
Funding for Roads in South Africa:

Understanding the principles of fair and efficient road user charges

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Author:
Department of Logistics, University of Stellenbosch, Department of
Logistics, Stellenbosch

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Prepared for: SABITA and South African Road Federation (SARF)

Sabita | Postnet Suite 56 | Private Bag X21 | Howard Place 7450

Tel +27 (0)21 531 2718 | Fax +27 (0)86 263 7067 |

Co Reg No 1989/000047/08, 031-993-NPO | www.sabita.co.za



South African Road Federation

Tel No. 011 394 5634

Fax No.011 394 7934

Fax2email 086 576 7952

Email: operations@sarf.org.za

Web site: <http://www.sarf.org.za>



Prepared by the Department of Logistics, University of Stellenbosch

Faculty of Economic and Management Sciences, Department of Logistics

STELLENBOSCH UNIVERSITY, Private Bag X1, MATIELAND, Stellenbosch, South Africa

7602

tel: +27 21 808 2624; e-mail: skrygsman@sun.ac.za

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Abstract

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Good roads, canals, and navigable rivers, by diminishing the expense of carriage, put the remote parts of the country more nearly upon a level with those in the neighboring town. They are upon that account the greatest of all improvements.

ADAM SMITH, *The Wealth of Nations* (1776)

An efficient road system gives a country a competitive edge in moving goods economically. Conversely, lack of accessibility or poor road conditions are barriers to agriculture, industry and trade, and may hinder the entire development effort. Nevertheless, the contributions of transport to national development may be difficult to quantify in economic terms.(Queiroz, 1992)

1 The importance of roads to South Africa

Roads are undeniably important to any country. Queiroz and Gautam (1992) in the quote above, persuasively testify to the main belief of, but also of the difficulty in measuring, the impact of an efficient road system on a country's economy.

The main purpose of roads and transport infrastructure in general, is to enable people to commute to work reliably and safely, and obtain goods without excessive costs or delays. The economic importance of roads, and in fact of all transport, is that it delivers inputs such as goods, services and labour, to places of production; delivers output to markets; and brings consumers and customers to the marketplace. People also use services that rely on others being able to get to where they are needed, such as medical services and the police.

Road infrastructure, and all the transport services that use roads, such as private vehicle owners, public transport operators and goods transporters, improve the standard of living for the public and businesses; provide a social service; and generally contribute to a government's developmental goal of supporting its country's economy. Policy-makers have always responded positively to this relationship between roads and prosperity, and as a result have invested heavily in roads. This was and remains the case in South Africa.

Governments obtain the funds for roads mostly, although not exclusively, by way of general taxation, road user levies and charges (including the fuel levy), and other taxes. Road-generated revenue is allocated to an earmarked road user fund or, more often, shared with other income sources in a general revenue account. Box 1 presents the two principle approaches to road maintenance funding and road funds (Independent Evaluation Group, 2007). Whether or not road funds are earmarked, a key consideration for any government transport infrastructure policy – but specifically for roads – should be that government's investment and road infrastructure spending be in the public interest, and that the public be confident that this is the case.

Financing Road Maintenance and Road Funds

Two approaches are followed: (i) The budget approach is the most widely used. It assumes that road expenditures (except for toll roads), including maintenance, are a public expenditure that need to be covered by the national budget. Fuel taxes, vehicle registration fees, and other levies are taken as general taxes. Extra budgetary funds are deemed to hinder government's efforts to allocate funding to national priorities. (ii) The road fund approach postulates that road users should pay for the cost of the roads and that revenue thus generated should be applied to cover road costs. The instrument is a road fund that generally becomes the main source of finance for road maintenance and other road expenditures. This approach, with variations, has been used in the United States, Japan, and New Zealand since the mid-1950s and is being used in more than 30 emerging economies. Users pay "user charges" mainly in the form of a gasoline levy, which generally provides the bulk of revenues. Income from these charges is, in principle, automatically allocated to road expenditures, especially maintenance.

A Decade of Action in Transport: An Evaluation of World Bank Assistance to the Transport Sector, 1995–2005, The World Bank

Box 1: Financing Road Maintenance and Road Funds

Road agencies select the road projects to be implemented based on various criteria including social needs, alleviating congestion, stimulating economic development, and other objectives of national or regional importance. Whatever the objective, road projects must be shown to improve productivity and ultimately the standard of living. If the projects do not meet these criteria, the funds must be spent elsewhere on other transport projects, or even outside of the transport domain.

Although funds for roads are mainly, though not exclusively, collected at a national level, the National Government are not directly responsible for road construction and maintenance. Nationally collected revenue are typically allocated to various road implementation agencies including provincial, municipal, and state-owned entities that are responsible for road construction, upgrading and maintenance. There is seldom a direct relationship between those organisations or departments in the public sector that are involved in collecting taxes and fuel levies, and those responsible for spending the funds (i.e. addressing the need). As a result, a financial mismatch may arise between the need (the local demand) and the availability of funds (the national supply). Inadequate funds for the road sector will cause the road network to deteriorate which ultimately impact on the economic role of roads as illustrated in Box 2. A country that do not regularly and adequately invest in its road network is in effect “eating” the asset and over the longer term the road network may become unsustainable.

The amount of funds typically allocated to road works in government budgets represents a sizable proportion of the total government budget. Yet in many cases these funds are insufficient to assure good road maintenance and essential road construction. Among the adverse consequences of insufficient budgetary allocation for road works are: (i) high vehicle operating costs; (ii) low vehicle speeds and therefore losses of time for road users; (iii) low economic efficiency and high prices; and (iv) constraint on economic development. Thus adequate road financing is extremely important to the national economy (Bousquet & Queiroz, 1996)

Box 2: Impact of insufficient funding for roads

The relationship between roads and economic development is, however, not always certain, exclusively positive, or even significant. Several researchers have discussed this ambiguous relationship, see for example (Banister & Berechman, 2001; Ding, 2012; Fedderke, Perkins & Luiz, 2006; Kraft, Meyer & Valette, 1971; Lakshmanan, 2011; Queiroz, 1992). Furthermore, the advocated economic benefits of roads are not always reflected in public perception. It is often extremely difficult to build new road infrastructure, as the public tends to be sceptical of its value. Even where urban road capacity is urgently needed, typically on suburban freeways heading into cities, the public usually demands that the government fund such expansion through normal taxes, as opposed to a toll or dedicated user tariff. The public consider roads a public good, which the government should have the responsibility to provide¹. Road users are likely to revolt against any additional taxes or higher levies, since they assume that they are already paying for the roads by way of the fuel levy

¹ In economics, a public good is a good that is both non-excludable and non-rivalrous in that individuals cannot be effectively excluded from its use, and where use by one individual does not reduce availability of the good to others. Although the public consider roads a government responsibility, roads are not entirely a public good. In fact roads contains properties of public goods (low volume rural

roads), private goods (congested toll roads), or club goods (uncongested rural toll roads) The provision of roads, however, cannot be left solely to the private sector as the road infrastructure is subject to various forms of market failure including that most roads cannot profitably be supply to consumers.

and other vehicle usage taxes. As a result, charging road users for specific projects or increasing a general fuel levy is nearly always a politicised decision that faces strong opposition. Public revolt against increased or additional road user charges and tolls is typically *more intense in the absence of alternatives to car travel, such as when public transport is inadequate or not available or where no alternative routes exists for toll roads*.

Funding for roads is controversial, faces many conflicting viewpoints and is notoriously complex. This situation is amplified in a developing country facing numerous developmental needs, limited revenue opportunities and a relatively small road user base. Governments cannot realistically always ensure that funds are indeed spent on roads given other urgent developmental requirements, or that the spending on roads is done in the economic efficient manner. Given the nature of roads infrastructure, indivisible, chunky and public nature, funding for roads is nearly always under pressure. To compound the problem, road users seldom, if ever, know the full usage price of their road use (cost observation) and mostly under-estimate the cost of their use of the scarce resource.

South Africa has seen its fair share of public debate on how the government should fund transport infrastructure and, increasingly, transport operations such as public transport. Roads in particular have received a lot of attention in the popular press, with statements ranging from alternative funding options, such as toll finance, to increased funding demands being made by three main interest groups: the government, state-owned entities, and the public.

A general theme in government, and state owned entities, policy documents and statements seems to indicate their preference to adopt the so-called *user-pay* principle to fund roads. Other than these general statements, no documents elaborate on the principle and what it entails. The popular press, on the contrary, seems to favour a more 'equitable'

allocation of the fuel levy, assuming that the fuel levy is sufficient if fully allocated to the road sector. Non-government civil action organisations typically support this viewpoint, often calling for the ring-fencing of the fuel levy for road infrastructure spending. The public is sceptical of government taxes and, if the recent experience with tolls is anything to go by, will be very reluctant to accept a new road tax or any form of toll. Civilian action organisations actively engage in this debate under the banner of fighting tax abuse, with the various conflicting groups arguing for or against toll roads, ring-fencing the fuel levy, lessening the financial load on motorists and stopping the subsidising of other economic sectors by the road sector. Near weekly revelations about '*state capture, corruption and the squandering of tax money seems to increase the unease of people to continue financing government spending*' (Visser, 2017). How roads should be funded (who should pay), and how much they should pay, seems to be the main points of contention.

Despite all these conflicting views, there is surprisingly little research in South Africa on road funding. In fact, there have been very little research on road funding since Peter Freeman conducted his seminal work, *The Road User Cost Recovery Study*, in the 1980s (Freeman, 1982a). The limited studies that have been undertaken in South Africa have focused the how to fund roads (as a non-pure public good) (Mirrilees, 1989; Naude, 1996) and on the issues of how much users should pay and who should fund roads (Brits, 2010; Stander & Pienaar, 2006). What is evident from the very limited number of studies undertaken in South Africa is that (i) the fuel levy may not be a viable long term solution given technological developments, (ii) road user charges based on weight distance charges may accurately reflect road users costs, and (iii) that South Africans may be paying more road use tax than what their fair share of road use demand.

Compounding this lack of research is the unavailability of data such as the size, composition and growth projections of the South African vehicle fleet, income from road use and expenditure on the road network, costs caused

by road users including maintenance, social and environmental unit costs, the allocation of costs to road user types, information on administration of road funding, the value of the road network and an understanding of road user charging principles.

To summarise: the road industry, broadly including road users, infrastructure service providers, transport operators, and the government and state-owned entities, seems saturated with distrust, suspicion and with untruths about road funding, specifically the *who* should pay, the *how* to pay and *need* for road funding.

The purpose of this research and associated report was not to present a solution to road funding, but instead to explain the road-funding dilemma in general; to discuss how road funds are allocated in South Africa; to clarify the user-pay principle; and finally to recommend a way forward to address the current policy vacuum and stimulate objective public debate on road funding. In doing so, it is hoped that this research will shed some light on the following research issues:

- The meaning of the *user-pay* principle and whether and how it should be implemented with regard to road use
- Whether or not roads *pay*, or should pay, for themselves via the user-pay principle
- The fact that South Africa's roads are under-funded compared to *international standards* and norms
- Whether or not *ring-fencing* the fuel levy is sufficient to fund roads in South Africa.

Answering these questions can provide the foundation to establish a road funding policy that is (i) sensitive to the specific circumstances of the road sector in South Africa, (ii) based on fair, equitable and efficient road user charges and (iii) adopts an inclusive institutional framework in road fund administration that can foster general consent of road user charging.

Section 1.1 briefly discusses the importance of roads to any economy, and the South African economy in particular. The section presents the alleged relationship between roads and economic development, as well as how the type of funding may affect this relationship. Following this is an overview of international road funding approaches, and the importance of such approaches in directing the local road funding debate. The current South African approach to road funding is contrasted to the international experience.

South Africa's road system is impressive by developing country standards, and even by world standards. It comprise roughly 750 000 kilometres (10th biggest road network in the world), handles approximately 162 billion kilometres of vehicle kilometres with the current value approaching R2 trillion rand (estimate).

Eighty percent of the 860 million tonnes of land freight is transported on the road network. In terms of value, 85% of freight is transported via the road network. Income from road freight and road passenger transport comprise R91 103 000 000 and R8 591 000 0000 respectively per year (excluding mini-bus taxis and metropolitan busses). The Global Attractiveness Index rate our roads 37th out of 144 and South Africa is 20th in terms of the Global Logistics Performance Index.

Even passenger transport is dominated by road based passenger transport with public and private road transport accounting for 95% of all passenger trips undertaken in South Africa. Roads can indeed be considered one of the pillars of the South Africa economy.

1.1 Roads and economic and social development

A basic conviction supporting the viewpoint of an infrastructure-led growth policy is the theory that transport, and particularly transport infrastructure, is growth-enhancing (European Conference of Ministers of Transport, 2001). Empirical support for this viewpoint is often provided by

referring to the statistical link between growth in Gross Domestic Product (GDP) or Gross National Product (GNP) and growth in road traffic (goods and passengers) or road network density. The National Planning Commission for South Africa even suggests that transport is a pillar for economic development and growth (National Planning Commission, 2009). While there is no doubt that the transport network and transport operations can support economic development, the issue is exactly *how* this would come about. Several matters should be addressed before this question can be answered, including:

- How adequate is GDP as a measure of economic growth?
- Is economic growth the same as economic development?
- Should mobility be viewed as an indicator of welfare and a goal of transport policy?
- What should be in place for roads to be able to support economic development?
- Are these impacts, long-, medium- or short-term in nature?

A full review and examination of the issues is not possible in the context of this report. It suffices to say that while transport infrastructure, which includes roads, *may* support economic development, the above (and other) reservations should be addressed before the real relationship between transport and economic development can be understood. A very basic overview of the assumed impact of transport on economic development is presented below.

Transport investments, such as roads, public transport network²s and intermodal transfer facilities, lower the costs of moving people and goods. This decrease in costs may increase the productivity of companies, organisations and individuals in that more time and money is made

² Increasing employment is an important objective of economic policy and incorporating employment objectives for transport projects is not totally unjustified. The problem, however, is in opting for transport automatically without considering the feasibility of other measures.

available, leading to increased output. Productivity, measured in terms of increased output per unit of investment, is a key element of economic growth. Economic growth, when measured in terms of the expansion of the GDP, may lead to a higher standard of living³. Whether or not the growth resulting from an increase in productivity is equally shared among the citizens is not considered here. Seen from this perspective transport (infrastructure) investments such as building new roads or upgrading existing roads may improve economic wellbeing through enhancing productivity. Central to this argument, however, is that the cost of the road investment be less than the savings generated by the new road. This implies, of course, that it is possible to overinvest, specifically with regards to (i) providing too much capacity too soon (ii) or too expensive road infrastructure or (iii) that the demand remains too low to support the road infrastructure.

The main function of transport is to facilitate other activities; it is a *derived* demand, as noted above. Implicit in this statement is that transport investments should reduce costs. Employment creation during the construction phase, for example, should not be seen as a benefit. In fact, while transport may create jobs (mostly short-term construction employment) these jobs are in fact part of the cost of constructing the infrastructure. Increasing the cost of transport may, due to expensive construction techniques, ultimately erode the benefits; that is, the savings in time and money gained by using the service. Employment during the construction phase, or even thereafter, should therefore be minimised and transport should not be used to as an employment creator (Blauwens, De Baere & Van de Voorde, 2012; Wachs, 2011). Note that while employment during the construction phase is indeed a benefit to the economy, this is only true if the optimal level of employment (including wages) is used. If

³ Economic growth is the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. It is conventionally measured as the percentage of increase in real GDP, usually in per capita terms. Economic development means an improvement in the quality of life and living standards of the citizens, e.g. increased literacy, life expectancy and healthcare.

this level is higher than optimal, the employment creation may affect the savings adversely.

While transport investment, and road investment in specific, may in fact support economic development, there are some important qualifications for development to occur (Banister & Berechman, 2001):

- (i) Positive economic externalities should be present which include agglomeration and labour market economies and the availability of a well trained workforce, among other,
- (ii) Investment factors are present which relate to the availability of funds for investment, the scale of investment and location, network effects (no missing links in the network), etc.
- (iii) Political factors are conducive to support economic development which includes sources of finance, the level of investment and supporting legal, organisational and institutional policies and processes.

If these requirements are not present, any transport investment to support economic development will be severely hindered and may even have counter development effects as adequately illustrated by Banister and Berechman (2001).

The savings offered by transport infrastructure can be measured by the rate of return produced by the transport investment. Governments at all levels use public funds to invest in transport projects such as roads. These public funds are the result of collected taxes, including the fuel levy or toll fees. To be worthwhile investments, the roads projects selected should deliver a high rate of return in order to ultimately support the goal of

increasing productivity and generating economic growth. It therefore follows that transport investments should be sound and be in response to a need, as opposed to being supply-driven.

Measuring the impact of transport infrastructure investments on the economy can be assessed at micro- and macro-level with various analytical techniques. Roads support economic development by bringing on direct savings. Micro-economic techniques capture the *direct* time and cost savings from transport improvements (such as vehicle operating costs), but not the *indirect* impact of these savings in the form of lower production costs and possible benefits from the reorganisation of logistical activities^{4,5}. These benefits are then compared to the costs, including external costs, associated with the investment. If these benefits, termed *first order or primary benefits*, exceed the costs, the transport (road) investment is worthwhile. While these techniques are widely used, they do not consider the network or general equilibrium effects of transport investments on the transport-using sectors of the economy or the indirect effects induced by road investment. These network benefits may in fact be dramatic in terms of the growth in total factor productivity. Macro-economic modelling techniques are used to capture these economy-wide cost reductions and the output expansion derived from transport infrastructure investments (Lakshmanan, 2011). Two other benefits ascribed to transport infrastructure are *spatial agglomeration* in larger urban areas, and *innovation and commercialisation of new knowledge* in connected areas. That is, good transport connections create productive and efficient cities which stimulate innovation and economy of scale.

Transport, and more specifically road infrastructure investments can undeniably contribute to improved accessibility (or reduced costs of

⁴ Indirect benefits resulting from improved transport infrastructure can raise total factor productivity by reducing transaction and other costs thus allowing a more efficient use of conventional productive inputs (for examples companies experience lower cost of purchasing goods and services and employees spend less on transport)

⁵ Conventional road economic evaluation tools such as Highway Development and Management (HDM-4) and Roads Economic Decision (RED) use the consumer surplus approach and only quantify the direct road user cost savings.

accessibility), which are key to creating an improved standard of living for citizens by giving them access to job opportunities and cheaper basic services. Figure 1 illustrates in broad terms how transport impacts on economic development. Investing in transport infrastructure, which includes roads and public transport, improves accessibility. Accessibility improvement typically relates to travel time and cost savings, as well as other related benefits such as decreased congestion and decreased risk associated with delays. As a result, businesses, transporters and commuters will have increased time and money available to invest, and economic growth may be stimulated. The latter is often referred to as the production and transaction costs savings.

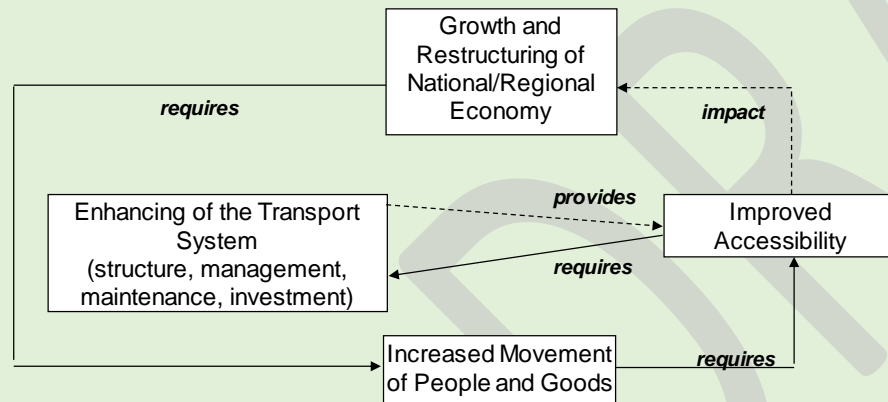


Figure 1: Relationship between transport and economic development (Botes & Pienaar, 2001)

⁶ “The interest payable on government debt is already a significant item in government annual expenditure and is estimated at R100-billion for 2014/2015, or close to 10% of government expenditure. This is in an environment of exceptionally low interest rates, as the South African Reserve Bank (SARB) has adopted a low-rates policy because of the slow economic growth and recovery from the financial crises in major economies. However, if circumstances changed, and the SARB felt compelled to increase interest rates significantly (which could easily occur in two to three years’ time), the effect on government’s ability to meet other desired expenditure could be compromised. For instance, if the interest rate reached 9%, the long bond rate could then move to 12%. As a result of this interest rate change alone, government’s debt servicing costs would increase by 50%, to around R150-

While transport can stimulate economic growth and development, there are two important caveats to be borne in mind. The first is that transport infrastructure expenditure should entail spending to address growth – not spending for the sake of spending. This can be easily addressed by submitting all transport investments to a thorough economic evaluation, including assessing the wider economic benefits. Transport infrastructure investments undertaken in response to a sound economic evaluation have a higher likelihood of supporting economic growth than hinder it.

The second caveat relates to funding. If roads are financed by public borrowing, the impact of debt servicing will be felt by other investments, including education and social services. Given South Africa’s current fiscal position, public borrowing may not be feasible⁶. Funding from the fuel levy, as a partial substitute for a road user charge, may lead to one of two outcomes. Unconstrained spending from a well-stocked fuel fund, especially spending that is not related to actual road use, can lead to inflationary pressure. By contrast, insufficient spending on the network, including on the necessary maintenance and upkeep, would lead to a rapidly deteriorating road network, increasing transport costs and placing time and financial pressure on businesses and citizens. The costs of poor

billion; in other words, a R50-billion annual constraint on other expenditure. In addition, raising new government debt would place pressure on the domestic bond market and could increase the spread of long bonds relative to short-term financing, thereby placing further strain on long-term debt financing. The situation could easily get worse if the government’s actions and policies caused some doubt on its ability to repay its bonds, which would increase the risk portion of bond interest rates and make raising new bonds more difficult. Under such circumstances, meeting the financing requirements to translate the ambitious goals of the NDP into reality would be difficult, if not impossible. The country’s recent financial pressures have brought to light the need for an analysis of debt sustainability, accompanied by appropriate debt management in the more difficult external and domestic environment”.

road management and inadequate road financing are, after all, borne primarily by road users through increased vehicle operating costs⁷.

Shifting road investments from the government to the private sector, including public/private partnerships, toll road concessions, etc. may be useful to secure much-needed funds. Although these initiatives are becoming more popular globally, they are associated with political inertia, an aversion from road users and enterprise regulation voids with regard to setting road use charges which hamper their roll-out and permanent use. Yet they do offer the possibility of cutting project implementation time significantly and securing funding for much needed projects.

Road infrastructure, and indeed all transport infrastructure, can support economic growth and development, but this can only be achieved with sufficient, stable modes of funding based on efficient road user charges. Funds must be spent judiciously and focused on bottlenecks where a deficient road network inhibits growth. Finally, if supporting conditions are not present, investment in road infrastructure to support economic development is not likely to occur. The next section briefly reviews some of the extensive international studies on road funding.

1.2 International studies on road funding

Road funding has received considerable attention in the international research domain. Since The White Paper on 'Fair Payment for Infrastructure Use' (Commission of European Communities, 1998a), a great deal of studies, reports and policy documents has been produced in the

EU, but also by the other regions such as the USA, Asia and Africa which focus on the funding for roads. Various policy documents have been produced, and experimental projects have been implemented to explore (i) determine the correct user charge, (ii) manage this income from road users and (iii) new ways to charge road users for their vehicle use. In South Africa, the press seems more concerned with road funding than the government or for that matter the academic fraternity. Media articles tend to focus on the negative aspects associated with road funding, including the apparently inequitable and excessive toll road tariffs, the abuse of the fuel levy, and the continuous deterioration of the roads. On the other hand, government-sponsored research is sparse and insubstantial, referring simply to the user-pay principle as the appropriate policy to secure income for road users.

Countries and regions face unique socio-economic and geo-political conditions which dictate their specific road development and funding needs. Fuel tax assessments for one country cannot simply be inferred from an optimal tax estimates from other countries as they depend on many local factors. A very different approach is followed in Europe, the US, Asia and in parts of Africa. Numerous policies and position papers have been published focussing on the funding and financing roads through innovative methods, determining the correct road user charge and the management and institutional arrangements for road fund administration (Asian Development Bank, 2012; Bousquet & Queiroz, 1996; Bruzelius, 2000; Commission of European Communities, 1998a; Heggie, 1995; National Surface Transportation Infrastructure Financing Commission, 2009)⁸. It is possible to distinguish some general themes from this body of research.

Submission for the 2015/16 Division of Revenue, Real Effects of Public Debt on National Development: CHAPTER 1 By: R. Mabugu, H. Maisonnave, M. Chitiga, and B. Decaluwé

⁷ In the absence of regular maintenance, it has been shown that roads deteriorate to a point where the cost of their restoration is three to five times that associated with a policy of timely and effective maintenance

⁸ Funding of public infrastructure reflects who ultimately pays for the infrastructure to be built and maintained over its lifetime. Funding can be sourced directly from the users of public infrastructure,

through tolls on roads and fares for public transport. It can also come from developer contributions on new housing estates, or levies on property owners whose properties become more valuable when new infrastructure improves their accessibility (known as 'value capture'). Although these mechanisms are widespread, most funding for transport infrastructure comes from the community through general taxation.

Financing of public infrastructure refers to the capital needed to pay for the investment costs up-front. Investments in public infrastructure can be financed from existing government revenues, government

Most European research, funded by the European Commission or individual governments, focuses on the setting the 'correct' price for infrastructure use under the general theme of fair and efficient pricing of transport services. The economic and spatial integration and the European Union necessitates harmonising the great diversity of road charging systems to avoid pricing distortions within and between modes and spatial regions. Internalising the external cost of transport, which includes environmental costs, congestion costs and other negative externalities, seems also to be a key focus of the European research. In addition, European research looks at how to cover the long-term costs of the road network in the case of deficits. The principle of marginal social cost pricing as the basis from which to recover road user costs seems to be preferred pricing alternative. Due to the various shortcomings associated with this pricing principle, deviations have been considered. Germany for example, argues for the adoption of average costs, the UK favours long-term marginal costs while the principle of short-term marginal social cost is really only considered in the Nordic countries (COMMUNITIES, 1998).

Some European countries are also investigating the technical requirements to implement a road user charge based on marginal social cost. GPS vehicle tracking has resulted in the ability to charge vehicles according to actual road use (distance, time of day and type of road), and this is gaining momentum. In several countries, initial experiments have led to pilot and even full-scale implementations. For example, on 1 April 2016, a per-

borrowing, or private financing. The availability of private financing does not preclude the need to identify a *funding* source for public infrastructure, since private financiers must ultimately be repaid (Terril, M.; Emslie, O. and Coates, 2016).

⁹ The On-Board Unit (OBU) calculates the toll to be paid. The tariff depends on the maximum authorised vehicle weight, the Euro emission class and the type of road. The toll is calculated according to the number of kilometres driven, and where (in which region).

¹⁰ Diminishing fuel tax returns have led Oregon decision-makers back to the drawing board to create a fair, reliable source of revenue to fund transportation projects. The result is OReGO, which entails that:

kilometre charge for heavy-goods vehicles with a gross vehicle weight of more than 3.5 tons took effect in Belgium. On-board tracking units are now required for all heavy vehicles, and even foreign vehicles are required to register⁹.

A few states in the US have also explored a road user charge based on vehicle characteristics and actual distance travelled, using satellite technology. Oregon, for example, is running a pilot programme allowing users to voluntarily take part in a distance charge project¹⁰. Box 1 presents a description of the project. The purpose of the exercise is to calibrate the road cost model and understand the administrative and technical aspects of the charging process. The exercise will also yield insight in the public acceptance of the user charge approach, something which is important and very relevant to the American approach to road user charging.

An underlying motivation for this research is also the increasing recognition in the US that the purchasing power of the fuel tax is diminishing due to the presence of more fuel-efficient cars, electrical vehicle technology, changing travel habits, and inflation. The fuel tax, which is the sole tax sustaining the National Highway Trust Fund, has not been raised since 1993. The tax current stands at 18.3 cents per gallon (equivalent to R0.67 per litre), and annual fund revenues have shown limited growth as a result of increased fuel efficiency and reduced growth in miles travelled. Vehicle tracking solutions aim to address these concerns, as well as the question of whether the current tax rate is in fact sufficient to account for road user

- OReGO volunteers pay a road usage charge for the number of miles they drive, instead of the fuel tax
- The OReGO road usage charge is set at 1.5 cents per mile.
- Volunteers receive credits on their bill for the fuel tax they pay at the pump.
- Volunteers have their choice of secure mileage-reporting options offered by OReGO's private-sector partners.

The first phase of OReGO will be limited to 5 000 cars and light-duty commercial vehicles.

(Source: <http://fortune.com/2015/07/17/oregon-road-usage-charge/>)

cost. Most USA researchers seem to think that the current tax does not take into account all the externalities of road use, and as such have consistently argued for an increase in the tax. Getting the prices 'right', however, seems to be a much bigger challenge, given the complexities and intricacies that surround actual road user costs (Delucchi, 2000).

Box 3: Oregon Road User Charge

As Congress continues to wrangle over solutions to the nation's ongoing highway funding issues, the Oregon Department of Transportation is rolling out a fairly radical alternative. The federal Highway Trust Fund has been destabilized, primarily, by declining revenues from the gasoline tax—a continuing trend caused by inflation, pricier construction materials, and rising fuel efficiency. So instead, Oregon is implementing a per-mile road usage charge that's the same for a panel van as for a hybrid car.

The program, called OReGO, is currently voluntary, with space for an initial 5,000 participants. Drivers in the program will install a small dongle into their on-board diagnostics (OBD) port, standard on all cars after 1996. The device will track miles driven, and report that information via 3G to Azuga, the private company handling the technology.

ODOT will bill users 1.5 cents per mile driven. But, crucially, program bills will also credit back any gasoline taxes paid at the pump, which could turn into a refund for those buying the most gas per mile.

Source: <http://fortune.com/2015/07/17/oregon-road-usage-charge/>

Research from Asian countries, with the support of the Asian Development Bank, appears to be advocating for comprehensive fuel tax reform, which would include the restructuring of both road funding and roads administration. The lack of a well-defined accountability mechanism such as a road trust fund has led to uncertainty over the allocation of user charges, and finally to a need for new funding sources and better administration (Asian Development Bank, 2012). Some of proposed changes include:

- the division of roles and responsibilities for funding between different government levels

- funding allocation based on needs
- new funding options to raise additional tax
- adjusting current funding sources to avoid them becoming less productive, and
- fund management.

Several Asian countries, and specifically China, have opted for this comprehensive approach in the light of a loss of direct local and provincial funding sources and declining purchasing power, as well as other broader considerations, such as inadequate funding and weak programme administration.

Some of the foundational principles that underlie fuel tax reform in Asia include (Asian Development Bank, 2012):

- *the user-pay principle*: road investment should generally be funded through revenue mechanisms that charge users for the benefits they receive, except where they cannot afford the fuel (or other) tax
- *regular and long-term financing*: annual maintenance and operating costs should be covered by road user charges on a pay-as-you-go basis, while long-term investments require long-term financing instruments
- *additional funding needs*: mechanisms to provide additional funding for ordinary roads should be explored
- *maintenance focus*: policy options should consider pragmatic approaches to both expand the road system and ensure that adequate resources are available to maintain and operate it
- *fuel tax increase*: increasing the vehicle fuel tax, whether through indexing, converting to an *ad valorem* tax, or a different option, should be considered with the purpose of addressing at least part of the existing road-funding shortage.

Australia, a large country with a relatively small population and vast travel distances, has spent significant amounts on their road network. They recently redeployed their spending away from highway funding, which may be politically motivated and is less important to the economy, to the transport infrastructure needs of cities (Terril, M.; Emslie, O. and Coates, 2016). New Zealand, in turn, has developed an elaborate and novel road-funding regime, in which the cost of using roads is recovered from road users via levies that are contained in the prices of some fuels, or via road user charges. All vehicles, regardless of weight, that are powered by diesel or a fuel not taxed at source, must pay the road user charge. Distance-based permits in units of 1000 km can be bought, and road users are required to display their current distance licence while driving on public roads. Road user charges are collected by the New Zealand Transport Agency and enforced by the New Zealand Police, while the revenue collected is dedicated to the National Land Transport Fund.

In Africa, as in other parts of the developing world, the research and policy focus has been on establishing an appropriate and effective road-funding and -financing regime, and identifying sustainable and efficient road income sources. This is partly in response to the socio-economic and spatial characteristics of African countries, which are typically large with extensive road network requirements, fragile or emerging economies, and road users with a lower ability to pay. This means that road users often deliver insufficient income for adequate maintenance. So-called second-generation funds are typically financed by fuel levies, and managed by boards representing the interests of road users (Gwilliam, 2003). Some of the underlying principles of these second-generation funds include:

- The road fund is managed through a separate road fund administration, which channels funds to all parts of the road network;
- Oversight should be by a public-private board made up of nominees from organisations with a strong stake in well-managed roads;
- Revenues should come from charges related to road use – ideally a two-part tariff consisting of vehicle license fees (often also a heavy vehicle surcharge) and a fuel levy or supplement.

In Africa, governments set the general revenue taxes, and the road boards, with significant user representation, determine the road user charges and control the revenue from them (Heggie, 1995). Separate agencies are responsible for actual road maintenance and planning. This approach is supposed to reduce rent-seeking behaviour and make resource allocation more efficient by creating an explicit link between what users pay for roads and the quality of the roads available to them¹¹. Namibia, in particular, has established a noteworthy road administration and road fund that seems to function as a model for other developing countries. It does seem that many of the Sub-Saharan African countries are adopting SADC principles in setting road user charges and establishing road funds.

The SADC protocol on transport, communications and meteorology in the Southern African Development Community (SADC) region has proposed

¹¹ Rent-seeking is defined as the practice of manipulating public policy or economic conditions as a strategy for increasing profits.

several guidelines for funding of road infrastructure¹². Article 4.5 and 4.6 (Appendix A) in specific, provides some guidelines for road funding source:

1. *“Member States agree to develop and implement cohesive and definitive road funding policies with a view to -*
 - a. identifying adequate, sustainable and appropriate sources of road funding which includes general revenue, road user charges and funds generated jointly by the public and private sectors;*
 - b. increasing transparency in the road funding process;*
 - c. ensuring that revenues obtained from road users under road user charges shall be regarded as dedicated for the provision, maintenance and operation of roads;*
 - d. ensuring that road users, including foreign road users, contribute to the full costs of maintaining roads and progressively contribute to the full costs of providing roads while (-)”*

In South Africa, none of the road policy documents, including the White Paper on Transport Policy, the National Transport Master Plan (NATMP), the National Land Transport Strategic Framework (NLTSP) and the National Development Plan (NDP) is very specific on how to fund road infrastructure. The overall idea appears to be that the user of the road or infrastructure, should pay for their use based on a variant of the user-pay principle. There is, however, very little evidence indicating how much users should pay, how they should pay, or which changes in the institutional regime will be required to facilitate the user-pay principle. In fact, there

seems to very little suggestion of what the user pay principle represent. Some of the South African studies seem to relate toll roads to the user pay principle, which it is not. Toll roads is merely one of many forms of road pricing, albeit a sophisticated one, that can be used to secure income from road users. Whether the toll reflects the correct road user charge, cannot be assumed unconditionally. Other techniques to charge road users for road use include local licences, parking levies, fuel tax, licences and registration levies, tyre tax, etc. All these road use charges can be designed to reflect road use costs in some way, known as the variabilisation of vehicle tax (Blauwens *et al.*, 2012). Most often, as is the case in South Africa, these charges and taxes do not reflect road user costs.

Based on the history of road user charges in South Africa (Chapter 2), the current fuel levy acts as a surrogate for user charges. Yet, as with most other income, all the income from the levy reverts to the National Revenue Fund. This fund is currently under fiscal pressure due to stagnant economic growth and increased social spending. Furthermore, South Africa has adopted various national developmental policies with direct implications for the fund, including adopting an infrastructure-led growth approach that focuses on exports, public transport and city development. All such infrastructure initiatives will require funding and place demands on the National Revenue Fund. The user-pay approach to fund infrastructure is really only be possible in a handful of cases.

¹² The Protocol oversees all aspects of transport, communications, and meteorology throughout Southern Africa with the intention of establishing systems for these sectors that function efficiently and productively, thereby promoting economic and social development. Through the Protocol, Member States agree to strategic goals and policies for an integrated network of transport, communications, and meteorology, with specific funding sources, regulatory mechanisms, environmental controls, and technical standards. The Protocol also outlines an institutional framework for its implementation, including a breakdown of committees and subcommittees, procedures, and duties, as well as systems for monitoring progress and addressing non-compliance with regulations.

This overview of selected literature served to illustrate current international road-funding and road-financing initiatives from different parts of the world. Four key developments have been identified:

1. There has been a gradual realisation that the fuel levy may be losing its effectiveness as a main income source, and that there is a need to move away from a general fuel tax to road user pricing that reflects actual road user costs such as marginal social cost. European countries are slowly exploring setting prices equal to MSC but adapted to local conditions.
2. The problems associated with inaccurate road user charges is now well recognised in that they give rise to significant distortions of competition within and between modes, limits the incentives to cut environmental costs and holds back the efficient provision of infrastructure.
3. Europe and the US are looking at technological solutions to implement a weight-distance road user charge. Pilot projects harnessing GPS vehicle tracking are in place.
4. Countries, typically from emerging and developing regions, that do not have effective road administrations, are attempting to establish institutionally sound road-funding and -administration regimes. Such institutional structures are a prerequisite to implement sound road user charging policies.

The research attention that road-funding and -financing receive world-wide is in recognition of the importance of roads in national economies, and the need for securing sustainable funding based on user costs. The following chapter discuss the road funding approach in South Africa.

2 The funding and financing of roads

There are various road financing systems in the world, and countries are very much unique in how they finance road upgrades, maintenance and new construction projects. Furthermore, few countries actually link their revenue and road expenditure directly. Some countries are very scientific in their road user charging approach, and base their charges on economic efficiency principles, such as that prices should equal the short-run marginal cost of road use (short-run marginal social cost). This pricing doctrine typically considers the damage to road pavement caused by different types of vehicles; the cost of road congestion and road accidents; and the environmental costs that vehicles impose on society. Countries that adopt this road user charging approach also differentiate road user costs based on the particular costs attributable to the different categories of vehicles (Bousquet & Queiroz, 1996). Other countries, which include South Africa, set road use taxes at levels that have no direct bearing on road use costs. Some countries, such as the USA, have ring-fenced road funds while most European countries, and South Africa, do not earmark funds or tax for road funding. For these latter countries, funds for roads is typically part of the normal, national budgeting process.

There is accordingly no standard approach to how roads are funded and how financing is obtained. The road funding regime adopted typically reflect the present political and economic environment of the country.

The allocation of funds to the road sector in South Africa forms part of the South African general budgeting process and covers the national, provincial and local municipal levels. It also involves state-owned corporations (SOC). In South Africa, the National Government collects all taxes levied on products and services within the country. In terms of the Public Finance Management Act (1999), all revenue reverts to the National Revenue Fund, and the annual budgeting process allocates all revenue in terms of the fiscal framework tabled in parliament. However, there are a

few exceptions, such as the Road Accident Fund levy, which goes directly to the Road Accident Fund (RAF), a state-owned corporation.

In some instances, provincial and local authorities as well as state owned corporations may implement road permits, tolls, levies and fees related to road use, such as parking charges, heavy vehicle permits and licenses charges. Income from these sources does not revert to the National Government but is allocated to their respective budgets.

With the exception of a short period in the 1980's, South Africa has never had a dedicated, ring-fenced road fund. National Treasury is responsible for coordinating the budgeting process. It is presumed that during this process, the Department of Transport (DoT) actively participates in various forums, which results in recommendations made to the Minister's Committee on the Budget. Roads therefore compete with all the other funding priorities and monetary demands placed on the National Revenue Fund. Informing this process is the policy on the financing of roads, which is also primarily the responsibility of the DoT, on whose signals and requests the National Treasury then acts. Roads is therefore funded from the general fiscus, as all economic infrastructure

2.1 South Africa: Past and Present

Government have always played a role in roads and specifically the provision of roads. Road infrastructure, which is usually a prerequisite for economic growth and effective logistics services (see Section 1), involve high upfront investment costs (which is subsequently sunk costs),

characterised by the indivisibility¹³ of the investment, difficulty of assembling the right-of-way and the longevity of the infrastructure (and also the investment risk). Most roads, with the exception of high volume roads, cannot be supplied by the private sector in the absence of an acceptable profit, or if an efficient means of collecting income from users is not readily available to private investors. Government therefore assumes responsibility for the provision of this (non-pure) public good.

South Africa started formalising the funding of roads since the beginning of the 20th century with a gradual centralisation of funding, and indeed policy, for roads from local to national level. Before 1935, road construction and maintenance were mainly the responsibility of provincial and local authorities who funded road infrastructure through local tax income. The National Government was entrusted with the development of the rail system at the time to cater for freight (and to some extent passenger) transport over long distances (Floor, 1984). After 1935, the financing of roads, which were considered to be of national importance to support economic development, came to be the responsibility of the National Government as well. Income for this function was sourced from the users of public roads by way of a user tax on fuel. This led to the establishment of the National Road Fund, which charged a percentage of the import tax from every gallon of fuel imported, 3 pennies per gallon (13.5 cents in current value) from 31 March 1935 (Van Lingen, 1960). The fuel tax was increased numerous times over the next 40 years in order to repay bonds, set up an urban highway fund, and sustain the pace of construction and maintenance. From 1974, the fund experienced declining revenues due in part to a decrease in fuel use as a result of international

sanctions, and it eventually failed to keep up with the approved road building programme (Floor, 1984)¹⁴.

New legislation passed in 1983 provided for tolls to fund new roads, or road improvements, on stretches where an alternative route existed¹⁵. Furthermore, from 1983 the National Road Fund was funded by a dedicated, ring-fenced fuel levy in addition to tolls (Floor, 1984). This arrangement was done away with in 1988, when the Act was amended by the then minister of finance, Barend du Plessis, and the ring-fenced fuel levy was changed to a general levy (Van Rensburg & Krygsman, 2015). It was argued the earmarked fund reduced the integrity of the budget process due to reduced transparency and accountability, in addition to the need that arose for funding other expenditure programs and access to additional funds if needed. This was the only period South Africa made use of a dedicated road fund.

Since 1988, all income from the fuel levy has been allocated to the National Revenue Fund, administered by the National Treasury. Funds from the revenue fund may be used for the construction and maintenance of roads, for support of public transport, as well as for general government expenditure (National Treasury, 2014a).

The fuel levy was and remains the most important means of recovering road usage cost from road users in South Africa, notwithstanding that it is not ring-fenced for roads (see footnote 15). It is also the only tax levied nationally and accruing to the National Revenue Fund which can be directly attributable to road use (see Table 1, page 42). Other notable income sources include toll fees from an expanding toll road network, license fees,

¹³ A commodity is indivisible if it has a minimum size below which it is unavailable, at least without significant qualitative change. Indivisible inputs yield economies of scale and scope.

¹⁴ A good overview of the national road finances is provided in "The History of National Roads in South Africa" (Floor, 1984). A cursory observation from the book indicate that the fuel fund experienced many peaks and slumps over the period 1940 – 1985 due to (i) decreasing returns from road user tax

revenue, (ii) under-estimating the cost of construction due to higher design standards and inflation, and (iii) overspending on road projects during some periods especially the on national highways.

¹⁵ The alternative route proviso for toll roads was removed in 1996, allowing the tolling of roads with no alternative. In effect, this immediately changed toll roads to a monopoly contracting scenario which held implications for capacity provision and revenue objectives.

permits, and traffic fines. Yet these fees are not levied nationally, and often have very little relationship with road use.

The popularity of the fuel levy as the primary road use tax in South Africa is mainly due to its historical use, its simplicity, the ease with which the tax may be levied and altered (increased or decreased), and also because of its basic characteristics (Freeman, 1982). This revenue source is difficult to evade; its administration cost is very low in proportion to the total revenue collected; and it is readily accepted by the public. Furthermore, it is widely believed that the amount paid varies with the distance travelled, the nature of the vehicle, the speed at which the vehicle travels and the manner in which it is driven, i.e. that the fuel levy reflects user behaviour and vehicle characteristics.

Notwithstanding all these favourable attributes, Peter Freeman (1982a) argued that the fuel levy is not a perfect cost recovery instrument. It is unable to recoup sufficient revenue to reflect the actual cost responsibility of all vehicle types, especially from heavy vehicles, to compensate for the extra cost burden they impose. Furthermore, the fuel levy cannot be fine-tuned to encourage or discourage any particular vehicle type or specific travel behaviour. Freeman envisaged that, with the increasing scarcity of oil and the subsequent increase in fuel prices, the demand for more fuel-efficient vehicles as well as for petroleum substitutes would become inevitable during the 21st century. All of these characteristics, as noted by Freeman, may in fact lead to stagnant fuel use as alternative fuels and propulsion technologies become more cost-efficient and affordable. As fuel levy revenue is dependent on fuel sales, the revenue from this source may become inadequate to meet the land transport operational and road infrastructure needs, which typically grow at a slightly higher rate than the population and economy. Freeman was ahead of his time in saying that the fuel levy should not be used in isolation, but rather serve as a basis from which supplementary user charges can be employed. One such a system proposed by him required charging users directly for their distances

travelled. This would allow the true cost of road use to be recovered, if the charge was based on the marginal social cost of road use or the additional maintenance, accident, environmental and congestion costs. Unfortunately, due to the lack of technology at the time and the administration cost of such a distance-based charge, the fuel levy prevailed as the main cost recovery method for road users in South Africa.

Despite the fact that many of these trends as pointed out by Freeman are present in South Africa very little research is and has been done in South Africa regarding alternative or supplementary income sources to the fuel levy. The result is pressure on the existing funding options and increasingly an insufficient allocation to road infrastructure. The following section briefly reviews some general income sources.

2.2 Funding of roads

Funding of roads reflects who ultimately pays for the road infrastructure. Road funds can be generated by a variety of taxes, fees, levies, fines and charges levied on users of the roads. However, non-users typically also contribute to road funding by way of income transfers.

Before road funding can be discussed, a distinction should be made between funding and financing.

Funding of public infrastructure reflects who ultimately pays for the infrastructure to be built and maintained over its lifetime. Funding can be sourced directly from the users of public infrastructure, through tolls on roads and fares for public transport. It can also come from developer contributions on new housing estates, or levies on property owners whose properties become more valuable when new infrastructure improves their accessibility (known as 'value capture'). Although these mechanisms are

widespread, most funding for transport infrastructure comes from the user community through general taxation such as the fuel levy.

Financing of public infrastructure refers to the capital needed to pay for the investment costs up-front. Investments in public infrastructure can be financed from existing government revenues, government borrowing, or private financing. The availability of private financing does not preclude the need to identify a funding source for public infrastructure, since private financiers must ultimately be repaid (Terril, M.; Emslie, O. and Coates, 2016).

The following section briefly provides a general overview of road financing followed by a more detail discussion of the various road funding options available in South Africa.

2.2.1 General sources of income available to fund road infrastructure

Local and provincial government as well as state owned entities responsible for roads construction, upkeep and management, can access various sources of financing in South Africa (Brand, 2016):

- i. Equitable Share: Local and provincial government, as well as the various state owned entities is entitled an equitable share of the revenue raised nationally and distributed from National Treasury to the various

Government departments, to provide basic services and perform the functions allocated to it in terms of section 214 and 227 of the Constitution. While this approach has some benefits, one of the weaknesses is that there is really no costing of basic services, including transport service provision.

- a. General sources of income, which are used for the funding of roads, include direct allocations from national government to provincial and local government, subsidies and loans. A direct allocation from the treasury can come from an earmarked fund, in which case the money can only be used for a certain purpose, or from the state's general income. Earmarked funds are discussed in the next section.
- b. The state (National Government) receives the funds out of which it finances road provision from various sources of income, which are in turn fed by a variety of economic elements like personal income tax, company tax, and VAT. For the financial year 2014/2015, personal income tax, company tax and VAT contributed 35.9%, 18.9% and 26.5% tot the national budget. Other taxes contributed the remaining 18.7% *of which the fuel levy contributes roughly 5%*¹⁶. Local government revenues come primarily from grants from central government funds, termed allocations, and municipal rates and various levies. Local government typically use direct allocations from National government as well as local income sources to fund roads^{17, 18}.

¹⁶ While the fuel tax is a nationally levied tax, it is generally revered to as a levy. <http://www.sars.gov.za/AllDocs/Documents/Tax%20Stats/Tax%20stats%202015/Tax%20Stats%202015%20Highlights.pdf>

¹⁷ Section 227 of the Constitution states that municipalities are entitled to a share of the revenue raised nationally, so that they can perform the functions allocated to them. Municipalities receive funding from the national government, in accordance with the Division of Revenue Act of 2005. This ensures that funds are distributed equitably between the national, provincial and local government.

¹⁸ Sections 227(1) (a) and (b) of South Africa's Constitution of 1996 state that local government (and each province) is entitled to an equitable share and may receive other allocations from national government revenue, either conditionally or unconditionally. Conditional grants are either direct or indirect. Direct conditional grants are transferred directly into the bank account of the recipient (for example, to a municipality) and must be used for the stated purpose and comply with stipulated conditions and reporting. In the case of indirect grants, a national sector department or public entity performs a function on behalf of a municipality or province. Thus no funds are transferred to the province or municipality concerned, but any infrastructure developed becomes the responsibility of the relevant subnational government.

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- c. Other income sources include traditional bond proceeds that are used when the government needs to repay bondholders from user revenues (including taxes), vehicle-related fees, and toll receipts¹⁹.
 - ii. Own Revenue: Local, and in some case provincial governments generate own revenue by way of rates and services charges. Surpluses generated from these sources, after providing the necessary services, may be used to finance assets. Other income sources related to transport include heavy vehicle permits, license and registration, parking fees and development impact levies. Development impact fees, typically take the form of contributions by established businesses and land development contributions.
 - iii. Public – Private Partnerships (PPP's): These partnerships may facilitate rapid infrastructure development. These mechanisms involve models for risk sharing between a municipality and its partner which may be in a better position to raise money via debt and equity to finance projects. The development of PPP's for economically justifiable projects eases the pressure on the municipality's budget and allows for better allocation of funds towards addressing the social needs of the community.
 - iv. Other income sources include Development Bank loans, bonds issued by the Infrastructure Finance Corporation, commercial bank loans and Municipal bonds. Income can also be acquired from donations and loans at favourable interest rates offered to the road authorities by organisations like the African Development Bank (AfDB), the Southern African Development Bank (SADB) and the World Bank. The conditions and covert costs of these loans and donations must, however, be thoroughly considered before they are accepted. When the construction of a facility with an expected lifespan of 20 years or less is under consideration, loan finance offers the advantage that the costs

can be spread so that the present generation of users does not have to subsidise the next generation.

- v. Local authorities can also use loan capital but money is seldom borrowed to finance the interurban road system. The inherent danger of loan financing lies in over commitment. Schutte and Jurgens (1980: 39) argue that the sensible use of loan financing offered advantages because it makes it possible for the state to supply a higher quality of infrastructure at an early stage, whether inflation is a consideration or not. Under inflationary conditions, the use of loan finance offers the further advantage that the loan is actually repaid in "cheaper money", providing that the inflation rate is higher than the applicable interest rate.
- vi. Governments can also use non-traditional and sometimes innovative approaches to fund transport infrastructure and maintenance. These are becoming increasingly important, and deserve attention as potential sources of income. Grant anticipation revenue vehicles are any debt-financing instruments (bonds, notes, certificates, mortgages, or leases) that a government issues whose principal and interest are repaid primarily by future government-aided funds. Similarly, private activity bonds are debt-financing instruments authorised for highway and intermodal transfer. Government credit assistance can be used, whereby the government provides provinces with direct loans, loan guarantees, and lines of credit for major transport infrastructure projects. Public-private partnerships establish a contractual agreement between a public agency and a private-sector entity to collaborate on a transport(ation) project.

In South Africa, very few of these measures are used to fund transport infrastructure. Most funds for road infrastructure is obtained from the equitable share allocations from National Government. National government in turn, collect most revenue from road users via the fuel levy

¹⁹ A bond is a debt investment in which an investor loans money to an entity (typically corporate or governmental) which borrows the funds for a defined period of time at a variable or fixed interest rate. Owners of bonds are debtholders, or creditors, of the issuer. The money paid to the issuer by the

purchaser or underwriter of a new issue of municipal securities. These moneys are used to finance the project or purpose for which the securities were issued and to pay certain costs of issuance as may be provided in the bond contract.

(See Table 2: Road-generated revenue ('000)). The following section will briefly present some practical costs recovery methods that are available, and can be used in South Africa to charge users for the use of roads.

2.2.2 Practical road cost recovery methods: Vehicle ownership and vehicle use taxes, charges, levies and other income sources

Section 2.1.2 discussed the general income sources available to finance road transport infrastructure. This section provides an overview of potential sources of income, from road users, that the national, provincial and local authority can access to fund roads. Seven types of income sources are discussed.

2.2.2.1 Road user levies

(a) Toll systems

A toll system involves a levy or toll fee for the use of a facility. This money has the following purposes:

- i. To finance expensive facilities (e.g. bridges, tunnels, and high quality roads) according to the principle of 'the user pays' when current road taxes do not make provision for such facilities
- ii. To charge the users of a facility on fairer grounds according to the damage done to the facility as a result of use
- iii. To expedite to provision of expensive facilities when the normal budgeting process will allow for such significant investments when needed

- iv. In some instances, and if allowed under the current policy, tolls may be used to decrease traffic congestion in congested urban areas (although this is really a congestion charge)

From a transport economic viewpoint, toll money is contentious, mostly for the following reasons:

- i. Collecting the tolls can be expensive and inefficient and leads to waste of resources
- ii. If there are enough other forms of road users' levies and indirect taxes to cover the total spending on roads, a toll system could mean double recovery of road user's costs.
- iii. Toll systems discriminate against people who live near the toll facility and are thus forced to make use of it (and to pay the toll money), compared to the inhabitants of other areas who have free access to the road system without paying.
- iv. If tolls are not subject to regulation, excessive income can be extracted from users in a similar fashion that a monopolist will maximise profits as opposed to welfare. This is especially the case when no other alternatives are available to the commuters.

A general principle in the determination of toll fees is that the cost must be less than the saving which the use of the toll facility holds for the road user. It must not be higher than the perceived costs, typically vehicle operating cost, travel time and convenience, of using the best alternative route.

As a result of the higher operating costs of heavy vehicles it is possible to apply a certain extent of differentiating in toll fees. The installation of equipment to measure the axle mass (tare) will also make it possible to identify overloaded vehicles. Floor (1981:20) mentions that when it is decided to use a toll system to finance road construction, the toll fees must be kept low to prevent traffic from using a different route. He was of opinion that, given the then income distribution pattern and low rural volumes of traffic in South Africa, such low toll fees, except on certain freeways, will probably not generate enough income to cover the costs of collection. Somewhat ironically, this statement of him may still apply to present day South Africa, where large income disparities gives rise to a very diverse commuting patterns. The spatial structure of South African cities has resulted in very long travel distances and high household transport spending.

This method of funding roads is increasingly being applied in South Africa. Public resistance against the Gauteng Freeway Improvement Project (E-Toll) and subsequent toll roads elsewhere in South Africa has halted the further expansion of the toll road network.

(b) Supplementary licensing (or urban congestion charge)

This system is used to limit access of vehicles to a particular area to vehicles that possess the applicable additional license disc. This kind of road user's levy, or a congestion charge, is in reality a limiting measure which can be used successfully in densely populated areas. At the moment it is used in Singapore and some densely populated cities in the EU that apply this principle.

The main advantage of additional licensing or a congestion tax, as a method to limit traffic congestion, lies in the ability of the licensing authority to control the issuing of permits, and therefore, to an extent limit the traffic density in the area. It has a further advantage in that it generates

income, but income maximizing (by the unlimited issuing of permits) should not get in the way of the primary objective of limiting traffic.

Singapore

The first city to implement a congestion pricing system in practice was Singapore in 1975. Automobiles entering the city's central area during congested hours must purchase and display a special paper license (nowadays electronically) in their windshields. This system is called the Area License Scheme (ALS) and is still in operation. The increase in ALS fees and improvements to public transport helped to hold down the growth of traffic entering the restraint zone in the morning despite large increases in total commuting to the Central Area and in auto ownership (Knight, Faber, Vanden Brander, Putter, Enock & Ukkala, 2000).

Fourie and Freeman (1980: 26) discussed the limitations to additional licensing in South Africa and they did not foresee the introduction of such a system in the foreseeable future. They expected considerable opposition from politicians, because in the past road facilities were not provided according to supply and demand, and current land use practices developed out of the road system. A sudden rate adaptation in the urban road charges could be seen as a restriction of freedom and will increase the economic load that conveyers have to carry as a result of the rise in fuel prices. Because of the lack of suitable alternatives, inhabitants of far-lying areas are forced to travel by car. A further problem they identified was that the motorists who would probably have to use the additional licenses are already marginal users who can hardly afford to use their cars. Such a system will thus be regressive in nature.

Another problem with congestions charges is that these charges may impact on the attractiveness of the urban area (CBD) since it will raise prices. In the absence of suitable public transport options and associated

taxes on the main sub-urban highways, congestion taxes and charges may not be appropriate for South Africa. Despite these comments, cities in South Africa are increasingly faced with massive congestion challenges. It may be an opportune time to reconsider these charges.

(c) *Electronic toll systems*

Electronic toll systems comprise the attaching of electronic equipment to vehicles and next to roads in order to monitor the movement of traffic continuously. This type of kilometre-based road user charges directly charge users for each kilometre driven. The method is deemed by some to be the best solution to the problems associated with the fuel levy, as it is not influenced by technological and social trends, is not dependent on fuel sales, can be a progressive tax, can generate more income to keep up with road construction costs, and taxes for actual road use. Furthermore, it can supplement and even in future replace the fuel levy to provide sufficient income. It is a policy-sensitive alternative whereby a change in the tax will impacts road users' behaviour. It is, in theory at least, relatively easy to implement and can inform road users of the costs they pay through an itemised monthly bill (Jaffe, 2015; Coyle, Robinson, Zhao, Munnich and Lari, 2011)

These systems are not yet in place and several issues hamper their full implementation including system costs, ethical and privacy concerns and the technical requirements to make such a system tamper proof and obligatory. Several pilot projects, however, are already being undertaken worldwide (See Box 2).

2.2.2.2 *Vehicle use and vehicle ownership levies*

(a) *Taxation on fuel*

Tax on fuel is the most general way to tax road users and is used by all countries. This form of taxation is popular because of its simplicity, the ease with which it can be applied and its general cost efficiency, as well as for its most important characteristics:

- It is paid according to distance (kilometres) travelled
- It varies according to the nature of the vehicle, e.g. mass and power, and
- It varies according to the speed at which the vehicle travels and the way in which it is driven (thus the fuel levy can account for, or internalise, the cost of congestion to some extent)

An important benefit of taxation according to the amount of fuel used is the fact that it offers a good way of measuring road use which is relative to advantages as well as the satisfaction of needs. Because of the direct relationship between fuel tax and road use, it is an attractive foundation for the recovery of road costs. It is virtually impossible to evade this taxation and the administrative costs are low in relation to the total income it generates. It is further acceptable to the public because it is paid at regular intervals and in small amounts to satisfy immediate needs. Nevertheless, it is not without weaknesses including that it is unable to recover the full costs associated with heavy vehicles. A possible solution is a differentiated tax on petrol and diesel, according to which users of diesel (mostly heavy vehicle owners) pay a higher levy than petrol users. Currently diesel vehicles sales make up 35% of the vehicle fleet market in South Africa.

Three disadvantages of this method are that users do not pay realistically according to the geographic distribution of their trips. About 60 – 80% of

all trips in SA take place within urban areas, while much less than 60% of the road lane kilometres occur within these areas. Also the fuel consumption on a good road, which is more expensive to build, is lower per vehicle than on a road of poorer quality at the same speed. Finally, with increasing fuel efficiency and the increasing popularity of electrical vehicles, the fuel levy may no longer accurately reflect road use.

(b) Taxation on tyres

Taxation on tyres reflects another kind of variable cost associated with road use. Wear and tear on tyres, and thus taxation, is progressive in nature and related to use. Tyres wear faster in urban traffic, where regular brake action, speed changing cycles and corners increase friction and the tyres deteriorate faster.

However, tax on tyres has disadvantages. Although the demand for tyres is not always price elastic, an increase in tyre prices can force owners to use their existing tyres for longer, which makes tyres unsafe. Tyre prices in SA do not, at present, include any form of 'allocated road levy' component. The only form of government income from tyres is excise on certain important ingredients used during the manufacture of tyres and on

In 2015's Budget review on tyre levy, reads: "South Africa generates an estimated 108 million tonnes of waste each year, of which only 10 per cent is recycled. Government has designed additional environmental levies on a range of waste streams to help divert waste away from landfills towards reuse, recycling and recovery. Government proposes a tyre levy, with effect from the last quarter of 2015, to be implemented through the Customs and Excise Act and collected by SARS.

The existing levy arrangements for tyres as per the Department of Environmental Affairs' regulations will be replaced with the proposed tyre levy. Revenues from the levy will be deposited into the National Revenue Fund, and an on-budget allocation will be made available through the budget of the Department of Environmental Affairs for the recycling of waste tyres and other waste streams."

imported material used to strengthen steel belt tyres. The current tyre levy in South Africa is R2.30 per kilogram on every new tyre sold.

(c) Levies on vehicle spare parts

Tax on spare parts generates a relatively small income in comparison to tax on new vehicles. The purchasing of spare parts is not a good measure of road use as a lot depends on the vehicle's age, type and brand. The total income from tax on oils and grease is also unimportant and this sort of taxation is not really a suitable way to recover funds from road users. There is no allocated tax on these products at present and the customs duties, excise and import duties levied in this regard are considered to be general state income.

(d) Mass-distance taxation

This form of taxation is meant to supplement the shortfall in the income from tax on fuel paid by heavy vehicles. Although the shortfall could be made up for by heavy duty license fees, these licenses do not make provision for distance travelled, with the result that a combination vehicle that only travels 10 000 km per year pays the same license fee as one that travels 90 000 km. The tax on fuel compensates for this to a certain extent, but a fair distribution requires that the distance travelled should also be brought into account. From a theoretical viewpoint resources can be allocated more efficiently by means of mass-distance tax. Progressive rates are determined for vehicles according to mass (or the damage done to the roads). The distance travelled by each vehicle then determines the applicable tax.

The obvious disadvantage of mass-distance tax is the additional cost for the authorities as well as the consumer. On the one hand auditors, inspectors and officials must be appointed to prevent people from evading the law, and on the other side it leads to extra administration costs, record keeping and expense on odometers for transport operators. It can

therefore be asked if the advantages attached to this kind of tax justify the costs in both fairness and economic efficiency. Mass-distance tax is not applied in South Africa but has been implemented in various EU countries under the Directive 1999/62/EC of the European Parliament. Most EU countries charge hauliers operating vehicles over 3.5 tonne for using their road infrastructure. The EU has introduced the Eurovignette with the aim of recovering construction, maintenance, repair and environmental costs, ensuring fair competition and preventing discrimination²⁰.

Some European countries also impose a Vignette in addition to licence, registration and normal fuel levies. Vignette is a form of road pricing imposed on vehicles, usually in addition to the compulsory road tax, based on a period of time instead of road tolls that are based on distance travelled. Vignettes are currently used in several European countries.

(e) Taxation on new vehicles

Tax is levied on new vehicles in the form of import duty which is meant to protect and support the local vehicle manufacturing industry, and excise duty (or purchase tax) which is payable on locally manufactured vehicles. Excise duty is a steady source of income that can be adapted to promote the use of a certain type of vehicle (e.g. for safety, air pollution or saving fuel). Both types of tax are only applicable to new vehicles in contrast to annual licenses, that are payable in respect of all vehicles, old and new. Although the chief purpose of import duty might be the protection of local vehicle manufacturers, it is usually considered as a source of general state income.

(f) License fees

License fees are payable in respect of certain periods, usually a year, for the right to use a vehicle on a public road. The amount payable is

determined by a variety of factors like mass, size, engine capacity, type and value, but not distance travelled. Apart from taxation on fuel, licensing is the most common way of taxing road users. In addition to the administrative expenses of the license authorities, the income from licenses is usually used to cover fixed road costs. Because the extent of road use does not play a role in the determination of license fees, it cannot be used to discourage marginal trips.

In South Africa, license fees differ from province to province and are dependent on tare mass, regardless of the actual carrying ability, with very little consideration of the actual costs caused by each type of vehicle. There was attempts to couple license fees to gross- vehicle mass and to adapt them to more realistic levels, but this has not yet been applied.

(g) Road transport permits

In addition to annual license fees, road freight conveyers must pay for permits respecting the transport of abnormal loads. All operators that professionally transport passengers must have a permit to run such a business. Permits are not usually considered as a form of recovery of road costs and are not directly related to vehicle characteristics.

(h) Axle or Wheel tax

This type of tax, if based purely on the number of axles or wheels involved (and not on axle mass as well), is counter-productive, since heavy vehicles with a large number of axles might cause less damage to roads than heavy vehicles with fewer axles. It does, however, distinguish to some extent between light and heavy vehicles. This form of taxation is not applicable in South Africa.

²⁰ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3Al24045b>

2.2.2.3 *Parking and loading levies*

Levies on parking and loading facilities should be treated in an integrated and comprehensive approach which includes provision, management, regulation and enforcement of on-street and off-street parking as well as parking garages. Such levies require intensive monitoring and enforcement of the law. This will also include supplementary measures like preference parking for owners of residential property in order to prevent over flow parking in adjacent residential areas.

Parking and loading levies can be charged in three ways:

- i. parking permits for vehicles which enter a certain area
- ii. tax on parked vehicles
- iii. tax on parking areas

The management of parking is also increasing being privatised in South Africa.

2.2.2.4 *Trip generation levies*

A number of principles are applicable if the private sector is to pay levies for the implementing and maintenance of transport infrastructure resulting from an increase in traffic volumes (Venter Commission)²¹:

- i. The existing taxpayers cannot be expected to carry the costs of infrastructure for the establishment of new businesses. These costs include the provision of road infrastructure to provide access, road improvements to lessen the congestion caused by increased traffic, and congestion costs which will have to be carried by the community if road improvements do not take place.
- ii. Authorities should not use levies on increased traffic to make a profit from private firm owners and developers by placing a levy on infrastructure that is not provided.
- iii. Placing of levies for the provision of infrastructure should not differ from levies on other large scale services
 - a. Long term marginal costs (which are equal to average costs) must act as basis for the allocation of costs for providing services.

There are two types of levies on trip-generation, namely:

- Contributions by established businesses
- Land development contributions

(a) *Contributions by established businesses*

It is important that levies paid by established businesses due to an increase in traffic should be associated directly with the provision and maintenance of roads, in order to separate them from general taxation and other service charges. Therefore it is desirable that the levy be linked to the following trip-generating factors, namely:

- gross leasable surface
- type of land use (trade, office, industry)
- trip-generation rate for each category; and

²¹ Venter Commission, 1984, Commission of Inquiry into Township Establishment and Related Matters, 2nd Report, 1984

- number of employees

(b) Land development contributions

High category roads surely have the most tangible and visible impact of all services on the value of land. This is clear from the fact that marketers of housing estates, office and industrial developments focus on the accessibility to freeways or in certain cases, public transport. It is therefore fair that developers should make a contribution to the expansion of transport infrastructure and capacity from the profits which the existing transport network adds to their development.

Although the principle of contribution by land developers is generally accepted, the following problems are often experienced in the practical application of the principle:

- Highly trained experts are necessary to determine the extent of the contribution expected for each specific development.
- The determination of the contribution as well as the subsequent negotiations increases the development costs and can slow down the process of approval.
- In cases where developers provide specific road improvements in the immediate area, there may be a subsequent over-provision of road capacity in the short term. The impact on traffic of subsequent developments will therefore seem much smaller than what it would have been had road improvement been absent.
- New developers sometimes feel that it is unfair that they should provide infrastructure that is to the direct advantage of existing competing industries.
- Some developments take place on land owned by the state or semi-state institutions. Such developments often do not contribute to road infrastructure improvement. Still, the advantage of the lower development costs is passed on directly or

indirectly to the private businesses. Further, the development of such land is in direct competition with development on surrounding private property. This leads to unfair competition.

- The trip-generation impact of small developers is often too small to make a contribution to the provision of transport infrastructure. Collectively, however, this type of development puts pressure on the capacity of the transport system.

There are a number of formulas which can be used to calculate development contributions. The following formula was recommended by the Steenkamp commission:

$$W_2 = n ((KE/E_pE) - (LE-E))$$

Where:

W_2 = the contribution of the developer for the provision of the road or the upgrading of the existing road

n = the total utilisation in terms of trips per hour generated by the development

KE = the replacement value of the road

E_pE = the capacity of the road in terms of trips per hour

LE = outstanding loan amount on the facility

E = the existing utilization of the road without the generated traffic.

The biggest weakness of this formula is the practical application thereof on an urban traffic network where the generated traffic is spread over the total road network.

2.2.2.5 Commercialisation

a) Service Delivery

It happens that private institutions require service from road officials, such as the collection of data or the approval of access applications. The delivery of such services contributes to the overall administration costs of road authorities. The opportunity exists to charge service delivery fees for, amongst others, the following administrative activities:

- Administrative fees for the checking and approval of traffic impact study reports
- Application fees for the approval of access to the metropolitan transport network
- Advertisements and sponsorships of studies and publications; and,
- The sale of data like traffic studies and charts.

b) Income from assets

If road authorities own assets from which an income can be earned, these can be considered as a source of income. Such income must, however, be considered as coincidental and authorities should not purposefully acquire assets with the exclusive purpose of generating an income from them. If road authorities purposefully speculate with property and infrastructure it can bring them into competition with the private sector, and therefore a

competitive advantage might exist in the granting, for example, of access to private developments. Income from this source should therefore be subject to guidelines in this regard.

Assets which can generate income include the following;

- Interest on surplus funds,
- Hiring out or selling property which was nationalized for transport infrastructure purposes
- Cooperation with the private sector regarding the development of facilities, e.g. shopping centres near transport facilities,
- Shares in businesses in exchange for the provision of the transport infrastructure necessary for the success of the business,
- Utilize the right of way to infrastructure by, for example, hiring out advertisement boards in the road reserve.

2.2.2.6 Local government tax

(a) Property and land taxation

Property tax is considered everywhere as a source of income for local authorities. The use of local taxation for the financing of roads is often advocated because it is spread equally, is relatively easy to administrate and is cheap, and because it is to a large extent proportional to economic potential. Inequalities which might exist are mainly the result of differences in housing density and family income. Road financing by local authorities must also compete with the provision of health services, facilities and other essential services.

c) Service levies

More than half of the income of local authorities comes from service fees levied by the service departments (especially the electricity-, public transport-, water- and sewerage departments) (Freeman 1981: 285). These levies are usually proportional to the service delivered and cross-subsidizing is therefore minimized. As it is economically desirable to finance such services as far as possible from the levy, road provision cannot be subsidized by means of cross subsidization. On the other hand, the provision of roads can be seen as a service and thus parking fees and parking levies are suitable instruments for the recovery of road costs.

2.3 Dedicated road funds vs general income funds

A dedicated or earmarked fund is a legislative provision that directs approved funds to be spent on specific programs. In the case of road funding, such a fund typically refers to a dedicated road fund, sustained by some form of direct user charges, used for the exclusive purpose of funding road construction, upgrade and maintenance. This type of fund holds numerous benefits including (i) ensuring a guaranteed minimum level of funding for essential infrastructure such as roads; (ii) provides for some stability of funding, since variability can be introduced when the road budget is part of the normal budgetary process; and (iii) establishes a causal link between taxation (income) and spending (expenditure) and can therefore give road authorities the necessary indication of the efficient allocation of resources.

Although the earmarking of funds for the capital costs related to providing roads (i.e. construction costs) is not always justified by the returns thereon (in comparison to the rates of return in other infrastructure sectors), there is still much to recommend the earmarking of funds for road maintenance.

For example, earmarking may ensure earlier maintenance on existing roads and that 'savings' because of postponed maintenance does not lead to greater expense in the future.

Probably one of the biggest benefits of earmarked road funding is that it may safeguard funds for critical road services, such as the routine maintenance of national roads and the upgrading of rural roads, from political inertia and indifference. During periods where road funding is under pressure from other funds, a dedicated road fund may ensure continuity.

Despite these benefits, dedicated road funds exhibit serious shortcomings, including that (i) they hamper effective budgetary control, as such a fund is outside of the control of a single authority; (ii) they may lead to a misallocation of financial resources by concentrating too much funding on the earmarked activities at the cost of other needs; and (iii) they tend to make a budget inflexible.

Funds are usually earmarked by the creation of a trust fund, like the Highway Trust Fund in the USA, or the National Road Fund, which was used in South Africa from 1983 to 1988. These funds offer the advantage that road authorities are assured of a steady and predictable source of income, instead of being dependent on taxes paid into the state's general income account and then transferred in the form of annual allocations. National treasuries tend to prefer the latter procedure, because it makes it possible to adapt the allocations according to the varying priorities of road provision and other community needs, as resources for roads typically decrease funds for other necessary infrastructure or social demands. In addition, road budgets are often subject to a predetermined policy stipulation; and the delegation of road financing decisions to the executive (Roads Authorities), rather than to the legislative authority (Treasury and National Government) may lead to an allocation of resources which does not

correspond to the public's valued priorities (Dehlan and Mitchell 1980: 204).

It is important to understand that a road fund need not be a lasting option. In fact, it is often considered a short-term approach to solving the longer-term objective of securing sufficient income for roads. Bousquet and Queiroz (1996) note that a road fund can represent a good solution if two conditions are met: (i) the transport sector is efficiently administered at all levels of government; and (ii) the overall budget is not efficiently managed. To this can be added the requirements of (iii) inadequate funding for the roads sector, (ii) inconsistency or changeableness of the budget, and (iii) a mismatch between the user-pay principle and what users actually pay. A dedicated road user fund does not make sense if the road user charges is not based on actual cost incurred by individuals.

Sufficient funding and, by proxy, good-quality roads, are not necessarily dependent on a dedicated road user fund. Most European countries do not have a dedicated road fund, but they have good roads. The USA, on the other hand, does have a dedicated road fund, but the fund is frequently in severe financial difficulty requiring federal bailouts. Large-scale road projects in the USA are also frequently funded at state or county level with an increase in sales or even personal tax as opposed to transfers from the Highway Trust Fund.

The effective management of the roads sector and the quality of the roads not only rely on adequate funds being made available to the road agencies, but also on transparency with regard to both income (funding) and expenditure and on the condition that road users pay their fair share of costs.

As noted in the introduction to this section, South Africa does not have a dedicated road fund. All allocations to the roads sector are made from the National Revenue Fund. There have been calls to establish a dedicated road

fund for South Africa (see Box 1). However, an earmarked road fund for South Africa is not possible given the current political, institutional and fiscal policy environment. An earmarked fund is really only suitable if user taxes and charges reflect road user costs. On a more technical level therefore, an earmarked road fund would require the empirical estimation of what users should contribute, i.e. their true costs, and their current road user charges. Using these charges and costs as basis, an economic efficient road user charge can be set. Ultimately, an earmarked fund may even generate insufficient funds if various conditions associated with economic efficient prices are not met or present.

The following sections will present in more detail the South Africa road-funding framework, assessing what user current pay as well as what they should potentially pay.

Cape Town - A proposed road maintenance fund is likely to win favour, but questions remain over how it will be operated as current legislation does not make provision for ring-fenced funds such as this.

About R120bn is needed to maintain the country's roads, many of which have become riddled with potholes due to poor planning, with recent heavy rains having made the situation worse.

On Tuesday, Transport Minister Sibusiso Ndebele indicated that his department would either set up a dedicated road maintenance fund or adopt the creation of such a fund as policy.

A statement from the department of transport said that the minister, along with the provincial transport MEC, called for the "finalisation of a proposed ring-fenced multibillion-rand programme for the maintenance of South Africa's road network."

Democratic Alliance (DA) shadow transport minister Stuart Farrow welcomed the statement.

A source in the National Treasury, who spoke on condition of anonymity, said that, while such a fund made some sense, the problem was that the Public Finance Management Act - the overarching law that governs state spending - does not make provision for ring-fenced funds.

"The way the Public Finance Management Act works is that all funds received, from taxes and levies, go into a centralised 'pot' and then are appropriated in the budget as part of government's spending priorities," the source said.

Farrow said the established Road Accident Fund receives its annual appropriation of about R35bn without much trouble.

"The point is that there are a lot of little taxes and levies that go into the funding government. Something can be done to either ring-fence the funds or condition the monies received to go back into maintaining roads," Farrow said.

Farrow's view is that the introduction of a dedicated road maintenance fund could help to ensure that provincial and local governments tackle serious road infrastructure problems, and that money is distributed systematically based on which areas need it the most.

(Source: <http://www.fin24.com/Economy/Proposed-road-fund-raises-questions-20110202>)

Box 4 Example of a call for a dedicated road fund

3 The South African road funding framework

Understanding the South African road funding policy framework is a challenging task, requiring a sophisticated appreciation of the political and administrative responsibilities of various government departments and the plethora of state-owned entities (SOE) or corporations. The collection of funds for the transport sector, which includes the funding of the road network, spans all three spheres of government and at least six road transport and associated state-owned entities. This section aims to unpack the South African road funding regime in quantitative monetary terms.

Ensuring adequate income for road maintenance and new construction is as much dependant on setting appropriate road user's charges as it is on dependant on a sound institutional and policy framework. Furthermore, road user fees, vehicle levies and vehicle purchase taxes, such as the fuel levy and annual registration fees, are strong policy instruments and, if correctly implemented can be used to promote sustainable travel, stimulate efficient land use patterns and even to transfer income to lower-income communities. Despite the importance of this well-recognised role, there is no single entity responsible for setting road tariffs or levies, and no single authority responsible for allocating and distributing the funds to the various implementation agencies. While National Treasury is ultimately responsible for the initial distribution of the funds to the various recipients, other state departments, notably the Department of Transport, are responsible for providing the policy guidance with regard to the demand for funding, as well as possible alternative income sources. The following section outlines the South African road funding framework, and aims to identify the current magnitude of revenue generation from road users and the expenditure thereof on the road system.

3.1 South Africa's road network, vehicle fleet and logistics performance

South Africa boasts the world's 10th longest road network and 18th longest paved road network (CIA, 2006; Kannemeyer, 2013). The country has an estimated road network length of 750 000 kilometres (2015), which consists of 158 124 kilometres of paved roads and 591 876 kilometres of gravel roads (National Department of Transport, 2016). SANRAL, a parastatal which also tolls 3 120 kilometres of South Africa's national roads, is responsible for 2.85% of the network (SANRAL, 2015a). For the remainder, 36.48% of the network falls under the jurisdiction of individual provinces; 8.82% under metropolitan cities; 34.26% under that of municipalities; and 17.59% of all roads are not proclaimed. The value of the road network was estimated at between R1.2 and R2 trillion rand in 2014 (National Treasury, 2015).

Since 1998, the portion of the national road network that was older than its original 20-year design life has grown from 36% to 78% in 2008 (Kannemeyer, 2011). This is mainly due to an estimated road maintenance backlog of R197 billion (Kannemeyer, 2014). The condition of the south African road network varies between transport authority and type of road. Overall, 30% of the network was in poor to very poor condition in 2008, 30% in fair condition and 40% in good to very good condition. Although the condition of the paved network is slowly deteriorating across the country, SANRAL is faring exceptionally well maintaining over 60% of its roads in good to very good condition (Kannemeyer, 2013).

According to eNatis, there were 10.35 million self-propelled vehicles using the country's roads network in 2014 (eNatis, 2015b). This translates into 191 vehicles per 1000 members of the population. From the available statistics, the annual growth in the vehicle population is estimated at around 4%. The combined vehicle fleet travelled an estimated 162.40 billion kilometres in 2014 (RTMC, 2014) with an estimated 30% of these

kilometres on the national road network maintained by SANRAL (SANRAL, 2015b).

In terms of vehicles per capita, South Africa ranks 85th in the world²². Consequently, the extensive road network is only serviced by a relatively small vehicle population which will have an implication on the user's cost responsibility. This mismatch between network size, representing the supply, and number of vehicles, representing the demand, implies that the funding requirement and resulting allocation to roads (upgrading, maintenance or expansion) will be proportionally more when compared to countries with a more even balance of road users and road network (see Figures 17 / 18). In short, if the network is bigger, the fleet or road user group should also be bigger. If not, road users will either be paying proportionally more (if there are fewer road users) for the network or proportionally less (if there are more road users).

South Africa's road network is fairly well aligned with the best international standards. The Global Attractiveness Index, a composite index of a country's investment attractiveness, reveals that the country ranks, overall, around 47 – 55 (out of 144) but that roads ranks 37th out of 144 countries in terms of their quality²³. This is in stark contrast to South Africa's electricity supply (99th out of 144) and fixed telephone lines per 100 of the population (90th out of 144).

²² Some of these vehicles may not be private vehicles or necessarily used on roads on a regular basis (such as tractors). A more accurate estimate of the number of vehicles on the road may be closer to 9 million resulting in 165 vehicles per 1000 of the population.

²³ The Global Attractiveness Index maps 144 economies from all over the world, evaluated according to 50 Key Performance indicators and provides an overall organized ranking. http://www.ambrosetti.eu/wp-content/uploads/2016-GlobalAttractivenessIndex_Highlights.pdf

²⁴ In economics, diminishing return is the decrease in the marginal (incremental) output of a production process as the amount of a single factor of production is incrementally increased, while the amounts of all other factors of production stay constant.

Similarly, the country ranks 20th in terms of the Global Logistics Performance Index and is the leading BRICS nation on the index (The World Bank, 2016)(Stellenbosch University, 2015). South Africa's good overall logistics performance is really the result of the quality of our overall infrastructure and timeliness in terms of deliveries and good road network. Softer knowledge skills, which includes logistics, maths and science, are really the factors that hinder the country's performance and not so much the quality of the transport network.

South Africa will find it difficult to dramatically improve its ranking on both these indices by expanding the current road network. The country's current good rating and the principle of diminishing return from increased investment imply that the benefits of road investment will be marginal, and demand large capital outlay^{24/25}. The opposite, however, also hold in that the country can very quickly loose its favorable ranking if the road infrastructure is not maintained to acceptable standards leading to the road infrastructure losing it high ranking.

South Africa, as the 25th largest country in the World, does possess an extensive and good road network which contributes to the global competitiveness of the country and generally support freight logistics. In fact the road network outperform indicators such as GDP (PPP) and GDP per capita (31th and 97th in the world respectively), human development index (119th in the world), quality of math's and science (139th) and the country's dismal GINI-Coefficient score (2nd worst in the world²⁶).

²⁵ Note that this only refer to specifically adding additional road length. Urban road capacity enhancements and investing in urban transport systems may in fact have considerable benefits for the country by facilitating urban development and productivity improvements.

²⁶ Implementing marginal social costs as pricing rule is based, among other, on the assumption that income is optimally distributed. Such a poor GINI coefficient does indeed indicate that this is not the case in South Africa.

Maintaining and upgrading such a comprehensive road network will place significant demands on financing and funding. The following section discuss the income derived from road users and compares this to international standards.

3.2 Total road-generated revenue and revenue per kilometre

Only the South African National Government is mandated to collect income via tax such as personal income tax, company income tax, value added tax and also the fuel tax. All revenue collected by National Government accrue to the National Revenue Fund administrated by National Treasury from where it is shared with the various government departments and government entities. Provincial and Municipal Government (municipalities) do not tax individuals but can access many sources of funding including rates and service charges, for example property rates, levies and permits in addition to their equitable share allocation and additional government grants²⁷.

Road users pay various taxes, charges and fees as a result of owning and operating a vehicle to all three spheres of government and state-owned entities involved in road operation and management. In 2014, R 166.4 billion was collected from road users (Table 2). National government collected 70% of the proceeds, of which the fuel levy comprised 29%. Provincial governments collected 4% from road users (traffic infringements, licenses and local permits), 6% was collected by local governments, and the state-owned entities (SANRAL, Road Accident Fund, Cross Border Road Traffic Agency, Driving Licence Card Account, Road

Traffic Infringement Agency and Road Traffic Management Corporation) collected the remaining 20% of the revenue.

This income from road users can be divided into direct and indirect (shaded lines) income (Table 2). Direct income is related to the actual use of vehicles and the road network, termed road generated revenue (RGR), and fluctuates based on the type of vehicle and road use. Indirect income is not associated with actual vehicle use and are general taxes that governments use to fund general expenditure and cannot be considered an earmarked tax for a specific purpose. The total direct revenue generated in South Africa during 2014 was R99 billion. The biggest contributors to the total income were the fuel levies (a tax), which consisted of R2.25 and R2.10 per litre respectively of petrol and diesel sold during the 2014/15 financial year. A separate tax of R1.04 per litre, on petrol and diesel, was ring-fenced for the Road Accident Fund (SAPIA, 2014).

²⁷ Property taxes are in fact local charges and levies for services rendered such as refuse removal etc. South Africans often incorrectly refer to these charges as property taxes.

Table 1: Road-generated revenue ('000)

Thousand	2010	2011	2012	2013	2014	%	Collected by
Fuel levy	R 34 417 577	R 36 602 263	R 40 410 389	R 43 300 000	R 47 516 564	29%	National Government
Road Accident Fund*	R 14 474 058	R 16 989 071	R 17 380 217	R 20 352 981	R 22 457 948	13%	SOC
Fines / fees and permits	R 9 011 537	R 10 988 624	R 12 933 722	R 10 853 033	R 10 678 864	6%	Provincial Government
License fees	R 5 057 977	R 5 953 006	R 6 530 434	R 6 765 016	R 7 349 077	4%	SOC and municipalities
Toll fees:							
concessions**	R 3 987 937	R 4 605 700	R 5 029 190	R 5 420 129	R 5 846 819	3%	SOC
Toll fees: SANRAL	R 2 073 060	R 1 987 379	R 2 199 090	R 2 759 839	R 4 221 433	3%	SOC
Co2 emissions	R 625 891	R 1 617 353	R 1 567 382	R 1 636 848	R 1 684 160	1%	National Government
DSML	R 51 000	R 53 000	R 152 000	R 140 000	R 170 000	<1%	National Government
Pipeline levy	R 31 000	R 32 000	R 33 000	R 35 000	R 37 000	<1%	National Government
IP Marker levy	R 1 000	R 1 000	R 1 000	R 1 000	R 1 000	<1%	National Government
VAT on vehicle sales	R 28 197 380	R 31 099 740	R 34 993 000	R 37 154 040	R 37 893 660	23%	National Government
Import duties:							
vehicle	R 10 442 000	R 14 348 000	R 18 702 000	R 21 635 000	R 22 567 000	3%	National Government
VAT on vehicle parts	R 3 909 640	R 4 126 080	R 4 496 380	R 4 788 700	R 5 009 760	14%	National Government
Custom and excise levy	R 817 000	R 847 000	R 875 000	R 922 000	R 981 000	<1%	National Government
TOTAL REVENUE ***	R113 097 057	R129 250 216	R145 302 804	R155 763 586	R166 414 285	100%	
Direct income	R 69 731 037	R 78 829 396	R 86 236 424	R 91 263 846	R 99 962 865	60%	
Indirect Income	R 43 366 020	R 50 420 820	R 59 066 380	R 64 499 740	R 66 451 420	40%	

* SARS also collects revenue on behalf of the Road Accident Fund (RAF)

** This is an estimate based on AADT and tariff

*** Other income sources from road users include: (1) developer contributions, (2) parking fees and permits, and (3) tyre tax (R500 000 000 in 2015)

(Various sources including: Road Accident Fund, no date; SAPIA, no date; Department of Energy, 2013; South African National Treasury, 2014; Statistics South Africa, 2014, 2016, National Treasury, 2014a, 2014b; International Transport Forum, 2015; Arrive Alive, 2016; Bakwena N1N4 Toll, 2016; Trans African Concession, 2016; N3TC, 2016; SANRAL, 2016)

The price of a litre of petrol in March 2015 was R11.27. Of this, the fuel tax components comprising the fuel levy, Road Accident Fund levy, DSLM, pipeline levy and tracer dye levy, amounting to R3.39 accrued to the National Revenue Fund. Road generated revenue made up on average almost 30% of the price per litre of fuel during that year (Department of Energy, 2013).

Putting this into perspective; accepting the direct revenue of R99 billion and an estimated average distance travelled of 162 billion kilometres per annum (2014), the average South African vehicle, irrespective of vehicle

type or fuel efficiency, using an internal combustion engine, adds R0.62 per kilometre to this direct revenue, of which the fuel levy contributes R0.29 per kilometre. In comparison, an average electric vehicle would pay only R0.17 per kilometre as it would not use any fuel and as such not be liable for any fuel taxes. In terms of indirect revenue, the payment is R0.41 per kilometre for both normal and electric vehicle motorists as this revenue is not related to vehicle or road use. In total, therefore, the *standard* road user is paying roughly R1.02 per kilometre for road use, while an average electric-vehicle road user will pay only R0.58 per kilometre. Note that we are referring to the average vehicle. No distinction is made between vehicle types. Typically heavy vehicles will pay more per vehicle kilometres and normal vehicles will pay less.

These per-kilometre user costs were compared to the Income and Expenditure Survey data available from Statistics South Africa (Statistics South Africa, 2011) which indicated similar results. Data from the survey was projected to 2014 values in order to estimate the percentage of their monthly income that road users spent on transport. Assuming an estimated average distance travelled of 15 000 km per annum and a vehicle with a fuel efficiency of 12 l / 100 km (0.12 litres per kilometre), the average South African road user using an internal combustion vehicle will pay R0.62 per kilometre in terms of direct cost. Similarly, an average electric vehicle road user travelling the same distance would pay only R0.18 per kilometre. In terms of indirect revenue, the user contribution is R0.41 per kilometre for both normal and electric-vehicle motorists. This means the average normal vehicle road user is paying R1.02 per kilometre for road usage and a hypothetical average electric-based road user would pay only R0.59 per kilometre, a reduction of 42% in income.

In summary: During 2014 – 2015, R99.9 billion was collected from road users through various charges, levies and taxes by *all levels of government*. This income was collected from a *vehicle fleet* of 10 350 835 travelling a distance of 162 405 499 396 kilometres using the 746 835 kilometres of roads in South Africa. Road users charges resulted in R0.62 of direct income collected per vehicle kilometre²⁸.

3.3 An overview of road expenditure in South Africa

Determining the expenditure on roads in South Africa is a tricky task, made complex by the fact that all three spheres of government and the state-owned entities receive income transfers from the National Government, but also collect their own funds. In addition, not all transfers and own income are dedicated to road expenditure. There is no single government department, agency or organisation responsible for monitoring or evaluating road infrastructure expenditure. Determining road expenditure for the country is therefore a meticulous process of unpacking the financial statements of all accountable road authorities for income, general expenditure and expenditure on road infrastructure. This is what the following section aims to do.

For the 2014 – 2015 financial year, SARS collected R49.4 billion from road users with local and provincial government and SOE collecting the remaining R49, 6 billion to account for the R99 billion as shown in Table 2. This R49.4 billion represents roughly 5% of the total tax revenue, R986 billion, collected for the 2014/15 fiscal year. It is the mandate of National Treasury to share all income with, among others, the various local and provincial governments via the state departments.

²⁸ No distinction is made between vehicle type such as normal passenger car or heavy goods vehicles.

The National Department of Transport (NDoT) received a transfer of R48.7 billion from Treasury, or roughly 50% of the direct income, i.e. what is collected from the road users of the road network (2014). Of this amount, the NDoT transferred R32.3 billion to the SOE's, provincial and municipal governments for road infrastructure and road sector operational activities. This includes conditional grants to provincial (R14.1 billion) and municipal government (R5.9 billion) and SOE's to be used for road infrastructure and road operations activities. The remaining R17.1 billion was allocated by the NDoT to other programs including Rail and Maritime Transport, Civil Aviation, administration, etc.

The Road Accident Fund (RAF) also collected funds (R22.4 billion in 2014) from road users in the form of a levy raised on fuel²⁹. As with all other taxes, the RAF levy is paid to the South African Revenue Service (SARS), who pays it to the RAF in accordance with provisions of the Customs and Excise Act, 1964 (Act No. 91 of 1964) and the Road Accident Fund Act 56 of 1996.

In addition to the transfers from the NDoT, SOE as well as Provincial and Municipal Governments may also use their own revenue to fund any road operation activities and infrastructure investment. Income sources include road user tolls (R10 billion) in the case of SANRAL (including its concessionaires), local licencing fees, parking and permit charges in the case of Provincial and Municipal Governments (R18 billion). Furthermore, the provincial and municipal government may also access loans, government grants and their equitable revenue share or own receipts from

²⁹ In fact, in the period under study, the RAF collected the second-most revenue from road users after the general fuel levy.

non-transport related activities (such as property tax) to fund transport infrastructure and operations³⁰.

For the 2014 – 2015 financial year, R119.5 billion was spent on road network infrastructure, operations and regulation in South Africa. Of this amount only R49.2 billion (Table 3) was spent on road infrastructure while the remaining R70.2 billion was spent on road operations and regulation³¹. Only SANRAL, Provincial and Municipal Governments were responsible for the R49.2 billion road infrastructure investment. All spheres of government and all the SOE's (SANRAL, Road Accident Fund, Cross Border Road Traffic Agency, Driving Licence Card Account, Road Traffic Infringement Agency and Road Traffic Management Corporation) contributed to the operational expenditure of R70.2 billion.

Table 3: Road infrastructure expenditure

(Thousand)	2010	2011	2012	2013	2014
National Government	-	-	-	-	-
Provincial Government	R 14 269 254	R 15 993 253	R 17 634 059	R 18 571 254	R 20 169 802
Municipalities	R 9 893 480	R 12 260 308	R 12 181 889	R 13 564 588	R 14 507 056
SOEs	R 18 972 179	R 15 852 104	R 15 191 965	R 15 253 520	R 14 584 260
SANRAL	R 13 523 456	R 12 638 823	R 12 881 594	R 13 079 213	R 12 850 991
SANRAL: concessions	R 5 448 723	R 3 213 281	R 2 310 371	R 2 174 307	R 1 733 269
Total	R 43 134 913	R 44 105 665	R 45 007 913	R 47 389 362	R 49 261 118

(Source: National Treasury, 2014; SANRAL, 2015a)

In summary: The National Department of Transport assisted the provincial and municipal governments as well as some SOE with road infrastructure and operations grants totalling R32.2 billion. These entities also allocated part of their equitable share income from National Treasury (general tax revenue sharing) or used their own revenue collected (either from vehicle ownership or road use activities) for road infrastructure investment. In total, R49.2 billion was spent on *road infrastructure* by SANRAL, provincial and municipal governments. Furthermore, all authorities spent R70.2 billion on road operations and regulation resulting in R119.5 billion being spent (R0.74 per vehicle kilometre) on road infrastructure, regulation and operations.

Figures 2 and 3 illustrates the collection of the R99 billion collected from road users, the distribution of the R32 billion in infrastructure and operations grants, and how South Africa spent the R119 billion on its road network infrastructure and operations.

³⁰ It proved very difficult to extract this other income, i.e. not transfers and not own income. Some reverse budgeting was done to determine the amount. That is, from the total expenditure on roads (funds allocated to roads) was subtracted the operational grants received from National Government, the infrastructure grants received and the own income generated. What remained after this was determined other income.

³¹ Road operations and regulation is defined as *Costs involved in administrating the operational and regulatory systems for a functioning road sector e.g. salaries, building rent, computers, consultant fees etc.*

Summary

During 2014 – 2015, R99.9 billion was collected from the road network and road users through various charges, levies and taxes by all levels of government. This income was collected from a vehicle fleet of 10 350 835 travelling a distance of 162 405 499 396 kilometres using the 746 835 kilometres of roads in South Africa. Road users charges resulted in **R0.62** of direct income collected per vehicle kilometre

R49.2 billion was spent on road infrastructure (planning and design for road upgrade, maintenance and new construction) by SANRAL, provincial and municipal governments. All authorities spent R70.2 billion on road operations and regulation resulting in R119.5 billion being spent on road infrastructure, regulation and operations. This investment was spent on 746 835 kilometres of roads as well as the supporting operational and regulatory agencies in South Africa, used by a vehicle fleet of 10 350 835 travelling a distance of 162 405 499 396 resulting in an investment of **R0.74** per vehicle kilometre.

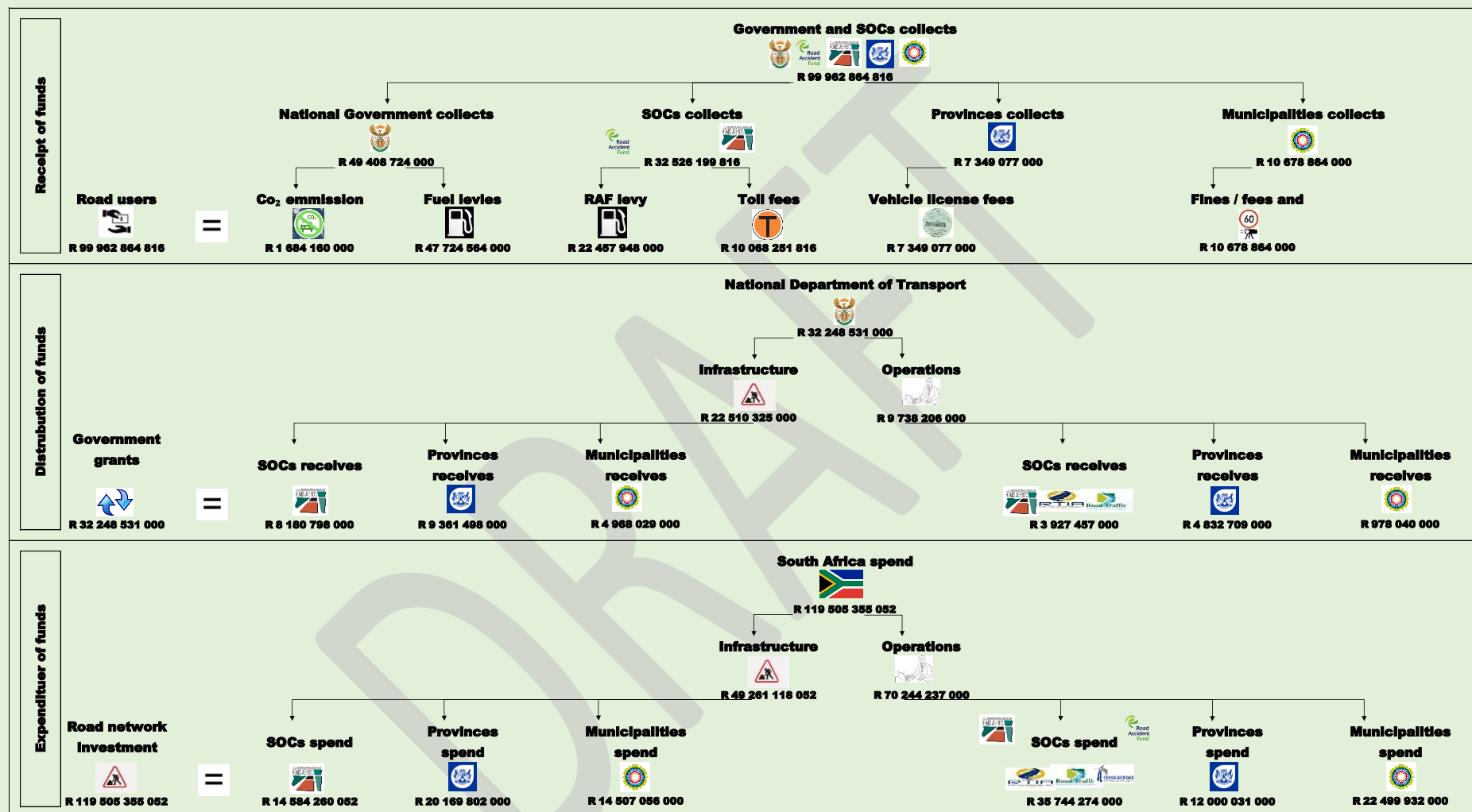


Figure 2: Road-generated revenue, distribution and expenditure

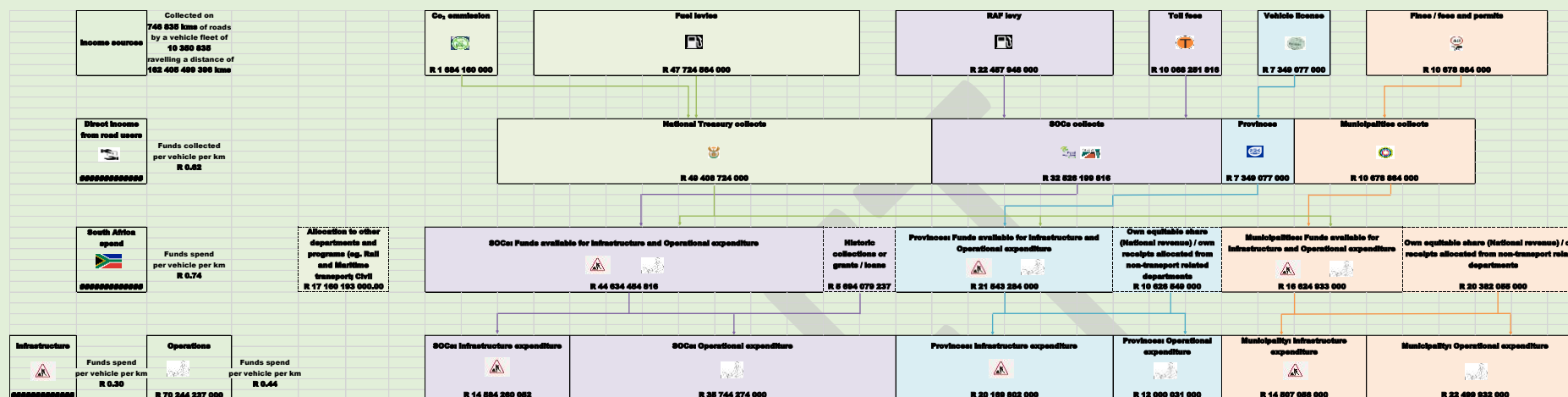


Figure 3: Road-generated revenue, distribution and expenditure

3.4 Comparing South Africa to the rest of the world

Comparing South Africa's road funding framework internationally may illustrate the similarities and differences between national policies, and in so doing identify the impact of different funding approaches on road expenditure levels. This section adopts the process used by Gomez and Vassallo (2014) in their study "A Comparative Analysis of Road Financing Approaches in Europe and the United States". Three ratios were calculated in order to compare the South African road expenditure model:

- the *road expenditure to revenue ratio (RE ratio)*,
- the *road expenditure to GDP ratio (RE/GDP ratio)* and
- the *road allocation to revenue ratio (RA ratio)*.

The RE ratio shows the funds spent on roads, including construction and maintenance, for every Rand charged for road use. It is obtained by dividing road expenditure (RE) by road-generated revenue (RGR). Figure 4 shows the RE ratio for developed countries (Europe and the United States) for the period 2004 to 2009 (Gomez & Vassallo, 2014) and for South Africa for the period 2011 to 2014. While the periods do not coincide due to the unavailability of data, the general trend can still be observed.

Road Generated Revenue (RGR): All monies in the form of taxes, levies and charges collected from road users related to the direct and indirect use of the South African road network

Road Expenditure (RE): All monies spent on roads including both new construction and maintenance, by different levels of government and state-owned entities (note that this does not include administration).

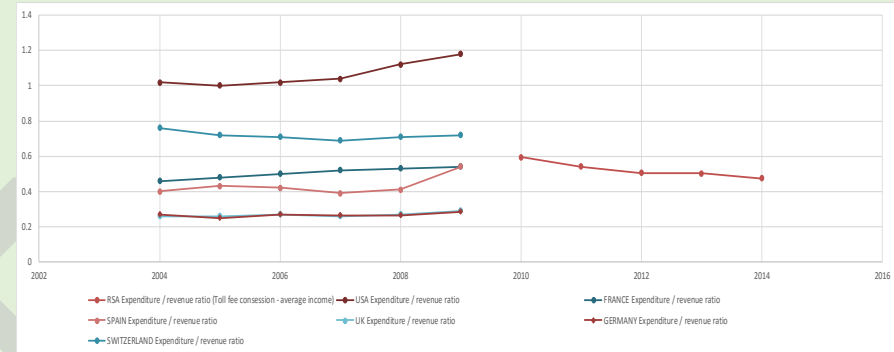


Figure 4: Road expenditure to revenue ratio, RE ratio, for selected countries (Various sources including: Own calculation, (Gomez & Vassallo, 2014))

Three groups of countries can broadly be distinguished: first, nations with a high commitment (more than 60%) of road revenues to road infrastructure. These include the United States and Switzerland. Second, countries with an average (40-50%) commitment of road revenues to road infrastructure, including France, Spain and South Africa. Third, countries with low levels of revenue commitment to expenditure (30% or below), which include Germany and the United Kingdom.

Figure 4 reveals that the road-generated revenue of all the selected countries greatly exceeds road expenditure, with the exception of the United States. Most countries also use some of their road-generated revenue for other general government expenditure, and few nations have a ring-fenced road fund. The United States has a ring-fenced highway fund, the Highway Trust Fund, into which all road-generated revenues are allocated³². This Highway Trust Fund is, however, frequently under severe fiscal pressure and requires frequent bailouts from the Federal Government.

³² The federal Highway Trust Fund (HTF) is capitalized by 18.3 cents per gallon federal gas tax. The tax has not been raised since 1993 and annual HTF revenues have shown limited growth because of increased vehicle fuel efficiency and reduced growth in vehicle miles traveled.

The RE/GDP ratio shows the total funds spent on road construction and maintenance for every South African Rand the country generates through the production of goods and services (measured at nominal prices) or the ratio of road expenditure to GDP. Figure 5 indicates that South Africa, on average, spends a proportionally greater share (1.2-1.6%) of its GDP on road construction and maintenance than developed countries (who spend 0.1-1.4%)³³. The data for South Africa was only available for the period from 2011 to 2014, while the data for the other countries was available from 2004 - 2014 (Statistics South Africa, 2016). As correctly stated by Gomez (2014), these ratios are not necessarily comparable, since they may vary according to population number, population density and size of the countries and road networks. Given that most other countries shown in the graph are all developed countries, South Africa's higher ratio may be a reflection of the country's commitment to infrastructure-led growth and investment in economic infrastructure, which includes roads, ports, electricity, etc. South Africa, however, does seem to allocate a reasonable share of its GDP to roads, but this share is steadily declining as other sectors of the economy receives greater political attention. The international average in 2014 was 0.67% of GDP spent, with South Africa at 1.29%.

The RA ratio shows the share of road-generated revenue earmarked for road construction and maintenance projects (Figure 6). The United States has the highest RA ratio as it earmarks federal and state taxes to road construction and maintenance projects. Switzerland mainly allocates vignettes (a form of road pricing), fuel tax and heavy vehicle fees to this purpose. South Africa ranks third in terms of road allocation. In the case of South Africa, some assumptions were made with regard to toll concessionaire revenues as this data is not published³⁴.

³³ For the period 2011 – 2014, the fuel levy as percentage of GDP averaged 1.2% and only increased to 1.4% in 2015
(<http://www.sars.gov.za/AllDocs/Documents/Tax%20Stats/Tax%20stats%202015/Tax%20Stats%202015%20Highlights.pdf>)

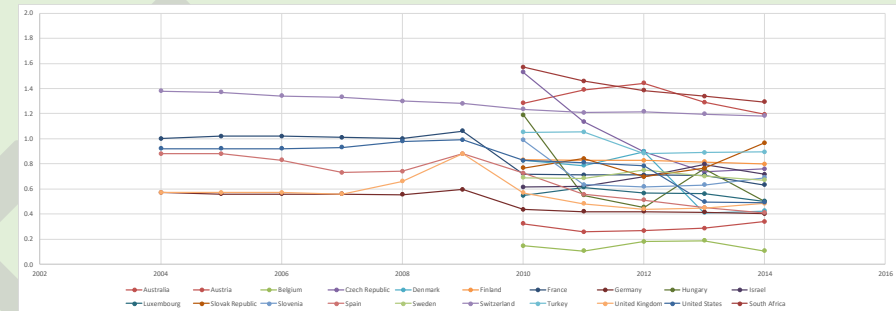


Figure 5: Road expenditure/GDP ratio for selected countries
(Various sources including: Own calculation, (Gomez & Vassallo, 2014))

It should be noted that no single road-generated revenue source is fully allocated to road construction and maintenance. In the case of toll roads, very little information is available regarding the income generated from tolls. Toll revenues may be used to cover debt servicing (financing of loans), operation, maintenance as well as upgrading the roads.

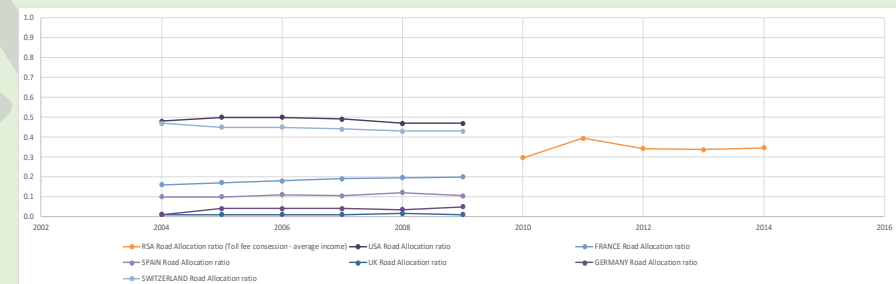


Figure 6: Road allocation ratio for selected countries
(Various sources including: Own calculation, (Gomez & Vassallo, 2014))

³⁴ Toll concessionaire's potential income collected during the period 2011 to 2014 was calculated on an average level. For the average income level an 80% and 20% split between light vehicles and heavy vehicles respectively was assumed. It is however not known how much of this potential income collected had to be spent on roads, or could be used for operational expenses and company profit. It was assumed that the cost of toll collection is 15% and that the return on investment that the funders require is 20% with a further 5% allocated to perform administrative duties.

Figures 4 – 6 seems to indicate that in relative terms at least, South Africa does allocate a comparable or reasonable share of revenue for road construction and maintenance. Measured as a percentage of GDP, South Africa does spend a sizable share on roads, which may reflect the country's large road network (due to relatively large size) and spatial structure with the main cities located in the centre of the country.

While these figure and values are by no means an indication of whether or not South Africa spends enough on the roads network, they do indicate that South Africa is not an outlier, towards the bottom, with regard to the allocation of road generated revenue to road construction and maintenance.

3.5 The price of fuel, affordability, and share of personal income allocated to fuel

The fuel levy remains the main income source from road users that *may* be used to support road construction and maintenance³⁵. It is also a significant component of the direct road-generated revenue (47%), and currently the only nationally levied road use tax that charges users, more or less, in proportion to their amount of road use. To satisfy the theoretical principles of user-pay (see Chapter 4), it seems that the fuel levy is currently the only tax available to serve as road user charge. The question remains, however, as to what extent the fuel levy can be increased, if required or whether the current fuel levy represent an appropriate user pay charge?

Bloomberg (2016) ranked 61 countries by three economic measures to compare the affordability of fuel, or as the publication put it, 'who feels the most pain at the pump'. The comparison included countries from North and South America, the Middle East, Africa, Europe and Asia-Pacific. South

Africa was ranked with selected BRICS and OECD nations in this report to simplify the figures.

In 2014, the average price of a litre of fuel in South Africa was R13.41. South Africa ranked 16th cheapest of the 61 countries compared, and ranked relatively low among the other BRICS and OECD nations (Figure 7).

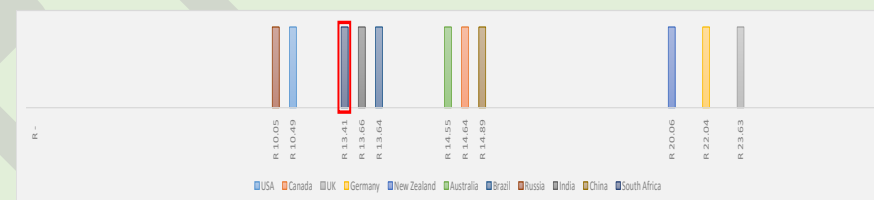


Figure 7: Fuel price (in Rand)
(Bloomberg, 2016)

Affordability is measured as a commodity's cost relative to the amount that the purchaser is able to pay. Using data from the 2014 Income and Expenditure survey (STATs-SA, 2011) the average daily income in South Africa was R192.64. It would therefore have taken 6.96% of a day's income to afford a litre of fuel. This placed the country 53rd, out of 61 countries, in terms of affordability with only India being less affordable of the BRICS and OECD nations (see Figure 8).

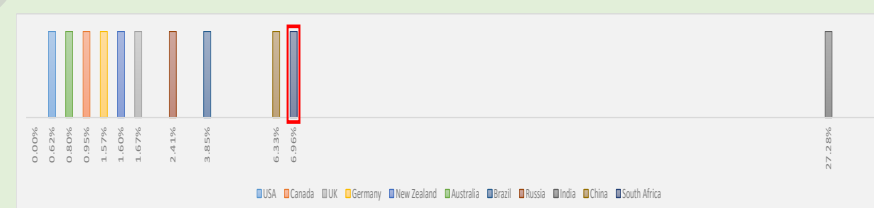


Figure 8: Affordability
(Bloomberg, 2016)

³⁵ Note that South Africa do not have an earmarked road fund and the fuel levy income reverts to the National Revenue Fund.

South Africans face a lot of ‘pain at the pump’, which is further exacerbated by how much fuel the country consumes. In no other country do people spend more of their salary filling up. The average driver in South Africa uses 216.6 litres of fuel per year, which consumes 4.13% of the typical salary. South Africa is ranked 61st out of all the countries, as well as the worst among the BRICS and OECD nations (Figure 9). This may in fact also be an indication of the inefficiency of land use patterns in South Africa with sprawling cities and low income residents located on the outskirts of towns and cities. Such spatial patterns lead to a mismatch between housing and employment resulting in long commutes, mostly with private vehicles.

Measuring the price of fuel in South Africa in terms of the share of personal income absorbed by fuel for travel illustrates the true cost to road user. Given the regressive nature of fuel levies, any increase in the price of fuel would therefore also impact poorer communities severely.

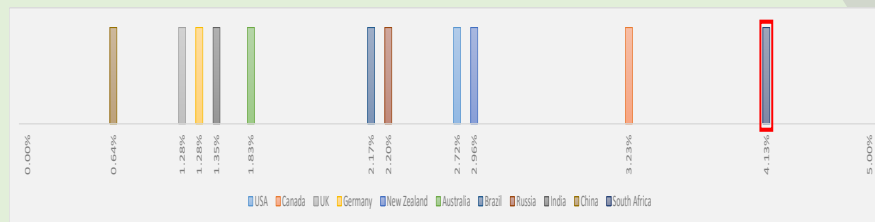


Figure 9: Percentage of annual income spent on fuel (Bloomberg, 2016)

Using income and expenditure data from Statistics South Africa (2011), it is possible to empirically determine the magnitude of transport costs, and the fuel levy in particular, on an individual and household budget. For comparative purposes the expenditure of the average South African was compared against that of the average vehicle user, and to a hypothetical motorist operating an electric vehicle (see Figure 10).

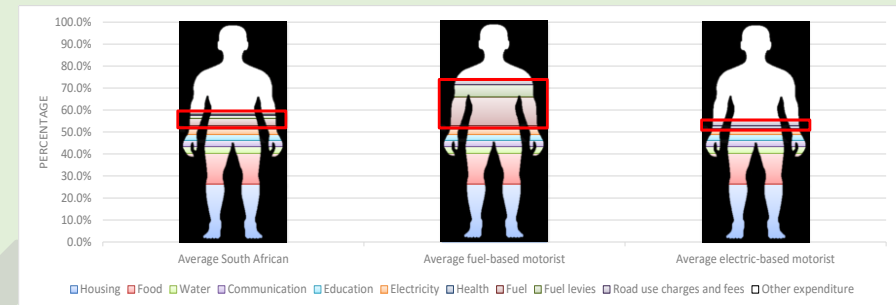


Figure 10: Income and expenditure of average user

The average South African household incurred an average annual household consumption expenditure of R116 381 in 2014 (projected using 2011 Income and Expenditure Survey data using an average inflation rate of 5.4%). Of this amount the three biggest expenditure items was housing (26.3%), transport (17.1%) and food (13.9%). Transport expenditure includes the purchase of vehicles such as motorcars, motorcycles and bicycles; the purchase of transport services which mainly relates to the fares of public transport and lastly the operation of personal transport equipment. The latter comprised of spare parts and accessories, maintenance and repairs of the personal transport equipment as well as expenditure on fuels and lubricants. Expenditure on fuel was 4.6% of the average annual household consumption expenditure. Of this 4.6% the general fuel levy comprised 0.9%, Road Accident Fund levy, demand-side management levy, IP marker levy and petroleum products levy constituted and further 0.5% resulting in 1.4% spent on fuel levies and taxes (thus 4.6 – 1.4 = 3.2% is therefore the expenses on the base cost of transport). Additionally 0.6% was spent on selected road user charges and fees.

Assuming this expenditure and an average fuel price of R12.06 and vehicle fuel efficiency of 12 l / 100 km, the average South African travelled 3 726 kilometres while using 458 litres of fuel in 2014. This discussion relates to

the average South Africa as characterised by a specific income and expenditure profile. A private vehicle owner, however, is more likely to travel approximately 15 000 kilometres per year and use 1 800 litres of fuel. Assuming the same income and expenditure levels as the average South African, expenditure on fuel (excluding fuel levies) would increase to 13.1%. The motorist would also pay 5.6% towards fuel taxes, and 2.4% on road user charges and fees such as speeding fines, parking costs, etc. The fuel levy alone would account for 3.8% of the annual expenditure. Expenditure on fuel and vehicle use related taxes would comprise 21.1%, a rather worrisome and unsustainable tax burden. This illustrates the pecuniary financial position of the 'average' South African with regard to road user charges and taxes. Coupled with long travel distances, the affordability of private vehicles is a significant financial undertaking for the majority of South Africans.

A hypothetical motorist operating an electrical vehicle, travelling on average 15 000 kilometres and assuming the same annual expenditure, would use no fuel and spend 0% on fuel taxes including the fuel levy. He/she would spend 2.4% on road user charges and fees as part of operating the vehicle on the road network.

South Africa currently derives revenue from road users through various direct and indirect taxes, levies and charges, etc. An amount of R49,2 billion was spent by all three levels of government and SANRAL on road construction, upgrading and maintenance. A significantly larger amount, R70.2 billion, however, is spent by all levels of government and the various state owned entities on road operation, administration and regulation activities. It is rather difficult to estimate how South Africa compares internationally due to the unavailability of information and direct international comparisons may not be entirely appropriate given different levels of development and spatial, economic and social circumstances,

such as the relatively large road network and relatively small GDP of the country.

While this chapter address the issue of what government collect and what is spent on roads, both in aggregate terms and per vehicle kilometre, it does not address what road users should be paying based on equitable and efficient road pricing principles. The following chapter discuss the issue of road user charges based on the principle of marginal social costs.

4 What is the user-pay principle?

A widely accepted economic principle is that the users of scarce resources should pay the full cost of their consumption of these resources. Adopting this approach, it is argued, will avoid a misallocation of resources, such as spending too much on certain sectors, and the possible distortion of economic processes. In this scenario, the principle would imply that the users of the road, the scarce resource, should pay for their use for every kilometre of road they consume. This principle is commonly referred to by the umbrella term of the 'user-pay principle'. The concept of user pay, however, is neither simple nor is there consensus regarding what the user should pay, or even what users are already paying.

Road User Charging versus Road Pricing versus User Pay

The terms *road user charging* or *road pricing* is often used interchangeably. While road pricing generally refers more to the setting of a price for road use, including urban, rural and intra-urban roads, road user charging seems to relate more to setting prices for road use in congested urban areas, i.e. the congestion charge.

Road user charging is well established in the (transport) economic domain where it refers, mostly, to setting the road use price equal to the *marginal social cost* of a trip.

Traffic engineers, transport planners and politicians, however, have assigned a much more generic meaning to the concept and mostly use the term to refer to the imposition of direct charges onto road users, with a variety of objectives in mind (Ison, 2004). These objectives may include making road users pay for congestion, air pollution or even repaying bonds and loans to finance toll roads.

The term *user pay*, or more specifically *road user pay*, does not really exist in policy documents outside of South Africa, and seems to be a linguistic distortion of the term *road user pricing*.

Three issues problematise this principle. Firstly, the so-called 'service of roads' is not delivered to users in the way that other services (e.g. water and electricity) are. Measuring individual use is therefore difficult, for example because roads are not equally accessible everywhere. Secondly, even non-road users benefit from the presence of roads. In fact, few economic or even social activities do not require roads in some form or other. Thirdly, the identification, measurement and inclusion/exclusion of costs, and the allocation of these costs to specific types of users, are not trivial exercises.

Despite the acceptance in South Africa that the user-pay principle should be implemented to fund roads, little evidence of its definition, calculation, implementation or efficiency has been presented. There are no reports or policies that elaborate on the concept of user pay beyond simply mentioning it as a solution for funding roads. This section will attempt to present the principle in simple terms and discuss it in comparison to the current road funding approach. Reference will also be made to the possible impact of implementing the user-pay principle in South Africa.

4.1 Definition

The user-pay principle is a variation on the polluter-pay principle that calls on the user of a scarce resource, such as road infrastructure, to bear the full *economic* cost of consuming the resource. In the case of roads, each user imposes a range of costs on the economy. A passenger car, for example, causes some damage to the road surface; adds traffic to the network, which may cause congestion, resulting in slower travel speeds; produces air pollution; generates vibration and noise; and may even contribute to accidents. A truck on the same road will obviously cause much more damage than a passenger car. In addition to these infrastructure and external costs, the road users also impose administrative, regulatory and operational requirements for the effective

operation of roads. For example, policing, traffic regulation and overhead activities are all undertakings in response to road users.

The different types of road users, from motorcycle and car users to heavy goods vehicle operators, are seldom aware of either the type or the magnitude of all the costs they impose on society and other users of the facility. Being unaware, or not paying the correct price, has consequences and may lead to a misallocation in the economic sector. This may, for example, result in too much freight being transported in trucks on the road network, as opposed to on the rail network, or, alternatively, too many people using private cars, as opposed to public transport, resulting in severe urban congestion. Too-high road user charges, however, may also impact negatively on individual's standard of living by eroding real income and ultimately impacting on economic development.

The user-pay principle implies that the road user is *aware* of their road user costs, both private and social, and pays the correct price for road use. Only then will they make the correct decision(s) in terms of their road use and travel behaviour, leading to a more equitable allocation of resources. Of course, if prices are not set correctly in other sectors (for example, if rail tariffs are too high, or the transport infrastructure is not available, or there are no public transport options), setting the correct road user tariff holds very little benefit, and may even have unintended outcomes, such as promoting inequality.

When the prices that are charged to road users are equal to the resource costs, those prices are referred to as efficient prices, as they will result in the economically efficient use of transport resources (Delucchi, 2000). In transport, the term marginal social cost (MSC) describes this efficient price (Macario, 2010). *Marginal* refers to the cost of each incremental unit, or

each additional unit of traffic. Marginal costs are therefore the costs that can be causally attributed to a specific vehicle at a specific time and a specific place. Marginal user cost differs from average user cost, which refers simply to the total cost of road use for all the users, divided among all of the users. *Social* refers to the cost to society as a whole, as opposed to the cost to the individual. Social therefore includes costs such as congestion, road damage, environmental pollution, accidents, and other costs that are traditionally *external* to the pricing mechanisms.

Marginal social cost is equal to marginal private cost (fuel, travel time, depreciation etc.) plus marginal external cost. Only when marginal social costs equal margin social benefits, will an economic efficient price be achieved leading to an efficient equilibrium³⁶. As noted in the literature, the traditional justification of MSC pricing is that it is allocation-efficient, in the sense that it optimises the allocation of resources and thus maximises the welfare of society (Macario, 2010; Nash & Matthews, 2005).

Note that MSC does not involve the user of the road paying sunk costs for past infrastructure expansion (i.e. the capital cost of the road), but only for the damage caused to the pavement of the road, thus some maintenance and some road admonition and operational costs. Figure 11 provides a practical definition of the costs elements contained in MSC. Marginal costs look to the future and not to the past. Only future costs that can be causally linked to road use are considered in marginal cost estimation (Kahn, 1970).

³⁶ When prices (P) equal marginal social costs, the equilibrium achieved is said to be both productive and allocatively efficient, since costs are equal to the prices obtained, assuming the costs are comprehensive and account for all of the costs imposed on society by the user. Allocative efficiency

requires that products / goods are produced only as demanded by the public (consumer sovereignty), and that firms are allowed to use the factors of production in an optimal way with no constraints or non-efficient requirements imposed on them.

A PRACTICAL DEFINITION OF MARGINAL SOCIAL COSTS

Marginal costs are those variable costs that reflect the cost of an additional vehicle or transport unit using the infrastructure. Strictly speaking, they can vary every minute, with different transport users, at different times, in different conditions and in different places. Moreover for the last extra carriage on the train, car on the road, or ship at sea, marginal costs can often be close to zero. Clearly such a strict definition is of no practical use, and like all other charging arrangements in the commercial world, a degree of approximation and averaging is necessary to develop understandable, practical charging structures. Marginal costs may at times merely reflect an average of variable costs. More usefully, they should reflect infrastructure damage, congestion and pollution costs, and so would vary according to factors like unit weight or number of axles, peak times, urban travel, and engine emissions.

Marginal cost components can include:

- **Operating costs:** energy, labour, some maintenance costs.
- **Infrastructure damage costs:** maintenance costs, wear and tear of the infrastructure, reflected by such as resurfacing of roads, rails and runways.
- **Congestion and scarcity costs:** The cost of time delays to other users or non users, resulting from congested traffic flows (on roads, queues for airports or railway stations). Moreover, a transport operator's use of infrastructure may prevent another operator from using it (e.g. an airport runway).
- **Environmental costs:** air, water, and noise pollution.
- **Accident costs:** Costs in terms of material damage, pain and suffering and production losses.

Figure 11: A definition of marginal costs (Commission of European Communities, 1998a)

MSC stands in contrast to the approach where users are paying an amount for road use that bears no relationship to their actual road use. In such a case, the amount can be either above or below the actual resource cost. In the latter case, users are directly or indirectly subsidised to use the resource, while in the former case they are paying more than the resource cost. Both of these outcomes are said to be inefficient. In the case where the user cost exceeds the optimal price, i.e. the MSC, users (notably poorer sections of the community) are discouraged from using the infrastructure, thereby reducing the social benefit provided by roads. A road user cost that is below the optimal resource price, on the other hand, will lead to excessive resource consumption, generating higher costs than benefits,

and individual users will have less incentive to reduce the costs that they impose on society. An efficient price results in users paying their correct share and adapting their use to an optimal level (where their benefit of use equates to the cost of their use).

While the user-pay principle, as formulated above, seems conceptually sound, MSC holds numerous problems and the concept is often considered more theoretical than practical as it presents some serious shortcomings (Rothengatter, 2003). Among these are the fact that its measurement is complex; that it ignores equity; that financing issues (i.e. the need to cover costs) and price distortions elsewhere in the economy are not considered; and that its implementation may involve substantial administrative costs. Probably the biggest concern with MSC pricing is that does not guarantee that all costs are covered, or that fiscal neutrality is achieved. All of this implies that MSC may not always be justified by the benefits it brings – or, in fact, be a realistic option at all.

While some of the shortcomings can be addressed, it must be emphasised that MSC pricing is not a straightforward, practical solution, and that it remains for the most part a theoretical approach to pricing policy. In fact, there is no country in the world where the approach is fully implemented. Yet this does not mean that the approach should be disregarded. It is generally accepted that MSC pricing should be used as a starting point (i.e. a base price), and that the shortcomings of the system should be accommodated by some optimal departures from the theory (Commission of European Communities, 1998b).

Implementing the user-pay principle according to theoretical principles is not always an option, as the necessary conditions are not always met³⁷.

³⁷ These conditions include cases where infrastructure demand is not optimally adjusted to supply, i.e. where demand is too low and there is an excess supply. In these cases the MSC will be negligible and will not cover infrastructure costs, which will lead to deficits. This is typically the case for rural roads. In cases where demand is optimally adjusted to supply, infrastructure costs as well as all other costs

will be covered, and MSC will lead to an efficient allocation of resources. In cases where demand exceeds supply, as is the case with highly congested urban cities, pricing according to MSC will exceed infrastructure costs and lead to surpluses.

The measurement of road use is difficult, and road use also varies enormously between users, making individual-user pricing challenging. The strict implementation of the user-pay principle may therefore not be feasible in South Africa at this stage. However, several alternative pricing doctrines may be considered, as briefly discussed in the next section.

4.2 Alternative pricing doctrines³⁸

Marginal social cost (MSC) is not the only pricing doctrine that may be considered to determine the cost of road infrastructure use. Even the European Union, arguably the most advanced region with regard to researching marginal social costs and road user pricing approaches, still faces a decision between various approaches to transport pricing (Figure 12). Short-run MSC pricing is only implemented in the Nordic countries, and only to a limited extent. Mainland Europe, led by Germany, typically adopts a full cost recovery approach to transport pricing, while the UK and France focus more on the long-run replacement costs of infrastructure.

Alternative pricing doctrines include average cost (AC), adaptations of MSC such as long-run marginal cost (LRMC), Ramsey-Boiteux pricing, and various accounting or cost allocation methods such as development cost (DC) and historical cost (HC) (de Palma & Lindsey, 2007; Proost & Van Dender, 2003).

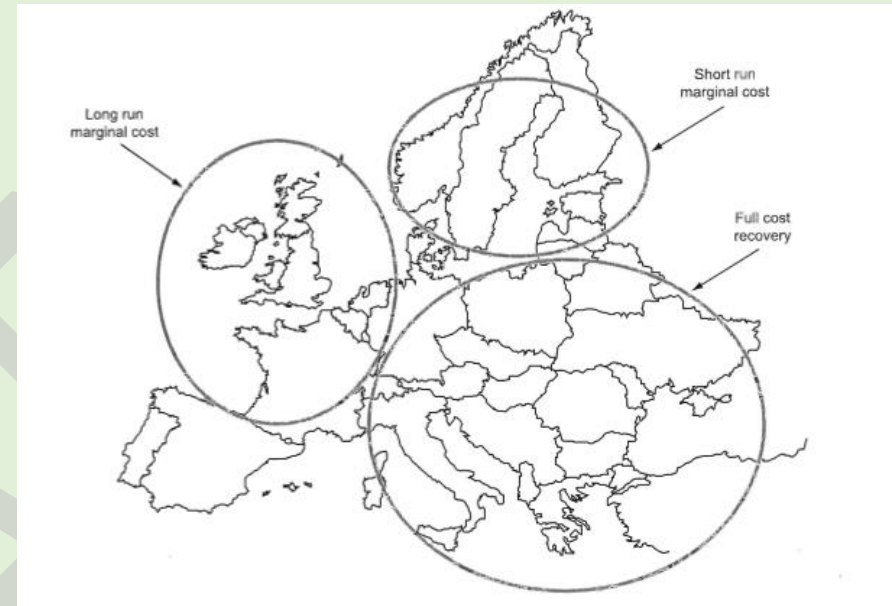


Figure 12: Alternative approaches to transport pricing (Nash, 2001)

One problem with MSC is that the costs vary nearly continuously in time and space. Average cost (AC) does not consider the incremental costs associated with each individual vehicle, and instead takes the total financial costs of all the transport modes in a specific area and divides it by the total use (in this case, the total kilometres driven by the different types of vehicles). The outcome therefore does not vary over time or spatially, and only one price is obtained, differentiated by vehicle type. The cost, for example, does not distinguish between busy and calm roads or time of day. Average cost does not lead to efficient prices or sustainable road use, as there is only a very general relationship between the cost of road use and the prices charged to that road's users. As a rule, external costs are not

³⁸ To avoid a lengthy and theoretical discussion, this section presents only a superficial description of the various pricing doctrines.

included in average cost price setting, but there is no reason, at least methodologically speaking, why external cost cannot be accommodated in average costs. Including external costs in AC, however, may lead to some inefficiency, as heavy polluters and road users will benefit from the averaging of costs between all the users.

As remarked before, MSC does not consider the financial break-even point, and implementing the concept may in fact lead to serious budgetary deficits. Ramsey-Boiteux pricing, also known simply as Ramsey Pricing (RP), implies that road charges, or taxes, are increased on goods and services with a low demand elasticity to levels exceeding MSC. RP is really a deviation from MSC pricing, and implies raising the tax on goods, such as road use, where demand is inelastic. Road tariffs can be increased on road use in circumstances where demand is inelastic, such as peak hour travel or commuter trips on motorways (toll roads). Price increases above marginal costs where demand is elastic, such as off-peak or leisure trips, are not considered (or as little as possible). Monopoly operators, or road sectors experiencing monopolistic competition, faced with scale economies, high fixed costs and significant joint and common costs, often employ this principle to increase profits while still maximising welfare, subject to certain conditions.

Marginal social cost also does not explicitly consider capacity expansion (the long-term expansion of a network due to increased traffic). When supply exceeds demand, resulting in congestion on roads, MSC pricing will generate 'profits', which can be used to expand the network. Unfortunately, as noted before, short-run MSC (SRMC) fluctuates continuously, which makes implementing the principle difficult. A more practical alternative is long-run marginal costs (LRMC), which do consider capacity expansion. The concept of LRMC is often used in industries with expensive infrastructure assets, such as roads or public utilities, where sunk costs (i.e. the physical infrastructure) constitute large, indivisible chunks. The problem with these industries is that their marginal costs of

operation are relatively small. If SMC is applied, the recovering of investment costs is unlikely under most operating conditions. The classic solution is for the public sector to pay for the infrastructure costs, after which users are then charged only the marginal costs. LRMC, on the other hand, implies short-run SMC, but with the marginal costs of capacity expansion included in the price.

A practical implementation of LRMC which overcomes the problem of indivisibility (big chunks of infrastructure requiring large capital outlays), is development cost (DC). It is the ratio between the discounted sum of future investments and the discounted sum of the traffic increases that make them necessary, both taken over a long period. On the one hand, DC has the virtues of including investment in the charges and making users sensitive to the investment expenses; furthermore, it smooths the SRMC, and evens out the charges over time and space. On the other hand, as the charges are smoothed, the incentives to the users (for peak periods for instance) are less powerful. Both DC and LRMC address one of the shortcomings of SMC in that it also considers the replacement costs of the infrastructure.

An approach that has not received much attention due to its incompatibility with economic theory (it does not lead to efficient prices, leads to inequity, and can result in double taxation) is the so-called historical cost approach. According to this approach, the sunk costs related to the construction, expansion or improvement of existing roads, as well as some variable costs (related to operating the service), are spread over time between successive generations of users. This approach entails that an estimate is made of the value of the capital invested in the physical facilities (roads), and an assessment is made of the variable costs. Thereafter, a representative discount rate is used to spread the value of the capital evenly over the lifespan of the road network.

4.3 Implementing the user-pay principle: The current user-pay approach in South Africa

This section provides an overview of what South Africa's road users currently pay per kilometre. Given the available information on road user cost and cost allocation data, it is not possible to assess the kilometre charge that should be paid. What is possible, however, is to determine what users currently spend on road use, and how much of these funds is allocated back to roads, and to deliberate on the upper and lower margins of a possible road use charge.

4.3.1 What are users currently paying?

As discussed in Chapter 3, road-generated revenue contributed almost 30% of the price per litre of fuel in 2014 (Department of Energy, 2013). This income accrues to the National Treasury, which subsequently transfers the money to the relevant state-owned entities, provincial and municipal road departments for expenditure on roads maintenance, roads operation and ancillary road activities (traffic management, accident prevention, policing, etc.).

Table 4 illustrates the total direct and indirect road income generated in South Africa, as well as the estimated total kilometres travelled by all motorised vehicles, licensed and registered, in South Africa³⁹. The *average South African vehicle* (see Table 4), using an internal combustion engine (as opposed to an electrical vehicle), therefore contributes R0.62 per kilometre of direct income, of which the fuel levy comprises R0.29 per kilometre. Note that this refers to an *average vehicle*: no distinction is made between vehicle types (heavy goods vehicles, sports utility vehicles,

small passenger cars, etc.). This is, of course, a flagrant generalisation and serves merely to illustrate the concept.

These calculations were made by firstly dividing the direct income (income as a direct result of road use) that was collected, and secondly the funds collected by the general fuel levy alone, by the estimated total distance travelled of 162 billion kilometres per annum by the total South African vehicle fleet (Road Traffic Management Corporation). By contrast, a hypothetical average electric vehicle user would pay only R0.17 per kilometre, as these vehicles do not use fuel and generate no measurable CO₂ emissions. In terms of indirect revenue, normal and (hypothetical) electric vehicle motorists contribute R0.41 per kilometre (by means of the same calculation as above). Adding these payments together, an average road user therefore pays R1.02 per kilometre, while an average electric vehicle motorist would pay only R0.58 per kilometre. Note that these values simply provide an indication of what users *are* currently paying. It is no indication of what they *should* be paying according to any road pricing theory. The per-kilometre costs (last column) make no distinction between different vehicle types, and is merely an average, uniform kilometre charge for the individual tax components.

The Income and Expenditure Survey (Statistics South Africa, 2011) revealed corresponding payments per kilometre by road users. Data from the 2011 survey was projected to 2014 in order to estimate the percentage of monthly income that road users spent on transport. Assuming an estimated average distance travelled of 15 000 km per annum and a vehicle with a fuel efficiency of 12l / 100km (0.12 l per km) and a fuel price of R12.06 per litre of petrol (2014), the average road user will pay roughly R0.62 per kilometre in terms of direct cost. The average electric-vehicle travelling the same distance would pay only R0.18 per kilometre. In terms of indirect cost the contribution is R0.41 per kilometre for both normal and

³⁹ Estimated by projecting the data on motor vehicle population and estimated total annual distance travelled, collected by the Road Management Traffic Corporation between 2000 and 2009.

electric-vehicle motorists. This means the average road user is paying **R1.02** per kilometre for road use and a hypothetical electric vehicle road user would pay only R0.59 per kilometre. This reflects the income from road users, per kilometre, both direct and indirect.

Current road user payments in the form of the fuel tax, the Road Accident Fund (RAF) levy and toll fees, for example, do not equate to the actual road user cost that users should be paying. It is merely what road users *are* currently paying, and it may or may not reflect an equitable and efficient road user charge.

Table 2: Total road-generated revenue and road user payment per kilometre ('000)

	2010	2011	2012	2013	2014	Per Km Costs (2014)
Fuel levy	R 34 417 577	R 36 602 263	R 40 410 389	R 43 300 000	R 47 516 564	R 0.29
Road Accident Fund	R 14 474 058	R 16 989 071	R 17 380 217	R 20 352 981	R 22 457 948	R 0.14
Fines/fees and permits	R 9 011 537	R 10 988 624	R 12 933 722	R 10 853 033	R 10 678 864	R 0.01
License fees	R 5 057 977	R 5 953 006	R 6 530 434	R 6 765 016	R 7 349 077	<R 0.01
Toll fees: concessions*	R 3 987 937	R 4 605 700	R 5 029 190	R 5 420 129	R 5 846 819	<R 0.01
Toll fees: SANRAL	R 2 073 060	R 1 987 379	R 2 199 090	R 2 759 839	R 4 221 433	<R 0.01
CO ₂ emissions	R 625 891	R 1 617 353	R 1 567 382	R 1 636 848	R 1 684 160	R 0.23
DSML	R 51 000	R 53 000	R 152 000	R 140 000	R 170 000	R 0.03
Pipeline levy	R 31 000	R 32 000	R 33 000	R 35 000	R 37 000	R 0.14
IP marker levy	R 1 000	R 1 000	R 1 000	R 1 000	R 1 000	R 0.05
VAT on vehicle sales	R 28 197 380	R 31 099 740	R 34 993 000	R 37 154 040	R 37 893 660	R 0.07
Import duties: vehicle	R 10 442 000	R 14 348 000	R 18 702 000	R 21 635 000	R 22 567 000	R 0.03
VAT on vehicle sales	R 3 909 640	R 4 126 080	R 4 496 380	R 4 788 700	R 5 009 760	R 0.04
Customs and excise levy	R 817 000	R 847 000	R 875 000	R 922 000	R 981 000	R 0.01
TOTAL REVENUE	R113 097 057	R129 250 216	R145 302 804	R155 763 586	R166 414 285	R 1.02
* This is an estimate based on AADT and tariffs.						
Direct income	R 69 731 037	R 78 829 396	R 86 236 424	R 91 263 846	R 99 962 865	R 0.62
Indirect income	R 43 366 020	R 50 420 820	R 59 066 380	R 64 499 740	R 66 451 420	R 0.41
Estimated annual km travelled	138 532 010	145 417 960	150 978 245	157 178 383	162 405 499	
Direct cost per km						
Normal vehicle	R 0.50	R 0.54	R 0.57	R 0.58	R 0.62	
Electric vehicle	R 0.15	R 0.16	R 0.18	R 0.16	R 0.17	
Fuel levy	R 0.25	R 0.25	R 0.27	R 0.28	R 0.29	
Indirect cost per km						
Normal vehicle	R 0.31	R 0.35	R 0.39	R 0.41	R 0.41	
Electric vehicle	R 0.31	R 0.35	R 0.39	R 0.41	R 0.41	
Total cost per km						
Normal vehicle	R 0.82	R 0.89	R 0.96	R 0.99	R 1.02	
Electric vehicle	R 0.46	R 0.51	R 0.57	R 0.57	R 0.58	

(Various sources including: Road Accident Fund, no date; SAPIA, no date; Department of Energy, 2013; South African National Treasury, 2014; Statistics South Africa, 2014, 2016, National Treasury, 2014a, 2014b; International Transport Forum, 2015; Arrive Alive, 2016; Bakwena N1N4 Toll, 2016; Trans African Concession, 2016; N3TC, 2016; SANRAL, 2016)

A review of the roads expenditure in South Africa, including all costs involved in the physical construction and maintenance of road infrastructure and the administration of the operational and regulatory systems for a functional roads sector, revealed that the government already spends roughly 12c more per km than what is collected (Table 5). This can be considered a non-user payment, or a transfer from general income sources to the road sector.

Table 3: Total road-generated revenue and road user payment per kilometre ('000)

	2010	2011	2012	2013	2014
Estimated annual km's travelled	138 532 010	145 417 960	150 978 245	157 178 383	162 405 499
Road-generated revenue	R 69 731 037	R 78 829 396	R 86 236 424	R 91 263 846	R 99 962 865
Income per km	R 0.50	R 0.54	R 0.57	R 0.58	R 0.62
Road expenditure: infrastructure	R 43 134 913	R 44 105 665	R 45 007 913	R 47 389 362	R 49 261 118
Expenditure per km	R 0.31	R 0.30	R 0.30	R 0.30	R 0.30
Road operation and regulation expenditure	R 43 664 508	R 65 865 489	R 58 106 520	R 56 886 853	R 70 686 248
Expenditure per km	R 0.32	R 0.45	R 0.38	R 0.36	R 0.44
Total expenditure per km	R 0.63	R 0.75	R 0.68	R 0.66	R 0.74
Additional funds spent (income – expenditure)	R 0.13	R 0.21	R 0.11	R 0.08	R 0.12

Essentially, everyone in the country pays for roads: road users via the various road use taxes and levies, and non-road users via general taxation and indirect payments. Figure 13 illustrates the funding from users and non-users over the period 2010 to 2014. User payments account for 70-88% of road funding, with non-road user contributions making up the rest.

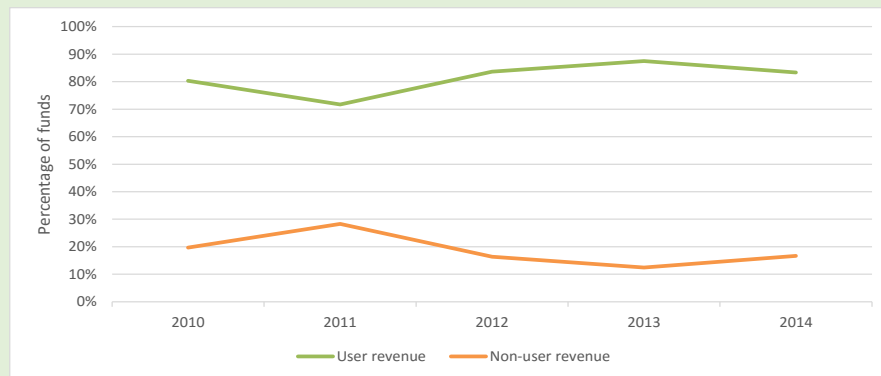


Figure 13: Percentage of funds from various sources, South Africa

The cumulative spending on roads from non-user funds, that is general taxation and indirect road revenue, has escalated to an amount of R100 billion over the past five years (Figure 12).

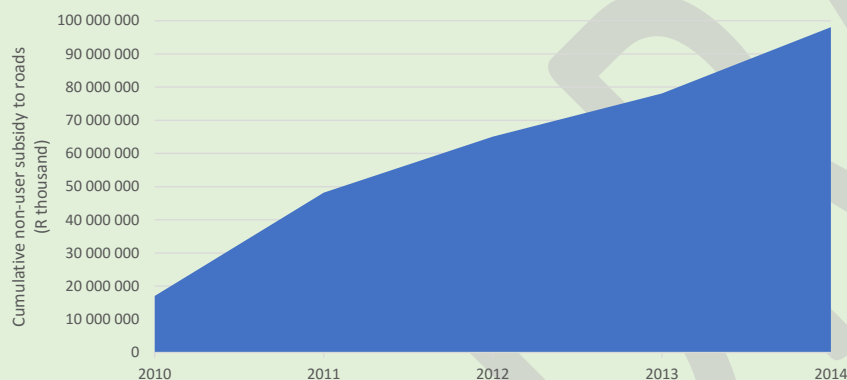


Figure 14: Cumulative non-user road expenditure

A similar, albeit more dramatic, effect has been witnessed in the United States. Non-user revenue, which include local sales tax for example, has increased over the last couple of years, now contributing roughly 40-45%. User revenue, in the form of the 'gas tax', has declined significantly, to less

than 50%. Bond revenue typically makes up the remaining income for highway spending (Figure 15).

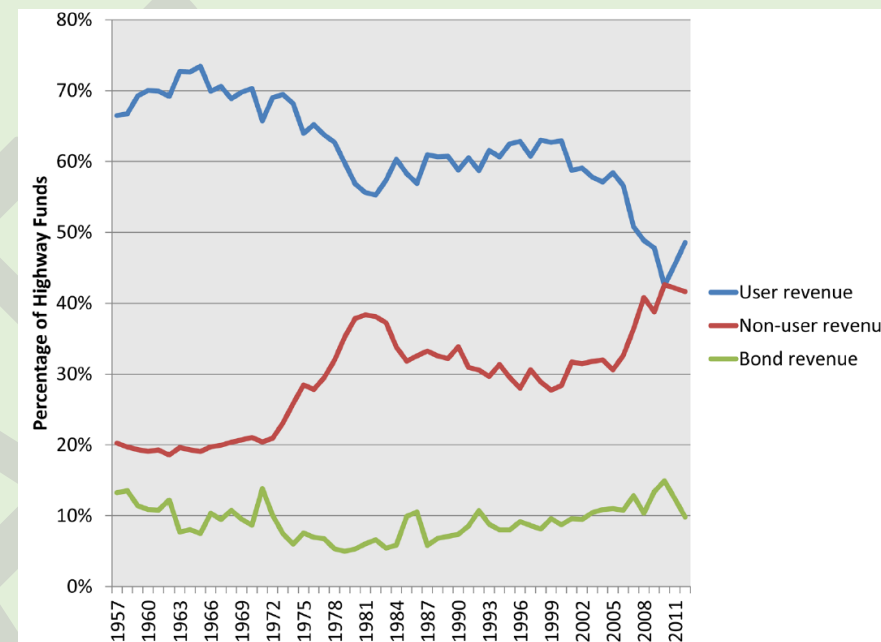


Figure 15: Percentage of funds from various sources, USA
(Source: Dutzik and Weissman, 2016)

4.3.2 What should users be paying?

Vehicle use impose four main costs on society, (i) accident costs, (ii) environmental pollution, (iii) road damage and (iv) congestion (Newbery, 1994). In the absence of road use taxes, society generally absorbs these costs. While the benefits of road use, such as fast and cheap access to employment, social and cultural activities are enjoyed by the individual, these external costs of the road provision and use are not always borne by

everyone (Korzhenevych, Dehnen, Bröcker, Holtkamp, Meier, Gibson, Varna & Cox, 2014).

Road users do not consider these 'external' costs in their travel and transport decisions, such as what route to take, when to travel, how many trips to make or even what mode to use. These costs are external to the individual's decision-making framework. Not considering these costs has an impact on society, such as additional (excessive) road capacity demands which leads to further congestion, noise and air pollution, and increased accident risk. Another outcome is that road user charges, and specifically infrastructure damage and road damage charges, will not cover all the costs to maintain the pavement, and will result in pavement deficits⁴⁰. Road pavements experience economy of scale with regard to durability. In addition to high fixed costs and the indivisible nature of road investment, roads are faced with a downward-sloping MSC curve, with average costs exceeding marginal social when demand is not aligned to capacity (i.e. when there is spare capacity). Setting road user charges to marginal social cost in such an environment will not cover the costs to maintain the road.

Internalising these external costs in road user charges would therefore be more fair and efficient. MSC represents such a fair and efficient price. While the concept seems straightforward, the methodology behind the concept, the costs categories to include, the calculation, the costs allocation and ultimately the implementation are far from simple. External costs or marginal social costs, as defined here, also differ between various road types (urban roads, rural, intra-urban and other), vehicle technologies (vehicle engine size and vehicle weight) and traffic conditions (free flow,

nearing capacity and fully congested). It also differs between urban, sub-urban and rural areas. There is thus not one road user charge, but multiple road user charges differentiated to reflect the different circumstances.

It is clear that estimating the appropriate road user charge is dependent on exact cost information, including road maintenance costs, accident cost, environmental cost, congestion cost, costs related to the expansion of the road network, as well as the associated operational and regulatory costs including policing and traffic control. Once determined and quantified, these costs need to be allocated to road users based on vehicle characteristics (fuel type and size), representing each road user's equitable share. The costs are then expressed per measure of use, for example, per vehicle kilometre. In the case of South Africa, very little information is available to determine such a cost. In fact, other than the more generic reviews and arguments for a road user pay approach (see page 11), very little of the supporting information is readily available in order to derive a road user charge. There is also a very clear difference between the various levels of expertise available with some institutions, such as SANRAL having vast expertise and resources while other institutions, such as the local government, remain virtually oblivious to the information demands of the road user pay principle.

While it difficult to determine or calculate a road user charge for South Africa, it is possible to illustrate the concept using international values and approximations⁴¹. The values so derived should only be seen as an

⁴⁰ Of course the converse is also true; if road user charges exceed social road user costs (i.e. charges are too high), the benefits that roads provide in terms of time and costs savings are eroded. The indirect impact of these savings in the form of lower production costs and possible benefits from the reorganisation of logistical activities will not materialise.

⁴¹ A road user charging policy for South Africa cannot be prepared in a month or even a six-month period. Given the information requirements, and the need to unpack the methodological and institutional requirements, such a policy will take 18 – 24 months to prepare. The policy should be prepared by National Government.

illustration of, firstly, how to determine a road user charge, and secondly, what are the important cost components that make up a road user charge.

4.3.3 Deriving an MSC-based road user charge

While some costs are available, such the annual maintenance costs (from audited accounts), most road use costs are not, preventing the exact estimation of an accurate road user charge. In other instances, aggregate costs estimates are available, such as the cost of accidents to the South African economy (R147 billion per annum in 2016), but these estimates should be treated with circumspection, as they do not reflect the *external costs* associated with road user, and because the calculation of the specific cost has not been ratified against the accepted methodology. Finally, an often wrongly understood concept is the inclusion of capital infrastructure costs in road user charges. As discussed above, the existing capital asset base is not considered in the setting of road user charges. Only the cost attributable to the road user, i.e. direct maintenance and some upgrade costs and other external costs, is included in road user charges. Historical investment costs are not included in road user charges, or if they are, they are often negligible. Historical cost may, however, provide an indication of how a private entity will set tariffs, and provide an indication of what revenue is required to maintain the current asset in an agreed state (Newbery, 1998).

South Africa has an estimated 750 000 kilometres of roads, with a potential value of R2 trillion in 2014 (National Treasury, 2015). This represents the sunk costs (road capital costs). The existing backlog is projected to be roughly R200 billion. With the historical cost method of pricing, sunk costs are spread over time between successive generations of users using a representative discount rate. Using a discount rate of 8%, the total annual road cost (2014) was R206 093 313 914 (assuming the backlog is first

addressed). Accepting the estimated total distance travelled in 2014 as 162 405 499 396 km (see Footnote 6), this results in a per kilometre cost of **R1.27** for the *average vehicle* (Table 2). This amount is necessary to maintain the road network in its current state. Allocating revenue to the road sector of less than this amount will lead to a gradual decline in condition of the service and / or the network. It does not represent the amount the user should pay but rather the average amount that the state and the user should contribute to roads.

Table 4: Estimated Cost Elements: Per kilometre cost

Cost Element*	Rand (2014)		Per km costs
Estimated value of road network	R	2,000,000,000,000	1.27
Operational Costs	R	70,686,248,000	0.44
Annual Maintenance	R	49,261,118,052	0.30
Cost of Accidents	R	126,000,000,000	0.78
Environmental Cost	R	20,778,948,768	0.13
Congestion Cost	R	60,000,000,000	0.37

As shown before, the total direct (R0.62) and indirect revenue (R0.41) collected in 2014 amounted to R166 414 285 000, or **R1.02** per kilometre. If the historical costs is assumed, users (i.e. all vehicle types on average) are contributing 25c per kilometre less than the required **R1.27** per km to maintain the road network asset without considering the operational costs. While not all operational costs should be attributable to the road user, assuming a 10% allocation or 5 c/km for operational costs, result in a road user cost of R1, 32 c/km and a deficit of 30 c/km.

Fair and efficient road pricing, however, does not make provision for charging road users for the historical (capital) costs or the cost of the backlog. Road user charging is forward-looking and only requires users to pay the cost of road use that they impose on society and which can be directly attributable to them. Excluding the capital cost from the

calculation and considering only maintenance (30 c/km) and operational costs (44 cent) to be covered results in a per kilometre cost of **R0.74** per km for road use. As noted not all operational cost should be allocated to the road users and using a 10% allocation or 5 c/km for operational costs, result in a road user cost of **35 c/km** (or rather a range from 35 – 74 c/km). The latter approach provides some indication of the average road user cost, although it still does not refer to MSC.

It is a complex and time-consuming task to derive the MSC of road use, and estimates of MSC are scarce. Probably the best source of reference values was produced by the European Union (European Commission) based on extensive and comprehensive research and consultation between all EU countries (see Doll and Essen, 2008; van Essen *et al.*, 2011; Korzhenevych *et al.*, 2014 for an overview). The extract below illustrates the importance given to the correct estimation of the external costs of transport (Doll & Essen, 2008):

“The estimation and internalisation of the external costs of transport have been important issues for European transport research and policy development for many years. In the light of Article 1(9) of the Eurovignette Directive 2006/38/EC (amending Article 11 of the previous Directive 1999/62/EC), the central aim of the IMPACT study is to provide an overview of approaches for estimating and internalising the external costs of transport. The results are presented in the separate deliverables of the IMPACT project, Deliverable 1 and Deliverable 3 respectively. These deliverables cover environmental, accidents and congestion costs.

The internalisation of these various types of external costs is strongly related to the charging for the use of transport infrastructures. Within the framework of the IMPACT project, the

Commission therefore also requested an analysis of infrastructure cost. Contrary to the other deliverables of IMPACT, the scope of this work is limited to road transport.”

Estimating MSC is a data-intensive exercise which demands good-quality and extensive data and a rigorous methodological approach. Two methodological approaches are often used: a bottom-up approach, which considers specific traffic studies to derive cost estimates and relies on case studies (i.e. individual-level calculations); and a top-down approach, using average national data typically obtained from national accounts. While the former is preferred, the unavailability of data and the costliness of the exercise prohibits this approach. The top-down approach requires less detail and less exact data, while still producing acceptable answers. Yet the cost allocation to specific modes is often quite rough (Korzhenevych *et al.*, 2014).

Good quality data on road maintenance, the vehicle fleet (size and composition), the emission and models to calculate the various costs elements are not readily available in South Africa. There is also not always agreement on the exact costs to include, or the accuracy of measurement of some costs or the time period under consideration. It is therefore not possible, within the scope of this project to determine MSC for South Africa⁴². What is possible is to consider international values of MSC and based on these derive corresponding estimates for South Africa based on local data.

4.3.3.1 Marginal Infrastructure Costs

Road maintenance costs in South Africa amount to roughly R49 billion. This entry in the national accounts, however, also includes new construction and road upgrades. Assuming that 45% of the annual road maintenance

⁴² To determine marginal social cost estimates for South Africa is a long-term exercise. It is recommended that such a project be undertaken.

cost is spent on maintenance, the marginal infrastructure cost is roughly R0.14 cents per kilometre. Furthermore, the operational cost of R70 billion cannot all be attributable to users and included in MSC. Assuming that 10% of these costs can be attributed to use by an individual user, it will result in a road user cost of R0.04 per vehicle kilometre. Marginal (or additional) infrastructure costs are therefore roughly **R0.18** (18 cents) per vehicle kilometre. Note: no distinction is made between vehicle types. Table 3 shows the *marginal infrastructure costs* in Euro per vehicle kilometre for 2014 for the European Union (the average for the 28 countries of the EU). Converting this to South African Rand shows that the marginal infrastructure cost (on average for the EU) for cars was R 0.085 (8.5 cents) per vehicle kilometre and R0.66 (66 cents) per vehicle kilometre for a heavy goods vehicle (40 – 50 tons, 8 axles)⁴³. These values are relatively low due to (i) the large number of road users (a large demand) as well as the (ii) economies of scale in road durability with respect to pavement thickness (de Palma & Lindsey, 2007). MSC is the cost of road use attributable to each additional vehicle. The size of the road network therefore does not directly impact on MSC. On the contrary, average costs, is the total costs of the infrastructure divided by all the road users. A larger road network, and relatively smaller vehicle population would therefore lead to a higher costs per road user. Note that road pavements experience economy of scale with regard to durability. In addition to high fixed costs and the indivisible nature of road investment, roads are faced with a downward-sloping MSC curve, with average costs exceeding marginal social costs when demand is not aligned to capacity (when demand is low as in the case with a small vehicle fleet compared to large road network). Setting road user charges equal to MSC would therefore lead to a budget deficit in such a scenario.

⁴³ On 1 July 2014, the exchange rate was R14.59 to the Euro.

⁴⁴ "Traffic congestion costs SA over R1bn - Joburg mayor" - <http://www.news24.com/SouthAfrica/News/Traffic-congestion-costs-SA-over-R1bn-Joburg-mayor-20151001>
<https://businesstech.co.za/news/general/59497/south-africas-r60-billion-traffic-congestion-bill/>

4.3.3.2 Marginal Congestion Costs

Appendix I contains various external cost estimates for the European Union (2010 values projected to 2014). Congestion costs far exceed the other external costs. This is especially so in the case of highly congested urban areas. Table I.1 shows that under free flow conditions, the cost of congestion is very low, as opposed to when capacity is reached and the network and flow suffer from severe congestion. Congestion costs, made up of travel time, vehicle operation costs and the inconvenience to all the road users who are impacted by the addition of one extra vehicle to the flow, can overshadow all other elements of marginal social costs, i.e. accident costs, noise and air pollution. This is subsequently the reason for the popularity of congestion charges, and their relative acceptance by the community, to curb congestion in urban areas.

The cost of congestion to the South African economy has seen wide ranges of speculative values ranging from R1 billion to R60 billion⁴⁴ annually. No formal congestion studies have, however, been undertaken in South Africa.

Data for the EU indicate that the cost of congestion, measured per vehicle kilometre, can vary significantly. Accepting R60 billion as the best guesstimate of congestion costs in South Africa, this would lead to an average per km cost of **37 cents** per vehicle kilometre. Note that this is again an average value.

Table 5: Illustrative marginal road infrastructure costs for EU countries (€ct per vkm)

Vehicle category	All roads	Motorways	Other trunk roads	Other roads
Motorcycles and mopeds	0.26	0.13	0.16	0.33
Cars	0.59	0.27	0.37	0.93
Buses	2.34	0.91	1.64	3.13
LDV < 3.5 t	0.84	0.36	0.53	1.37
HGV 3.5 - 7.5 t, 2 axles	0.08	0.04	0.06	0.47
HGV 7.5 - 12 t, 2 axles	1.74	0.73	1.21	9.69
HGV 12 - 18 t, 2 axles	4.55	1.90	3.17	25.37
HGV 18 - 26 t, 3 axles	6.11	2.55	4.26	34.08
HGV 26 - 32 t, 4 axles	7.75	3.24	5.40	43.25
HGV 26 - 32 t, 5 axles	4.24	1.77	2.96	23.66
HGV 32 - 40 t, 5 axles	9.42	3.93	6.56	52.52
HGV 32 - 40 t, 6 axles	5.64	2.36	3.93	31.46
HGV 40 - 50 t, 8 axles	5.94	2.48	4.13	33.11
HGV 40 - 50 t, 9 axles	4.53	1.89	3.16	25.27
HGV 50 - 60 t, 8 axles	12.52	5.23	8.72	69.80
HGV 50 - 60 t, 9 axles	8.94	3.73	6.23	49.85
HGV 40 t, 8 axles	4.10	1.71	2.86	22.87
HGV 40 t, 9 axles	3.30	1.38	2.30	18.42
HGV 44 t, 5 axles	22.18	9.27	15.45	123.70
HGV 44 t, 6 axles	12.18	5.09	8.48	67.91

4.3.3.3 Marginal Accident Costs

Recent work for the RTMC revealed the annual costs of road accidents to be R142.95 billion, equating 3.4 per cent of GDP. This translates into a per kilometre charge of 78 cents per kilometre (when discounted to 2014). This cost, however, cannot be assumed to be the external cost of accidents and is merely the average 'cost' per vehicle kilometre. The external costs will require an assessment of the degree of risk internalisation of accidents

(i.e. own insurance), as well as the risk associated with each vehicle and driver. Such an exercise was not possible in the context of this report. Assuming EU values for South Africa and combining this with research undertaken at Stellenbosch University, the per kilometre cost for accidents is likely to be in the range of 1 – 15 cents (we assumed a value of 9 cents per kilometre for calculation purposes).

4.3.3.4 Marginal Environmental (Noise and Pollution) Costs

Only limited work has been done in South Africa with regard to the environmental costs (pollution and noise) associated with transport, and road transport in South Africa. Several environmental models such as COPERT 4 (Computer programme to calculate emission from road transport) developed by the European Environmental Agency Environmental have been applied to the sector in South Africa. Furthermore, the AA publishes vehicle emissions for all vehicles in South Africa (comparative passenger car fuel economy and co2 emissions data). Using the AA data, external costs were estimated for South Africa using distance travel per vehicle type and CO² equivalency factors (CO²_e). A cost of R476.79 per tonne CO²_e was used to derive a per kilometre cost of **13 cents**. Unfortunately no noise data was available.

4.3.3.5 Total Marginal Social Costs

Summation of the cost components per vehicle kilometre, i.e. infrastructure operations and maintenance (18 cents), congestion (37 cents), accidents (9 cents) and pollution (13 cents) results in a cost of +/- **R0.77** per vehicle kilometre. This should be compared to the **R1.02** that road users in South Africa are already paying towards road use (both in indirect and direct charges) and the **R1.27 - R1.32** to maintain the network. Note that these values have been averaged over different vehicles, times of the day, types of road, etc. It serves merely as an illustration of the concept.

If capacity is not optimally adjusted to demand, for example low demand with excess capacity, setting optimal road user charges will lead to deficits. South Africa has a large road network with a comparatively small vehicle population. Charging a road user fee that excludes the external cost component will clearly not deliver sufficient income. Implementing congestion charges, and other external costs, with road damage charges, however, may address part of this problem.

The impact of congestion cost is prominent. Appendix I, Table 3 shows the efficient marginal congestion costs in €ct per vkm for 2014 for the EU. Using the data supplied for the EU, Table 4 illustrates the dramatic differences in marginal social costs between a car (engine < 1.4l) and heavy goods vehicle (HGV) that travel in and outside of the peak. Congestion cost is the main contributor to peak cost values. Equivalent values for South Africa were derived using an exchange rate of R14.59 to the Euro (Column 2) and using purchasing power parity (PPP) (Column 4)⁴⁵.

⁴⁵ Purchasing power parities (PPPs) are the rates of currency conversion that equalise the purchasing power of different currencies by eliminating the differences in price levels between countries. In their simplest form, PPPs show the ratio of prices in national currencies of the same good or service in different countries. PPPs are also calculated for groups of products and for each of the various levels

Table 6: Marginal Social Costs (EU average values) (2014)

European Commission Marginal Social Costs: EU, US and SA				
	€ct per vkm	SA Cent per vkm	US cent per vkm	SA Cent (PPP) per vkm
Car: Motorway - Off Peak	0.77	11.20	1.05	5.61
Car: Motorway - Peak	29.17	425.64	39.75	213.40
Car: Urban road - Off Peak	2.29	33.39	3.12	16.74
Car: Urban road - Peak	54.54	795.74	74.30	398.94
HGV: Motorway - Off Peak	3.94	57.45	5.36	28.80
HGV: Motorway - Peak	89.61	1,307.46	122.09	655.50
HGV Urban road - Off Peak	9.66	140.96	13.16	70.67
HGV: Urban road - Peak	156.14	2,278.08	212.72	1142.12

Using 2014 as the base year, an equivalent United States road user charge is shown in Table 6 in US cents per vkm. As mentioned in Footnote 27, the Federal Highway Trust Fund (HTF) is capitalized by 18.3 cents per gallon federal gas tax, or 4.75 US cent per litre of fuel. This charge has not been raised since 1993 (it is not indexed to inflation) (Langer, Maheshri & Winston, 2017). Assuming a conservative fuel efficiency of 1l /10 km, this would deliver an income of 0.475 US cents per vkm, considerably lower than any of the current hypothetical charges in Table 4, Column 3. As discussed in Section 4.3.1, user revenue only contributes 40 – 45% of the funds for road construction in the USA, which is remarkably similar to the ratio of 0.475 to 1.05 cents per vkm for a car on a motorway (off-peak).

Table 4, column 4, does not indicate what MSC should be in South Africa. It is merely an illustration of the ranges of MSC for road use in the EU and

of aggregation up to and including GDP. The basket of goods and services priced is a sample of all those that are a part of final expenditure: household consumption, government services, capital formation and net exports, covered by GDP. This indicator is measured in terms of national currency per US dollar.

the comparative South African values, based on Purchasing Power Parity (PPP). Note that while these values do not hold any relevance for South Africa, they do show how road user charges are impacted by location, time of day and vehicle characteristics, and specifically the importance of congestion on road user charges.

These results clearly indicate the very different outcomes that can be obtained using the different approaches, as well as the sensitivity of the final road user charge to the available cost data. However, the findings do seem to indicate, simply based on comparison with international data and road user charges, that South Africans are already paying a fair price for road use in rural areas but that urban and peak hour road user charges may not cover road user costs.

Table 2 revealed that the average vehicle is paying roughly **R0.62** per kilometre (in direct charges). *It is of course paradoxical to refer to a single road user charge as the value is differentiated by time, place, vehicle and type of road.* Comparing this to Table 6 reveals that road users (normal cars and heavy goods vehicles) may be paying their fair share in off-peak and in rural areas, but that peak hour cost exceeds this value quite dramatically. A normal car travelling on a motorway (in an urban area) would pay R2, 13 cents per kilometre in peak and only 16 cents per kilometre in the off peak.

Implementing such a road user charge would make road users aware of their congestion costs and it may entice more sustainable driving behaviour, such as choosing public transport in urban areas. It may also shift trips to the off-peak, thereby reducing congestion. The problem in South Africa may be less a question of additional or increasing road user charges and more an issue of differentiated charges between urban and rural areas, between congested and non-congested roads and the allocation of road funds. In congested urban environments and the main metropolitan highways the situation may be different and current road

user charges may not adequately reflect the congestion caused by vehicles. An important caveat for implementing road user charges based on marginal social costs is the pricing principle should followed by all modes and services, that is price distortions elsewhere is not considered. Implementing the user pay approach based on the principle of MSC also does not guarantee that costs will be covered (or in fact that it should be covered). Chapter 5 discuss various financing options to cover any possible shortfall between efficient road user charges and road funding needs. Cost recovery depends to a large extent on the balance between and supply and the ability to internalise the costs of congestion.

4.4 Conclusion

This Chapter set out to explain the user pay approach, which seems to have been distorted in South African policy documents. The term user pay seems to imply that users of the road should be responsible for the costs associated with road use. What these costs entail is less clear in local policy documents and papers. An overall theme of South African policy documents seems to suggest that the *user pay* will result in additional payments or increased revenue from road users.

The user pay approach, if equated to the internationally accepted term of social marginal costs as road user charge will cover road user costs, but the principle does not guarantee sufficient income or budget neutrality. In fact, applying the road user pay approach may lead to a decrease in revenue from road users in some areas, notable rural areas and off-peak travel, while it may lead to an increase of revenue in urban areas and on the main highways experiencing congestion. At a minimum, road use tariffs should not be set lower than the variable cost of road used, i.e. the marginal costs. Local taxes and charges can be used to support lightly travelled local access roads and cover all the road use cost of providing these roads. Congestion

costs should be included in road use charges in congested cities and high volume roads(Heggie & Vickers, 1998).

Finally, South Africa is not unique in its road funding dilemma. Few countries manage to balance revenue from road users with demands for road funding. While there is not clear recipe for success, it seems that countries that do implement the road user pay approach, based on the concept of marginal social costs seem to be more successful in getting the prices right, i.e. fair and efficient road user pricing.

The above discussion should not be seen as an accurate representation of MSC-based road user charges in South Africa. It is merely an attempt to illustrate how MSC can be derived in South Africa, the data requirements that will be required to establish the approach and the possible impact of the approach on existing road user charges.

Implementing road user charges based on the MSC-pricing approach is dependent on;

- (a) An understanding of the concept by all the relevant parties
- (b) An appropriate policy framework
- (c) Data supporting the calculation of the various external cost
- (d) Accurate costs accounting procedures
- (e) Accurate vehicle fleet and road use information

MSC as presented in this Chapter will lead to fair and efficient prices or road use charges for road users⁴⁶. While the principle is quite clear, the current road user charging institutional framework in South Africa is not receptive for such an approach. Road use charges and road ownership taxes are collected at various levies of Government and has very little, in fact no relationship with the actual costs imposed by road users on society. Any relationship between efficient road user charges and the current road

user taxes and levies are merely spurious. Chapter 5 will present an approach and recommendation to transform the South Africa road funding regime to accommodate the road user pay principle but also to achieve more consensus on the need to fund South African roads sustainable and to accommodate the socio-economic and technical terms impacting on the current fuel taxes.

⁴⁶ This project is not concerned with the first best requirement to set prices equal to MSC in all transport sectors and not only in the road sector.

5 Discussion and Recommendations

(Road Funding Policy recommendations)

“I have a very simple proposition to put, that transport finance is in a mess and some radical thinking is required to solve the problem. I think the time is ripe to draw the lessons of history, and a remarkable number of pieces of the jigsaw are now falling into place. I shall propose a way of reforming the management of public sector assets, and specifically the road system. I think it is a suitably millennial task for the present Government, and a nice response to the previous Government’s success in privatising public utilities”.(Newbery, 1998)

This statement by David Newbery (Professor of Economics, Department of Applied Economics, Cambridge, UK) seems particularly relevant to present day South Africa. The road funding environment is seemingly characterised by a void in terms of research, policy and supporting facts. This is really worrying given the road asset values in South Africa (estimates of R1 - R2 trillion), the significant income generated by the road sector (+/- R120 billion annually), annual capital and maintenance expenditure (R49 billion) and annual operational budget (R70 billion).

Few, if any, of the various road factions have access to all the required information needed to make informed statements on road funding and what the user should pay. These interested parties include the road users, the authority at all levels of government and government agencies, the operators, and the infrastructure providers. A good road funding policy should benefit all and not only the infrastructure providers. Roads’ sole purpose is in fact to support accessibility, which is needed to in turn support well-being and economic development.

The current road funding regime in South Africa is characterised by some anomalies:

- 1) There is no comprehensive road funding policy or a full understanding of the user-pay principle. The most recent policy and strategy documents in South Africa focus on the *backlog* and seemingly *too little* money for roads. A common statement of all these documents is the need to move to the user-pay approach to funding roads, and to increase the funding allocated for roads. Several alternative funding sources are considered to fund this backlog and road allocation gap. These alternative funding options, however, do not represent the user-pay principle, and as such do not consider the full magnitude of the current road user charges imposed on the user.
- 2) The fact that South Africa seems less attuned to international trends and developments with regard to (i) involving the public in road policies and road user forums, (ii) establishing clear road income and expenditure accounting practices and record keeping, (iii) understanding and implementing the user-pay principle for roads, and (iv) quantifying the impact of new technological developments on road-generated income.
- 3) Not being aligned to what a road user charge should be:
 - a) The user-pay policy in South Africa is a distortion of what user pay entails. No evidence was found on how the various road user taxes, charges and levies resulting in the risk of opacity in price setting mechanism. The mooted user-pay principle as used in South African policy documents seems to be a distortion of the free market pricing principle that applies to perfect competition. Roads present qualities of a natural monopoly, and road-user charges should be set to maximise welfare, i.e. a regulated monopoly, and not to cover the cost of the sunk costs.

-
- 4) There is a critical shortage of usable information on the expenditure, income and user charges associated with road use, such as studies on infrastructure costs; data on vehicle fleet composition, use and growth; accounting systems; cost allocation, the external costs associated with vehicle and road use, etc.

The current South African road funding debate, seems more of a collection of myths, untruths and ignorance, than an objective, scientific and evidence-based debate. This sets the scene for suspicion and conflict, as opposed to a constructive debate.

While the current situation does not bode well for introducing an insubstantial road funding policy, it does provide an opportunity to reform the South African road funding regime. In some peculiar way, South Africa can benefit from and even leapfrog many of the past, expensive pitfalls related to road funding, using the latest international developments, thinking and trends to develop a new policy. Such a policy may be a 'nice response', to quote Newbery, of the Government to put in place a road funding policy that addresses:

- (i) New technological trends, such as increased fuel efficiency, electrical vehicles, shared vehicle ownership, etc.
- (ii) Setting road user charges at fair and efficient levels that represent the road user cost principle
- (iii) Ensuring a predictable and stable source of income from and for the road sector
- (iv) Obtaining public acceptance for the need to maintain and expand the road network and the users' fair contribution for such activities
- (v) Setting the scene for harmonising road user charges in Sub-Saharan Africa
- (vi) Ensuring competition and inter-modal harmonisation between road and rail by setting tariffs at appropriate levels

Underlying any policy, however, is the strength of road governance. The Development Bank of South Africa, in its 2012 report *The State of South Africa's Economic Infrastructure: Opportunities and Challenges*, notes the importance of governance in infrastructure development (Box 4). It may work well for the road sector to establish a sound institutional framework before embarking on major, specific funding and road user charge policies.

Governance of infrastructure development

State capacity to deliver and effectively maintain infrastructure is grounded in the following functions of a democratic, market-based economy such as South Africa's:

- 1) The state's ability to collect tax and user charge revenue, as this determines the quantum of resources available for infrastructure investment;
- 2) Allocative efficiency, which in turn depends on the state's capacity for integrated planning across different infrastructure sectors;
- 3) The efficacy with which programmes are implemented and delivered to the targeted beneficiaries (including the management of public finance, procurement processes, contract management and effective monitoring of state-owned enterprises (SOEs));
- 4) Effective oversight and regulation of public and private entities that provide infrastructure, and associated services.

Notably, all these capacities rely on the strength of the public institutions tasked with implementing them. If any of the four capacities are inadequate, infrastructure delivery will be compromised. This also applies to the complete cycle of project development including inception, implementation, operation and management, maintenance, and the refurbishment and replacement of infrastructure assets.

Source;

<http://www.gov.za/sites/www.gov.za/files/State%20of%20SAs%20Economic%20Infrastructure%20Report%202012a.pdf>

Box 5 : Governance of infrastructure development

5.1 Findings: The original research questions

Roads feature predominantly in the South African economy. In fact, roads are, in spatial extent, the most prevalent network infrastructure, totalling roughly 750 000 km, with about 80% of the 860 million tonnes of land freight transported via the road network. Compare this to the electricity grid consisting of high voltage transmission lines (27 770 km) and distribution network (325 000 km) and the size of the road network is obvious. In terms of value, 85% of freight is transported via the road network⁴⁷. Even passenger transport is dominated by road-based transport, with public and private road transport accounting for 95% of all passenger trips undertaken in South Africa. Roads can indeed be considered one of the pillars of the South African economy.

Ensuring a sustainable income source for roads is therefore crucial to economic growth and development. Roads are funded mainly by allocations from the national government to the various SOCs, local and provincial government. The question, really, is how South Africa is faring, and how we are measuring up internationally⁴⁸.

Chapter 3 revealed that roads in South Africa receive a fair share of revenue, compared to other selected countries. South Africa seems to lie in the top half when comparing revenue generated by the road sector to funds allocated to road network. South Africa also seems to spend a fair amount on the roads sector, as revealed by the share of road expenditure as percentage of GDP, although such comparisons are hindered by the availability of data and the spatial economic conditions of the country. Chapter 3 furthermore showed that in terms of the affordability of fuel and the share of personal income spent on fuel, South Africa is one of the worst performers. A relatively low fuel price (in 2014) is offset by low affordability

and a high percentage of income spent on fuel. Chapter 3 furthermore showed that in terms of the affordability of fuel and the share of personal income spent on fuel, South Africa is one of the worst performers. A relatively low fuel price (in 2014) is offset by low affordability and a high percentage of income spent on fuel. These factors are probably due to the skewed income distribution in South Africa and may not entirely reflect the situation for the vehicle owner population. Private vehicle ownership in South Africa is likely to remain subdued due to affordability.

South Africa boasts the 10th to 13th largest road network in the world, but only the 85th largest vehicle fleet: a larger network served by a small vehicle population (large supply and small demand) inevitably puts pressure on any budget and ultimately may influence user tariffs.

⁴⁷ *State of the Logistics*, CSIR, 2014

⁴⁸ Given countries' unique circumstances, including their level of development and their size, a direct comparison is not always appropriate or possible.

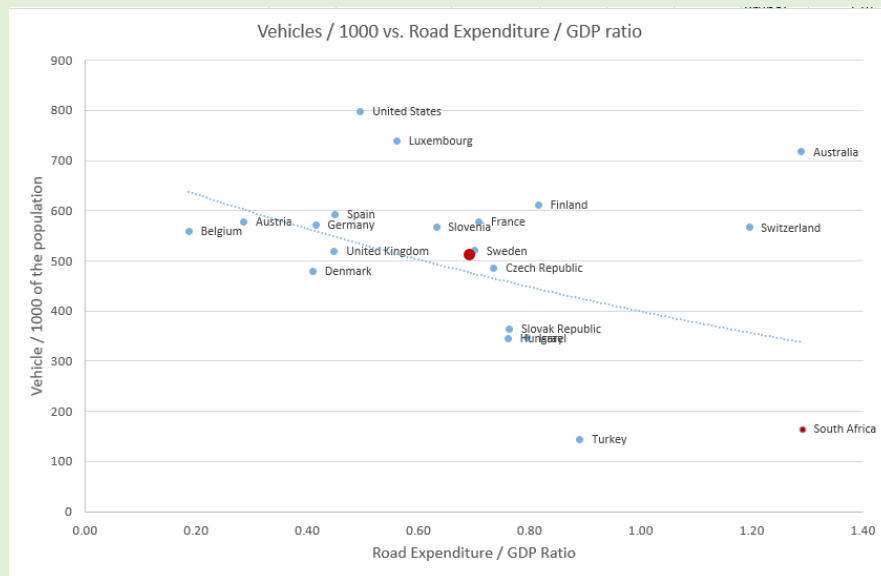


Figure 16: Road expenditure and vehicle fleet (Red dot indicate average)

Figures 16 and 17 compare what South Africa spends on roads as a ratio of GDP compared to vehicles per 1000 of the population and to the road network, respectively. In both figures, South Africa lies on the periphery of the countries (red dot is the average value). Both figures support the suggestion that South Africa spends a reasonable large share of its GDP on roads. While there is no right or wrong and South Africa's expenditure on roads may be justifiable, the statement, there is *safety in numbers* may be well worth considering.

South Africa is facing many developmental challenges and for a foreseeable future a bleak economic outlook. This does create some very real funding dilemma for road financing:

- South Africa is already spending a sizeable share of its GDP on roads
- Road users face affordability constraints and are already paying comparably high taxes, charges and levies for road use and vehicle ownership

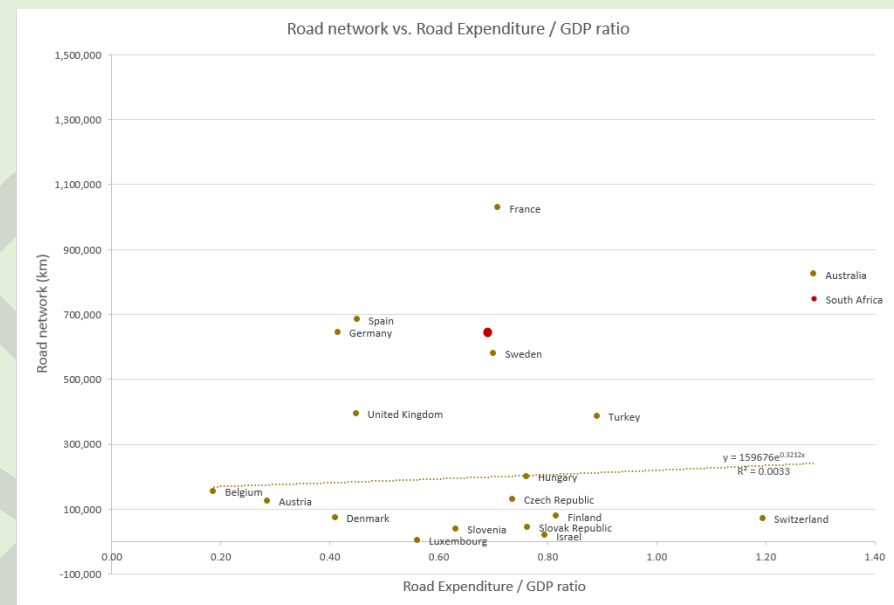


Figure 17: Road Expenditure and road network (Red dot indicate average)

- Implementing the user-pay principle may not lead to an increase in revenue and requires extensive knowledge on the external cost associated with road use
- The road users believe they are already paying for road use, and that they are victims as opposed to contributors (of congestion)
- South Africa has a very expansive road network and a relatively small vehicle fleet (measured in terms of vehicles per 1000 of the population). While this should not impact on the road users charges, it will impact on possible deficits and the public budget
- The funding source, that is the fuel levy, is facing long term viability constraints.

It must be emphasised that South Africa, as all developing countries, faces a plethora of developmental needs and pressure on the fiscus and budget-associated funds to fund these needs. The historical (pre-1994) spatial, economic and social policies certainly contributed to a society demanding various affirmative policies. These policies also affect the road sector and include, amongst other, funding needs to restructure the cities and align the focus on public transport networks and operational. While roads undoubtedly support and facilitate economic development, they only do so in the presence of other positive externalities including efficient cities, a trained workforce and favourable economic policy. The existence of a large road network (the supply) does not automatically guarantee a sufficient allocation from Treasury. A relatively small vehicle population (the demand) will result in road funding deficits in sparsely populated areas while it may put pressure on the road users to fund the road network if the marginal social cost approach is not employed. Parts of the network, notably cities and larger metropolitan areas that face congestion will experience funding deficits as road use charges do not consider congestion (directly) and road budgets is not allocated according to kilometres of road use. If alternatives to private car use is not available, congestion may in fact get worse and any additional taxes imposed on motorists will face public adversity.

Roads, however, are undoubtedly also one of the pillars supporting South Africa's competitive advantage and economic growth potential. Neglecting

to fund our road network will in fact lead to cost to the road user whom ultimately pays for poor maintenance via increased vehicle operating costs. The increase in VOC due to poor maintenance far exceeds the savings of deferred or inadequate maintenance. The longer term costs of poor maintenance leads to expensive rehabilitation compared to regular and appropriate maintenance. Poor maintenance also has significant impacts on the economy, especially so in rural areas where there is a direct cost in terms of lost production (spoiled agriculture produce) and in urban areas where congestion has significant time and cost implications for individuals.

The fuel levy is probably exhausted as a long term sustainable road user charge and is becoming increasingly inefficient as fuel efficiency increase and new technology (electrical vehicles) emerge. The road funding structure for South Africa also seem complex with funding from various road use and road ownership sources and large operational expenditure (Figure 18).

Funding of roads rest on three principles: Efficient pricing based on marginal costs, efficient investment based on need and efficient management of roads which allows the linking of revenues and expenditure. South Africa may require some road sector reform in order to before the funding dilemma can be addressed.

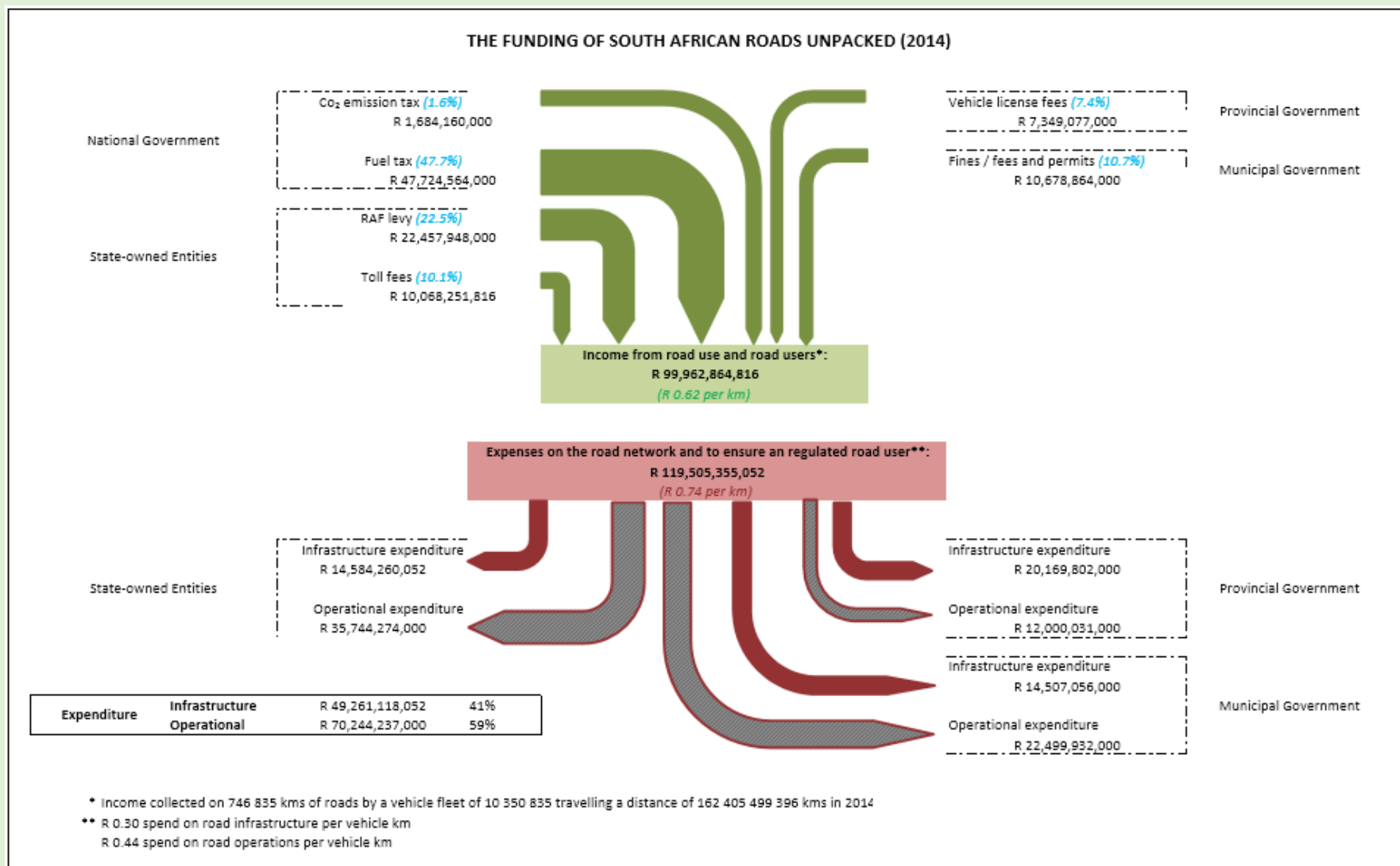


Figure 18: The funding of South Africa roads (2014)

5.2 Setting the scene for comprehensive reform

The road funding problem in South Africa is perhaps less about funding and more about claims to funding: myths, untruths and ignorance about how much road users should pay towards the infrastructure. Many of the current problems in South Africa seem to originate from subjective conjectures, as opposed to a real understanding of the dilemma. Calls for addressing the funding shortfall by increasing fuel levies or alternative income sources may in fact not be appropriate, and a longer-term view to restructuring and normalising the industry may pay better dividends.

Heggie already noted in the 1990s that successful road funding and road administrations are dependent on (Heggie, 1995):

1. *“independent management by establishing professional management agencies run according to sound business practices to obtain value for money;*
2. *ownership by involving road users and civil society stakeholders in the management of roads to encourage better management, demand for efficiency, and control of monopoly power;*
3. *financing by stabilizing road financing through securing an adequate and stable flow of funds; and*
4. *responsibility by securing clear definition, separation, and assignment of responsibilities with matching authority and performance targets.*

As these four reforms are complementary, all of them have to be implemented through a comprehensive reform program if the objective of effective and sustainable road management is to be obtained. Without all four, proper commercialization may not be attained, and

only part of the ultimate objective of ‘good’ road services may be achieved.”

The World Bank notes that bringing about the necessary changes in terms of management and financing of transport infrastructure in Africa hinges on these four building blocks, i.e. ownership, financing, responsibility and management. While South Africa is arguably the most developed country in Sub-Saharan Africa, with an extensive road network funded by a diversity of income sources and with capable roads agencies (at least with regard to national roads and some provinces), the existing state of affairs seems to indicate that neither financing alone nor the presence of pockets of excellence in road management is sufficient to address road maintenance needs. Furthermore, there may be limits to the capacity of South Africa to raise taxes, fuel levies or duties on vehicles where these are already very high and make a sizeable contribution to the general revenue fund. The issue is really, what *more* has to be done in South Africa to improve road management and funding.

South Africa cannot address the road funding dilemma in the current institutional and policy framework and public perception about tax abuse. Any attempts to introduce new toll roads will receive severe public opposition; increasing the fuel levy will only temporarily address the problem; and introducing other road ownership or road user taxes typically do not adhere to the principle of a road user charge (user pay). Roads may not receive an equitable share from the Treasury, leading to the well-deterioration of the network and the asset base. There is, however, very little tangible evidence to support this in the public domain, or to support the proposition that road users are not paying their fair share for road use. The road sector, including all the necessary operational, regulatory and management agencies, receives a significant allocation (as revealed by the allocation to roads as a share of GDP). The problem may be less of a funding problem and more a problem related to an understanding to road funding,

and specifically maintenance needs, knowledge of the road-generating revenue and road expenditure, and accurate accounting of income and costs in the road sector. For this reason, any attempt at a new road funding policy should start with establishing a sound institutional and operational framework, i.e. a road management policy.

Given the current political inertia and public resistance to road use charges, it is recommended that general consensus is achieved on the road funding problem. The following section briefly outlines such a process.

5.2.1 Establish a common understanding of the problem⁴⁹

a) Gain general acceptance of the road funding problem

- The various stakeholders, that is the government (Ministry of Finance and Treasury), road users, road infrastructure providers and state-owned entities, have very different opinions with regard to road funding. A first step will be to involve the stakeholders in understanding the dilemma.
- An informative workshop (2 – 3 days) should be convened with the aim to inform stakeholders and reach a consensus on the problem, possible causes and remedies, and the way forward.

b) Publish a position paper

- An outcome of the workshop should be a position paper setting out the problem to be resolved, the specific matters to be addressed, a timetable for the process, milestones and decision points, and the responsibilities of the various participants.

c) Conduct studies and investigations

An intention of the position paper should be to identify research requirements and information needs:

1. The importance of roads to the economy: The case for roads should be made.
2. Road maintenance and network expansion needs study: Undertake a study to establish the current road funding backlog required to restore the network to the acceptable level. Once restored, only normal maintenance will be required to keep the network on an agreed standard. The backlog should not be for the account of current users but should be financed by transfers from the Treasury. It is also important to understand the future maintenance and network expansion requirements for roads.
3. Road funding study: Such a study should unpack all the charges and fees paid by road users, i.e. the road-generated revenue. To ensure that the earmarking of road

⁴⁹ This section relies considerably on the study *Road Funds and Road Maintenance: An Asian Perspective* undertaken by the Asian Development Bank, July 2003.

user charges has as far as possible a neutral effect on the National Revenue Fund, a study of road funding is needed to recommend which road use taxes, charges, levies and fees (or parts of taxes) paid by road users are best earmarked for the RMF, then relabelled as user charges.

4. Cost allocation study: This study should address the cause-and-effect relationship between road use and agency costs: that is, what are the road use costs caused by each category of road user? While frequent mention is made of the pavement damage cost caused by heavy vehicles, South Africa has not done sufficient cost allocation studies to indicate the financial responsibility of different vehicle classes⁵⁰.

d) Encourage public comment on a draft road user funding paper

- The outcome of the previous step should lead to a draft road user funding policy, which considers (i) the establishment of a road user fund, (ii) the charges earmarked for the fund, and (iii) the management of the fund. This document should be in the public domain and open to comments and feedback. Once received, the government can start with the implementation process.

5.2.2 Institutional recommendations

The success, and public acceptance, of any future road funding policy will very much depend on the *supportive* involvement of the various stakeholders, and specifically the road users. Involving road users in the management of roads holds several benefits, including providing a transparent, predictable and accountable institutional framework. Several case studies exist of how to establish a Road Users Authority involving the various stakeholders.

1) Establish a Road Users Authority (RUA)

- i) A Road Users Authority (RUA) or similar forum need not be a permanent establishment, but can be a medium-term vehicle to build capacity and trust in the industry, and accelerate the meeting of the required information and data needs. A key focus of this body, however, should be to oversee the implementation of the Roads Funding Policy, and the establishment of a Road Fund Administration (RFA) and Road Fund (RF).
- ii) Representation on the RUA can include road users, government officials (Treasury and Department of Transport), civil society stakeholders, state-owned enterprises (SOE's), operators and contractors.

⁵⁰ Cost responsibility is the principle that those who use the roads should pay for them and, more specifically, that the different users should pay in proportion to the road costs for which they are responsible. Cost responsibility requires each category of highway users to contribute to road revenues in proportion to the costs they impose on the road system. Cost allocation is the process of

apportioning the cost of road work to the vehicles that impose those costs and is therefore necessary for the implementation of the road charging policy.

2) Establish Road Fund Administration, Road Fund and Road User Charges Guidelines

- i) The Road Fund Administration (RFA) should be responsible for overseeing the collection of all road-user-related charges. This fund need not be a ring-fenced fund, but should aim to be revenue-neutral with regard to the fuel levy (or road-distance charge that replaces the fuel levy) for the National Revenue Fund. It is important that the fund keep accurate records of road user revenue and road expenditure (capital, maintenance and operational). The road fund administration will also be responsible for setting the level of road user charges.
- ii) The Road Fund must ensure stable and predictable road funding and overcome the shortcomings of conventional budgeting (i.e. funding for roads is dependent on the annual budget process). The main issues to be addressed by the Road Fund are (a) transparency with regard to both road-generated revenue and expenditure, (b) ensuring that road users pay their fair share towards road costs and (c) ensuring that adequate funds required to maintain and expand the road network are made available to road agencies (Bousquet & Queiroz, 1996).
- iii) Importantly, the Road Fund (RF) must replace some part of the current road *taxes and levies* by road user *charges* under the (regulated) control of the Road Fund and Road Fund Administration, and subsequently outside the control of the Treasury (as in the present system).

3) Establish a Transport (Economic) Regulator

- i) The main task of a road regulator is to regulate road user charges and service quality, and to make sure that the residual monopolists in the sector do not overcharge or cheat on the quality of service provided to the users.
- ii) The Regulator's role is to settle issues as specified in the charter or law creating this institution. In a nutshell, the Regulator's decisions have to result in outcomes mimicking that of a competitive environment (in other words, what would road users be paying if roads were privatised and users were faced with alternative options).
 - This means that the Regulator is concerned with efficiency and minimizing costs, while ensuring that investment decisions are consistent with demand at unbiased prices.
- iii) In this process, a regulator must also ensure that the monopolistic operators get a reasonable return on their assets. Though it seems simple enough in practice, it is often more complex because governments face a multiplicity of objectives. Efficiency (stimulating cost minimisation and pricing at marginal cost) and fairness are only two of the objectives that reforming governments seek. Governments also have strong fiscal and distribution concerns they want to address through the reforms. When this objective dominates the others, it can reduce the scope for efficiency, which can be quite constraining for a regulator.
- iv) A regulator should also focus on the separation of powers: the authority that provides roads cannot be allowed to set tariffs, nor can they be allowed to make the rules with regard to access.

5.2.3 Funding

The proposed Road Fund Administration (RFA) will be responsible for setting tariffs and road user charges as well as determining the budgetary need. Preferable road user charges are those that link the charges most closely to the use of the roads (road space), the damage caused to the road, and societal impacts (such as congestion). Furthermore, the principles underlying road user charges should be that they are (i) economically efficient, (ii) equitable, (iii) cost little to collect and (iv) are not easily evaded (Queiroz, 2009). Following the latest international trends, income for road funds typically comprise two or three parts:

1) Fuel levy

- The current fuel levy in South Africa delivers sufficient income to cover the annual expenses on roads (maintenance and operations). For the immediate future, this will remain the main source of revenue from road users. Disruptive technologies such as electrical vehicles, and vehicle ownership trends such as shared ownership and vehicle-on-demand services, however, may significantly impact income from the fuel levy.

2) Heavy goods vehicle charges

- Fuel levy income can be complemented with a mass-distance charge on heavy vehicles and electrical vehicles. Charges should be based on costs to the network imposed by HGV (> 3.5 tonnes).

3) Toll roads (public/private partnerships)

- a) Congestion and demand for road transport are most likely to be experienced on the main suburban arterials and freeways. Population growth and rising vehicle ownership will necessitate significant investment in these links to ensure that road infrastructure facilitates rather than impedes economic growth in the cities.
- b) Recognition that to deliver the investment required, the highways sector – like other classes of infrastructure – needs stable long-term funding streams, based on user charges. This will reduce the sector's overall vulnerability to central government budget cuts, and allow the earlier construction of facilities which otherwise may have been delayed if funding was dependent on a road fund or general budgetary process.
- c) As the financial and material capacity of the public sector is limited, toll roads also provide an ideal opportunity to involve the private sector to complement government allocations to the road sector. Infrastructure banks can play a central role in these public/private partnerships and can address some of the current risks.
- d) Toll roads, however, have become very contentious in South Africa. Some international experience to 'soften' the negative perception may include (Zmud, 2008):
 - (i) The public wants to see value.
 - A toll must be with respect to a problem, and this problem needs to be concrete.
 - In urban areas, tolls should be to charge for congestion, not to fund roads in another area.
 - (ii) The public cares about the use of revenues.

- Revenues should be linked to specific uses and not specific agencies.
- (iii) Building support is a long-term, continuous process
- (iv) The public uses available knowledge and information.
 - There should be an objective explanation of why and how much.
- (v) The public believes in equity, but wants (geographical) fairness.
 - Explain why an existing route is tolled, and ensure that there is an alternative route.
- (vi) The public want simplicity.
- (vii) The public favours tolls over taxes.
 - Tolls are a form of earmarking.
 - Tolling represents freedom of choice – only users pay.

Toll roads hold many benefits, including less travel time variability, higher speeds, lower vehicle operating costs, a positive impact on property values, and benefits to industries. These benefits can be used in stating the case for toll roads. The problem with toll roads is that if they are implemented in an already high-tax environment, and/or where road funding and spending are not transparent or accountable, or where alternatives does not exist, user willingness to pay is significantly diminished.

4) Other income sources

In addition to the road use charges discussed thus far, two additional income sources must be considered which can play an important role to fund road transport infrastructure and operations.

i) Congestion tax

- Significant pressure will be placed on the general revenue fund to fund public transport and address congestion in the main metropolitan areas. Cities' own revenue sources are severely limited, and congestion charges can deliver a source of income for public transport and urban road maintenance, and capacity expansion.
- Congestion charges also internalise the costs of congestion, which can result in significant increases in revenue from road users (see Chapter 4), but also act as a very strong policy tool to alter road user behaviour.

ii) Government transfers

- Given the extensive road network in South Africa, and the relatively small road user base, shortfalls will be inevitable if road user charging is based on marginal cost approaches. As roads benefit road users and non-users alike (there really is no such thing as a non-road user), the burden of financing roads should not be exclusively the responsibility of road users. As a result, increased allocations and transfers from the Treasury should be motivated. In the case of rural roads,

While there are several other sources of income available (see Section 2.2), these sources (i) mostly deliver small contributions (compared to the fuel levy and congestion charges); (ii) often do not adhere to the principles of user pay; and (iii) may induce undesirable behaviour, such as delaying tyre replacement due to the tax and levy of spare parts.

5.3 Conclusions

Transport infrastructure, roads in particular, impacts on economic growth by lowering transaction costs and ultimately improving productivity (see Chapter 1). In addition to the direct and even some indirect effects such as employment creation, transport infrastructure also supports trade, competitiveness, regional integration and tourism – all important developmental objectives that are part of the National Development Plan of South Africa. Roads, and in fact all transport infrastructure, are not sufficient, however, to induce growth, and this exact relationship between transport infrastructure and economic growth depends very much on the presence of other factors (see Chapter 2). With regard to South Africa, the relationship between transport infrastructure and economic development is also not always consistent. South Africa performs well on the road infrastructure quantity measures, and the cost of transport, measured in vehicle operating cost per kilometre, is comparable to the developed world. Our logistics indicators rate in the top quantile in the world (Chapter 3), especially on the infrastructure side.

As discussed in Chapter 3, the country also generates and spends a comparable amount of funding on roads (road-generated revenue and road expenditure). On a personal level, however, South Africans are already facing affordability problems, with the share of income spent of fuel taxes in South Africa among the highest in the world.

South Africa also does not perform very well when considering public transport provision and service quality: our cities are increasingly clogged and feature high on international congestion indices, and our main sub-urban highways are severely congested in peak times. Rail freight volumes have dwindled due to poor service quality, and the overloading of heavy vehicles continues to contribute to road pavement deterioration,

increasing the cost of road maintenance. Simply put, the country performs poorly when the efficiency of the overall transport infrastructure provided is measured, despite our relatively large road and rail network. Expanding and maintaining our road network is only part of the solution: getting the prices right between modes and within modes (competition and regulation) and getting the service delivery model right (ownership, administration and institutional) are important performance of the transport sector.

South Africa may have reached a level of saturation with the current road stock, and comparative analysis shows that South African roads are very much on par with international standards. Future investment should be directed to improving the quality and resilience (to climate change amongst other things) of the network, expanding regional trade and economic integration corridors, both national and interregional, to the major trading partners, and addressing the severe congestion in and around the large cities. Despite the public and political opposition to toll roads, these roads deliver much better services than the high-volume non-tolled highways.

South Africa appears to spend a lot of funds on roads, particularly administration and regulation, but also on road maintenance and construction. Despite this, the country is faced with a rapidly deteriorating road network, increasing congestion in the urban areas, and an insubstantial national road funding policy. The country cannot rely on the current national road funding framework to finance or manage its roads. In place of the current approach, a policy is proposed founded on the principles of (1) efficient road user charging to regulate the demand for road capacity, (2) efficient investment to minimise the total public and private investment in road capacity, and (3) efficient road management to coordinate road user charging and investment. An effective road funding policy is dependent on close cooperation between these three elements.

Implementing one without the other will not deliver any results and may in fact be counterproductive.

While state-owned enterprises have been in the news for all the wrong reasons, reforming the roads sector in South Africa will probably result in some additional (although functioning independent) parastatals such as a Road Users Authority, Road Fund Administration and Road Fund. The National Treasury and the Department of Transport should transfer to them the responsibility for managing, financing, and maintaining the roads. These entities should establish a system of road user charges based on the marginal social concept principle. Heavy vehicle (> 3500 kg) weight-distance charges and congestion charges are well-known and practical cost recovery mechanisms that can be effectively implemented. Shortfalls should be covered by transfers from the National Revenue Fund and not imposed on existing users.

A gradually deteriorating physical road network, set to require billions in roads investment over the next decades, should equal plenty of opportunities for companies in South Africa. However, major projects have typically been slow to come to market, and investors are wary of emerging markets, particularly due to their higher risk factors, which include policy vacuums, uncertainty with regard to how they set tariffs (road user charges), and independent management governance. State-owned companies like SANRAL (the roads agency), TRANSNET (rail, port and pipeline), PRASA (passenger rail) and ESKOM (power utility) are running into difficulties in financing ambitious capex plans – partly due to issues with setting tariffs.

South Africa seems to have reached a critical point with regard to road funding. It is unclear whether roads are currently allocated sufficient funds. All indications are that the country allocates a comparable amount of funds to the roads sector. What did become glaringly clear during the research

is the absolute lack of general knowledge about how much money is spent on roads, the need for funding, how much users are spending, and how the funding cycle works. In South Africa, the responsibility for establishing a road funding policy, setting road user tariffs, managing the road funding budget, collecting data and disseminating reports to the public, and even simply stating the case for roads seems disjointed. No single authority seems to take responsibility for these tasks. The solution to road funding in South Africa is therefore not only a monetary problem but also a *knowledge* problem. It is firmly recommended that the institutional and policy framework be addressed before any funding issues are considered.

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Appendices

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Appendix A

Document Reference:

http://www.sadc.int/documents-publications/show/Protocol_on_Transport_Communications_and_Meteorology_1996.pdf

Article 4.5

Funding Sources

2. Member States agree to develop and implement cohesive and definitive road funding policies with a view to -
 - e. identifying adequate, sustainable and appropriate sources of road funding which includes general revenue, road user charges and funds generated jointly by the public and private sectors;
 - f. increasing transparency in the road funding process;
 - g. ensuring that revenues obtained from road users under road user charges shall be regarded as dedicated for the provision, maintenance and operation of roads;
 - h. ensuring that road users, including foreign road users, contribute to the full costs of maintaining roads and progressively contribute to the full costs of providing roads while -
 - i. ensuring that the revenues obtained from foreign road users are devoted to the maintenance of the RTRN within their respective territories;
 - ii. ensuring that the use of roads is priced so as to improve economic efficiency in road transport; and
 - iii. promoting equity between different categories of road users;
 - e. ensuring that Member States shall apply the principle of non-discrimination in implementing road user charging instruments to foreign road users.

2. In order to promote harmonized national road user charging systems, Members States shall develop a common understanding in respect of the types of road user charging and the levels of such charges and introduce in their respective territories on the basis of regular exchange of information -

- a. fuel levies (designated as road charges);
- b. vehicle licence fees;
- c. road tolls;
- d. abnormal and awkward load charges;
- e. weight-distance type charges;
- f. cross-border road user charges;
- g. entry fees payable by foreign registered vehicles; and
- h. parking and traffic congestion costs.

Article 4.6

Regional Funding Initiative

1. Member States agree to implement harmonized cross-border road user charging systems which shall be regularly reviewed, improved and supplemented through improved research and data collection.
2. Member States acknowledge that national funding may be insufficient to ensure adequate extension, maintenance or improvement of the RTRN and, to this end, agree to encourage, in support of the activities of national roads authorities -
 - a. the development of joint regional research and other programmes to assess on a continuous basis the adequacy of road funding in the region;
 - b. the development of transparent and comprehensive regional strategies aimed at procuring funding sources which may include the levying of cross-border road user charges and the collective or individual procurement of loans; and
 - c. the establishment of a regional road maintenance fund.

Appendix B

Article Reference: http://www.dailymaverick.co.za/opinionista/2015-05-29-fuel-levy-is-the-best-solution.-heres-why.../#.WDI1h_I96Uk

Fuel levy is the best solution. Here's why...

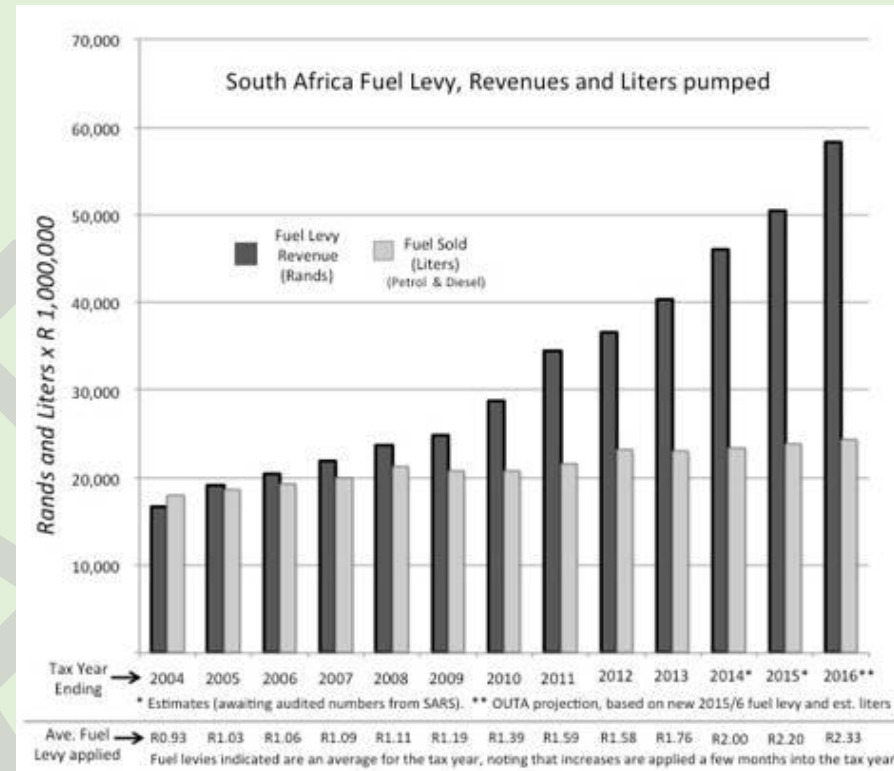
By Wayne Duvenage
May 29, 2015

There's no question the fuel levy is a worthy alternative to the hated e-toll system imposed on Gauteng motorists. There is a 100% compliance level, it costs little to administer, is already government policy and will bring R55 billion into the country's coffers this year. So why can't the government just use it to fund road-building, as it was originally designed to do?

It is important to note that the fuel levy funds are not necessarily ring-fenced for roads and transport. The money goes into Treasury's general tax pot, to be used and divvied up the best way to most effectively manage the country's affairs.

The fuel levy is a direct user-pay tax on the motoring public. It is also one that was initially introduced by the Apartheid government in the '70s in order to raise taxes directly from motorists, which were allocated to a road-building fund. Later, the ring-fenced requirement was dropped, allowing the fuel levy to be used to alleviate other socio-economic pressures applied to Treasury's allocation needs.

The fuel levy of today has become an ever increasing and lucrative tax for the authorities to tap into. It has been generally motivated as a 'tax on the rich', because vehicle owners are regarded as being on the wealthier side of the fence. The table below shows how much the fuel levy has attributed to the national coffers over the past 12 years



Interesting to note from this table, is how the income to the South African Revenue Service from the fuel levy will have increased by some 250% over 12 years, from 2004 to 2016, while over the same period, the volume of fuel pumped has only increased by roughly 36%, representing an average of 11% year on year increase in the fuel levy rates applied to motorists, since 2003/4 (excluding the Road Accident Fund, which is funded by the RAF levy, a separate fuel tax from the fuel levy).

The arguments for the use of the fuel levy as a funding mechanism are:

- The fuel levy attracts zero administration costs, compared to costs in excess of R1 billion every year to administer the collection of e-tolling revenues.

- There is 100% compliance level with the fuel levy. Aside from the few battery-powered vehicles on our roads, petrol or diesel is used to power all road transport in South Africa. At best, e-tolling could only generate around 45% compliance by mid 2014.
- The use of the fuel levy is currently in existence as government policy to fund road infrastructure. The e-toll regulations and policies on the other hand, have been rewritten and gazetted on several occasions since 2009, and are still not complete or effective in achieving the aims intended.
- The Gauteng Freeway Improvement Plan (GFIP) bonds require approximately R1.9 billion per annum to finance over 24 years, including interest. This is equivalent to approximately 10c per litre in the fuel price.
- The fuel price has risen by R1.22 per litre since the advent of the GFIP construction in 2008, i.e. 12 times more than that required to fund the GFIP bonds over 24 years.
- In the tax year ending 2008, the fuel levy generated R24.8 billion. This tax year, the fuel levy is estimated to swell government's coffers by over R55 billion. The increase of the fuel levy, since the building of the GFIP began, can effectively finance two extra GFIP projects every year, in cash.
-

Vehicle owners – government's cash cow

While there is a correlation between car ownership and wealth in South Africa, the level of taxation applied to vehicle ownership is extremely high. There comes a time when the ability to continue with excessive taxation on motorists reaches a point of saturated tolerance, the point at which the cost of vehicle ownership becomes out of sync with the perceived benefits derived, and with a lack of public transport alternatives, resistance from motorists begins to develop.

The backlash against the e-toll decision is an indicator of frustration expressed by motorists in South Africa, suggesting that tolerance for government's abuse of the motoring public has now peaked.

Vehicle ownership in South Africa is also subject to other taxes:

1. Import/excise duties;
2. Vehicle (carbon) Emissions tax – roughly an additional 2.5% on the car value;
3. Tyre taxes – R2.30 per kilogram on replacement tyres;

4. Fuel levies—(over one-third of the retail price of fuel) per litre of 95 ULP in Gauteng is made up of:

- a. R0.33 – Gauteng Zonal Differential;
- b. R2.54 – from April 2015;
- c. R0.04 – Customs;
- d. R1.54 – Road Accident Fund (RAF);
- e. R0.10 – Inland Demand Levy;
- f. R0.01 – Inland Pipeline Levy.

5. Vehicle license fees – average of R650 per car in Gauteng per annum; and now...

6. Tolloed roads.

When one weighs up all the options available to government, we fail to understand why the authorities are not making use of the most efficient tax collection mechanisms on the table. Why can government not accept that, no matter how hard they try to disguise the e-toll scheme, gloss over the nature of its inefficiencies, deny the high costs of administration, and refute its overall irrationality, the public does not want its urban roads funded this way, even at half the price.

Given the choice on every occasion that the government has sought input from the public, in over 95% of the submissions made, society has chosen to go with the fuel levy over e-tolls. We fail therefore to understand how Deputy President Cyril Ramaphosa and Premier David Makhura's advisory panel can claim that they have heard the people on the e-toll matter.

Appendix C

Article Reference: <http://mg.co.za/article/2014-07-10-the-truth-about-south-africas-fuel-levy>

The truth about South Africa's fuel levy

By Anim van Wyk
July 10, 2014

Tax statistics compiled by the South African Revenue Service and the national budget indicate that the amount of money collected from South Africa's fuel levy is quite different from the figures touted by the Opposition to Urban Tolling Alliance (Outa) and the Democratic Alliance (DA).

The National Treasury's 2013 budget review lists fuel levies collected from 1995/96 to 2011/12. Taken from the 1998/99 financial year to 2012/13 the total amount collected comes to just under R340-billion, far more than the DA's claimed R180-billion and R240-billion.

When calculated for the last six financial years – from 2007/08 to 2012/13 – fuel levies amount to R188.8-billion. That is around R50-billion less than the amount cited by Outa – a pressure group campaigning against controversial electronic tolls implemented in Gauteng province.

Outa and the DA argue that road construction and maintenance could be adequately funded using the existing national fuel levy system and that there is no need for e-tolls.

Out by huge margins

The numbers bandied about by Outa and the DA were out by huge margins.

A recent post on Outa's Facebook and Twitter accounts asked: "Two hundred and thirty eight billion [rand] in six years. Where has it all gone? Remind me again why

we have e-tolls?" And it exhorted readers to "[s]hare this if you agree we need a forensic audit of the fuel levy fund".

The DA took up the charge on Monday with a press release jointly issued by its parliamentary leader, Mmusi Maimane, and MP Manny de Freitas.

"Currently the National Roads Act of 1971 allows the government to collect a fuel levy from every litre of fuel sold, and to add that to the national fiscus and spend it on any budget item," they stated. "Over R240-billion has been collected through this levy since 1998."

A version of the press release given to journalists at a DA press conference stated that over "R180-billion has been collected through this levy since 1998".

Maimane and De Freitas went on to argue that "the fuel levy ought to be directed solely to road construction and maintenance, which will further negate the need for e-tolls".

What is the fuel levy?

The fuel levy is an annually adjusted tax that is largely intended to fund government's general expenditure programmes. About a third of the money is also shared with metropolitan municipalities.

For the 2014/15 financial year, the levy amounts to 224.5 cents per litre of petrol sold and 209.5 cents per litre of diesel.

Thorough research required

So where did Outa and the DA get their numbers?

De Freitas who claimed that the R240-billion figure originated from studies done by the Automobile Association (AA) and the Southern African Bitumen Association. But neither the AA study, which was conducted in 2008, nor the 2006 one carried out by the Southern African Bitumen Association list fuel levy amounts.

Outa chairperson Wayne Duvenage said the fuel levy figure their association used had been calculated by multiplying the total litres of fuel sold in a given year –

gleaned from annual reports of the South African Petroleum Industry Association (Sapia) – with the fuel levy tax rate. But this method is wrong as Sapia provide totals for a calendar year, whereas the fuel levy changes at the beginning of government's financial year each April.

"We had not updated our research until Friday and I guess this amount may have been based on conservative assumptions or different time periods," Duvenage said, conceding that Outa should "do more thorough research before we repost information of this nature"

Appendix D

Article Reference: <http://www.iol.co.za/the-star/fuel-levy-debate-is-running-on-empty-1589009>

Fuel levy debate is running on empty

By The Star
October 8, 2013,

The government has consistently said the money spent on roads and public transport outweighs the revenue it earns from the petrol tax, says Vusi Mona.

Opponents to tolling have raised the decibels in their call for the fuel levy to fund the Gauteng Freeway Improvement Project (GFIP). Curiously, they don't tell us what ought to be done with the other roads that are already tolled.

Will tolling on those roads be stopped and funded by the fuel levy or is this supposed to be a special dispensation for the GFIP? And will Treasury increase the fuel levy every time there is a major road development to be undertaken?

Have they conducted research to indicate by how much the fuel levy will have to be increased to fund new roads and the road maintenance backlog of nearly R150 billion?

The only semblance of research we have seen is one paragraph by the Opposition to Urban Tolling Alliance that says: "Our simple calculations indicate that for the 20 billion litres we sell per annum, at 10c/litre, ring-fenced for GFIP, we will raise the approximately R2bn per annum required to fund the R20bn capital requirement and interest (at 9 percent) costs over a 15-year payback period. At R1 per litre, we would pay the road off in less than two years."

Simple calculation and simple research indeed.

While simplicity should be extolled, road funding and budgeting for a country are not that simple. The issue of ring-fencing of a fuel levy to finance the implementation of the GFIP was carefully considered by the government as a matter of policy and ultimately rejected.

The fuel levy is a nationally raised tax. The government took the view that it was inequitable to expect all road users in the country to pay for heightened levels of road services in Gauteng while there were areas in South Africa that do not have adequate basic levels of service. Indeed, allocating nationally raised revenue towards a single province would not be consistent with the redistributive objectives of the government.

In this regard, account had to be taken of the recommendations of the Financial and Fiscal Commission, established in terms of the constitution, which require funds like the fuel levy or the general revenue to be distributed equitably between provinces and between national, provincial and local government.

The principle of equity in allocating nationally raised resources has proven difficult to grasp, especially by those who argue that Gauteng contributes more in terms of the fuel levy and should therefore get the lion's share. That would be inconsistent with the principles of equity, redress and fairness in fiscal arrangements and with the government's programme of poverty alleviation.

But then, every country has its own version of the Tea Party – essentially a movement of the middle class that is sponsored by business in its belief that taxes and social welfare must be reduced and that the well-off have no responsibility towards the less privileged. One of this movement's defining features is its lack of focus on social equity accompanied by a special emphasis on economic and limited government issues.

Its view of taxes is that they "disappear" into a government pot to fund social welfare services – hence its opposition in the US to the Patient Protection and Affordable Care Act (otherwise known as Obamacare).

Locally, we have heard similar views about the fuel levy allegedly disappearing "into the pot to fund the many other socio-economic issues our government has

to deal with". Its local adherents are saying: "We want the fuel levy, we want it for ourselves, and we want it largely for Gauteng."

The other reason the fuel levy was rejected is that it is already being shared with metro municipalities and the Road Accident Fund. Add to that the diesel fuel levy refund scheme which benefits our primary sectors and you'll realise a large sum of the current fuel levy revenue pool is already committed.

Treasury is on record as saying the current fuel levy is insufficient to cover existing road construction and maintenance budget allocations. Anyone who has done maths at school or run a household budget can figure this out.

Treasury collected R42bn in fuel levies in the past financial year. Take R20bn of that and allocate it to the GFIP – which is what Sanral borrowed to finance the project – and you are left with R22bn for the entire country. This, after allocating nearly 50 percent of the fuel levy to one project in one province!

South Africa once had the National Road Fund which was funded through the fuel levy. It ran into financial difficulties in the 1970s. Increases in fuel prices had the effect of reducing consumption to below what was projected and this had a knock-on effect on the fund's revenue.

Bernal Floor, author of The History of National Roads in South Africa, states that in 1974, the fund's revenue fell to 65 percent of what was projected.

Faced with constraints on the fuel tax, other sources of revenue had to be found.

Thus tolling was introduced, giving us the first toll road in South Africa in 1984, the Tsitsikamma Toll Road.

We have been here before and the fuel levy did not necessarily rise to the occasion.

Of course, it did not help that part of it was used to fight misguided border wars by some of the people who are today telling us how wonderful the fuel levy is.

* Vusi Mona is head of communications at Sanral.

** The views expressed here are not necessarily those of Independent Newspapers.

Appendix E

Article Reference: <https://businesstech.co.za/news/government/88290/why-a-fuel-levy-for-e-tolls-was-rejected-again/>

Why government refuses to use a fuel levy for e-tolls

By Staff Writer
May 26, 2015

South Africa's government says that it rejected a fuel levy to fund e-tolls in Gauteng "due to its indiscriminate nature".

It called a fuel levy an 'anti-poor form of tax'.

Last week, Deputy President Cyril Ramaphosa announced a new payment model for e-tolls in Gauteng, which will see a monthly cap adjusted to R225, from R450 previously.

The current 58 cents per kilometre will be reduced to 30 cents per kilometre for people using e-roads, while motorists will have to pay their outstanding e-tolls upon renewal of vehicle licences.

The response from Gauteng motorists, who have largely rejected the system, has been predictable, while lobby group Outa (Opposition to Urban Tolling Alliance) said that the new dispensation "is tantamount to putting lipstick on a pig".

"People will not be seduced or coerced," said Outa chairman Wayne Duvénage.

He said that a 10 cents per litre increase in the fuel levy in 2007 would have covered the cost of the improvement of the Gauteng freeways and would have resulted in the capital cost of the project being settled by now.

Why did you not use the fuel levy – it has been increased after all?

The government said that the advisory panel's findings and recommendations reaffirmed the user-pays principle. It said that the fuel levy is already being used as part of general taxation to raise revenue to meet the country's financial needs and obligations.

This year saw a substantial increase in the fuel levy to address the fiscal pressures. The fuel levy is not ring fenced or earmarked for a specific budget item.

Treasury announced a 30.5 cents per litre rise on the general fuel levy in February, and an additional 50 cents for the Road Accident Fund.

"Due to its indiscriminate nature, a fuel levy can be an anti-poor form of tax. In a country like ours where the majority live far from their places of work, this would definitely impact the working class more as it would be impossible to exclude public transport – their preferred mode of transport," the government said.

Also, it said that the average fuel consumption per vehicle is declining every year as a result of improvements in vehicle engine technology and the introduction of alternate fuel vehicles.

"The relative revenue per vehicle is therefore declining. In the long term, this is not a sustainable solution," it said.

The advisory panel has dealt with this issue and correctly advised against its application.

"A provincial fuel levy would be approximately 3.44 times higher than a national fuel levy, without considering the potential of reduced fuel sales due to vehicles rather filling up outside the province," the government said.

Appendix F

Article Reference: https://www.citylab.com/commute/2017/02/dont-demonize-driving-just-stop-subsidizing-it/517044/?utm_source=eb

Don't Demonize Driving, Just Stop Subsidizing It

By Joe Cortright
February 16, 2017

As a matter of fairness and practicality, drivers should pay for the roads they drive on.

There are lots of problems that stem from the way we use cars. We price roads incorrectly, so people overuse them. Cars are a major source of air pollution, including the carbon emissions that are causing climate change. Car crashes kill tens of thousands of Americans every year, injure many more, and cost us billions in medical costs and property damage. And building our cities to accommodate cars leads to sprawl that pushes us further apart from one another.

But the problem is not that cars (or the people who drive them) are evil, but that we use them too much, and in dangerous ways. And that's because we've put in place incentives and infrastructure that encourage, or even require, us to do so. When we subsidize roads, socialize the costs of pollution, crashes and parking, and even legally require that our communities be built in ways that make it impossible to live without a car, we send people strong signals to buy and own cars and to drive—a lot. As a result, we drive too much, and frequently at unsafe speeds given the urban environment.

Many people—transit boosters, cyclists, planners, environmentalists, safety advocates—look at the end result of all this, and understandably reach the conclusion that cars are the enemy. The overriding policy question, then, becomes: “How do we get people out of their cars?”

In this December 2015 story in The New Republic, for example, Emily Badger quotes Daniel Piatowski, a planning PhD presenting a paper on “carrots and sticks” at the Transportation Research Board conference, saying: “The crucial component that’s missing is that we’re not implementing any policies that disincentivize driving.”

“Getting people out of their cars” is a rallying cry and a mission statement that’s guaranteed to provoke a formidable opposition. That’s because most people, correctly, can’t imagine any time soon when they won’t need to use a car for most—even all—of their daily trips. As a practical matter, the fact that for seven or eight decades the entire built environment and most transportation investments have been predicated on car travel means that we can’t quickly move away from auto dependence. For most Americans, driving isn’t attributable to an irrational fondness for cars. In many places, it’s simply impossible to live and work without one.

But there’s good news. The first is that incentives matter. We learned that higher gas prices, for example, had a large and sustained impact on driving behavior. After growing steadily for decades, vehicle miles traveled per person peaked and declined after 2005 (as gas prices shot up). This produced knock-on changes in housing markets, and helped accelerate the move back to cities. And the decline in gas prices since 2014 has triggered more driving. “This shows that more intentional kinds of pricing schemes, like congestion pricing or parking pricing, could have similar effects.”

The second point is that small changes matter. Even slight reductions in car use and car ownership will pay big dividends. Traffic congestion is subject to non-linear effects: small reductions in traffic volumes produce big reductions in traffic congestion. Travel monitoring firm Inrix reported that in 2008, the 3 percent decline in vehicle miles traveled led to a 30 percent decline in traffic congestion. As driving declined, carbon emissions declined and so too, did crashes and traffic deaths.

Moralizing about mode choice is a recipe for policy gridlock

Bitter and acrimonious flamewars between people who are convinced that one side or the other is trying to run us off the road will surely be unproductive. We agree with most of the policies that advocates like Piatowski want, including the “sticks” like parking and congestion fees—but not the way they’re being described. Rather than being framed as a punishment, it should be more about responsibility. Drivers should pay for the roads that they drive on. They should be regulated in a way that protects the safety of other users of the right of way. Trucks ought to pay for the damage they do to roads. Every car driver ought to pay for their parking space they use—whether it’s in the public or the private realm. All cars and trucks should be responsible for the carbon pollution they emit. We shouldn’t require third parties such as homebuilders or renters or local businesses to subsidize car travel and parking. This isn’t about creating a “disincentive for car use,” but, as a matter of fairness and practicality, dropping what have essentially been subsidies for financially and socially expensive and dangerous behaviour.

Driving is a choice, and provided that drivers pay all the costs associated with making that choice, there’s little reason to object to that. After all, very few people think that a zero car world is one that makes a lot of sense. Low-car makes much more sense than non-car as a policy talking point. How do we get people to make these choices. There’s an analogy here to alcohol. We tried prohibition in the ‘20s. It was moral absolutism, zero tolerance. Alcohol in any amount was evil. That didn’t work.

When we experienced the epidemic of drunk driving, we didn’t go back to prohibition. Instead, we raised penalties to make drivers more responsible, set tougher limits on blood alcohol content, and put more money into enforcement. People still drink—but there’s a different level of understanding of responsibility and consequences, and fewer people drive drunk.

Appendix G

Article Reference: <http://www.fin24.com/Budget/significant-knock-on-effect-if-fuel-levy-is-increased-in-budget-2017-expert-20170208>

Significant knock-on effect if fuel levy is increased in Budget 2017 - expert

By Staff Writer
February 08, 2017

Cape Town - An anticipated increase in the fuel levy in Budget 2017 later this month will have a significant knock-on effect, Adam Orlin, head of Investec Import Solutions, cautioned on Wednesday.

In his view, the anticipated increase in the fuel levy will not only negatively impact consumers and businesses, but also place importers under increased pressure in already challenging market conditions.

“With several economists of the opinion that the price of petrol and the fuel levy will continue to rise this year, the knock-on impact this will have in the South African market will be significant. The transport industry is already operating under incredibly low margins, so any additional increases could be quite damaging,” he explained.

This is expected to see a further increase in transport costs as the industry attempts to mitigate the additional economic expenditures.

“In a price-conscious market, we are incredibly aware of all the related increases that changes to the fuel levy - and per implication the petrol price - will have for all South Africans. Even though the impact on inflation might not be as bad as anticipated, importers need to be even more savvy in terms of how they position their products in a cash-strapped market,” said Orlin.

“There is, unfortunately, no silver bullet to addressing higher fuel levies. Despite importers doing future-forward planning around these increases, the reality sees

consumers ultimately paying the price of a leaner supply chain. Profitability is already under the spotlight so decision-makers at importers and transport companies are feeling the pressure to do more than simply raising prices.”

Some of these initiatives could include enhancing partnerships between importers and transport and logistics companies. Implementing new technology on the back-end to manage the supply chain more efficiently could also assist in cutting unnecessary costs.

“Additionally, import and working capital specialists can go a long way in freeing up capital that is traditionally tied in with stock and imports. For a business limited by cash flow, this is a game changer as businesses can offset costs with additional benefits where debt can actually help them grow,” said Orlin.

“Despite the negative sentiment around the fuel levy increase and the economic challenges it creates, there are also opportunities for importers to find even more innovative ways of using available technologies and other solutions. And while the risk to the collective pockets of South Africans is real, it should not be all doom and gloom as importers identify other ways of delivering value.”

Appendix H

Article Reference: <http://www.news24.com/SouthAfrica/News/breaking-npa-seizes-half-a-billion-rand-in-assets-from-corrupt-official-20170407>

BREAKING: NPA seizes half a billion rand in assets from corrupt official

Durban - Houses, farms, cattle, vehicles and a luxury boat are among assets worth half a billion rand that have been seized from a syndicate involving a senior government official who looted state funds from the Department of Transport in KwaZulu-Natal.

The KwaZulu-Natal National Prosecuting Authority's (NPA) asset forfeiture unit (AFU) on Friday morning seized assets worth R543 328 962.62 from the property of the department's Sphiwe Christopher Majola and several service providers who reportedly received millions in kickbacks from Durban plant hire companies that were awarded contracts to repair KZN's ailing road infrastructure.

It was reported that in 2010 that the police's anti-corruption task team (ACTT) investigated allegations relating to procurement irregularities including theft, fraud and corruption at the department in Pietermaritzburg.

It emerged that the department's service providers had fraudulently secured several tenders from the department for supply chain goods and services for plant and earthmoving equipment on behalf of the department.

The awarding of the tenders was preceded by several irregularities including the fraudulent circumvention of the department's supply chain management processes and related prescripts.

Among other fraudulent activities, the service providers invoiced and charged the department for excessive amounts for services purportedly rendered and services which were never rendered. Several substantial corrupt payments were also made to or on behalf of department officials.

Appendix I

Data Reference:

https://ec.europa.eu/transport/sites/transport/files/themes/sustainable/doc/2008_costs_handbook.pdf

EU external costs estimates: 2014

Vehicle	Engine	EURO-Class	Urban (€/vkm)	Suburban (€/vkm)	Interurban (€/vkm)	Motorway (€/vkm)
Car diesel	<1.4l	Euro 2	3.7	1.5	0.8	0.8
		Euro 3	2.6	1.3	0.8	0.9
		Euro 4	1.8	0.9	0.6	0.6
		Euro 5	0.9	0.6	0.4	0.4
		Euro 6	0.7	0.3	0.2	0.2
		1.4-2.0l	10.1	3.1	0.9	1.0
	>2.0l	Euro 1	3.7	1.5	0.8	1.0
		Euro 2	3.3	1.4	0.8	0.8
		Euro 3	2.6	1.3	0.8	0.9
		Euro 4	1.8	0.9	0.6	0.6
		Euro 5	1.0	0.6	0.4	0.4
		Euro 6	0.7	0.3	0.2	0.2
Car petrol	<1.4l	Euro 0	10.5	3.5	1.2	1.3
		Euro 1	3.8	1.5	0.8	1.0
		Euro 2	3.4	1.5	0.8	0.8
		Euro 3	2.7	1.3	0.8	0.9
		Euro 4	1.8	1.0	0.6	0.6
		Euro 5	1.0	0.6	0.4	0.4
		Euro 6	0.7	0.3	0.2	0.2
	1.4-2.0l	Euro 0	3.5	3.2	2.3	2.7
		Euro 1	1.0	0.7	0.3	0.4
		Euro 2	0.7	0.4	0.2	0.2
		Euro 3	0.5	0.2	0.1	0.1
		Euro 4	0.4	0.2	0.1	0.1
		Euro 5	0.4	0.2	0.1	0.1
Bus	<1.4l	Euro 6	0.4	0.2	0.1	0.1
		1.4-2.0l	3.7	3.4	2.8	3.5
		Euro 1	1.1	0.8	0.4	0.4
		Euro 2	0.7	0.4	0.2	0.2
		Euro 3	0.4	0.2	0.1	0.1
		Euro 4	0.4	0.2	0.1	0.1
	>2.0l	Euro 5	0.4	0.1	0.1	0.1
		Euro 6	0.4	0.1	0.1	0.1
		Euro 0	3.9	3.6	2.9	3.5
		Euro 1	1.0	0.7	0.3	0.4
		Euro 2	0.7	0.4	0.2	0.2
		Euro 3	0.4	0.2	0.1	0.1

I. 2 Marginal external air pollution costs in €/vkm (2014)

Mode	Time of d	Traffic type	Urban	Suburban	Rural
Car	Day	Dense	9.0	0.5	0.1
		Thin	21.8	1.4	0.2
		Dense	16.4	0.9	0.1
	Night	Thin	39.7	2.6	0.4
		Dense	18.0	1.1	0.1
		Thin	43.6	2.8	0.4
Motorcycl	Day	Dense	32.8	1.9	0.2
		Thin	79.4	5.2	0.6
		Dense	44.9	2.5	0.4
	Night	Thin	109.1	7.0	0.8
		Dense	81.9	4.6	0.7
		Thin	198.6	12.9	1.5
Bus	Day	Dense	44.9	2.5	0.4
		Thin	109.1	7.0	0.8
		Dense	81.9	4.6	0.7
	Night	Thin	198.6	12.9	1.5
		Dense	82.6	4.6	0.7
		Thin	200.5	12.9	1.5
LDV	Day	Dense	150.7	8.5	1.3
		Thin	365.4	23.6	2.7
	Night	Dense	82.6	4.6	0.7
		Thin	200.5	12.9	1.5
		Dense	150.7	8.5	1.3
		Thin	365.4	23.6	2.7

I. 1 Illustrative marginal noise costs for the EU, € per 1000 vkm

Vehicle	Region	Road type	Free flow (€/vkm)	Near capacity (€/vkm)	Over capacity (€/vkm)
Car	Metropolitan	Motorway	0.0	28.4	65.3
		Main roads	1.0	150.0	192.4
		Other roads	2.6	169.2	257.4
	Urban	Main roads	0.7	51.6	80.5
		Other roads	2.6	148.0	244.6
	Rural	Motorway	0.0	14.2	32.6
		Main roads	0.4	19.4	64.4
		Other roads	0.2	44.6	147.8
Rigid truck	Metropolitan	Motorway	0.0	54.0	124.1
		Main roads	1.9	284.9	365.5
		Other roads	5.0	321.5	489.1
	Urban	Main roads	1.3	98.1	152.9
		Other roads	5.0	281.2	464.8
	Rural	Motorway	0.0	27.0	62.0
		Main roads	0.8	36.9	122.4
		Other roads	0.4	84.7	280.7
truck	Metropolitan	Motorway	0.0	82.4	189.3
		Main roads	2.9	434.9	557.8
		Other roads	7.7	490.8	746.5
	Urban	Main roads	1.9	149.8	233.4
		Other roads	7.7	429.1	709.5
	Rural	Motorway	0.0	41.2	94.7
		Main roads	1.3	56.4	186.8
		Other roads	0.6	129.3	428.5
Bus	Metropolitan	Motorway	0.0	71.0	163.2
		Main roads	2.5	374.9	480.9
		Other roads	6.6	423.1	643.6
	Urban	Main roads	1.7	129.1	201.2
		Other roads	6.6	369.9	611.6
	Rural	Motorway	0.0	35.5	81.6
		Main roads	1.1	48.6	161.0
		Other roads	0.6	111.5	369.4

I. 3 Efficient Marginal Congestion Costs, €/vkm, 2014

State/Type	Car			HGV			Motorcycle		
	Motor-way	Other non-urban road	Urban road	Motor-way	Other non-urban road	Urban road	Motor-way	Other non-urban road	Urban road
Austria	0.5	0.4	0.9	5.8	1.8	3.8	0.4	5.6	12.1
Belgium	0.3	0.3	0.4	3.0	1.5	0.9	1.6	3.0	6.0
Bulgaria	0.1	0.1	0.3	0.5	0.5	1.1	0.0	0.0	0.1
Croatia	0.3	0.2	2.9	0.9	0.6	16.4	0.0	0.2	1.6
Cyprus	0.8	0.1	2.1	2.0	0.3	46.2	0.3	0.1	5.6
Czech Republic	0.1	0.2	0.2	1.1	0.6	1.0	0.0	0.2	0.2
Denmark	0.1	0.1	0.1	1.1	1.0	0.7	0.3	1.2	3.8
Estonia		0.4	0.2		0.5	0.8		0.2	0.2
Finland	0.1	0.1	0.1	0.2	0.5	0.3	0.3	1.1	2.1
France	0.1	0.2	0.2	0.4	0.5	0.7	0.9	2.3	7.8
Germany	0.2	0.4	0.6	2.4	1.3	1.5	0.6	3.3	8.5
Greece	0.2	0.2	0.2	0.9	1.3	1.3	0.1	0.1	0.4
Hungary	0.1	0.3	1.3	0.8	1.2	6.8	0.0	0.1	2.4
Ireland	0.1	0.2	0.1	1.7	1.4	0.6	0.2	0.4	0.3
Italy	0.1	0.2	0.6	2.1	1.0	4.0	0.1	0.2	1.5
Latvia		0.3	0.2		0.4	0.5		0.1	0.3
Lithuania		0.2	0.3		0.3	0.9		0.2	0.2
Luxembourg	0.9		0.1	1.8		0.1	23.8		3.5
Malta			3.6			17.3			0.7
Netherlands	0.0	0.1	0.1	0.3	2.3	1.2	0.2	4.5	11.6
Poland	0.1	0.2	0.5	0.6	0.6	1.9	0.0	0.1	0.4
Portugal	0.1	0.1	0.3	2.1	2.7	9.3	0.1	0.2	0.9
Romania	0.0	0.2	2.1	0.1	0.6	12.0	0.0	0.0	1.5
Slovakia	0.1	0.3	0.5	0.8	0.7	12.2	0.0	0.2	0.5
Slovenia	0.1	0.2	0.2	0.5	0.7	1.7	0.0	0.3	0.1
Spain	0.2	0.1	0.1	1.8	0.9	0.3	1.0	0.8	1.6
Sweden	0.3	0.3	0.3	1.2	1.0	0.9	1.0	3.4	8.1
Great Britain	0.1	0.1	0.2	0.9	0.5	0.3	0.4	1.3	2.1
EU average	0.1	0.2	0.3	1.2	0.8	1.1	0.2	0.5	1.9

I. 4 Marginal accident cost estimates, €/ct/vkm (prices of 2010)

Appendix J

How the price of fuel is determined

**NATIONAL ASSEMBLY
QUESTION FOR WRITTEN REPLY
QUESTION NUMBER: 2360 [NW2722E]
DATE OF PUBLICATION: 19 JUNE 2015**

2360. Ms N I Tarabella Marchesi (DA) to ask the Minister of Finance:

- (1) What is the breakdown with regard to the current price per liter of (a) petrol and (b) diesel in terms of the (i) cost of petrol or diesel, (ii) fuel levy, (iii) tax and (iv) any other items;
- (2) what amount has been collected by National Treasury through fuel levy (a) in the (i) 2011-12, (ii) 2012-13, (iii) 2013-14 and (iv) 2014-15 financial years and (b) since 1 April 2015;
- (3) whether any amount is ring-fenced for the maintenance of roads; if so, what amount has been spent on maintaining roads (a) in the (i) 2011-12, (ii) 2012-13, (iii) 2013-14 and (iv) 2014-15 financial years and (b) since 1 April 2015?

NW2722E

REPLY:

The Honourable Member should note that the Department of Energy is responsible for administering the petrol and diesel prices, and also for determining the basic fuel price (BFP). The Minister of Finance is only responsible for setting the levies and any taxes on petrol and diesel. However, to make it easy for the Honourable Member, I will draw from the website of the Department of Energy (http://www.energy.gov.za/files/petroleum_frame.html) to assist in providing a comprehensive response to the question. The starting point in arriving at the domestic wholesale retail selling price of petrol diesel in South Africa is the calculation of the basic fuel price (BFP), and I will draw on the website of the Department of Energy in response to questions 1(a) and (b) (i) and (iv)), and then provide my own response to the questions on the tax and levies on petrol and diesel.

(1). (i) and (iv) The website of the Department of Energy states that the basic fuel price (BFP) attempts

"to represent the realistic, market-related costs of importing a substantial portion of South Africa's liquid fuels requirements, and it is therefore deemed that such supplies are sourced from overseas refining centres capable of meeting South Africa's requirements in terms of both product quality and sustained supply considerations.

The petrol price in South Africa is therefore directly linked to the price of petrol quoted in US dollars at refined petroleum export orientated refining centres in the Mediterranean area, the Arab Gulf and Singapore. This means that the domestic prices of fuels are influenced by (a)

international crude oil prices, (b) international supply and demand balances for petroleum products and (c) the Rand/US Dollar exchange rate".

The website goes on to note that there are both international and domestic influences that are added to the BFP to arrive at the final pump prices in the different fuel pricing zones (magisterial district zones). The domestic influences include inland transport costs, wholesale margin, retail profit-margin, the slate levy, and various taxes / levies as listed below. It should be noted that diesel prices are regulated only up to the wholesale level; so the retail price of diesel is not regulated.

(ii), and (iii) Levies on fuels and taxes

The following levies and taxes that apply to liquid fuels in South Africa are provided below:

Table 1: Levy, tax and additional items on PETROL AND DIESEL

Levy	Date first imposed	Amount of levy Fiscal year 2015/16	Objective of the levy
General fuel levy	Early 1980s; Customs and Excise Act, No.91 of 1964 Introduced for the first time around April 1983	255 cent per litre on petrol and 240 cent per litre on diesel	Revenue (net of the refunds) go to the National Revenue Fund, from which they are appropriated to fund government's general expenditure programmes, including the construction and maintenance of roads and support of public transport. Refer to the annual Budget Review for more information for any specific fiscal year. . Since the abolishment of RSC levies, about one third of the revenue is shared with metropolitan municipalities.
Customs and excise levy	1994; Customs and Excise Act, No.91 of 1964 Introduced in April 1983	4 cents per litre on petrol, diesel and biodiesel. The 4 cents per litre has been fixed since the 1990s.	Included in the Southern African Custom Union (SACU) pool and shared amongst the SACU member countries.
Road accident fund levy	Road Accident Fund Act, No.56 of 1996 Introduced in May 1997	154 cents per litre on petrol, diesel and biodiesel	Provides cover for all road users against injuries sustained or death arising from accidents involving motor vehicles.

Equalisation fund levy	Central Energy Fund Act, No. 38 of 1977; Introduced in January 1979	Zero cents per litre on both diesel and petrol since 1996	The fund was in the past primarily used to smooth out monthly fluctuations in the price of liquid fuels. This was an attempt to try and limit the impact of volatile international crude oil prices and fluctuations in the Rand / US \$ exchange rate on fuel prices. This effort has not been very successful and was ceased about 5 years ago.
Demand Side Management Levy	The Central Energy Fund Act, No. 38 of 1977; Introduced in January 2006	10 cents per litre on 95 Octane petrol in inland areas	Most vehicles in the inland market do not require 95 ULP. In an effort to limit the demand for 95 ULP in the inland area to prevent "octane wastage" and to ensure sufficient supply for motorists who really need it the DSM levy was introduced.
Petroleum Pipelines Levy	The Petroleum Pipelines Levies Act, No. 28 of 2004 Introduced in March 2007	0.15 cents per litre - NERSA	To meet the general administrative and other costs for the functions performed by the Petroleum Pipelines Regulatory Authority.
Slate Levy	The Central Energy Act, No.38 of 1977 Introduced in January 2009	Fluctuates	To finance the balance in the Slate account when the Slate is in a negative balance. If the daily Basic Fuel Price (BFP) is higher than the BFP in the fuel price structure, a unit under recovery is realised otherwise there is an over recovery for the oil companies.
IP tracer dye levy	Central Energy Fund Act, No. 38 of 1977. Introduced in August 1999	0.01 cents per litre	To curtail the unlawful mixing of diesel and illuminating paraffin, an illuminating paraffin tracer dye is injected into illuminating paraffin. An illuminating paraffin tracer dye levy was introduced into the price structures of diesel to finance expenses related thereto.

The Table below indicates how the pump price for petrol, and the wholesale price for diesel, is determined for an inland province like Gauteng.

Table 2: Composition of levy, tax and additional items in Gauteng

COMPOSITION OF THE RETAIL PRICE OF PETROL AND THE WHOLESALE PRICES FOR DIESEL IN GAUTENG FOR June 2015		
GAUTENG FUEL PRICES	Petrol 93 ULP	Diesel * 0.05% S
	c/l	c/l
Basic fuel price (BFP)	644.65	638.63
Wholesale margin	33.50	64.70
Service cost recoveries	30.00	30.00
Dealers margin (*)	151.10	N/A
Zone differential in Gauteng	35.30	35.30
Fuel levy	255.00	240.00
RAF levy	154.00	154.00
Customs & excise duty	4.00	4.00
IP Tracer levy	N/A	0.01
Slate levy	0	0
Petroleum Pipelines Levy	0.15	0.15
Rounding	0.3	
Retail price	1 308.00	
Wholesale price		1 166.79

(2) Fuel levy revenue

The money received from the fuel levy is recorded in the relevant audited financial statements every year, and included in the appropriate Budget Review, all made available to Parliament and the public. The figures below are drawn from annual Budget Reviews.

Table 3: Revenue from the General Fuel Levy and RAF

R million	General Fuel Levy (net)*	Road Accident Fund Levy
2011/12 (audited)	36 589.07	16 628.02
2012/13 (audited)	40 320.20	17 621.42
2013/14 (audited)	43 684.65	19 961.98
2014/15 (estimate)	48 466.52	22 038.71

* Net of diesel refunds

Source: Budget Review

Table 4: Initial estimate of revenue collected since 1 April 2015 to 31 May 2015

2015/16 [#]	8 602.88	4 364.56
Revenue from 1 April 2015 to May 2015		

Source: Statement of the National Revenue, Expenditure and Borrowing as at 31 May 2015 issued by the DG: National Treasury

(3) No, as noted in the Budget Review and other budget documents every year, there is no money received from the fuel levy that is ring-fenced for the maintenance of roads. The building and maintenance of roads is done by departments or agencies in all three spheres of government, and is appropriated in national and provincial laws and municipal budgets. The amounts spent directly by the national government on the maintenance of roads are appropriated from the National Revenue Fund, and the budget information is provided below. A national entity like SANRAL also funds maintenance of certain roads, using budgetary funds and revenue it may collect. The actual funds spent per year on the maintenance of roads requires the Honourable Member to consider the budgets and annual reports of all organs of state involved with road funding in all three spheres of government.

It should also be noted that in 2014/15 R10.19 billion of the net revenue from the general fuel levy was allocated to the eight metropolitan municipalities as a part of a revenue sharing arrangement.

Money from the Road Accident Fund levy is ring-fenced and used by the Road Accident Fund to compensate victims of vehicle accidents for injuries sustained as a result of such accidents. The Road Accident Fund Levy is thus a form of a personal injuries insurance policy. Further information is available from its annual reports.

The tables below are from the 2015 Budget document Estimates of National Expenditure (ENE) and provide an overview of the funds allocated to the National Department of Transport.

Vote 37: National Department of Transport			
Subprogramme: R million	2014/15	2015/16	2016/17
Administration	382.90	399.80	423.50
Integrated Transport Planning	81.20	84.30	89.10
Rail Transport	15 034.60	18 362.00	19 389.60
Road Transport	21 645.30	22 852.10	23 876.20
Civil Aviation	148.30	154.00	162.70
Maritime Transport	110.60	115.40	121.80
Public Transport	11 323.80	11 846.40	12 779.10
TOTAL	48 726.70	53 814.00	56 842.00

Vote 37: National Department of Transport			
Subprogramme: %	2014/15	2015/16	2016/17
Administration	0.8%	0.7%	0.7%
Integrated Transport Planning	0.2%	0.2%	0.2%
Rail Transport	30.9%	34.1%	34.1%
Road Transport	44.4%	42.5%	42.0%
Civil Aviation	0.3%	0.3%	0.3%
Maritime Transport	0.2%	0.2%	0.2%
Public Transport	23.2%	22.0%	22.5%
TOTAL	100%	100%	100%

NOTES