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Executive Summary

After contributing substantially to the country's formative development, it has become increasingly evident that the rail sector is past its peak in terms of contributing to the national freight and passenger transport tasks. It has experienced a generally downward trend for several decades, although there have been a few highlights. It has lost virtually all its branch line traffic, virtually all long distance passenger traffic, slipped from par player in global heavy haul to third place in iron ore with 6% and fifth place in coal with 5% of the respective global markets, while general freight and commuter rail market shares are around 10%. Meanwhile, the world's railway industry has been reinventing itself for fifty-odd years to realise the benefits of global railway renaissance. Year 2050 looms beyond that, by which time many governments will depend on rail to meet substantial international commitments to reduce transport sector greenhouse gas emissions. This will require increasing rail traffic by two, three, four times. These events have provided eight consecutive decades of golden opportunities, but the country's railways have barely scratched their surface.

Rail's colonial heritage of low axle load, low speed, short trains, small vehicle profile and monolithic organisational structure set it up for troubles in later years. The sector had to be statutorily protected against road from the 1930s until 1988. Its inherently uncompetitive narrow gauge technology is unsustainable in a deregulated market. Inability to renew equipment resulted in generally outdated, low performance, operationally inefficient, underutilised assets, which are unable to keep domestic traffic or support exports. Road was able to punch above its weight, indeed the demise of rail has been road's single biggest success factor. Furthermore, road and rail do not enjoy a symbiotic relationship, which precludes spontaneous development of intermodal collaboration. The cost to the economy due to increased road congestion, externalities and maintenance is enormous.

Institutionally, rail transport was tightly held by national government while road transport was devolved to both lower spheres of government. Rolling out road infrastructure was comparatively straightforward, and vehicles easy to come by. Ultimate investment in fixed and moving transport assets is therefore strongly biased toward road. Consequently road congestion is already a serious problem in metropolitan areas and truck traffic on all road categories is overbearing.

Both freight and passenger rail markets are monopolistic. Furthermore, funding for both sub-modes is inadequate. This has resulted in investment funding for freight rail being limited to what Transnet can leverage from its balance sheet, which is not sufficient for its present needs, let alone positioning rail to play its destined role in climate change mitigation. Consequently it has used its monopolist's position to restrict its service output and maximise its financial performance. It is thus not possible to gauge the true size of the rail freight market for driving investment. In the case of passenger rail inadequate funding has starved all but Gautrain and commuter rail: The latter is fighting a losing battle against deteriorating trains until

manufacture of the next generation comes on stream. Current institutional arrangements do not support accelerating remedial responses.

The National Rail Policy intends is to place rail on a sound footing to collaborate with and compete against the other transport modes to position it to serve as national land transport backbone by 2050. The remedial interventions will be two-pronged, infrastructure investment interventions to enhance rail's inherent competitiveness, and enabling interventions to adjust institutional arrangements to ensure that rail functions effectively in delivering its share of the national transport task.

Regarding infrastructure investment, rail's inherent competitiveness will be maximised by implementing standard gauge technologies on the national rail network, while retaining existing Cape gauge on the metropolitan commuter networks where narrow gauge does not impede inherent competitiveness. The investment will over time redress and rebalance the inordinate differences between rail and road asset value and market shares. Regarding enabling interventions, regulated competition will be introduced into the freight rail market, to gauge its true size. The Single Transport Economic Regulator will oversee access arrangements and fees, market behaviour, public sector participation, train path allocation and more, while the Railway Safety Regulator will adopt a risk based approach to safety management.

Funding of both freight and passenger rail will recognise that present sources are inadequate and government will ensure that additional sources are tapped. In principle, government will take responsibility for infrastructure funding, while train operators will fund their own rolling stock, an arrangement that is commonly applied to all transport modes. Beyond that, several sources have been identified, including private sector participation in infrastructure and rolling stock, to solve to the impasse of too much investment backlog and too little funding ability.

The foregoing interventions will stimulate railway renaissance in the country. The technologies that have handicapped railways will be relegated to the past as inherently competitive high speed trains, full strength heavy haul, container double stacking or heavy intermodal, contemporary urban rail and regional rapid transit are enabled to occupy market spaces in which rail is strongly positioned. In addition, revitalising the rail sector is likely to be the country's largest infrastructure project ever, with huge job creation potential. Urban rail will be devolved and ultimately assigned to local government. This will enable it to be nurtured in a setting where it will be valued and integrated into other local transport initiatives. Beyond railway renaissance, which has become the new normal, the country's rail sector will be positioned to start making a massive contribution to climate change mitigation targets for 2050. Boasting the lowest energy consumption of all transport modes for a given task, rail is well-positioned to substantially reduce overall energy consumption by increasing its volumes by two, three and four times, and thereby

shift substantial traffic from high energy consumption air and road to low energy consumption rail.

Transnet Freight Rail will be separated into an Infrastructure Manager and a Train Operator, initially by accounting as separate entities and later institutionally. The Infrastructure Manager will operate the national rail network, initially as is, and ultimately, after remedial investment, the standard gauge high performance national rail network. It will undertake the required brownfields and greenfields works with funding allocated by Department of Transport. After urban rail has been devolved and assigned to local authorities, PRASA will be repositioned to deliver long-distance and high speed services. It will deliver long distance services by the most economically advantageous mode, by bus or by train. High speed services will run on dedicated routes, and will contribute lower energy consumption than classic trains and stimulate agglomeration benefits in the corridors that they serve. In addition, contingent on feasibility studies, passenger trains in the 160–200km/h range could see service on some sectors of the standard-gauge high-performance national rail network.

Metropolitan areas are already vulnerable to traffic congestion over extended peak periods, a situation that is projected to worsen over time. Additional urban guided transit, which can be made immune to traffic congestion on its own right of way is contemplated in the National Rail Policy. This will not be confined to heavy metro as at present, but on lighter density routes could use one or more of the lighter urban guided transit variants. Regional rapid transit will provide inclusivity to outlying areas.

Department of Transport will drive the overall rail revitalisation intervention, in conjunction with Department of Public Enterprises, PRASA, Transnet, a transport economic regulator, the Railway Safety Regulator, provincial governments and local governments. Department of Transport will develop a National Rail Master Plan, and thereafter monitor and evaluate policy implementation. It is projected that the entire suite of investment and institutional interventions will be complete by 2050.

The National Rail Policy sets out to unshackle the rail sector from the constraints of its heritage and let it develop on the strength of challenges that it can address better than other transport modes. While there are some that believe that the cost of repositioning rail would be too high for the economy to bear, the cost of doing nothing would be the cost of South Africa becoming a country with road based transport except for metropolitan areas. By 2050, when the rest of the world is enjoying the benefits of transport running on renewable energy, the country could find itself dependent on expensive and polluting fossil fuelled road transport.

Chapter 1 Introduction

Rail launched the country's economic development by rapidly networking significant places by the fastest, most reliable freight and passenger transport mode. Thereafter, it opened rural areas to agriculture and mining. However, the forbidding mountainous Indian Ocean coastal belt prevented the Cape–Natal Railway from achieving its objective. Instead, the principal network followed an inland sweep from Cape Town via Johannesburg to eThekwini, supporting major diverging routes from hinterlands to ports and branchlines off all of them. Notwithstanding an absence of explicit rail policy, this foundation endured to the present. Successive governments administered railway operations, maintenance, capacity and network expansion, as best they could within the means at their disposal.

As other transport modes emerged over time, their competing demands and other public interests eroded rail's influence on funding and its share of the national transport task. Originally regulated to protect rail, deregulation of road transport in 1988 left rail in dire straits. Ultimately, in 1990 the various state-owned transport modes were separated as commercialised divisions of Transnet Limited, while commuter rail assets fell to South African Rail Commuter Corporation. Meanwhile, vigorous development of rail's inherent strengths stimulated a global railway renaissance to which many countries were attuned. As its last manifestation emerged in the 1990s and renaissance rail became the new normal, the 1992 United Nations Framework Convention on Climate Change imparted further impetus to rail as countries turned to its inherently low energy consumption to help meet their 2050 greenhouse gas emission reduction targets. However, over the last quarter-century, and with a few exceptions, it has become abundantly evident that at operational level the country's rail sector has failed to deliver its expected share of the national transport task, and that at strategic level it has missed the railway renaissance and is ill-positioned to support the county's future climate change response.

In recent years several government policy documents, e.g. the New Growth Path for South Africa of 2011, the National Climate Change Response White Paper of 2011, the National Development Plan of 2012 and the Integrated Urban Development Framework of 2016, have articulated many desirable but generally unrealised railway attributes and expected contributions to the economy and society. The National Rail Policy now sets out Government's remedial interventions to achieve rail renaissance in South Africa, to position rail to contribute substantially to reducing the country's harmful emissions, and to enable rail to serve as backbone of the national logistics and mobility tasks.

Chapter 2 examines how rail originated and relates to its setting, then lists the country's pertinent statutes and lastly surveys the country's railway actors.

Chapter 3 examines key performance and institutional problems and compares them to other transport modes in the country, and to global railway positioning trends.

Chapter 4 posits a Vision and Mission, as well as setting out supporting Goals and Objectives, to guide overall policy formulation.

Chapter 5 introduces an array of high-level policy principles, which it applies to rail sector investment and reform as fundamental revitalisation interventions.

Chapter 6 states policy interventions under the headings Infrastructure Investment, Enabling Interventions as well as Freight Rail and Passenger Rail.

Chapter 7 sets out roles and responsibilities of the spheres of government and the entities that deliver freight and passenger rail services.

Chapter 8 sets out policy implementation priorities; co-ordination mechanisms; National Rail Act development; the Rail Revitalisation Programme; National Rail Master Plan development; and implementation, governance and monitoring.

Chapter 9 concludes the National Rail Policy.

Chapter 2 Rail's Background

Much of rail's present situation can be understood in the context of its roots in policy, society and technology. This chapter examines how rail originated and developed in relation to its setting, then surveys the country's current railway operators and finally lists pertinent policies and legislation from the time of progressive interventions.

2.1 Railway Origins

Man used the wheel for millennia until the industrial revolution finally replaced muscle power by machines, initially on railways that rapidly became a formidable freight-and-passenger wheeled transport mode. The revolution also nurtured other transport modes so, as industrialisation advanced, machines came to power ships, road vehicles and aircraft. In creating land transport networks, rail and road leveraged their unique strengths to differentiate one from the other, while offsetting their respective weaknesses as best they could. Thus they came to compete in some situations, and complement one another in others, as they still do today.

Initially promoted by private enterprise, rail's commercial success and economic power eventually attracted government attention in many countries, by way of nationalisation and regulation. Rail infrastructure and operations are linked closely,

so rail leaned naturally toward vertical integration, also of funding. Hence national-isation, vertical integration and political correctness characterised the classic monolithic state railway archetype. Accounting for different rail service types in one entity seemed rational, but opportunities for undue political influence and internal cross-subsidisation ultimately distorted the outcome, as it still does today. By contrast, operator diversity characterises the maritime, road and aviation modes, so their infrastructure and operations lean naturally toward vertical separation, also of funding. Hence vessel, road vehicle and aircraft operators take publicly-funded open access infrastructure for granted, but naturally fund their own movable assets.

The foregoing developments occurred during Europe's colonial era. By the time colonial powers came to build railways in colonies, they had already settled on standard gauge (and broad gauge in Portugal and Spain) for their home railways. Reflecting the asymmetrical relationship between colonies and colonial powers, the latter built colonial railways in South America, South- and Southeast Asia, and Sub-Saharan Africa to narrow track gauge and substantially lower alignment, axle load, and gradient standards than at home, and imported custom-built small-profile low-capacity rolling stock to run on them. The territories that now constitute South Africa joined that milieu in 1860 when private enterprise introduced the first train in Durban, later followed by nationalisation and construction of two colonial and two republican railway networks. Used for agricultural, military and mining traffic, they were unified in 1910 as South African Railways & Harbours (SAR & H), a monolithic public entity that provided freight, long-distance passenger and suburban rail services, as well as harbour services.

Long-distance passenger trains were a significant constituent of the country's early railways. Daily trains were the norm, several on main routes but only one on branch lines. As the road network developed, SAR&H also deployed Road Motor Transport intermodal services from strategically located stations. In time, direct road journeys, and later air transport, offered superior service at lower price. Narrow gauge constraints prevented rail from hitting back, and ultimately its long-distance passenger market waned. The country's present urban networks also date from rail's early years, and to some extent shaped their host cities. However, rail failed to closely follow the country's economic and social development, hence buses, cars and taxis eroded much of what remained of its passenger market.

The remainder of this document recounts significant events that built on the foregoing foundation to the present day, and then introduces a national rail policy that addresses the dysfunctions that have emerged and accumulated over time.

The country’s current rail network is eleventh largest in the world at 22 387 route-km or 30 400 track-km. It comprises 12 801km of national network, 7 278km of branch lines and 2 228km of narrow gauge urban network, as well as 80km of standard gauge regional rapid transit network. Annexure A shows the national network together with larger-scale Cape Town, eThekwini and Gauteng urban rail networks.

2.2 Existing Railway Operators

2.2.1 Transnet SOC Ltd

Transnet State Owned Company Ltd is a major public entity under Schedule 2 of the Public Finance Management Act (PFMA). The Minister of Public Enterprises represents the shareholder. It owns, operates and maintains some of the country’s principal transport assets through its Freight Rail, Engineering, National Ports Authority, Port Terminals, and Pipelines divisions. In 1990 it legally succeeded the former South African Transport Services (SATS), a commercialised state enterprise that among other continued the monolithic commuter, freight and long-distance passenger rail services that it inherited from the original SAR & H in 1981. Transnet's establishment might have appeared to unbundle that monolithic entity, but Transnet SOC Ltd is still a single accounting entity. Only commuter operations and long-distance passenger services were transferred to Passenger Rail Agency of South Africa (PRASA) in 2008.

Transnet Freight Rail (TFR) operates the national long-distance rail network and, in addition to its own capacity requirements, also provides access to PRASA's long-distance trains. The largest of the divisions, TFR currently contributes 51% of Transnet's income. Transnet has implemented strategic interventions to align itself with government priorities and shareholder compact targets in recent years.

2.2.2 Passenger Rail Agency of South Africa

Passenger Rail Agency of South Africa (PRASA), a PFMA Schedule 3B National Government Business Enterprise, reports to Department of Transport (DoT) via a Board. The Legal Succession Act of 1989 established its predecessor, South African Rail Commuter Corporation as owner of all commuter rail fixed and rolling assets in 1990: It was renamed PRASA in 2008, to which Spoornet's Shosholoza Meyl long-distance trains and Transnet's Autopax bus services were subsequently transferred. It is funded by the fiscus (53%), fare revenue (40%) and rental income (7%).

PRASA's Rail division delivers Metrorail urban commuter services plus Shosholoza Meyl and Premier Classe long-distance passenger services, while Its Autopax Passenger Services (SOC) Ltd subsidiary operates fully commercial bus services. It plays a major role in fulfilling government’s obligation to develop social and

economic infrastructure. Per the National Land Transport Act (NLTA) it provides rail commuter services in public interest at DoT's request and long-haul passenger rail and bus services in consultation with DoT. It operates heavy rail commuter networks in metropolitan areas, which offer valuable high capacity rapid transit access to inner cities. Its City to City long-distance buses connect the country's cities and rural municipalities, while its Translux luxury services connect its major cities and towns.

2.2.3 Gautrain

In terms of the Gauteng Transport Infrastructure Act of 2001, concessioning authority Gauteng Province and concessionaire Bombela Concession Company agreed in 2006 that the latter would design, partly fund, construct, operate and maintain a rapid rail link under a 19½-year concession. The Gautrain Management Agency (GMA) Act of 2006 established the GMA, a PFMA Schedule 3C entity, to manage the concession. Gautrain introduced novel railway concepts to the country, e.g. private sector participation; performance to contract with penalties for missing targets; passenger and asset security; railway safety-by-design; and regional rapid transit. Since operations commenced in 2010, its contribution to provincial gross domestic product (GDP) has come close to matching its initial investment, while sustaining jobs and increasing tax revenues. It established a role model for South African authorities that have no prior experience of implementing a greenfields rail project.

2.2.4 Other Operators

Some 250 small operators have emerged over time. Freight examples range from railways integrated into industrial and mining production, to private sidings. The latter industries commit to substantial inbound and or outbound rail logistics. The niche includes locomotive and wagon leasing, infrastructure and rolling stock maintenance, as well as outsourced operations. Passenger examples range from world class hotels-on-wheels, to day trippers using steam locomotives and heritage coaches.

2.3 Policy, Legislation and Strategies

Disparate statutes have influenced the country's rail sector without constituting a coherent rail policy. They, however, have informed the policy positions adopted in this policy. Pertinent aspects are referenced where appropriate throughout this document.

a) Constitution of the Republic of South Africa, 1996;
b) White Paper on National Transport Policy, 1996;
c) Southern African Development Community Protocol on Transport, 1996;
d) National Railway Safety Regulator Act, 2002;
e) Public Transport Strategy, 2007;

f) Legal Succession Amendment Act, 2008;
g) National Land Transport Act, 2009;
h) New Growth Path for South Africa, 2011;
i) National Climate Change Response White Paper, 2011;
j) National Development Plan, 2012;
k) Infrastructure Development Act, 2014;
l) National Land Transport Strategic Framework, 2015; and
m) Integrated Urban Development Framework 2016.

Chapter 3 Problem Statement

While rail is a well-established industry in the country, it has experienced challenges over time and several historic events have impacted adversely on the industry's overall development and the socio-economic impact it should have had on the economy. Rail is currently not performing at the level that it should. Its low market share, of less than 20% for general freight and less than 10% for passengers, indicates that rail is not performing at the level that it should. Even in bulk minerals, where rail should be unbeatable, road-going side-tipper interlinks have captured significant market share.

Historic events, such as the De Villiers report of 1986 that recommended no new rail investment but rather sweat existing assets, and deregulation of road in 1988, have pushed large portions of the rail industry into acute decline. Absence of equitable road pricing and institutional bias toward road have also advantaged road transport operators and further eroded rail's ability to compete effectively in the market.

Although State Owned Entities have made some investments in recent years and there has been some improvement, the rail industry still faces many major challenges. A massive capital investment backlog and inadequate funding, obsolete and ageing infrastructure, deteriorating rolling stock and outdated technologies, limitations of narrow gauge, and insufficient specialised technical skills contribute to rail's generally moribund state. Quality issues, e.g. passenger and freight safety and security, train overcrowding and service reliability also remain a challenge in rail.

The foregoing challenges have resulted in uncompetitively positioned, ineffectively equipped, operationally inefficient railways that have lost their ability both to dominate local logistics and mobility markets, and to support global exports.

Old solutions have been reapplied and have not enabled rail to rise to the country's transport challenges. Innovative thinking is required to address these issues. The

country needs rail infrastructure, institutions and operators to match its economic ambitions in an increasingly competitive global economy.

3.1 Performance Challenges

3.1.1 Outdated Technologies

Contemporary rail is a safe transport mode, however, outdated technologies still in service compromise safety. They do not design out human error, and exacerbate human factors challenges in safety-critical train controller and train driver jobs. They lead to unsafe responses to abnormal conditions, while maintaining them is an unrelenting challenge that increases their frequency. In freight rail, they contribute to unduly high derailment propensity and poor stopping ability. In urban rail, they undermine service quality that prompts arson incidents which lead to fewer trains available for service, unsafe overcrowding of remaining trains and ultimately further undermine service quality.

3.1.2 Low Performance and Operational Inefficiency

While the country takes pride in the long heavy haul trains on its narrow gauge railways, the two other key railway metrics, axle load and speed, are mediocre compared to countries with standard (or broad) gauge railways. Consequently, the ratios between the output measures tonne-km per route km and passenger-km per route km, and the input measure route km, which is the key measures of operational efficiency, are well below achievements in those countries.

Rail commuters have shown deep dissatisfaction over low operational inefficiency as the average distance between service failures has shrunk to less than 1000km in recent years. Such events reduce availability of both trains and train paths, depriving prospective passengers of confidence that the train they intend boarding will actually run; if it runs whether there will be sufficient coaches; and if they board the train, whether it will complete the journey on schedule or fail en route.

Shosholoza Meyl's low-technology, unreliable coaches and locomotives date from a bygone era, the handed-down locomotives being particularly prone to repeated failures. A scheduled, i.e. non tourist, passenger service cannot survive on that basis: Low performance has reduced the quality and quantity of services to irrelevance—far less than a million passengers per year. In addition to the direct negative impact on PRASA, the resulting service disruption also negatively impacts freight tonne-km, TFR's prime operational efficiency metric.

As counterpoint, Gautrain, in its seventh year of service and performing to tight targets, demonstrates that contemporary railways are able to consistently achieve high-performance operational efficiency and safety.

3.1.3 Underutilised Infrastructure

The popular notion that railway infrastructure is underutilised, particularly outside urban areas, rests on the observed absence of activity, or even of rolling stock, on railway lines and yards that are visible to passers by.

The light axle load, low speed, short freight trains on existing Cape gauge mainlines, let alone branch lines, are inherently uncompetitive against road transport because they do not exploit any of the strengths that rail's genetic technologies endow. Rather than representing underutilised infrastructure, the evidence indicates that narrow gauge freight railways are unable to compete against well-developed, internationally-proven long-haul trucking technology on the country's roads.

Long-distance passenger traffic mostly defected to other modes long ago. Modest speed on narrow gauge track thwarted journey time reduction, in turn preventing long-distance passenger rail from differentiating itself competitively from other transport modes. Outdated trains could not demand higher performance from infrastructure, which therefore defaulted to freight rail standards. Significantly, tourist trains still prosper despite low speed, because tourists want a restful experience, not a hasty journey.

3.1.4 Capitalised Maintenance

TFR has escalated its Capitalised Maintenance/Operating Maintenance ratio from less than 2 to more than 5 over the last three years. As benchmark, the ratio for United States (US) railways is around 1: They maximise effectiveness of track occupations by combining extension and or upgrading works with routine maintenance. In return, clients expect more reliable, safer service; increased line capacity, expanded facilities; traffic pattern flexibility and higher network speed. Such interventions demonstrate that a railway is intimately in touch with its market.

Capitalised costs must associate with incremental benefits, e.g. increased capacity or extended life. Noting that assets typically emerge from TFR's comparatively high capitalised maintenance investment with the same performance attributes as before, the presumed intent is to extend their useful life. However, without evidence of enhanced ability to win business or to satisfy clients, it appears that TFR is extending the life of uncompetitive assets rather than replacing them by competitive ones, and is therefore out of touch with its market.

3.1.5 Branch Lines

Branch lines were originally built to develop rural areas. Light track was laid for low axle loads and short trains on typically steep and curvy alignments that constrained average speed to 30km/h or less. Together, these attributes compromised rail's inherent competitiveness. Over time, good quality provincial and national roads, and even freeways, have been built parallel to or near to branch lines, on more direct routes that permit substantially higher speeds. A few branch lines were re-laid with heavier rails, but most still fall short of the axle load ruling on the main lines to which they connect. Unless branch lines carry the same axle load as main lines, they in turn compromise main line operational efficiency and hence increase overall railage costs. Unsurprisingly, branch lines that could not compete on cost, networkability and or service, ultimately lost virtually all their traffic to road hauliers.

Three attempts have been made to revitalise branch lines by concessioning, namely Orange River Rail Company on the Aliwal North–Barkly East line, Alfred County Railway on the Port Shepstone–Harding line, and Kei Rail on the Amabele–Mthatha line. They failed in 1996, 2004 and 2010 respectively, due to their revenues being insufficient to cover variable operating costs. Most recently, in 2015 Transnet requested proposals to concession the 85km 18.5 tonne/axle Belmont-Douglas branch line, but received no bid. By now it should be self-evident that branch line revitalisation initiatives should be approached circumspectly.

3.1.6 Track Gauge

This document takes three views on competition and competitiveness to position rail in its task environment. The first concerns rail's ability to compete against other transport modes, recognising that railways that use inappropriate and out-dated technologies are inherently less competitive than railways that use appropriate and contemporary technologies. This is the domain of *inherent competitiveness*. The second concerns rules of engagement among competitors in a particular market. This is the domain of *transport economic regulation*. The third concerns planning the market space within which entities and or modes will compete, with reference to their economic and social contributions. This is the domain of *transport policy*.

Three genetic technologies distinguish rail from all other transport modes: *Supporting*, which facilitates heavy axle load; *Guiding*, which facilitates high speed; and *Coupling*, which facilitates long trains. They impart to rail inherent competitiveness in Heavy Haul (heavy axle load but low speed to convey bulk commodities), High-Speed (high speed but light axle load to convey passengers) and Heavy Intermodal (heavy axle load and high speed to convey double-stacked containers). Coupling also shortens average headways between vehicles to deliver higher

throughput capacity than any other mode, thereby counteracting rail's weakness in light axle load, low speed passenger service. Hence rail's inherent competitiveness extends to high-density urban services, where single-deck vehicles cannot attain heavy axle load and maximum speed is only 80km/h, as well as to regional rapid transit where longer distances between stations allow 160-200km/h, often using double deck vehicles to maximise passenger count and hence maximise axle load.

Rail's genetic technologies enable it to do duty as backbone of integrated, energy efficient urban, regional, national, continental and intercontinental transportation. Coupling scales capacity to match demand extremes, rail being the only mode to count freight vehicle combinations in hundreds, or to count passengers per hour per direction in many tens of thousands.

Regarding Supporting, assertive standard (and broad) gauge railways in China, India, North America, and Russia, that move half the world’s rail freight, operate or aim at 30-32½ tonnes/axle for general freight and 30-40 tonnes/axle for heavy haul and heavy intermodal. The country’s narrow gauge track generally allows 16-18½ tonnes/axle on branch lines, 20 tonnes/axle on the Cape gauge national network and 26-30 tonnes/axle on heavy haul lines. High-value low-density freight in containers, and passengers, are light: Unfortunately, the Cape gauge centre of gravity height limit precludes double decking passengers or double stacking containers to achieve sufficiently high axle load to maximise rail's inherent competitiveness.

Regarding Guiding, low speed is expressed in tens of km/h, high speed in hundreds of km/h. Thus general freight, heavy haul, long-distance passenger and urban trains at 60-90km/h maximum are low speed. Double stack trains at 120km/h, so-called higher speed trains at 160-200km/h, as well as high speed trains at 300km/h or more, are high speed. Narrow gauge track does not support service-proven speeds higher than 130km/h, hence it is unable to support high- and higher speed trains.

Narrow or Cape gauge track therefore excludes the country from the high speed and double stacking railway renaissance market spaces, and thwarts achievement of full-strength heavy-haul. Its narrow gauge railway foundation is incapable of supporting three out of four railway renaissance sub-modes, thereby putting South Africa at a competitive disadvantage to countries whose railways use standard gauge. No surprise that its railways are generally, with exceptions, in dire straits.

3.2 Institutional Challenges

3.2.1 Monopolistic Markets

3.2.1.1 Freight

TFR owns and operates the country's only long-distance rail network, and also owns and operates virtually all freight locomotives and wagons. By virtue of it being the only rail freight operator, with limited local exceptions, the de facto market structure is monopolistic. No legal constraint excludes others from the freight rail market, but entry barriers are high and industry's participatory overtures before the last commodities boom were declined by Transnet.

Because of this monopolistic freight rail market structure, Transnet has no commercial incentive to develop planning methodologies showing evidence of understanding the market within a competitive multi-operator environment, which would have enabled it to articulate the drivers and predict the dynamics of the relative rail and road competitivenesses that determine modal split. Transnet's Long Term Planning Framework (LTPF), predicting only marginal change for the next 30-40 years, projects rolling national freight demand per section as per *the road-to-rail migration strategy* and *market share targets* without any mention or explanation whatsoever of such strategy or targets. It consequently fails to articulate what interventions it must implement to achieve road-to-rail shift, or how it plans to defend itself against the rising tide of truck competitiveness. Furthermore, the LTPF fails to recognise the major contribution that rail must make to mitigating climate change by 2050. It is understandable that Transnet, given its *de facto* monopoly status and against the background of its main objective, taking into account its developmental role, of maximising profit and shareholder value, ostensibly sees no need for or appreciates the value of extensive or realistic modelling or planning for the whole of freight rail as a transport mode.

TFR's compound annual growth rates over the last decade were:

Tonnes transported	3.35%
Revenue	10.7%
EBITDA	17.9%
Capital Investment	18.9%

Tonnes transported bore some relation to economic growth, but Revenue and EBITDA grew much faster, although not as fast as Capital Investment. TFR therefore appears more proficient at growing performance metrics than at growing output.

TFR therefore appears to be comfortable in its monopolistic market position, reluctant or unable to pursue opportunities significantly beyond its present volumes. It exhibits the classic monopolistic outcome of restricting service quality and or quantity to maximise returns within the constraints of its own financial structure. It is therefore an inescapable conclusion that TFR is neither intimately in touch with its present market nor effectively pursuing the rail addressable market. Such outcomes are endemic in monopolies: They belie the notion that competition from other modes can eliminate monopolistic behaviour, which only direct competition can do. From a national rail policy perspective this implies that additional third party train operators must be admitted to fully exploit rail's potential share of the freight market.

3.2.1.2 Passenger

Similarly, PRASA owns and operates the country's only urban rail networks and provides its only long-distance passenger services, a few tourist trains excluded. The market structure is monopolistic, and instances of apparently monopolistic behaviour are not unknown, such as provision of insufficient capacity to meet demand and service quality below expectations. In recognising these problems, one root cause, namely inadequate funding over many years, must be concurrently recognised.

Setting aside long-distance passenger services addressed elsewhere, and assuming sufficient funding, the urban rail issue reduces to maximising the value of services procured by that funding. Several alternatives have been tried around the world, from the traditional owner-operator solution to a privately-funded thirty-year concession over Seoul Metro Line 9. The traditional solution numerically far outweighs others, and is usually satisfactory when a local authority operates urban rail together with its other urban transport solutions. Citizens whose mobility needs are closely met develop love and respect for their urban rail systems, and treat them accordingly.

3.2.2 Cross-Subsidisation

Cross-subsidisation between operating divisions is common practice in monolithic entities, a heritage that may ultimately cause resistance to their unbundling. It is generally agreed that port charges currently levied by Transnet National Ports Authority (TNPA) are excessive. Cautionary notes to Transnet annual reports since 2008, which have stated that corporatisation of TNPA in terms of the National Ports Act of 2005 will have significant adverse financial and strategic impact on Transnet in respect of funding and investment, have strengthened long-held misgivings that some portion of the excess finds its way to TFR. To the extent that excessive port charges have propped up a railway that loses domestic traffic to road hauliers and export traffic to other countries despite that support:

a) Three transport modes—maritime, rail and road—have been structurally distorted, that is;
b) Excessive South African port charges have shifted exports from and imports to landlocked countries to ports in neighbouring countries with concomitant loss of jobs and revenue for the country;
c) Freight rail's inherent uncompetitiveness is actually worse than it appears, but has been obscured rather than recognised and remedied, leading to the erroneous belief that normal management interventions can turn it around when in fact it is irredeemable by such means; and
d) Road hauliers have found themselves able to punch above their weight due to a dysfunctional railway shedding its natural traffic to them and thereby giving rise to undue road maintenance costs.

The overall losers are the country and its people, who suffer the bad fruits of high costs and poor service. National Rail Policy must therefore recognise freight rail's weak inherent competitiveness in relation to the accounting transparency and financial sustainability that prospective private sector investors will seek.

PRASA faces comparable problems. Its government operating subsidy is inadequate and mainly funds salaries. In addition, Shosholoza Meyl was transferred to it from Transnet as an unfunded stepchild. While there is an evident cross-subsidy from Metrorail to Shosholoza Meyl, if the overall quantum of funding is inadequate, revenue and expenditure must ultimately be balanced by a blend of poor service, deferred maintenance and capitalised maintenance, not one of which puts stakeholders at ease.

3.2.3 Misaligned Land Use and Rail Transport

Many of the country's human settlements have far lower population density than in other countries that use urban rail intensely. Hence it is necessary to actively align human settlements and transport modes, to maximise the role of rail and hence to shift traffic from road to rail. Urban planners should ideally aspire to 40 units/ha in metropolitan residential areas. The higher the population density, the more viable is urban guided transit (UGT). Cities with comprehensive rail-based public transport prefer high rise buildings to squeezing in more people at ground level.

At the other end of a commute, high density trip attraction zones, e.g. central business districts (CBDs), ideally terminate transportation corridors. Suburban office and retail nodes are less attractive, even if they are integral to modern planning.

Direct pedestrian access to railway stations is usually only practicable in highly developed areas such as CBDs and high-rise apartment clusters. In larger, lower

density catchment areas, feeder and distribution services may be required. In such cases a station becomes an intermodal facility, to be designed for that purpose.

Recognise that situations also exist in which rail is not the optimum solution, notwithstanding that there may be heritage infrastructure on a proposed route. In such cases it may be appropriate to defer to a more appropriate mode, such as road, or to a more appropriate sphere of government, such as a province.

3.2.4 Skills Development

The rail industry constitutes a specialised work setting that requires specific and sometimes scarce skills to support research, development, design; investment, construction and manufacturing; marketing; operations and maintenance; and corporate strategy. The impact of the industry's decline over several decades resulted in it losing its ability to develop and retain skills. One of the challenges to its revitalisation is therefore to restore that ability.

3.3 Rail's Backlog Relative to Other Modes

3.3.1 Evolution of Rail's Position

Railways played a founding role in the country, as private undertakings from 1860 to 1870, after which successive governments developed infrastructure and services. A few new developments still stir pride: Gautrain introduced contemporary regional rapid transit, PRASA initiated the world's largest commuter train procurement programme and TFR's Integrated Solutions technology will position its services amongst leading freight railways. In contrast to such developments, main rail routes were completed before 1900 and most branch lines by 1910. Difficult terrain resulted in original route alignments having tight curves and or steep gradients. Some ten percent of mainline route-kilometers were regraded and or straightened between the 1950s and 1980s. The remaining ninety percent are still as curvy and steep as when they were built. Even the heavy haul lines are now older than forty years, although Ermelo-Richards Bay was doubled and partly regraded in the 1980s.

Rail's colonial heritage added more handicaps. First, penny-pinching Cape gauge track stunted rail's inherent competitiveness so much that it cannot keep up with economic growth, while natural rail traffic defaults to other modes. Second, the original narrow gauge vehicle profile provided full but narrow width down to near rail level, but constrained capacity. In time, the top portion was widened above platform height to produce the country's peculiar mushroom-shaped vehicle profile, which does not allow double decking or double stacking.

The De Villiers Report on Strategic Planning, Management Practices and Systems of 1986 highlighted SATS' mistaken investment in rail sub-sectors unable to compete with other modes, or that ran at a loss. Subsequent investment in SATS was severely curtailed. Next, the Transport Deregulation Act of 1988 resulted in significant road transport expansion at rail's expense. While public funding was promoting all transport modes except rail, the latter was denied the same and left to its own devices, that at a time when railway renaissance was visibly gaining traction. Railway investment is long term commitment: Nearly three decades passed before the unintended consequences of this strategic misstep became plain for all to see.

The approximate national total asset values of the rail and road sectors are:

Rail infrastructure and rolling stock,	R billion	229
Road infrastructure and vehicles, conservatively,	R billion	2284

The road transport asset base is ten times larger than its rail counterpart. If for no other reason, one would expect road to dominate the land transport modal split. For further comparison, the network lengths are rail 22 387km and road 947 000km.

3.3.2 The Maritime, Road, Aviation and Pipeline Modes

Cape Town completed its first formal harbour, the Alfred Basin in 1870: A contemporary container vessel would fill the entire Alfred Basin. Ultimately, specialised ports for very large bulk carriers were commissioned at Richards Bay and Saldanha in 1976. Several decades after the first railway and harbour, road and later aviation emerged as new transport modes that would erode rail's dominant position by offering door-to-door convenience, faster transit, precise timekeeping and lower all-in costs. National road network construction started in the 1930s, followed by freeways in the 1970s and ultimately by metropolitan ring roads and strategic toll road concessions. The interlink trucks that ply the country's roads without restriction are amongst the world's heaviest. South African Airways established formal aviation in 1934, progressing from Rand Airport to OR Tambo International Airport as aircraft capacity grew almost forty times from 14-passengers to 538-passengers. The country's maritime, road and aviation infrastructure capabilities, plus pipelines added from 1965, have kept pace with global developments. Successive governments provided public infrastructure to support new modes as they emerged, and later expanded and upgraded each one to ever higher performance, some several times. By comparison, rail's infrastructure, and the rolling stock that it allows, have fallen far behind the up-to-date infrastructure of the four other transport modes.

3.4 Positioning Relative to Significant Global Trends

3.4.1 Rail Trends

3.4.1.1 Continental and Intercontinental Networking

Continental and intercontinental journeys are generally too long for rail passengers: The heading essentially applies to freight rail, which is enjoying robust growth. The North American Free Trade Agreement, the European Single Market and China exemplify continental rail networking, individually contributing 29%, 24% and 15%, together 68%, of global GDP. China, Kyrgyzstan, Tajikistan, Afghanistan and Iran are building a standard gauge railway to connect the Chinese, Middle Eastern and Western European standard gauge networks, creating an intercontinental network to support 40% of global GDP. Despite existing breaks-of-gauge, fifteen European cities already enjoy twice-weekly bi-directional 12 000–13 000km rail services with China.

North African railways were originally built to standard gauge. Following substantial rail network expansion currently underway in the Gulf Cooperation Council states, they can potentially link to the China–Middle East–Western Europe network. Several East and West African countries are implementing standard gauge networks too. By clinging to a narrow gauge colonial railway heritage, the country and its neighbours risk isolation from an ever more inclusive global railway network, and foregoing future opportunities to compete in Eurasian markets over distances of 11 000–12 000km.

3.4.1.2 Climate Change Imperatives

The world has embraced a low-carbon renewable-energy future to mitigate climate change, 2050 being the strategic horizon for harmful emissions reduction targets. The country's National Climate Change Response White Paper charts a way forward, but its COP (Conference of Parties) 21 Intended Nationally Determined Contribution (INDC) to emissions reduction lags global norms. Fortunately, rail is the most energy efficient transport mode. However, simply renewing powered rolling stock from time to time only realises evolutionary efficiency gains, while foregoing the more fundamental advantage of positioning rail to compete strongly and win against other modes in high density corridors, and to complement them in intermodal transfers where high density and low density corridors intersect. Positioning rail as the backbone of a transport system must therefore recognise its integrative role in continental, national, regional and urban spatial development.

In providing a country's 2050 logistics and mobility backbone, high-speed trains will service journeys to three hours or 1000km. Pit-to-port heavy haul will continue to

move bulk commodities. Intermodal trains will convey containers over great circle continental- and intercontinental routes at higher speed and lower energy consumption than maritime transport: Double-stacking containers will lift their axle load into the heavy haul domain to further reduce energy consumption and operating costs. Urban guided transit and regional rapid transit will provide short- and medium distance mobility in cities and conurbations, and service high-speed rail catchment areas. At airports, high-speed rail will provide long-distance connections, while urban- and or regional rapid transit will provide local connections. Figure 1 indicates how rail sub-modes as building blocks will integrate and support one another to position rail as backbone of a national or larger transport system: They may be reconfigured to meet specific requirements.

The country's present National Climate Change Response only reflects incremental benefits from advancing rail technology, but fails to recognise that rail must carry a substantially larger share of the national transport task to substantially reduce transport energy consumption and harmful emissions in line with global norms.

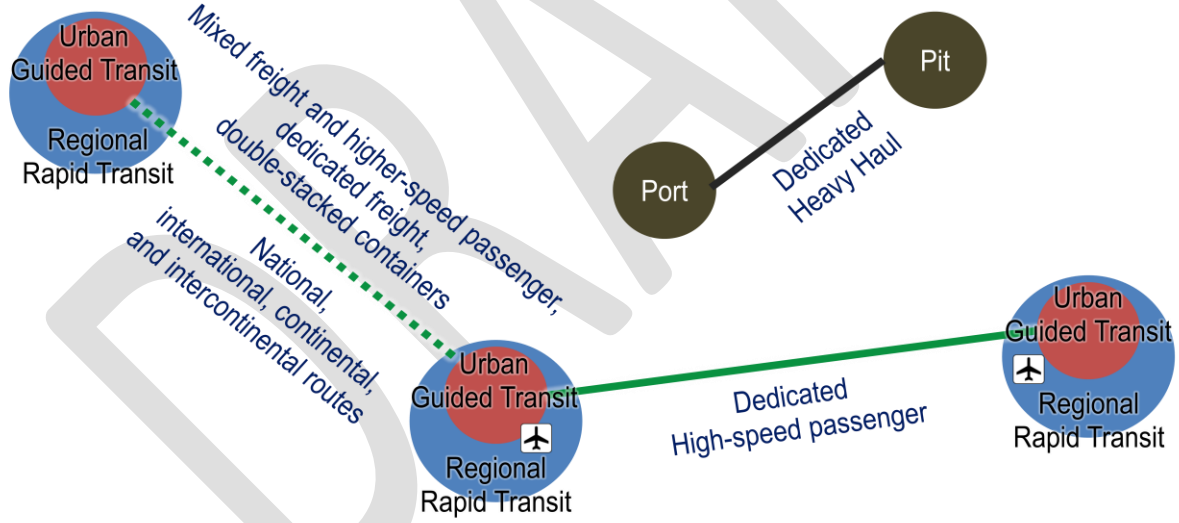


Figure 1: Sub-mode building blocks to position rail as transport backbone

Each railway renaissance sub-mode, high speed, heavy haul, heavy intermodal, as well as urban and regional rapid transit, is a good fit with renewable energy, although they optimise their climate change mitigation contributions in different ways. Distinguishing aspects are aligning gradients, regeneration capacity and smart grid storage for heavy freight (Ermelo-Richards Bay could be energy self-sufficient); high speed trains consuming less energy per seat-journey than classic passenger trains by using high speed on down gradients to avoid wasting energy by braking; and high density urban rail consuming less energy by attracting bus and car traffic. Many non-

energy-related reasons exist why systemic optimisation would have the four rail sub-modes using separate infrastructure: Factoring in energy considerations adds more reasons. Alternatively, if traffic density is too low to justify separate infrastructure, then energy considerations call for diligent systemic optimisation. The country's electricity utility can play a symbiotic role in maximising rail's contribution to its INDC.

3.4.1.3 The Demise of Narrow Gauge Railways

Low networkability constrains narrow gauge rail's business catchment area. Narrow gauge freight railways currently convey less than 3% of world rail tonne-km, most surviving traffic originating from mines with finite resources in Brazil, Queensland and South Africa. Long-distance passenger traffic on narrow gauge rail is no longer significant. The only other narrow gauge passenger traffic is urban or regional; Japan's being the most significant. There, electric multiple units similar to PRASA's new commuter trains, operate at up to 130km/h on routes of average length 27km.

Straggling narrow gauge railways are being wound up one by one, the following exodus currently underway: Bangladesh is following neighbour India in converting its narrow gauge lines to broad gauge; China is closing its narrow gauge mine railways or standard-gauging them; Ethiopia's first standard gauge route is open, more are planned; Ghana is implementing an Accra–Lake Volta standard gauge link; Indonesia envisages a standard gauge high-speed line; Jordan plans to align with its standard gauge neighbours; Kenya's first standard gauge route is complete and locomotives are being commissioned. Malaysia is planning standard gauge national network extensions; Nigeria's first standard gauge route is open, and another is under construction; Philippines is to renew its network on standard gauge rather than rehabilitate it on narrow gauge; Narrow gauge bastion Queensland will use standard gauge for new mines in its Galilee Basin; Russia is broad-gauging its narrow gauge Sakhalin Island. Standard gauge, and to a lesser extent broad gauge, railways have built up dominant critical mass by virtue of wide networkability and formidable competitiveness. No country or continent is building its 2050 transport scenario on a narrow gauge railway backbone.

3.4.1.4 Railway Renaissance and South Africa's Strategic Backlog

Half a century ago, Japan's high-speed trains triggered railway renaissance and a vibrant global industry. Heavy haul followed in 1972, heavy intermodal in 1980, and urban- and regional rapid transit in 1989. Today, most new railway investment gravitates to one or more of these market spaces, or to align existing railways with them, by increasing axle load, raising speed and extending train length.

All transport modes use similar enterprise management and client facing information and communication technology (ICT) systems, which cannot advantage one mode over another. Only genetic technologies are able to change the competitiveness of one mode relative to another. ICT Investment is therefore not an alternative to investment in strengthening rail's genetic technologies, but a necessary adjunct.

A vital new generation of liberated railways that comprehend the collaborative and competitive dynamics in their markets, and position themselves as logistics and mobility leaders, have already displaced many former monolithic national railways. The country's preoccupation with preserving a colonial railway heritage is regrettably moving some of its rail constituents counter-current, while other countries overtake them. Without the compelling, incisive interventions set out in the National Rail Policy, rail will be unable to become the backbone of its transport system.

3.4.2 Road Trends

3.4.2.1 Logistics

Truck manufacturers have developed the following technologies to emulate rail's genetic technologies, thereby to aggressively encroach on rail's eminent domain:

a) Highway pilot, which automates steering, speed modulation, and braking;
   it emulates rail's Coupling and Guiding genetic technologies, and
b) Platooning, which remotely links multiple highway pilot trucks
   to minimise inter-truck gaps, save fuel and increase road capacity;
   it advances emulation of rail's Coupling and Guiding genetic technologies.

Autonomous truck technologies are predicted to reduce road transport costs by up to fifty percent and increase service quality. They will damage the rail sector unless it can reduce costs and improve quality significantly.

Beyond emulating rail's genetic technologies, emerging truck telematics and smart highways are set to erode the relative advantage of rail's large-scale command and control systems. Furthermore, overhead electric traction, such as used by railways and mining trucks, has recently migrated to road transport to substantially boost its sustainability. Freight rail is defenceless against competing transport modes if it does not vigorously pursue leading railway genetic technology advances.

3.4.2.2 Mobility

On-demand road-based car-pooling, journey aggregation and ride-sharing ICT applications are already eroding rail's market in regions where high speed, regional rapid transit and urban guided transit are well represented, e.g. Europe. Such applications are cost effective and at least one, Uber, is already active in the country.

In addition, autonomous single-passenger drones are predicted to make inroads into UGT. The country's many low density human settlements, in conjunction with low-capacity minibus taxis and widespread mobile phone use, offer an untapped market in which such ICT applications could potentially thrive at rail's expense. Rail's Guiding and Coupling genetic technologies can best defend it against ICT market erosion by offering high capacity services in densely developed and or densely populated corridors.

Chapter 4 Policy Guidelines

Attention now moves from problems to policy interventions to resolve them, so a vision and mission as well as goals and objectives are appropriate. They project Government's need to address and resolve the problems identified within a finite time frame. Around the world and in South Africa, 2050 is the date by which critical environmental sustainability objectives should have been achieved: Recognising the rail sector's major role in the associated interventions, rail revitalisation should be complete by that date.

4.1 Vision

Rail as an affordable, competitive, effective, integrated, reliable, safe, sustainable and valued transport mode that provides the backbone of South Africa's freight logistics and passenger mobility systems and strengthens its economic growth and social development by 2050.

4.2 Mission

To recognise and understand rail's heritage of missed opportunities, strategic missteps and structural impediments, and hence to identify and mobilise funding and resources to leverage rail's inherent competitiveness to reposition it as backbone of South Africa's land transport task.

4.3 Goals

The goals of the National Rail Policy are as follows:

a) Reposition the country's rail networks as transport backbone from which to serve the urban and medium-to-long-distance mobility needs of its natural citizens and the logistics needs of its corporate citizens;
b) Provide a long-distance national rail network with access for qualified operators, PRASA for passenger trains, as well as TFR and third parties for freight trains, subject to appropriate economic and safety regulation.

c) Provide affordable, value-for-money mobility for the country's people and visitors in densely populated urban settings, as well as in densely travelled medium- and long-distance corridors;
d) Enhance the competitiveness of the country's exports in global markets to facilitate trade with its partners;
e) Maximise the socio-economic contribution of rail transport in South Africa, the Southern African Development Community (SADC) region, and the rest of Africa, and optimise the economic balance between rail, road and other transport modes;
f) Support the country's commitments to mitigating climate change by repositioning rail to substantially increase its national transport task contribution, thereby to reduce energy consumption and the associated harmful emissions; and
g) Enable economic and social development by promoting SMMEs, co-operatives, rural development and BBBEE and create employment, maintenance and productive capacity in the rail industry.

4.4 Objectives

To these ends Government will pursue achievement of the following objectives:

a) Halt and reverse the decline of the rail sector by developing a National Rail Master Plan and supportive intervention and investment programmes;
b) Fund all national rail policy objectives directly or indirectly, to ensure their achievement, starting a rolling annual programme within five years of approval of the National Rail Act and completing it before 2050;
c) Facilitate or provide attractive, competitive, efficient, reliable, safe and secure freight and passenger rail services to reposition rail as the mode of choice and spontaneously shift freight and passengers from road to rail;
d) Reduce the cost of doing business in the country by maximising the rail freight sector's contribution to the national transport task, encouraging the use of the most cost-effective transport mode;
e) Augment Transnet's and National Treasury's funding ability from additional sources to develop a standard gauge high performance national rail network oriented to freight requirements with, where appropriate, passenger-oriented enhancements.
f) Establish governance, institutional and regulatory frameworks for managing, operating and maintaining railways, as well as facilitate

infrastructure and rolling stock investments in new technologies that increase inherent competitiveness;

g) Promote rail transport's contribution to spontaneous intermodal collaboration, by providing convenient infrastructure and facilitating efficient transactions; via policy and funding in the case of passengers who have limited or no alternatives, and via more sophisticated inducements in the case of freight;
h) Strengthen investment so that the rail mode can aggressively exploit its inherently competitive technologies to compete effectively and sustainably and to collaborate in intermodal solutions in the local transport market, and to support exporters in global markets;
i) Attract, encourage, and regulate private sector participation in all categories of investment as well as operations and maintenance, to revitalise the rail sector, drive development and maximise growth to ensure accessible, affordable and effective service delivery to present and prospective railway users;
j) Invite private sector participation where government cannot or should not invest, or where it demonstrates superior value for money, or where it is quicker to market;
k) Accommodate prospective rail freight investors who are able and willing to fund their rail access and service requirements when incumbent entities are unable to fund the required capacity or unwilling to bear the investment risk;
l) Invest in freight rail infrastructure to meet specific client or potential client demands, and allow private sector participants to step up to the opportunity where state-owned agencies and or companies are unable or unwilling to do so;
m) Facilitate long-term PSP in below-rail infrastructure by allowing concessionaires or lessees to amortise their investments over suitably long periods; and
n) Institute considerate, empathetic, fair, independent, sensitive and transparent economic regulation of the national rail network and train operators thereon.

Chapter 5 Policy Principles and Interventions

This chapter introduces an array of high-level principles to guide the National Rail Policy, and then applies them to rail sector investment and reform as fundamental revitalisation interventions without dealing with modalities thereof (the latter will be

addressed in the Policy Statements). After introducing the high-level guiding principles, this chapter distinguishes between a primary intervention, Rail Sector Investment, and a secondary intervention, Institutional Repositioning. During the initial stages of policy development it became evident that much of rail's unacceptable performance was attributable to inappropriate and insufficient investment over many years. This needs to be remedied by the primary intervention. However, deeper investigation revealed that the primary intervention alone would not suffice, and that institutional dysfunctionalities regarding market behaviour, roles and responsibilities also needed attention. They need to be remedied by the secondary intervention.

5.1 Guiding Principles

The following principles will guide the National Rail Policy:

a) Understand the fundamental drivers of railway inherent competitiveness so that interventions achieve the desired outcome and avoid unintended consequences.
b) Underpin the formulation and implementation of National Rail Policy by consultation with affected and interested stakeholders.
c) Recognise that safety and security of railway passengers and freight are of prime importance, as is the safety of persons residing alongside a railway reserve;
d) Promote economic growth and social development through investment in rail;
e) Apply user pays principles, except where government funds and provides passenger rail services as an instrument of economic and social policy.
f) Retain all State-owned railway network and rights-of-way in State ownership but, where appropriate, make them available to the private sector on mutually agreed terms to facilitate private sector participation;
g) Ensure that subsidies, where provided, are targeted, transparent and monitored with respect to achieving their intended purpose;
h) Protect and secure railway assets as well as those of clients;
i) Increase rail's operational efficiency and performance, to maximise its utilisation; and
j) Encourage the use of local content and local manufacturing in rail investment.

5.2 Primary Intervention: Rail Sector Investment

The country is weakly positioned regarding rail's contribution to urban mobility, the inherent competitiveness of freight as well as medium and long-distance passenger services and, as a consequence, mitigation of climate change. This Policy therefore sets out to revitalise the country's railway sector by investing substantially to establish a high-performance rail sector that will recapture rail's proper contribution to the national transport task and thereby reduce transport sector harmful emissions. Given the enormity of the task, attempting to deliver the required outcome by extending and upgrading the existing inherently uncompetitive Cape gauge long-distance national network would not achieve the desired outcome. Rail has accumulated a formidable investment backlog relative to other transport modes, particularly road, so the primary intervention must be investment to reposition rail as land transport backbone by 2050. This intervention shall initiate railway renaissance in the country by deploying high speed, heavy haul, heavy intermodal as well as contemporary urban- and regional rapid transit, in situations where rail offers the most economically, environmentally, financially and socially viable logistics and or mobility solution. To redress the road-biased imbalance between the country's rail and road infrastructure investments, the future rail network will comprise, where appropriate, high density freight- and or passenger corridors. Given Government's resolve to reposition rail as land transport backbone, and noting the present poor run down condition of rail in general, the country has never had a better opportunity than the present to progress toward a new rail dispensation.

The major revitalisation investment will therefore be development of a minimalist standard-gauge high-performance national rail network to maximise rail's inherent competitiveness, and provide sufficient capacity for heavy haul and general freight services, as well as for regional rapid transit and long-distance passenger services. Where appropriate and feasible, Government will direct investment to standard-gauging existing infrastructure, to complement the greenfields projects that will also be necessary. By 2050, the national long-distance rail network will be largely standard gauge, at least one dedicated passenger high speed route will be in operation, and Cape gauge will be confined to urban areas where it cannot frustrate rail's inherent competitiveness: Some heavy haul operations may possibly retain Cape gauge where the value of remaining reserves and the logistics cost of delivering them to destination cannot support standard-gauging track.

Urban rail will be founded primarily on the existing Cape Town, eThekwini and Gauteng Cape-gauge metropolitan networks, amongst other to segregate them from freight rail that will use the standard gauge high performance national network. The

urban guided transit networks in these three conurbations will be substantially augmented, expanded and or extended to alleviate existing road congestion and avert ultimate gridlock as their populations and car ownership increase exponentially, and to meet future capacity and catchment area requirements. Like many cities that grow their urban rail networks, additional routes are not necessarily required to interoperate with existing systems, and complementary grid, radial and or circular routes typically emerge to maximise capacity, coverage and origin-destination flexibility. Such routes may therefore use standard gauge to reap the economic benefit of standard designs. Different solutions may emerge in Buffalo City and Nelson Mandela given their atypical small networks.

5.3 Secondary Intervention: Institutional Repositioning

The Green Paper on National Rail Policy identified weak inherent competitiveness as rail's primary problem, with remedial investment as the indicated solution, referred to as the primary intervention in this document. Absence of competition in the rail sector was recognised as a contributory problem but, to minimise the complexity of remedial interventions, considered a secondary problem to be addressed later. However, it has become evident that institutional issues were masking the true size of the primary problem. This section therefore addresses additional insights into market behaviour, roles and responsibilities in the rail services market, leading to a corresponding secondary intervention that addresses institutional repositioning.

5.3.1 Freight Rail

It has become evident that TFR actually addresses, or intends to address, only a fraction of the rail addressable market. It passes up the remaining opportunity due to inadequate capital availability, operational inefficiency and or return on investment. LTPF capacity requirement forecasts are therefore not a dependable basis for planning rail revitalisation interventions. It is difficult to fathom the true size of the rail freight market, other than that it is larger than what TFR chooses to convey.

The classic remedy is to allow on-rail competition. If TFR is unable to, or chooses not to, fully exploit the rail addressable market, then third party train operators must be allowed to avail themselves of the opportunity. Such intervention should grow traffic at a reducing price until market equilibrium is achieved at higher service quality and or quantity and at a lower price: Over time it will reveal the true size of the rail addressable market, enable rail planners to design well-grounded investment plans and ultimately achieve a broadly acceptable modal split between rail and road.

Introducing on-rail competition is a palliative that recognises only service quality, quantity and pricing at market equilibrium, as well as the incremental operational

efficiency that comes with competition. However, it does not and cannot address the root problem of narrow gauge rail's inherent uncompetitiveness. It should therefore not be considered an alternative or substitute for the primary investment-led intervention in a standard-gauge high-performance national rail network. Third party train operators must therefore be admitted to the national rail network only in conjunction with commitment to the investment-led intervention.

5.3.2 Passenger Rail

PRASA occupies a monopoly position in providing passenger rail services. It is largely funded by the fiscus, and therefore has no basis for monopolistic market behaviour. However, being the only service provider may desensitise it to user perceptions of service quality and quantity. Furthermore, as currently constituted there is no assurance that PRASA maximises the value of services delivered to passengers and minimises the economic resources that it uses to do so. Introduction of competition for services rendered by PRASA must therefore be considered. Nevertheless, when urban rail is assigned to appropriate transport authorities it will encounter natural competition for funding from other modes managed by that authority, which will sharpen sensitivity to user perceptions of service quality.

Direct on-rail competition in PRASA's primary urban commuter market is generally accepted as unworkable, because trains following one another at short headways in a closed system do not allow one operator to distinguish itself from any other operator. However, outside of narrowly defined operations, opportunities for competition abound.

Chapter 6 Policy Statements

This chapter proposes policy interventions under four headings. First, Infrastructure Investment addresses the durable and expensive interventions that cut across freight and passenger rail. Note that they signal infrastructure being positioned to lead rail revitalisation. This position aligns rail to other transport modes in the country, where public funding defines the space within which operators deliver services using their own conveyances. Particularly when public funding is constrained, funding infrastructure alone, instead of infrastructure and operations, enables government to maximise its direction of the sector and minimise the fiscal contribution. Second, Enabling Interventions addresses broad high-level institutional considerations that also cut across both freight and passenger rail. Third, Freight Rail and last Passenger Rail policy interventions follow separately, to recognise their significant differences and to afford each due consideration in relation to its unique challenges.

6.1 Infrastructure Investment

6.1.1 Rail Infrastructure Planning

Issue

Several indicators have flagged concerns regarding the country's rail infrastructure planning quality, which includes funding, in respect of the following aspects:

a) Absence of shared vision for long-distance passenger services in relation to development of the national rail network;

b) A groundswell of disappointment in rail's economic and social development achievements annual reports;

c) Absence of light urban guided transit sub-modes from the space between bus rapid transit and heavy urban rail;

d) Stretching Cape gauge beyond its natural journey-time reach in situations where regional rapid transit would provide a better solution;

e) Narrow gauge's inherent uncompetitiveness and inability to expand capacity rapidly have disadvantaged railways and mines;

f) Branch lines having wasted away for decades and, despite dedicated, sincere efforts to revive them, have not rewarded the effort; and

g) Aggregate funding sources are insufficient to support all legitimate rail funding requirements.

They show that the absence of national rail policy has created a vacuum within which rail entities and stakeholders have planned and invested, guided bottom-up by their particular interests rather than top-down by the national good.

The interventions required to reposition rail for competitiveness and sustainability are complex, will involve substantial funding, and will demand sustained attention over three to four decades.

Policy Statement

Rail infrastructure planning is a centralised strategic function that DoT will undertake. It includes, but is not limited to, guiding decision making on repositioning rail:

a) In relation to other transport modes to ensure that rail leads the national transport task in high traffic density corridors;

b) In relation to other transport modes to ensure that rail anchors the country's national climate change response in respect of land transport;

c) By, guiding which rail sub-mode, i.e. heavy haul, heavy intermodal, high speed, regional rapid transit and urban rapid transit, as well as the lighter urban guided transit modes, should be deployed to each situation;

d) Within the three spheres of government, to maximise mutual alignment and synergy among rail projects in pursuing the national good; and

e) Regarding developing sufficient funding sources, including private investment, and allocating funding secured to maximise the commercial, developmental and environmental value of infrastructure provided.

DoT shall, as first priority, establish a Government Component, to be known as the Rail Planning Component, to undertake centralised rail planning. It shall be mandated to:

a) Direct investment in rail infrastructure to position the country for transport sustainability by 2050 and beyond by leveraging rail.

b) Plan the modalities of establishing a new standard-gauge high-performance freight and passenger national rail network for the country.

c) Maximise the Cape gauge urban rail networks contribution and segregate them from the standard-gauge high-performance national rail network.

d) Promote high speed rail in selected corridors to maximise rail's contribution to long-distance travel and minimise energy consumption.

e) Undertake a cost-benefit analysis of the land transport sector to enable investment decisions to be taken in full knowledge of relevant trade-offs.

f) Avoid significant long-distance rail or road infrastructure investment until road alternatives have been supported by grounded understanding of rail versus road commercial and technical dynamics, as well as the overall transport modal split objective.

The DoT's Rail Planning Component shall cooperate closely with operating entities, who will undertake their own planning in respect of operations requirements, including but not limited to, energy provisioning, financial management, human resources, maintenance and rolling stock.

6.1.2 Climate Change Mitigation

Issue

Until recently, rail's contribution to mitigating climate change has been expected to come from more energy efficient rolling stock as well as shifting traffic from road to rail. Rail is indeed the most energy efficient of all transport modes in niches that its

genetic technologies equip it to serve best. Shifting traffic from air and road to rail therefore immediately reduces energy consumption by 60-70% for comparable transport tasks, and reduces harmful emissions by the same amount when using non-renewable energy. Notwithstanding rail's naturally low emissions, railway renaissance technologies can yield further substantial reduction, by some 50% per passenger-km and per tonne-km by 2030 with reference to 1990 baseline. However, this requires doubling, tripling and quadrupling rail's market share and taking all in the case of heavy haul and high speed, together with the necessary rail network expansion. Coordinating and driving the country's 2050 urban, regional and long-distance mobility solution that positions rail as backbone for passenger services that ripple outward from urban areas at higher-speed over medium distances and high-speed over longer distances, as well as freight services that connect to major agricultural, commercial, industrial and mining areas will require strong leadership.

Policy Statement

DoT's Rail Planning Component shall:

a) Undertake rigorous consultation, alignment, integration and ultimately, planning, in relation to all three spheres of government, to ensure that rail maximises its contribution to the country's 2030 and 2050 energy consumption and harmful emissions reduction targets by repositioning it as backbone of land transport.

b) Coordinate planning of rail infrastructure investment interventions in relation to the initiatives of other departments that also address reducing energy consumption and harmful emissions.

c) Plan, fund and facilitate implementation of all inherently competitive rail sub-modes, i.e. heavy haul, heavy intermodal and high speed, as well as urban rapid transit, lighter urban guided transit sub-modes and regional rapid transit.

d) Manage the associated emissions downward in accordance with global best practice.

6.1.3 Track Gauge

6.1.3.1 Liberate Rail's Inherent Competitiveness

Issue

Narrow gauge track reduces rail's inherent competitiveness, except for urban rail, making it easy for road transport to encroach on rail's natural freight and passenger domains, and easy for other countries to encroach on the country's export markets.

Not only is road transport weaving itself ever deeper into the country's industrial and urban spatial development fabric to the exclusion of rail, but failure to achieve substantial road-to-rail shift hinders the country from meeting international commitments to reduce harmful emissions. It is therefore imperative to plan, fund and implement the country's standard-gauge high-performance national rail network.

Policy Statement

The DoT shall therefore develop, as part of the National Rail Master Plan, a standard-gauging plan to guide relevant rail infrastructure investment.

The standard-gauging plan must balance a brownfields approach, to minimise costs by retaining as much as economically possible of the existing infrastructure, against a greenfields approach, to extend the standard gauge network at every economically justifiable opportunity to turn the tide of road domination.

The country's Cape gauge national rail network shall be re-gauged to develop the standard-gauge high-performance national rail network, with due regard for necessary route rationalisation.

The standard-gauge high-performance national rail network must be designed to maximise the economic stimulation that follows agglomeration of spatial developments by a competent railway network, and optimise rural cohesion and inclusion.

6.1.3.2 Affected Corridors and their Timing

Issue

The country's total long-distance rail network, including connections with neighbouring countries, constitutes the heritage that planners must reshape as the major element of infrastructure investment. Rail's relatively low operating costs dilute its relatively high fixed costs as haul or journey distance increases, so commercially viable rail freight hauls tend to be long distance (exceptionally, heavy traffic over shorter distances is possible, e.g. a mine exporting minerals through a nearby port). Classic passenger train journeys tend to be shorter because people are reluctant to undertake long-duration journeys on slow Cape gauge routes. The existing Cape gauge national rail network has therefore defaulted to a freight orientation. Several existing mainlines include portions that are constrained by tight curves with low speed limits, some as slow as 50km/h. They also increase route distance, e.g. Johannesburg–Durban 568km by road, 730km by rail. Such situations are unacceptable for time-sensitive freight services, let alone passenger services. In

rolling out remedial infrastructure interventions, the following constraints will determine the actual revitalisation programme timing:

a) The assumptions that the present Parliament completes the legislative process, that the National Rail Master Plan is completed within three years thereafter, and that engineering and procurement for short lead time (i.e. selected brownfields) projects can commence construction in another two years, i.e. 2024.

b) The planning-to-operations-commencement cycle, which takes 10-15 years for greenfields projects, and somewhat less for brownfields projects that attract fewer land acquisition and environmental impact issues.

c) The disruptive impact of construction on existing national network services, as well as the commercial benefits of strong inherent competitiveness: Completing projects quickly eases both constraints, favouring long corridors such as Gauteng to Cape Town, Nelson Mandela and eThekwini as the foundation of the high performance standard gauge national network. Other routes will follow.

d) Devolution and assignment of urban guided transit, with concomitant funding, to local authorities: This action should be completed no later than the end of PRASA's present contract for commuter trains, or earlier if local authorities so request. No local urban guided transit plans to address road congestion exist at present, so new infrastructure could take ten years or more to commence operations. Further rolling stock for existing urban networks could be procured in a shorter time.

e) Provincial reserve: The National Rail Policy will advise provinces to exercise their authority to implement regional rapid transit: Operations commencement could be achieved 10-15 years after enactment.

f) The rate at which the construction industry can deliver constituent projects, and state and private investors sustain the requisite funds flow: From international experience, national gauge-change projects take around 25 years from ramp-up to demobilisation.

g) Generally poor asset condition: The opportunity to invest in inherently competitive assets must be realised as soon as possible, while investment in new Cape gauge assets outside urban areas must be avoided.

h) The opportunity drivers for 300+ km/h trains in the Gauteng–eThekwini corridor could reach critical mass from around 2030 onwards, placing such trains on the critical path for rail revitalisation.

i) Substantial climate change improvements are expected by 2030, while all related interventions must be complete by 2050.

j) The mining industry will lead heavy haul investment requirements in the light of the state and development of global markets for the commodities in which it trades.

Policy Statement

DoT's Rail Planning Component shall prioritise and accelerate standard gauge implementation on major rail corridors that will constitute the standard-gauge high-performance national rail network, to ensure that new commercial, industrial, mining and or residential spatial developments are afforded maximum opportunity to align and integrate their plans with freight and passenger rail transport opportunities.

To the extent that increasing urbanisation extends beyond the natural reach of Cape gauge urban rapid transit, standard gauge regional rapid transit must be provided. Where such routes are conveniently close to portions of the standard-gauge high-performance national rail network, sharing the same infrastructure or right of way must be considered, together with provision of incremental line capacity for passenger services, so that they do not adversely affect freight services.

The minimum standard gauge high performance network will include the important Gauteng to Cape Town, eThekwini and Nelson Mandela corridors, which will be cleared for double stacked containers and, depending on the outcome of feasibility studies, may also provide capacity for 160-200km/h passenger trains on some sectors.

Heavy haul lines must be treated separately. The remaining life of existing mines and the life expectations for new mines are germane to contemplating retention of Cape gauge or standard-gauging them. The mining sector is best informed and equipped to make the correct call to align rail transportation investment with mining investment. DoT's Rail Planning Component shall engage the mining sector to create effective, funded, integrated and responsive rail logistics solutions to support the country's mineral extraction, beneficiation and export objectives.

High level achievements will generally follow the timing below, where routes mentioned are visible on the maps attached as Annexures A and B:

2019 National Rail Policy enacted;

2021 Accounting separation of TFR Infrastructure Manager and TFR Train Operator complete and regulated third party access commences.

2022 National Rail Master Plan completed;

2022 Local authorities complete planning for additional urban guided transit corridors;

2024 Construction of short lead time projects commences, followed in later years by longer lead time projects;

2025 Devolution and assignment of urban guided transit to local authorities completed;

2032 Earliest operating commencement date for Gauteng–eThekwini high speed trains;

2032 Earliest operating commencement date for regional rapid transit trains.

2032 Earliest operating commencement date for additional urban guided transit corridors.

2037 Gauteng to Cape Town, Nelson Mandela and eThekwini sectors of the high performance standard gauge national network completed;

2049 Latest operating commencement date for Gauteng–eThekwini high speed trains; and

2050 All other rail revitalisation projects completed.

6.1.3.3 Standard-gauge Specifications

Issue

The country is a small player in what has become a large global railway market, so its existing railways rest on miscellaneous specifications, Cape gauge and other. New investment in the standard gauge high performance national rail network, and probably in one or more dedicated high speed routes as well, therefore presents both opportunity and responsibility to select and adhere to well-grounded, widely recognised specifications that facilitate participation in the economic and technical advantages of global mainstream solutions. The following three considerations will be new to the country.

Whereas narrow gauge isolated the country from rail's huge strides in speed, rail revitalisation can realise valuable operational synergy from positioning the standard-gauge high-performance national rail network in the 120-200km/h service speed range: The lower value represents the maximum speed of double-stack container

trains, and the upper value represents the maximum speed for mixing freight and passenger trains on the same infrastructure.

Train speeds in the country, Gautrain excepted, have never been sufficiently high to justify automatic train protection (ATP), but without it fatal collisions are only a moment's inattention away. The standard gauge high-performance national network will enhance safety by elevating regional and long-distance passenger train speeds to 160km/h and higher where ATP is world best practice, also where freight and passenger trains run on the same infrastructure.

The world's dominant vehicle profiles all feature full-width bodies down to near rail level, an essential feature to achieve heavier axle load by double-decking passenger trains and double stacking container trains. Fortuitously, the country's long-distance passenger trains are almost inactive, presenting an ideal opportunity to demolish disused platforms and introduce a new standard gauge vehicle profile from scratch.

Policy Statement

Trains must go where business and passengers want them to go: The standard-gauge high-performance national rail network shall therefore support unrestricted interoperation over its entire extent. As exception dedicated passenger lines should not require vertical clearance for double stacked containers.

This Policy proposes a meta-specification, i.e. a specification for a suite of specifications, not the specifications themselves. To avoid casting presently imprecise requirements in legislative concrete, DoT must facilitate and lead, in consultation with the rail sector and its suppliers, a forum within which stakeholders can negotiate and agree a suite of specifications for the standard-gauge high-performance national rail network.

DoT and the stakeholder forum must therefore maximise use of specifications created by others to acquire suitable and compliant equipment at minimal or no price premium. They must also envision a liberal development trajectory that will not lock in constraints, such as those that determined its narrow gauge heritage, but will maximise its strategic freedom in the decades ahead.

DoT and the stakeholder forum shall develop specifications for maximum axle loads, speeds and train lengths; vehicle profile; train authorisation and protection systems, and electrification where that is indicated. In the proposed regulated third party access dispensation, where penalties for in-service and in-section failures will exist, passenger trains tend to be sufficiently reliable to exclude coupling and braking as interoperability constituents.

Standard gauge specifications should maximise rail's competitive advantage by maximising the contributions of its genetic technologies. Regarding Supporting, vehicles on public roads cannot emulate rail's heavy axle load, so revitalisation investment must aim high, e.g. 32.5 tonnes, for general freight. Regarding Coupling, the country already occupies a leading position in freight so Association of American Railroads' specifications remain a good choice while and distributed power can increase train length even after coupler strength maxes out: This is a non-issue for passenger trains. Regarding Guiding, new high-speed lines should also aim high e.g. 400km/h, to provide headroom for future increases.

6.1.4 Route Rationalisation and Expansion

Issue

The existing national rail network (i.e. the total Cape gauge network less the three Cape gauge metropolitan networks), which defaulted to a freight orientation due to its narrow gauge limitations, appears too large in relation to the volume of traffic that it carries. A substantial part thereof is concentrated on a few corridors and ninety-five percent of revenue is generated on 30% of the network. Freight traffic density in tonne-km per route km is low by comparison with the standard (and broad) gauge railways of the country's BRIC and heavy haul peers, as is passenger-km per route km. The latter metric indicates that tonne-km per route km are not low because passenger-km per route km are high: Shosholoza Meyl's contribution is actually negligible. Therefore, even if the less productive 70% of the network were discounted, traffic density would still lag that of the country's peers.

In contrast to asserting that the existing network is too large, further network expansion will likely be necessary to recognise that repositioning rail to exploit its inherent competitiveness will expand its market and shift freight from road to rail. The latter is likely to be larger than the few corridors that earn most of the revenue at present. Furthermore, greening the country's transport system, as well as shifting the passenger traffic caused by urban road congestion to rail, will require general network expansion.

Policy Statement

The heritage network attributes will best serve as foundation for a freight national rail network, although requirements also exist to accommodate passenger services that use or will use the national rail network.

DoT shall therefore specify the new standard-gauge high-performance national rail network, which will replace the existing Cape gauge national rail network, to meet essential freight rail requirements: It will serve only high density corridors that can

support the investment required to reposition rail in market spaces where it can exploit its inherent strengths to attract sufficient traffic. Noting that single track standard gauge freight railway capacity maxes out at around 150 million tonnes per year, some currently double tracked routes may be reduced to single track, to minimise the overall cost of developing the standard gauge high performance national rail network.

DoT shall consider all branch lines in the light of their traffic volume and economic interoperability, to determine whether they qualify for connection to the standard-gauge high-performance national rail network or for service by gauge-changing rolling stock.

DoT will also promote the expansion of the existing urban network to relieve road congestion where necessary.

6.1.5 Branch Lines

Issue

Branch line rights-of-way and network connections represent an opportunity for relieving unemployment by creating jobs to restore and then operate them. Many branch lines have however been closed, dormant, lifted or underutilised, on average for three to four decades. During that time they were not maintained and essential items have been vandalised or stolen. Returning them to service will require restoration to safe working order. Several will nevertheless remain unable to meet contemporary logistics and mobility requirements even after restoration due to light axle load, low speed and short trains, and will therefore, in addition to the cost of restoration, require an ongoing operating subsidy.

Substantial shale gas reserves lie beneath most of the country and, if fracking were allowed, suitably located branch lines or their rights-of-way could have value for conveying inbound fracking materials and outbound petroleum products. Such heavy traffic is ideally suited to rail and could give affected branch lines a new lease on life. Formation and bridges would likely need strengthening to carry mainline axle loads and new track would be required, and possibly also curve easement.

Policy Statement

Branch lines shall be categorised as Strategic and, by default, Non-strategic. The criteria that qualify a branch line as Strategic will be determined by the DoT. Considerations may include, benefits regarding socio-economic upliftment of rural communities, developmental infrastructure, food security, maintenance of secondary

roads, relative cost of satisfying a given need by rail in comparison with road and more.

Any Government entity, or other stakeholder that wishes to sponsor freight and or passenger service on a state-owned branch line, identified as Strategic in terms of the criteria determined by the STER, shall fund the actual costs of carrying and maintaining the branch line by the Infrastructure Manager, as well as the actual costs of operating trains. Where a branchline is inactive, and requires rehabilitation to restore it to minimum safe standards, the Government entity or stakeholder shall also fund that investment. The Government entity or stakeholder shall procure a train operator in terms of the STER's dispensation as well as public procurement legislation where applicable. The Operator shall administer user charges, and the Government entity or stakeholder shall subsidise any shortfall to sustain operation. All such rehabilitation and operation shall be subject to the oversight of the Railway Safety Regulator (RSR) and the STER.

Where a state-owned branchline is inactive, and no Government entity or other stakeholder is willing to fund restoration and maintenance to minimum safe standards, and no operator wishes to provide service on it, the Single Transport Economic Regulator shall upon request permit the owner to cease operations.

Dormant and disused branch lines shall be left safe and secure after the owner has been permitted to cease operation. Valuable materials must be removed, buildings must be occupied. If no tenant can be found, buildings must be razed to pre-empt harbouring vagrants and criminals. Contemporary freight railways do not require dairy rooms, lamp stores, parcels counters, ticket offices, public toilets, signal cabins etcetera, so they must not be retained. Track formation may be left to weather.

6.1.6 Neighbouring Countries and Africa

Issue

Africa's continental area can contain the world's four largest rail networks, those of China, India, Russia and the US. Their networks total 520 million km, and convey 10 500 billion passenger-km plus tonne-km annually, more than half the world's total rail traffic. If Africa is to base intra-continental trade on rail, as continents do, and as it will have to do to meet global emissions targets, it needs a standard gauge continental rail network. A 2007 African Union (AU) Conference on Rail Interoperability therefore resolved: *To this end and to facilitate interoperability of rail transport networks in Africa, standard 1435 mm gauge should be adopted and retained for construction of new rail lines in the Continent*. *The conversion to standard gauge for new railway lines should enable African railways to benefit further*

from the wide range of material and equipment at global level, and will contribute significantly to resolving the problem of interoperability in the future Pan-African railway network.

Meanwhile, it is important to retain the country's rail connections with the SADC region's current Cape gauge network. Several technologies can do this, namely changing bogies (e.g. the broad gauge Community of Independent States (CIS) and their standard gauge neighbours to the south); transloading containers from standard gauge to broad gauge wagons and vice versa (e.g. China to Western Europe); variable gauge axles (e.g. standard gauge Western Europe and broad gauge CIS neighbours to the east and Spain to the west); and lastly three-rail dual gauge track (e.g. Cape gauge and standard gauge in Western Australia).

Policy Statement

South Africa will use technical solutions to maintain rail connectivity with the SADC Region, whilst facilitating a dialogue with the Region on migration to standard gauge.

In line with the AU resolution, all future greenfields rail projects will be on standard gauge, with the exception of extensions to the Cape gauge urban networks.

6.1.7 Rolling stock

Issue

This Policy recognises the distinction between infrastructure and rolling stock. Rolling stock goes where business goes, in response to business cycle ups and downs, changing seasons, growth in some markets and decline in others, and more. All other transport modes take for granted that one party (sometimes a few) provides infrastructure and many parties operate on it, a principle that should be no less true of rail than of any other transport mode. This approach is aligned with Government's Industrial Policy Action Plan, which has made significant progress regarding manufacture of railway rolling stock, securing investment and scaling up industry capabilities using a range of policy measures, including the Competitive Supplier Development Programme, industrial financing and technology support.

Policy Statement

Train operators, including third party operators, on the existing Gape gauge national rail network and on the future standard-gauge high-performance national rail network shall therefore fund, procure and maintain their own rolling stock. During Cape gauge to standard gauge transition, state owned entities may dispose of rolling stock, even that of entire business units, in terms of applicable public procurement legislation to raise funds for infrastructure investment.

Government regards provision of own rolling stock by freight and passenger train operators as an additional funding source to be exploited to close the gap between existing funding sources and overall funding requirements.

After responsibility for urban rail has been assigned to local authorities, they shall procure their own rolling stock requirements.

Government recognises the importance of standard gauge in mitigating the risk of rolling stock investment failure by ensuring that alternative deployment, if need be in the large global standard gauge market, is possible.

To the extent economically feasible, new rolling stock must be future-proofed against obsolescence due to changing track gauge. Traction bogies for Cape gauge locomotives in particular should provide for changing wheel sets to standard gauge.

Rolling stock planning is excluded from the DoT's responsibilities. Nevertheless, it must be conversant with key attributes of railway rolling stock and trains.

6.1.8 Job creation

Issue

Rail revitalisation Investment to construct the standard gauge high performance national rail network and associated rolling stock, will sustainably absorb huge unemployment. The total capital investment, probably the country's largest public works project ever, will sustain a substantial number of jobs over a minimum twenty-year transition period. They will spread across the country and support the construction and rail supply industries. The former will enable construction companies to establish and populate specialist rail divisions; the latter will provide ongoing work for an industry that the Industrial Policy Action Plan has already reinvigorated on the back of locomotive and multiple unit contracts. The benefits will permeate the country's socio-economy much deeper and wider than only the abovementioned jobs, through flow-down to job holders' families, job multiplication through contributions from lower tier suppliers, corporate social investment by participating entities, and a general economic uptick as a high performance inherently competitive railway does the country's logistics and mobility heavy lifting.

Policy statement

Government endorses the package of rail revitalisation investment interventions as a substantial contribution to reducing the country's unacceptably high unemployment, and to stimulating its economic growth.

6.2 Enabling interventions

6.2.1 Economic Regulation

Issue

The revitalised rail sector will have a more complex array of actors and stakeholders than heretofore. Their different interests will require economic regulation to ensure the sector's fairness and long-term sustainability. DoT has established an Interim Rail Economic Regulatory Capacity to collect data from operators to analyse the rail sector's performance and structure, as well as their network access and use, to determine what economic regulatory interventions the rail sector needs.

TFR's freight rail monopoly needs attention. Price regulation may moderate monopoly profits, but Transnet Board is statutorily accountable for the SOC's financial sustainability: Regulation can do little to increase productive output to the level that a competitive market would achieve. Generation of electricity has demonstrated the challenge of regulating a monopoly to produce output beyond its chosen level: Competition is a surer way of eliciting higher output to prove where demand limits lie.

Introducing competition on the existing Cape gauge national network will however not address the fundamental issue of rail's inherent uncompetitiveness. Private sector initiative will identify commercial opportunities and increase activity, but it cannot substitute for standard gauge's inherent competitiveness, and will therefore do nothing to enable full-strength heavy haul, container double stacking and higher-speed or high-speed passenger trains. Conclusions drawn from such intervention will rest on false premises. Comprehensive remedial investment, including standard-gauging the national network, must lead the rail revitalisation agenda as fundamental intervention: Introducing regulated on-rail competition is nevertheless an essential way station in determining the true demand for freight rail service that must be used to design investment interventions.

Policy Statement

Economic regulation as an intervention will play a vital role in providing regulatory certainty to multiple rail sector actors, which is fundamental to successful railway revitalisation. General railway economic regulation functions will include:

a) Ensuring non-discriminatory access to public rail infrastructure, as well as fair pricing and associated terms and conditions, to train operators in relation to access quality and technical standards;

b) Regulating market entry and exit, revenue adequacy, and service quality levels; tariff approval and commercial dispute resolution, with due regard

for essential differences between commercial and subsidised services, infrastructure owners and train operators, logistics and mobility requirements, as well as public and private ownership;

c) Aligning rail market behaviour with approved national economic policy and strategic objectives of the developmental state, as well as with legitimate private sector participants' requirements for stable and transparent policy;

d) Regulating the provision of adequate, affordable, efficient and sustainable rail services;

e) Promoting and regulating on-rail competition in a way that all participants perceive the playing field to be level;

f) Promoting equity of access to investment opportunities;

g) Promoting investment in rail equipment, infrastructure and services;

h) Overseeing agreements among train operators regarding matters of common interest, such as but not limited to train inspection, wagon repairs and wagon pooling.

i) Determining a fair and reasonable basis for setting tariffs for using public rail infrastructure and services, to inform assessment of tariff approval requests received from infrastructure owners and train operators;

j) Investigating complaints and conduct market enquiries where necessary or where requested by competent authority;

k) Determining financial stability requirements for train operators: and

l) Determining and administering penalties for non-compliance with access terms and conditions.

Rail regulatory responsibilities shall include research, compliance and performance monitoring, as well as preventing abuse of market power and facilitating dispute resolution between operators, customers, investors and other stakeholders.

Economic regulatory functions shall be executed independently of rail sector operators and or service providers and directly accountable to the Minister of Transport, to whom periodic reports on the status and performance of the railway sector will be made.

6.2.2 Safety Regulation

Issue

Rail safety complements rail revitalisation. Investment in standard gauge assets opens multiple opportunities for a fresh start, unfettered by the country's existing rail technological heritage which, amongst other limitations, has generally lower safety resilience than standard gauge railways. Furthermore, shifting traffic from road to rail potentially reduces fatalities per billion passenger-km by a factor of approximately fifty, while dedicated high-speed lines are virtually fatality-free.

Policy Statement

The RSR shall, complementary to its current statutory responsibilities, develop a railway risk matrix that balances the severity of harm against the probability of its occurrence and align the risk levels with best global railway practice, to achieve an inherently safe railway.

RSR shall then ensure that infrastructure and rolling stock technologies incorporated in standard gauge rail revitalisation interventions provide a quantifiable and acceptable residual safety risk.

On portions of the network that remain on Cape gauge where the latter does not compromise inherent safety, such as low speed urban rail using single-deck vehicles, and possibly some heavy-haul lines, the RSR shall similarly ensure that the embedded technologies provide a quantifiable and acceptable residual safety risk.

6.2.3 Rebalancing Rail and Road

Issue

The accumulated funding applied to or attracted to land transport modes shows a dominant bias toward road. With reference to the three spheres of Government:

Local governments have never had a mandate to invest in rail. Unsurprisingly, they invested only in road. Local governments will only strike their own rail-road investment balance when urban rail has been assigned to them.

Provincial governments had no rail transport competence until the Constitution assigned it to them, concurrently with national government. Unsurprisingly, until Gautrain, provincial governments also invested only in road. Gautrain is the country's only existing example of rail investment explicitly directed at road to rail shift.

The Constitution assigns National government competency to develop policy, to plan and regulate freight and passenger rail. However, like former state railways in many countries, government-of-the day exigencies shaped PRASA, TFR, and their

predecessors: Like that reference group, isolation from market signals distanced them from real requirements, until they found themselves unable to contribute their expected share of the national transport task, having shed most of it to road.

Road infrastructure investment attracts complementary user investment in road vehicles. Rail in the country does not yet significantly exploit that opportunity because PRASA and TFR each own both infrastructure and rolling stock. However, the business model clearly works well for road around the world, for rail in countries that have adopted it, and for all other transport modes (except pipelines, where infrastructure and vehicle are identical).

Aligning land transport governance to optimise balance and complementarity between rail and road is an emerging global trend. While not directly within rail policy ambit, the country would do well to internalise such developments.

Policy Statement

The National Rail Policy signals a change from exclusive access to rail infrastructure to regulated access to rail infrastructure, a dispensation that will enable the three spheres of government to fund and to implement such rail infrastructure as assigned to them, independently of operators. Like roads, they will be responsible for providing rail infrastructure where they believe rail is the appropriate transport mode

The dispensation will remove the obligation from state owned entities to balance the cost of providing and maintaining infrastructure against net revenue earned from services provided by their rolling stock fleets.

The National Rail Policy shall assign to each sphere of government responsibility for providing rail infrastructure according to the same criteria as other land transport infrastructure within its jurisdiction.

National government shall bear responsibility for funding or securing funding for both the urban and national rail network infrastructure capital expenditure, where applicable initially as-is on Cape gauge, through the re-gauging process and thereafter on standard gauge. National Government shall also guarantee funding for operating expenditure short falls for urban rail networks and where necessary also for freight network that it believes should be provided for strategic reasons.

DoT shall use its good offices to develop, fund and implement the National Rail Master Plan in such a way as to achieve an equitable balance between future investment in rail and existing road assets such that rail will function as the country's transport backbone by 2050. Similarly, it shall work towards aligning funding flows from all government sources to land transport projects undertaken by all spheres of

government with the country's goals in respect of transport modal split and climate change mitigation.

6.2.4 Security Management

Issue

Rail is not considered to be a safe mode of transport, which impedes patronage from increasing. Protection and security for rail assets, freight and passengers at railway stations and other fixed facilities, as well as on board freight and passenger trains, must be seen in the context of the need to provide reasonable security at other transport facilities, routes and public premises throughout the country.

Policy Statement

Operator owned or outsourced security services will provide first line defence in the rail setting. They will manage safety and security as well as protect assets, passengers and personnel. They will also address fixed facility requirements, e.g. emergency communications, lighting, perimeter protection and surveillance etc.

Additional security requirements may be specified in Service Level Agreements between rail operator and infrastructure owner.

Network and train operators and station managers shall develop security plans to improve the safety of the public and assets in their custody. The infrastructure or network manager, together with Government agencies, will ensure that railway infrastructure is protected from vandalism, theft and sabotage.

Enforcing the law on trains is difficult as trains traverse many jurisdictions en route, while authority falls only within a specific jurisdiction. The South African Police Service Protection and Security Services Division (Railway Police) will therefore continue to enforce the law within the rail setting, i.e. both fixed facilities and trains.

Railway network, train and station operators; in-house and external security companies and Railway Police, shall cooperate in addressing safety and security.

6.2.5 Skills Development

Issues

The rail sector employs only some seven percent of the country's transport industry work force, but uses many systems and technologies that set it apart from other transport modes and other industries. Skills development must therefore rest to a large extent on sector initiatives, and resumption of new investments such as Gautrain, TFR locomotives and PRASA commuter trains, has re-established skills development channels. Indeed, recent Transnet annual reports portray employees in

proper personal protective equipment demonstrating their skills. Nevertheless, there is still a way to go, as the following challenges indicate:

a) The quality and quantity of job market entrants cannot meet demand;

b) The number of critically-skilled staff is inadequate;

c) Education institutions that address rail-specific needs are inadequate;

d) Training facilities for rail-specific safety critical skills are inadequate; and

e) A retirees–new generation gap endangers institutional knowledge retention.

Policy Statement

A competitive, revitalised rail industry will set the stage to attract the right calibre of job seekers. Government will promote rail skills development to prepare people for employment opportunities at all levels as an integral part of its investment plan to reposition the rail sector as backbone of the country's land transport by 2050.

Operating entities will manage and deliver workplace exposure and rail skills development programmes in support of rail revitalisation.

The supply industry will build on Industrial Policy Action Plan achievements. Operating entities will manage and deliver skills development programmes where workplace exposure is required.

The DoT, will lead the initiative, supported by the Departments of Higher Education and Training as well as Trade and Industry, National Treasury, network and train operators as well as the RSR.

6.3 Freight Rail

6.3.1 Market and Organisation Structure

Issue

At present, TFR is vertically integrated, an organisation structure that heavy haul railways frequently adopt. There rail, and indeed an entire mine–rail–port system, competes against similar entities in other countries and, in some instances, even in the same country. Such systems closely integrate their productive assets as well as their respective investments, operations and maintenance. Where the system is not owned by a single entity, the rail portion of the value chain is best managed by a single entity that possesses the necessary acumen: In that case vertical integration is the most appropriate organisation structure.

By contrast, where clients demand fast response to rapidly-changing domestic or global market requirements, competition amongst train operators has value in optimising service availability, speed, price, quality, reliability, and responsiveness. The monopolistic freight rail sector does not currently support such competition.

Policy statement

Regulated on-rail competition shall be introduced on TFR's existing Cape gauge national network by admission of qualified (i.e. formally approved by RSR and STER) third party freight train operators: This dispensation shall be carried over to the standard-gauge high-performance national rail network as and when portions of it are opened for revenue service.

Initially the financial accounts shall be separated in respect of what will be known as the TFR Infrastructure Manager and the TFR Train Operator to enable the STER to make an informed ruling on any matter that it is called upon to do so. Many essential functions are deeply embedded in existing organisational practices and structures, so the intervention cannot be abrupt.

The STER shall formulate and publish proposal and appeal procedures, by which any qualified third party operator may propose a train service to TFR Infrastructure Manager with a view to negotiating and concluding a network access agreement. The procedures shall recognise the case where existing capacity is sufficient, as well as the case where incremental expansion is required to create additional capacity. The latter case will likely require incremental funding by the proponent of the train service.

6.3.2 Access Arrangements

Issue

At present no formal procedure exists by which operators may seek access to the national rail network and TFR rarely consents to access requests.

Policy Statement

TFR Infrastructure Manager shall establish a separate Traffic Management Function to control access to and manage operation of the national rail network, i.e. all routes except PRASA's three Cape gauge metropolitan networks. Fees and terms of business shall be published in the public domain.

Penalties shall apply to agreed events that impose on other parties such as, but not limited to, non-provision or non- acceptance of agreed train paths, failure of trains in section, failure of infrastructure in an agreed train path and inability of trains to maintain scheduled running times.

The STER shall regularly audit the Traffic Management Function for impartiality. It shall also receive and investigate complaints of unfair access or other practices.

STER shall establish an Access Coordination Forum to represent all infrastructure providers, train operators and maintenance service providers. It shall advise the STER on matters such as, but not limited to, detailed access rules and associated terms and conditions, technical standards, non-compliance penalties, as well as but not limited to procedures and responsibilities for rail-worthy and train-worthy inspections, unplanned maintenance, emergency services and the associated fees.

The STER shall establish criteria for determining who becomes a train operator, taking into account amongst other the need to promote SMME development and introduce new entrants to the rail market with regard to the relative size of operators, their competitiveness and agility.

In negotiating network access agreements TFR Infrastructure Manager must not discriminate unfairly between the proposed rail operations and the pre-existing rail operations of TFR or other Train Operator including, but not limited to:

a) Train path allocation;

b) Management and authorisation of train movements;

c) Operating standards; and

d) Imposition of barriers to entry.

All access to the existing Cape gauge long-distance network and the standard-gauge high-performance national rail network shall be overseen by the RSR and the STER in terms of their respective legislation.

Both the existing Cape gauge national network and the standard-gauge high-performance national rail network shall provide access to passenger trains.

6.3.3 Intermodal Logistics

Issue

Setting aside unavoidable transport mode changes such as land to maritime, transferring freight already loaded on one land transport mode to another is a costly operation that, if at all viable, associates with high-value freight. The essential starting point for such intermodal service is therefore a symbiotic relationship between two land transport modes. Only thereafter can facilities and technologies support further volume growth. The country does not yet have the foundation of spontaneous collaboration that is necessary to seed successful intermodalism on land, because rail is inherently uncompetitive for long-haul high-value freight.

Intermodal logistics therefore presents an intractable challenge for rail until it has been strengthened to offer real commercial advantage in combination with another mode or other modes. This will happen when the remedial investment to be made in a standard-gauge high-performance national rail network maximally exploits rail's inherent competitiveness, so that its natural strengths attract long-haul high-value freight from road in collaborative arrangements that offer clients greater value than road hauliers can offer alone.

The country already has a substantial heritage of unused rail-based fixed intermodal facilities: Provision of more such facilities, without intermodal arrangements already having spontaneously emerged, is likely to result in wasted expenditure.

Policy Statement

DoT shall ensure that facilities and technologies to support further intermodal growth on land will be provided on a case by case basis and then only after informal or temporary facilities have burst out of their seams.

6.3.4 Funding

Issue

Funding adequacy for the country's Cape gauge national rail network has been problematic from the SATS dispensation, and arguably before that since road transport emerged as a competitor. The returns leveraged from freight rail's inherently uncompetitive asset base have been insufficient to fend off aggressive competition from other modes, let alone expand into new business. To revitalise rail by repositioning it competitively and sustainably, additional sources to fund aggregate rail investment requirements will henceforth need to be found.

Policy Statement

Government will limit its funding contribution to rail infrastructure only, and leave train operators to fund their own rolling stock. This approach will reduce Government's overall financial obligation in respect of the national rail network, while still allowing it to influence the course of rail sector development.

DoT will secure sufficient additional funding from other sources, including but not limited to the equity and other long-term sources mentioned below, to augment debt funding supported by Transnet's balance sheet. The latter is insufficient to pursue all present freight business prospects and basic passenger capacity requirements on its Cape gauge rail network, let alone take on standard-gauge high-performance national rail network investment requirements. The following are some of the available sources of funding:

a) Capital grants from national Government.
b) Capital grants or long term investment instruments from provinces and or industries that benefit from the heavy haul lines that serve them;
c) Capital grants from provinces and or towns that desire to retain or stimulate industries that add significant, irreplaceable economic value;
d) Capital investment by different spheres of Government to redress present imbalances between modes, particularly rail in relation to road.
e) Rolling stock funded by third party train operators who access the Cape gauge, and later the standard-gauge, national rail networks;
f) Sale of existing rolling stock to third party operators to free capital for investment in public infrastructure, and similar creative instruments;
g) Speculative investment in locomotive and wagon fleets by lessors;
h) Concessioning new routes, or upgrading and concessioning existing routes, as has been done for toll roads;
i) Complementary investment in heavy haul infrastructure as an element of new mining development;
j) Sale of unused PRASA and TFR land; and
k) Infrastructure investment funds.

Access fees paid by operators, or by sponsors in the case of subsidised services, will fund the Infrastructure Manager's current expenditure.

Initially, organs of state will fund all standard-gauge high-performance national rail network capital requirements. As at present, this source will not be sufficient and private sector participation will be sought. Therefore, the Infrastructure Manager function, including the entire national rail network, will ultimately need to be corporatised to provide the transparency that private sector participants will require as precondition to investing in infrastructure. The latter source of funding could feature in negotiating access with the Infrastructure Manager for heavy haul trains. Alternatively, a miner could invest in an exclusive-use railway, which would not form part of the national rail network, although it may connect to it.

TFR's financial, legal and organisational structures shall be amended to afford above and below rail equity investments by entities other than government all due protection. DoT will anticipate and prepare to deal with potential train operators who may be reluctant to invest in assets whose productive use will be tied to the infrastructure of an organisation whose financial standing is not open to due diligence.

The standard-gauge high-performance national rail network will probably need to carry passenger services on some routes, but the nature of rail transport in relation

to the country's population and size indicates that freight traffic will dominate the national rail network in the foreseeable future. Basic national network funding will therefore reflect freight rail requirements, while passenger-specific incremental requirements will be funded by PRASA as an additional source of funding.

6.3.5 Private Sector Participation

Issue

The National Development Plan foresees private sector partnerships as essential to upgrading corridors and expanding capacity for mineral exports: Where state owned enterprise is unable to meet demand for freight services, the state should involve the private sector. It is already involved in peripheral activities such as maintenance: Private sector participation is therefore taken to include any and all opportunities, including long term investment in core railway business.

The funding sources mentioned in the section above might over time have resulted in private sector investments meeting most above-rail requirements. However, despite several overtures, private sector interest thus far has been marginal.

Consider first above-rail: The worst case railway-specific risk to rolling stock investors is the Infrastructure Manager being unable to reliability provide agreed train paths, leaving them with no alternative but to cease operation and dispose of their rolling stock. For Cape gauge rolling stock, there are limited alternative deployment opportunities, so ownership risk is high. For standard gauge rolling stock, many alternative deployment opportunities exist, so ownership risk is lower. In contrast, road vehicle deployment is not beholden to a single infrastructure operator, and the comparatively short design life of road vehicles reduces exposure to time-dependent risks. From the perspective of an investor contemplating investing in transport in the country at this time, road could be more attractive than rail. Private rolling stock investment has a long and stable history in many markets, notably Europe and North America. It flourishes where large contiguous networks diversify the risk of being unable to use the rolling stock. Private sector investment in rolling stock is less common for other track gauges.

Consider next below-rail: Private investors incline towards opportunities with ready alternative use, so they tend to avoid infrastructure with its significant regulatory-political risk. Government would find itself taking the risk for, say, a tunnel that has limited use other than its original purpose. Cash flow is only stable if conditions do not change. Brownfield investments are considered safest with lowest risk/return ratio because the assets are already in operation and cash is flowing. Greenfield

investments are considered most risky because they have not yet been built and therefore do not generate cash flow.

Instances of private long-term investment in core narrow-gauge railway business are few. Australia's Aurizon, in addition to other interests, operates and manages the Central Queensland Coal Network on a 99-year lease from Queensland Government. Australia's competition law obliges Aurizon to admit third party operators, at present only one. Brazil's Estrada de Ferro Vitório a Minas conveys iron ore from Minas Gerais state to Tubarão port under an exclusive 30-year concession. These examples have much in common, also with South Africa that must avoid pitfalls by learning from their experiences: Both were former state railways, operate heavy haul on narrow gauge, invested mainly in rolling stock, are sustainable, and risk of infrastructure ownership ultimately falls to the respective governments.

Policy Statement

Government will invite private sector to invest in rail projects where it is unable to invest or where the private sector can demonstrate value for money.

Government appreciates that, although private sector participation appears to be a ready funding source, the modalities of realising that potential are complex and delicate. DoT's Rail Planning Component must address the following issues in such a way that willing private sector investors can be involved on an ongoing basis in respect of rolling stock and infrastructure, the latter most likely for heavy haul:

a) Align government objectives sufficiently closely with those of private investors to establish a voluntary working relationship, where necessary working with other Departments.
b) Do preparatory due diligence on project opportunities that must go forward to ensure that there will be no private sector participation stumbling blocks, as part of planning and funding planning.

Cases where incremental expansion is required to create additional capacity should be considered a special case of third party access. The Infrastructure Manager could require incremental infrastructure funding by proponents, in which case the tenor of any agreements should be sufficiently long to allow them to amortise their investments.

6.4 Passenger Rail

6.4.1 Urban Guided Transit

Issue

Road congestion in the country's metropolitan areas is increasing incessantly. Peak hour travel time is on average double that of the off-peak. People are consequently changing their travel behaviour, those who are able shifting their daily activities to travel outside the peak hour, a phenomenon known as peak spreading.

Metropolitan populations will experience further significant growth over the next decade, due to economic growth and urban migration, which will increase travel demand and car ownership, especially in Cape Town, eThekwini and Gauteng. Although future road plans exist, they do not keep up with increasing travel demand, and funding for their implementation is limited. If current trends continue, the road network will be unable to accommodate the traffic growth, resulting in worse congestion and ultimately in gridlock. Furthermore, travel demand immediately before and after peak periods will also increase, resulting in longer congested periods that make peak spreading impossible. High congestion levels and long travel times negatively impact economic growth and commuters' quality of life. Crucially, all road-based transport is vulnerable to such service deterioration, while global socio-economic drivers and technological advances have substantially broadened UGT's solutions spectrum.

Transport Planners, in developing solutions for urban guided transit, do not appreciate the full spectrum of technical solutions available i.e. heavy metro, automated light metro and light rail, automated guided transit, monorail and BRT. Failure to appreciate available technical solutions leads to sub-optimum project investment.

Policy Statement

Government acknowledges that substantially enhanced urban guided transit (UGT) capacity is one of the most pressing transport problems currently confronting it.

The most appropriate UGT mode or sub-mode shall be deployed to optimally align public transport solutions with transport demand in each urban corridor. In developing such solutions, Transport Planners must therefore consider the full spectrum of available UGT solutions, i.e. heavy metro, automated light metro and light rail; automated guided transit, monorail and BRT, the latter three on rubber tyres, and undertake a detailed analysis in that regard.

Planning and implementation of future mobility in cities that have sufficient road congestion and or population to justify the investment shall focus primarily on own-right-of-way UGT. It is the only transport solution that is not constrained by road congestion, hence its operating speed and service reliability are distinctly higher than those of road based modes. Where urban guided transit is indicated, local authorities shall plan for the sub-mode with highest appropriate capacity to form the backbone of their Integrated Transport Plans. In addition, it shall serve as distributor and feeder for faster rail sub-modes, such as high speed and regional rapid transit, as well as for domestic and or international airports.

Transport planners must recognise that traffic growth may saturate the capacity of a particular UGT sub-mode and that a higher-capacity sub-mode may required in future. As far as reasonably practicable, alignment and clearance should be future-proofed: E.g. a BRT alignment should ultimately accommodate, say, a light metro.

Where it is necessary to expand the three existing Cape gauge metropolitan rail networks by contiguous extensions, for use by single-deck low-speed heavy rolling stock, Cape gauge should be retained. Where greenfields route developments are ideally located away from existing urban rail lines to creating new capacity, they need not interoperate with existing systems, and the economic benefits of using standard gauge equipment, mentioned in the next paragraph, should be recognised.

Where one of the lighter UGT sub-modes is contemplated, it is improbable that it will be required to interoperate with existing urban rail services, and standard gauge should be a requirement. Around the world, local authorities prefer standard gauge for such standalone UGT systems, whatever the track gauge of other rail systems in their city or country, to reap the economies of participation in large markets for new and surplus equipment, proven designs and scale.

6.4.2 Regional Rapid Transit

Issue

The regional rapid transit rail sub-mode covers longer routes at higher speed in or near large city-regions or conurbations: Gautrain is the country's first example. It enables people to enter conurbations from outlying areas as urbanisation expands, to connect over longish distances within them, or to traverse them, without contributing to road congestion or becoming snarled up in it. It is sometimes known as suburban rail elsewhere in the world, or commuter rail in North America. Maximum speed is usually at least 160km/h and may go as high as 200km/h. Journey times are competitive with private cars, although maximum speed is too low to compete with air. Passenger train service speed should increase commensurately

with journey distance to maintain acceptably short journey times, so journeys may even extend to a few hundred kilometers, say Gauteng to Polokwane. Infrastructure may be dedicated, as in the case of Gautrain, or shared with others over all or part of a route, e.g. national railways and, in North America, freight railways.

Cape Town and the Winelands, eThekwini conurbation and the Durban–Pietermaritzburg corridor, Gauteng–Bloemfontein, Gauteng–Polokwane, Gauteng–Rustenburg and Mthatha–Buffalo City–Port Elizabeth, have regional rapid transit potential.

Policy Statement

Provincial Governments shall develop business cases for further deployment of regional rapid transit, to integrate urban guided transit, i.e. heavy metro and lower capacity UGT sub-modes, and high speed or higher speed long-distance rail, to:

a) Maximise the total national economically justifiable passenger rail catchment area by 2050.
b) Maximise the connectivity between urban, regional, higher speed and high speed rail systems, as well as airports and their catchment areas.
c) Voluntarily minimise the number of motor cars that traverse urban areas by providing affordable, convenient, safe, and secure rail service.

Note that, depending on economic geography and built environment, some of these goals may overlap. In such cases solutions should complement rather than duplicate one another.

On routes where infrastructure will be shared with others, such as portions of the standard gauge high performance national rail network, the permissible vehicle profile must accommodate double-deck rolling stock, to maximise the number of passengers that can be conveyed in each timetable path, and minimise the number of timetable paths required for a given passenger capacity and hence to minimise capacity appropriated from routes that may be shared with others

6.4.3 Long-distance Services

Issue

By 2050, urban rail plus a dedicated high speed route or two will not accommodate all the country's passenger rail requirements: Other authorities will have adopted Gautrain-type regional rapid transit solutions, and opportunities or potential for higher-speed medium and long-distance passenger services on portions of the standard gauge high performance national rail network will have emerged.

Classic 90km/h long-distance passenger trains currently require access to TFR's freight-oriented Cape gauge national rail network, to deliver socio-economic services. Government may be obliged to retain them until it becomes economically feasible to introduce high speed trains on dedicated routes. Long-distance passenger rail service on non-high-speed routes will however remain beholden to the national rail network, initially on Cape gauge until it is re-gauged to form the standard gauge high performance national rail network. Mixing freight and passenger trains on shared infrastructure is neither easy nor impossible, but the traditional expedient of assigning priority to passenger trains by train working rule is no longer defensible in a business setting where both freight- and passenger train operators must commit to specified arrival times.

Faster passenger trains catch up with and must overtake slower freight trains: In practice, slower trains are either diverted into short loops and stopped, which reduces line capacity, or long loops are provided to enable faster trains to overtake them while both are moving, which increases capital costs. Hence line capacity cost increases disproportionally when trains run at different speeds. Higher speed requires more precise track alignment tolerances than heavy axle load at lower speed. Hence track maintenance cost also increases disproportionally when trains run at different speeds. Freight wagons are stronger than passenger coaches: More expensive passenger train crashworthiness requirements mitigate the risk of a freight wagon penetrating a passenger coach during a crash. Limiting maximum line speed for mixed freight and passenger operations, commonly to 200km/h, allows a solution space that accommodates all three considerations.

Shosholoza Meyl is currently an unfunded stepchild beholden to TFR's national network. It provides paltry service for low-income travellers at ever decreasing frequency. However, because it is unfunded does not mean that its services cost nothing to provide: They currently come at the cost of reducing the quality and quantity of other PRASA's other services.

Policy Statement

The country is unlikely to find separate freight and passenger long-distance rail networks affordable for the foreseeable future. A single standard-gauge high-performance national rail network shall therefore be implemented initially to serve the country's long-distance freight and passenger rail requirements.

DoT and Provinces shall examine retention and possible expansion of classic, i.e. 160-200km/h long-distance passenger services on the standard gauge high performance national rail network, noting the National Development Plan position that, given the need to fund improved transport services for commuter rail and bus

services with a wide reach for poor people, the net benefits of long-distance passenger rail investments seem unjustified. They must therefore also evaluate alternative road-based options against the high costs and limited coverage of long-distance passenger rail.

If DoT and Provinces find that classic long-distance passenger rail services are indeed justified, two implementation options are available. First, on routes where freight train line capacity allows additional train paths, it will be possible to run passenger trains at normal freight train speeds: Passenger train schedules should improve materially on standard gauge double stack container train routes that allow 120km/h maximum speed. This zero-premium option will enhance passengers' travel experience, and normalise the cost of line capacity by not requiring a passenger train operator to contribute premium capital investment and or operating expenditure because their trains operate at higher speed than freight trains. This solution is appropriate in Shosholoza Meyl's current low-end market. As far as the standard-gauge high-performance national rail network reaches, it will render low-end long-distance passenger trains sustainable from a capacity perspective, an improvement over the current state of that market space on Cape gauge.

Second, above and beyond the zero premium option, if line capacity cannot be made available or a passenger train operator requires faster scheduling than freight trains, selected portions of the standard gauge high performance national rail network, may justify premium infrastructure investment for 160-200km/h services. They will feature additional tracks and or crossing loops to avoid freight and passenger trains contending for line capacity, as well as ATP and, if level crossings are allowed at all, vital protection for them. Affected entities must resolve line capacity, track maintenance and vehicle crashworthiness considerations to their mutual satisfaction under RSR and STER oversight. Both options will require standard gauge rolling stock.

As interim measure, existing Cape gauge Shosholoza Meyl rolling stock may be run-out for as long as it can be economically and safely maintained. Thereafter it must not be replaced. If retention of classic long-distance passenger trains passes all economic and financial hurdles, commissioning of relevant sections of the standard gauge high performance national network, acquisition of new standard gauge trains, and withdrawal of existing Shosholoza Meyl rolling stock must be synchronised.

The foregoing dispensation is predicated on user pays principles: If higher speed but otherwise classic long-distance passenger services are required, they must be fully funded. If they are introduced without adequate funding to provide infrastructure designed for trains running at different speeds, they will result in service-debilitating,

capacity-sapping contention between freight and passenger trains as at present. The capital and operating cost differences attributable to operating passenger trains at higher speed than freight trains must be allocated to the passenger train operator per the user pays principle. The cost of adequate crashworthiness will be included in the price of rolling stock and therefore be borne by the train operator.

6.4.4 High Speed

Issue

High speed rail complements major conurbations each of six million inhabitants or more each, which are separated by a journey of 2-4 hours duration (there are also many examples outside this range) where it typically displaces long-distance air and road passenger mobility. By comparison with classic long-distance passenger rail, it can bring the following benefits to the country:

a) Mobilise geographically separate areas to behave as a larger whole that multiplies economic opportunities for workers and businesses as a consequence of very much shorter journey times. This phenomenon, known as the agglomeration benefit, achieves higher aggregate economic growth than the sum of the separate areas.
b) Accelerate achievement of developmental objectives through higher economic growth. High speed rail is an essential enabler for the country's population to participate in ever expanding economic opportunities, rather than the luxury that some commentators believe it to be.
c) Lower energy consumption per passenger journey than classic rail and much less than air or road, due to substantially shorter journey time as well as advanced train-and-infrastructure design integration.
d) Shift traffic from air and road to rail: High speed rail is the long-distance mode of choice. It will take all passenger traffic from air and a substantial amount from road on routes such as Johannesburg-eThekwini. It even displaces classic long-distance passenger rail services.
e) Continue to provide sustainable long-distance mobility when rising energy prices have drastically curtailed air travel.

High speed rail operating at 300km/h or more requires dedicated infrastructure, separate from the standard gauge high performance national rail network. The three-way contention between line capacity, track maintenance and crashworthiness is simply too great to contemplate low speed traffic on high speed routes.

High speed rail developed briskly in the National Rail Policy primary reference countries. China and Russia have implemented high speed services and are

currently expanding them, with intent to link their high speed networks. China leads the world of high speed rail. India's first high speed route is under construction, and several more have been approved and budgeted. Brazil's high speed venture has thus far taught that onerous requirements repelled rather than attracted the private sector participation that it sought. The country's Cape gauge heritage has precluded it from entering the high speed rail market space.

High speed trains could traverse the 570km Gauteng-eThekwini corridor, at present one of the world's busiest air routes, in approximately three hours with stops at the intermediate Newcastle, Ladysmith and Pietermaritzburg population centres. The existing classic long-distance train journey takes 14½ hours: High speed rail does not simply reduce journey time; it opens a world of new opportunities.

Gauteng's population exceeds 13 million, while eThekwini plus the triangular Pietermaritzburg–Port Edward–Richards Bay catchment area, is projected to attain six million by 2029 at Durban's long-term historical growth rate, or by 2045 at its current growth rate. Population growth along the route could add another million people by then. This could become the country's first high speed route.

Given the country's large surface area and comparatively small population, high speed rail is unlikely to be implemented in more than a few corridors. Nevertheless, it must be exploited where economically viable because its impact is out of all proportion to the size of its network in the same way as the huge impact of motorways typically comes from well under five percent of a country's road network

Policy Statement

DoT's Rail Planning Component and PRASA who will ultimately become the contracting authority, shall undertake feasibility studies on the viability of high-speed rail in relation to government's developmental objectives and in relation to positioning passenger rail to serve as long-distance mobility backbone under energy availability and emissions constraints by 2050.

It shall recommend, in a tiered approach to long-distance mobility, which network sectors have potential as high speed routes, which have potential as classic passenger train or regional higher speed routes in the range 160-200km/h range, as well as those that are best served by air or road.

Noting that population growth in the Gauteng-eThekwini corridor should support high speed rail before 2050, and that the planning-to-operations-commencement cycle is in the range 10-15 years, planning for high speed rail must be prioritised, rather than considered a distant possibility.

Where feasible and necessary, high speed trains should use portions of the standard gauge high performance national rail network to access convenient stations and terminals. Major airports should be served by high speed rail, preferably directly but if is not feasible, then via the urban rapid transit or regional rapid transit networks.

6.4.5 Funding

Issues

Urban rail and urban guided transit: Government's capital allocation has increased significantly in recent years to modernise infrastructure and rolling stock, to position the sector will serve as urban mobility backbone. However, the capital investment programme will take many years to achieve its intent. Only then, with greater market share and higher ridership, will it realise more cost effective and sustainable operations. Meanwhile, PRASA's operating subsidy is not concurrently trending upward, resulting in an unsustainable shortfall. Noting further the substantially increased capacity that rail and urban guided transit must contribute to avoid intolerable road congestion, and to support climate change mitigation, all spheres of government will need to revisit the quantum of funding contemplated for UGT.

Regional rapid transit: The country's first application was a PPP between Gauteng Province and a concessionaire, which enabled the province to bootstrap its rail capacity in quick time. The model has demonstrated workability in situations where a concessioning authority's payment obligations and a concessionaire's service delivery obligations can be precisely aligned and specified.

Long-distance and higher-speed passenger services: Existing Shosholoza Meyl services are moribund. Depending on financial viability, it may be necessary to fund higher speed long distance services on the standard gauge high performance national network.

High speed: This sub-mode typically involves complex funding arrangements that, in addition to customary commercial and national sources, may include export credit, foreign direct investment, intergovernmental agreements and supplier credit. As greenfields projects in the country, with limited or no interoperation with the rest of the standard gauge high performance national rail network and or regional rapid transit networks, it will be possible to precisely specify the high speed system boundary and performance requirements, to minimise project and funding risks.

Policy Statement

There is no single ideal way of funding passenger rail services. The respective spheres of government may apply own funds to rail investments to the extent of their

ability, which nowadays is usually insufficient. Beyond that, as in many countries, the responsible authority may engage other interested entities to co-fund passenger services and or attract private sector participation, thereby to leverage their ability.

Government accepts that the operating subsidies that it provides for urban rail services must be increased substantially, at least during the initial stages of PRASA's new fleet roll-out, to fund the expected demand surge for enhanced services and convert it into fare revenue.

DoT must review the urban passenger transport funding mechanisms, as road-based urban transport approaches intolerable congestion and the urban guided transit share must increase. Dysfunctional road-based urban transport cannot be allowed to choke economic growth simply because it is easier to fund than rail-based urban transit. In addition, municipalities must plan and quantify the expected road to rail shift and budget timeously for the requisite urban guided transit investment.

Government will encourage metropolitan municipalities and provinces to seek out opportunities for regional rapid transit services to position rail as passenger mobility backbone in outlying areas of ever-expanding cities and conurbations, as urban economic advantages attract ever larger populations and it becomes economically and environmentally prudent to pre-empt road traffic from developing to intolerable congestion levels before intervening to shift traffic to rail.

Government will fund the operating and maintenance costs of existing Shosholoza Meyl long-distance services on a run-out basis for as long as there is Cape gauge track on which to run them, to avoid PRASA having to shave quality and quantity off its other services. As the standard-gauge high performance national rail network emerges, PRASA may consider standard speed or higher speed rail services on that network, in the light of socio-economic circumstances at that time and Government's view on subsidies, if necessary.

After a sufficient portion of the standard-gauge high-performance national rail network is in place, PRASA may choose to implement the standard gauge services contemplated in the section dealing with long distance services above, either in container train schedules at the same access price as freight trains, or at higher speed against payment of a premium access fee that reflects measures to preserve freight train line capacity. PRASA will secure funding, possibly with contributions from provinces and or other willing stakeholders.

PRASA shall seek out opportunities to leverage high speed to minimise harmful emissions from long-distance passenger transport and to maximise economic development in the chosen corridors. PPPs represent an appropriate basic funding

vehicle that will include technology transfer and skills development. PRASA must also develop skills in attracting and managing sophisticated funding vehicles.

Where PRASA identifies new service opportunities beyond those provided by existing routes and rolling stock, it should consider public private participation as a possible funding vehicle.

6.4.6 Urban Rail Devolution

Issue

Around the world, urban rail generally has always been a local government function. It is better managed at local level by people who are in touch with local needs. Most of them are not physically interoperable with national networks because it is not necessary. India and Russia are notable exceptions, both with a heritage of less than exemplary urban rail systems. India has recently devolved urban rail from national government to state governments that implement projects through joint ventures with local governments, an institutional arrangement that is rapidly delivering best practice urban mobility. Russia is moving more slowly in the same direction.

The NLTSF is clear that urban commuter rail management is a local government function. The NLTSF states that local rail services must be procured and managed at Local Government level, to ensure consistency with local Integrated Transport Plans and urban development programmes. The New Growth Path envisions creating workable urban transit solutions by increasing investment in public transport, resolving existing public transport policy issues, and devolving transport management to local government.

The NLTSF requires that feasibility studies regarding devolution of passenger rail services to metropolitan municipalities be carried out. eThekwini and Cape Town have already done so and established Transport Authorities, thereby assuming management authority for urban rail, although PRASA still delivers the actual services. However, their separate bus and rail system maps do not show intermodal interchanges with one another: The arrangement seems to be a work in progress. Ekurhuleni, Johannesburg and Tshwane are engaged in establishing a Gauteng Transport Authority, while Nelson Mandela is investigating establishment of a Transport Authority. They have already advanced far toward urban rail devolution.

Notwithstanding such developments, it has long been asserted that local government does not have capacity to manage urban rail. Noting that the combined value of assets in the Cape Town, Ekurhuleni, eThekwini, Johannesburg and Tshwane municipalities, excluding vehicles on their roads, is more that six times the value of PRASA's assets, including rolling stock, the metropolitan municipalities have already

demonstrated capacity to take on general management of entities the size of the commuter railways in their jurisdictions. Noting further that Gauteng Province got a regional rapid transit railway up and running from scratch in less than five years, one must conclude that the foregoing assertion lacks substance.

The existing institutional arrangements exhibit three flaws. First, PRASA is not positioned to mediate contending requests for service from metropolitan municipalities, and indeed experiences a funding shortfall that should not be devolved. Second, any inability to agree on a rail solution simply defaults to a road solution. Third, PRASA's present one-size-fits-all technology is well suited to high capacity routes, but does not admit lower capacity UGT, thereby once more defaulting modal choice to road for all but the highest density routes.

Policy Statement

In accordance with National Land Transport Act and National Development Plan provisions, that transport functions be assigned to the most appropriate sphere of Government, the DoT will, together with provincial governments where necessary, proactively identify capacity gaps within the metropolitan municipalities, if any.

The Department will develop a devolution strategy in alignment with the Integrated Urban Development Framework. Thereafter it will capacitate Municipalities as necessary and devolve operational subsidies for urban commuter rail to all of them to be managed as part of their Comprehensive Integrated Transport Plans. Up to this stage PRASA shall manage operations and maintenance of their urban rail systems.

Government recognises PRASA's substantial commitments to recapitalise the commuter rail fleet, and that the project development phase requires a stable setting. Hence the next phase of urban rail positioning, assignment of responsibility for managing all urban rail functions to metropolitan municipalities, including planning, funding, procurement, operations and maintenance, shall be achieved after completion of PRASA's current phase of the rolling stock recapitalisation plan.

Noting however that intolerable road congestion may require acceleration of UGT investment before completion of PRASA's present recapitalisation commitments, requests from metropolitan municipalities for assignment of the urban rail function to them will be considered sympathetically. This acceleration will enable them to increase the contribution of rail-based UGT capacity to their Comprehensive Integrated Transport Plans.

The lighter UGT sub-modes Light Rail, Automated Light Metro, Automated Guided Transit and Monorail are not present in the country, so no sphere of government has experience thereof. Nevertheless, to exploit all opportunities for urban guided transit

and to initiate movement toward assignment, the aforementioned sub-modes shall, as for BRT, be assigned directly to the municipal sphere of government, as well as to provinces where coordination between municipalities is required. This policy position intends to provide opportunities for building rail and urban guided transit capacity in local government. Where appropriate and necessary, they should use PPPs to concession routes, transfer technology and develop skills.

Instead of modal choice defaulting to road at the first obstacle, DoT through the National Rail Policy must facilitate the choice falling on rail despite all obstacles.

Urban rail monopolistic behaviour should be left in abeyance until after assigning the function to local authorities, after which the problem may resolve itself in the face of competition against other transport modes for available funding. If not, addressing it in the local government sphere could be more effective than in the national sphere.

6.4.7 Interchange and Intermodal Facilities

Issue

Much of the country's passenger rail infrastructure dates from a time when road transport was a work in progress, airlines were in their infancy, people who travelled by air did not travel by train, feeder and distribution services were not in the lexicon, and ICT had not been conceived. Even major stations in Johannesburg, Cape Town and Durban were rebuilt as long ago as 1951, 1961 and 1980 respectively. The youngest is 37 years old, during which time seismic economic, political and social changes have reshaped the country and its notions of integrated transport.

Positioning rail as the backbone of a passenger transport system therefore requires Intermodal Station Design that recognises the requirements of fitting a railway into its catchment area.

Design of complex multimodal public transport systems cannot accommodate every conceivable trip on a single route or in the same vehicle, hence interchange stations are required to connect with other routes and or other rail operators, while intermodal facilities are required to connect with other transport modes. These functions are mentioned separately to distinguish them, but in practice they may be physically integrated and located on the same site.

Exact correspondence between modes, e.g. cross-platform movement, is ideal but neither essential nor always feasible. Hence passengers frequently transfer between modes or routes on foot; for a short while being mode-less and open to alternatives. The minibus taxi industry is adept at creating or finding new opportunities, hence the country's significant railway stations are already abuzz with taxis. Evidently

intermodal connections originate spontaneously when there is opportunity to exploit synergy between two modes. Thus while railway policy must address the facilities required to make intermodal movements convenient, orderly and safe, planning of location and modal mix must rest on findings from evidence-based research.

Policy Statement

Government recognises that even in a well-designed and developed mobility system many passenger journeys will require one or more modal and or intermodal interchanges. The quality and range of facilities provided at such sites shall ensure a convenient and pleasant experience that encourages passengers to plan their routes without regard for mode, with assurance that any interchanges they encounter will work seamlessly.

Local authorities and operators of the railways and other modes involved shall cooperate to provide, operate and maintain modal and intermodal interchanges.

6.4.8 Rail Tourism

Issue

Rail tourism can contribute valuable foreign earnings to the country's economy and create jobs in a labour intensive industry. Operators such as Blue Train and Rovos Rail sell experiences, not mobility. Short journey time is not a requirement, and frequently longer is better because it allows broader and deeper experiences. Cuisine, luxury, natural beauty, nostalgia, places of interest and service are some important constituents of their offers. In addition to normal business and hospitality acumen, delivering such experiences requires enthusiasm and passion, particularly when operating and maintaining steam locomotives and coaches from a bygone era. Such operators necessarily use the rail infrastructure of others: Access to the networks of others is therefore crucial to tourist train owners and operators, but network operators may view them as a nuisance.

Policy Statement

The National Rail Policy encourages rail tourism from the perspectives of diversifying the country's tourism offering into its interesting railway heritage, particularly in the global market, and of creating jobs.

Tourist train operators have the right to negotiate a fair access fee with network operators, and an obligation to abide by reasonable conditions that the latter may impose. The Single Transport Economic Regulator shall oversee such transactions.

6.4.9 Universal Design

Issue

Universal design, sometimes inclusive design or universal access, involves providing infrastructure and services that accommodate the needs of people with disabilities and people at all stages of life. This policy approaches universal design from the perspective of passengers: Universal design of railway premises for employees and visitors is covered by applicable national universal design dispensation.

The country's Promotion of Equality and Prevention of Unfair Discrimination Act of 2000 amongst other requires all levels of government and their agencies to plan and demonstrate how they promote equality and prevent discrimination. This is a universal design access plan for public transport. The country signed its commitment to the United Nations Convention on the Rights of People with Disabilities in 2007.

It has developed a Universal Design Access Plan (UDAP) development framework, which includes rail, to assist authorities such as provinces, municipalities, state-owned entities and transport providers, to develop networks or services that meet National Land Transport Act of 2009 requirements.

The plan provides the means to deal with all universal access issues. It also provides the basis for communication on universal access issues between the transport provider; state-own entity, municipality or province, and national government.

Policy Statement

All public transport modes and networks to provide inclusive service to accommodate passengers with special categories of need

As government department that carries obligations under departmental and national legislation, as well as international commitments, DoT shall, in consultation with operators, ensure that all rail infrastructure owners and operators comply with universal design guidelines.

In line with its Implementation Plan to Guide the Provision of Accessible Public Transport Systems in South Africa (Accessible Public Transport Strategy), all new transport systems and work related to new transport systems must be universally accessible. Existing systems must be upgraded over time to the same standard or to provide the same outcome.

These two elements form the basic UDAP structure. In addition, any funds provided for public transport or to public transport; whether rail, or any other mode, shall meet the same goal. Thus a universal design access plan is required for any form of public transport that uses funds provided by government.

Chapter 7 Roles and Responsibilities

This chapter identifies the roles responsibilities of the spheres of government in relation to the entities that are obliged to deliver freight and passenger rail services in their respective jurisdictions.

The Constitution of the Republic of South Africa of 1996 identifies the legislative responsibilities of different spheres of government with regard to freight and public transport. Transport is a function that is legislated and executed in the national, provincial and local spheres of government.

7.1 Department of Transport

The White Paper on National Transport Policy of 1996 identifies the different subsectors of the transport sector, namely airports, pipelines, ports, railways, roads, as well as the cross-modal functions public transport and freight.

DoT shall provide regulatory oversight and coordinate all government and other investments in the rail sector. It is responsible for legislation, policy formulation, co-ordination of its implementation, strategic planning and leadership, applicable equally to freight rail and passenger rail. It shall develop and co-ordinate all policy and high-level planning decisions relating to rail revitalisation, to reposition rail as backbone of the country's land transport system by 2050.

DoT conducts sector research, to set strategic direction of subsectors, assigns responsibilities to public entities and other levels of government. It sets norms and standards, and monitors implementation.

In line with its integrated approach to transport planning, DoT shall formulate a national rail strategy, to rebalance the historical underfunding of rail, incorporating planning for all sources of rail transport funding, whether public or private.

The Minister of Transport must provide rail regulatory oversight to TFR to ensure that it complies with the National Rail Policy

By accepting funding responsibility for the existing Cape gauge national network, in addition to its existing responsibility for PRASA's metropolitan networks, and later the standard-gauge high-performance national rail network, DoT will have assembled a public rail network, comparable in principle to the public road network, to which the STER will regulate access.

7.2 Department of Public Enterprises

The Department of Public Enterprise (DPE), as shareholder representative for Transnet, will continue to oversee implementation of rail policy.

A material weakness in the foregoing arrangement is that Department of Transport, as custodian of national rail policy, is not consulted in mandating key performance measures and indicators to be attained by Transnet's Freight Rail division.

Department of Public Enterprises must during compilation of the Shareholder's Compact in respect of Transnet's Freight Rail division ensure that rail revitalisation precepts as contained in the National Rail Policy are clearly articulated.

The DPE as a shareholder department will continue with enterprise and compliance oversight.

7.3 PRASA

PRASA will continue to operate urban commuter rail and long-distance passenger rail, under the guidance and support of DoT, until government has devolved and ultimately assigned urban guided transit to the lowest competent sphere of government. At that time it will recast PRASA into a new role. Existing long-distance passenger rail on Cape gauge is a strategic misfit that must be reformed, while high speed rail as an element of the 2050 integrated backbone transport solution is not yet present in the country's rail fleet.

PRASA should thus naturally ascend to the role of the country's high speed (300-350km/h) rail champion, as well as manage higher-speed (160-200km/h) long-distance services, which will become workable when sufficient standard gauge track is available.

PRASA shall undertake all high speed detailed planning, funding and development and associated contracting and management.

Government will therefore reposition PRASA over time as its long-distance passenger public transport service provider, to deliver service by the most appropriate mode, rail or road. PRASA's role as the country's high speed rail champion will commence with approval of the National Rail Act. Its role as urban commuter rail services provider will end when all commuter rail services have been assigned to transport authorities in metropolitan municipalities, or to a provincial authority in the case of Gauteng. PRASA will manage the current rolling stock recapitalisation programme until the last contract has been executed.

7.4 Transnet

Transnet's Freight Rail division will be most affected by the National Rail Policy pronouncement on regulated third party access to the national rail network. TFR will therefore become both a rail infrastructure operator and a train operator.

To enable regulated third party access to the rail network, it will be necessary to determine corridor specific rail network access charges. TFR must therefore ring-fence its infrastructure endeavours in terms of accounting practices to make these figures absolutely credible. Third party access charges will be a function of the costs associated with these infrastructure related actions.

The TFR Infrastructure Manager shall manage national rail network operations and maintenance. It shall strive to maximise utilisation of line capacity. It shall also manage implementation of the infrastructure investment initiatives envisioned in the National Rail Policy and associated strategic plans. Strategic planning and funding of expansion, extension and upgrading of the public network assets shall be the responsibility of the DoT, except as otherwise agreed in whatever private sector participation arrangements may emerge. Ultimate ownership of rail infrastructure will remain with government regardless of any private sector participation, but with due protection of the latter's interests.

Running inspection and maintenance facilities, geographically distributed to serve the entire country, are currently all owned and operated by Transnet Engineering (TE). Third party operators may need their services, although they will be free to either undertake their own inspection and maintenance or outsource it to specialists.

It is important for future rail sector skills development that Transnet's human capital that is currently involved in network infrastructure and train operation be retained as it is essential for National Rail Policy implementation. Current expertise will have to lead development of skills for the expected much larger, future rail sector.

7.5 Single Transport Economic Regulator

The Single Transport Economic Regulator (STER) to be established in terms of the Economic Regulation of Transport Bill. It is the intention that the STER will oversee regulation of all transport modes, including rail. The Bill deals with the following aspects of economic regulation of transport facilities and services: Price regulation, economic oversight of regulated entities, complaint investigation by the Regulator, review of the regulator's decisions and hearing procedures. Establishment of the STER is a pre-requisite for implementation of regulated third party access to the national rail network.

7.6 Railway Safety Regulator

The RSR must promote and regulate railway safety through appropriate and timely application of the legislated support, monitoring and enforcement instruments.

Whilst railway operators remain responsible for railway safety within their respective areas of activity, the RSR must support and comply with national rail policies and monitor and enforce compliance with its enabling legislation, *inter alia* by:

a) Granting, amending, suspending or revoking safety permits subject, if necessary, to conditions;
b) Monitoring and enforcing railway safety by way of inspections and the issuing of non-compliance notices;
c) Accrediting appropriate training providers who will provide training, and licensing for services in respect to safety critical grades;
d) Maintaining and monitoring a national information and monitoring system; and
e) Advising the Minister on any action or condition within the rail environment that poses a threat of harm or damage to persons, property or the environment, or that potentially does so.

The RSR must oversee management and execution by accredited service providers of a structure for filling safety critical grade positions. The RSR will not itself issue licenses, but must evaluate prospective service providers and will, subject to conditions it deems necessary, accredit an appropriate number of service providers to:

a) Provide training and refresher courses for safety critical grade positions;
b) Assess persons applying for a safety critical grade licenses; and
c) Issue such licenses to persons meeting the required standards.

7.7 Provincial Governments

The NLTA assigns to provincial government responsibility for formulating provincial transport policy and strategy within the national policy and strategy framework; and planning, co-ordinating and facilitating of land transport functions in the province.

To revitalise rail and actualise its role as backbone of an integrated transport system, Provincial Governments shall align their plans with the objectives and sequencing of interventions pursuant to National Rail Policy, as well as with other DoT strategies and plans. This applies especially to Gauteng, where PRASA's urban rail network operates seamlessly across metropolitan and other local government boundaries as a provincial system but, while the political process is underway, is not yet integrated with other modes and operators under the auspices of a transport authority.

Provinces shall exercise their rail function in respect of regional rapid transit services. Looking towards 2050, provincial governments must consider opportunities to deploy regional rapid transit to increase the reach of agglomeration benefits.

Where Metropolitan and local municipalities can benefit from the integration of all public transport modes across their boundaries, the provincial sphere of government must ensure that they establish a coordinating body at a higher level.

7.8 Local Governments

The Integrated Urban Development Framework (IUDF) emphasises integrated logistics and mobility as a vital component of the country's economic infrastructure investment. The IUDF recognises that logistics and mobility integrated with land-use planning contributes to creating compact and connected, dense and efficient cities.

The NLTA enables local government to take over the transport regulatory and contracting functions. However, they have made little progress, because assuming these functions is a complex process and has major funding and human resources implications.

For commuter rail, the proposed devolution and assignment strategy should investigate specific performance standards and realistic targets to be negotiated between the affected municipalities and the DoT (including PRASA).

Local Government, supported where applicable by Provincial Government, DoT's Rail Planning Component and PRASA, will undertake the extensive planning, implementation and operation of UGT services to meet their future mobility needs.

Chapter 8 Implementation Priorities

This chapter describes, at high level, the key modalities required to implement the National Rail Policy.

8.1 Develop a National Rail Act

A National Rail Act shall be developed to realise the final policy positions. The DoT shall develop the National Rail Act, which must address the following:

a) The minimum elements of national rail policy;
b) The DoT's function in respect of developing a national rail policy;
c) The DoT's duty to consult with provincial and other stakeholders on the national rail policy;
d) Mechanism to implement, apply and enforce the national rail policy;
e) Sanctions in the event of non-compliance with the national rail policy;
f) Aspects determined in the National Rail Policy to receive immediate attention;
g) The mechanism to address a conflict between the national rail policy and the implementation of mandates by relevant entities; and

h) The establishment of a dedicated entity to administer the policy and relevant legislations; and ancillary matters.

8.2 Develop a National Rail Master Plan

Development of a co-ordinated and integrated Rail Revitalisation Programme is essential to direct rail investment processes in a way that accelerates achievement of policy objectives and maximises return on investment. DoT shall champion the Rail Revitalisation Programme in conjunction with TFR, PRASA, GMA, Provinces, Transport Authorities and other significant stakeholders such as investors, operators, maintainers and suppliers. It shall include all projects associated with the proposed standard-gauge high-performance national rail network, as well as all urban rail projects associated with PRASA's strategic development plans, regional rapid transit projects by Gautrain Management Agency and or other provinces, as well as any rail projects undertaken by statutory Transport Authorities.

The Department of Transport shall establish a Rail Planning Component to develop a National Rail Master Plan (NRMP). It shall articulate the national centralised strategic plan that directs infrastructure investment initiatives over rolling short, medium and long term horizons. The NRMP shall also identify network constraints and opportunities, as well as infrastructure improvements and expansions required to ensure safe, affordable and efficient movement of freight and passengers.

It shall detail the current status of the rail sector, provide an overview of passenger and freight trends, the challenges, requirements and needs of the sector, and forecast the expected demand, amongst others. For the latter, appropriate demand models shall be in place and calibrated.

Informed by global, African and national perspectives on railway corporate citizenship, as well as rail technology and rail market dynamics, it shall map national, provincial, and local views of the country’s rail network, indicating the various corridors, the capacity and purpose of each line, its essential characteristics, current and future infrastructure projects, its relation to the country's road transport sector and the potential value of shifting road traffic to rail, and more.

The NRMP shall identify and prioritise infrastructure projects, informed by Government priorities, the needs of the country, as well as of State Owned Companies and Agencies, and private sector participants. It shall recommend the sequencing of infrastructure projects, influenced by applicable evaluation criteria and considering limited resources. The NRMP shall also indicate timelines for the various identified infrastructure projects.

As a national plan, the NRMP shall inform metropolitan integrated transport plans, and shall therefore be upgraded as part of a five-year planning and budgeting cycle.

The DoT shall lead development of the NRMP, in close collaboration and consultation with all stakeholders such as State Owned Companies and Agencies, relevant Departments in all three spheres of government, private sector participants, as well as rail and logistics experts.

8.3 Monitor and Evaluate Policy Implementation

DoT shall develop objectives, indicators and targets as well as monitor and evaluate policy implementation performance against them to ensure adherence. It shall identify deviations and reasons therefor, taking corrective action where necessary. The DoT, in consultation with the relevant stakeholders, shall review and evaluate the Policy post implementation at five-year intervals to ascertain its impact on the sector and decide whether there is need for policy amendment.

Chapter 9 Conclusion

The country's rail challenge cannot be represented as a single problem, but rather as an accumulation of many problems over many years. For most of its existence, the country's rail sector was taken for granted rather than nurtured. With hindsight, it was set up for dysfunction by choice of inferior colonial technology, later exacerbated by choice of monolithic organisational structure and direct parliamentary oversight. Each of these choices originally seemed perfectly rational, but over time they proved unable to support adaptation to new transport modes, as well as to emerging perspectives on society, the economy and the role of government.

Historically, the interventions that followed the SAR&H era did not fully recognise all the underlying problems. Unbundling monolithic railways is challenging because, without the possibility of cross-subsidising, the sustainability of each entity needs to be recognised and provided separately, and the country has not yet fully supported this principle. The SATS dispensation did represent a transition from parliamentary oversight to a commercialised outlook, but the next intervention, based on the De Villiers Report, stopped investment in loss-making activities without recognising the presence of the railway renaissance. Steady loss of passenger traffic, largely attributable to narrow gauge not fully supporting modern passenger rail, appears to have numbed sensitivity to passenger matters. Ultimately leaving Transnet alone to steward the national network has biased the outcome toward freight: Inadequate provision was made for funding the country's rail requirements as a whole, and passenger rail in particular. Lastly, legislation rendered rail investment opportunities

inaccessible except to PRASA and Transnet, whereas prime competitor road transport was essentially accessible to all, largely through publicly funded infrastructure and absence of obstacles to investment.

The desired road to rail shift will not take place given rail's present low inherent competitiveness, inadequate funding and dysfunctional institutional arrangements. The further road to rail shift to achieve United Nations-led greenhouse gas emissions reduction is not on the present statutory agenda, and hence out of reach without specific intervention. There are two options to shift traffic from road to rail: By regulatory coercion, with the unintended consequences that will inevitably accompany traffic shifting from a high-performing sector to an ailing sector; or by the course set out in the National Rail Policy, namely remedial investment plus market and institutional interventions to lift rail's inherent competitiveness to renaissance standards and then reposition rail as the backbone of the national transport task.

While the proposed interventions have been categorised to facilitate comprehending and designing them, they must be applied concurrently as an interdependent suite.

Rail's institutional arrangements must support a dynamic, responsive relation with the task environment to facilitate continuous and rapid adaptation to shifting requirements and opportunities, and to avoid degenerating to a state of near-stasis.

Rail funding must be substantially increased, to redress and rebalance investment between rail and road. This requires expansion of funding sources, including operators to provide their own rolling stock so that rail can exploit the same business model as other transport modes. Government shall take the risk of investment in and ownership of rail infrastructure. Standard gauge will be implemented on the high performance national rail network to minimise risk to investors and to be part of the dynamic global rail equipment and funding market.

Rail will be positioned to be inherently competitive by redeveloping and regauging the current Cape gauge national rail network to the standard gauge high performance national rail network. The three Cape gauge urban rail networks will be operationally segregated from the standard gauge high performance national rail network by virtue of their different track gauges.

Regulated competition will be introduced in freight and passenger services that will use the standard gauge high performance national rail network. Competition may also be beneficial for commuter services, but devolution is a first priority to achieve balanced rail and road investment at local government level. Thereafter, competition among modes within a local authority will follow naturally, or local authorities could choose to open all or part of their urban rail systems to competition.

The country has a substantial railway problem. Nevertheless, rail's future is bright in the total transport domain, where new transport forms are set to complement it rather than compete with it. The National Rail Policy interventions will position rail robustly for this future. Now is the right time to intervene. The situation will not improve by itself, and the timing is right to support the quantum rail repositioning that will be required by 2050.

It is also necessary to consider the *Do Nothing* option. Railway renaissance started more than fifty years ago, and its solutions and technologies have already become the new normal for railway investment around the world. The country has however not yet recognised the new direction and has fallen far behind. Meanwhile, the other transport modes with unrestrained competition have been growing stronger and stronger. Only the very best of railways can compete with the best of road. Laggards have no hope at all. PRASA's investment in its new commuter fleet should in principle save urban rail, although there is much work to be done to provide sufficient capacity to avert gridlock traffic congestion, and to introduce lighter urban guided transit sub-modes. Outside metropolitan areas, assets have been crumbling since the De Villiers report. TFR is buying new locomotives, but they are expensive in relation to their tractive effort. The rail land transport mode no longer features in the country's spatial development investments. Road has won the war. The do nothing option will allow the remainder of the national rail network to atrophy until nothing is left. The country's logistics and mobility could become road-based except for urban rail. Some might say that is no problem. But in 2050, when the rest of the world has set itself up for a preponderance of renewable energy with rail as its transport backbone, the country will be left uncompetitive with a high-cost transport system. That will be bad for the economy, for investment, for jobs, and for the environment.

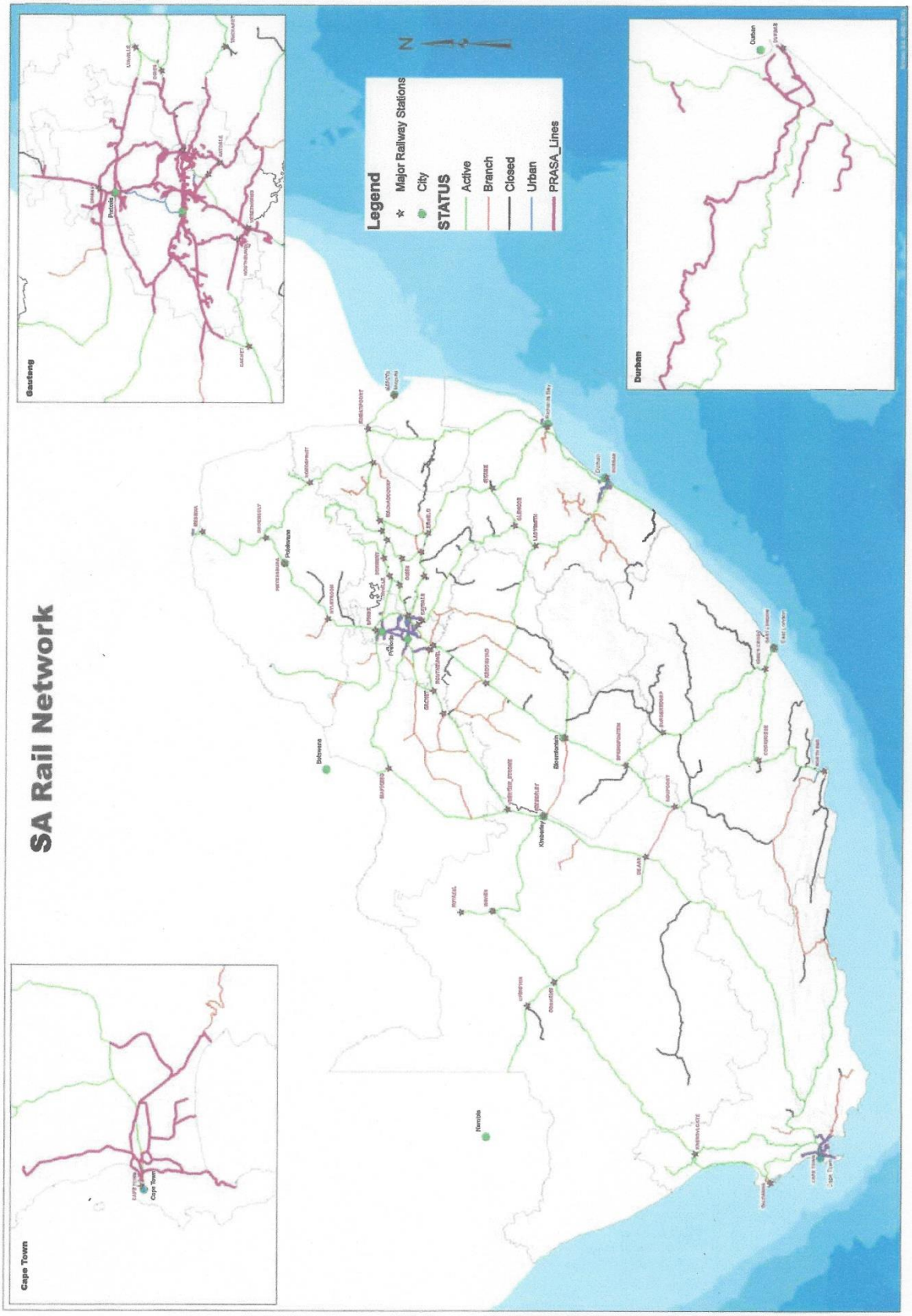
Abbreviations and Glossary

Alignment	Means the straights (or tangents) and curves (horizontal alignment) and the gradients and vertical curves between them (vertical alignment) of a railway line. Unless otherwise stated, alignment means both horizontal alignment and vertical alignment.
Assignment	Legally giving to an entity full responsibility for a function, including planning, funding, implementing and operating.
ATP	Automatic train protection
AU	African Union

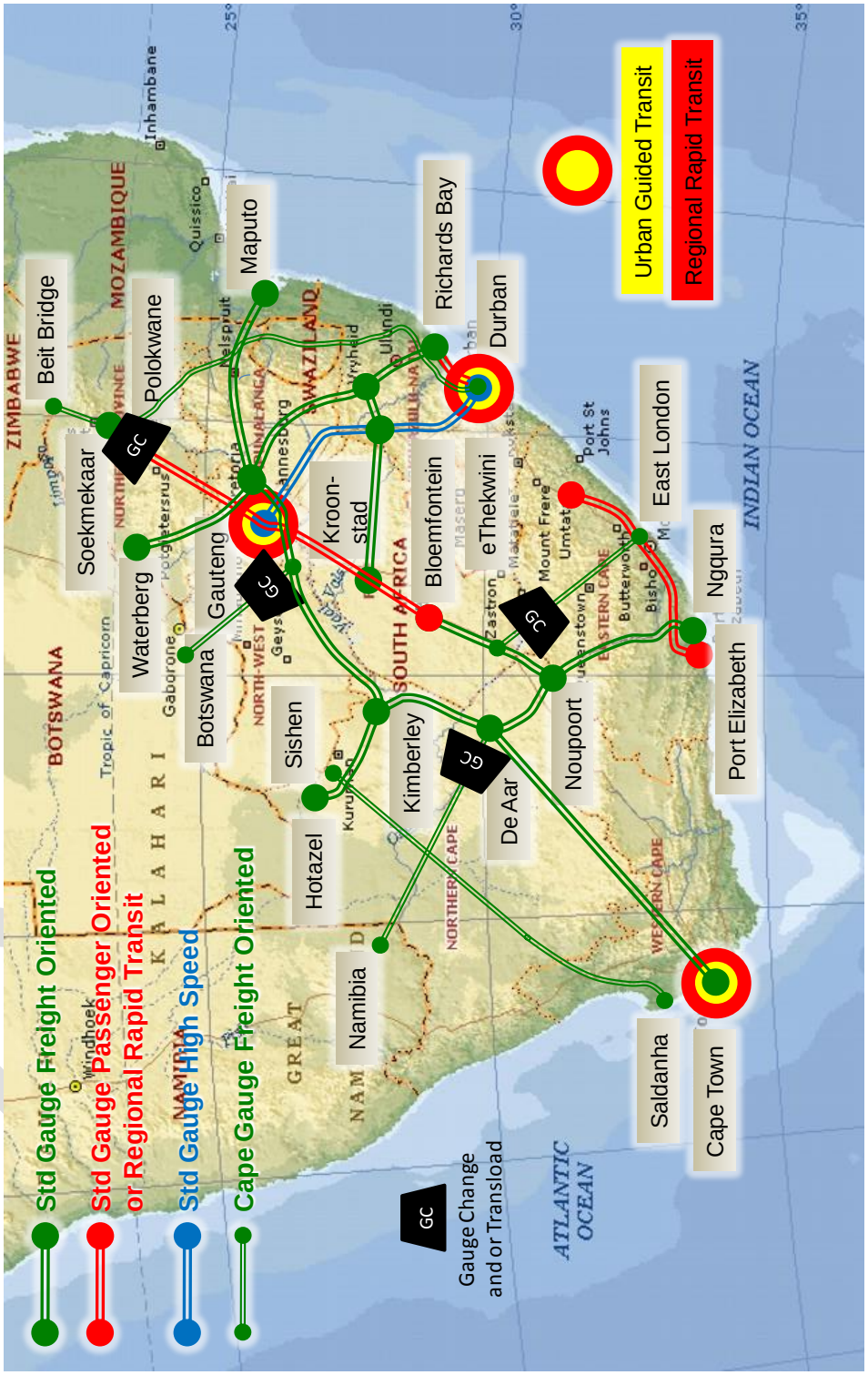
CIS	Commonwealth of Independent States
Devolution	An intermediate step to Assignment, whereby an entity is responsible for planning a function, but other elements thereof are executed by others.
DoT	Department of Transport
DPE	Department of Public Enterprises
GDP	Gross Domestic Product
GMA	Gautrain Management Agency
High speed	Applied to passenger trains that run on dedicated infrastructure at a maximum speed of 300km/h or higher.
Higher speed	Applied to passenger trains that, in some situations may share infrastructure with other trains including freight trains, with a maximum speed around 200km/h.
ICT	Information and communication technology
INDC	Intended Nationally Determined Contribution
IUDF	Integrated Urban Development Framework
LTPF	Long Term Planning Framework
NATMAP	National Transport Master Plan
NLTA	National Land Transport Act, 2009
NRMP	National Rail Master Plan
PFMA	Public Finance Management Act, 1999
PICC	Presidential Infrastructure Coordinating Commission
PRASA	Passenger Rail Agency of South Africa
RSR	Railway Safety Regulator
Regional rapid transit	Means rail service that integrates conurbations (e.g. Gauteng City Region) by providing several services per hour with 160km/h or faster trains that stop at major nodes only. Sometimes called Commuter (US) or Suburban (UK). PRASA's Metrorail provides services formerly known as suburban, but they do not fit the contemporary definition of regional rapid transit.

Regulated Competition	Competition between two or more train operators on shared infrastructure provided by a single operator and regulated in terms of the STER Act. Where any entity is involved in both above rail and below rail operations, it shall be deemed to be a single operator, whether or not above and below rail accounts are separated.
SADC	Southern African Development Community
SAPS	South African Police Service
SAR&H	South African Railways & Harbours
SATS	South African Transport Services
SIP	Strategic Integrated Project
SOC	State Owned Company
STER	Single Transport Economic Regulator
TE	Transnet Engineering
TFR	Transnet Freight Rail
TNPA	Transnet National Ports Authority
Transit	Means fixed-route, fixed schedule public transport.
UDAP	Universal design access plan
UGT	Urban Guided Transit, which subsumes Heavy Metro, Automated Light Metro, Light Rail, Automated Guided Transit, Monorail and Bus Rapid Transit.
US	United States
Vertical integration	Means that a single entity operates all fixed rail infrastructure (below rail) and all rolling stock (above rail) under its control.
Vertical separation	Means that one entity operates all fixed rail infrastructure (below rail) while one or more separate entities operate all rolling stock (above rail).

Annexure A: Railway Map of South Africa



Annexure B: Gauge Change Map



Note that the information shown on this illustration is indicative only, to illustrate some key aspects of the proposed investment led interventions.