Chapter 7

Regulatory Frameworks, Policies, Norms and Standards

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Abstract This chapter provides a review of policies, strategies, and regulations in the transport sector. The narrative plays out in terms of outlining national, provincial, and local application dimensions and impacts of transport using green transport lenses. The different application scales for transport policies, strategies and regulations as enunciated through different spheres of government constitutes the main thread of the discussion. In any case, the impact and outcomes of government and non-governmental transport intervention are discussed from a green transport perspective. Complementary to this, the role and scope for norms and standards in promoting green transport policy, innovation and activities is outlined. A thematic approach is used in unpacking green transport issues with respect to transport in Limpopo province. The analysis is anchored within the green transport systems theory of innovation framework.

Keywords Green transport · Norms and standards · Policies · Strategies · Regulations · Systems

7.1 Introduction

Literature review corroborates that transport has long been acknowledged as being the heartbeat of South Africa's economic growth and social development (Dewar and Todeschini 2017; Dimitrov 2012; Plan 2010; Walters 2013). Thus, transport is a proven structuring element and instrument for building and developing local, regional, and international markets, facilitates inter and intra-trade, linking and connecting people, places, spaces with communities across the world. However, at the same time, the transport sector is heavily reliant on conventional, fossil-based fuels and therefore, contributes to the problem of not only climate change but poor

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urban quality, given that the road sub-sector is the fastest growing in developing countries like South Africa (Broto and Bulkeley 2013; Creutzig et al. 2015; Jennings 2015a, b; Turner 2017). Greenhouse gas emissions from the transport sector are said to be the fastest growing but, at the same time, the sector as a whole also offers the highest climate change mitigation potential, estimated at around 34% if appropriate mitigation interventions are to be made (Borel-Saladin and Turok 2013; Bulkeley 2013; Chakwizira et al. 2011; Davoudi et al. 2009; Farid 2016; Meyer et al. 2007; Wilbanks et al. 2012). A green transport strategy is necessary in the transport sector as part and parcel of contributing to the “National Climate Change Response Policy and the Green Economy Accord, but also implementation of Chapter 5 of the National Development Plan” (Gupta and Laubscher 2017; Jennings 2015a, b; Labuschagne and Ribbens 2014). Under commitment 9 of the Green Economy Accord, the Department of Transport has committed to reducing carbon emissions on national roads. However, the transport sector makes contributions that cut across other Accord commitments, such as commitment 4 on energy efficiency and commitment 6 on biofuels (Borel-Saladin and Turok 2013; Brent 2016; Death 2014; Mohamed et al. 2014). Exploring the implications of policies, strategies, regulations, norms, and standards in the transport sector is therefore an important aspect in the quest to transition to a low carbon economy in South Africa.

7.2 Literature Review

Addressing climate change through a transport lense requires cooperation by government and non-government sectors operating at different spatial scales (Bobbins and Culwick 2015; Broto and Bulkeley 2013; Cilliers and Camp 2013; National Planning Commission 2013b; Oranje and Merrifield 2010). The issue of transport justice and equity has increasingly gained prominence in literature emphasising the cardinal role that transport interventions can contribute towards spatial transformation aimed at tackling spatial fragmentation and automobile dependent high energy consumption systems and spatial set-up, typical of the post-apartheid South African settlement system (Davoudi et al. 2009; Jennings 2015a, b; Schalekamp and Behrens 2010; Venter 2013). The need to address spatial mismatches between job density and opportunities with location of residential areas especially for low-income earners remain a stubborn matter requiring decisive measures in post-apartheid South Africa (Farid 2016; Musyoki 2012; Rogerson 2017). At the same time spatial fragmentation continues to manifest in the form of social exclusion, deprivation and perpetuated disadvantages for marginal and low-income settlement residents in South Africa (Chakwizira et al. 2011; Dimitrov 2012; Van Wyk 2015; Walters 2014). The fractured and splintered nature of settlements encourages spatial and housing settlement gentrification which reinforces inherited inequities, encourages continued growth, and use of private motor cars (Bruwer and Andersen 2015; Chakwizira 2015, 2016; Dewar and Todeschini 2017; Turok 2012). The automobile dependent economy places a high premium on energy consumption as well as generation of green-house gases

in the atmosphere leading to climate change (Banister 2011; Bulkeley 2013; Dickey 2017; Viitanen and Kingston 2014; Wilbanks et al. 2012). The impact of climate changes entails the need to rethink spatial and settlement planning, infrastructure, and mobility systems in both urban and rural areas (Creutzig et al. 2015; Dulal et al. 2011; Hickman et al. 2010; Marsden and Rye 2010; Meyer et al. 2007; Stanley et al. 2011; Turner 2017; Wilbanks et al. 2012). While transport policies, framework, legislation, norms and standards, surveys and studies have been conducted at international and national level, similar studies have not been cascaded and implemented at provincial and local level to the same degree with particular reference to South Africa (Koma 2010; Montmasson-Clair 2012; Mtembu and Pillay 2017; Nhemachena et al. 2015; Economic Policy Reforms 2010; Wentworth 2014). A study that therefore focuses on green transport economy in Limpopo becomes instructional as it seeks to unravel the nuances and subtle matters linked to transport policies, framework, legislation, norms, and standards at the provincial, district and local level within the purview of a predominantly rural province in South Africa. Understanding the implications that appropriate and adequate transport policies, framework, legislation, norms, and standards, play in anchoring a low carbon economy is therefore of fundamental importance.

7.3 Research Methodology

The empirical research approach employed involved interviews with Key Informants (KI). The chapter utilizes a case study approach of Limpopo province to unpack the green transport policies, framework, legislation, norms and standards matters. Case studies have been argued to be an appropriate methodology for gaining in-depth insights of a phenomena and process through the application of the attitudes, knowledge, awareness and practices (AKAP) tool or methodology as exercised in this instance (Casey and Houghton 2010; Mahlatji 2013; Montmasson-Clair 2012). Case studies also arise from the need to understand complex socio-economic dynamic matters such as the link and implications that green transport policies, framework, legislation, norms, and standards pose within the transport governance framework and system (Geels 2011; Lawhon and Murphy 2012; Yin 2003).

7.3.1 *Questionnaire Survey*

A research questionnaire with 26 close and open-ended questions was developed to guide the interview process. Researcher assistants were drawn from the Transport, Education and Training Authority (TETA) Sponsored project master's student cohort. The researchers were trained in the questionnaire survey methodology and administration by the Senior researcher responsible for the theme. The questionnaire was pilot tested within the project team at the University prior to being tested

at the TETA Workshop with participants held at Polokwane Ranch Hotel. During the workshop the questionnaire was shared with delegates for feedback and input aimed at further strengthening the questionnaire format, questioning style, format, organisation, general flow, and relevance of questions for the subject under investigation. Through these exercises, combined questions that needed to be open ended and those that required being coded and close ended questions were identified and developed. The final outcome of the series of internal and external peer review of the questionnaire instrument was the final questionnaire that was used in executing the research project. In any case, the Client (TETA) was also consulted for approval prior to administering questionnaire interviews in the field. Overall, the methodology for data collection employed was purposive random sampling focusing on selected key stakeholders in the province.

7.3.2 Stakeholder Mapping and Consultation

A list of key transport and green transportation related database was generated in consultation with TETA. Table 7.1 presents the transportation stakeholder list which was consulted to gain insights and knowledge on green transport issues in Limpopo province.

7.3.3 Secondary Data Analysis

Studies that deal with legislation requires document analysis of policy, strategy, and legislative documents available in the public domain. Table 7.2 presents the list of documents consulted and analysed for gaps, opportunities, and issues regarding transition towards a green transport in Limpopo province.

From Tables 7.1 and 7.2 we can deduce that a mixed research method was used. Central to the operationalization of the mixed method was the use of the snow-ball technique in assisting to address key issues. Techniques such as gap analysis and strength, weakness, opportunities, and threats (SWOT) analysis were utilised in identifying the challenges that existing policy, legal and strategic transport and transport related documents present in the context of Limpopo Province.

7.3.4 Analytical Framework

Thematic analysis of policy, strategy and legislative documents covering green transport was conducted within the purview of the green transport systems theory of innovation framework. The spatial and human settlement planning and management models of polycentric and monocentric nodes/hubs, central place theory, transplant

Table 7.1 Sample list of stakeholders consulted in the Green Transport Project in Limpopo province

Government departments	Universities and educational institutions	Research institutions	Members of professional bodies consulted
“Department of Transport (DoT)”	University of Venda	Council for Scientific & Industrial Research (CSIR)	South African Planning Institute (SAPI)
“Limpopo Department of Roads and Transport”	University of Limpopo		South African Council of Planners (SACPLAN)
“Department of Roads, Public Infrastructure and Planning”	University of Johannesburg		Engineering Council of South Africa (ECSA)
“Limpopo Department of Economic Development and Tourism (LEDET)”	TVET Vhembe		South African Institution of Civil Engineering (SAICE)
“Department of Economic Affairs”			Council on Built Environment (CBE)
“The Department of Cooperative Governance, Human Settlements and Traditional Affairs (CoGHSTA)”			
“South African Local Government Association (SALGA)”			

cities and rural areas, industrial satellite cities, cluster cities and regions, hub and spoke urban and rural areas, university towns, resource and tourism based cities, functional settlement and regions as well as transport governance and innovation systems are the building blocks in unpacking green transport policies, framework, legislation, norms and standards in Limpopo province (Chakwizira and Mashiri 2009, 2017; Geels 2011; Lember et al. 2011).

Table 7.2 Sample list of legal, policy and strategic documents consulted for the Green Transport Project in Limpopo province

Legal document	Policy documents	Strategic documents
Spatial Planning, Land use and Management (SPLUMA) (2013)	Rural Transport Policy (2007)	Limpopo Provincial Growth and Development Plan (2009–2014)
National Environmental Management Act (NEMA) (2008)	Public Transport Strategy & Policy (2007)	Limpopo Land Transport Framework (2009)
Municipal Structures Act (MSA) (1998)	National Development Plan (2030)	Limpopo Freight Databank & Policy (2011)
Municipal Systems Act (MSA) (2003)	New Growth Path (2011)	Limpopo Spatial Development Plan (2016)
National Land Transport Act (NLTA) (2009)	Sustainable Development Goals (2016)	Limpopo Spatial Development Plan (2007)
	Limpopo Green Economy Plan (2013)	Integrated Development Plans (IDPs)—All Municipalities in Limpopo
	The Moving South Africa (MSA) study (1998)	Integrated Transport Plans (ITPs)—All Municipalities in Limpopo Province
	“National Freight Strategy (2005)”	National Master Plan (2050)
	“The National Land Transport Strategic Framework (2012–2017)”	Limpopo Rural Transport Plan (2009)
	The Industrial Policy Action Plan (2011/12–2013/14)	Energy Efficiency Strategy (2005)
	National Strategy for Sustainable Development 2011–2014 (NSSD1)	White Paper on National Transport Policy (1996)
	National Climate Change Response Policy (NCCRP), 2011	National Climate Change Response White Paper (2011)
	“Draft Policy and Strategy Framework for Green Economy in the Context of Sustainable Development: Towards Implementation of the National Development Plan, 2014”	

7.4 Discussion of Research Findings and Results

7.4.1 *Status Quo of South Africa's Transport Policy and Legislative Framework with Respect to Green Transport*

The status quo within “South Africa’s transport sector has been informed by a number of legislative and policy documents, most of which have been developed since the advent of a new democratic dispensation, and some of which have been inherited from previous dispensations” (Walters 2013, 2014). “The Constitution Act 108 of 1996 mandates the President and other members of Cabinet with the responsibility to develop national policy” (McKay et al. 2017). “This mandate places responsibility on the Minister of Transport to ensure that any development and implementation of national transport policy by the DoT addresses the mobility needs of all citizens” (Chakwizira 2016; Goetz and Schaeffler 2015). “The Constitution assigns different roles and responsibilities to each sphere of Government. With specific reference to transport matters, Schedule 4 Part A of the Constitution assigns Public Transport as a functional area over which both the National and Provincial governments have concurrent jurisdiction, whilst Local Government has a responsibility for Municipal Public Transport” (Marsay and Seobi 2010; Schalekamp and Behrens 2010). The Constitution does not, however, define Public Transport nor does it make reference to green transport. Table 7.3 presents a high-level summary of instructive national policy frameworks and strategic documents supporting the green economy.

In short, Table 7.3 presents that South Africa’s short, medium and long-term national spatial and transportation vision includes the need to plan for environmentally sustainable, climate-change resilience, and a transition to a low-carbon economy and just society (National Planning Commission 2013a). Pursuant to the need to monitor and evaluate progress with respect to moving “*towards a green economy*” strategy, green economy indicators were identified, which also cover the transport domain (Goetz and Schaeffler 2015; Mtembu and Pillay 2017). However, to date finding data for the measurement of the green economy indicators has however proved to be a challenge and in particular for the various sub-sectors in the transport industry (Bobbins and Culwick 2015). Inclusive green transport thus entails the robust deployment of fuel efficiency for public and private vehicles as a critical part of both the energy and transport policies (Pasquini et al. 2015). Efforts in the energy sector to move toward green transport also include the use of clean fuels to minimize pollution (Labuschagne and Ribbens 2014). As a result, the use of natural gas is an alternate fuel to gasoline and diesel which is being actively explored—for public transport fleets in the short term and for private vehicles in the longer term.

7.4.2 Green Transport Strategy

In the interim, the current Mid-Term Strategic Framework period, the Department of Transport has finalised and approved the Green Transport Strategy (GTS) and Implementation Plan, 2018. The GTS is a strategic document that complements

Table 7.3 National policy frameworks and strategy documents supporting green economy and transport in South Africa

Policy framework	Provision	Implications for the transport sector and green transport
“National Strategy for Sustainable Development 2011–2014 (NSSD1)”	“The NSSD1 identifies “towards a green economy” as being one of the five key priorities for the transition towards a green economy encompassing green transport sector growth and management”	“The need to transit to low transport technologies”
“National Development Plan (NDP), 2011”	“Green economy discussion is largely orientated around the promotion of renewable energy, application of energy efficient technologies, developing a resource efficient low carbon economy in which clear strategies for both adapting and reducing the carbon emissions from the transport sector are clearly articulated”	“The need to explore alternative sources of fuel for the transport sector” “The need to move towards public transport systems rather than retain a motorised approach to development” “The need for compact, smart and integrated urban and rural settlements”
“2020 New Growth Plan (Accord 4: Green Economy Accord), 2011”	“The 2020 New Growth Plan identifies the Green Economy as being one of the key sectors for growth. The Green Economy Accord prioritises green industries and manufacturing through a localised strategy that uses the enormous spending on climate change-induced technologies to create local industrial capacity, local jobs and local technological innovation. The opportunities in the green economy are described as varied and include energy efficiency, recycling, green buildings and biofuels”	“Implications regarding transport sector green industries and value chain promotion and development” “The need to anchor transport sector green procurement systems in the industry and beyond” “Provision and deployment of transport sector green infrastructure investment and incentives” “Transport sector green road, rail, aviation and maritime construction and building materials”

(continued)

Table 7.3 (continued)

Policy framework	Provision	Implications for the transport sector and green transport
“National Climate Change Response Policy (NCCRP), 2011”	“The NCCRP aims to promote investment in human and productive resources that will facilitate the growth of the green economy and that government will have to increase the mobility of labour and capital out of carbon intensive sectors and industries and move towards greener productive sectors and industries”	“Transport sector green skills, capacity building and training” “Transport sector knowledge economy” “Transport sector creative and innovation economy”
“Industrial Policy Action Plan (IPAP), 2013”	“The IPAP identifies green industries as being a priority area and supports the state’s comprehensive and integrated drive to scale up industrial policy by developing and designing sector-specific incentives for strategic areas, including the green industry area”	“Transport sector green industry development roadmap implementation plan”
“Draft Policy and Strategy Framework for Green Economy in the Context of Sustainable Development: Towards Implementation of the National Development Plan, 2014”	“The Draft Policy and Strategy Framework states that in terms of the 2010 green economy deliberations, South Africa views a green economy as a sustainable development path based on addressing the interdependence between economic growth, social protection and natural ecosystem”	“Green transport is part of the wider green economy enabling and intervention framework”
“Medium Term Strategic Framework for 2014 to 2019”	“The framework defines the strategic objectives and targets of government with respect to key green economy issues such as job creation; skills development and infrastructure; sustainable human settlements; and rural development”	The Department of Transport developed a Green Transport Strategy and Implementation Plan, 2018 to guide the sector response

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Table 7.3 (continued)

Policy framework	Provision	Implications for the transport sector and green transport
“NATMAP, 2050”	“Long term efforts towards transitioning to a green economy in the immediate and long term, way beyond year 2050”	“Implement low carbon transportation systems i. Mass transport ii. Electric vehicles Remove subsidies for fossil fuel and penalise inefficiency (high fuel consumption)” “Engage in a long-term strategic shift away from private car use and support for mass transit, public transport, rail, etc.” Explore ways to work closely with Transnet to significantly improve Spoornet so that freight is moved much more by rail than road transport”

Sources Black (2010), National Planning Commission (2013b), Emeran et al. (2013), Giles-Corti et al. (2016), Letsoalo (2013), Masson et al. (2017), McKay et al. (2017), Musyoki (2012), Nhemachena et al. (2015), Pasquini et al. (2015), Schoeman (2015)

the National Climate Change Response Policy (NCCRP) of 2011, and sets out the environmental directive of the DoT. It is envisaged to be an all-encompassing document, covering all modes of transport; and packaged in such a way that it includes *all economically viable climate change mitigation measures and options across the modes, based on their peculiarities, to avoid a “one-size-fits-all” approach*, which may be inappropriate and impractical to implement for some transport sub-sectors. The goal of the GTS is to promote transport that reduces emissions and associated with transport systems while supporting the contribution of the transport sector to the social and economic development of the country.

From the innovation and technology development point of view, it is envisaged that the strategy is all encompassing, and also investigates other transport-related mitigation options such as electric vehicles and promotion of cleaner or alternative fuels for the sector. To this end, the Department is working closely with the Department of Energy on exploring possible options to make electric vehicles more affordable so as to promote their uptake and remove any market barriers related to the uptake of cleaner fuels such as “*Compressed Natural Gas, or BioGas*”. The Department of Transport is thus committed to the reduction of Greenhouse Gases through several climate change mitigation partnerships such as the “*Nationally Appropriate Mitigation Actions*”, or NAMAS. NAMA’s are emissions reduction measures by the United Nations Framework Convention on Climate Change (UNFCCC) Parties that are reported by national governments. They can also be referred to as a set of policies and actions that countries undertake as part of their commitment to reduce their

Greenhouse Gas emissions. NAMAs also emphasises financial assistance from developed countries to developing countries to reduce emissions. Furthermore, developing countries NAMAs can be tailored to suit their national circumstances. In 2011 the Department, in partnership with the Department of Environmental Affairs, initiated the transport NAMAs through the project “*Establishing Transport NAMAs in South Africa*”, these projects include:

- The up-scaling of the Bus Rapid Transit (BRT) systems;
- The shift from “Road to Rail”
- The promotion of Non-Motorised Transport; and
- The Cleaner Fuels Initiative.

7.4.3 The Intersection of the Transport Policy and Legislative Framework with Energy Dimensions

A review of the regulatory requirements relating to alternative low carbon fuels such as gas and biofuels yields exciting findings. The Gas Act (No. 48 of 2001) stipulates certain licensing requirements that apply to commercial transmission, storage, distribution, liquefaction or re-gasification facilities or to trade in gas, but these do not represent an unnecessary burden to stakeholders. Similarly, consulted stakeholders in Limpopo do not regard the more extensive regulations covering biodiesel and ethanol under the Petroleum Products Act (No. 120 of 1977) and subsequent amendments, to be obstacles to the take-up of these transport fuels. The energy policy framework comprises various key development-based policies and integrated plans, which together indicate that the government considers natural gas and biogas as central to South Africa’s energy mix. Table 7.4, presents a tabular illustration linking the transport policy and energy nexus dimension in South Africa.

From Table 7.4, we can deduce that a strong nexus exists between transport and energy in South Africa. The relationship has ramifications regarding the need for full cycle analysis and implementation in the transport and energy planning sectors, transportation manufacturing, construction and infrastructure maintenance and rehabilitation value chain. Consequently, in consultation with various industry stakeholders, the National Planning Commission (NPC), departments of energy and trade and industry, and National Treasury are in the process of drafting the Gas Utilisation Master Plan (GUMP), which will take a 30-year view of the industry from a regulatory, economic, and social perspective. Initially commissioned to diversify South Africa’s energy production mix with conventional and unconventional gas, GUMP has developed to include industry and infrastructure planning models and acknowledges that it should also inform the gas IPPs. The latter development directly affects the downstream petroleum sector. The NPC recognises that, for gas exploration and production to remain viable, suitable downstream entities will need to provide the demand. Gas Independent Power Producers (IPPs) are expected to provide the initial demand but, for sustainability purposes, other downstream players will also need to

Table 7.4 Linking the transport policy and energy nexus dimension in South Africa

Policy	Content
Competitive Supplier Development Programme (CSDP)	The CSDP aims to improve the capacity and competitiveness of the local supply base and contribution to growth, employment creation, poverty reduction, skills development, and Broad Based Black Economic Empowerment (B-BBEE) imperatives. These aims are to be achieved primarily through the requirement for local manufacturing
National Industrial Participation Programme (NIPP) and Industrial Policy Action Plan 2012–2015 (IPAP)	The NIPP and IPAP consider transportation to be a key multiplier for economic development. An important development sector identified is fleet programmes and products, albeit in the context of supply chains and local manufacturing, rather than the provision of a municipal service. IPAP also considers biofuels development to have significant economic development potential because of its strong linkages to agriculture, manufacturing and distribution, and its ability to create substantial numbers of labour-intensive jobs in the agriculture sector. Government has committed to a 2% blend target for including biofuels in the national fuel supply but is looking to increase this to 10%, which would create approximately 125 000 direct jobs

contribute to demand. This offers scope for downstream petroleum sector players, such as municipalities intending to switch municipal bus fleets to gas, to introduce BRT system as well as the need to transition public transport buses and minibus taxi buses (MBTs) to benefit immensely from the GUMP process. The need to provide viable alternatives, such as “*Alternative Cleaner Fuels and Efficient Vehicle Technologies*”, programs to reduce private car usage by providing efficient, safe and reliable public transport as well as non-motorised transport infrastructure is therefore a central recommendation for the green transport agenda in Limpopo.

7.4.4 South Africa’s Transport Policy and Legislative Framework Implications for Green Transport Innovation and Technologies

Historically, South Africa’s success in the automotive industry has been the driver behind efforts to develop an electric vehicle industry. The Department of Trade and Institute (DTI’s) second Industrial Policy Action Plan (IPAP2) includes the commercialisation of electric vehicles, and appropriate support to encourage local manufacture of Electric Vehicles (EVs) and related components, installation of infrastructure

for such EVs, creation of testing facilities, provision of demand-stimulation mechanisms, and public education on the use and benefits of alternative-energy vehicles. Led by the DTI, the plan was supported by the DoT, the Department of Science and Technology, provincial governments. The need for such policy expression to become a reality in Limpopo Province is critical as currently no green car manufacturing plant is in the province.

7.4.5 Norms and Standards in the Transport Sector of South Africa

Another critical dimension of the green transport discourse is the role and scope for transport norms and standards in making green transport transition easier in Limpopo province. A clear norms and standards set-up will entail that green transport transition will happen with minimum challenges. Norms and standards for the green economy and transport sector in South Africa can be deduced from legislation, policies and strategies. Key legislation, policies and strategies including the associated norms and standards are presented in Table 7.5.

Table 7.5 Derives norms and standards in the transport sector of South Africa

Legislation	Norms and standards	Implications for transport sector
NLTA (2009)	Integrated transport planning Joined up transport governance	Integrated land use and transportation planning Developmental local government Cooperative local governance
SPLUMA (2013)	Spatial resilience Spatial economy Spatial efficiency Good administration Mixed housing Compact settlements Integrated housing and settlements Spatial integration	Inclusive green transport economy Transport sector resilience Transport technology efficiency Transport systems and governance Sustainable human settlements Adaptive and green transport infrastructure and services
NEMA (2008)	Environmental sustainability Environmental impact assessments Traffic impact studies Environmental mitigation and Adaptation	Sustainable transportation and services Transportation mitigation and adaptation Emissions standards
NATMAP (2050)	Low carbon economy Compact settlements Integrated settlements Appropriate transport technologies Public transit systems Bio-fuels and alternative energy sources	Green transportation Transit Orientated Developments (ToDS) Efficient energy vehicles Efficient transport technologies Alternative fuel types and combustion engine types

Table 7.5 presents norms and standards that exist for measuring transformation towards a green economy and transport sector in South Africa. The challenge though is the lack of adequate datasets and information on indicators or measuring criteria. In addition, achieving the norms and standards in the transport sector is hamstrung by financial, technical and human skills constraints.

7.4.6 *Green Economy and Transport Initiatives in South Africa*

Table 7.6 presents some examples of green economy and transport initiatives in the South African provinces. What stands out from the table is that all provinces in South Africa including Limpopo which is the case study of this project have virtually developed green economy strategies and frameworks meant to assist in implementing “towards a green economy” national plan.

Table 7.6 Examples of green economy and transport initiatives in South African provinces

Province	Green economy and transport initiate
Gauteng	“In 2010 Gauteng Province’s Department of Economic Development finalised its provincial strategy for a developmental green economy. The strategy responded to international trends, as many cities, city-regions and other similar areas had begun investing heavily in green technologies and creating green jobs in a post-economic crisis environment where sustainable growth becomes the norm. A further incentive is the need to avoid environmental taxes and penalties. The overall goal of the strategy is sustainable growth and job creation for Gauteng”
Kwa-Zulu Natal	“In 2012 KwaZulu-Natal’s Department of Economic Development and Tourism published its green economy strategy with the principal aim of supporting and directing the re-orientation and growth of the province’s economy to become increasingly competitive and resilient, and to reduce poverty, create sustainable jobs for local citizens, and address social equity throughout the province. There are three specific goals listed in the strategy: <i>Goal 1:</i> Leverage the green economy through greening provincial government investments, activities and operations <i>Goal 2:</i> Create “enabling conditions” for the development of the green economy; and <i>Goal 3:</i> Unlock the green economy through turnkey/pilot projects in the green economy”
Limpopo	“In June 2013 the Limpopo Province’s Department of Economic Development, Environment and Tourism published the province’s Green Economy Plan—including Provincial Climate Response. The plan identifies short, medium and long-term green economy goals for the province: <i>Short-term:</i> Generate jobs; Improve environmental quality <i>Medium term:</i> Create enabling conditions for green growth; Change behavioural and production patterns, and <i>Long-term:</i> Build a new economic/environmental paradigm for Limpopo”

From Table 7.6 we also identify that green economy and transport is an inclusive rather than exclusive concept and approach. Interventions and programmes aimed at promoting green economy and transport are predicated on the need to create jobs, alleviate poverty and encourage greater economic diversification and growth patterns in the economy.

However, while green growth and green economy discussions at a metro level are not yet fully developed, there are initiatives within the major metropolitan cities of South Africa aimed at anchoring green transport interventions much more strongly. Examples include the Cape Town's *MyCiti* Integrated Rapid Public Transport System, Johannesburg BRT *Rea Vaya*; Tshwane's *Areyeng*, Ekurhuleni's *Harambee* and Gautrain. These are public transport integrated bus rapid systems aimed at encouraging a modal shift from the less energy and fuel efficient private transport system towards a more efficient urban mass transit system. Table 7.7 presents a sample of green transport initiatives in South Africa.

From Table 7.7, we can deduce that there are several existing platforms that can be used to promote strategic environmental protection and sustainable economic development making use of a green economy and transport approach, such as the Climate Change Municipal Support Programme. In this envisaged approach, onward feedback loops into local Integrated Development Plans (IDPs); Comprehensive Integrated Transport Plans (CITPs) etc. as practised in the city of Cape Town are pronounced. The green economy and by extension green transport dimensions presents opportunities to address service delivery challenges with new and more sustainable solutions that are more resource and cost efficient and more resilient over the longer term. Many municipalities have recognised over time the need to invest in greener infrastructure and related climate change projects. The Municipal Finance Management Act 56 of 2003 allows for this investment, but there are some constraints, such as inadequate budgetary allocations particularly with respect to the capital outlay infrastructure and transport (including road and rail) requirements and investments projects with longer-term payback periods. Lack of capacity and skills is a further aspect, which can be mitigated through inter-governmental partnerships as well as partnerships with non-profit organisations and private companies. In Limpopo province there is need to appreciate the key role that public –private partnerships can play in helping to facilitate knowledge sharing and unlocking shared barriers for municipalities.

7.4.7 Sustainable and Safe Transport Policies and Programmes in Limpopo Province, South Africa

The Limpopo green economy plan highlights key interventions and considerations necessary to encourage the transition to a low carbon economy. Nationally, it is important to acknowledge that the transport industry has taken several steps to reduce CO₂ emissions and other environmental impacts, notably those associated with fossil-fuel combustion. Combined with growing demands for mobility, many

Table 7.7 A sample selection of green transport initiatives in South Africa

Area	Type of green transport intervention/program
Cape Town	<p>“The City of Cape Town has adopted a UNEP-based definition of the green economy, emphasising low-carbon, resource efficient, socially inclusive solutions. The desired outcomes include identification of new economic opportunities, environmental risk-reduction and job creation. Within the broader green economy, the City has identified key roles for itself:</p> <ul style="list-style-type: none"> • Ensure that the city remains attractive to investment by using appropriate regulations, incentives, and planning tools • Develop and market economic opportunities with competitive advantage, e.g. eco-tourism and renewable energy • Stimulate private sector growth through green procurement, green building, water and energy efficient technologies • Ensure greened and climate-resilient infrastructure, and • Build on Expanded Public Works Programme job creation to unlock longer-term job opportunities that reduce environmental risk and offer the opportunity for alternative methods of service delivery”
Greening infrastructure	<p>“The Western Cape Infrastructure Framework (WCIF) aims to align all infrastructure development in the Western Cape to the province’s strategic agenda, described in the One Cape 2040 Vision. It also has links to the Green is Smart Strategy Framework. The WCIF outlines a fundamental shift towards greening infrastructure in the Western Cape with key transitions in energy, water, transport, settlements and information, communication technology (ICT), including plans to:</p> <ul style="list-style-type: none"> • Introduce natural gas processing and transport infrastructure to make gas available as a transition fuel • Promote the development of renewable energy plants in the province and associated manufacturing capability • Have more stringent water conservation and demand-management initiatives • Adopt more widely the reuse of wastewater effluent as standard practice • Adopt large-scale desalination once it becomes the “next best” option • Invest in public transport and non-motorised transport infrastructure, particularly in larger urban centres • Prioritise general rail freight over bulk rail freight • Shift freight traffic from road to rail along major routes • Diversify the housing programme, with greater emphasis on incremental options • Integrate settlement development, prioritising public service facilities in previously neglected areas, and • Increase the speed and functionality of existing ICT networks and supply new technology as it becomes available” <p>“Implementation guidelines for the WCIF that incorporate measuring green transport have clear monitoring and evaluation indicators that have been prepared”</p>

(continued)

Table 7.7 (continued)

Area	Type of green transport intervention/program
South African Green Economy Modelling Report (SAGEM)	<p>“The SAGEM study was undertaken in 2013 at the request of the Department of Environmental Affairs (DEA) to assess potential opportunities to promote a green economy as set out by the National Development Plan—Vision 2030. Commissioned by UNEP, the assessment was led by Stellenbosch University and the Sustainability Institute of South Africa. It utilised the Threshold 21 framework developed by the Millennium Institute, customized for the South African context”</p> <p>“The SAGEM study comprised of a modelling exercise comparing a ‘business-as-usual’ investment scenario with other scenarios in which investments were allocated in various configurations to four critical green economy sectors, namely, natural resource management, agriculture, transport and energy”</p> <p>“Considering economic growth, poverty, employment, resource efficiency and climate change, the research showed that the strengthening of natural resource management and environmental protection is fundamental for sustained economic growth and wellbeing. Reducing emissions and conserving natural capital stocks in the short-term to profit from their healthier state in the future, benefitted both sustainable growth and wellbeing”</p> <p>“Overall, the model suggested that driving green economy investment was better for the economy than not. Concentrating investment in the energy sector was shown to maximize employment creation potential overall. This is due to additional infrastructure requirements in the sector. However, given an equal allocation of investment across the four sectors, agriculture showed the highest employment creation potential”</p> <p>“This work fed into the development of Green Accord, which forms part of the New Growth Path”</p>

Sources Antal and Van Den Bergh (2016), Graichen et al. (2017), Mazzucato et al. (2018), Munang et al. (2013), Olhoff and Christensen (2018), Pasquini et al. (2015), Williams (2013)

eco-innovation initiatives have focused on increasing the energy efficiency of vehicles and other forms of transportation, while at the same time improving safety. Table 7.8 summarizes the transport sector green economy challenges with respect to Limpopo province. These challenges operate at all scales, spheres and sectors of government and non-governmental sectors. Table 7.8 presents highlights of some transport sector major challenges in Limpopo Province.

Letsoalo (2013, pp. 33–34) indicates that to promote faster development in transport sector as highlighted by the Table 7.8, there is a need for a more user-friendly policy and government intervention to enhance competition for new innovations, business ideas and strategies to manage the environmental impact on the transportation system. Some of the issues requiring the intervention is:

- Consideration of subsidising cost to convert a vehicle to an aftermarket alternative fuel system;
- Consideration of exempting taxis and buses powered by alternative fuels from paying road tax;

Table 7.8 Highlights of some transport sector major challenges in Limpopo province, South Africa

Identified issue	Challenge	Opportunity for action
Spatial planning	Land fragmentation	<p>Bring people closer to work opportunities to reduce need for transport, align land-uses with public transport and pedestrian routes</p> <p>Review land regulations and operations</p> <p>Compile an updated Green House Gas inventory and Atlas for Limpopo province</p> <p>Enhance the use of existing infrastructure like the natural gas pipelines, existing distribution channels of LPG, existing petrol/diesel stations for biodiesel/bioethanol blends, including charging EVs at home or shopping malls or airports</p> <p>Promotion of modal shifts, favouring transport modes with high transport and fuel efficiency, e.g. high-speed passenger trains or rail such as the Johannesburg to Durban high speed passenger train as well as shifting freight from road to rail</p>
Taxi industry	<p>Transformation of taxi industry</p> <p>Disgruntlement with new arrangements such as BRT</p>	<p>Corporatization of taxi industry</p> <p>opportunity to move operators from second to first economy (i.e. from taxi owners to bus owners/operators)</p>
IRPTN projects—Polokwane	<p>Integrated ticketing system</p> <p>Branding of public transport</p> <p>Roll-out and implementation of BRT project</p>	<p>New jobs created through bus operation like maintenance, fare collection, security can be quite sustainable moving into the future</p> <p>Develop comprehensive rail policy and programmes aimed at addressing inefficiencies in the rail sector thus promoting it as viable option for transportation of both goods and passengers</p>

(continued)

Table 7.8 (continued)

Identified issue	Challenge	Opportunity for action
Alternative green technology and innovation	Deployment, cost, access, affordability and acceptability of new transport technologies in transit systems and for private vehicles	<p>Testing next generation climate friendly buses including ethanol, CNG, and biodiesel buses in order to gain operational, environmental, and financial data on their impact</p> <p>Putting more emphasis on the introduction of electric and hybrid vehicles to mitigate climate change</p> <p>Synchronize the traffic lights</p> <p>Urban design for energy efficiency (bicycle roads, no car zones)</p> <p>Solar traffic lights</p> <p>Solar street lights</p> <p>Alternative energy vehicles</p> <p>Cars: Hybrid or electric</p> <p>Bus retrofitting (gas)</p> <p>Electric bikes</p> <p>Hybrid buses</p> <p>Gas fuel technology</p> <p>Biodiesel</p> <p>Hydrogen fuel cell</p> <p>Solar production of hydrogen for rail and public transport</p> <p>Biofuel</p> <p>Roads upgrading programme using environmentally responsible technologies (green roads)</p>
Expanded public works programme	Upgrading EPWP to be compliant to green procurement and green job profiling requirements	Opportunity to secure funding to create green jobs within these projects
Building on momentum of the 2010 World Cup NMT initiatives	Development of NMT infrastructure and green jobs around 2010 roads projects	Utilise and development of NMT infrastructure and green jobs around 2010 roads projects and beyond
Shifts in policy direction	Take advantage of reviews of IDPs, ITPs, SDFs etc. to infuse and incorporate green transport components	Development of new policy direction around issues like climate response strategy for the transport sector, energy efficiency framework for the transport sector including cleaner fuel technologies and alternative fuels

Sources Broto and Bulkeley (2013), Giordano (2014), Letsoalo (2013), Rivett-Carnac et al. (2016)

- Consideration of exempting import duties and encouraging the setting up of manufacturing facilities in South Africa for products like toolkit development, dispensers, cylinders, batteries, etc.;

7.5 Transport, Policy, Norms and Standards in Limpopo Province: Case Study Findings

Transport, policy, norms and standards in Limpopo province are an extension of the national transport, policy, norms and standards. The issues, gaps, opportunities and challenges mirror those reflected at the national level. However, differentiated nuances emerge in the context of Limpopo province informed by unique geographical realities, context and the interplay of various development dynamics in the country.

7.5.1 Lack or Absence of a Provincial Green Transport Policy

Limpopo province does not have an explicit green transport policy that addresses the emergent green transport issues. Consequent to this, green transport initiatives and policy directions are approached by default and implicitly. It is for this reason among others that green transport is either addressed as a sentence, a few sentences, a paragraph or section in various policy documents. In this policy findings and recommendations, we thus argue that transport and by extension green transport is a specialised domain and field that requires undivided and indivisible attention if green transport matters are to occupy the rightful place in development debates. Table 7.9 presents selected highlights of a transport and related policy documents opinions from a provincial green transport perspective as indicated by surveyed stakeholders. While the Constitution (i.e. 28.5%) and the NDP (28.5%) are key national policy pronouncements, these are not enough in themselves for purposes of realizing a green transport compliant Limpopo province. Transport sector strategies and plans such as public transport strategy (14.28%), National Transport Master Plan (NATMAP) (14.28%) etc. do not provide structured green transport transitional measures to facilitate a seamless shift from a high carbon emitting economy to a low carbon emitting economy. Other complementary green transport policies, guidelines and regulations will need to be developed at the provincial and local level if green transport is to become a success.

From Table 7.9, we can further deduce that while transport policy documents exist at national level, these are not enough in themselves to ensure green transport implementation at the provincial and local level. In order to implement robust, flexible and resilient green transport policy provisions, there will be need to supplement and complement them with provincial green transport policy and guidelines attuned to Limpopo's local needs and requirements.

Table 7.9 Selected highlights of transport and related policy document shortcomings from a provincial green transport perspective

Name of policy document	Identified policy shortcoming	Frequency	%
Constitution of Republic of South Africa	Is generic and does not provides specifics to respond to new issues such as green transport	6	28.5
NATMAP, 2050	Was crafted prior to Climate change and green transport becoming topical issues and hence is silent on the matters	3	14.28
Public Transport Strategy, 2007	Addresses green transport by default and does not provide adequate guidance regarding green transport manufacturing, procurement and implementation guidelines for use at local or municipal level	3	14.28
National Development Plan (2030)	Identifies transition to a low carbon economy as essential and presents some broad-brush measures such as compact development and integrated spatial planning. However, this picture is illustrative and inadequate for local-level interventions needs	6	28.5
National Land Transport Framework (2014–2019)	Incorporates the need for low carbon transition in the transport sector but does not provide a province specific road-map and strategy for implementing low carbon transitions in each of South Africa's provinces	2	9.52
Others		1	4.76
Total		21	100

Sample size N = 21

Source Research Findings, 2016

7.5.2 Lack of or Absence or Inadequate Green Transport Budgeting and Accounting

While in the province, specific Departments such as Limpopo Department of Economic Development and Tourism (LEDET) and Limpopo Department of Roads and Transport (LDoR&A) have been charged with the responsibility to oversee green economy initiatives, budgeting and accounting systems beyond these main Departments is not clear. While Departments can and do indeed reflect and comment on green transport contributions and impact, this is as an addendum or after thought. At the same time, when budgets are being disbursed from Treasury, be it provincial or national there is no explicit budgetary line that indicates that such an amount is meant to promote exclusively green transport initiatives. As a result of this, beyond

Table 7.10 Suggested drivers for integrating green transportation and logistics initiatives in Limpopo province, South Africa

Options	Scale 1–5 (1 lowest and 5 highest)				
	1	2	3	4	5
Partnerships			6		
Decreasing CO ₂				2	
Implement policies related to green transportation					4
Decrease conventional fuel consumption for bio-fuel				2	
Provide green transport (BRT)		4			
Incentives for individuals and companies towards a green transport economy			3		
Total	0	8	27	16	20
Rank	5	4	1	3	2

Sample size N = 21

Source Research Findings, 2016

LEDET and LDoR&T, green transport actions and measures are not explicitly tied to budgeting and funding flows but finds themselves expressed by implication. The need to develop a clear framework for provisioning green transport budgeting and accounting becomes critical.

Table 7.10 presents the ranking of suggested drivers for integrating green transportation and logistics in Limpopo Province. In terms of ranking establishing partnerships (27) with individuals, companies and sectors aimed at promoting green transportation is crucial. As an example partnership with schools and Universities regarding green projects, innovations and competitions would be one way of strongly anchoring the green economy and transport project in Limpopo Province.

From Table 7.10 we can deduce that implementing policies (20) related to green transportation came second, suggesting that the value of policies lies in their implementation and uptake. Decreasing carbon emissions (16) through using cleaner fuels and better transport was also important and is therefore a critical element in actions and measures meant to reverse and reduce the carbon footprint of transport and the economy in Limpopo Province.

7.5.3 *Inadequate Research and Innovation Think-Tank on Green Transport in Limpopo Province*

Granted that there is the existence of the Limpopo research commission which is made up of all stakeholders in Limpopo including research and university community, green economy and by extension green transport interventions still remain largely inadequate. Even when one factors the efforts of the National Transport Forum (NTF) that includes all provinces and stakeholders involved in the transport sector, at the provincial operational level, transport research and by extension green transport research is inadequately covered. In order to overcome this challenge, it is suggested that the Limpopo Transport Forum (which was quite vibrant at some reference point in terms of the Limpopo Freight Transport Forum) be revived and used as a springboard for sharper and heightened focus on green transport matters covering all transportation sectors in the province such as roads, railways, air etc. Figure 7.1 presents an overview of the importance of green issues in the transport sector in Limpopo Province.

From Fig. 7.1 we can deduce that most interviewed stakeholders identified that green issues are very important (61.9%) for and in the transport sector. However, the challenge they raised related to the need to address “*green transport adoption*” owing to perception, opinion and behaviour or lifestyle issues. It was argued that a significant proportion of people in the province believe that they are “*incomplete*” if they are not driving. However, at the same time the impact of decentralisation of services between areas for example Louis Trichardt (LTT) and Thohoyandou was viewed as one practical way of reducing emissions by eliminating trips through bringing services closer to people. This was viewed in the context of densifying

Fig. 7.1 Importance of green issues as an overall strategy in the transport sector of Limpopo province. Sample size N = 21. *Source* Research Findings, 2016

and diversifying services offered in Thohoyandou so that the need to travel to Louis Trichardt is minimized.

7.5.4 Existing Spatial Patterns of Settlements in Limpopo Province Present Green Transport Implementation Challenges and Opportunities

The fragmented and scattered nature of settlements overlaid on a difficult geographical and challenging climatic zone make it difficult to engage in alternative and green transport interventions such as cycling and walking given the terrain (i.e. slopes), long distances between home areas, work area and facilities of interest. However, at the same time opportunities for pooling transport resources together and engaging in car—pooling, car sharing, lift-clubs and use of buses including BRTs present an opportunity to reduce the carbon footprint of traffic in the Province. It is however critical to realise that the province has different types of towns which will require differentiated green transport interventions. For example, the province has mining towns, agricultural towns as well as border towns all presenting different nuances of green transport needs. If one also includes the strong eco-tourism component of the province, this brings another dimension of the green transport relevant to the tourism sector as an example. Recognition that no one size fits all for green transport interventions is one central theme that green transport policy and recommendations in Limpopo Province will need to be sensitive to. Table 7.11 presents the results of the opinion survey from stakeholders indicating which plans they view as providing leadership to tackling green transport issues in the Province.

From Table 7.11, we can deduce that currently the provincial green economy plan is viewed as the document providing clear direction to the green transport sector (33.33%) than anything else. While respondents argued that the provincial land transport plan (14.28%) should provide leadership, it was argued that the existing document is outdated and required urgent review. Given that the last provincial land transport plan (PLTF) did not incorporate green issues, the plan was criticized as

Table 7.11 Provincial long-term plan viewed as providing direction for green transport in Limpopo province

Provincial long term green plan portrait	Frequency	%
Provincial growth and development plan	4	19.04
Provincial green economy plan	7	33.33
Provincial spatial development plan	4	19.04
Provincial land transport plan	3	14.28
Provincial infrastructure master plan	2	9.52
Others	1	4.76

Sample size N = 21
Source Research Findings, 2016

providing little value in addressing green transport challenges. The provincial infrastructure plan (9.25%) (i.e. currently under preparation) was viewed as an opportunity that should not be missed in seeking to craft and strongly infuse the green economy and by extension green transport matters in the province.

7.5.5 Existence of a Conducive National Transport Policy, Regulations, Norms and Standards to Act as Platforms for Implementing Provincial Customized Green Transport Solutions

The review and discussions with stakeholders yielded the outcome that overall national frameworks and regulations exist. However, the downside of it, is that as framework legislation, they were never crafted to address the provincial peculiarities and dynamics of implementation that vary from one province to the next. As such it is critical that the province of Limpopo develops its own refinement and improvement of the broad-based national frameworks, policies and norms adapted to the case of Limpopo. Table 7.12 presents some of the innovative ways that the province can introduce to move away from conventional energy sources.

From Table 7.12 we can deduce that no stand-alone intervention exist that can single-handedly address fully green transport requirements in Limpopo province. This strongly suggests that a balanced implementation approach that considers the need for promoting BRT (23.8%) were appropriate, promoting NMT (28.57%) as far as practical as well as fostering enhanced smart and integrated planning (38.09%) are important. However, others (19.04%) suggest that innovation and thinking beyond the current approaches is also an important ingredient for sustainable green transport development and implementation in Limpopo Province.

Table 7.12 Some innovative ways that the province can introduce to move from conventional energy sources of supply

Innovative option	Frequency	%
Bus Rapid Transport (BRT)	5	23.8
Promote non-motorised transport (NMT) such as cycling, walking etc	6	28.57
Smart and integrated planning e.g. compact development, Transit Orientated development (ToDs etc.)	8	38.09
Others	4	19.04
Total	21	100

Sample size N = 21

Source Research Findings, 2016

7.5.6 *Lack or Absence or Inadequate Coverage of Green Transport Qualifications or Programme Offering in Limpopo Province*

While different types of educational institutions ranging from Universities, Technical Vocational and Educational Training (TVET) colleges, Schools and private institutions exist offering different programmes which have resonates in green transport, the challenge is that the actions are ad-hoc, not streamlined and integrated. The focus is not clearly structured to address green transport needs in the province and by extension in the country. While it can be argued that graduates from these institutions will adapt and learn the green skills, knowledge and needs once at work, it is also true that challenges will abound under such a model. Indeed, academic institutions touch on green economy and green transport challenges in courses on environment, tourism, agriculture, geography, urban and regional planning, engineering, etc. However, the problem is that the focus of the programs is not green transport and hence inadequate attention is paid to in-calculating knowledge, skills and techniques relevant to green transport. The TVET colleges do not have dedicated programmes on green infrastructure designing and manufacturing as an example. Table 7.13 presents the state of planned and current green transportation and logistics initiatives in Limpopo Province.

Table 7.13 Planned and current green transportation and logistics initiatives in Limpopo province, South Africa

Options	Scale 1–5 (1 lowest and 5 highest)				
	1	2	3	4	5
Emissions measuring and reduction		1			
Improving energy efficiency in motor vehicles		1			
Trail or use of alternative green fuels			1		
Moving freight away from air, road to rail					6
Strategic warehousing and distribution centres after peak hours				1	
Vehicles routing to reduce mileage and carbon emission					
Green procurement			2		
Green materials usage		1			
Sustainable transport policies and green thinking					6
Hybrid and alternative energy vehicle development and usage				1	
Others					1
Total	0	6	9	8	61
Rank	5	5	2	3	1

Sample size N = 21

Source Research Findings, 2016

From Table 7.13 we can deduce that high and middle income people own cars. For them to switch to green transport modes there is need for incentives in terms of providing a standard BRT service or incentives for car sharing and pooling or making it affordable to acquire green cars. Sustainable transport policies and green thinking (6) will result in improved spatial outcomes and spatial transformation that leads to green resilient settlements. Spatial planning, land use and management act (SPLUMA, 2013) is expected to play a leading role in making this contribution a reality. Moving freight from air and road to rail (6) was a strategic move to reduce emissions especially given the high volume of trucks on the N1 road that traverses Limpopo Province.

7.5.7 *Lack of a One Transport Governance Approach in (Re)solving Issues*

While institutions and actors exist covering different components of the transport sector such as infrastructure, construction, planning, policy, financing and sustainability as examples, the efforts are disjointed, fragmented and incoherent. There is therefore need for a one governance approach to enable integrated land use and transportation planning which is at the core of green transport interventions. Table 7.14 presents the results of the opinion survey from stakeholders interviewed. While challenges exist, the “*silver lining*” is that public–private partnerships (PPP) can offer a window to implement a raft of interventions that would assist in green transport transformation in the province. Establishing a green fund initiative (i.e. 47.61%) was argued as a practical way to ensuring green budgeting, accounting and monitoring as well as supporting science and technology (S&T) work aimed at upscaling, retrofitting and acquiring green manufacturing equipment aimed at reducing the carbon footprint of industries and sectors that support and promote green transport in Limpopo Province.

Table 7.14 How policy makers can promote PPP in the green transport sector

PPP intervention measures and option	Frequency	%
Green transport industrial fund	10	47.61
Green transport corridors	5	23.8
Eco-mobility initiatives	3	14.28
Carbon tax policy	2	9.52
Tax rebates for individuals who use public transport, car sharing, car-pooling or lift clubs etc.	1	4.76
Others	0	0
Total	21	100

Sample size N = 21

Source Research Findings, 2016

From Table 7.14, we can deduce that achieving a sustainable green transport policy direction in Limpopo province will require multi-faceted and diverse implementation models. No one approach will provide an inclusive, integrated and comprehensive solution. The need to apply different strategies fit for different scales that consider different dynamics and realities of individuals, institutions and sectors is therefore fundamental. While eco-mobility (i.e. 14.28%) was mentioned, the respondents indicated that this solution required initiatives that predate to implementing awareness campaigns to children starting at the Crèche or kindergarten level. In this thinking the slogan “*catch them young*” was touted as one practical way of developing and building a “green transport” generation of citizens, essential in promoting green interventions throughout their life-cycles. The carbon tax policy (i.e. 9.25%) although hailed as a move in the right direction was questioned regarding its implementation practicalities. It was cautioned that given the rural nature of the province and the reality that certain marginalised and deep rural areas are only saved by the “*bakkie*” transport, implementing a carbon tax model may be pricing the transport service out of the reach of peripheral and poor people in the province. In this regard, solution and policy direction must strike a differentiated balance between promoting green transport and ensuring that the intervention bring a “*value add*” dimensions to all sectors of the society and economy without disempowering others sectors unconsciously.

7.5.8 *Overcoming Constraints to Implementing Green Transport in Limpopo Province*

Stakeholders discussed and identified that different forms and types of constraints exist in seeking to promote the transition to green transport in Limpopo. These range from financial, structural or spatial, policy or legislative as well as behavioural or institutional constraints. In seeking to propagate a suitable green transport agenda for Limpopo province, it was suggested that all areas and sectors required attention if an inclusive, resilient, integrated and sustainable green transport agenda is to be realised. Figure 7.2 presents suggested key issues in developing a green economy in Limpopo Province.

From Fig. 7.2 we can deduce that technological innovations (33%) running the gamut of vehicle manufacturing, infrastructure manufacturing and transportation construction materials and technologies are at the centre of a green transport turnaround strategy and policy. For this to happen, a supportive policy and legislative environment (29%) that will enable the “*painless transition*” is fundamental. Implementation of a carbon policy on emissions such as car retirement policies, enforcing carbon emission certificates and standards (19%) is also a critical dimension of a broad-based pathway towards a low carbon economy in Limpopo Province.

Fig. 7.2 Suggested key issues in developing a green economy in Limpopo province. Sample size N = 21. *Source* Research Findings, 2016

7.5.9 Synthesis of Green Transport in Limpopo Province

A synthesis of the policies, strategies, regulations, norms and standards in the transport sector highlights a strong narrative replete with low carbon transition gaps (Benson et al. 2014). At the same time these existing gaps represent an opportunity to convert them in value adding and transformation green transport levers and platforms for charting a low carbon transition roadmap and implementation in Limpopo province. Figure 7.3 presents a schematic diagrammatic illustration summarising the critical Highlights of Regulatory Framework, Policies, Norms and Standards Research Findings.

Fig. 7.3 Summary highlights of regulatory framework, policies, norms and standards research findings. *Source* Authors own conceptualization, 2021

From Fig. 7.3 we can deduce that to transition towards a low carbon economy in Limpopo, there is need for the implementation of a raft of interventions and measures covering the full gamut of regulatory framework, policies, norms and standards in the transport sector. It is heartening to realise that minimum conditions and a framework regime for implementing and engaging in a green transport inclusive and green induced and focused growth and economy exist (Montmasson-Clair 2012). However, the need to upscale, update and align the Regulatory Framework, Policies, Norms and Standards to be compliant to a green transport growth and development approach requires further investment in innovation, training and skills transfer and knowledge development also taking into account the 4th Industrial Revolution (Aoyi et al. 2016; Gumbo and Letlape 2016).

7.6 Chapter Recommendations

i. Short and medium term

In the short to medium term, several high impact and practical policy measures are recommended for development, implementation and management. The recommendations are based on principles and values aimed at strengthening and improving existing systems and mechanism in line with the need to promote the green economy and by extension green transport initiatives. These are as follows, namely:

- Generation of a 10-year provincial short-medium term green transport policy in Limpopo that is aligned with the National Development Plan (NDP) 2030;
- The development, implementation and management of green transport budgeting and accounting guidelines for use by Government departments and sectors in promoting the “transition to a green economy in Limpopo province” (Letsoalo 2013);
- The development, implementation and review of short term (i.e. refresher courses, certificate and diploma courses) in transportation with a clear emphasis on green transport by Universities in Limpopo such as “University of Venda”, “University of Limpopo” etc. aimed at (re)training current and future green transport stakeholders such as practitioners, policy-makers, decision-makers etc. (Musyoki 2012);
- Implementing a robust and flexible training, capacity building and awareness raising programmes, projects, campaigns and roadshows covering the need, importance and relevance of green transport budgeting and accounting for all government departments, sectors and non-governmental sectors in Limpopo province;
- Development and support of green transport non-governmental organisations (NGOs), civil groups and or incorporation of green transport activists

in existing and future NGOs, civil groups to create multiple lobby and advocate groups in promoting green transport and by extension green economic development;

- Revival of the Limpopo transport forum with a special chapter or sub-group or reference working group focusing on green transport and the green economy. The aim of the special chapter or sub-group or reference working group is to “facilitate information sharing and coordination, including organising seminars and site visits to different municipal green transport initiatives” (Nhemachena et al. 2015);
- The University of Venda to establish a transportation research unit which focuses among other themes on green transport as a niche area;
- Utilise Limpopo’s Polokwane’s bus rapid transport (BRT) project to showcase the need and advantages of green transport in the growth and development of secondary cities and small-medium sized cities.
- “Successes and lessons learned in implementing green transport initiatives need to be effectively disseminated between cities, small to medium sized towns, communities, farms and villages in the Province” (Mahlatji 2013);
- Update existing provincial, district and local level transport, land use, infrastructure, economic and closely related policy documents to incorporate green economy in general and green transport in particular interventions explicitly. This should be implemented during the next rounds of reviews for the different documents, namely in the next 5 years for the integrated transport plan (ITP) review, local economic development (LED) policy document and next integrated development policy (IDP) cycle for all municipalities etc. respectively;
- Establish green economy desks or green transport desks in departments and sectors either individually or in clusters depending with need and budgetary provision to assist in expanding and aligning green transport portfolios and footprints of interventions between and across sectors;
- Employing the October transport month to pilot, demonstrate and show-case eco-mobility interventions such as cycling, car free days etc.;
- Identification, implementation and management of green transport high impact corridors of interventions in which “green infrastructure and transport interventions are consciously implemented as demonstration or pilot projects per each Local municipality or District municipality in the province” (HM Treasury 2011);
- Establishment and development of a green transport manufacturing, procurement requirements, systems and regulations value chain and addition structure aimed at developing a minimum set of skills, knowledge and competencies upon which a green economy rests on;

ii. Long-term

- The University of Venda to develop a new programme or a suite of transportation programmes offered at both undergraduate and post-graduate level with green transport as a niche area;
- Departments to transition towards green transport “budgeting and accounting” complete with key performance areas (KPAs) and key performance indicators (KPIs) to facilitate project and programme monitoring of interventions and challenges thereof (HM Treasury 2011);
- Use lessons from the implementation of Polokwane’s BRT to implement similar BRT’s in other secondary cities such as Mokopane, Lepalale, Tzaneen etc.;
- Explore and investigate how the concept of integrated rapid public transport plan (IRPTN) can be extended to service the needs of rural based transport corridors connecting major towns with villages e.g. Polokwane with Lebowakgomo etc.;
- Develop a 2050 Green Transport Master Plan for the province of Limpopo clearly articulating the green transport transition pathway for the province by department, sectors, non-state sector complete with timelines, budgeting, responsibilities etc. This plan should indicate clearly the green transport infrastructure requirements, options and funding modalities as an example etc.;
- “Streamlining and development of a joined up or one governance transport approach and systems to facilitate better and coordinated green transport interventions and measures” (Chakwizira 2016).

Key Actors

Several key actors exist regarding addressing the critical green transport transition and required development trajectory. The identified key actors include the following, namely:

- **Limpopo Department of Roads and Transport:** The Department’s mission and vision is to spearhead, oversee and provide leadership regarding key policy issues in Limpopo, of which the green transport is one such area. The need for the department of Transport to provide structured leadership in this direction can-not be over-emphasised.
- **Limpopo Department of Economic Development (LEDET):** This department has already provided impetus and is mandated with championing green economy and sustainable environmental interventions and transformation in the province. The need to upscale green economy interventions and make such work more inclusive and complementary to green transport interventions is vital.
- **South African Local Government Association (SALGA):** SALGA is expected to play a key role in capacity building and training of district and local authorities regarding smart planning, integrated land use and transportation planning, SPLUMA as well as green transport.

- **District and Local Municipalities in Limpopo province:** These play a key role in ensuring policy implementation and filtering into the respective documents including the need to make sure that integrated development plans (IDPs), integrated transport plans (ITPs), Infrastructure Master Plans etc. reflect and incorporate green transport infrastructure and services needs in their proposals and implementation plans.
- **Office of the Premier—Limpopo:** The Office of the Premier through its planning and coordination role provides overall sight leadership and guidance to all policies being implemented in the province. Their role in securing green transport transformation cannot therefore be over-emphasised.
- **University of Venda:** The University offers a Bachelor of Urban and Regional Planning programme which has transportation courses and components. In developing both short-term and long term green transport courses, the Department is expected to explore certificate, diploma, degree and post-graduate qualification in Transportation Engineering, Planning and Logistics using green transport as a niche.

The shift towards green transport is a process. As such available options such as dual-fuel and hybrid-electric vehicles provide a means to manage the risk and transition associated with switching to cleaner technologies. The “*silver-lining*” for green transport transition perhaps lies in the fact that the private sector has innate capacity and willingness to invest in green transport technologies, infrastructure and services needed to accomplish this shift (Graichen et al. 2017). “In light of the public benefits associated with green transport, government needs to assist by creating demand and providing an enabling environment” (Gupta and Laubscher 2017).

7.7 Conclusions

The South African government as well as the international community have over the past decades entered into several commitments related to transport, and in particular the need to curtail the contribution of gaseous emissions by the transport sector to the atmosphere. As an example, the latest sustainable development goals (SDGs) recognize explicitly the central role that sustainable transport will play in climate change adaptation and mitigation measures (Banister 2011; Chevallier 2015; Wilbanks et al. 2012). Both “national and international policies, frameworks, legislation, norms and standards have in common the need and goal of transforming the transport sector albeit among many other sectors to ensure that the future is sustainable” (Schwanen et al. 2011; Viitanen and Kingston 2014). An important message from the chapter is that industry, society and communities all have shared co-responsibility for shaping a modern and post-modern transport agenda in which green economy, growth and transport will play an increasingly influential role (Dewar and Todeschini

2017; Minchener 2012). Indeed, the transport governance sector approach needs to permeate all sectors and areas of the economy so that barriers linked with fragmented spatial and transportation approaches can be dismantled and reversed (Death 2014; Turok 2012). Such new thinking presents exciting opportunities for developing better human settlements and enhanced transportation governance systems that are robust and adept to better guiding global and country decision-making processes and investments towards green focused development in which transportation plays a pivotal role (Hickman et al. 2010; Lawhon and Murphy 2012). Again, it should be re-emphasised that the shift towards green transport is a process and not an event. In this regard, the gained momentum towards green transport friendly interventions in the country require further refinement and promotion through adequate budgetary, financial, evaluation and monitoring systems (Mtembu and Pillay 2017; Wentworth 2014). However, the challenge of developing transport policies, framework, legislation, norms and standards for sustainable development is to orient and adapt the transport sector and allied sectors towards a balanced approach to sustainable transport development. Many of the measures required to achieve this balance are not new, the main difficulty is effective implementation (Aoyi et al. 2016; Schäffler and Swilling 2013). The approach to achieving sustainable development of the climate change resilient and competitive transport sector requires a combination of solutions (Brent 2016; Gupta and Laubscher 2017; Lember et al. 2011; Zikhali et al. 2016).

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