plan 2019 - 2024

INTRODUCTION

The transport sector in the Western Cape recorded the highest energy consumption for any sector of the province's economy, as well as measuring a one percent increase in consumption in each three-year measurement cycle between 2009 and 2015/16. The sector contributed an average of 30 percent of CO_2 emissions in the province over the same period, which is the second highest contributor to energy related GHG emissions after the industrial sector.

Climate change has a significant impact on every aspect of the economy and can have an equally significant impacts across society. The impacts of changing rainfall patterns and drought cycles has already been experienced in the Western Cape and increasingly so in South Africa on the whole. These changes in turn drive shifts in supply and demand in the economy, which can negatively impact employment stability and local job growth. With the potential for negative externalities, it is necessary and urgent to adapt practices across economic sectors while mitigating the severity of climate change through changed behaviour.

Given that the transport sector is a significant energy consumer and CO_2 emitter, a key part of climate change response is to focus on reducing such energy consumption and CO_2 emissions. Against this background, this review forms part of a collaboration project between the Western Cape Government and the Centre for Transport Studies at the University of Cape Town. This partnership project aims to develop a sector-specific approach towards mitigation and adaptation for climate change in the Western Cape, and is funded by the Cape Higher Education Consortium (CHEC) and Western Cape Government Joint Task Team.

The review presented in this report is a systematic investigation of published academic literature and documents from all three spheres of government relevant to transport, climate change, and mitigation and adaptation initiatives in the Western Cape. It forms the first output of the collaboration.

The review has been guided by themes identified by the project partners in the preparation of the research proposal and during a joint inception meeting in March 2020. Areas of interest for the review include mitigation and adaptation initiatives per mode of passenger transport, transport-use behaviour change initiatives, liquid fuels, and adapting spatial planning and infrastructure development to the effects of climate change. The review also draws on the 2014 Western Cape Climate Change Response Strategy and will contribute to the current revision process to this strategy that the WCG: EA&DP is leading.

The purpose of the review is not only to collate a diverse and large corps of documents relative to transport-related climate change mitigation and adaptation in the province, but also to inform and build dialogue amongst stakeholders around this topic, and to strengthen the production and sharing of knowledge especially between the academic and public sectors in the province.

After this background section follows a brief overview of the 2014 WCCCRS. Thereafter the report is divided into five main chapters. The first covers national, provincial, and district/metropolitan legislative and policy frameworks pertaining to transport and climate change. The second provides an overview of the strategic approach taken in this review. The third and fourth chapters review the mitigation and adaptation initiatives in the transport sector, respectively, that can be found through desktop sources. The final chapter discusses policy and knowledge gaps that will assist the shift to an improved response to climate change from the transport sector. A bibliography and addenda can be found at the end of the report.

Western Cape Climate Change Response Strategy (WCCCRS)

The WCCCRS, first published in 2008 and updated in 2014, provides strategic direction for the WCG's efforts to mitigate and adapt to climate change. Through this strategy the WCG set out to integrate the province's climate change response actions across departments, as well as in collaboration with the three spheres of government, civil society, business, and academia.

The WCG views its mitigation efforts as a contribution to national and global efforts to reduce GHG emissions and build a sustainable low carbon economy that creates jobs and improves socio-economic conditions. Adaptation seeks to reduce the vulnerability of people, the economy, eco-systems, and infrastructure to the impacts of climate change, while enabling the province to meet its socio-economic and environmental goals. The WCCCRS seeks to prioritise the following actions:

- Recognition and prioritisation of scaled and unprecedented climate response mechanisms as an integral component of provincial transversal growth and development programmes
- Institutionalisation of and mainstreaming climate change response into government and other stakeholder structures, strategic plans and action plans
- Ongoing collaborative research in order to:
    - Monitor changing conditions and provide and improve implementable local climate solutions
    - Develop innovative ways, funding mechanisms and partnerships to effectively and proactively respond to changing climatic conditions
    - Better understand the complexities inherent in these conditions.

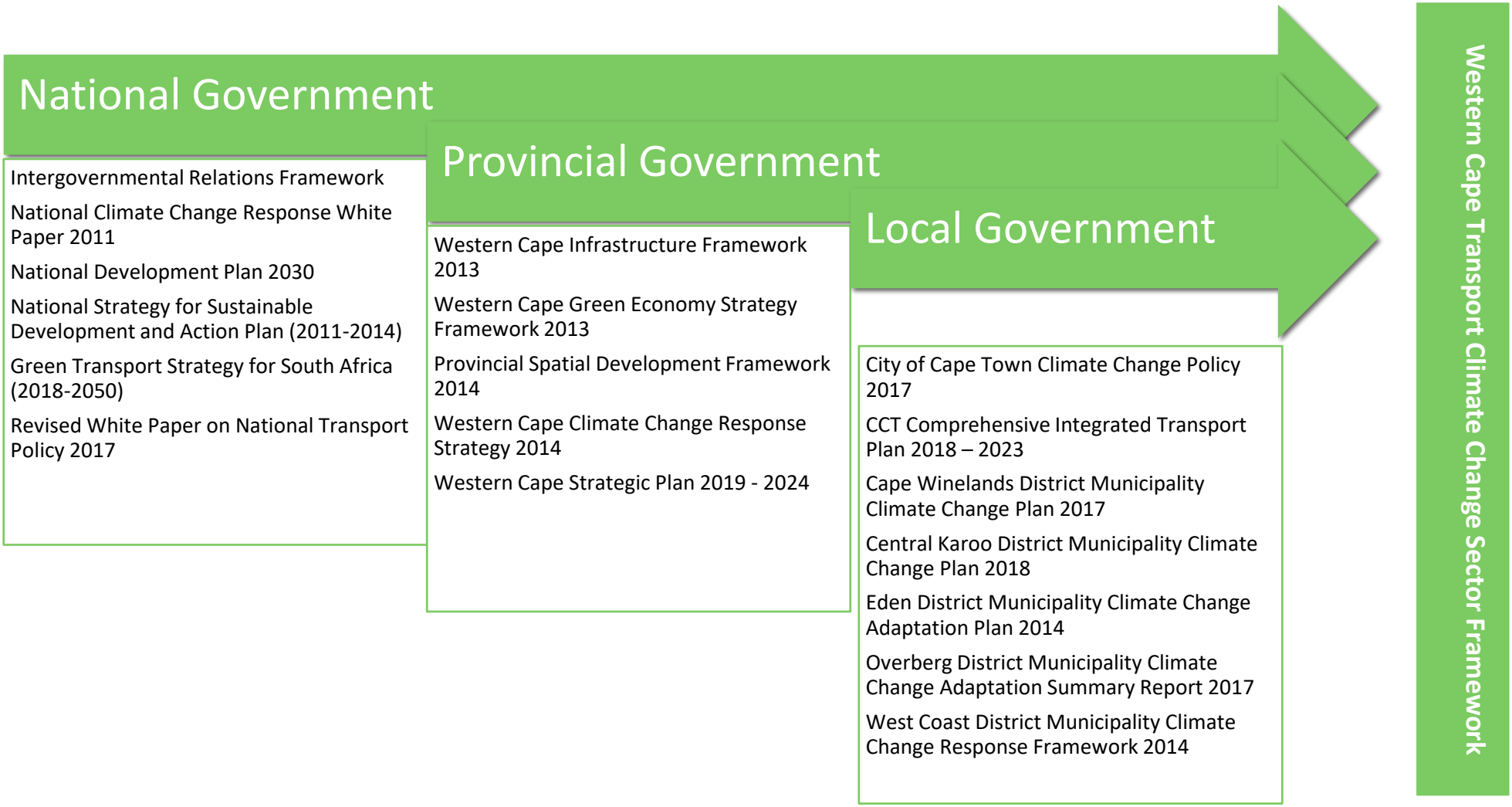
The focus areas of the WCCCRS, which is currently undergoing a review, are:

- Energy efficiency and demand-side management
- Renewable energy
- The built environment, including critical infrastructure, human settlements and integrated waste management
- Sustainable transport
- Water security and efficiency
- Biodiversity and ecosystem goods and services
- Coastal and estuary management
- Food security
- Healthy communities

Communication, awareness-raising, capacity building and education, financial models and mechanisms, and job creation are priorities that affect all of the above focus areas.

The WCCCRS identifies promoting the move to public transport, the shift from road to rail freight, improved efficiencies in private vehicles, changing travel behaviour, spatial planning, government fleet management, and prioritisation of non-motorised transport (NMT) as areas of opportunity to reduce energy consumption and GHG emissions by the transport sector.

CHAPTER ONE: TRANSPORT AND CLIMATE CHANGE LEGISLATIVE AND POLICY FRAMEWORK



The provincial government operates within a three-tiered government system and is guided by the policies and legislation of the national government, in turn setting guidelines for district or local governments. This chapter details the legislation, policies, and plans that affect the climate change response of the Western Cape Government for the transport sector. The Integrated Development Plans of key local municipalities are reviewed in Chapter Four, as part of the analysis of existing local municipality climate change adaptation initiatives.

NATIONAL GOVERNMENT

National Climate Change Response White Paper 2011

The white paper acknowledges that South Africa's transport sector remains highly reliant on carbon intensive energy. Apartheid-era spatial planning has created sprawling urban cities and dispersed rural settlements. Mitigation solutions planned in the White Paper include modal shifts to public transport and switches to alternate vehicles and low-carbon fuels. The national government proposed a carbon budget which specifies desired emission reduction benchmarked against the national GHG emissions trajectory.

The Transport Flagship Programme sought to achieve lower carbon mobility through public transport development in five metros and ten smaller cities by 2020. This included an efficient vehicles programme, rail recapitalisation for both passenger and freight transport, and procurement objectives for electric vehicles and efficient vehicle technologies in the government fleet.

The Climate Change Bill, which is currently being developed, is focused on building an effective climate change response and ensure the long-term just transition to a climate resilient and lower carbon economy and society. The Bill highlights the requirements of the different spheres of government as well as non-governmental stakeholders in responding to climate change and will include the need to look at the transport sector as a key contributor to GHGs and responding to climate change.

National Development Plan 2030

The NDP reiterates the need to implement the NCCR and that adapting to climate change must strengthen the nation's economic and societal resilience. Transport is viewed as a key driver to improve the livelihoods of South Africans, which is currently hampered by the high cost of public transport and long travel distances due to urban forms. The National Planning Commission has also highlighted the need for the national development plan to include a vision for a just transition in South Africa, focussing on transitioning to a low carbon society while also addressing the triple challenge of reducing poverty and inequality and creating jobs.

National Strategy for Sustainable Development and Action Plan 2011-2014

Under the NSSDAP, government and industry are to establish partnerships to develop sector-specific strategies to achieve energy efficiency targets. Green economy programmes need to be scaled up, for which modal shifts and more energy efficient vehicle engines form part of the transport sector response. The National Climate Change Adaptation Strategy, 2020, and the South Africa Low Emissions Development Strategy, 2020 are two further multi-sectoral policy documents.

Green Transport Strategy for South Africa 2018 – 2050

The GTS provides a detailed overview of South Africa's transport sector and a detailed account of strategies and initiatives that seek to contribute to the climate change mitigation and adaptation efforts. The national government acknowledges in the GTS that climate change adaptation transport planning and decision-making practices are not mainstream. Two national government-led initiatives, specific to the Western Cape, include

lithium-ion battery production and Hydrogen fuel cell production, mentioned in chapter two. The strategic initiatives identified by the national government is detailed in Addendum C.

Overarching all the strategic initiatives is the importance of integrated transit systems. Road transport initiatives include public transport priority, freight modal shift, a tax on new vehicle sales to contribute towards the procurement of green vehicles, and the relaxation of taxes associated with green vehicles, converting government fleets to more energy efficient vehicles, working with the private sector to increase the number of charging stations powered by renewable energy sources, introducing car life-cycle limits, road freight permits based on emissions linked to carbon tonnage, expanding carbon taxes to include commercial vehicles, develop freight vehicle regulations to only allow entry into urban hubs in the off peak, and develop green standards and guidelines for road construction, maintenance and upgrades for the inclusion of climate change resilient materials. National department of energy will be engaging fuel producers on new standards and norms required for emissions profiles.

Revised White Paper on National Transport Policy 2017

The revised white paper sets to carry out mitigation and adaption measures in the transport sector through transport and spatial planning, construction and operation of transport infrastructure, to align environmental and transport policies, and to promote low-carbon mobility and cleaner fuels. Non-motorised transport is viewed as key to reducing carbon emissions, including shifts to public transport and transit-orientated development, and the national government supports the principle of market based measures to reduce carbon dioxide.

PROVINCIAL GOVERNMENT

Provincial Freight Strategy, 2019

The PFS prioritizes freight transport's alignment with sustainable transport systems; of particular importance was the need to better understand freight demand management opportunities. The strategy noted that economic growth in South Africa is closely tied to freight transport growth, which increases energy use and CO_2 emissions. Therefore, the strategy places a priority on developing mechanisms to uncouple economic growth and freight transport demand.

Western Cape Infrastructure Framework 2013

The WCIF prioritises investment in public transport and NMT infrastructure, particularly in urban centres. It seeks to achieve a modal shift to public transport in the medium term and to electric cars in the longer term, both in the attempt to reduce reliance on liquid fuels. The use of natural gas has the potential to act as a transition fuel, from carbon intensive liquid fuels to electric vehicles, while promoting the development of renewable energy plants. The WCIF notes the need to shift general freight rail to bulk rail freight, in addition to shifting freight traffic from road to rail along major routes. The framework also brings to attention the specific situation of the rising the cost of waste transport due to the limited air space for landfills.

Western Cape Green Economy Strategy Framework 2013

The GESF lists a series of innovative solutions to encourage job creation as well as achieving climate change mitigation and adaptation measures. Buying local is a stated priority as a mechanism to reduce the use of long distance, carbon intensive freight transportation. A solution presented is an integrated waste exchange which facilitates a free online system that enables waste generators and users to exchange waste materials in the City of Cape Town. The exchange has the potential to reduce the pressure on Cape Town's landfills and minimise

waste transport requirements. Improving minibus-taxi industry efficiencies through using travel smart driver efficiency monitors, as well as integrating it with the broader transport system. The framework gives attention to GoMetro's smart transport efforts, UCT's RideLink carpooling programme, the conversion of the WCG fleet to alternate or lower carbon fuels, Green Cab Services in Cape Town which provides transport services using LPG and biodiesel fuels. In terms of NMT, the framework views cycling as a 'smart NMT solution' but recognises that it is hindered by the significant infrastructure requirement.

Provincial Spatial Development Framework 2014

The PSDF recognises climate change has a risk for the economy and the spatial form of the province. The framework outlines the need for spatial efficiency to reduce overall energy use and carbon emissions - compaction as opposed to sprawl; mixed use as opposed to monofunctional land uses; residential areas close to work opportunities as opposed to dormitory settlement, and prioritisation of public transport over private car use. Transport is viewed as a potential game changer in the energy sector, with significant reductions in energy use and carbon emissions realisable in shifting away from liquid carbon intensive fuels and scaling up urban and rural public transport and rail freight transport, the sector can be resilient of peak oil. In addition, NMT infrastructure must complement all other transport modes and the West Coast gas opportunity must be investigated and developed with a focus on imported Liquid Natural Gas (LNG).

Western Cape Strategic Plan 2019 – 2024

The WCG will prioritise leveraging provincial and municipal investments in infrastructure and services, so that communities can heal, connect, integrate, and transform while reducing vulnerability to climate change. Resource resilience is viewed as an enabler for economic growth. The WCG has outlined that it will adopt a 'Whole of Society Approach' to governing; it is within this context that it desires for more people to use safe, reliable, affordable, and low-carbon public transport. Reducing the time, cost and distance of commuting is reduced with more mixed-use, mixed-income neighbourhoods, better linkages between home, work, social services, and amenities, and sustainable densification of economic centres. This will simultaneously increase the proportion of people who choose public transport and NMT over private transport, contributing to the goal of a low-carbon province.

The long-term planning for public transport is increasingly seen as a municipal competence, which must be supported by national and provincial government. Local government will provide the planning framework for transport and human settlements initiatives, will maintain and improve basic service levels to households and will work with national and provincial government to implement catalytic infrastructure projects. The WCSP makes special mention of the project in Overberg Local Municipality to improve the quality and responsiveness of minibus taxi services using technology to offer feasible public transport in and between smaller rural towns.

Provincial Sustainable Transport Programme, 2018

The PSTP seeks to assist strategically selected municipalities in addressing mobility issues. It was not possible to secure a copy of this document within the timeframe of this review, but its existence is nonetheless flagged for future follow-up studies.

DISTRICT, METROPOLITAN AND LOCAL GOVERNMENT

City of Cape Town Climate Change Policy 2017

The CCP, which is currently being updated, states that transport is driving Cape Town's energy consumption growth. The City of Cape Town has identified reducing the number of private transport trips as the key to solving

the high energy consumption problem. Adaptation – climate compatible design promotes TOD as the solution to reduce GHG emissions by using greater urban densities to drive modal shifts in favour of low carbon transport modes and NMT, more efficient engines and alternate fuel sources, and increased occupancy in private vehicles.

By 2017, the CCT had identified transport adaptation measures for infrastructure and networks that are potentially at risk from climate change and implemented sustainable design construction principles for roads to withstand climatic changes. Of particular concern for the CCT is the South Peninsula Transport Corridor due to its vulnerability to storm surges and wind-blown sand. In terms of climate change mitigation, CCT continues to develop its Integrated Public Transport Network (IPTN) programme, its long term city-wide non-motorised transport (NMT) programme, which started in 2010 and is aligned with the road and rail based public transport network, development of a Cycling Strategy, initiated the TOD detailed design process, are pursuing modal integration through stakeholder engagement, and has developed of a Travel Demand Management (TDM) Strategy. The CCT has rolled out the Travel Smart behaviour change campaign and has initiated programmes to green the City's fleet.

In 2020, CCT released a draft Climate Change Strategy for public comment. This included a strategic focus area on transport for quality of life and livelihoods. The transport mitigation strategy is looking at an efficient and ultimately electric network through the best practice EASIA framework (Enable, Avoid, Shift, Improve, Adapt). This entails promoting efficiencies in: transport governance, land-use, multimodal transport system, road space usage and vehicles, and that infrastructure is adapted to climate hazards. In the local context, EASIA involves enabling a shift to walking and cycling while switching to electric vehicles in the transport sector off the back of clean energy and continuing the long-standing national and local efforts to achieve better public transport and, in particular, be proactive on the rail system so that its future role in the system is clear.

City of Cape Town Comprehensive Integrated Transport Plan 2018 – 2023

The CITP holds climate change high on its agenda in line with the CCP and the NDP. Compact, high density development partnered with the promotion of NMT are core to CCT's transport improvement efforts. As an additional measure, the city of Cape Town's Transport Directorate (CCTTD) will determine the carbon footprint of each of its own offices. To achieve these objectives, CCTTD intended to establish of the Sustainable Mobility Sub-committee, market walking, cycling and other active forms of NMT as travel smart options by highlighting the cost savings, environmental benefits and health benefits, market completed strategic NMT routes to residents residing within 1km of the route, continue to support concepts such as "car free days" and "open streets", support and promote recreational walking, running, cycling and other active NMT by advertising events on the City's website, require non-cycling events to include cycling in their event transport plans, prepare motivations to National for amendments in legislation that will cultivate the use of NMT.

Cape Winelands District Municipality Climate Change Adaptation Summary Report 2017

The report makes minimal mention of transport as part of its district adaptation plan. However, it does mention the risk of isolation of rural communities due to the impact of increased flooding and erosion on rural roads.

Central Karoo District Municipality Climate Change Adaptation Summary Report 2018

The summary report makes limited mention of transport in its district adaptation plan. However, it does note that infrastructure is vulnerable to climate change, which has a negative impact on disaster management efforts for rural communities, and that freight is mostly transported by rail.

Eden District Municipality Climate Change Adaptation Plan 2014

The Eden District Municipality has identified the need to improve NMT infrastructure, an Integrated Public Transport System research project, in partnership with NMMU and an exchange with CCT, on the current carbon emissions and looking at positive implications of this after four years. No budget or timeframe has been identified and the project is not in the IDP. A skills development project which promotes NMT usage amongst farmworkers was also identified. No budget has been allocated and it is not in the IDP.

Overberg District Municipality Climate Change Adaptation Summary Report 2017

The summary report set outs out the following list of actions with an associated priority marker: assess transport infrastructure to identify priority areas for interventions with the assistance from provincial and national government (low priority), develop and implement a regional transport management plan (medium priority), support the switch from road to rail for freight as well as redesign agricultural produce collection routes to reduce distances travelled, assess the viability of including existing rail into public transport network and as a tourism attraction (medium priority), support switch to mass transport systems to increase access to low-carbon transport (medium priority), and optimise supply chains and promote reverse logistics. The district municipality recognises its need for support from the different spheres of government and its entities.

West Coast District Municipality Climate Change Response Framework 2014, and Climate Change Plan 2019

Coastal transport infrastructure is identified as high risk in the report because of increased intensity of severe weather events. This will cause disruptions to emergency transport and deterioration that shortens the lifespan of infrastructure. Roads, culverts, and bridges are identified to be at risk. Mitigation measures identified includes improved public transport, encouraging the use of public transport and non-motorised transport, and commuting practices that reduces fuel consumption. Adaptation measure include integrating climate change information into transport planning and master planning to account for risk of severe weather events.

CHAPTER TWO: STRATEGIC APPROACH OF THE REVIEW

The 2013 National Household Travel Survey (which by now is outdated especially given the deterioration of urban rail services in the City of Cape Town) indicates minibus-taxi as the dominant travel model with 25.5 percent of trips, followed by private car, walking, train, and bus travel at 22 percent, 17.1 percent, 15.4 percent, 10.5 percent, and 7.3 percent, respectively, in the province. Travel patterns between rural districts and the City of Cape Town metropole is only significantly different for train travel and walking. Train travel averages at 2.4 percent of trips in rural Western Cape, whereas the metropole reported 14.3 percent of the mode share in 2013, which has reduced considerably in recent years. Walking in Cape Town accounts for 12.5 percent of household travelling, whereas in rural districts walking averages 28.6 percent of the mode share.

2.1. Breakdown of the transport sector

To develop an in-depth understanding of the low-carbon transport initiatives, a sectoral breakdown as set out in Table 1 below was used to determine which sector components affected each mode. This was used to identify initiatives in fuel, vehicle, infrastructure, behaviour, energy consumption, and GHG emissions. Transport sector initiatives in the Western Cape, found in this desktop study, are detailed in this chapter, per sector component. The rationale for this method of analysis is that developing an understanding of fuel, vehicles, infrastructure, behaviour, and emissions will enable the provincial government to influence multiple transport modes, simultaneously.

<table>
<tr><td colspan="2" rowspan="3"></td><td colspan="13">Modal Designation</td></tr>
<tr><td colspan="2">NMT</td><td colspan="5">Public Transport</td><td colspan="3">Private Transport</td><td colspan="4">Freight Transport</td></tr>
<tr><td>Walking</td><td>Cycling</td><td>MBT</td><td>MyCiti/ GoGeorge</td><td>GABS</td><td>Metrorail</td><td>Petrol</td><td>Diesel</td><td>Electric</td><td>Truck/Van</td><td>Ship</td><td>Rail</td><td>Plane</td></tr>
<tr><td rowspan="6">Sector Components</td><td rowspan="3">Inputs</td><td colspan="2">N/A</td><td colspan="3">Liquid Fuel</td><td>Electricity</td><td>Liquid Fuel</td><td colspan="2">Electricity</td><td colspan="4">Liquid Fuel</td></tr>
<tr><td>N/A</td><td colspan="12">Vehicle</td></tr>
<tr><td colspan="13">Infrastructure</td></tr>
<tr><td rowspan="3">Operations</td><td colspan="13">Travel Behaviour</td></tr>
<tr><td colspan="9">N/A</td><td>Charging Behaviour</td><td colspan="3">N/A</td></tr>
<tr><td colspan="2">N/A</td><td colspan="3">Driving Behaviour</td><td>N/A</td><td colspan="4">Driving Behaviour</td><td colspan="2">N/A</td></tr>
<tr><td rowspan="2">Outputs</td><td colspan="2" rowspan="2"></td><td colspan="11">Energy Consumption</td></tr>
<tr><td colspan="11">GHG Emissions</td></tr>
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Table 1: Sector components broken down by transport modes

Transport sector government responsibility is complex, this review is only intended to guide the actions of provincial government. In the Western Cape, responsibility over the low-carbon transport related sectors is described in Table 2, below:

Table 2: Division of government responsibility in the Western Cape low-carbon transport sector

	Sphere of government		
Components	**Local**	**Provincial**	**National**
Fossil liquid fuels			Sets grading specifications and issues production licenses
Alternate fuel sources			Leading hydrogen fuel cell research and development. Issues LPG supplier licenses Issues permits and licenses for biofuel-related activities.
Electricity	City of Cape Town produces electricity. Local governments are responsible for electricity distribution within a city/town. Issuer of EV charging installation permits.		*Producer of electricity: both Eskom, renewable energy, and independent producers. Distribution of electricity to areas not served by municipalities Issues Lithium-ion battery production licenses
Vehicles			Issues licenses for EV and ICE production and determines import regulations
Infrastructure	Non-motorised transit infrastructure development is primarily the responsibility of local governments, but provincial and national government do assist where necessary through grant funding or catalytic projects where appropriate.		
Behaviour	Advocacy programmes, and congestion charge-TDM type programmes, are run primarily by local governments and provincial governments, often in partnership with civil society or the private sector.		
Energy consumption			Sets vehicle efficiency standards
GHG emissions	Local and Provincial develop mitigation programmes and targets		Sets emission regulations through carbon tax and mitigation policy, including CO_2 emission labelling requirements on new vehicles

The division of responsibility affects the approach of a provincial transport sector climate change response framework. The approach is also dependent on the resources of provincial government and the strategic direction of the administration. The analysis above can be summarised into a potential strategic approach detailed in the box below:

Western Cape Government's role in the transport sector's Climate Change response

The transport sector response to climate change should be drafted in the lens of the WCG's 'Whole of Society Approach' to governing. The division of responsibility across spheres of government in the transport sector means that it is not straightforward for the WCG to promote low-carbon and climate resilient projects in every sector component. In the case of biofuel, for example, the industry is regulated by the national government. However, the WCG could promote the biofuel industry through the influence of its agriculture or economic development departments. The 'Whole of Society Approach' guides the transport sector's climate change response to consider catalytic interventions along the value chains of low-carbon transport initiatives.

In addition, the WCG should prioritise leveraging national, provincial and municipal resources to investment in catalytic infrastructure projects to enable economic growth and social transformation. Long term planning, provision and maintenance of basic services is the competency of local governments, however, the WCG might be required to provide assistance in their efforts to mitigate and adapt to climate change.

CHAPTER THREE: EXISTING MITIGATION INITIATIVES

Mitigation measures can, amongst others, centre on the introduction and promotion of cleaner energy sources and low – or lower – carbon vehicles, the provision of infrastructure that encourages lower carbon transport forms of travel, encouragement of behaviour change in relation to travel patterns and travel mode choice, and more efficient use of energy. This chapter provides an overview of such initiatives that are planned, have been undertaken, or are currently being implemented in the province.

3.1. Cleaner fuels

Low-carbon energy sources can take on a range of forms from lower carbon fuels to electric batteries. The Western Cape has initiatives underway in hydrogen fuel cell development, biofuel production, and electric mobility battery development. The findings of the desktop study are summarised in Addendum A.

Hydrogen fuel cell and electric mobility development has an academic focus, initiated by national government, and has attracted some private sector investment. The Western Cape boasts five biofuel producers: four of the businesses produce biofuel from used cooking oil and one has its production in the Free State using grain sorghum, with headquarters in Cape Town. Green Diesel is both a producer and a supplier of biofuel processing and dispensing systems. Based on the reports on the companies' respective websites, it is likely that the Western Cape produces around 500 000 L of biofuel a year.

The WCG invested in market research into bioenergy production through GreenCape. The outcome of this research was that large scale bioethanol projects at a production level of 160 million litres/year would require a government subsidy to be economically viable to be able to compete with crude oil prices, at the time of the study. Bioethanol from agro-processing waste, including wine production residue and fruit wastes was considered. Production at a volume of 1.2 million litres/annum was economically viable, with a potential production capacity of 10 million litres/annum. This opportunity was pursued by Namaqua Fuels but the project stalled due to lack of funding.

In terms of biodiesel, the market research found that canola was the only viable crop for biodiesel production of 20 to 40 million litres/annum. However, the competition from the food market was considered a significant risk to the viability of canola-based biodiesel production. Biodiesel production from waste cooking oil offers more promising prospects. Processing all the waste cooking oil in the province could produce 15-20 million litres/annum in biodiesel. Waste oil-based biodiesel raises health concerns if any excess oil was to make its way into animal feed. GreenCape commissioned the market research between 2013 and 2016, therefore it may be valuable to investigate market viability at present with an emphasis on supporting low-cost innovations in the biofuel value chain.

Provincial government opportunity

All three levels of government have identified the greening of government vehicle fleets. The WCG has a provincial fleet of 5000 vehicles, which could investigate the potential for agreements with biodiesel producers in the province. The City of Cape Town has noted the growing cost of waste transport as landfills move further to the urban edge and a more regionalised approach to waste management is taken in the districts so that waste management facilities are centralised. Gas flaring projects are under way at Coastal Park and Belville South landfills, the municipality has indicated the potential for the production of biogas that could power waste transport vehicles. Both the biogas opportunity and the provincial fleet greening project has the potential to act those

3.2. Low carbon vehicles

Low carbon vehicles include bicycles, vehicles with ICE engines that require or can use lower carbon fuels, electric vehicles, and the shift of freight transport from road to rail. No evidence of electric vehicle manufacturing was found in the Western Cape. However, research by GreenCape and the Trade and Industrial Policy Strategies research institution provides a case for sector investment. The impact of lower carbon ICE vehicles on climate change is through cleaner emissions, therefore, it is discussed under section 3.5.

Bicycle manufacturing

The Western Cape boasts a significant cycling population and a large bicycle repair and public sales market. Bicycle manufacturers, assemblers, or large volume distributors were found in the City of Cape Town. The electric bicycle market which is based in the Western Cape consists of number of suppliers – some of which manufacture electric bicycles from imported parts, some which convert pedal bicycles to electric, and some who imports electric bicycles from Europe for distribution in South Africa. In light of the WCG's 'Whole of Society Approach', the bicycle manufacturing value chain offers an opportunity to promote low-carbon transport and stimulate economic development. There is value in investigating the existing markets that might be able to supply the local bicycle manufacturing market, and how provincial government support may improve their ability to offer low cost materials to the low carbon transport sector.

Electric vehicle initiatives

The City of Cape Town undertook a feasibility assessment of converting the City of Cape Town government fleet to electric vehicles. The study found that converting the entire fleet is not financially viable; however, it is cost effective to convert higher capital cost vehicles with higher annual mileages. The study recommended that the City undertake a partial conversion for research purposes.

The EV market is growing, mainly abroad but with increasing – if numerically still limited – local uptake. In South Africa, the highest concentrations of EV vehicles are found in Gauteng and the Western Cape. The South African EV market is constantly shifting with models changing and new manufacturers making their vehicles available locally. Globally, EV equivalents for passenger, light commercial vehicles, minibuses, buses, forklifts, and heavy-duty vehicles are available. However, in South Africa EV vehicles have only penetrated the private passenger vehicle and public transport bus market by less than 1 percent.

The accessibility of charging stations is a significant driver of the uptake of EVs. The private sector has taken the lead on charging infrastructure development. GreenCape estimate that there were 143 publicly accessible charging stations across South Africa. The cost of lithium-ion batteries is a significant driver of the cost of EVs, whose high cost relative to ICE vehicles in South Africa is a barrier to the adoption of EVs. Importing vehicles into South Africa attract import duty, VAT, and ad valorum tax. Electric vehicles also attract a high import duty, which currently sits at 25 percent, VAT at 15 percent, and ad valorum tax for which the maximum is 20 percentm making for a total potential import tax rate of 60 percent. Importing vehicles, whether ICE or EV, is disincentivised to protect the local automotive manufacturing sector.

The South African Automotive Masterplan (SAAM) has extended the incentives of the Automotive Production Development Programme (APDP) until 2035. The APDP continues to be technology agnostic, with no explicit incentive to advance EV manufacturing in, or importing into, South Africa. However, the SAAM notes the importance of local EV technology development and the risk that South Africa faces of being left behind in the global technology shifts.

Given the research and development being undertaken at the University of the Western Cape, lithium-ion battery production is an opportunity for the Western Cape to contribute to climate change mitigation beyond its borders. The battery remains the biggest opportunity, in the EV value chain, to reduce upfront capital costs and increase EV uptake.

3.3. Infrastructure

Non-motorised transport infrastructure is a high priority across the Western Cape. Numerous projects have taken place across the province, often in conjunction with road upgrades or alongside the GoGeorge and MyCiTi IPTN public transport improvement projects. A few notable NMT infrastructure projects include the upgrade along the N1 national road in De Doorns and along the N2 in George. In Cape Town, The Greater Tygerberg Partnership undertook the Elsieskraal Green Belt project to promote NMT in the area, and the dedicated cycle lane from the Cape Town CBD to Bloubergstrand. NMT and public transport infrastructure is a priority in the 2019 WCG Strategic Plan; in addition it remains the policy of the CCT to upgrade NMT alongside public transport projects or road upgrades. The City of Cape Town lacks a comprehensive cycling network; although there is debate in academia as to whether cycling infrastructure encourages cycling mobility or vice versa, it is a possible opportunity for a catalytic project which the WCG could champion.

The Voortrekker Road Corridor has been identified as an integration Zone by the City of Cape Town, in line with National Government's Integrated City Development Grant. The aim is to increase the viability and long-term sustainability of public transport infrastructure and public investment and drive densification and diversification of land uses. The Greater Tygerberg Partnership has already initiated strategic stakeholder relationships with property and business owners, private developers, academic institutions, shopkeepers, office workers, commuters who travel through this area daily.

Provincial government opportunity

Two catalytic infrastructure projects present possibilities for further investigation – the Voortrekker Road Corridor and climate change mitigation and adaptation preparation in the Overberg District Municipality. The Voortrekker Road Corridor has been identified by the CCT as an integration zone to drive densification and diversify land use in line with the national Integrated City Development Grant. The Overberg District Municipality has identified the need for provincial or national government assistance to conduct an infrastructure assessment to identify priority interventions to mitigate and adapt to climate change.

3.4. Behaviour change

The Western Cape has an active civil society sector that advocates for low carbon transport at a variety of scales. Addendum B outlines the activities of four NMT advocacy programmes that are run in Cape Town. Desktop data collection for behaviour change advocacy programmes did not find programmes in the rural districts of the Western Cape. However, low carbon transport advocacy might be taking place but the programmes may not have reached the scale of an online presence. Travel, charging, and driving behaviour is also impacted by fourth industrial revolution applications, also listed in Addendum B. The Western Cape boasts a significant number of ride-sharing platforms that offer services to the public and closed corporate systems. Again, evidence was only found of these platforms existing in Cape Town aside from e-hailing service, Taxify, who offers services in the Garden Route.

Civil society organisations and emerging small businesses often need support at key moments to ensure that their projects reach the scale that is impactful on the behaviour of a community. The support that OpenStreets received from the City of Cape Town and the support that GoMetro received from the WCG is indicative of the potential when government supports private sector efforts to solve key problems.

3.5. Energy consumption and emissions efficiency

South African vehicle manufacturers have no reporting requirements and no GHG emissions threshold is imposed upon the vehicles which they manufacture. However a once-off emissions tax is imposed on new vehicle sales, and fuel consumption and CO_2 labelling is required on all new vehicles. The emissions tax rate was increased and the threshold lowered in 2020, to reach its current level of R120 (excluding VAT) per gram of CO_2 per km above 95g CO2/km. In practice manufacturers pass this tax directly to purchasers by including it in the sale price of the vehicle, thus creating limited consumer awareness.

A study conducted by the International Council on Clean Transportation found that, on average, the SA new vehicle fleet emits 22 percent more CO_2 than a European fleet of similar sized vehicles. The study concludes that setting a CO_2 emissions standard for the SA vehicle market and setting a national fuel standard would have a positive impact on efforts to mitigate the emissions from new future vehicle sales.

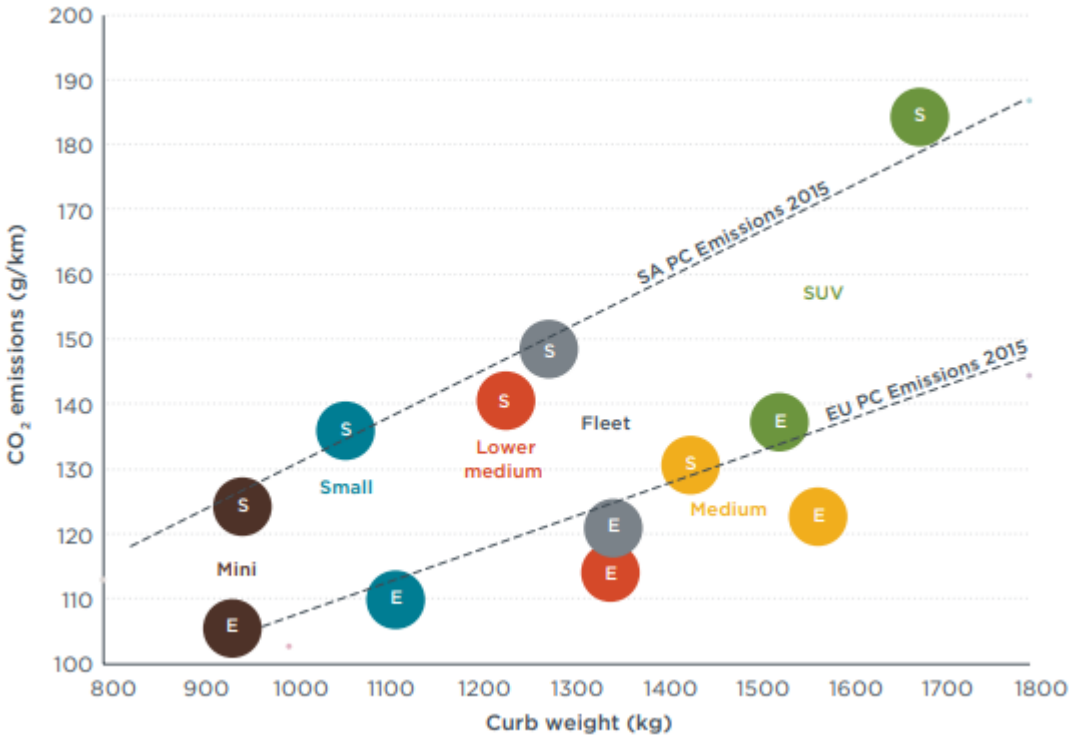


Figure 1: Comparison of new vehicle sales-weighted CO_2 emissions in SA and Europe. Source: ICCT, 2018.

A general carbon tax came into effect on 1 June 2019 and is linked to carbon budgets which are regulated under the Climate Change Bill which was expected to be passed in 2020. The carbon budgets will only become mandatory in 2021. Given that transport is the biggest energy consumer and second biggest CO_2 emitter in the Western Cape, the WCG could lobby the National Government to set CO_2 emissions standards. It will have positive consequences for the provinces' mitigation efforts and it will encourage the vehicle manufacturing sector to shift with the global trends and ensure that the South African vehicle export market remains competitive.

CHAPTER FOUR: EXISTING ADAPTATION INITIATIVES

The most recent scenario planning for climate change adaptation in South Africa states that temperature and rainfall projections remain reasonably uncertain. For the Western Cape, temperature warming is expected to be lower than the 5-8 degrees Celsius expected for the interior of South Africa. The province is expected to face lower rainfall with drier conditions expected in the West and South of South Africa.

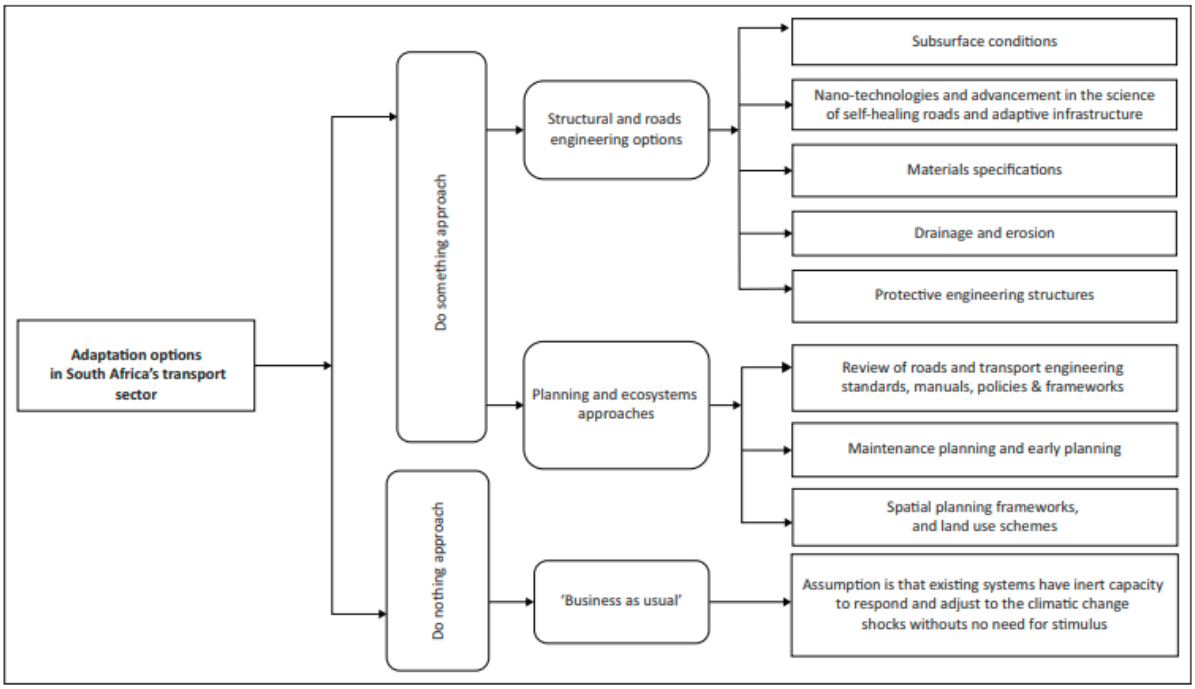
Four climate scenarios for South Africa's six hydrological zones have been developed. The Western Cape forms part of the Breede-Gouritz/Berg hydrological zone. The scenario-based projections for rainfall are Captured in Table 5 below.

Table 3: Rainfall projections for the Breede - Gouritz/Berg zone. Source: Long term adaptation scenarios, Department of Environmental affairs

SCENARIO	BREEDE-GOURITZ/BERG ZONE
Warmer/wetter	Reduced rainfall in Autumn; greater rainfall in Winter and Spring. Greater frequency of extreme rainfall events.
Warmer/drier	Strongly reduced rainfall in all seasons, especially in the West. Greater frequency of drought events, somewhat greater frequency of extreme rainfall events.
Hotter/Wetter	Reduced rainfall in Autumn; greater rainfall in Winter and Spring. Substantially greater frequency of extreme rainfall events.
Hotter/Drier	Strongly reduced rainfall in all seasons, especially in the West. S Substantially greater frequency of extreme rainfall events and greater frequency of extreme rainfall events.

These scenarios set out in the table will require consideration when investing in storm water and road infrastructure, coastal roads, mountain passes, emergency scenario planning for communities linked via rural roads etc. to ensure that the province and local governments reduce the risk of losing the value-added through developmental investments. James Chakwizira, a transport researcher, developed rural transport adaptation options, shown in Figure 6, below. Many of these are applicable options for urban transport adaptation.

Figure 4: Transport adaptation options in South Africa. Source: Chakwizira, J. 2019.



Chakwizira demonstrates that climate change adaptation is more complex than mitigation efforts, due to the institutional nature of the required reforms.

Other research and literature on the understanding of climate change adaptation for the Western Cape is limited. However, one particularly relevant paper, by Pasquini et al, details the enabling factors for mainstreaming climate change adaptation in two municipalities, Hessequa Municipality and the City of Cape Town, in the Western Cape. The research found that the size of the municipality could act as both a deterrent and an encourager of climate change adaptation.

A large and complex institution encounters more difficulty in breaking from mainstream thinking, though it may have access to more resources and greater access to a knowledge base; the work required by a senior official or a senior political champion is greater because of the greater number of people who need to be influenced. A smaller municipality, with the correct partnerships to improve access to resources and knowledge, has the advantage of only needing to convince a smaller council structure and fewer officials to implement climate change adaptation ideas.

Experientially, many municipal officials and politicians are able to attest to the effects of natural disaster events. The cost impact of these natural disasters has proven to be an incentive to respond to climate change in an adaptative manner; linked to reducing the cost impact of climate change is recognising the value of natural ecosystems as natural adaption mechanisms.

Lastly, Pasquini et al. noted the influence of political stability on the vision of the municipality, the appointment and continuity of senior administrative officials, and the continuity of debates within the council structures.

INTEGRATED DEVELOPMENT PLANS

In light of the guiding adaptation fundamentals developed by Chakwizira and understanding of the 'push and pull' factors for mainstreaming adaptation by Pasquini et al., this review analysed the local integrated development plans (IDPs) of the significant urban centres of the district municipalities that demonstrated a clear strategic intent to implement climate change mitigation and adaptation measures in their transport sector. Integrated Development Plans give practical local outcomes to strategic intent, influenced by the different levels of government. The IDPs reviewed below are the current IDPs for the Overstrand Local Lunicipality, Saldanha Bay local municipality, George local municipality, Knysna local municipality, Mossel Bay local municipality, Hessequa Local Municipality, Breede Valley Local Municipality, and Stellenbosch Local Municipality. The City of Cape Town IDP is omitted from this section of the review because their climate change policy and CITP address the climate change transport adaptation measures extensively, as was set out earlier in this report.

Overstrand Local Municipality

The Overstrand IDP identified the lack of a dedicated environmental official to focus on sustainable urban transport; as a result, the IDP recognises that the municipality is at risk of failing to fulfil their climate change mandate. The WCG has developed an IRPTN plan for Overstrand which focuses on the Hermanus CBD. Public transport projects have been identified for Sandbaai, Kleinmond and Buffelsjagsbaai, and cycle lanes have been expanded in the Hermanus industrial area. The lack of adequate public transport is noted as a weakness in the local municipality's efforts to mitigate the effects of climate change. Outside of the projects listed above, there is no NMT plan for the Overstrand area, this despite the fact that the IDP's climate change strategy includes increasing the public transport share and providing NMT and awareness campaigns. The 2013 Overstrand ITP is currently under review with the assistance from the DTPW.

Saldanha Bay Local Municipality

The Saldanha Bay IDP's only climate change related project is NMT improvements in the Vredenburg Urban Revitalisation project. The municipality committed to working closely with the DPTW to identify risks and plan for low carbon responses and adaptation and resilience responses.

George Local Municipality

The George IDP notes that its ITP expired in 2019 and is now outdated. The IDP promotes the increased use of NMT and improved access to public transport. George boasts a comprehensive public transport network – GoGeorge phases 1 to 3 are operational, the infrastructure for phase 4 and 5 are largely ready for use. However, the IDP does not mention the need to adapt planning and construction methods so as to adapt to climate change.

Knysna Local Municipality

The Knysna ITP is currently under review, in coordination with the Garden Route District Municipality; the current version is out of date. In the IDP, climate change mitigation projects include the provision of bicycle lanes for cyclists and establishing an effective public transport system in Ward 1, encouraging public transport use through improvement to taxi shelters on strategic routes and the establishment of a public transport interchange in Ward 4, public transport provision for residents who live in outlying areas of Ward 5. Potential climate change adaptation intervention is available at the development of a transport management framework plan for the Knysna CBD, ward 10.

Mossel Bay Local Municipality

The IDP identifies potential mitigation projects in the CBD, Great Brak River, and Dana Bay in the form of public transport and NMT improvements. Public transport is identified as one of the significant needs in the municipality. NMT improvements and landscaping along main roads throughout the municipality boundary, and the investigation of a tram system that connects Mossel Bay to outlining communities on the existing rail infrastructure are some significant projects. The municipality is considering an developing an ITP that will see the phased implementation of public transport system that connects the surrounding towns. Identified climate Change adaptation projects are the upgrading of gravel roads in rural settlements and improving of stormwater drainage on Kwanonqaba Road.

Breede Valley Local Municipality

Climate change mitigation is being carried out through NMT improvements for Avian Park, implemented in 2016/17, and walkway improvements to improve safety for Riverview and Roodewal. The Breede Valley Municipality has identified the transport sector has being one that still needs a lot of development, as public transport is considered to be unsatisfactory and unaffordable.

Stellenbosch Local Municipality

Climate change interventions are mostly focused on mitigation efforts. Ward 1 has implemented a public bus service that connects Paarl and Stellenbosch, public transport infrastructure improvements are underway in Ward 2, NMT improvement planning is underway in Ward 4, bicycle racks are to be implemented in Ward 8, a bike share pilot was piloted in ward 8, and electric yellow cabs were investigated to reduced congestion in ward 8, NMT infrastructure improvements for Ward 9, and 10, and 11 in the form of sidewalk improvements and bicycle lanes establishment. Sidewalk beautification in ward 17. Public transport which links Ward 19 to surrounding urban centres is identified as a priority, a pedestrian crossing is to be implemented in Ward 20, a cycling and walkway route is the process of being established in Ward 21. The Stellenbosch NMT master plan is due to be updated this year, along with the roads master plan, and stormwater master plan, and the CIPT.

Provincial government opportunity

Local municipalities across the Western Cape acknowledge the impact of climate change. However, transport sector initiatives are focused on mitigation projects and the institutional measures to mainstream climate change adaptation seems to need further encouragement. The IDPs covered in this review do not mention transport sector projects that are intended to address climate change risks related to storm water and road infrastructure, coastal roads, mountain passes, emergency scenario planning for communities linked via rural roads etc. Provincial government has an opportunity to harness the political will and administrative interest to improve the capacity for climate change adaptation measures and build capacity in the local municipalities..

CHAPTER FIVE: POLICY AND KNOWLEDGE GAPS

This desktop review has demonstrated two key areas that appear to be hindering the realisation of mitigating of, and adapting to, climate change in the transport sector. The first area is catalytic enablers for existing mitigation initiatives, and the second is knowledge production and capacity development for climate change adaptation initiatives.

Informants from local municipalities were reluctant to be interviewed for this project, and as a result an interview with the George Local Municipality, the World Wildlife Foundation (WWF), based in Cape Town, and GreenCape were the only stakeholders willing to contribute through semi-structured interviews. By and large, informants cited limited institutional interest and likely budget cuts in the short to medium term, as reasons for this type of engagement being unnecessary. However, interviews with these three stakeholders already demonstrated common threads that aligned with the desktop review.

A lack of adequate skills, budget for comprehensive transport planning, and institutional interest in new climate-change orientated thinking constrains the George Local Municipality from shifting the approach to climate change in the transport sector beyond an emphasis on NMT. There also has not been a significant investment into emission reduction transport efforts other than the GoGeorge IPTN project.

The WWF, GreenCape, and the George Local Municipality informants raised the need for capacity building. GreenCape has partnered with the City of Cape Town to implement a climate change – transport workshop series to upskill the City of Cape Town transport directorate.

The desktop review highlighted that governmental and private sector stakeholders understand the importance of climate change mitigation. There is extensive acknowledgment of the need to shift to cleaner fuels, public transport, and to promote NMT to reduce the impact of climate change. There is also a recognition of the impact of spatial design and therefore the need to use TOD and TDM mechanisms in public, private, and freight transport to reduce carbon emissions. This sentiment was shared by the George Local Municipality, specifically on the importance of NMT.

In the Western Cape, there have been pilot attempts in biodiesel and lithium-ion battery production, with the most policy interest being found in the City of Cape Town. Bicycle manufacturing, assembly, and distribution also boasts a number of stakeholders, along with acknowledgement by both the CCT and smaller local municipalities of the role of cycling in climate change mitigation. Yet, in all these low-carbon transport climate change mitigating industries there is limited evidence of biodiesel, battery production, and cycling-transport being able to realise meaningful impact in the efforts to reduce carbon emissions and energy consumption. This demonstrates a progression from initial policy ideas, and pilot implementations on many of the concepts, to evidence of apparent difficulty to catalyse climate change mitigation efforts. The most impactful initiatives in reducing carbon emissions in the Western Cape are likely to come from shifting energy generation from coal to renewable sources.

Experience from initiatives to develop cleaner or alternate fuels and encourage low-carbon transport behaviour change can be harnessed, through stakeholder engagement, to fill the knowledge gaps and develop a transport response framework that learns from the existing experience to enable catalytic shifts in climate change mitigation.

Climate change adaptation does not receive as much attention as mitigation, particularly due to the complex nature of adaptation responses; however, the larger urban municipalities recognise the need to change planning and construction practices. An opportunity exists to evaluate construction specifications and material codes to institutional climate change adaptation in road infrastructure development.

Adapting to climate change improves infrastructure investment returns; its impact is long-term in nature and therefore is the likely reason for adaptation receiving less attention. In the IDPs of the local municipalities reviewed, there is ample mention of roads master plans, stormwater master plans, and NMT improvements but there is little to no mention of risk analyses that accounts for climate change adaptation. District municipalities with rural communities frequently identified the risks that disaster management efforts faced due to climate change, and therefore necessitated adaptation of road infrastructure. However, the identified risk by the district municipalities were not found to have translated into local municipality IDPs. This demonstrates a gap in climate change adaptation knowledge.

In closing, there are a number of gaps that the transport climate change response framework should address, and this can be grouped into two areas. The first is the creation of a response framework that learns from the existing mitigation initiatives in battery and biodiesel production, attempts to shift to cleaner euro-rated fuels, changing travel behaviour through transit-oriented development and travel demand management, and changing transport behaviour to increase the NMT and public transport mode shares. The second area is capacity building that will increase the knowledge base, and instil a greater sense of urgency, for climate change adaptation in transport planning and construction methods.

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ADDENDUM A: SUMMARY OF INITIATIVES IN ALTERNATIVE FUEL PRODUCTION IN THE WESTERN CAPE

*Note: The Western Cape alternative fuel industry is relatively new, therefore, this summary is not exhaustive as all stakeholders cannot necessarily be found online and stakeholders change frequently.

	Organisation	Activity	Production	Founded	Location
Hydrogen Fuel Cell	HySA System	Develop Hydrogen and Fuel Cell systems and lithium ion batteries demonstrators, prototypes and products. A national department of science and technology initiative.	Research and Development	2008	University of Western Cape
	HySA Catalysis	Develop catalysts and catalytic devices for the early stage of the Hydrogen and fuel cell value chain. A national department of science and technology initiative in partnership with national mineral research organisation, Mintek.	Research and Development	2008	University of Cape Town
Biofuel	BioGreen	Converts waste oil and chicken fat into biofuel. Produced between 20000 l/a and 25 000 l/a. Launched turnkey franchise opportunities in 2017.	20 000 to 25 000 L/month in 2016	2007	Sand Industria, Cape Town
	Enviro Diesel	Converts used cooking oil into biofuel, producing about 20000 l/m in 2012	20 000 L/month in 2012	Unknown	Paarden Eiland, Cape Town
	Green Diesel	Biodiesel producer, Suppler of biodiesel processors and dispensing systems.	Unknown	2007	Bellville, Cape Town
	Mabele Fuels	Biofuel production from grain sorghum. HQ based in Cape Town. Plant based in Bothaville, Free State	Production capacity at 153 million L/year. Supposed to come online in 2017.	2005	CBD, Cape Town
	Eden Biofuels	Distributes cooking oil to the hospitality industry and converts the used cooking oil into biofuel.	Unknown	Unknown	Mossdustria, Mossel Bay
	Namaqua Fuels	A joint project between Namaqua Wines and Taurus Distillation launched in 2014, with the hope of production in 2015. However, a lack of funding stalled the project.	N/A	2014	Vredendal
Electric Mobility	BattCo	UWC partnered with CT-based company to commercialise a modular lithium-ion battery. The university of the Western Cape has demonstrated the production of lithium-ion battery cells at pilot scale. BattCo. Metair invests R3M after the pilot project	Research and Development	2016	University of Western Cape

	Metair	A R3 million investment to pilot the prototype lithium production project, improve equipment and sponsor a post-doctoral fellow	Research and Development	2018	University of Western Cape

ANNEXURE B: SUMMARY OF LOW CARBON TRANSPORT BEHAVIOUR CHANGE INITIATIVES IN THE WESTERN CAPE

	Organisation	Activity	Founded	Location
Advocacy	Open Streets	Advocates for pedestrian safety, low carbon transport, and Transit-orientated-development	2012	Cape Town
	WWF Low Carbon Transport Division	Conducts technical research and works with stakeholders to promote low carbon transport	2010	Newlands, Cape Town
	Learn2Cycle	Cycling education programme	2017	Pinelands, Cape Town
	Bicycle South	Cycling tourism and advocacy. Bicycle South runs a bike-friendly business certification programme, wider adoption of NMT through mass cycling events and The Bike Bus initiative	2012	Cape Town
	Pedal Power Association	Promotes cycling, the interests of cyclists, development through cycling and advocacy.	1976	Cape Town
	Bicycle Empowerment Network	Distributes bicycles to disadvantaged communities and advocates for NMT integration into transport planning.	2002	Marina Da Gama, Cape Town
Technology innovations	uGoMyWay	Carpooling app. Closed in 2018 due to insufficient demand and government support.	2014-2018	Cape Town
	OneCity	Ride sharing app for daily commuting	2018	Cape Town
	Jumpin	Peer to peer ride sharing app	2016	Cape Town
	Lula	Ride sharing app specialising in corporate ride sharing services	2016	Cape Town
	CarTrip	Ride sharing app specialising in corporate ride sharing services	2016	Cape Town
	Taxify	E-hailing service	2016 launch in SA	Cape Town/Garden Route
	Uber	E-hailing service	2013 launch in SA	Cape Town
	GoMetro	Transport data collection and information processing	2012	Cape Town
	Whereismytransport	Transport data collection and information processing	2008	Cape Town

ADDENDUM C: STRATEGIC INITIATIVES IN THE NATIONAL GREEN TRANSPORT STRATEGY

Integrated Transit Systems

1. Develop best practice guidelines to ensure that integrated, climate-friendly transport options are incorporated into land use and spatial planning.
2. The DoT in consultation with National Treasury will provide a national team of green transport experts to consult to all spheres of government.

Road Transport initiatives

1. Proposed tax on new vehicle sales, and consideration is being given to taxing diesel and petrol manufacturers, will be used to contribute to the cost of procuring green vehicles and funding e-mobility development.
2. Relaxing taxes associated with green vehicles.

Road Passenger Transport

1. Expand Bus Rapid Transit systems throughout large cities.
2. Engage the taxi industry to adopt the role as feeders to the public transport system.
3. Develop single ticketing systems.
4. Plan and design transport infrastructure that includes cycle lands and improved pavements for walking.
5. Government will work with the private sector to expand charging stations infrastructure powered by renewable energy sources.
6. Vehicle energy efficiency programme which includes government instituting procurement guidelines and to set targets for the procurement of alternate and fuel efficient vehicles.
7. Develop a national green transport awareness campaign.

Road Freight Transport

1. Development of regulatory and policy frameworks that enables congestion zone taxing in conjunction with supporting public transport infrastructure.
2. Review environmental levies on new vehicle CO_2 emissions to include commercial vehicles
3. Test vehicle emissions for roadworthiness and emissions standards that are linked to annual car licenses.
4. Label vehicles according to fuel economy norms and standards.
5. Introduce car life cycle limits on the road
6. Limit the entry of freight vehicles into urban centres during peak hour and consider introducing permits which link pricing and emissions per tonnage.
7. Develop green standards and guidelines for road construction, maintenance and upgrades.

Rail transport initiatives

Passenger rail transport

1. Improve PRASA infrastructure and services and, using the Gautrain model, upgrade rail networks in urban areas to increase frequency, information access, reliability, and safety for passengers.
2. Restore rural branch rail networks
3. Research the possibility of taxing the road transport sector for road maintenance.
4. Encourage PRASA to shift to fuel-cell and solar powered rail.
5. Develop green standards and guidelines for rail construction, maintenance and upgrades.

Freight rail transport

1. Improve reliability, safety, frequency, and digital information of transporting freight by rail.
2. Improve the competitiveness of rail transport cost versus road transport cost.
3. Encourage Transnet to shift to fuel-cell and solar powered rail.

Aviation transport initiatives.

1. ACSA is committed to investing in green energy systems at their airports.
2. Reducing emissions in the South African airspace is focused on implementing performance based navigation which requires flexible use of airspace but reduces fuel burn and emissions.
3. Due to financial constraints, investment into biojetfuel and more fuel efficient aircraft is on hold and retrofitting for improved efficiencies is preferred.

Maritime transport initiatives

1. South Africa is party to the adoption of a marine sulphur cap of 0.5 percent effective from January 2020.
2. South Africa is yet to formulate and implement policies that give effect to its multi-lateral environmental obligations that relate to maritime transport.

Cleaner and alternative fuels initiatives

1. There is currently no policy or regulatory framework that outlines norms and standards for cleaner fossil fuels in South Africa. Developing such a policy and framework is a high priority.
2. The National Department of Transport will engage the National Department of Energy on the drafting of regulations requiring refineries to produce fossil fuels that meet improved emission standards.
3. Draft regulations, in conjunction with cities, requiring 10 percent of municipal fleets to be converted to energy efficient vehicles.
4. Provide available funding models to convert minibus-taxis and fuel stations to using dual-fuel technology.
5. Establish a team to examine the cost and benefits of building biogas plants at urban landfills and sewerage plans.

6. The national government supports research programmes into biofuel and hydrogen fuel cell vehicle energy sources.

Electric vehicle initiatives

1. Develop an incentive for the manufacturing affordable electric vehicles in South Africa for both local and international markets.
2. Support research into lithium-ion battery production.
3. Set targets for government fleet electric vehicle and hybrid vehicle procurement.
4. Encourage the retrofitting of older vehicles with EV technology.
5. Investigate the possibility of manufacturing parts for EV production.