

DRAFT POLICY PAPER

**A FRAMEWORK FOR CONSIDERING
MARKET-BASED INSTRUMENTS TO
SUPPORT ENVIRONMENTAL FISCAL
REFORM IN SOUTH AFRICA**

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National Treasury

Tax Policy Chief Directorate

DISCLAIMER

This draft policy paper reflects the preliminary views of the National Treasury and not necessarily those of Government. It should be noted that the document is being released in order to facilitate open and frank discussions on the subject of environmental fiscal reform. This will assist Government to formulate well-considered tax proposals, which will be informed by the needs of the country and international trends.

Table of Contents

EXECUTIVE SUMMARY.....	I
CHAPTER 1: INTRODUCTION.....	1
1.1 SCOPE OF THE POLICY PAPER.....	2
1.2 DEFINITIONS.....	3
1.3 OBJECTIVES OF THE POLICY PAPER.....	6
CHAPTER 2: SOUTH AFRICA’S SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL OBJECTIVES.....	10
2.1 SUSTAINABLE DEVELOPMENT IN SOUTH AFRICA.....	11
2.2 MEASURING PROGRESS TOWARDS SUSTAINABLE DEVELOPMENT.....	13
2.3 AN OVERVIEW OF ENVIRONMENTAL PRIORITIES FOR SOUTH AFRICA.....	16
2.4 ECONOMIC VALUATION OF ENVIRONMENTAL GOODS AND SERVICES.....	22
CHAPTER 3: SOUTH AFRICA’S TAX SYSTEM.....	26
3.1 PRINCIPLES OF TAXATION.....	26
3.2 TAX INCIDENCE.....	27
3.3 AN OVERVIEW OF TAX REFORM SINCE 1994.....	28
3.4 FISCAL DECENTRALIZATION.....	31
3.5 CURRENT ENVIRONMENTALLY-RELATED TAXES AND CHARGES.....	33
3.6 THE ROLE OF ENVIRONMENTALLY-RELATED TAXES IN FUTURE TAX REFORMS.....	38
CHAPTER 4: IDENTIFYING APPROPRIATE INTERVENTIONS TO CORRECT FOR MARKET FAILURES.....	41
4.1 MARKET FAILURE AND THE ENVIRONMENT.....	41
4.2 OPTIONS FOR GOVERNMENT INTERVENTION.....	43
4.3 CHOOSING BETWEEN DIFFERENT POLICY OPTIONS.....	49
4.4 THE APPROPRIATE LEVEL OF GOVERNMENT INTERVENTION.....	52
4.5 THE POLICY DEVELOPMENT PROCESS.....	53
CHAPTER 5: CRITERIA FOR ASSESSING ENVIRONMENTALLY-RELATED TAXES.....	56
5.1 PRINCIPLES OF ENVIRONMENTALLY-RELATED TAXATION.....	56
5.2 CRITERIA FOR ASSESSING ENVIRONMENTALLY-RELATED TAXES.....	56
CHAPTER 6: OPTIONS FOR ENVIRONMENTAL FISCAL REFORM MEASURES IN SOUTH AFRICA.....	65
6.1 USER CHARGES, LEVIES AND ADMINISTRATIVE FEES.....	65
6.2 OPTIONS FOR REFORMING EXISTING ENVIRONMENTALLY-RELATED TAXES.....	70
6.3 OPTIONS FOR DEVELOPING ENVIRONMENTALLY-RELATED TAXES.....	78
6.4 OPTIONS FOR REFORMING NON-ENVIRONMENTALLY-RELATED TAX LAWS WITH PERVERSE ENVIRONMENTAL INCENTIVES.....	85
6.5 (FISCAL) INCENTIVES TO IMPROVE ENVIRONMENTAL OUTCOMES.....	89
6.6 REVENUE HYPOTHECATION.....	101
CHAPTER 7: SUMMARY.....	104
BIBLIOGRAPHY.....	106

ANNEX 1: TAX REVENUE TRENDS	111
ANNEX 2: ENVIRONMENTAL VALUATION IN SOUTH AFRICA.....	116
ANNEX 3: MAKING GROWTH GREEN - ENVIRONMENTAL DUTY, THE WORLD BANK	123

List of Tables

Table 1: Waste generation in South Africa in 1998	21
Table 2: An overview of some valuation techniques and their potential applicability	25
Table 3: Environmentally-related taxes and charges in South Africa (2005/2006).....	34
Table 4: Revenues from environmentally-related taxes in South Africa	39
Table 5: Policy matrix of interventions to correct for environmental market failure.....	43
Table 6: Guiding principles of environmentally-related taxation	57
Table 7: Options for reforming existing environmentally-related taxes.....	70
Table 8: Proposed fuel tax framework for South Africa	73
Table 9: Options for developing new environmentally-related taxes.....	79
Table 10: Water use by sector in South Africa.....	82
Table 11: Possible reform options to reduce perverse environmental incentives	86
Table 12: Use of environmentally-related tax revenues in the UK.....	92
Table 13: Review of specific tax provisions to incentivise conservation activities	96

List of Figures

Figure 1: Gross, net and adjusted (or genuine) savings for South Africa: 1970-2001	15
Figure 2: A process for considering the application of market-based instruments	55
Figure 3: Suggested criteria for assessing environmentally-related tax proposals	58
Figure 4: Waste management hierarchy.....	75

List of Boxes

Box 1: Classifying environmentally-related taxes and charges.....	4
Box 2: Examples of environmental market failures.....	42
Box 3: Examples of information disclosure programmes in South Africa	45
Box 4: The Indonesian Programme for Pollution Control Evaluation and Rating (PROPER)	47
Box 5: The South African ROSE Foundation	48
Box 6: Plastic bags and the use of voluntary agreements in South Africa.....	48
Box 7: China's system of pollution taxes and subsidies.....	51
Box 8: Taxes and user-charges in an environmental context.....	68
Box 9: Applying the polluter-pays principle.....	69
Box 10: Sweden's refunded NO_x emissions payments	80
Box 11: Tradable water rights in Chile.....	83
Box 12: Recent amendments to New Zealand's tax depreciation rules.....	95

Box 13: Tax measures to promote conservation in Australia 100

EXECUTIVE SUMMARY

Introduction

Sustainable development is about enhancing human well-being over time and managing a broad portfolio of economic, social and environmental assets that society has at its disposal in order to sustain a flow of consumption¹. As the South African economy continues to develop, it is increasingly important to ensure that it does so in a sustainable way and that, at the same time, issues of poverty and inequality are effectively addressed. It is, therefore, important to appreciate that it's not just the *quantity* of growth that matters, but also its *quality*.

The aim of this policy paper is to outline the role that market-based instruments, specifically environmentally-related taxes and charges, *could* play in supporting sustainable development in South Africa, and to outline a framework for considering their potential application. The paper focuses on the options for environmental fiscal reform and the policies and measures capable of contributing to both revenue requirements and environmental objectives. The policy paper therefore seeks to:

- Explore how environmentally-related taxes and charges could assist in progressing towards the achievement of environmental goals and objectives in a cost effective and efficient manner;
- Explore how environmentally-related taxes are able to contribute to revenue-raising requirements;
- Provide a guiding framework and develop a process for considering the use and development of different market-based instruments; and
- Provide a consistent set of criteria for evaluating environmentally-related tax proposals.

Scope of the policy paper

Market-based instruments are a package of policy instruments that seek to correct environmentally-related market failures through the price mechanism. By seeking to alter the relative prices that individuals and firms face, market-based instruments could be a more efficient way of addressing certain environmental concerns. In some instances, such instruments could be used to replace command-and control measures, but in most cases they have a complementary role.

In focusing on *market-based instruments for environmental fiscal reform*, the policy paper primarily looks at reforms to revenue-raising instruments, particularly environmentally-related taxes and charges and their role in wider fiscal policy. Reforms on the expenditure side, such as direct subsidies or more general government expenditure, are not considered in detail although they have formed important aspects of environmental fiscal

¹ World Bank (2003) "*Sustainable Development in a Dynamic World: Transforming Institutions, Growth and the Quality of Life*", World Development Report 2003, World Bank, Washington DC.

reform programmes internationally. Such issues will be the subject of future work. However, some subsidy-related incentives, specifically where they take the form of tax expenditures (such as reduced tax rates or exemptions) or revenue recycling are dealt with in this policy paper.

Definitions

In line with international classifications, an environmentally-related tax is classified as “a tax whose tax base is a physical unit (or proxy of it) that has a proven specific negative impact on the environment”. Put slightly differently, an environmental tax is a tax on an environmentally-harmful tax base. Included in this definition are transport fuels, motor vehicle taxes, emissions taxes, landfill taxes and, more broadly, energy taxes. Although the definition does not make reference to the *intent* of the tax, it is nevertheless of critical importance but it should not be used for classification purposes. By classifying environmentally-related taxes according to the tax base, the debate over intent is also likely to be highlighted since some (many) such tax instruments were historically introduced without specific consideration for environmental issues.

A **tax** is defined as a compulsory *unrequited* payment not proportional to the good or service received in return for that payment. Characteristics of a tax include:

- No direct benefits accrue to individual beneficiaries in exchange for payments;
- Payments are enforced in terms of legislation; and
- Government or organs of State directs the use of tax revenues.

A statutory **levy** is a compulsory payment and is, therefore, a tax.

A **user-charge** is defined as a *requited* payment for a specific service rendered. User-charges are therefore very close to *prices* or consumer tariffs in the case of electricity, for example. Characteristics of a user-charge include:

- A marketable good or service is provided to identifiable beneficiaries;
- Direct and proportional benefits accrue to beneficiaries in exchange for payments; and
- Transactions take place in a willing buyer market.

Administrative fees are a form of user-charges and are usually implemented by (government) agencies to recover all or more usually, a proportion of the costs involved in providing a service. Characteristics of administrative fees include:

- A good or service is provided to identifiable beneficiaries;
- Direct benefits accrue to beneficiaries; and
- Payment is required for the provision of certain government goods and / or services.

Despite the significant conceptual differences between taxes and user-charges, under certain circumstances relating to the environment, it might be difficult to clearly distinguish between the two. In order to minimise any grey areas, the definitions must be applied as

strictly as possible and different situations, particularly with respect to the environment, may need to be considered on a case-by-case basis.

Environmental priorities for South Africa

Environmental assets form an integral part of human well-being and it is important that they are managed appropriately. At present, South Africa does not have an over-arching National Strategy for Sustainable Development and a coherent approach to measuring the sustainability of current resource use and consumption trends.

South Africa faces a number of environmental challenges. According to the National State of the Environment Report², some of the key environmental issues include:

- Air pollution and climatic change;
- Biodiversity loss and damage to terrestrial ecosystems;
- Land degradation;
- Water scarcity and water quality management; and
- The generation and disposal of waste.

Economic valuation offers a useful and consistent framework for prioritising and ranking the different issues. However, although a number of valuation studies have been undertaken in South Africa, for the most part, they are of limited use for policy-making purposes.

Overview of South Africa's tax system and environmentally-related taxes

Since 1994, South Africa has undertaken comprehensive tax reforms aimed at improving economic growth, development, employment creation, and encouraging investment and enterprise development. Reform efforts have focused on simplifying the tax system, broadening the tax base and reducing tax rates to ensure a more favourable fiscal environment within which economic growth can take place.

South Africa has a number of environmentally-related taxes already in place (see Table 1). Together, these tax instruments account for approximately 2 per cent of GDP and just under 10 per cent of total tax revenue. Environmentally-related tax revenue trends are heavily influenced by the general fuel levy, which accounts for over 70 per cent of the revenue collected from this group of instruments.

Since the majority of existing environmentally-related taxes were introduced with the primary intention of raising revenue, there exists the potential to improve the environmental outcomes and behavioural incentives created by these instruments. From a fiscal point of view, the idea of using environmentally-related taxes as part of a tax shifting exercise also needs to be explored.

² DEAT (1999) "National State of the Environment Report", Government of South Africa.

Table 1: Overview of environmentally-related taxes and charges in South Africa (2005/2006)

SECTOR	LEVY (charge)	LEVEL	APPLICATION	TAX RATE
Transport fuels	General Fuel Levy	National	Petrol Diesel Biodiesel	116 cent per litre. 100 cent per litre. 60 cent per litre.
	Road Accident Fund Levy	National	Petrol, Diesel, Biodiesel	36.5 cent per litre.
	Equalisation Fund Levy	National	Petrol, Diesel, Biodiesel	Currently zero.
	Customs and Excise Levy	National	Petrol, Diesel, Biodiesel	4 cent per litre.
Vehicle taxation	<i>Ad Valorem</i> Customs & Excise Duty	National	All passenger and light commercial vehicles	Graduated rate based on the vehicle price with an upper ceiling of 20 per cent.
	Road Licensing Fees	Provincial	All registered vehicles	Fees vary between different provinces – usually based on weight.
Aviation taxes	Aviation Fuel Levy	National	Aviation fuel sales	1,5 cents per litre on all fuel sales excluding foreign operators.
	Airport charges	National	Landing, parking, and passenger service charge	Charges imposed to fund the operation of the South Africa Civil Aviation Authority (SACAA).
	Air Passenger Departure Tax	National	International air travel from SA	R120 per passenger; R60 per passenger to BLNS countries.
Product taxes	Plastic shopping bags levy	National	All plastic shopping bags	3 cents per bag.
Electricity	NER Electricity Levy	National	All electricity generated	A levy per kWh is implemented on all electricity generated to fund the National Electricity Regulator.
	Local Government Electricity Surplus	Local	Electricity distributed to end-users by municipalities	Implicit tax rates vary between different municipalities. Total surplus revenue raised is approximately R 1.4 billion.
Water supply	Water Resource Management Charge,	National	All registered water use from DWAF water schemes	Charge rates vary according to different users. The aim is to recover costs associated with water supply and abstraction.
	Water resource development and use of water works charge.	National	All registered water use from DWAF water schemes	Charge rates vary according to different users. The charges aim to recover the costs associated with the construction, operation and maintenance of water schemes.
	Water Research Fund Levy	National	All registered water users	This levy is earmarked to fund the operations of the Water Research Commission.
Waste water	Waste Water Discharge Charge System (proposed)	National framework	All (DWAF) registered water dischargers	The WDCS is in the process of being developed. 2 components are proposed for the system. A cost recovery based charge and a levy/ tax on waste effluent.

The instruments in the above table have been included on the basis of the (tax) base and not their intent. Using the tax base for classification purposes is in line with international conventions and allows a more consistent cross-country comparison.

The idea of taxing *bad*s (such as pollution) and reducing taxes on *good*s (such as labour) has been termed the *double-dividend hypothesis*. This hypothesis argues that there may exist scope to achieve a win-win situation where not only is an improvement in environmental quality secured (the first dividend), but the efficiency of the tax system can also be improved (the second dividend). Although there is a degree of uncertainty surrounding the extent of the second dividend, tax shifting may be an appropriate way of minimising the burden of environmentally-related taxes on the affected sectors, whilst creating the required behavioural incentives to achieve certain environmental outcomes.

Identifying appropriate government interventions to correct for market failure

In general, markets provide an efficient (although not necessarily the most equitable) means of allocating scarce resources. However, some markets are subject to failure, particularly with respect to environmental goods and services, and this can lead to insufficient consideration of environmental issues in everyday market activities. Under these circumstances, there is a strong rationale for some form of government intervention. By intervening and influencing the institutions that determine how markets operate, government can play an important role in encouraging more efficient resource use. However, by intervening, the government must be confident that the benefits of doing so are likely to outweigh the resulting costs.

Government can intervene to attempt to correct for environmental market failures in a number of different ways (see Table 2). Currently, government's environmental policies are dominated by regulatory instruments such as standards, bans on the use of certain goods or technologies, liability payments (such as the mining rehabilitation fund) and non-tradable permit systems. Information disclosure strategies are used selectively and there is a growing trend towards the use of voluntary agreements.

Table 2: Policy matrix of interventions to correct for environmental market failure

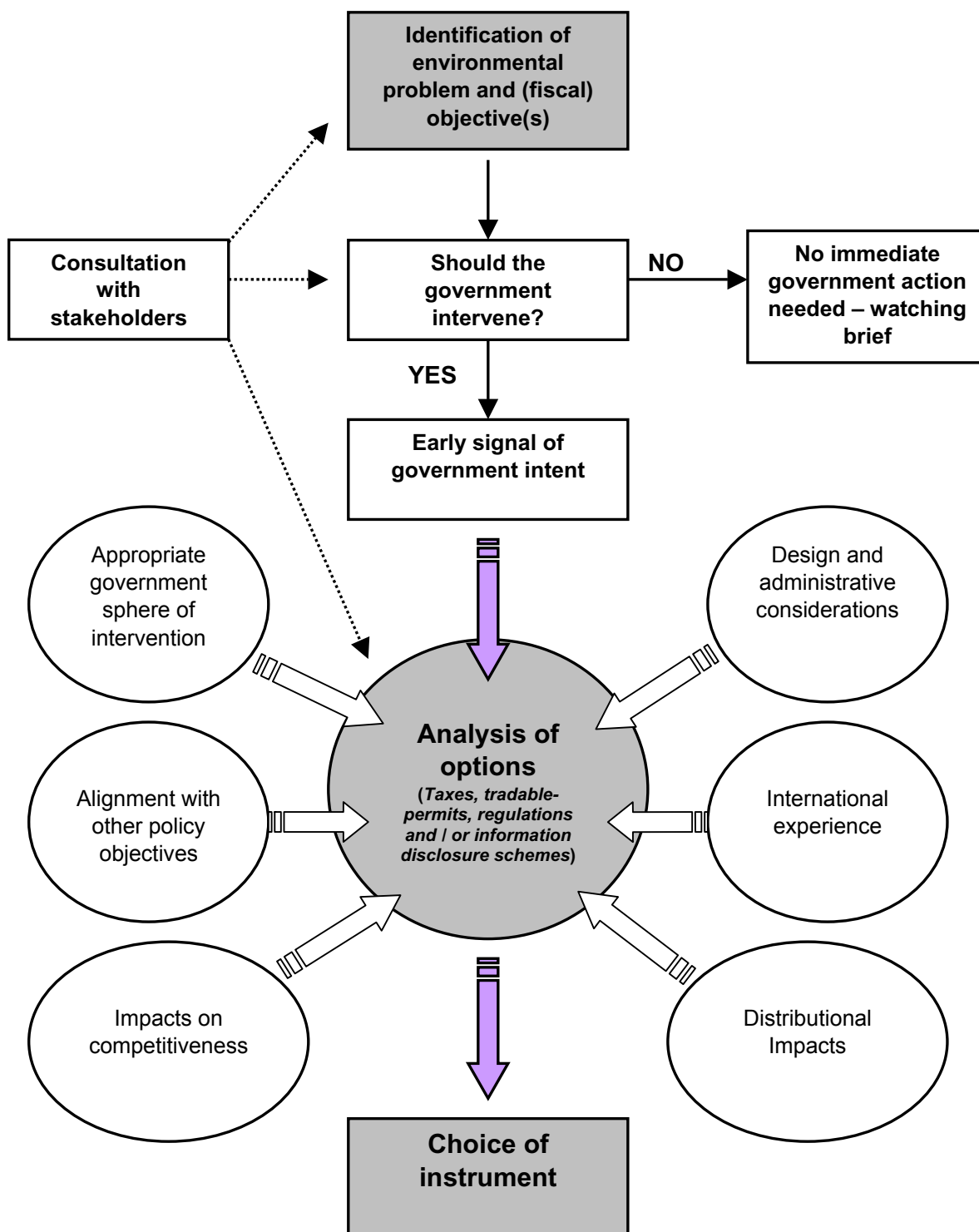
Using markets (using existing prices)	Creating markets (forming new markets and marketable goods)	Environmental regulations	Engaging civil society
Elimination of perverse subsidies; Environmentally-related taxes; Deposit-refund systems; User charges; and Targeted subsidies	Property rights and decentralisation; Tradable Permits and rights; and International offset systems	Product and process standards; Bans / prohibitions; Non-tradable permits and quotas; Zoning; and Liability and performance bonds	Public participation; Information disclosure; and Voluntary agreements

No one approach is necessarily better than another. Of greater importance is selecting the most appropriate intervention for the specific circumstances and not to be overly prescriptive at a general level. However, due to the institutional and administrative complexity of tradable-permit systems, these are likely to be less appropriate in a

developing country context where as certain taxes and charges have been successfully implemented in a number of developing countries.

The possible use of subsidies needs to be considered with care. Whilst direct subsidies can burden the fiscus, lead to further market distortions and contravene the generally accepted polluter-pays principle, there may be cases where subsidies in the form of tax incentives (i.e. reduced tax rates or exemptions) could be appropriate.

Figure 1: A process for considering different government interventions



In choosing between the different intervention options, the nature of the market failure has to be carefully analysed and a clear process capturing the key components outlined in Figure 1, should be followed. The framework is generically applicable but for every different set of circumstances, it needs to be used with sufficient judgement and flexibility.

Criteria for assessing environmentally-related taxes

Like other tax instruments, environmentally-related taxes should conform to the generally accepted principles of good taxation, particularly the principles of efficiency, equity, certainty, simplicity and cost minimisation. Where an environmentally-related tax is deemed as potentially suitable, more detailed analysis is needed to assess its appropriateness. The criteria that should be used and consistently applied when developing or evaluating different environmentally-related tax proposals include:

Environmental effectiveness	There should, as far as possible, be a clear environmental objective and the tax must be well targeted to that objective. To ensure that the tax is as effective as possible, the <i>best</i> design should be aimed for and the number of exemptions kept to a minimum.
Tax Revenue	The level of tax revenues and the way in which they are used are important considerations. Certain environmentally-related taxes will be capable of raising significant amounts of revenue, particularly where the demand for the good or service being taxed is price inelastic. In other cases, tax revenues may be small and therefore of secondary importance.
Support for the tax	Taxes are necessary to fund government activities and the provision of public goods and services. With every tax reform, there are likely to be winners and losers and these groups of stakeholders need to be clearly identified. All relevant stakeholders should be engaged in the assessment process.
Legislative aspects	Legislative aspects also need to be considered. The Minister of Finance is responsible for the imposition of taxes, duties and levies. Different environmentally-related tax instruments may require different legislative amendments (e.g. direct versus indirect taxation). With respect to international commitments, environmentally-related tax measures will need to be compatible with World Trade Organisation (WTO) rules and possibly with on-going tax harmonisation efforts within the Southern African region through SADC.
Technical and administrative issues	Technical and administrative issues are important considerations that can influence whether or not a tax instrument may be appropriate. Ideally, the tax base should be as close as possible to the environmental objective although in certain cases, a proxy may be required. Where there is a clear environmental objective, the tax rate should be set according to the level of the externality. Where this is not possible, the tax rate must be sufficient to achieve the environmental (and / or fiscal) objective. Minimising the possibilities of tax avoidance, tax evasion, compliance and collection costs are other important design considerations.

Competitiveness effects	The impact of environmentally-related taxes on domestic industries and other aspects of the economy such as employment and inflation are of critical importance. Where impacts on competitiveness are deemed <i>ex ante</i> to be unacceptable, mitigation measures may need to be considered. These may include, amongst other things, reduced tax rates, tax ceilings, tax refunds, appropriate mechanisms to recycle tax revenues, or tax shifting options.
Distributional impacts	An understanding of the way in which environmentally-related taxes impact on different income groups is important. For every proposed tax reform, the likely tax burden on different income groups and the anticipated distribution of environmental benefits needs to be assessed. The possibility of making environmentally-related taxes progressive should be integral to the design of any proposed instrument. Where there are likely to be adverse impacts on income distribution, mitigation or compensation measures may need to be considered. In some cases, such measures can be built into the tax instrument itself whilst in other cases it may be necessary to compensate certain groups through alternative (income supporting) measures.
Adjoining policy areas	The extent to which environmentally-related taxes can assist in meeting other government policy objectives is an important consideration. From an environmental point of view, it is important therefore that any tax measure is aligned with other regulatory or voluntary approaches. In certain cases, other policy processes may be driving an environmentally-related tax reform measure and it is important that environmental considerations are effectively integrated (e.g. company car tax and allowance reforms or the Electricity Industry Restructuring process). The extent to which environmentally-related taxes can be designed to contribute to policy goals such as job-creation, poverty alleviation and the expansion of basic services is also important.

Options for environmental fiscal reform measures

The nature, type and design of taxes send signals that potentially impact on the decisions made by taxpayers and, therefore, can support or discourage certain values. Environmentally-related taxes can play an important role in helping to ensure that economic growth and development are sustainable and discourage activities that impose high social costs in environmental terms. In some cases, it may be difficult for consumers or producers to alter their behaviour in response to an environmentally-related tax, particularly where there is a lack of *alternatives*. Supporting expenditure reforms may therefore be required.

The report discusses a number of tax reform options that could contribute towards meeting both fiscal and environmental objectives. No attempt has been made to prioritise these options, rather the focus has been on presenting a framework within which possible tax reform measures could be analysed and evaluated. In presenting the different options, due consideration is given to the regulatory capacity needed to ensure that these

instruments are able to function effectively. The options discussed are divided into the following categories:

A. Options for reforming existing environmentally-related taxes and charges

Transport sector:

- The general fuel levy;
- Vehicle customs and excise duties; and
- Provincial vehicle license fees.

Solid waste:

- Product taxes on certain goods such as batteries or packaging;
- Deposit-refund systems;
- Disposal taxes; and
- Differential tariffs for waste related services.

B. Options for new environmentally-related taxes

- In the electricity sector, the Electricity Distribution Industry Restructuring Process may require the introduction of certain tax reform measures with the aim of compensating municipalities for the loss of electricity surpluses. Integrating environmental issues where possible into such reforms should form an important part of the design process; and
- The Waste Water Discharge Charge System (WDCS) that is currently being developed by the Department of Water Affairs and Forestry. One element of the proposed WDCS could be a tax that is linked to the level of waste water discharge.

C. Options for reforming legal aspects of non-environmentally-related taxes with perverse environmental incentives

There are a few aspects of non-environmentally-related taxes that create easily identifiable negative impacts on the environment. More specifically, certain deductions under the Income Tax Act create perverse incentives that may undermine conservation activities whilst incentivising land conversion and cultivation practices. In addition, the VAT zero-rating of farming inputs such as pesticides and fertilisers, and illuminating paraffin may lead to sub-optimal environmental outcomes. Finally, if designed creatively, property rates can be used to incentivise improved environmental, conservation and land management practices.

D. (Fiscal) incentives to improve environmental outcomes

A number of stakeholders raised the need to investigate the role that (tax) incentives could play in achieving environmental outcomes. Five broad and in some cases overlapping categories of incentive mechanisms have been identified as relevant for promoting positive environmental outcomes:

- Environmental funds;
- Partial or soft earmarking of environmentally-related tax revenues;
- Rehabilitation funds / guarantees;

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- Accelerated depreciation allowances; and
 - Review of specific tax provisions.

Although direct subsidies are not promoted due to their non-compliance with the polluter-pays principle, the important role that these incentive mechanisms can play in encouraging better responses to environmentally-related taxes is recognised.

Tax revenue use and earmarking

The way in which revenues from environmentally-related taxes should be used has been raised as an important issue of contention. Generally speaking, there are no clear-cut criteria to dictate when revenue hypothecation is appropriate or not. As a rule, the *full* earmarking of selected tax revenues is not a preferred option due to the constraints placed on the budget process and the rigidities that tend to follow from earmarking can lead to the inappropriate allocation of resources. Earmarking practices may also limit the extent to which environmentally-related tax revenues can be used as part of a possible tax shifting exercise.

Requests for earmarking will, therefore, have to be evaluated on a case-by-case basis, with on budget funding through the normal budgetary process being the first best option. As a second best alternative, the *partial* or *soft* earmarking of tax revenues could be considered in that revenues will have to flow via the fiscus with the provision that special consideration be given to fund certain activities but with no fixed commitment to allocate all the revenues from a specific source to such activities.

Summary

The key messages from the policy paper are as follows:

1. Market-based instruments, particularly environmentally-related taxes and charges, may have certain advantages over traditional regulatory (command-and-control) approaches and may be a more efficient way to address certain environmental concerns whilst also contributing to fiscal objectives;
2. A coherent framework is presented to consider and evaluate the use of market-based instruments;
3. The development of environmentally-related tax proposals must be undertaken according to a specific set of criteria and should, as far as possible, be adequately integrated into existing government policies;
4. Earmarking revenues from environmentally-related taxes is not in line with sound fiscal management practices and proposals for earmarking need to be evaluated on a case-by-case basis; and
5. The paper presents a range of options for environmental fiscal reform measures, illustrating potentially appropriate interventions that may lead to both environmental and fiscal benefits.

CHAPTER 1: INTRODUCTION

Sustainable development is about enhancing human well-being over time. It is about managing a broad portfolio of economic, social and environmental assets that society has at its disposal in order to sustain a flow of consumption³. As the South African economy continues to develop, it is increasingly important to ensure that it does so in a sustainable way and that issues of poverty and inequality are effectively addressed. The growing importance of environmental issues is partly in recognition of the fact that it is not just the *quantity* of growth that matters, but also its *quality*.

In an attempt to better manage environmental assets, the role of market-based instruments, specifically environmentally-related taxes and charges, has gained increasing prominence over recent years. Fiscal policy, and tax policy in particular, contributes towards the creation of an enabling environment in which economic activities can take place.

The overarching aim of this policy document is to outline the role that market-based instruments *could* play in supporting sustainable development in South Africa and to outline a framework for considering their potential application. It focuses on the main options for environmental fiscal reform and the policies and measures capable of contributing to revenue requirements and environmental objectives.

Environmentally-related taxes can also play an important role in increasing the overall efficiency of the tax system. Exploring such opportunities is an important aspect of environmentally-related tax policy development. Given this focus, the policy paper does not aim to provide a comprehensive analysis of all South Africa's environmental challenges, rather, it seeks to provide guidelines for the development of market-based instruments in the context of wider fiscal reforms.

The paper has been developed on the back of an earlier discussion document produced for the National Treasury by Eunomia consulting, the University of Pretoria and an independent consultant, Stefan Speck.

The policy paper is structured as follows:

Chapter 1: Introduction – the rest of this chapter explores the scope and objectives of the policy paper in more detail. Some key definitions and concepts are also presented.

Chapter 2: South Africa's sustainable development and environmental objectives – outlines some of South Africa's main environmental challenges and priorities. The role of environmental economics and valuation in strengthening policy development is discussed.

³ World Bank (2003) "*World Development Report – Sustainable Development in a Dynamic World, Transforming Institutions, Growth and the Quality of Life*", The World Bank, Washington DC.

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- Chapter 3: South Africa's tax system** - provides an overview of the existing tax system in South Africa, the extensive reforms that have been undertaken post 1994 and the respective revenue raising competencies across different tiers of government. A brief review of existing environmentally-related taxes and charges is presented.
- Chapter 4: Identifying appropriate interventions to correct for market failures** – examines different ways of addressing environmentally-related market failures and places environmentally-related taxes in the context of other market-based instruments and policy options. A process for considering different policy instruments is presented.
- Chapter 5: A framework for assessing environmentally-related taxes** – Building on Chapter 4, it is important that the use of environmentally-related taxes conform to the principles of good taxation, be well designed and targeted towards specific policy objectives. This chapter proposes a set of criteria for assessing different environmental fiscal reform options and tax instruments.
- Chapter 6: Options for environmental fiscal reform in South Africa** – given the assessment criteria presented in Chapter 5, this section reviews a series of environmental fiscal reform options that could lead to improved environmental and fiscal outcomes.
- Chapter 7: Summary** – presents the key messages from the policy paper.
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1.1 Scope of the policy paper

Market-based instruments are a group of policy instruments that seek to correct environmentally-related market failures through the price mechanism. This is in addition to, or in certain circumstances as a substitute for, regulatory or command-and-control instruments, which use legislative or administrative regulations to directly alter the amount of and type of technology used by firms. By seeking to alter the relative prices that individuals and firms face, market-based instruments could be more efficient in addressing certain environmental concerns. In some instances, such instruments have been used to replace command-and control measures, but in most cases they have complemented them.

Generally, the term environmental fiscal reform is used to refer to the interface between two large policy areas; fiscal policy and environmental policy. Very broadly, environmental fiscal reform is concerned with the way in which government revenue raising strategies and expenditure programmes impact on the environment. Internationally, the term has been used to describe reforms ranging from a single fiscal measure to a more complex package of reforms implemented together. Components of an environmental fiscal reform process could include the following aspects:

On the revenue side:

1. Reforms to existing environmentally-related taxes to better incentivise environmentally-preferable outcomes;
2. The development of new environmentally-related taxes to incentivise environmentally preferable outcomes;
3. Reforms to existing non-environmentally-related taxes with perverse environmental incentives (including tax expenditures); and
4. (Fiscal) incentives to improve environmental outcomes.

On the expenditure side:

1. Reforms to existing (perverse) subsidies to better incentivise environmentally preferable outcomes; and
2. The introduction of new subsidies to incentivise environmentally preferable outcomes.

In focusing on *market-based instruments for environmental fiscal reform*, this policy paper primarily looks at reforms on the revenue side, particularly environmentally-related taxes and charges and their role in wider fiscal policy (areas 1 and 2). Reforms on the revenue side, particularly product subsidies or more general government expenditure, are not considered in detail. However, other subsidy-related incentives, specifically where they take the form of tax expenditures (such as reduced tax rates or exemptions) or revenue recycling are included.

Recognising that environmentally-related taxes and charges are only one way of incentivising environmentally preferable outcomes, due consideration is given to other market-based instruments in the document.

1.2 Definitions

The meaning of the term *environmentally-related taxes* varies depending on where and how it is used. International best practice suggests that an environmentally-related tax should be defined through the *tax base*. In line with best practice, an environmentally-related tax in this policy paper is defined as a:

“tax whose tax base is a physical unit (or proxy of it) that has a proven specific negative impact on the environment”⁴.

Put slightly differently, an environmental tax is a *tax on an environmentally harmful tax base*, which includes transport fuels, motor vehicle taxes, emissions taxes, landfill taxes and, more broadly, energy taxes. Although the definition does not make reference to the *intent* of the tax, this does not mean it is not important. The intent of a tax *is an important consideration* when balancing different policy objectives and when considering how best to design the tax and set the tax rate. It should not, however, be used for the purpose of classification. This is an important point of clarification. Considering environmentally-related taxes on the basis of their outcomes alone could lead to difficulties if the objectives of an instrument are not realised or are unclear. Similarly, important environmental

⁴ OECD (1997) “*Evaluating Economic Instruments for Environmental Policies*”, Paris, and EC (1997) “*Proposal for a Council Directive Restructuring the Community Framework for the Taxation of Energy Products*”, COM (97)30 Final, Brussels.

outcomes resulting from tax instruments without a specified environmental intent could be overlooked.

It is important to note that the *intent* of a tax instrument can evolve over time. The current excise duties on alcoholic beverages and tobacco products are good examples in this regard. Originally, these taxes were imposed with the prime intention of raising revenue but, over time, their intent has evolved to also try and alter consumer behaviour in order to achieve certain social and health objectives. Similarly, it could be argued that the intent of the general fuel levy has evolved over time with some emphasis now being placed on its environmental outcomes. In effect, by using the tax base to define environmentally-related taxes, an environmental *intent* is given to these instruments. Box 1 provides additional information with regards to definitions and classifications.

Box 1: Classifying environmentally-related taxes and charges

There are a number of different ways to classify environmentally-related taxes and charges. An environmentally-related tax is defined by the OECD and the European Commission as “*tax whose tax base is a physical unit (or proxy of it) that has a proven specific negative impact on the environment*”.

Classifying environmentally-related taxes according to the *tax base* and not the *intent* of the tax is important for the following reasons:

1. It is in line with international practices and facilitates cross-country comparisons;
2. *Unintended* environmental outcomes are captured; and
3. It provides a consistent framework to evaluate the impact of a particular tax instrument over time irrespective of the original intent.

The example of taxes on transport fuels illustrates the importance of using the *tax base* rather than the *intent* of the tax for classification purposes. Although such taxes were introduced with the primary intention of raising revenue, they have positive environmental outcomes, for example, in the form of reduced emissions of key air pollutants. Also, through the use of differential fuel tax rates, the use of cleaner types of transport fuels can be promoted.

Historically fuel taxes in South Africa have accounted for between 30 and 40 per cent of the retail pump price of petrol. The short and long run price elasticities of the demand for petrol varies between -0.25 and -0.35 and -0.70 and -0.90 respectively. If all indirect taxes on petrol are abolished, the price of petrol would theoretically decrease by about 30 per cent with a resulting increase in quantity demanded of about 9 per cent in the short run and probably by as much as 24 per cent in the “long run”. Hypothetically speaking, if all indirect taxes on petrol and diesel were abolished, it is likely to result in significant increases in fuel consumption and associated emissions into the atmosphere.

In trying to understand the extent of environmental incentives created by a particular tax instrument (irrespective of whether or not this was the original *intent*), it is important to appreciate the need to obtain reasonable estimates of both the short and long run price elasticities of demand for certain goods and services.

The following distinctions are used in the policy paper:

- **Tax** – a tax is a compulsory *unrequited* payment not proportional to the good or service received in return for that payment. Since the payment made does not necessarily equal the benefit derived, the general benefit principle, but not the individual benefit principle applies. Important characteristics of a tax include: beneficiaries constitute distinct groups of individuals; no direct benefits accrue to individual beneficiaries in exchange for payments; payments are enforced in terms of legislation; and Government or organs of the State directs the use of tax revenues;
- **User Charge** – a user charge is a *requited* payment for a specific service rendered. These payments are based on the individual benefit principle and attempt to link the amount paid to the benefit received by a specific individual. Important characteristics of a user charge include: the provision of a marketable service to individual beneficiaries; direct benefits accrue to beneficiaries in exchange for payments; and transactions take place in a willing buyer market. As a guiding rule, user charges should not exceed the average cost of providing the service. In some instances, user-charges might be set below average cost to ensure affordability;
- **Levy** – a statutory levy is a compulsory payment and is, therefore, a tax; and
- **Earmarked tax** – is a tax, the revenues from which are used to finance a specific activity or programme.

Despite the conceptual differences between taxes and user charges, under certain circumstances, it might be difficult to clearly distinguish between the two. In order to minimise these grey areas, it is important to interpret the definitions as strictly as possible.

Some aspects that should be considered when choosing either a tax or a user charge include⁵:

- User charges are better able to recover costs without adverse allocative impacts when they are applied uniformly. For example, charging national park entrance fees on a selective number of parks to cover the costs of providing the entire park network is unlikely to be the best solution if fees can be imposed on all parks (albeit at differentiated rates where necessary);
- User charges may encourage better economic use of a good or service than a tax since they enable clearer links to be made between costs and benefits. The desirability of these incentives have to be weighed against other objectives such as redistributive goals;
- Where the ability to pay principle for a particular good or service supplied by the government is important, taxes rather than user charges are likely to be more appropriate;

⁵ See IMF (1995) “*Tax Policy Handbook*”, IMF, Washington DC. These issues are discussed in more detail in Chapter 6.

Where the administration of a user charge is very complex (i.e. equating costs or payments with the benefits received in return) or resource intensive, a tax may be a simpler and / or cost effective alternative.

1.3 Objectives of the policy paper

Environmentally-related taxes and charges are in themselves a varied set of policy instruments. They can be applied to meet a variety of different objectives across different sectors. South Africa has a number of environmentally-related taxes currently in place and there is growing interest in this area within and across different spheres of government and civil society.

The objectives of this policy paper are outlined below. Note that all the objectives listed will not necessarily apply in all circumstances or for every type of environmentally-related tax instrument. In certain cases there will be overlaps: in others, objectives may be mutually exclusive. What they do indicate, however, are what the goals of environmentally-related tax reform should be if they are to be consistent with good fiscal policy.

1.3.1 Revenue-raising objectives; the “double-dividend” hypothesis

Some environmentally-related taxes have the potential to raise significant amounts of revenue. This is particularly so where the good or service being taxed is relatively price inelastic, i.e. the quantity demanded is not very sensitive to changes in price. Taxing price inelastic goods and services is generally regarded as good tax practice since decisions concerning the allocation of resources are not unduly influenced. Environmentally-related taxes are not capable of raising large amounts of revenue where the quantity demanded of the good or service being taxed is very responsive to changes in price. Where this is so, a tax could be expected to create potentially powerful incentives for consumers and / or producers to alter their behaviour. Under these circumstances, revenue considerations would be secondary.

Under circumstances where revenue-raising potentials are significant, how the revenues are used becomes an important issue. There are essentially four different (although not necessarily mutually exclusive) uses to which the revenues could be put:

1. Revenues accrue to the fiscus and are allocated to priority spending needs through the normal budgetary process;
2. Revenues accrue to the fiscus and are used as part of a tax-shifting exercise to reduce the marginal tax rates of other distortionary taxes such as taxes on labour;
3. Revenues are earmarked or *ring-fenced* for spending on specific environmental programmes (*explicit / hard* earmarking); and/or
4. Revenues accrue to the fiscus but there is some form of *agreement* that spending on environmental programmes will be increased through on-budget channels (*implicit / soft* earmarking).

From a fiscal policy perspective, the possibilities referred to in option two are particularly attractive. Taxes on labour (income and pay-roll taxes) are necessary to raise revenue for public spending programmes. However, if employment and investment are to be stimulated as much as possible, such taxes must be kept within reasonable limits. It has been argued that if additional revenues can be generated through environmentally-related taxes, taxes on labour and the associated distortions this brings with it can be reduced. This policy option merits special attention in the case of South Africa.

The concept of *taxing bads* (such as environmental pollution) and *reducing taxes on goods* (e.g. labour) has been termed the *double-dividend hypothesis*. This hypothesis asserts that a win-win situation could be achieved in that not only is an improvement in environmental quality secured (the first dividend), but gains in economic efficiency and employment could also be realised (the second dividend). Although there is a degree of uncertainty over the practical scope of the double-dividend benefits, many countries have implemented environmentally-related taxes on these grounds. The possibility and desirability of using environmentally-related tax revenues in this way in South Africa should be explored.

1.3.2 Maintenance of a coherent tax policy framework

Macro-economic stability is an important requirement in creating a platform for economic growth and development. It is widely acknowledged that fiscal policy, and tax policy in particular, contributes towards the creation of an enabling environment in which economic activities take place. Tax policy in South Africa must, therefore, seek to optimally fulfil revenue-raising requirements, achieve economic and allocative functions whilst strengthening redistributive and social-policy needs. Looking at the big picture is vital to ensure that these objectives and an appropriate level of economic and social stability are achieved.

An important aspect of environmentally-related taxes and charges concerns the appropriate tier of government at which different instruments should be imposed. There may be cases where, due to the nature of the tax base or the particular environmental issue under focus, it could be most suitable to have a decentralised instrument. In other circumstances, it is difficult to visualise a tax operating effectively at any level other than National Government.

Having a coherent framework in this regard is important to guide the development of an environmental fiscal reform agenda. The proliferation of levies (large or small) on an *ad hoc* or poorly conceived basis, at any level of government, needs to be avoided. Environmentally-related taxes, like any other tax instrument, must be used in such a way that will maintain and / or enhance the integrity of fiscal policy. In line with this goal, the policy paper seeks to provide a framework and to ensure that where environmentally-related taxes and charges are deemed appropriate, they are well conceived, designed and implemented.

1.3.3 Improving markets and the allocation of resources

Economic theory suggests that, in general, markets provide the best means of allocating scarce resources. Markets, through the price mechanism, provide strong incentives to all

participants in the economy to optimise the use of resources and encourage the most productive and efficient businesses to prosper and grow. However, in some instances, markets can be subject to imperfections and failure. Market failures with respect to the environment can be complex and take many forms. Corrective government action can increase the welfare of society as a whole by improving the allocation of resources and the overall efficiency of the economy.

Environmentally-related taxes and charges, by operating through the price mechanism, have some particularly desirable features which command-and-control measures lack. They encourage both *static* and *dynamic* efficiency. Static efficiency is achieved where a given environmental standard is achieved at least cost to society. Different firms face different pollution abatement cost functions. By implementing a tax on emissions, for example, it will be advantageous for some firms to cut back on emissions more than others (up to the point where marginal abatement costs are equalised across all polluters). This least-cost solution is unlikely to be achieved if a uniform environmental standard was applied to every individual polluter.

Dynamic efficiency refers to the ongoing incentives created by using market-based instruments to continually reduce pollution abatement costs and ultimately pollution levels. To comply with command-and-control measures, polluters must only meet a specific standard but when faced with the prospect of paying an emissions tax, for example, there will be a continuous incentive to undertake cost-effective abatement and innovation in cleaner production technologies in order to reduce tax payments.

Whilst appreciating the possible benefits of economic instruments, it is important not to polarise the different approaches. In practice, both market-based instruments and command-and-control measures are important tools of government policy. They reinforce each other and have a critical role to play in ensuring markets function as efficiently and effectively as possible.

It is important to stress at this juncture that internalising negative environmental externalities and correcting for other market failures comes at a price. Even where the aim may be to internalise externalities in line with some socially optimal level, it cannot always be achieved immediately. There are “win-win” cases where more environmentally informed business practices go hand-in-hand with improved competitiveness. However, this is not immediately possible in all cases and a phased approach, taking into account potential impacts on competitiveness, must be adopted in order to give time for specific sectors to adjust.

1.3.4 Equity issues and impacts on the poor

A growing body of research indicates that poor environmental quality may impact disproportionately on poor and low-income groups⁶. Evidence suggests that these groups are often the ones most dependent on the quality of environmental goods and services and most vulnerable to the effects of environmental degradation. In line with wider

⁶ See DFID, EC, UNDP & World Bank (2002) “*Linking Poverty Reduction and Environmental Management: Policy Challenges and Opportunities*”, World Bank, Washington DC.

redistributive goals, an important aspect of environmental fiscal reform will be to ensure that instruments are *pro-poor* or, as a minimum, do not place a disproportionate burden on low-income groups.

CHAPTER 2: SOUTH AFRICA'S SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL OBJECTIVES

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

-Brundtland Commission, 1987⁷

Sustainable development can be thought of as having three equally important pillars: economic, social and environmental. Based on the Brundtland Commission definition of sustainable development, the United Nations Conference on Environment and Development (Rio Earth Summit) adopted Agenda 21 in 1992 as a response to achieving sustainability. The programme identified key areas of action and in 2002, the World Summit on Sustainable Development (WSSD) was held in Johannesburg where progress towards sustainable development in terms of Agenda 21 was evaluated. Subsequently, the Johannesburg Declaration on Sustainable Development and a Johannesburg Plan of Implementation (JPOI) was established, which includes specific targets as outlined in the Millennium Declaration and programmes of action to achieve sustainable development. These targets include:

- Halving the proportion of people in poverty by 2015;
- Halving the number of people who do not have access to safe drinking water by 2015;
- Halving the number of people without basic sanitation by 2015;
- Reducing the current rate of biodiversity loss by 2010 and maintain and restore collapsed fish stocks by 2015;
- Decreasing the use of chemicals with adverse impacts on human health and the environment by 2020; and
- Steps towards developing and implementing national sustainable development strategies by 2005.

The JPOI provides programmes of action to make available basic services such as water, energy, and health care to the poor as well as encourage waste minimisation and agricultural development. These programmes aim to ensure that all our assets are used in a sustainable manner to eradicate poverty amongst the current generation and at the same time ensure that sufficient resources are available for consumption by future generations.

The eradication of poverty, changing unsustainable patterns of production and consumption and protecting and managing the natural resource base of economic and social development are essential requirements for sustainable development⁸. This chapter aims to provide an overview of the concept of sustainable development, its theoretical

⁷ World Commission on Environment and Development (1987) *“Our Common Future”*, Oxford University Press, UK.

⁸ World Summit on Sustainable Development (2002) *“Plan of Implementation of the World Summit on Sustainable Development”*, United Nations, Johannesburg.

underpinnings, and how progress towards sustainable development is being measured in South Africa⁹. This chapter focuses on the environmental component in particular and reviews the main environmental challenges and objectives facing South Africa. Finally, a summary of the techniques that could be used to value un-priced environmental goods and services is provided.

2.1 Sustainable Development in South Africa

“Sustainable development is about enhancing human well-being through time and society's ability to enhance or improve human well-being depends on the choices made or preferences of individuals, firms, communities and government on how to utilise their assets”.

-World Bank, World Development Report, 2003¹⁰

The ability of a nation to sustain a consumption flow (and therefore to be sustainable) depends on the change in its stock of assets or wealth. These assets include human assets, natural assets, man-made assets, knowledge assets and social assets. The management of this asset base is vital to achieving sustainable development. Whilst these assets complement each other (i.e. all are needed at some level to ensure well-being), they can be substituted for one another to varying degrees. However, there are limits to substitutability, particularly for environmental and social assets that enhance human well-being through their mere existence as well as indirectly through their contribution to production and material well-being.

Different assumptions about the degree of substitutability between different assets have given rise to the concepts of *weak* and *strong sustainability*. *Weak sustainability* asserts that sustainable development should not impose strong constraints on growth since assets can be substituted for one another to a relatively high degree. Under this scenario, technology and research and development will always provide alternatives or options for changes in the asset base that yields a particular flow of consumption. Alternatively, proponents of *strong sustainability* argue that assets, particularly environmental assets at a global level, can not easily be substituted for by others and that it should not be assumed that developments in technology will provide infinite possibilities for changes in the asset base. Accordingly, critical natural capital (such as water and soil resources, the ozone layer, global climates and forest resources, for example) needs to be preserved for development to be sustainable.

In recognition of the dwindling natural resource base and uncertainty surrounding current impacts on environmental resources over time, the preferences of future generations for different forms of assets and the technological options that may become available to them, the *precautionary principle* has been advocated. This principle states that “*where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation*”¹¹.

⁹ Sections 2.1 and 2.2 draw heavily from, World Bank (2003), *Op. cit.*

¹⁰ *Ibid.*

¹¹ Report of the UN Conference on Environmental and Development (Rio Earth Summit), June 1992.

In summary, for any given technology, preference structure, and known resource base there are some resource utilisation rates that cannot be sustained. From an environmental point of view, an economic development path that does not consider its environmental consequences is unlikely to be sustainable. As the quality of environmental resources deteriorates, amongst other things, human health is likely to suffer from environmentally induced diseases, long-term labour productivity may be adversely affected, the costs of which are likely to fall disproportionately on the poor. A strict strategy of *grow now, clean up later* is unlikely to be a balanced approach or one that seeks to maintain or increase human well-being over time.

In order to ensure that environmental issues form an effective part of developmental goals, the National Environmental Management Act (No 107 of 1998) highlights the following factors that need to be adequately considered¹²:

1. That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
2. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
3. That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
4. That waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
5. That the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
6. That the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
7. That a risk averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
8. That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

South Africa is also a signatory to many multilateral environmental agreements and has to meet its international obligations through the implementation of various policies, programmes, and strategies. These agreements relate to biodiversity, climate change, desertification, chemicals management and hazardous waste.

¹² DEAT (1998) "National Environmental Management Act (No. 107 of 1998)", Government of South Africa.

2.2 Measuring progress towards sustainable development

Measuring whether or not a development path is sustainable remains one of the major challenges surrounding the implementation of sustainable development practices. Most approaches rely on a series of indicators such as the UN Human Development Index, which when measured over time can provide useful information on development trends. When using any indicator, understanding the processes that drive changes over time is critical, particularly if the indicator is to contribute in a meaningful way to policy formulation.

To date, much of the progress in developing indicators of sustainability has been in the economic and environmental sphere. Social indicators of sustainability remain comparatively under-developed.

Three, mainly complementary, approaches for measuring different aspects of sustainability are discussed in more detail below. These are:

1. GDP and satellite accounts;
2. Adjusted net savings or genuine savings; and
3. Environment and sustainable development indicators.

2.2.1 GDP and satellite accounts

Traditional measures of gross domestic product (GDP) do not capture the values of non-marketable environmental goods and services. They present, therefore, only a partial picture of changes in welfare. The System of National Accounts (SNA) focuses principally on measuring economic growth and the production or value of goods for which prices are available. The initial SNA guidelines produced by the UN Statistical Office (1968) considered the depreciation of fixed capital but did not deal with natural capital and its linkages to the economic system¹³. Over recent decades, many attempts have been made to incorporate environmental damage, environmental services and changes in the stock of natural capital into traditional measures of GDP, but the need to rely on valuation estimates has proved problematic in most cases.

In a revision of the SNA by the UN Statistical Office in 1993, two recommendations were made:

- All assets that contribute to the marketplace should be included; and
- Environmental and economic accounting should be done in satellite (supplementary) accounts that are linked with the main accounts of the SNA.

This led the UN to develop a System for Environmental and Economic Accounting (SEEA) to assist countries in developing indicators for their natural resource base. At the Rio Earth Summit in 1992, it was recommended in Agenda 21 that the governments of signatory countries should undertake integrated environmental and economic accounting.

¹³ Hamilton, K. & Lutz, E. (1996) "Green National Accounts: Policy Uses and Empirical Experience", Environmental Economic paper No. 039, World Bank, Washington DC.

In 1999, Statistics South Africa attempted to construct domestic satellite accounts for minerals and water and link them to national accounts information.

Whilst a useful approach, satellite accounts for different natural resources have their disadvantages since extensive valuation of different environmental goods or services is required to make comparisons between different accounts. The tendency, therefore, has been to focus on physical accounts, which in turn limits the extent to which comparisons can be made and priorities and potential trade-offs identified.

2.2.2 Adjusted Net Savings or Genuine Savings

Due to the difficulties with satellite accounts, the emphasis has shifted towards measuring changes in wealth as an indicator of sustainability. Changes in the wealth (appropriately defined to include a comprehensive set of assets) are a good measure of the *prospect* of well-being since it indicates a country's ability to sustain a consumption stream, which is what ultimately matters for sustainability. Only if wealth increases over time, that is, only if adjusted net savings (or genuine savings) are positive will intergenerational well-being increase.

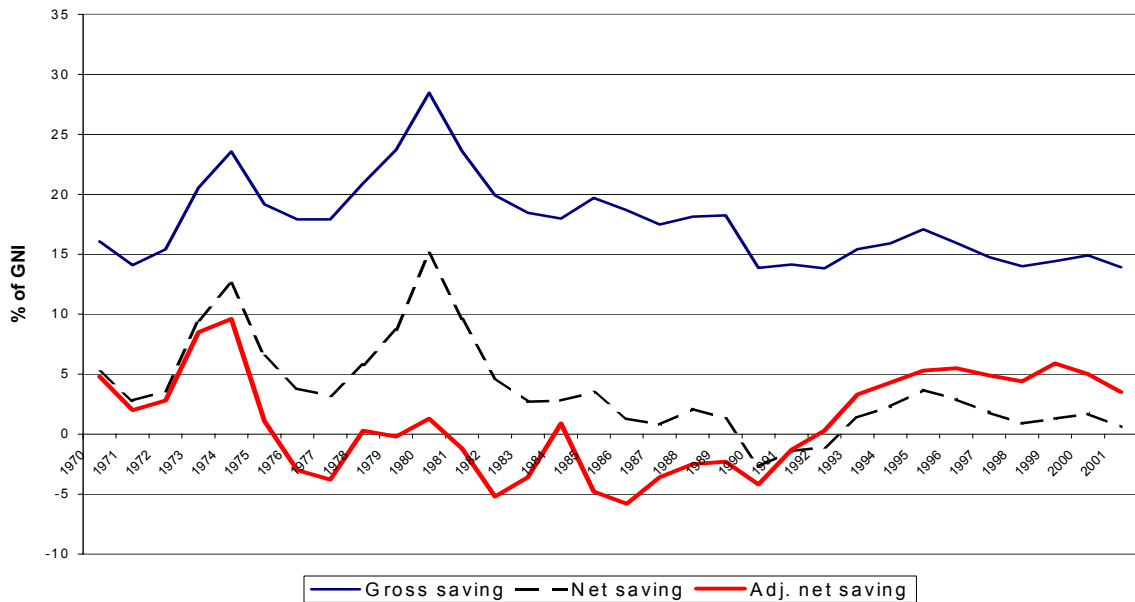
Ideally, measures of adjusted net savings would account for human capital, natural assets, knowledge and social assets. Measurement difficulties and a lack of data usually preclude the inclusion of all these assets. In current World Bank estimates, only energy depletion, mineral depletion, net forest depletion and carbon dioxide emissions are captured. Spending on education is included, as a proxy for human asset accumulation.

Figure 1 shows gross domestic, net domestic and adjusted or genuine savings for South Africa for the period 1970-2001. Gross domestic savings is the traditional measure of savings in the economy. Net domestic savings are calculated as the difference between gross domestic savings and the consumption of fixed capital. Adjusted net savings are calculated as follows:

$$\text{Adjusted net savings} = \text{net domestic savings} - (\text{energy depletion, mineral depletion, net forest depletion, and carbon dioxide damage}) + \text{expenditure on education.}$$

Until 1991, adjusted net savings for South Africa were constantly below the net savings rate, even negative until the early 1990s, suggesting that the economy was *de-capitalising* rather than adding to its stock of wealth. Thereafter, the level of genuine savings has increased, mainly because of an increase in spending on social capital (i.e. spending on education)¹⁴. One important factor not considered in the approach is population growth. For the adjusted net savings rate to be positive on a per capita basis, the rate of genuine savings must be greater than the rate of population growth, which is indeed the case in South Africa post 1996, but only by a small fraction. Another important factor not captured at this highly aggregated level is the issue of distribution and to whom increases (*decreases*) in wealth are accruing.

¹⁴ See Blignaut and de Wit (2004) "Sustainable Options: Economic development lessons from applied environmental resource economics in South Africa", UCT Press for more detailed analysis.

Figure 1: Gross, net and adjusted (or genuine) savings for South Africa: 1970-2001¹⁵

In summary, although genuine savings can act as a useful headline indicator of sustainability for a particular economy and allows comparisons between different countries to be made, its use is limited for (environmental) policy making purposes. Changes in the stock and quality of environmental resources are affected by a large range of different factors that are not easily singled out in this approach. A more detailed and disaggregated set of indicators that seeks to capture the drivers of change would potentially be a more useful measurement tool – especially at a national or sub-national level.

2.2.3 Environment and sustainable development indicators

Perhaps most useful for measuring sustainable development in South Africa would be a country or region specific set of indicators that seek to measure certain outcomes and a supporting system to ensure that they are regularly monitored and updated. Currently, such a set of indicators does not exist. South Africa, led by DEAT, is in the process of developing a National Strategy for Sustainable Development (NSSD). Many of the generic indicators suggested by the UN Commission on Sustainable Development (UNCSD) were deemed inappropriate for use in South Africa. With regards to environmental indicators, in 1999, DEAT initiated the National Environmental Indicators Programme (NEIP), which aimed to develop a set of *pressure-state* indicators for:

- Inland waters (marine, coastal and estuarine);
- Biodiversity and natural heritage;
- Land use;
- Human well-being;
- Atmosphere and climate;
- Waste; and
- Environmental management.

¹⁵ Ibid.

The indicators developed were used in the National State of the Environment Report for South Africa¹⁶. The extent to which these indicators reflect general changes in environmental quality or whether they have been designed to assess the impact of specific policy interventions is not clear.

2.3 An overview of environmental priorities for South Africa

South Africa is fortunate in that most of its environmental resources are not irreversibly degraded and that it does not face the kind of *acute* environmental stresses hampering certain other countries. However, as a semi-arid country with a rich biodiversity, South Africa remains vulnerable to the impacts of climate change over time. The way in which environmental assets are managed into the future remains important and environmental concerns need to be integrated into development strategies to ensure sustainability and effective long-term poverty reduction¹⁷.

Currently, some of the main environmental challenges in South Africa include air pollution, climate change, biodiversity loss, land degradation, water scarcity and pollution, and excessive waste generation and disposal. Although the nature of these challenges differ and are often driven by different sets of circumstances, in many cases there are strong links between them and they often serve to compound one another. In particular, the impacts of climate change are likely to worsen many existing environmental trends such as water stress, the incidence of disease (i.e. malaria), land degradation, biodiversity loss and in some cases even local air pollution. There are also important spill-over effects between other environmental issues, for example, water pollution can lead to a decline in the quality of biological resources or even a loss of diversity in some cases. Similarly, inadequate waste management practices can contribute to water pollution problems.

Within Government, responsibility for these environmental themes is split between different departments at the national level and across different spheres of government. The Constitution allocates concurrent and exclusive responsibility to local government for certain themes. As lead department on the environment, DEAT has a central role to play in the formulation and development of environmental policies. Each theme is discussed in more detail below.

2.3.1 Air pollution and climatic change

Local air pollutants including oxides of sulphur, oxides of nitrogen, particulate matter (specifically PM¹⁰), non-methane volatile organic compounds (NMVOCs) and ozone can have significant adverse impacts on human health and ecosystems. These pollutants are generated as a result of both natural and anthropogenic activities. Their levels in the atmosphere vary considerably between different regions in South Africa and they are generally of most concern in urban environments, particularly in terms of impacts on

¹⁶ DEAT (1999) "National State of the Environment Report", Government of South Africa.

¹⁷ Annex 3 presents a recent speech from James Wolfensohn, the president of the World Bank, on the importance of the environment in meeting the Millennium Development Goals (MDGs) and long-term poverty eradication.

human health. From anthropogenic activities, the majority of local air pollution in South Africa is mainly a consequence of fuel burning, including: industrial and commercial fuel burning, petrol and diesel combustion in vehicles, domestic fuel burning, coal-fired electricity generation, and biomass burning¹⁸. According to the National State of the Environment Report,¹⁹ emissions from vehicles contribute to 44 per cent of the total nitric oxide emissions and 45 per cent of the total national NMVOC emissions, which combine to form photochemical smog.

Indoor air pollution is a particular problem in South Africa. The use of coal, biomass and paraffin in households is widespread and results in significant adverse health impacts for those people using them. A high number of deaths related to the use of paraffin are recorded every year, particularly amongst children²⁰. Government has launched various initiatives in an attempt to address in-door air pollution including the National Electrification Programme and Basa Njengo Magogo project.

Lead and other heavy metals are also a cause for concern. Atmospheric concentrations of lead and ultimately ingestion by people are largely attributable to its use in petrol as an octane enhancer. In an effort to reduce these external costs, the government has initiated a clean fuels initiative that has set targets for lead to be removed from petrol by January 2006 and to reduce the amount of other pollutants in petrol and diesel such as sulphur. The clean fuels initiative will enable further emission reductions from vehicles over time (see section 6.2).

The new Air Quality Management Act seeks to address the shortcomings of the Atmospheric Pollution Prevention Act by creating a new framework for the regulation of emissions into the atmosphere and establishing national norms and standards for air quality.

With respect to *climatic change*, South Africa is both sensitive to the potential impacts of climate change and a significant contributor to global greenhouse gas emissions. South Africa is heavily reliant on coal to meet the majority of its energy requirements and over 90 per cent of electricity generation is coal-based, accounting for approximately 40 per cent of all carbon dioxide emissions. Other important greenhouse gases emitted in South Africa include methane (mainly from agriculture) and nitrous oxides (from sources such as agriculture, industry and transport).

As a signatory to the UN Framework Convention on Climate Change (UNFCCC), South Africa has no current obligations to reduce its greenhouse gas emissions although this situation may change post 2012. However, partly due to the fact that the South African economy has one of the highest energy intensities in the world (i.e. energy consumption per unit of output), improvements in energy efficiency and the promotion of renewable energy sources have been highlighted as an important component of DMEs future energy policy. The DMEs proposed Energy Bill would allow the Minister of Minerals and Energy to establish a National Energy Efficiency Program to regulate energy efficiency matters. With respect to climate change adaptation, a National Climate Change Response Strategy

¹⁸ FRIDGE (2004) "Study to examine the socio-economic impact of measures to reduce air pollution from combustion", unpublished document.

¹⁹ DEAT (1999), Op cit.

²⁰ See www.pasasa.org.

was adopted in 2004 that highlights potential areas for government intervention to both mitigate and adapt to the effects of climate change.

2.3.2 Biodiversity loss and the damage to terrestrial ecosystems

South Africa has the third highest level of biodiversity in the world, with two internationally recognised biodiversity hotspots: the Cape Floristic Kingdom and the Succulent Karoo. Rates of species extinction are high by global standards. Pressures arising from population growth, urban and industrial developments and the expansion of human settlements have resulted in the transformation of approximately 25 per cent of South Africa's terrestrial habitats from their natural states. The pressures on agriculture and forestry to meet demands both locally and internationally have encouraged the development of production monocultures. Coupled with poor land-use and management practices, these factors contribute significantly to biodiversity loss and excessive depletion of soil nutrients²¹.

The implications of biodiversity loss and ecosystem degradation are not certain. To a large extent, these effects are irreversible and there is a risk that the potential future value of genetic resources is being forfeited without ever having had a chance to fully exploit them. A loss of biodiversity implies a reduction in the genetic pool, which is likely to be integral to future economic development and human health. Excessive transformation or fragmentation of natural habitats can also serve to disable vital ecosystem processes such as flood control, water purification and maintenance of soil fertility that ultimately support economic growth. The introduction and spread of *alien invasive species* further contributes to biodiversity loss and ecosystem degradation, having particular implications for endemic species and water availability.

Recognising the importance of South Africa's biological resources, The White Paper on Biodiversity identifies the protection and sustainable use of biological resources and the need to restore degraded ecosystems as a national environmental priority. With respect to South Africa's international obligations, DEAT is currently leading a process to develop a National Biodiversity Strategy and Action Plan to submit to the UN Convention on Biological Diversity (UNCBD).

2.3.3 Land degradation

A large proportion of South Africa's soils are unstable. It is estimated that approximately 500 million tonnes of topsoil is lost annually to wind and water erosion. Overgrazing, poor land management practices, population growth, the cultivation of marginal lands, over collection of wood fuel resources and human settlement pressures exacerbate the problem of erosion. In certain localities, particularly some of the former homeland areas, land degradation is considered a critical environmental issue and a key obstacle to poverty reduction. In addition, the increased use of agrochemicals has resulted in the acidification of about 2.5 million hectares of soil²².

²¹ DEAT (1999), op cit.

²² DEAT (1999), op cit.

The White Paper on Agriculture identifies land degradation as a national environmental issue and promotes agricultural production based on the sustainable use of natural agricultural land and water resources in a variety of ways. The Conservation of Agricultural Resources Act (Act 43 of 1983) forms the foundation for the implementation of various measures to prevent or contain soil erosion.

The National Department of Agriculture (NDA) is responsible for the implementation of the National LandCare Programme, which advocates the sustainable use and management of natural resources by both communities and individual farmers. In each province, land and water degradation issues have been identified and action plans or projects have been developed to address these issues. In 2004, 346 LandCare projects existed throughout the country²³.

South Africa is signatory to the United Nations Convention to Combat Desertification (UNCCD). One of the aims of this agreement is to support member countries in Africa to prevent desertification and its consequences. As a signatory to this convention, South Africa has obligations to address land degradation issues, which are of specific relevance to biodiversity loss and water conservation.

2.3.4 Water pollution and Water Quality Management

Water scarcity and water quality are pressing environmental, social and economic issues in South Africa. Recognising the importance of adequate and clean water supplies throughout the world, participating countries at the World Summit on Sustainable Development (WSSD)²⁴ agreed to:

- a. Intensify water pollution prevention to reduce health hazards and protect ecosystems by introducing technologies for affordable sanitation and industrial and domestic wastewater treatment, by mitigating the effects of groundwater contamination and by establishing, at the national level, monitoring systems and effective legal frameworks; and
- b. Adopt prevention and protection measures to promote sustainable water use and to address water shortages.

The Department of Water Affairs and Forestry (DWA) is responsible for issues related to water in South Africa. DWA have recently passed two pieces of legislation: the Water Services Act (No. 108 of 1997) which provides a legal framework through which water and sanitation policy is delivered, and the National Water Act (No. 36 of 1998) which, amongst other things, deals with water conservation, allocation, pricing and demand management.

Water scarcity

South Africa is classified as a semi-arid country with low annual levels of rainfall and limited surface water resources upon which to draw. The level of rainfall is also erratic, varying considerably from year to year and between different regions of the country. Existing patterns of rainfall are likely to be adversely impacted upon by anticipated future climatic changes. Although water resources are sufficient to meet present requirements,

²³ South African Yearbook.

²⁴ www.johannesburgsummit.org.

they are already almost fully utilised. In order to meet the expected growth in demand of between 30 to 50 per cent over the next 50 years, South Africa's water resources need to be carefully managed²⁵. Since the cost of securing new supplies from neighbouring countries is likely to grow steeply, demand management is likely to play an increasingly important role.

The scarcity value of water has not historically been well reflected in government policies. From the 1950s until the 1980s, water use was heavily subsidised, particularly for the agricultural and industrial sectors. Over recent years, DWAF and local governments have undertaken pricing reforms with the aim of increasing the cost recovery of water supply schemes and expanding access to previously disadvantaged groups. On-going reforms are being made to the way in which water is allocated between different user-groups. Finally, in an effort to mitigate the impact of alien invasive species on water resources (and to create jobs), DWAF has initiated the Working for Water Programme, which seeks to remove alien vegetation from the landscape.

Water quality management

The White Paper on Environmental Management Policy recognises that water quantity and water quality issues are interrelated. Water scarcity can be further aggravated by problems of pollution and effluent discharges that reduce the quality of the water resource. Water pollution has been highlighted by government and other stakeholders as an important environmental issue in South Africa. The major direct pollution sources include industrial effluent, domestic and commercial sewage, acid mine drainage, agricultural runoff and litter. Although freshwater pollution is an issue of national importance, certain regions of the country are polluted more heavily than others. In an attempt to deal with water pollution issues, DWAF is currently developing a Waste Water Discharge Charge System (see sections 3.5.5 and 6.3.3).

Marine pollution is also an important environmental concern. There are 63 pipelines along the coast of South Africa discharging about 800 million litres of sewage and industrial effluents daily into the sea²⁶. Shipping discharges and off shore drilling are other important pollution sources.

2.3.5 Waste

The generation and disposal of waste is an important environmental issue in most countries. Waste generation usually exhibits a positive relationship with growth and population, i.e. as a country's wealth and population increases, so too does the level of waste generated. The diverse nature of waste products and their forms implies an equally diverse range of environmental issues and objectives. DEAT defines waste as:

"An undesirable or superfluous by-product.....or residue of any process or activity that has been discarded, accumulated, or been stored for the purpose of discarding or processing".²⁷

²⁵ DEAT (1999). Op. cit.

²⁶ *ibid.*

²⁷ DEAT (1999) "National Waste Management Strategy", Government of South Africa.

Waste can be broken down into two different categories: general waste and hazardous waste. General waste such as glass, plastics, metals, organic and other inert materials do not pose a significant problem to public health if managed appropriately. However, hazardous waste such as poisonous / infectious substances, even in low concentrations, can severely impact on human health and the environment if not handled, stored and disposed of appropriately. For example, the disposal of these waste streams to landfill sites that meet the minimum legislative requirements may increase the risk of groundwater contamination. In addition, landfill waste disposal may be characterised by considerably high transport and disposal costs. As a result, alternative disposal methods such as waste incineration may be implemented which may alleviate the problem of groundwater pollution but have adverse impacts on air quality.

The extent to which the environment can act as a waste receptor underpins the *waste problem*. Waste is generally only a problem when the assimilative capacity of the environment is exceeded. In such cases, the waste problem will continue to grow. However, for some forms of waste or pollutants, the environment has no assimilative capacity. Persistent Organic Pollutants (POPs), for example, are not easily broken down through natural processes and continue to move through the food chain at ever increasing levels. Reducing the flow of these pollutants or waste streams is of particular importance and South Africa, as a signatory to the Stockholm Convention on POPs, is obliged to do so.

Table 1: Waste generation in South Africa in 1998

Sector	Waste (million tons per annum)	Percentage of total waste
Mining	468.2	87%
Industrial	16.2	3%
Power Generation	20.6	4%
Agriculture & Forestry	20	4%
Domestic & Trade	8.2	2%
Sewage Sludge	0.3	0%
TOTAL	533.6	100

Source: www.dwaf.gov.za.

Table 1 illustrates the volume of waste generated in South Africa according to different sectors. This corresponds to about 0.7 kg per person per day, which is comparable to many OECD countries. Typically, other developing countries generate around 0.3 kg per person per day²⁸. The relative high per capita waste generation in South Africa is partially explained by the large and heavy volumes of waste generated by the mining, industrial and power generation sectors. Excluding the hazardous waste generated by mining, only 1 per cent of all other waste is considered as hazardous.

Various white papers identify waste management as a priority environmental issue for South Africa and the need to extend waste management services to those that currently do not have access. Responsibility for waste management is divided between all three spheres of government. Schedule 5 of the Constitution provides local government with exclusive authority over the functions of cleansing; refuse removal; refuse dumps; and solid waste disposal. Provincial governments have a role in monitoring and providing

²⁸ DEAT (1999), op cit.

support to local governments and ensuring that the allocated responsibilities in relation to waste management are effectively performed. National government, particularly DEAT and DWAF, are responsible for policy oversight and perform certain licensing functions with respect to landfill operations.

The National Waste Management Strategy (1999) emphasises the need to move away from excessive focus on waste treatment and move instead towards waste prevention and minimisation. The Polokwane declaration on waste management sets the following specific targets for waste management in South Africa:

- To reduce the volume of waste generated by 50 per cent by 2012;
- To reduce the volume of waste being disposed of by 25 per cent by 2012; and
- To develop a plan for zero-waste by 2022.

2.4 Economic valuation of environmental goods and services

All of the above challenges can be considered *priorities* in the sense that government (either through domestic policies or multi-national environmental agreements) and other stakeholders have identified them as such and have initiated measures that seek to wholly or partly address them. However, is any one issue more pressing than another? In addition, is it possible to rank the different challenges in order of importance and to identify potential trade-offs?

There are many different ways to assess the extent of or to rank environmental issues. Economic valuation is one way and provides a useful and consistent framework for analysing different objectives and quantifying environmental impacts. Economic valuation with respect to the environment can be useful for:

- Comparing different costs and benefits in the same medium (usually in monetary terms);
- Ranking in terms of costs;
- Setting targets; and
- Raising the profile of environmental issues in a readily understandable form.

At the heart of many environmental problems lies the fact that many environmental goods and services are not *priced* since they are generally not traded in markets like other goods and services. However, this does not mean that they are not of *value* – they are, and they form a very important component of human well-being. What economic valuation attempts to do is to impute a *value* for environmental goods and services so that they can be more easily incorporated into decision-making processes.

Valuation is relevant at all levels of public choice, be it project, programme or policy appraisals²⁹. As mentioned in section 2.2, it can even be applied to stocks of environmental resources although there are significant challenges involved in obtaining

²⁹ CSERGE (1994) “*Economic Values and the Environment in the Developing World, A Report to the United Nations Environment Programme*”, Nairobi, Kenya.

reliable estimates. The usual objective of economic valuation in an environmental context is not to give the environment a value *per se*, but to measure people's preferences (i.e. their willingness-to-pay or willingness-to-accept) for a specific *change* in the level of an environmental good or service. The use of money as a measurement unit enables comparisons to be made more easily with other costs and benefits.

The value people place on particular aspects of the environment can be broken down into different components. Together these components make up the *total economic value* of an environmental asset³⁰. They include:

- *Direct-use values* - people derive benefits from directly using the environment. Timber extraction or the consumption of other non-timber forest products is a good example of direct use values;
- *Indirect-use values* (or non-consumptive use values) – which typically capture the benefits derived from ecosystem services, for example, people may benefit indirectly from forests in the form of flood control. Should the forest area be converted into an alternative form of land use, former beneficiaries would incur potentially significant costs;
- *Option values* – which capture the future potential value of environmental assets. Biodiversity, for example, has high option values in that, due to current scientific knowledge, it may only be possible to exploit the true potential of certain resources some time in the future; and
- *Existence values* – which aim to capture the intrinsic value of environmental assets irrespective of the way in which they may be used.

2.4.1 Valuation techniques

A range of different techniques, some of which are outlined in Table 2, can be used to value changes in the quality of environmental goods and services that do not typically have a market price attached to them. These techniques are often complex and can be categorised in a number of different ways. All, however, have two main characteristics, they either:

1. Estimate the costs incurred as a result of a change in the provision of the environmental good or service; or
2. Value environmental changes by observing the physical relationships (dose-response relationships) that exist between environmental conditions and a receptor.

Choosing the right valuation techniques for the specific circumstances is very important. Contingent valuation is probably the broadest (in that it can cover all components of total economic value), most straight forward and flexible technique since it involves directly questioning people about their environmental preferences. It is, however, highly sensitive to the survey methodology used. Other techniques take a more indirect approach and are largely based on observing actual behaviour as a proxy for certain environmental preferences.

³⁰ IUCN (1999) "Integrating Economics into NBSAPs in East Africa", Nairobi, Kenya.

A number of valuation studies have been undertaken in South Africa, which suggests the presence of significant un-internalised externalities (see Annex 2). The majority focus on the external costs relating to transport, coal-based activities and local air pollution. A few studies have employed hedonic pricing methods to understand how property values are affected by environmental conditions³¹. For the most part, the South African literature remains underdeveloped for policy making purposes for the following reasons. Firstly, scientific information, particularly around cause and effect relationships, is difficult to obtain. Understanding the way in which polluting activities translate into actual impacts is often complex and can be very data intensive. Taking the example of emissions into the atmosphere and the costs imposed on human health, firstly it is necessary to know the level of pollutants being emitted. Further information is then needed about how the level of emissions contributes to ambient concentrations of the pollutants in the atmosphere. The next step would be to understand the extent of human exposure and finally, the increase in exposure to the pollutant must be translated into health outcomes. The resulting costs (the valuation part) can only be reliably estimated when clear health outcomes have been identified.

Secondly, economic valuation has not featured prominently in environmental policy making to date. The current literature, therefore, is not particularly well targeted for this purpose. Finally, valuation studies can be expensive to undertake and are generally very resource and data intensive.

In summary, although the use of valuation techniques has expanded over recent years, they remain complex tools that are often subject to a large degree of uncertainty. Potentially, they have an important role to play, particularly where project, programmes or policies are subject to cost / benefit assessments. In conjunction with other criteria, they could also play an important role in helping to identify and rank different environmental priorities. Where appropriate, the application of these techniques should be expanded in South Africa.

³¹ See Turpie, *et al* (2001) "Valuation of open space in the Cape Town Metropolitan Area", City of Cape Town.

Table 2: An overview of some valuation techniques and their potential applicability

Valuation Technique	Description	Guidelines for application
Opportunity cost method	Estimates the value of <i>un-priced</i> environmental goods and services by measuring the forgone benefits of using the same resource for another purpose. For example, a nature reserve could be valued by measuring the forgone benefits from converting it to agricultural land.	Must be seen as a minimum estimate of value. Due attention should be paid to irreversibility issues. It is generally a blunt technique and has limited applicability.
Defensive expenditure method	Based on the assumption that individuals spend money on mitigating or eliminating damages caused by adverse environmental impacts. For example, defensive expenditure against noise, air filtration to avoid impacts of air pollution.	Must be seen as a minimum estimate of benefits since it must be assumed that the benefits derived from avoiding damages are higher than or equal to the costs incurred to avoid them. Again, this is a blunt but relatively easy technique to employ.
Cost of illness approach	Used to estimate the monetary value of an environmental change through its impact on illness or life. This could be done in terms of treatment costs, loss of wages and/or loss of life.	Done comprehensively, this technique can be complex and very data intensive. Often, it may be necessary to import data from other studies done internationally which can compromise accuracy.
Replacement cost approach	Captures the cost of providing an equal good or service somewhere else. This could take the form of asset reconstruction, asset transplantation or asset restoration. For example, if a wetland is lost in the process of a development, how much would it cost to create a similar wetland elsewhere?	This technique can only be used in a limited number of circumstances. Problems could be encountered around the ability to recreate natural environments and the goods and services provided.
Travel cost method	Based on the expenditure incurred by individuals to reach a site. By observing such behaviour, demand curves can be derived for the recreational activity. Willingness to pay can be deduced.	Generally limited to valuing recreational services. It only captures <i>use values</i> and not other economic components of total economic value
Hedonic pricing method	Two methods: <ul style="list-style-type: none"> ▪ Property values - Based on individuals' willingness to pay for property. Assumes that the buyer reveals their attitude to a bundle of attributes including environmental quality through their willingness to pay. ▪ Wage differential approach: uses information on wage differences for jobs with different elements of risk of illness or death to place values on incremental morbidity and mortality risks. 	Both approaches have drawbacks in that it is difficult to isolate the exclusive impact of changes in environmental quality on the value of property or wage rates, and are very data intensive.
Contingent valuation approach	Involves directly asking people through questionnaires or experiments their willingness to pay for an environmental good or service (good) or willingness to accept to forgo an environmental bad.	Generally applicable to all environmental issues as it captures the direct use values of an environmental asset and the non-use values which is unique to this methodology.

CHAPTER 3: SOUTH AFRICA'S TAX SYSTEM

3.1 Principles of taxation

Tax reform in South Africa has been underpinned by two Commissions of Inquiry into the Tax Structure of the Republic of South Africa; the Margo Commission (1984 to 1986) and the Katz Commission (1994 to 1999). These investigations went to considerable efforts to underscore the generally accepted principles of taxation underlying their analyses in accordance with international best practice.

The Margo Commission summarized the basic principles of taxation as follows:

The basic characteristics of an adequate tax structure (where one principle of taxation does not conflict with another) are equity, neutrality, simplicity, certainty, administrative efficiency, cost effectiveness, flexibility, stability, distributional effectiveness and a fair balance from the point of view of taxpayers between the respective burdens of direct and indirect tax.³²

Both Commissions emphasised that any tax reform measures must be tested against these criteria and must be examined for their transitional feasibility.

The ideal, both for direct and indirect tax instruments, is a broad-based, equitably distributed, low-rate, high-yield tax. In addition, adherence to these features tends to improve the standards of tax morality and compliance. As a general proposition, appropriate economic incentives should be based on low tax rates and not on tax expenditures and unsustainable tax allowances. Some of the principles of taxation underlying South African tax reform warrant more in-depth discussion due to their specific importance for environmental fiscal reform.

3.1.1 Neutrality

The principle of tax neutrality requires that the tax system should not unduly influence economic decision-making, i.e. people should not be influenced solely by the tax system to choose one course of action over another. A neutral tax system, therefore, is one that minimizes, as far as possible, the impact of the tax structure on economic behaviour, including business organization, work effort and saving. This is particularly true in the scenario where the intention of an impost is purely to raise sufficient tax revenue for the fiscus. However, where the primary intention of a tax is to change taxpayer behaviour and to raise revenue in the process, the neutrality principle becomes secondary.

3.1.2 Equity

Equity in the tax system is defined through the ability to pay principle. This principle is derived from the concept that a tax should be based upon some kind of personal

³² Report of the Commission of Inquiry into the Tax Structure of the Republic of South Africa (The Margo Commission Report), RP34/1987 (Pretoria: The Government Printer 1987), para. 1.28(a).

economic well-being. It is also important to distinguish between horizontal and vertical equity. Horizontal equity requires that persons in the same economic situation be treated equally. Vertical equity, on the other hand, requires that those in different economic circumstances bear appropriately different tax burdens, i.e. those with a higher level of economic well-being shoulder greater tax burdens than those less fortunate.

3.1.3 Certainty and simplicity

Taxes should, as far as possible, be certain and simple in concept and in collection. Certainty in this context requires that a taxpayer be reasonably certain of what his or her tax liability will be in any given set of circumstances. Simplicity requires that a tax should be easily assessed, collected and administered in order to minimize costs. The costs of tax collection consist of administrative costs (the cost of establishing and maintaining a tax collection agency, the cost of dealing with offenders, etc.) and compliance costs (the costs for taxpayers in terms of time, money and effort spent in order to fulfil their obligations).

The costs of collecting a particular tax should not be a disproportionately high percentage of tax revenue yields. Collection costs, however, constitute only part of the cost of any taxation system. The other important component is the cost to society of the misallocation of resources through stifled economic activity induced by distorting taxes. This is termed the dead-weight loss (excess burden or distortionary loss) of a tax. The more neutral a tax instrument is, the lower the dead-weight loss.

Where taxes are very complex, attempts to avoid taxation give rise to what could be considered a pure loss to society, as real resources are employed in the socially unproductive activity of finding loopholes and non-taxable alternatives. The resultant tax-avoiding decisions may further distort the allocation of resources. Consequently, substantial anomalies in the tax system can often be more significant in their effects than the taxes themselves.

3.2 Tax incidence

Formal tax incidence refers to the point where a tax is legally assessed, i.e. those who are legally liable to pay the tax. On the other hand, effective tax incidence (or the economic incidence of a tax) identifies those who are, in the end, out of pocket as a result of the imposition of the tax, i.e. after taking into account adjustments to economic behaviour induced by the tax concerned. The formal incidence of a tax is therefore very different from the economic incidence.

Taxes will be passed forward onto consumers of goods and services in proportion to their inability to substitute untaxed for taxed goods, or passed back to providers of labour, capital and natural resources in relation to their ability to respond to tax changes. The international and regional mobility of labour and capital has an important bearing on the incidence of taxation in South Africa. Because unskilled labour is often the least economically mobile resource, it is likely that the economic burden of taxes on labour, corporates and goods and services falls disproportionately on this group.

As formal (legal) and effective (economic) incidence differ, a distinction must be made between the perceived and actual equity of the tax structure. In general, a tax system that is popularly perceived to be fair is one that is progressive, i.e. where high income individuals pay higher taxes. The fact that these taxes may be passed on to consumers or workers while affecting the actual equity of the tax system need not necessarily detract from its perceived fairness. For this reason, it is often perceived that company profits should be taxed, even though these taxes will ultimately fall on individuals, whether shareholders, workers or consumers. In a country with wide wealth disparities like South Africa the overall tax system must be perceived to be sufficiently progressive to inspire confidence in the system, especially by those who are relatively less well-off.

3.3 An overview of tax reform since 1994

In his Budget Speech to Parliament on 22 June 1994, the Minister of Finance announced that he would appoint a "Commission of Inquiry into Certain Aspects of the Tax Structure of South Africa". The terms of reference for the seven-member Commission, which came to be known as the Katz Commission was very broad. It was to investigate virtually every aspect of the South African tax regime against the backdrop of the political, social and economic goals of the incumbent government. Between its inception in 1994 and 1999, the Katz Commission issued nine interim reports, providing a foundation on which to build subsequent tax reform efforts.

Recommendations around reforming the tax administration system dominated the early work of the Commission and concern regarding the limited administrative capacity available to the revenue authority was an important consideration throughout the Commission's reports. The first interim report also set out the guiding principles of tax reform that should underpin all proposals to restructure the tax regime. The Commission reiterated the need to adhere to the basic tenets of a good and sustainable tax system (and the trade-offs it sometimes implies), i.e. efficiency, equity, administrative simplicity, certainty and revenue-raising capacity. The major tax reforms undertaken in South Africa since 1994 have been developed on the back of recommendations made by the Katz Commission. These are discussed in more detail below.

3.3.1 Direct taxes

The introduction of a residence-based income tax system and capital gains tax have been two of the major reforms intended to broaden the tax base and close certain tax loopholes.

The previous *source-based income tax system* provided opportunities for tax planning and avoidance. Taxpayers sought opportunities to reclassify as untaxed foreign-source income, income that would normally have been taxed in South Africa. These tax arbitrage opportunities were facilitated by increasing globalisation and the relaxation of exchange controls. The move to a *residence-based income tax system* was intended to broaden South Africa's income tax base, limit opportunities for tax arbitrage and bring the tax system in line with generally accepted norms for taxing international transactions³³.

³³ National Treasury (2000) "*Budget Review 2000*", Government of South Africa.

The *capital gains tax* was introduced to enhance the South African tax system by addressing key structural weakness, especially in view of the inequalities of income and wealth distribution and the sophistication of South Africa's financial markets. The capital gains tax improved equity in the tax system by ensuring that taxpayers with similar income levels bear similar tax burdens, regardless of the form in which their income is received. To the extent that capital gains accrue primarily to upper income taxpayers, the progressivity of the income tax and the vertical equity of the tax system were enhanced. The capital gains tax also reduces distortions in real economic activity so that tax revenue is raised directly through taxing capital gains and indirectly by protecting the integrity of the income tax base.

3.3.2 Personal income tax

In addition to enhancing the overall efficiency and equity of the tax system, personal income tax relief over the last decade was aimed at increasing the disposable income of employees and thereby stimulating the demand for goods and services and encouraging increased savings.

Some of the main personal income tax reforms include:

- Reduction in the number of personal income tax brackets from ten to six;
- Top personal income bracket increased by more than the rate of inflation to R400 000, top marginal rate decreased to 40 per cent, primary rebate increased to R7 200 and secondary rebate increased to R4 500;
- Fringe benefit taxation reform to ensure a greater degree of equity;
- Phased introduction of a residence-based income tax, foreign dividends as from 23 February 2000 and for South African residents as from 1 January 2001;
- Capital gains tax as from 1 October 2001;
- Increased interest and dividend income exemption;
- Increased provisional tax threshold for individuals; and
- Closing loopholes by limiting or eliminating certain deductions.

3.3.3 Corporate income tax

In addition to reductions in the corporate tax rate and the secondary tax on companies, other reform measures were introduced to enhance the competitive position of businesses and the South African economy more generally. These measures included accelerated depreciation allowances, a Motor Industry Development Programme and a Strategic Investment Incentive programme.

Some specific reforms to corporate taxes have included:

- Statutory corporate tax rate reduced to 29 per cent;
- Reduction of the Secondary Tax on Companies to 12.5 per cent;
- Tax incentives such as a Tax Holiday Scheme for limited time periods;
- The Strategic Investment Incentive Programme;
- The taxation of the gross interest and net rental income of Retirement Funds (introduced in 1996 at 17 per cent, increased to 25 per cent in 1998 and reduced to 9 per cent in 2006);
- Tax allowances (depreciation) for certain permanent structures;

- Graduated rate structure for Small and Medium-size Enterprises (SMEs) (tax exemption for first R40 000 of income, rate of 10 per cent applies to taxable income greater than R40 000 but not exceeding R300 000 and 29 per cent thereafter), special depreciation allowances under certain circumstances and additional deductions for start-up expenses;
- Phased introduction of a residence-based income tax, foreign dividends as from 23 February 2000 and for South African residents as from 1 January 2001;
- Capital gains tax as from 1 October 2001;
- Wage incentive / learnership scheme;
- Accelerated depreciation for buildings to promote certain urban development zones; and
- Income tax exemption / relief for certain public benefit organisations.

Historically, tax allowances have not been granted for the depreciation of permanent structures, as these assets generally have long economic lives and investment in permanent structures (such as transmission lines, railway lines and airports) are traditionally undertaken by government. However, the promotion of private investment in public infrastructure requires that South Africa follow international trends towards tax allowances for the depreciation of permanent structures. Allowances have therefore been introduced for pipelines transporting oil and gas, electricity transmission lines, telephone transmission lines, railway lines, airport hangars and runways.

3.3.4 Indirect taxes

In 1996, pursuant to the Katz Commission recommendations, the definition of the VAT base was extended to include all fee-based financial services, except:

- Premiums on life insurance policies issued in terms of the Insurance Act and contributions to pension, provident, retirement annuity and medical aid funds; and
- Compulsory charges built into the selling price of unit trusts.

Some of the specific reforms to indirect taxation have included:

- Extension of VAT to fee-based financial services;
- Abolition of the levy on financial services;
- VAT zero rating of paraffin;
- Reforming customs duties in accordance with WTO agreements;
- Introduction of the Skills Development Levy;
- Introduction of the Air Passenger Departure Tax;
- Diesel fuel concession to primary sectors including Fishing, Coastal shipping, Agriculture and Mining);
- Reduction of maximum *ad valorem* excise duty rates to 7 per cent and 5 per cent and eliminating some commodities from the *ad valorem* duty net. However, *ad valorem* vehicles excise duties are applied according to a set formula, not exceeding 20 per cent;
- Reduction in Transfer Duties;
- Abolition of excise taxes on lubricating base oils; and
- Increased excise duties on tobacco products, alcoholic beverages & transport fuels.

3.3.5 Earmarked Levies and Money Bills

An increasing number of requests by Government Departments and newly established regulatory bodies in the form of Public Entities for earmarked levy funding arrangements have necessitated a review of procedures and processes in this regard. All taxes and levies increase the overall tax burden and should, as far as possible, be explicitly accounted for. Hence, the National Treasury is in the process of compiling a regulatory framework and procedures to subject all extra-budgetary levy revenue to the same discipline as for budget appropriations. The aim is to further enhance the transparency of the budgetary appropriation process and minimise the fragmentation of the budget.

The Constitution prescribes the submission of a Money Bill to Parliament by the Minister of Finance for the imposition of taxes and levies. The suggested regulatory framework and procedures to review and process proposals for the imposition of levies will therefore complement the National Treasury's existing procedures for the evaluation, processing and oversight of Money Bills.

3.4 Fiscal decentralization

Fiscal and political decentralisation is often advocated on economic grounds for its potential to improve allocative efficiency in the government sector in particular and the economy at large. However, the decision to pursue a decentralised system of government is mainly political. Whereas the existence of provincial and local governments is due to the different spatial incidence of various public goods, the boundaries of sub-national governments are usually determined historically or politically.

It must be noted that fiscal centralisation and decentralisation are not either-or conditions. In most countries an appropriate balance between the two positions is essential to the effective and efficient functioning of government. In many instances where national governments decentralise responsibilities, they often retain important policy supervisory roles.³⁴

The South African Constitution entrenches 'co-operative governance', obliging the three spheres of government to co-operate and negotiate political and budgeting issues between them.³⁵ The majority of taxes in South Africa are raised at national government level, the argument being that national taxes are easier to administer and avoid the problems of duplication associated with a decentralised tax system. Schedule 5 of the Constitution specifies that certain expenditure responsibilities be devolved to the provincial and local government sphere, while others are administered jointly as specified in Schedule 4. The provincial legislation in respect of Schedule 5 takes precedence over national legislation, except when national legislation is necessary to establish national norms and standards. Provinces, therefore, have a limited degree of fiscal and political autonomy.

³⁴ Litvack and Seddon, Decentralising Briefing Notes, World Bank Institute, p.5.

³⁵ National Treasury, Intergovernmental Fiscal Review 2003, p.3.

The Constitution allows provinces to impose taxes, levies and duties other than income tax, value-added tax or customs duties and also to raise loans. Local governments are allowed by the Constitution to impose rates on property and surcharges on fees for the services they are responsible for, as well as to raise loans subject to restrictions. Section 227 (2) of the Constitution states that: "Additional revenue raised by provinces or municipalities may not be deducted from their share of revenue raised nationally, or from other allocations made to them out of national government revenue. Equally, there is no obligation on the national government to compensate provinces or municipalities that do not raise revenue commensurate with their fiscal capacity and tax base".

Generally provinces have little own revenue capacity and currently only raise about 4 per cent of their revenue requirement themselves.³⁶ Municipalities have significantly more revenue-raising powers than provinces and collect between 60 to 95 per cent of their own revenue.³⁷ Sub-national governments also have access to loan financing. However, loans may be raised only to finance capital expenditure and not current expenditure. The national government raises most of the fiscal revenue in the country, but exercises control over only approximately 40 per cent of total non-interest budgetary expenditure. By contrast the nine provincial authorities control about 60 per cent of total non-interest expenditure while raising less than 5 per cent of the revenue required to defray aggregate budgetary spending. The central government is therefore faced with funding the revenue shortfalls of provinces through unconditional grants.

The fiscal capacity of provinces and local governments varies significantly. Of concern is the fact that fiscal effort also varies significantly across provinces and local governments and that sub-national jurisdictions (especially local governments) with lower fiscal capacities also exhibit lower fiscal efforts. There is, therefore, a trade-off to be made between increased grants to *poorer* sub-national jurisdictions in the short run, and incentives to encourage *poorer* provinces (and local governments) to develop their tax bases in the long run so as to prevent disparities from being perpetuated.

The Constitution does allow for a surcharge on the personal income tax base or a surcharge on the general fuel levy, as well as other autonomous taxes over which the provinces would have greater control. The Katz Commission recommended against a surcharge on the income tax base due to likely administration difficulties (i.e. requiring a complete change to the income tax regime to replace the rebate system with a system of abatements); the base is inequitably distributed across the provinces and such a tax would not necessarily increase accountability at provincial government level. The Commission expressed its preference instead for a surcharge on the General Fuel Levy in the medium term.

Regarding other taxes that could be devolved directly to Provincial Government, the Commission supported the greater use of user charges, excise taxes on some services, severance taxes on mineral extraction, selected environmental taxes and possibly presumptive taxes (i.e. business licence fees). The Commission also advanced the view that South Africa's emerging system of fiscal federalism was not yet ready for significant devolution of taxation powers.

³⁶ National Treasury, *op cit*, p.5.

³⁷ *Ibid*.

In its Eighth Interim Report, the Katz Commission addressed the issue of introducing a land tax in South Africa. It rejected the feasibility of a land tax at National Government level and instead focused on the possible imposition of a rural land tax within the context of local government financing.

Subsequently the Government decided against introducing a separate land tax, and to include all land and improvements, including agricultural land, in the property tax regime imposed by Local Authorities. The Municipal Property Rates Act was promulgated in May 2004, which regulates and provides a broad framework within which Municipalities impose property rates.

3.5 Current environmentally-related taxes and charges

As already mentioned, The Constitution of South Africa allocates particular responsibilities to specific spheres of government. Functional areas of concurrent national and sub-national competence are outlined in Schedule 4 of the Constitution. Schedule 5 specifies those functional areas that are devolved exclusively to the provincial and local government spheres.

Schedule 4 concurrent responsibilities between the national and sub-national spheres of government include: administration of indigenous forests, environment, nature conservation (excluding national parks, national botanical gardens and marine resources), pollution control, soil conservation, vehicle licensing, air pollution, and water and sanitation services limited to potable water supply systems and domestic waste-water and sewage disposal systems. Schedule 5 responsibilities that are delegated exclusively to provincial governments include provincial roads and traffic. Those responsibilities that are delegated exclusively to local governments include cleansing, municipal parks and recreation, municipal roads, noise pollution, refuse removal, refuse dumps and solid waste disposal, and traffic and parking. The prevailing environmentally-related taxes and charges currently in operation in South Africa are presented below.

Table 3 presents these instruments according to the spheres of government (national, provincial or local) where they occur. The focus is on transport, non-transport energy, water, waste water and waste management sectors. Note that these tax instruments are classified as environmentally-related taxes due to the nature of their *tax base* and not necessarily according to their *intent*. Value-added Tax (VAT) is not usually considered as an environmentally-related tax since it is related not to environmentally damaging goods *per se*, but to price, irrespective of the good or service purchased³⁸. Consequently, relatively few environmentally-related taxes are *ad valorem* taxes (i.e. based on a proportion of the price) although there are some exceptions. The use of an *ad valorem* tax would imply that low cost production, which is often though not always, more environmentally damaging, is subject to lower rates of taxation.

³⁸ Note, however, that environmental incentives can be created through the VAT system (e.g. through exemptions or zero-rating) but such practices can lead to excessive administrative complexity and should, as a rule, be avoided where possible.

Table 3: Environmentally-related taxes and charges in South Africa (2005/2006)

SECTOR	LEVY (charge)	LEVEL APPLIED	APPLICATION	TAX RATE
Transport fuels	General Fuel Levy	National	Petrol Diesel Biodiesel	116 cents per litre. 100 cents per litre. 60 cents per litre.
	Road Accident Fund Levy	National	Petrol, Diesel, Biodiesel	36.5 cents per litre.
	Equalisation Fund Levy	National	Petrol, Diesel, Biodiesel	Currently set at zero
	Customs and Excise Levy	National	Petrol, Diesel, Biodiesel	4 cents per litre
Vehicle taxation	<i>Ad Valorem</i> Customs & Excise Duty	National	All passenger and light commercial vehicles	Graduated rate based on the vehicle price with an upper ceiling of 20 per cent.
	Road Licensing Fees	Provincial	All registered vehicles	Fees vary between different provinces – usually based on weight.
Aviation taxes	Aviation Fuel Levy	National	Aviation fuel sales (wholesale)	1,5 cents per litre on all fuel sales excluding foreign operators.
	Airport charges	National	Landing charge, parking charge, and passenger service charge	Charges imposed to fund the operation of the South Africa Civil Aviation Authority (SACAA).
	Air Passenger Departure Tax	National	International air travel from SA	R120 per passenger; R60 per passenger to BLNS countries.
Product taxes	Plastic shopping bags levy	National	All plastic shopping bags	3 cents per bag
Electricity	NER Electricity Levy	National	All electricity generated	A levy per kWh is implemented on all electricity generated to fund the National Electricity Regulator.
	Local Government Electricity Surplus	Local	Electricity distributed to end-users by municipalities	Implicit tax rates vary between different municipalities. Total surplus revenue raised by metropolitan municipalities is approximately R1.4 billion.
Water supply	Water Resource Management Charge,	National	All registered water use from DWAF water schemes	Charge rates vary according to different users. The aim is to recover costs associated with water supply and abstraction.
	Water resource development and use of water works charge.	National	All registered water use from DWAF water schemes	Charge rates vary according to different users. The charges aim to recover the costs associated with the construction, operation and maintenance of water schemes.
	Water Research Fund Levy	National	All registered water use from DWAF water schemes	This levy earmarked to fund the operations of the Water Research Commission.
Waste water	Waste Water Discharge Charge System (proposed)	National framework with rates likely to be set at CMA and WMA level	All (DWAF) registered waste water dischargers	The WDCS is in the process of being developed. 2 components are proposed for the system. A cost recovery based charge and a levy/ tax on waste effluent. Rates to be determined.

Note consumer tariffs (e.g. for electricity) have not been included.

3.5.1 Transport Fuels

Petrol, diesel and biodiesel are classified as fuel levy goods in terms of the Customs and Excise Act, No. 91 of 1964, and are therefore subject to fuel taxes and levies, but are zero rated for VAT purposes. The general fuel levy is determined by the Minister of Finance in the annual budget. It is used to finance general government expenditure programmes. The Road Accident Fund Levy is an earmarked tax used to compensate victims of motor vehicle accidents. The Equalisation Fund Levy is an earmarked levy primarily used as a mechanism to smooth retail fuel prices in times of significant price shocks. The Customs and Excise levy is imposed as a source of funding for the member countries of the South African Customs Union (SACU).

Table 3 highlights the fuel taxes that are currently applied on petrol, diesel and biodiesel. Currently, diesel is taxed at a lower rate than petrol and no fuel tax differential currently exists between leaded and unleaded petrol.

Two types of environmentally friendly alternative fuels from biomass have reached technical maturity and acceptance in international fuel markets. These are biodiesel from vegetable oils and bioethanol fuels. Currently, biodiesel can be produced more economically than bioethanol fuels, provides more energy, is a cleaner burning fuel and is compatible with existing engines and commercial fuel distribution systems. Given the potential long-term benefits of biodiesel, a favourable fuel tax treatment was announced in the 2002 budget in an attempt to reduce the cost disadvantages that biodiesel currently faces with respect to fossil fuels. The intention is to give a similar fuel tax dispensation for bioethanol in the future.

3.5.2 Vehicle taxation

Value added tax (VAT) is imposed on all motor vehicle sales and an *ad valorem* customs and excise duty, based on the price of the vehicle, is imposed on all passenger and light commercial vehicle purchases. Medium and heavy commercial vehicles are exempt from *ad valorem* customs and excise duties.

Provinces have exclusive responsibility under the Constitution for provincial road management and traffic control. The Road Traffic Act of 1996 with its relevant regulations empower provincial governments to impose certain road traffic fees. The Road Traffic Act fees are divided into the following categories: motor vehicle licenses that include all categories of vehicles; operator licenses that include learner's and driver's licenses; roadworthy; and motor vehicle registration. There are different categories of motor vehicle license fees, which are based on the weight of the vehicle. Provinces have the authority to set the level of these fees and appoint registering agents to collect the fees on their behalf. Provinces also charge fees for road traffic regulation services besides those in the Road Traffic Act (for example, vehicle registration fees upon change of ownership).

3.5.3 Aviation Levies

The South African Civil Aviation Authority (SACAA) regulates the air transport sector in South Africa. The following charges are imposed on the aviation industry:

- Aviation fuel levy - payable by wholesale distributors on the sale of all aviation fuel that is manufactured, distributed, imported or sold in South Africa; and
- Airport charges - payable by the operators of aircraft in South Africa and consists of a landing charge, parking charge, and passenger service charge.

In addition to these user-charges and fees, national government imposes an air passenger departure tax, which is a departure tax on international air travel from South Africa, the revenues from which flow into the national revenue account. However, upon imposition of the air passenger departure tax, additional funding has been made available to DEAT for tourism promotion. Recognising the higher effective burden on international flights to neighbouring countries, a reduced rate applies to departures to Botswana, Lesotho, Namibia and Swaziland.

3.5.4 Electricity

The structure of electricity tariffs in South Africa is relatively complex, as there are currently many different economic actors, levels (national and local) and components of final tariff determination. Generally, the cost and tariff structures are not transparent, especially for municipalities. At the national level, the only levy applied is at the generation stage, the revenues from which are earmarked to fund the National Electricity Regulator (NER).

The distribution of electricity is currently undertaken jointly by Eskom and approximately 187 different municipalities that purchase electricity from Eskom's distribution arm and then resell it to end-users. All electricity sales are subject to 14 per cent VAT. Generally, municipal tariff structures include a lifeline tariff for domestic consumers providing some free electricity or electricity at a reduced cost for low-income households. Implementation practices currently vary considerably between different jurisdictions. In addition, some municipalities are currently generating a surplus from electricity sales, i.e. generating revenues that exceed the costs incurred to provide the service. This *hidden* surplus could be viewed as an *implicit* tax, the extent of which varies considerably between jurisdictions. In 2005, the six metropolitan municipalities raised approximately R 1.4 billion on sales of 48 billion kilowatts of electricity.

3.5.5 Water Supply and Waste Water

DWAF's *Water Pricing Strategy* is divided into four different tiers:

- The first tier corresponds to the use of raw water from the water resource;
- The second tier refers to the water supplied in bulk by the water boards and in some instances local authorities;
- The third tier encompasses the water distributed to end users; and
- The fourth tier captures waste water returned to the water resource.

The pricing tiers are cumulative in the sense that all form part of the final price paid by end users, particularly households. At the national level, VAT is the only tax currently applied.

With regards to user-charges, the Water Resource Management Charge, the Water Resource Development and Use of Water Works Charge and the Water Research Commission (WRC) charge are applied as part of the first pricing tier. The Water

Resource Management Charge seeks to cover the costs associated with, amongst other things, planning and implementing catchment management strategies, management of water quality and use, water resource protection, and water demand management. Eventually, this charge will be used to fund the operations of the Catchment Management Agencies (CMAs). The Water Resource Development and Use of Water Works Charge seeks to cover the construction, operation and maintenance costs of different water schemes. Finally, the WRC charge is used to fund the operations of the Water Research Commission.

Charges imposed in the second pricing tier will typically reflect those applied in the first with additional costs of supply included. Pricing structures in the third tier vary considerably according to different municipalities. Generally, these will include a lifeline or social tariff (as in the case of electricity) for domestic consumers providing some free water or water at a reduced cost for low-income households. Reduced tariffs are generally applicable to industrial consumers for non-potable water. Some municipalities, Hermanus being a good example, apply an increasing block tariff (i.e. increasing marginal rates) in combination with a fixed charge for water usage by domestic consumers, while different non-household water users are charged differentiated flat rate tariffs.

With regards to tier four, DWAF is currently in the process of developing the Waste Water Discharge Charge System (WDCS), the aim of which is to recover the costs associated with different water treatment and water quality management programmes and to provide incentives for water users returning water back to the water resource to reduce their pollution loads. Many municipalities also impose charges to cover the costs of their own water treatment programmes (i.e. as part of tier three pricing). Durban and the City of Tshwane municipalities, for example, have introduced further sanitation charges for waste water discharges that exceed the pollution load of normal waste water.

3.5.6 Mining

The White Paper on Minerals and Mining Policy of 1998 holds mining companies responsible for all costs pertaining to the impact on the environment of mining operations. Prior to any mining activity, an Environmental Management Programme Report (EMPR) has to be prepared and has to make financial provision for rehabilitation after mining operations have ended. Arrangements for monitoring and auditing must also be made under the Environmental Management Programme. To make the necessary financial provisions, mines may open a dedicated trust fund under the Income Tax Act of 1962.

The Income Tax Act of 1962 provides, through the use of a special rehabilitation fund, tax incentives for mining operators to set aside funding or reserves for mining rehabilitation. Section 11(hA) provides a deduction for the reserves set aside and section 10(1)(cH) for the tax-free build-up of those reserves. This fund can take the legal form of a company, society or other association of persons or a trust, whether or not registered under law and only contributions made to any of these bodies and considered as reasonable will be allowed as a deduction in terms of Section 11(A). For the fund to qualify as a tax-free fund, the terms of the fund must be approved by SARS and its sole objective must be for the environmental closure of the mine, of which only the environmental closure costs of mining must be considered, and not the environmental operating costs. The use of money from the fund must be authorised and certified by the Minister of Minerals and Energy, which should verify the objective of the withdrawal or distribution. In addition, the fund is

not permitted to distribute any of its profits or gains to any person, and is only permitted to have a limited set of investments to ensure the fund maintains fairly liquid investments that can be used for the rehabilitation process. Penalty provisions have also been made for failure of the fund to comply with provisions of the Income Tax Act 10(1)(cH)(iv).

3.5.7 Waste

The excise tax on plastic shopping bags (implemented in June 2004) is the only waste-related product tax in South Africa. As it stands, the levy does not seek to incentivise changes in consumer behaviour. Instead, it seeks to raise revenue, some of which will be used to fund plastic recycling operations (see Box 6 for further information).

As already mentioned, under Schedule 5 of the Constitution, Local Government has exclusive responsibility for refuse removal, refuse dumps and solid waste disposal. In general, the charges applied are relatively complex and vary considerably between different municipalities.

For refuse collection, charges (where applied) primarily aim to cover the costs of service provision which is increasingly being contracted out to private sector operators. In some cases, municipalities do not impose separate charges. Instead, waste removal services are financed through an additional item on property taxes. Where households are charged directly, it is usually based on one of the following criteria:

- Flat rate charges;
- Household income brackets; and
- Household plot size.

The relationship to the level of waste generated is not always strong.

In general, charges for waste disposal appear quite low in South Africa compared to other countries. For a number of materials, charges are often not applied, the reasons for which are not altogether clear. Where such materials are used for daily cover at landfills, no charge is understandable. The charges that are applied are usually differentiated to a certain degree according to the specific waste stream. Again, rates vary considerably between different jurisdictions and disposal operators. Where hazardous waste is collected by a waste operator, charges tend to be higher to reflect costs associated with handling, subsequent treatment and potential remediation of leachate.

3.6 The role of environmentally-related taxes in future tax reforms

Currently in South Africa, environmentally-related taxes account for approximately 2 per cent of GDP and just under 10 per cent of total tax revenue. Table 4 illustrates revenue trends from environmentally-related taxes over time. The general fuel levy, as one of the major six tax instruments in South Africa, dominates revenue collections, accounting for between 65 to 74 per cent of all revenue generated from environmentally-related taxes since 1997/98. Note that the current surpluses generated by municipalities (approximately

R 1.4 billion in 2005) on the distribution of electricity have not been included although they could be interpreted as environmentally-related taxes.

Table 4: Revenues from environmentally-related taxes in South Africa

(R millions)	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
General fuel levy	12,092	13,640	14,290	14,496	14,923	15,334	16,252	19,190
SACU customs & excise	636	641	649	627	657	680	787	802
Road accident fund levy	2,183	2,151	2,165	2,483	2,821	3,264	3,894	4,624
<i>Ad valorem</i> duties new vehicles ³⁹	543	622	849	1,093	1,473	1,622	1,522	1,489
Provincial road traffic fees	1,198	1,256	1,514	1,748	1,965	2,152	2,506	2,672
Total revenues	16,652	18,310	19,467	20,437	21,839	23,052	24,961	28,777

It should be noted that the majority of existing environmentally-related taxes and charges were introduced with the intention of raising revenue. Consequently, the environmental effects were not a strong influence in their design. However, this does not detract from the very likely positive impacts that these instruments are having in terms of environmental outcomes.

The objectives of an environmentally-related tax or charge to either raise revenue or change taxpayer behaviour are not mutually exclusive. However, a trade-off sometimes exists between these two seemingly disparate objectives. The ability of environmentally-related taxes to change taxpayer behaviour is largely a function of the price elasticity of demand for the good or service affected. The more price elastic the demand is, the more likely a tax-induced price increase would lead to a decrease in the consumption of the relevant good or service. In such instances the goal of improving taxpayer behaviour would override the objective of raising revenue. On the other hand, where the price elasticity of demand is relatively inelastic, the potential to effect a change in taxpayer behaviour is limited. In such instances the raising of tax revenue would be the overriding objective.

The environmental effects of existing environmentally-related taxes and charges need to be better understood and quantified where possible. In some instances this will prove difficult since many of these instruments have been in place for some time. A study of the impact of current environmentally-related taxes may therefore depend on the development of scenarios to illustrate what the situation would have been in the absence of these taxes.

Given the likely potential to improve the environmental effectiveness of existing environmentally-related taxes and charges, such opportunities need to be identified and assessed. This important step will help to identify priority areas for future environmental fiscal reforms. In addition, potentially new environmental tax instruments need to be identified and their appropriateness evaluated.

³⁹ *Ad valorem* duties are only applied to new passenger and light commercial vehicles. Medium and heavy commercial vehicles do not attract these duties.

In terms of fiscal objectives, one area that has received a great deal of attention over recent years is the idea of using the revenues from environmentally-related taxes as part of a tax shifting exercise. The idea of taxing *bads* (such as environmental pollution) and reducing taxes on *goods* (such as labour) has been termed the *double-dividend hypothesis*. This hypothesis asserts that a win-win situation could be achieved in that not only is an improvement in environmental quality secured (the first dividend), but gains in economic efficiency and employment could also be realised (the second dividend)⁴⁰. Such a policy approach is of particular relevance to South Africa since it offers the potential to better align the achievement of environmental goals with other social and economic objectives.

There remains some uncertainty, however, over the practical scope of the double-dividend benefits. Critics of the hypothesis argue that whilst the environmental dividend from environmentally-related taxes may indeed be positive, realising the second dividend will be more difficult and will depend to a great extent on the efficiency with which the different tax instruments are able to raise revenue (i.e. to realise the second dividend, the environmentally-related tax has to be more efficient at raising revenue than the tax that is being reduced or replaced)⁴¹.

Despite the uncertainty over the second dividend, many countries have implemented environmentally-related taxes as part of tax shifting exercises, the rationale being that recycling tax revenues in this way is likely to be the most effective way of minimising the overall tax burden on the affected sectors, whilst still creating the required behavioural incentives with respect to environmental practices. The possibility and desirability of implementing such reforms in South Africa needs to be explored.

⁴⁰ Schob, R. (2003) "*The Double-Dividend Hypothesis of Environmental Taxes: A Survey*", CESifo Working Paper No. 946, University of Magdeburg, Germany.

⁴¹ Bovenberg & Goulder (1997) "Costs of Environmentally Motivated Taxes in the Presence of Other Taxes: General Equilibrium Analysis", in *National Tax Journal*, 50(1), pp59-87.

CHAPTER 4: IDENTIFYING APPROPRIATE INTERVENTIONS TO CORRECT FOR MARKET FAILURES

Achieving the sustainable development objectives outlined in chapter 2 will require support and commitment from all groups in society. The government has an important role to play in ensuring progress is made towards these goals and that trade-offs are recognised and appropriately addressed. With respect to achieving environmental objectives, the role of government has to be carefully considered. In particular, the government needs to have a clear rationale for intervening and it must be confident that the benefits generated from an intervention are likely to outweigh any costs that are incurred.

In consultations with stakeholders on the initial discussion document, it was noted that environmentally-related taxes and charges are only one group of instruments capable of achieving environmental outcomes and that greater emphasis needs to be given to other possible approaches. This chapter sets environmentally-related taxes within this context and develops a framework for considering the use of different market-based instruments. Recommendations are also given concerning the process that should be followed with respect to instrument selection.

4.1 Market failure and the environment

In general, markets provide the most efficient means of allocating scarce resources, although not necessarily the most equitable. Prices derived in a competitive environment provide incentives to all participants in the economy to maximise the productivity of resources and encourage the most productive businesses to prosper and grow. However, some markets are subject to failure, particularly with respect to environmental goods and services. This can lead to insufficient consideration of environmental issues in everyday market activities. Box 2 outlines some examples of market failures relating to the environment.

Because environmental costs and benefits are not always reflected in prices, markets can not always be relied upon to guarantee appropriate environmental standards and practices. In addition, because environmental market failures can be complex and involve a large number of individuals and / or groups, members of society are not always able to cost-effectively organise themselves to develop mutually beneficial mechanisms to compensate one another for the costs and benefits incurred. Under these circumstances, there is a strong rationale for some form of government intervention. By intervening and influencing the institutions that determine how markets operate, government can play an important role in encouraging more efficient resource use.

Box 2: Examples of environmental market failures⁴²

Externalities	Externalities (or external effects) arise when certain costs and benefits are not included in market prices. Negative externalities can lead to too much of a good or service being supplied where as positive externalities can lead to under production.
Un-priced assets or missing markets	For many environmental goods and services, markets are often missing or are incomplete. This creates limited incentives for individuals, firms or industries to incur costs to protect and maintain such resources.
Public goods	Market failure can also occur where the environment has public good qualities. A public good has two distinguishing qualities: it is <i>non-rival</i> and <i>non-excludible</i> . Non-rival means that one individual's consumption of the good does not reduce another's ability to consume the good. Non-excludible means that it is impossible to prevent individuals from benefiting from the provision of the good or service. Such properties mean that there are no incentives for these goods to be provided by private firms despite the fact that society would be better off if they were to be provided. Accordingly, these services are either provided by government directly or on behalf of government by the private sector funded by taxpayer's money. Examples of pure public goods include defence, air quality, biological diversity and public conservation areas.
Undefined or unenforceable property rights	Clearly defined and enforceable property rights are an essential criterion for ensuring that markets exist and are able to function effectively. In their absence, a situation of <i>open access</i> can arise whereby individuals impose incremental costs on other users of a resource that can lead to degradation and over-exploitation. By establishing clear and enforceable property rights for individuals or groups of users, over-exploitation or degradation can be avoided.
Information and uncertainty	A lack of information and uncertainty can prevent a clear and accurate understanding of environmental and natural processes. Incomplete information can lead to economic activities that do not take full account of social costs and benefits. Better information can greatly improve decision-making and may assist in internalising environmental externalities.
Irreversibility	Irreversibility is largely an information problem and concerns uncertainty about possible future development options. It is often difficult to take account of the value future generations may place on certain environmental resources.

The challenges and objectives outlined in chapter 2 are underpinned by different kinds of market failures and / or policy failures. In some cases, it can be difficult to clearly identify and disentangle what is driving a particular problem or issue. There may be cases where several types of market failure contribute to a particular environmental issue. Under such circumstances, a more complex *package* of corrective measures may be necessary in

⁴² Markandya, A *et al* (2003) "Environmental Economics for Sustainable Growth", Edward Elgar, UK; and Perman, R. *et al* (2003), "Natural Resource and Environmental Economics", Addison Wesley, UK.

order to reach a specific environmental objective. For example, part of the externality phenomenon relates to a lack of information about the relative costs and benefits that certain economic activities impose on the rest of society.

In seeking to address an environmental issue, the underlying source of market failure needs to be carefully identified and analysed. By doing this, stronger arguments for government intervention can be developed and the proposed interventions can be more effectively targeted.

4.2 Options for government intervention

Once the rationale for government intervention has been developed and a clear objective established, an appropriate course of action must be identified. Government can intervene to correct for environmental market failures in a number of different ways. Taxes and charges are only one option and due consideration needs to be given to the alternatives such as appropriate regulation, tradable permits or information strategies. No one approach or policy instrument is necessarily better than another. Of much greater importance is selecting the most appropriate intervention for the specific circumstances. Depending on the nature of the market failure and the required objectives, a combination of instruments may be required.

Currently, environmental outcomes in South Africa are achieved mainly via regulatory instruments such as standards, bans on the use of certain goods or technologies, liability payments (such as the mining rehabilitation fund) and non-tradable permit systems. A selection of information disclosure schemes are also in operation. Environmentally-related taxes and user-charges are only used to a limited degree across different spheres of government as outlined in chapter 3. Finally, a limited number of private sector deposit-refund systems are in operation for certain products such as glass bottles, aluminium cans and car batteries in some cases.

Table 5: Policy matrix of interventions to correct for environmental market failure⁴³

Using markets	Creating markets	Environmental regulations	Engaging civil society
Elimination of perverse subsidies; Environmentally-related taxes; Deposit-refund systems; User charges; and Targeted subsidies	Property rights and decentralisation; Tradable Permits and rights; and International offset systems	Product and process standards; Bans / prohibitions; Non-tradable permits and quotas; Zoning; and Rehabilitation, liability and performance bonds	Public participation; Information disclosure; and Voluntary agreements

⁴³ Adapted from Sterner, T. (2003) "Policy Instruments for Environmental and Natural Resource Management", RFF Press, Washington DC.

Table 5 lists a range of different options for government intervention, dividing them into four broad categories: *using markets*, *creating markets*, *environmental regulations* and *engaging civil society*. Market-based instruments are primarily those falling under the *using markets* and *creating markets* categories. Unlike *environmental regulations* or command-and-control measures, which use legislative or administrative regulations to directly alter the quantity and quality of technologies used by firms, market-based instruments achieve improved environmental outcomes through the market by altering the relative prices that individuals and firms face. In working through the price mechanism, market-based instruments are likely to be more efficient from an economic point of view. However, it must be emphasised that market-based instruments cannot function independently from the institutional environment that they seek to affect. In other words, some form of regulatory measures, monitoring, and enforcement are required for any market-based instrument to operate effectively.

The *using markets* category captures fiscal measures including subsidies, taxes and user charges. This group of instruments seeks to improve environmental outcomes by building on markets (and prices) that already exist. The underlying principle seeks to internalise un-priced environmental costs and benefits by incorporating them into price structures. In contrast, instruments in the *creating markets* category are based on developing a new set of property rights for an environmental good or service.

The *environmental regulations* category groups the more traditional command-and-control instruments which tend to be the most heavily used policy instruments in most countries. Such instruments can take many different forms and vary significantly between countries. Typically, regulatory measures seek to place direct controls on the behaviour of polluters (or potential polluters) in the following ways:

- Input restrictions into the production process;
- Technology controls;
- Output quotas (especially with respect to natural resource management);
- Emissions licensing or permitting (with ambient pollution requirements); and
- Zoning (which seeks to influence where particular forms of pollution can be released, or where natural resources can be harvested).

Where there is a risk of substantial damage to the environment and / or human health, bans or prohibitions are often implemented (for example, due to the severe adverse impacts of lead on human health, the Government of South Africa has banned its use in petrol since January 2006). Performance bonds and liability payments are alternative forms of regulation that are of growing importance for specific sectors. The mining sector is a good example of where such measures have been used to guard against negative environmental impacts both during and after mineral extraction has been completed (see section 3.5.6).

The *engaging civil society* category captures those instruments that are based on an appreciation of the importance of public access to reliable information and/or the benefits of community participation in achieving environmental objectives. With respect to information disclosure, governments internationally are seeking to reduce the burdens being placed on regulatory infrastructures in terms of designing, implementing, monitoring and enforcing effective environmental strategies by encouraging more direct responses from civil society.

Box 3: Examples of information disclosure programmes in South Africa

South Africa has a number of information disclosure strategies in operation relating to the environment. Many of these are internationally driven which can increase their credibility. Some of the main initiatives include:

Certification Schemes The **SABS ISO 14001** series is perhaps the most widely recognised scheme. As of March 2006, more than 223 business operations have been officially registered and certified as complying with these standards and all have an environmental management system in operation.

In addition to ISO 14001 certification, many commercial forestry operators are also certified according to the **Forestry Stewardship Council** which ensures that partaking forests are managed in a sustainable way. South Africa currently has the fourth largest area of FSC-certified forests in the world. The **Marine Stewardship Council** performs a similar role for the South African Hake Trawl fishery.

Fair Trade in Tourism South Africa is a new locally developed certification and trade-mark scheme supported by the IUCN. The trade-mark is based on 6 principles, one of which is sustainability and sound environmental practices.

Labelling schemes The **Blue Flag** initiative is a private international labelling scheme operated by the Foundation for Environmental Education (FEE). The Blue Flag award is given to certain beaches and marinas that meet water quality, environmental information and education, environmental management, safety and other environmental criteria. So far, 8 beaches have been accredited in South Africa.

Proudly South African is a national labelling scheme aimed at encouraging the domestic consumption of South African goods and services. 1740 companies are Proudly South Africa accredited. A company's commitment to sound environmental practices feature in the accreditation process but few specific criteria are applied.

The **Oeko-Tex scheme** has been operated by CSIR Textile Technology (Textek) since 1996 and is based on the German and Austrian model. The label can only be used for Southern African textile products that meet certain environmental codes and practices.

Ranking and Rating Schemes Various rating and ranking schemes operate in South Africa, many of which are locally driven initiatives. Whilst not being as intensive as the majority of certification and labelling schemes, they provide important information to both consumers and producers on environmental performance. Some of the major ranking initiatives include:

- The **Edward Nathan and Friedland Sustainability index** which ranks the top 40 companies on the JSE in terms of sustainability;
- The **Excellence in Mining and Management Award** operated by the Department of Minerals and Energy;
- **Greening the Future** operated by the Mail and Guardian Newspaper;
- The **National Occupational Safety Association (NOSA)** environmental indicators; and
- The **Clean City Competition** run by the Department of Environmental Affairs and Tourism.

Information strategies can take many forms, including:

1. **Labelling schemes** - such as energy efficiency labels on electrical appliances or organic farming produce;
2. **Information disclosure programmes** - such as the Toxic Release Inventory in the United States or Indonesia's PROPER initiative;
3. **Rating and ranking** - where the environmental performance of a firm is ranked or rated according to certain criteria and publicly made available through the stock exchange for example; and / or
4. **Certification schemes** - such as the ISO 14000 series, which is awarded when certain environmental conditions and practices have been met.

The underlying principle of all these strategies is that if members of society have access to reliable information, it may facilitate more informed decision-making with respect to product purchases and investments. At the same time, groups that suffer negative environmental externalities are encouraged to take preventative action themselves. However, due to the difficulty and high cost of gathering and verifying environmental information, it is unlikely to be provided through the market without some form of government intervention.

Box 3 provides details of the environmental information schemes in South Africa. Whilst unlikely to be sufficient in themselves to achieve most objectives since there is often a degree of uncertainty concerning environmental outcomes, information strategies could play a strong supportive role to other forms of regulation and incentives. The Indonesian PROPER initiative serves as a good example of what government can achieve through the appropriate use of these systems (See Box 4). The DMEs proposed Energy Bill allows the Minister of Minerals and Energy to establish a National Energy Efficiency Program. In support of the program the Minister may prescribe the certification and labelling, and regulation of energy efficient technologies such as household appliances, devices and motor vehicles.

Another policy approach, which has grown in use considerably over recent years, is voluntary agreements. These usually take the form of negotiated contracts between different stakeholders. The ROSE Foundation is a good example of a voluntary agreement between industry members (see Box 5). However, by becoming involved in or initiating such agreements, the government can lend significant weight to these processes. Typically, agreements of this nature will stipulate that a firm or industry must adopt certain changes to reduce negative environmental effects. In exchange, the government provides some form of incentive, either in the form of direct financial assistance or more commonly through the application of a threat (i.e. restraint in the imposition of more formal regulation or taxation). The Government of South Africa has recently employed a similar policy approach in an attempt to deal with the external costs associated with the disposal of plastic shopping bags (see Box 6).

Whilst voluntary agreements have the potential to offer more rapid and simple solutions without placing an undue burden on the regulator, their development must conform to certain principles to ensure greater effectiveness and consistency. Voluntary agreements should, therefore, include the following generally applicable features:

1. A legitimate and real threat from government should non-compliance or free-riding on the actions of others become an issue;
2. A transparent process is followed and all the relevant stakeholders are involved. This applies as much to government as it does to the private sector and other stakeholders, especially where there is reliance on another government department (such as National Treasury) to introduce complementary measures such as taxation;
3. A clear environmental objective needs to be identified and the negotiated agreement must be capable of meeting the specified objective; and
4. Progress towards meeting the objective must be clearly monitored and chartered with the actions of individuals being clearly recognised.

Box 4: The Indonesian Programme for Pollution Control Evaluation and Rating (PROPER)

In 1995, Indonesia's environmental protection agency, BAPEDAL, developed the Programme for Pollution Control Evaluation and Rating (PROPER) in an attempt to improve the environmental performance of some of the country's major companies. Over the years prior to 1995, BAPEDAL had experienced difficulties in applying environmental standards and struggled to enforce plant closures, fines and other penalties against major corporate operations that refused to comply.

Rather than opt for a system of environmentally-related taxes which could create incentives for further corruption and bribery given the local institutional difficulties, BAPEDAL chose to develop a rating system based on a company's environmental performance against regulatory standards and to make it available to the general public. Under this system, complex environmental data is summarised and each company is given one of the following ratings:

GOLD	World-class clean technology. Waste minimisation and pollution prevention efforts;
GREEN	Above legally required standards for environmental protection. Good maintenance and environmental work;
BLUE	At legally required standards for environmental protection;
RED	Below legally required standards for environmental protection; and
BLACK	Serious environmental damage. No pollution control effort.

The system has proved very successful to date and compliance with standards has improved significantly. Over the years since its introduction, a large number of firms have moved from ratings of RED and BLACK to BLUE. No company has yet achieved a GOLD standard. Participation and scrutiny from communities in close proximity to the companies has been strong.

Source: Sterner (2003)

Box 5: The South African ROSE Foundation

The Recovery (Recycling) of Oil Saves the Environment (ROSE) Foundation, a non-profit organisation formed in 1995 by major lubricant suppliers in South Africa, is responsible for co-ordinating the collection, storage and dispatch of used lubricating oils for recycling purposes. Lubricating oil consists of hydrocarbons, heavy metals and spent chemical additives which, when disposed of improperly, can cause significant environmental externalities and they are not easily biodegraded. In 2001, 241 million litres of new lubricating oil was sold in South Africa of which an estimated 50 percent was destroyed through use and 20 percent was recovered, with the remaining 30 percent being disposed of inappropriately.

The Rose Foundation is a private sector initiative independent of government support. To facilitate the safe collection of used oil, over 9000 mini oil tanks are distributed to lubricant users generating lube oil by the foundation. Each major lubricant supplier contributes 9 cents per litre of new lubricating oil sold, to manufacture and install mini oil tanks across South Africa. These tanks are designed to withstand impact and avoid leakage, and they contain a basket to collect foreign solids such as oil cans. The containers are then collected by Oilkol, the company in partnership with the ROSE Foundation, who are responsible for collecting used oil and managing storage sites from oil collected at over 30,000 sites nationally. Oilkol compensates users when tanks are collected or if the tank is delivered to the company. The used oil is then sold to approved recyclers for conversion into fuels or new lubricants. Currently, the ROSE Foundation is in agreement with a used oil refiner, three used oil fuel re-processors and a lime producer to whom the untreated used oil is sold and these parties are subject to regular environmental performance assessments. The cost of the used oil tank is covered by the sale of the first tank of oil. 25,000 handy containers have been sold to do-it-yourself enthusiasts and taxi drivers, which holds 18 litres of oil that can be dropped off at a ROSE drop off point. There are 400 ROSE drop off sites across the country.

The ROSE Foundation has increased the collection of used oils from 29 million litres in 1996 / 1997 to 38.5 million litres in 2001 following an intensive oil recycling promotion campaign between 1998 and 2001. However, further work needs to be done to expand the coverage to more remote areas. The total amount of potentially recoverable oil is about 120 million litres per annum.

Source: The ROSE Foundation, www.rosefoundation.org.za

Box 6: Plastic bags and the use of voluntary agreements in South Africa

In attempting to deal with the negative external effects associated with the use and disposal of plastic shopping bags, DEAT entered into a formal agreement with organised industry and organised labour. New standards for plastic shopping bags have been established and a voluntary agreement with regard to charging consumers for such bags has been reached.

The Memorandum of Agreement also provides for the imposition of a levy on plastic bags. Given the agreement reached on voluntary charging for plastic shopping bags, the current levy's primary objective is not so much to act as a disincentive measure but more to contribute towards funds to promote the recycling of plastic bags in particular and environmental awareness in general. This is the main reason for the relatively low tax rate of 3 cents per bag.

Should the voluntary agreement to charge consumers for plastic bags become ineffective there is the option to increase the rate of the levy, in which case the tax would serve both environmental and fiscal objectives.

4.3 Choosing between different policy options

Due to the complexities and specific nature of many market failures, it is not possible to be overly prescriptive concerning appropriate policy instruments at a general level. For each environmental objective, a tailored or stylised solution is likely to be required. Some broad guidelines for matching the capability of instruments with particular sources of market failure are as follows⁴⁴:

- **Negative environmental externalities** – taxes or tradable permit schemes will encourage negative environmental externalities to be incorporated into prices, thereby internalising external costs. In some instances, traditional regulatory approaches alone may be appropriate to the extent that they can be adequately enforced;
- **Positive environmental externalities** – will depend largely on the type of externality and the actors involved. The development of mechanisms whereby groups that incur costs in providing environmental services are compensated by other groups that benefit from them is becoming increasingly popular internationally. Importantly, these mechanisms can have significant pro-poor dimensions and can be cost-effective under certain circumstances. Where such solutions are not appropriate or unfeasible, more direct forms of government intervention may be necessary such as subsidies or regulation;
- **Under-provision of public goods** – voluntary agreements or other forms of collective action can be appropriate to increase the supply of environmental public goods. It is likely that government will have a central role to play in the process; and
- **Information failures / uncertainty** – due to economies of scale and information asymmetry, the government may have an important role to play in collecting, verifying and disseminating relevant information across society to better inform decision-making.

When choosing between different policy instruments, further criteria and specific conditions need to be considered. These include:

- **Static efficiency** (achieving an environmental target at least overall cost) – most market-based instruments are likely to be advantageous in this respect, especially when there are many different polluters and abatement costs vary significantly between them. The overall costs of regulatory approaches can be high, especially when government mandates specific technologies. Differentiated abatement responsibilities between polluters (up to the point where marginal abatement costs are equalised) will ensure that overall costs are kept to a minimum;
- **Varying damage costs over different locations** – selecting the appropriate level of intervention will have implications for the choice of instrument (see section 4.3.1);

⁴⁴ See HM Treasury (2002) "Tax and the Environment: using economic instruments", HM Treasury, UK.

- **Dynamic efficiency** (on-going incentives to reduce abatement costs over time) – taxes are likely to provide the best incentives for dynamic efficiency. Tradable permits less so since the incentives to reduce abatement costs can be undermined by rapid developments in technology. Since subsidies tend to distort entry into and exit from a particular market, the incentives for dynamic efficiency are severely reduced where they are used. Command-and-control regulations offer no incentives for on-going cost reductions;
- **Complexity** – Certain market-based instruments can be technically complex and difficult to administer. These additional costs and constraints must be considered; and
- **Distributional and competitiveness issues** – all instruments have some form of economic and distributional consequences in the sense that they will ultimately impact on the price of different goods and services. Where such effects are or are likely to be unacceptable, mitigation and / or compensation measures should be considered.

The use of environmental taxes conforms to the polluter-pays principle. Although the statutory tax incidence may rest with the polluter, the economic incidence of the tax needs to be analysed in more detail. Tradable permits can conform to the polluter-pays principle where permits are auctioned but not when they are given away freely (see discussion below). Subsidies (including incentives such as reduced tax rates or tax exemptions) do not conform strictly to the polluter-pays principle since the right to pollute rests with the polluter and society is essentially paying the polluter to change their behaviour (see Box 9 in section 6.5 for more information). However, where concerns over international competitiveness is an issue, pollution abatement subsidies (possibly in the form of tax incentives) could be considered to the extent that they do not contravene international trading rules and can help to promote other policy objectives such as sustaining job opportunities. As a general rule and in line with international best practice, subsidy incentives should only be considered when implemented in conjunction with other instruments such as taxes. Such arrangements would largely preserve the notion of the polluter-pays principle⁴⁵. The Chinese system of pollution charges is a good example of how the two policy instruments can be effectively used together (see Box 7).

Market-based instruments have a number of attractive features and a potentially large role to play in meeting South Africa's environmental and sustainable development objectives. The need to build on and strengthen existing regulatory systems is important and any future development of market-based instruments should be considered in this context.

Most countries, particularly middle-income and developing countries, have opted for fiscal reforms (i.e. taxes and charges) rather than to create new markets for environmental goods and services. International experience with tradable permit systems and international offset systems (such as the clean development mechanism) remains largely underdeveloped. These instruments are relatively sophisticated in comparison to other options and require extensive supporting regulatory infrastructure. Most tradable permit

⁴⁵ Smith, S. (2003) "Energy Taxation and Environmental Policy", Paper prepared for the SADC Conference on Excise Taxation, 11-13 June 2003, Pretoria, South Africa.

systems have been pioneered in North America (for emissions standards) or Australia (fisheries). Other notable examples include Singapore (CFC trading) and Chile (water rights). In general, they are very data intensive instruments requiring detailed knowledge of emissions (harvesting rates) and reliable enforcement.

Box 7: China's system of pollution taxes and subsidies

In the early 1980s, the Chinese government implemented a nationwide system of pollution taxes aimed at controlling water effluent, air emissions, solid waste and noise from industry. The primary objective of the scheme is to create sufficient incentives for industries to comply with environmental standards. Accordingly, the taxes are only imposed on units of emissions that exceed specified discharge standards and, therefore, are very similar in concept to non-compliance fees.

In an attempt to provide stronger incentives for firms to reduce their environmental impact, the tax revenues are earmarked into an environmental fund, the majority of which is used to subsidise investments by industries in pollution abatement technologies. If an individual firm that has contributed to the fund through tax payments decides to invest in pollution abatement measures, up to 80 per cent of the amount paid by the firm can be used to subsidise the proposed investment. However, in order to make the collection of the tax effective, *penalties* are also applied which industries are not able to recoup through subsidies.

Assessments suggest that the system has been effective in reducing the overall pollution intensity of Chinese industries. However, due to differing levels of enforcement between different jurisdictions, the system has been more effective in some regions than in others. All the assessments that have been undertaken to date suggest that there exists scope to increase the quantum of the charges.

Source: Wang, H. & Chen, M. (1998) "How the Chinese System of Charges and Subsidies Affects Pollution Control Efforts by China's Top Industrial Polluters", World Bank unpublished paper.

Based on existing experience, key features underpinning the effective operation of a tradable permit system are as follows:

1. Permits must be well defined;
2. Free and open trade must dominate the market;
3. The transaction costs and other aspects that limit the scope for trading must be kept to a minimum;
4. Permits should be bankable such that individuals have the flexibility to spend or save permits according to market fluctuations; and
5. The penalty for permit violation must greatly exceed the permit price.

The ability to trade a permit on an open market is the distinguishing characteristic of these systems. Open trade enables polluters to respond to price signals created by the limited number of permits. In a freely operating market, permits would be traded until the marginal abatement costs are equalised between different polluters. This would be an efficient outcome from an economic perspective. If the conditions for effective trading are not put in place, the overall costs to society could be greatly increased. It could also have knock-on impacts in terms of reduced overall competition in a particular sector if permits are used as barriers to entry. Creating the necessary market conditions for open trade will be difficult in South Africa because many industries are still largely oligopolistic and

dominated by a small number of large firms. This is likely to limit the level of trading, which, in turn will undermine the effectiveness of these kind of systems.

In terms of generating revenue for the fiscus, tradable permit systems are not likely to be as effective as tax instruments although this will depend on how the permits are initially allocated. There are several options but the usual approach is for government to allocate permits freely according to historical use or emissions (*grandfathering*). In this case, little or no government revenues will be generated and those individuals or groups receiving the permits will experience windfall gains. There are relatively few cases where permits have been auctioned to raise revenue for government despite this being widely regarded as the better option in many cases.

For the above reasons, tradable permit systems are, at present, less appropriate for use in South Africa than fiscal reform options, both in terms of operational practicalities and their potentially small contribution to revenue raising objectives. In future, they may have a role under *niche* circumstances, particularly in improving local level natural resource management. Such opportunities will need to be investigated further.

4.4 The appropriate level of government intervention

Many environmental issues can be differentiated according to geography or location. For example, a particular pollutant can have very different negative impacts depending on where and when it is emitted. Similar principles are applicable to other environmental issues such as land transformation and biodiversity loss. Under such situations where damage costs are not homogeneous, choosing the appropriate level of intervention is important to ensure that a particular market failure is efficiently addressed and that any intervention takes into consideration the relevant costs and benefits.

Typically, the environmental issues outlined in Chapter 2 can be broken down into the following categories:

1. Global environmental issues that are best addressed through multi-lateral efforts to ensure the provision of global public goods and services;
2. National environmental issues that are best addressed by national governments;
3. Provincial or regional environmental issues that are better addressed at a sub-national level; and
4. Local environmental issues that are more appropriately dealt with at a local government level.

Not all environmental issues can be neatly placed into each of these categories and there can be strong linkages between global and national / sub-national levels in some cases. For global or trans-boundary issues, unilateral action by an individual country or region has to be considered carefully. Little may be achieved if the end result of an intervention serves to relocate sources of pollution to a different country or region that has not taken any action to address the environmental issue. Similar issues can be applicable to more

localised environmental problems. Although there is little empirical evidence to support the idea of *pollution havens* or that geographical regions enter into competition against one another to lower environmental standards to attract investment, care must still be taken to mitigate against such incentives. Where sources of pollution are highly mobile, there may be benefits in having a common framework across different regions specifying minimum tax rates or standards. This is the approach taken in the new Air Quality Management Act where minimum (ambient) air quality standards are determined at a national government level. Where there are specific localised air pollution problems, provincial and local governments are empowered to set stricter standards.

The selection of an appropriate level of government intervention, guided by inter-governmental relations as defined in The Constitution, is likely to impact on the choice of instrument. Different instruments may operate better and more efficiently at different levels of government. For example, where the number of polluters is high and their abatement costs relatively varied, there may be a strong case for using a national tax instrument over regulatory alternatives since the overall cost savings are likely to be much greater. However, if the damage costs associated with the polluting activities also vary considerably and local government level intervention is deemed most appropriate, then a tax instrument may no longer be the most suitable option when the administrative costs and practical implications are considered. Highly differentiated taxes can lead to excessive complexity, which may, in turn, undermine the effective operation of the instrument.

4.5 The policy development process

Establishing a clear process for considering the application of market-based instruments is important. The process followed in selecting and ultimately developing an instrument can have important implications for its success. The broad framework presented below does not seek to determine the relative merits of a particular proposal or to provide a detailed set of rules that must be followed. Rather, the intention is to provide a series of guidelines for line departments, provincial and local government as well as the National Treasury with the aim of ensuring a more coordinated government approach. For each individual set of circumstances, the framework needs to be applied with the necessary judgement and flexibility.

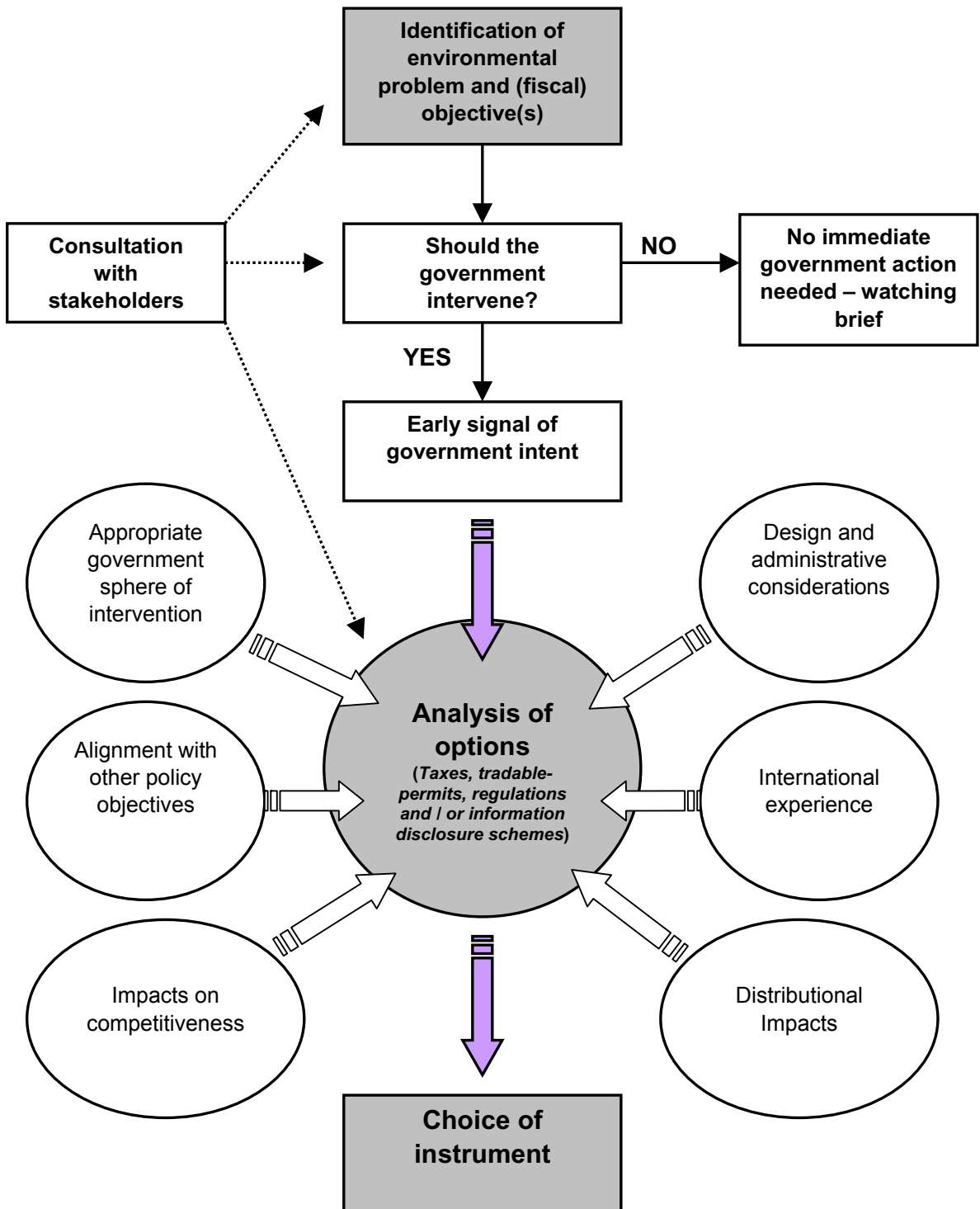
Establishing goals and objectives	At the outset, it is important to have a clear environmental and possibly fiscal objective. Chapter 2 provided an overview of some of the major environmental issues and objectives for South Africa and the way in which responsibility for them is differentiated between different line departments and spheres of government. Consultation with all relevant stakeholders will be an important part of problem conceptualisation and establishing objectives. Valuation estimates can lend support to these goals and should be used where appropriate.
Justifying the need for government intervention	Once a goal has been identified, the source of market failure needs to be analysed and the rationale for government intervention justified. This will involve detailed analysis of the way in which current markets and relevant industries operate, the level of competition between different groups and

firms, and an assessment of current government interventions and relevant policies. For the government to take (additional) action, it must be confident that the benefits of any (further) intervention will outweigh any costs incurred. Where immediate and / or direct action is not deemed necessary, government should maintain a watching brief with the intention of periodically reviewing the need for future intervention.

Signal of government intent	Having justified the need to take action, an early signal of government intent and consultation with all relevant stakeholders can add value to the process at this stage and assist with the timely development of an appropriate solution.
Assessment of options	As discussed in section 4.2, there are many ways in which government can intervene to correct for market failures relating to the environment. These were divided into four different categories: <i>using market</i> , <i>creating markets</i> , <i>environmental regulations</i> and <i>engaging civil society</i> . Choosing between different instruments is a key stage in the process. Certain instruments will be more or less applicable depending on the specific goals and objectives that have been identified and how well they are able to contribute to other policy objectives (e.g. sustaining employment opportunities, etc). As already noted, taxes and charges are likely to have some advantages over other market-based instruments and some forms of regulation. Nevertheless, the relative costs and benefits of all options still need to be considered. In particular, static and dynamic efficiency, likely administrative complexity (including monitoring and enforcement), and competitiveness / distributional implications need to be assessed. The sphere of government through which an instrument may be implemented will be of significance.
International comparisons and possible design issues	International comparisons may also be an important consideration and may help inform the choice of instrument(s). Finally, instrument selection should ideally be informed by stages further down the policy development process such as design and implementation issues. Whilst these stages can only be explored in earnest once a decision has been made concerning which instrument to use, consideration needs to be given to any potential difficulties in this respect at an early stage.

Figure 2 links key stages in the policy development process in the form of a flow chart. Although these are presented sequentially in the diagram, there are likely to be important cyclical aspects to the process. Note that much of the analysis undertaken at this stage will be targeted towards choosing the most appropriate form of intervention. Once this decision has been taken, much more detailed micro analysis will be required concerning specific design options and potential impacts on competitiveness and distributional issues.

Figure 2: A process for considering the application of market-based instruments



CHAPTER 5: CRITERIA FOR ASSESSING ENVIRONMENTALLY-RELATED TAXES

5.1 Principles of environmentally-related taxation

The National Treasury believes that, where appropriate, environmentally-related taxes could have an important role to play in South Africa's future tax policy. In combination with other measures, such as regulation and voluntary approaches, these instruments can play a role in meeting current and future environmental challenges. In addition, environmentally-related taxes could help to improve the efficiency and equity of the tax system.

The process presented in Figure 2 outlined the main issues that need to be considered when identifying the rationale for government intervention and when selecting an appropriate form of intervention. Where an environmentally-related tax is selected as being potentially suitable, like other tax instruments, it must be developed in line with the principles of good taxation. It is important to ensure that these instruments contribute to fiscal integrity, are capable of raising revenue efficiently and are able to achieve their intended environmental outcomes. However, not all of the generally accepted principles (as outlined in chapter 3) will be relevant in every case. Table 6 outlines some guidelines in this respect and the extent to which the major principles of taxation can be applied when environmental objectives are considered.

5.2 Criteria for assessing environmentally-related taxes

In addition to the general principles, more detailed criteria are needed to assess the appropriateness of environmentally-related tax instruments. Due to the diverse nature of environmental objectives and the range of tax options that could be used to address them, a simple weighting or ranking exercise is not appropriate. Instead, a range of broad criteria based on best practice is proposed. From National Treasury's perspective, these will be the key criteria used to assess different environmentally-related tax instruments and should be taken into consideration by other line departments and stakeholders when considering or developing proposals for these instruments. Most of the criteria are relevant to assessing the appropriateness of other market-based instruments.

Table 6: Guiding principles of environmentally-related taxation

General Tax Principle	Description	Applicability to environmentally-related taxation
Neutrality	A tax should not unduly influence economic decision-making or the allocation of resources. This is particularly so where the intention of the tax is solely to raise revenue for the fiscus.	<p>Applicable where the objective of an environmentally-related tax is predominantly to raise revenue (as with the levy on plastic bags for example).</p> <p>Not applicable where environmentally-related taxes have an incentive effect and it is the policy objective to strengthen this effect. In many cases, the principle of neutrality will not apply and it will be an explicit objective of the tax instrument to change taxpayer behaviour. Under such circumstances, it may be appropriate to ensure the tax is as visible as possible.</p>
Equity	Relates to the <i>ability to pay principle</i> . Horizontal equity requires that similar individuals be treated similarly. Vertical equity requires that those in different circumstances bear appropriately different burdens.	Generally applicable – principles of horizontal and vertical equity should be applied to the greatest extent possible.
Certainty, simplicity and minimising costs	<p>Taxpayers should be certain about the tax liability in a given set of circumstances. Simplicity is important to ensure greater certainty and facilitate cost minimisation.</p> <p>Administration and compliance costs should be kept to a minimum. Equally, the loss in welfare to society as a whole (the dead-weight loss) should be kept to a minimum.</p>	<p>Applicable – environmentally-related taxes add an extra layer of complexity where there is a specific environmental objective. Consequently, many taxes can be complex and the need for certainty and simplicity can not be over-stated.</p> <p>Applicable - as with all taxes, the ratio of costs to revenues should be as small as possible. Establishing new tax administration systems can be expensive. Equally, compliance burdens for taxpayers must be kept to a minimum.</p>

Ideally, consideration should be given to analysing the environmental objective(s) and the difficulties this may cause for tax design *before* a decision regarding the choice of instrument has been made. Where a tax seeks to achieve an environmental objective, all the criteria together aim to assess two fundamental questions:

- Can a tax measure be used to address the environmental issue?
- Is that tax measure the best way of addressing the environmental issue?

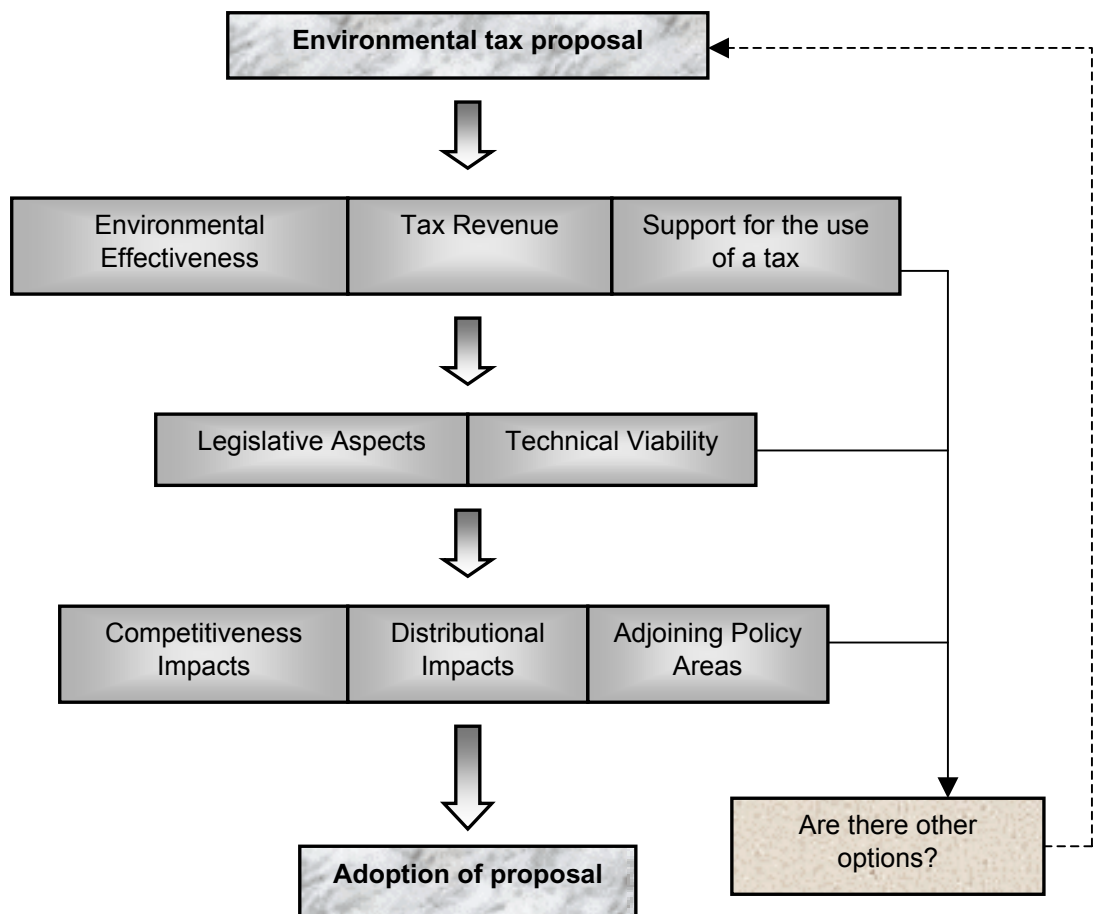
From the instrument selection process outlined in Figure 2, some idea of the potential suitability of a tax measure may be evident. However, in order to answer these questions more fully, some form of *ex ante* appraisal is necessary which aims to understand, to the

greatest extent possible, what the effects of the tax measure are likely to be, particularly in relation to potential impacts on competitiveness and income distribution. Whilst it is not always possible to anticipate all the likely impacts through economic models with absolute certainty, the *ex ante* assessment exercise should be capable of determining, with a degree of confidence, that the benefits of the proposed tax measure are likely to outweigh the costs incurred. In addition, where certain industries or income groups are likely to suffer (genuinely) unacceptable burdens as a result of a tax measure, possible mitigating and compensation measures should be identified at this stage.

In addition to *ex ante* assessment, *ex post* evaluation that seeks to understand the actual effects of a tax measure (or other forms of government intervention) is also important. Due to the difficulty of disentangling the effects of a specific tax measure, it is important to identify appropriate criteria against which the assessment will be made.

Figure 3 outlines the criteria that need to be used when considering the suitability of a specific environmentally-related tax instrument. Each is discussed in more detail in the following sections.

Figure 3: Suggested criteria for assessing environmentally-related tax proposals⁴⁶



⁴⁶ HMCE (2002) "Appraising Environmental Taxes: A tool for Assessing New Proposals", Environmental Taxation Department, Her Majesty's Customs and Excise, UK.

5.2.1 Environmental effectiveness

Linking the tax to the externality

Where there is a clear environmental objective, the tax must be well targeted to that objective. Ideally, there should be a direct link between the environmental issue and the tax. Under such circumstances, incentives to change taxpayer behaviour are likely to be stronger and unintended side effects minimised. Where a direct link is not possible, the closest link should ideally be used instead, for example, where the objective is to reduce vehicle emissions into the atmosphere, a tax per unit of emissions would be one of the closest links to the environmental externality. However, this option is not technically or administratively feasible. Instead, taxing the consumption of petrol / diesel and / or vehicle use may be used as a proxy for air emissions, since their consumption can be linked (although one step removed) to vehicle emissions.

Aiming for best design and small number of exemptions

To ensure that the tax is as effective as possible, the *best design* should be aimed for. As a rule, exemptions should be kept to a minimum so as to not impact adversely on administrative requirements. In some cases, concessions may be necessary to avoid creating perverse incentives that undermine the environmental effectiveness of the tax. For example, in attempting to reduce local air pollution and encourage greater energy efficiency, a number of countries have implemented taxes on electricity consumption. Renewable energy is usually exempted in recognition of its environmental advantages. Were it not exempted, confusing signals would be sent to taxpayers. Similarly, it may be necessary to broaden the scope of the tax to ensure that perverse incentives are not created for any non-taxed goods or services (See section 5.2.5).

In general, if concessions are to be granted to those contributing to environmental damage, they should take the form of lower tax rates rather than complete exemptions.

5.2.2 Tax revenue

Level of tax revenues

Some environmentally-related taxes have the potential to raise significant amounts of revenue. This is particularly so where the demand for the good or service being taxed is relatively price inelastic. Taxing price inelastic goods and services is generally regarded as good tax practice since decisions concerning the allocation of resources are not unduly influenced and revenues are likely to be buoyant over time (i.e. they are capable of growing as the economy grows). Environmentally-related taxes are not capable of raising large amounts of revenue where the particular good or service being taxed is very responsive to changes in price. In such instances, a tax could create strong incentives for consumers and / or producers to alter their behaviour. Consequently, revenues from the tax are likely to be comparatively small and decline over time.

A good example of a price sensitive product and related environmental tax is the Irish tax on plastic shopping bags, which was introduced at 0.15 Euros per bag in March 2002. An estimated one billion plastic bags were

thought to be given out each year before the tax suggesting possible tax revenues in the region of 150 million Euros given no change in the quantity demanded. However, within a very short period of time after its introduction, consumption of plastic bags had fallen by up to 97% in some areas of the country, illustrating a very strong and rapid behavioural response⁴⁷.

Use of tax revenues How the revenues are used may be an important aspect of the political acceptability of the tax. Further information on earmarking is provided in section 6.6.

5.2.3 Support for the tax

Assessing support for tax reform measures Although taxes are generally perceived as a necessary evil and are not very popular, they are necessary to fund government activities and the provision of public goods and services. The introduction of a new tax or reforms to an existing instrument will be much easier if there is public support and acceptance (or a lack of opposition to it). Where this is the case, improved standards of tax morality and compliance may result.

In every case, there are likely to be winners and losers. Identifying these groups, their respective lobbying power and the extent to which they hold information that the government doesn't, are important steps in the assessment process. Similarly, ensuring that all relevant stakeholders are engaged will be an important aspect of building support for any tax reform.

5.2.4 Legislative aspects

Compatibility with other tax legislation and government commitments The Minister of Finance is responsible for the tabling of all legislation that imposes taxes. This duty is entrenched by sections 73 and 77 of The Constitution, in terms of which the Minister of Finance must submit a Money Bill to Parliament when taxes, duties or levies are imposed. Hence the National Treasury is the responsible government line department for the approval and implementation of all tax legislation, often in consultation with SARS that is responsible for tax administration.

In general, various environmentally-related tax instruments would rely on different tax legislation. Direct tax interventions would rely on direct tax legislation (e.g. the Income Tax Act), while indirect tax measures would be determined by indirect tax legislation (e.g. the Customs and Excise Act, Value-Added Tax Act or separate levy legislation). For example, most tax arrangements related to transport fuel are dealt with through the Customs and Excise Act, while tax arrangements on corporate tax would fall under the Income Tax Act.

The Constitution assigns the functional areas of competence between the three tiers of government, i.e. national, provincial and local. The

⁴⁷ Ibid.

Constitutional prescriptions in this regard have to be adhered to when legislative measures are introduced to implement environmental tax measures that will affect different tiers of government and / or intergovernmental arrangements. In a broader sense, environmental legislative measures would also have to be compatible with South Africa's commitments in terms of its World Trade Organisation (WTO) agreements, as well as the ongoing tax harmonisation efforts within the Southern African region through SADC.

5.2.5 Technical and administrative viability

Defining the taxable commodity

Technical and administrative issues are some of the most challenging aspects of environmentally-related tax development. The importance of a well-defined taxable commodity or event has already been highlighted in relation to environmental effectiveness. The tax base should be as close to the actual environmental objective as possible and should ideally be based on a precise and discretely measurable unit of pollution. Where this is not the case, a suitable proxy must be identified.

Setting the tax rate

How and at what level the tax rate is set is a critical design aspect. In an ideal world, the tax rate would be set according to the level of the externality, thereby reducing external costs to the socially optimal level. However, due to the difficulties in placing monetary values on environmental externalities and the inherent unreliability of these estimates, it is generally not appropriate to use such estimates for this purpose. Where there is a specific environmental target, how the quantum of the tax translates into specific environmental outcomes needs to be understood. Consideration must also be given to phasing in the tax gradually, with tax rates increasing over time (and with a significant pre-announcement period), or whether the intended tax rate should be adopted from the outset. In order to give taxpayers sufficient time to adjust, gradual implementation with pre-announcement is advisable.

Tax avoidance and evasion

Tax avoidance and tax evasion are potential problems that should be dealt with at the design stage. Perhaps most importantly, care must be taken not to create perverse incentives in the design of the tax. A good example of this would be a tax on (certain forms of) waste disposal. Such a tax would raise the cost of disposal through formal channels, thereby creating incentives at the margin to dispose of waste either illegally or through alternative means that may not be environmentally preferable. The extent to which avoidance and evasion can be policed and the availability of non-taxed substitutes are important aspects that need to be considered. Both could seriously undermine the effectiveness of the tax and the revenues generated. The importance of adequate monitoring and enforcement can not be over emphasised and the effectiveness of any tax instrument will ultimately depend on it. Where taxes are implemented on products, the international context becomes important and consideration must be given to cross-boarder shopping, comparable taxes and tax rates in neighbouring countries.

Collection costs Implementing a new tax can be expensive and the risks of evasion and avoidance can impact adversely on collection costs. In order to minimise set-up costs, evasion and other aspects of non-compliance, *taxation at source* is desirable since this approach usually minimises the number of statutory taxpayers, which in turn minimises costs and leakages. However, this may not always correspond to targeting the environmental externality in the most direct way possible. In terms of revenue yield, the ratio of revenue collected to the costs incurred in collecting that revenue might be an important consideration.

Collection costs will also be influenced by the entity responsible for collecting the tax. SARS is the primary collection agency for most tax revenue in South Africa. The costs associated with a new tax instrument are likely to be greatly reduced if economies of scale and the existing administration systems are exploited to the fullest extent possible. Where administration systems are in place with other agencies (such as DWAF), it may be more appropriate to build on these systems rather than to involve SARS to administer certain tax instruments, e.g. the proposed Waste Discharge Charge System.

Compliance costs Collecting taxes does not only impose costs on tax administrators. The compliance costs for taxpayers might be substantial, particularly as emphasis moves towards self-assessment. As a rule, compliance costs need to be kept to a minimum, particularly for small and medium size enterprises.

5.2.6 Competitiveness effects

Assessing competitiveness impacts The impact on the competitiveness of local industries is of critical importance when assessing tax instruments and is likely to vary greatly according to the tax base and the tax rate. It should be noted that any measure seeking to influence behaviour, be it regulation or taxation, will have knock on economic effects. This is indeed the intention of all such policy interventions. Understanding the nature and extent of these effects and who will ultimately bear the burden is important in order to minimise any adverse competitiveness impacts.

The formal incidence of a tax (i.e. the point at which the tax is legally assessed) is different from the effective incidence (i.e. where the economic burden of the tax actually falls). Depending on the point of formal incidence, a tax may be passed forward to consumers of goods or services or alternatively backwards along the supply chain to producers, providers of labour, capital and / or natural resources.

Issues around competitiveness are most likely to arise when environmentally-related taxes are imposed on products or key factors of production that are traded in international markets. Substitution possibilities are also important in the sense that if there is limited scope for the adoption of cleaner technologies and processes, then there is reduced ability to

substitute away from the tax. Economic modelling would be required to analyse the impact on competitiveness to the greatest extent possible⁴⁸.

For industries competing primarily in the domestic market, there exists scope to pass on the tax burden in the form of higher prices. The extent to which this can be done will depend largely on the price elasticity of demand for the affected good or service and the degree of competition from imports. Different domestic firms or industries are likely to be impacted on in different ways and competition between them could be (adversely) affected. Second order impacts on investment, employment, inflation and other key variables need to be considered.

For those industries that are exposed to international competition, the ability to pass on the tax in the form of higher prices may be restricted even further since local firms are unlikely to have significant influence over price levels. Where environmentally-related taxes would potentially have significant negative impacts on the competitiveness of local industries, certain mitigating measures may be required. Such measures can include:

- Reduced tax rates, tax ceilings or in extreme cases complete exemptions;
- Tax refunds;
- Recycling revenues;
- Gradual implementation and phase in of a tax instrument;
- Boarder tax adjustments; and
- Tax harmonisation.

The way in which tax revenues are used is also very relevant. If environmentally-related taxes are implemented as part of a tax shifting exercise, revenues can be recycled back to industry in the form of lower payroll taxes for example. Whilst the actual impact would vary from firm to firm, the overall impacts on competitiveness could be greatly reduced through such an approach.

5.2.7 Distributional impacts

Income distribution effects

The way in which environmentally-related taxes impact on different income groups is of utmost importance. As outlined in section 3.1, any tax instrument should ideally embrace vertical and horizontal equity considerations. The extent to which an environmentally-related tax may be regressive depends in part upon the tax base and how the tax is designed. There exists scope in some cases to design a tax so that it is progressive whilst preserving the environmental incentive. In other cases, particularly with certain product taxes, this will be more difficult.

For every environmentally-related tax instrument, the effective tax burden on different income groups and the anticipated distribution of environmental benefits needs to be assessed. Where an environmentally-related tax

⁴⁸ See OECD (2001) "Environmentally-related taxes in OECD Countries: Issue and Strategies", OECD Paris.

instrument has unacceptable distributional effects, mitigation and compensation measures should be considered. Mitigation measures seek to reduce the overall burden of a tax on specific income groups. In some cases, it might be difficult to build such relief measures into the design of the tax or to effectively target and administer such measures. Alternatively, compensation measures could be considered. These are *ex post* measures that seek to compensate special groups through alternative means such as tax refunds or income supporting measures.

5.2.8 Adjoining policy areas

Alignment with environmental measures The extent to which environmentally-related taxes can assist in meeting other policy objectives is an important consideration. With respect to environmental goals, it is important that the tax is aligned with complementary measures such as regulation or voluntary agreements and that where a range of measures are introduced to achieve an environmental objective, they are mutually supportive of one another. Where there may be potential trade-offs, these need to be identified and adequately addressed.

Alignment with other social and economic objectives The extent to which environmentally-related taxes can contribute towards achieving other social and economic objectives is also important. Job-creation, poverty alleviation and the expansion of basic services such as electricity, water and sanitation are some of the major challenges facing South Africa. Where practically possible, environmentally-related tax measures should assist in meeting these goals.

In certain cases, other policy processes that do not have an explicit environmental objective may drive an environmentally-related tax reform measure (see section 6.3.1 on the electricity industry restructuring process). Ensuring that environmental issues are mainstreamed into these processes is important to ensure a sufficiently balanced approach.

CHAPTER 6: OPTIONS FOR ENVIRONMENTAL FISCAL REFORM MEASURES IN SOUTH AFRICA

Fiscal policy in general, and tax policy in particular, contributes towards an enabling environment in which economic activities take place. How and what government taxes sends signals that can support or discourage certain economic activities. In its efforts to promote equitable and high levels of economic growth, the National Treasury recognises that the *quality* as well as the *quantity* of growth matters. Environmentally-related taxes can play a role in ensuring that growth is sustainable and discouraging activities that impose high social costs in environmental terms.

In the following sections, the conceptual differences between taxes, levies and user-charges are discussed and some tax reform options that could contribute towards meeting both fiscal and environmental objectives are presented. The list is not intended to be exhaustive and any option must be evaluated using the criteria outlined in Chapter 5. In presenting these options, due consideration is given to the regulatory and institutional capacity needed to ensure that the instruments are able to function effectively. The reform options have been divided into four categories:

- Options for reforming existing environmentally-related taxes and charges;
- Options for introducing new environmentally-related taxes;
- Options for reforming non-environmentally-related taxes with perverse environmental incentives; and
- (Tax) incentives to improve environmental outcomes.

6.1 User charges, levies and administrative fees

Section 1.2 briefly defined taxes, levies, user-charges and earmarked taxes. Despite the significant conceptual differences between taxes and user charges, under certain circumstances, it can be difficult to clearly distinguish between the two. In order to minimise these grey areas, it is important to interpret the definitions as strictly as possible. When attempting to improve environmental outcomes via the use of fiscal instruments, it is difficult to state categorically and for every circumstance whether taxes or user charges should be employed. The aim of this section is to elaborate on these concepts and to provide some guiding principles in order to inform discussions on the options for environmental fiscal reform.

In South Africa, the imposition of user charges and administrative fees may require the concurrence of the Minister of Finance, but it does not require the submission of a Money Bill. It is necessary, therefore, to have a clear basis for distinguishing taxes, duties, and levies from user charges and administrative fees.

6.1.1 Taxes and levies

A tax is defined as a compulsory *unrequited* payment not proportional to the good or service received in return for that payment. Since the payment made by an individual or firm does not necessarily equal the benefit derived, the *general benefit principle*, but not the *individual benefit principle* applies. In South Africa, most tax revenues flow into the national revenue fund and are allocated to priority spending needs through the national budget process.

Levies are classified as taxes in terms of international classification standards, i.e. System of National Accounts (SNA) and the Government Finance Statistics (GFS) Manual. The imposition of taxes and levies falls under the supervision of the Minister of Finance. By virtue of sections 73 and 77 of the Constitution, such supervision is provided for through the requirement that the Minister of Finance must submit a Money Bill to Parliament when taxes, duties or levies are imposed. Determining characteristic of taxes and levies include the following:

- No direct benefits accrue to individual beneficiaries in exchange for payments made;
- Payments are enforced in terms of legislation; and
- Government or organs of State directs the use of tax revenues.

6.1.2 Earmarked taxes and levies

Where all or part of the revenues from a tax or levy is allocated to a specific spending purpose, earmarking or hypothecation is practiced (see section 6.6). A good example of an earmarked tax in South Africa is the Road Accident Fund levy, the revenues from which flow into a dedicated fund used to compensate victims of road accidents.

Where taxes are explicitly earmarked, as a general rule, total receipts from the tax should not recover more than the total costs of providing the good or service. The normal practice to achieve this is to set the level of the tax equal to average cost. It follows that earmarked levies for services should not be used to cross-subsidise other services. A statutory earmarked levy / tax should only be considered where it is not possible or impractical to finance the intended services and functions by way of user-charges. For example, where user-charges will provide unearned benefits to persons who choose not to pay, but still consume the good or service (the so-called free-rider problem), the use of a levy may be more appropriate.

Where earmarked levies are approved, it is necessary to periodically review the rationale for their continued existence. Periodic re-evaluation of such levies would be aimed at ensuring administrative efficiency, fairness and appropriate controls over the allocation of revenue.

6.1.3 User charges and administrative fees

User charges and administrative fees can be defined as *requited* payments for specific goods or services rendered. These payments are based on the individual benefit principle and attempt to link the amount paid to the benefit received by a specific individual.

Determining characteristics of a user-charge include the following:

- A marketable service is provided to identifiable beneficiaries;
- Direct and proportional benefits accrue to beneficiaries in exchange for payments; and
- Transactions take place in a willing buyer market.

Determining characteristics of an administrative fee include the following:

- A service is provided to identifiable beneficiaries;
- Direct benefits accrue to beneficiaries; and
- Payment is required for the provision of certain government goods and / or services.

In general, user charges and administrative fees are sound forms of part financing or self-financing because the costs are borne directly by the beneficiaries. User charges are usually determined by transactions in a willing buyer market. Regulating the level (and use) of such charges, unless monopoly conditions prevail, should be kept to a minimum. As a guiding rule, user charges should not exceed the average cost of providing the good or service. In some instances, user-charges might be set below average cost to ensure affordability.

Administrative fees are sometimes imposed by government departments where, having decided to deliver the goods or services as a matter of public policy, a fee is imposed or some items are sold rather than provided free of charge to defray some of the costs or to eliminate excess demand that otherwise would exist.

The Report of the Committee of Inquiry into a Comprehensive System of Social Security for South Africa (the Taylor Report) distinguishes a separate type of user-charge it calls consumer tariffs. Consumer tariffs fulfil the same function as prices of private consumer goods by allocating consumer spending to different factors of production. In this sense consumer tariffs have no consumer regulation function, nor a redistribution of wealth function. The only objective of consumer tariffs is to yield sufficient income to cover the full costs of supplying services to individual consumers. The tariff covers only the per unit costs of the services supplied. Where consumer tariffs are set at levels to deliberately induce a revenue surplus, this surplus constitutes a tax with a redistribution of wealth effect.⁴⁹

Box 8 below gives a description of how user charges and taxes can be applied in an environmental context. The example cited illustrates why environmental taxes should not be considered as user charges, as the payments made will not be in proportion to the benefits received for those payments. Box 9 outlines how user charges and taxes relate to the polluter pays principle. It is important to note in this regard that a tax that achieves the desired environmental objective is consistent with the polluter-pays principle.

⁴⁹ Taylor Report, pp. 138-139.

Box 8: Taxes and user-charges in an environmental context

Although there are significant conceptual differences between taxes and user-charges, applying the concepts in certain environmental contexts can be difficult and there are some potential grey areas. Taking the example of atmospheric emissions, how should user-charges and taxes be conceptualised with the aim of internalising negative externalities?

Tax

- No direct benefits accrue to individuals in exchange for payment;
- Payments are enforced in terms of legislation; and
- Government or organs of the state direct the use of tax revenues.

User-charge

- A marketable service is provided to identifiable beneficiaries;
- Direct and proportional benefits accrue to beneficiaries in exchange for payments; and
- Transactions take place in a willing buyer willing seller market.

From a user charge point of view, it could be argued that the government, as custodian of national air quality is providing a *service* to all those using the atmosphere and that polluters are therefore deriving a benefit from being allowed to use the resource as a pollution sink. Because the atmosphere, like other environmental resources, has a certain assimilative capacity (i.e. limited levels of pollution can be emitted without impacting excessively on other users or on ecosystem processes) polluters could be regarded as *using* the atmosphere up to this point. Accordingly, user-charges could be considered as a means of defraying the administration costs incurred by the regulator. In an attempt to discourage excessive pollution, penalties (non-compliance fees) could also be imposed on pollution levels that exceed the assimilative capacity of the atmosphere. Note that regulatory measures could also be used to achieve the same goal. The quantum of the non-compliance fee would have to be sufficient to deter excessive pollution, i.e. greater than the pollution abatement costs. Since the payments made by the polluter would not necessarily be in proportion to the benefit received in return, the non-compliance fee would be more akin to a tax than a user-charge. In addition, since the atmosphere simply exists (there are no production costs incurred in providing air) the government is in a position to direct the use of the revenue generated from the non-compliance fee to priority spending needs.

From a tax perspective, an alternative way of attempting to internalise air pollution externalities would be for the government to tax emissions released into the atmosphere (note that this arrangement would be the same as a non-compliance fee with an authorised pollution level of zero). Polluters would then be faced with a choice; either they pay the tax and continue to pollute; or they reduce the level of pollution to avoid paying the tax. From an economic point of view, it would be advantageous for a polluter to reduce the level of pollution up to the point when the costs of doing so are equal to the level of the tax.

If a tax is selected as the preferred institutional arrangement, the environmental objective can be achieved *AND* revenues can be generated. The tax simply acts as an incentive mechanism and the way in which tax revenues are then used is un-related to achieving the desired environmental objective. If the revenues generated from the emissions tax are allocated to national spending priorities through the budget process, then benefits derived by the polluters from the taxes paid will not necessarily be in proportion to the benefits they receive in return. It should be noted that an emissions tax is still in line with the polluter-pays principle (see Box 9) and some of the revenue could be used to cover administrative and regulatory costs.

In summary, there are some conceptual grey areas and potential overlaps between taxes and user-charges in certain environmental contexts and proposals need to be considered on a case-by-case basis. In the case of air pollution, the application of user-charges would be closer to a traditional regulatory and cost recovery approach, whereas a tax would seek instead to internalise externalities through the price mechanism.

Box 9: Applying the polluter-pays principle

The polluter-pays principle is a relatively simple principle, which states that those responsible for negative environmental externalities should, as far as it is practically possible, bear the costs of internalising those externalities. Basically, it seeks to place the economic burden of reducing pollution on the polluters themselves to the extent that this is possible. The earliest definitions of the principle originate from the early 1970s when it was adopted by the OECD Council:

“ The polluter should bear the expenses of carrying out environmental protection measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the cost of these measures should be reflected in the cost of goods and services, which cause pollution in production and / or consumption. Such measures should not be accompanied by subsidies that would create significant distortions in international trade and investment”.

Essentially, the polluter-pays principle is a statement about property rights and distributional impacts. According to the Coase Theorem, the allocation of property rights between the polluter and those incurring the costs of pollution should not influence the attainment of an optimal level of pollution (although there may be important distributional impacts). Instead, the establishment of clear and enforceable property rights is of greater importance than their allocation. According to the theorem, where the polluter owns the right to pollute, it will be in the interest of those suffering negative environmental externalities to pay the polluter to reduce pollution up to the point where the benefits of doing so equals the costs suffered. Where property rights are owned by those suffering the impact of negative externalities, it will be in the interests of the polluter to compensate the victims up to the point where the benefits of doing so equals the costs incurred.

Strict adherence to the polluter-pays principle is the same as saying that, at all times, property rights should not rest with the polluter. In applying the principle, different countries have interpreted it differently but it is usually used to cover one or all of the following aspects:

- Regulatory costs or pollution control costs - polluters should bear the costs incurred by government (or an alternative regulatory body) of regulating polluting activities;
- Internalising negative externalities - i.e. polluters should bear the costs of reducing the *flow* of pollution to an acceptable level; and
- Victim compensation or environmental remediation costs - where such expenditures are deemed necessary, polluters should be forced to bear the burden.

The polluter-pays principles can, therefore, encompass user-charges (to the extent they cover regulatory costs or the costs of pollution control measures), taxes that seek to internalise negative environmental externalities, and liability payments that seek to award damages to victims of pollution or recover the costs of remediation activities. What is not supported by the polluter-pays principle are subsidies to help polluters reduce their environmental impacts, especially where these distort international trade or investment.

Source: Perman et al (2003) & OECD (2001)

6.2 Options for reforming existing environmentally-related taxes

Chapter 3 presented an overview of the existing environmentally-related taxes and charges in South Africa. For many of these instruments, environmental issues did not feature strongly in their design. Consequently, some opportunities exist to review the role of these instruments to improve environmental outcomes whilst at the same time generating revenues as intended. Table 7 outlines the options by theme. Each is discussed in more detail in the following sections.

Table 7: Options for reforming existing environmentally-related taxes

Theme	Instrument	Incentive mechanism	Shortcomings and key technical considerations
Transport (National Government)	General fuel levy	<ul style="list-style-type: none"> ▪ Increases the price of transport fuels, thereby suppressing demand; ▪ Discourage vehicle use; ▪ Encourage the use of public transport / vehicle sharing; ▪ Encourage the development of fuel efficient technologies; and ▪ Could encourage the use of certain fuels over others. 	<ul style="list-style-type: none"> ▪ Not differentiable for time and location of infrastructure use; ▪ Relatively far removed from the main source of environmental externality; ▪ Complementary policies required to increase its effectiveness such as information campaigns; ▪ Potentially regressive.
	Vehicle customs and excise duties	<ul style="list-style-type: none"> ▪ Increase the price of certain vehicles (building on the idea of a luxury tax) thereby suppressing demand for passenger and light commercial vehicles; ▪ Encourage the use of public transport / vehicle sharing; ▪ Could encourage the use of selected types of vehicles / technologies through differential taxation. 	<ul style="list-style-type: none"> ▪ High information requirements on vehicle types and technologies; ▪ Difficult to link tax to the time and frequency of infrastructure use (if desirable);
Transport (Provincial Government)	Vehicle licensing fees	<ul style="list-style-type: none"> ▪ Increase vehicle ownership costs and therefore suppress vehicle demand; ▪ By altering the fee structure to include environmental criteria, appropriate incentives could be offered to vehicle users; ▪ Could be used to increase scrapping rate of older vehicles (i.e. differentiate fees according to the age of the vehicle). 	<ul style="list-style-type: none"> ▪ The environmental incentive is likely to be small; ▪ Must avoid over-complication of fee structure; and ▪ Potentially regressive.

Solid Waste (Relevant spheres of government)	Product taxes	<ul style="list-style-type: none"> ▪ Discourage the consumption / production of certain products; ▪ Could take the form of advanced disposal fees and raise revenue to finance recycling, re-use and product disposal. 	<ul style="list-style-type: none"> ▪ Can contribute to the proliferation of tax instruments and complicated funding mechanisms; ▪ Can be difficult to target the source of externality.
	Deposit-refund systems	<ul style="list-style-type: none"> ▪ Encourage certain products to be returned to relevant points. 	<ul style="list-style-type: none"> ▪ Can only be applied to certain products; ▪ Administrative and compliance costs can be high; and ▪ Not intended to raise revenue.
	Disposal taxes	<ul style="list-style-type: none"> ▪ Encourage a reduction in overall waste levels; ▪ Could discourage certain waste streams; ▪ Could be used to penalise certain forms of waste disposal over others; and ▪ Could be used to encourage up-grading of waste disposal facilities. 	<ul style="list-style-type: none"> ▪ May run counter to other waste management objectives; and ▪ May lead to perverse incentives and tax avoidance (especially in the context of hazardous waste).
	Differential User charges	<ul style="list-style-type: none"> ▪ Encourage reduced generation of waste; ▪ Encourage greater separation of waste at source; 	<ul style="list-style-type: none"> ▪ Exclusively a local government competence and only loosely associated to wider environmental fiscal reform objectives; and ▪ May be difficult to implement in low-income households.

6.2.1 Transport (*National Government*)

There are many different externalities associated with road transport in South Africa. Several studies have estimated the costs of these externalities to be in the region of R 34 to 55 billion per year⁵⁰. Of particular importance is the impact of vehicle emissions on human health, particularly pollutants such as particulates, sulphur dioxide and nitrogen oxides in urban areas. The same studies indicate that such costs (excluding lead and other heavy metals) could be in the region of R 10 billion per year. In an attempt to reduce these significant negative externalities, DEAT and DME have developed a joint strategy aimed at regulating emissions from road-going vehicles⁵¹. The strategy has two distinct components. The first revolves around developing cleaner transport fuels with the following specifications:

For petrol:

- All lead based additives are prohibited since January 2006;
- Heavy metal additives will only be allowed in lead replacement petrol;
- The sulphur content will be reduced from 500ppm to 50ppm by 2010;

⁵⁰ See section 2.4 and Annex 2 - Different studies have examined different externalities.

⁵¹ DEAT & DME (2003) "Joint Implementation Strategy for the Control of Exhaust Emissions from Road-going vehicles in the Republic of South Africa", Version 4, Final draft.

- The maximum benzene content is set at 3 per cent since January 2006 with the intention of reducing it to 1 per cent at a future date; and
- The maximum content of aromatics is set at 42 per cent since January 2006 with the intention of reducing it to 35 per cent at a future date.

For diesel

- The maximum sulphur content is set at 500ppm since January 2006 with the intention of making cleaner diesel with a sulphur content of 50ppm nationally available by January 2010.

The second is to ensure that all new vehicles conform to European vehicle emission standards. The timeline suggested for this is as follows:

- January 2004 – all homologated vehicles conform to Euro 1;
- January 2006 – all newly homologated vehicles conform to Euro 2;
- January 2008 – all newly manufactured vehicles conform to Euro 2;
- January 2010 – all newly homologated vehicles conform to Euro 4; and
- January 2012 – all newly manufactured vehicles conform to Euro 4.

In addition, the Department of Transport is developing a programme to address atmospheric emissions from road transport, particularly in relation to *problem vehicles*. The intention is to introduce some form of licensing system to ensure that certain vehicles (particularly heavy commercial vehicles) are well maintained and adhere to emission standards / prescriptions.

The general fuel levy indirectly acts as an incentive to reduce air pollution externalities caused by vehicle emissions. By increasing the pump price of transport fuels, consumer demand is suppressed to the extent that the demand for transport fuels is responsive to changes in price. Because petrol is a complementary good, higher fuel taxes tend to discourage the use of private vehicles and encourage the use of public transport / vehicle sharing. Additionally, higher fuel prices are likely to incentivise the demand for more fuel efficient technologies. However, quantifying the environmental effect of these incentives is quite complex. Due to the important contribution transport fuels make to the economy and an underdeveloped public transport infrastructure, the demand for transport fuels is not very responsive to changes in price.

A number of reform options exist to increase the contribution that the general fuel levy makes to air pollution objectives. Differentiated tax rates that reflect the external costs associated with fuel use could provide incentives and facilitate the introduction of cleaner fuel specifications. Accordingly, dirtier fuels would be taxed at a higher rate to discourage their use. Table 8 presents an overview of a proposed fuel tax framework.

Currently, leaded, lead replacement and unleaded petrol are taxed at the same rate. Over time, it is proposed that lead replacement petrol be taxed at a higher rate than unleaded petrol to discourage its use. Imposts on diesel are at present just under 86 per cent of the current tax burden on petrol. This reflects both the reliance of the primary sectors on diesel fuel as a production input and the current excess supply in the country.

Table 8: Proposed fuel tax framework for South Africa

Fuel	Type	Fuel tax burden (2005 / 2006)	Proposed fuel tax burden
Petrol	Lead replacement petrol (Leaded petrol prohibited in Jan 2006)	100%	100%
	Unleaded	100%	95%
Diesel	Standard (500ppm sulphur)	85.5%	95%
	Low-sulphur (50ppm)	Not yet available	85%
	Bio-diesel	52%	52%

From an environmental perspective, there is little merit in promoting diesel use over petrol. Whilst diesel engines are more efficient and have advantages in terms of greenhouse gas emissions, petrol engines can have air quality advantages and lower particulate emissions using basic abatement technologies. Since the diesel fuel tax concession addresses concerns over diesel input costs for off-road primary users, the proposed fuel tax framework aims to better reflect the environmental costs associated with diesel in comparison to petrol. The framework could be further refined to reflect other environmental externalities and objectives.

Although the general fuel levy could be reformed to better contribute to air quality objectives, the limitations of this instrument must be recognised. In particular, it is difficult to create more targeted incentives beyond those outlined above. Supplementary reforms in vehicle taxation could be used to this end and could help to incentivise the introduction of vehicles that produce fewer emissions and with increased fuel efficiency.

At the national level, reforms to existing vehicle excise duties could play an important role. Currently, new passenger and light commercial vehicles (both domestically produced and imported) are subject to an *ad valorem* customs and excise duty based on their value. The tax structure as it stands is a *luxury tax* based on price in the sense that the more expensive the vehicle, the higher the tax burden (up to a ceiling of 20 per cent). To the extent that more expensive vehicles use better technologies to reduce emissions into the atmosphere, the current imposts are not supportive of environmental objectives.

In taking environmental considerations into account, it would be appropriate to distinguish between the environmental costs imposed by different vehicles. This could be done according to a range of different criteria including vehicle type, fuel type, and / or emissions. In doing so, care must be taken not to adversely impact on the rate of renewal of the vehicle stock or the level of tax revenue. Since the external environmental costs resulting from the use of medium and heavy commercial vehicles are likely to be much higher than for passenger or light commercial vehicles, consideration could also be given to include these categories of vehicles in the excise duty net.

In summary, the options outlined above need to be investigated in more detail and in the context of the multiple policy objectives surrounding the transport sector. A holistic approach is required so that any potential trade-offs can be adequately addressed. Any tax reforms must, therefore, be integrated into wider transport policies and complement on-going initiatives.

6.2.2 Transport (*Provincial Government*)

Provinces have exclusive responsibility under the Constitution for provincial road management and traffic control. The Constitution, however, provides for concurrent responsibility for public transport, road traffic regulation and vehicle licensing. Motor vehicle registration and licensing, roadworthy testing, the issuing of learner's and driver's licenses, and other traffic-related activities are covered in the Road Traffic Act (Act 93 of 1996).

Fees (and levies) collected under the National Road Traffic Act remain the largest source of provincial own revenue, contributing just over 39.6 per cent in 2001/02 (R1.96 billion). This share is expected to increase to around 52 per cent by 2006/07. There are significant variations in levels of revenues collected between provinces. This results primarily from differences in vehicle license fee structures and the regularity of their revision, vehicle population and composition, commission structure and pay-over rates of agents.

Despite the upward trend in revenue collection over recent years, annual vehicle license fees in South Africa are very low in comparison to other countries⁵². There appears to be significant scope to simultaneously increase the revenues generated whilst at the same time creating better environmental incentives. Currently, vehicle licensing fees are based on tare (or net weight of the vehicle). There have been suggestions that license fees should instead be based on gross rather than net weight to better reflect the road damage caused by heavy and medium sized commercial vehicles.

There are a number of options to include environmental criteria in the license fee structure and to complement efforts undertaken at the national level. One possibility would be to include fuel consumption criteria with the less fuel efficient vehicles being required to pay higher licensing fees. Another (possibly complementary) option could be to differentiate fees according to different technologies such that vehicles without catalytic converters are charged at a higher rate.

However, given that licensing fees constitute such a small part of overall vehicle operating costs, the environmental benefits are likely to be small unless the fees are increased significantly. Moreover, because vehicle license fees are a cost on ownership and not on use, they are likely to have a limited impact on the actual use of the vehicle, and consequently its environmental impact, once a decision to purchase the vehicle has been made. Ensuring that information about license fees is linked to vehicle purchasing decisions is likely to be an important consideration for realising changes in environmental behaviour.

In exploring these options, care must be taken not to over complicate administrative systems since this could have implications for cost effectiveness and the levels of revenue collected. In addition, distributional implications also need to be carefully analysed. Finally, since vehicles are a relatively mobile tax base, there could be benefits in developing guidelines at the national level to avoid excessive tax competition between provinces and to reduce tax avoidance as vehicle owners are drawn to the provinces with the lowest license fees.

⁵² See Metschies (2001) "Fuel Prices and Vehicle Taxation", GTZ, Germany.

6.2.3 Solid Waste

Responsibilities for waste management are divided between all three spheres of government. Schedule 5 of the Constitution provides Local Government with exclusive authority over the functions of cleansing; refuse removal; refuse dumps; and solid waste disposal. Provincial Governments have a role in monitoring and providing support to local governments and ensuring that the allocated responsibilities in relation to waste management are effectively performed. National Government, particularly DEAT and DWAF, are responsible for policy oversight and perform certain licensing functions with respect to landfill operations.

The diverse nature of waste products and their forms implies an equally diverse range of environmental issues and objectives. The adoption of broad principles forms an especially important part of waste management approaches. The *waste hierarchy* outlined in Figure 4 is widely used to inform management practices in many different countries and is highlighted as a guiding principle for South Africa in the National Waste Management Strategy. The hierarchy makes logical sense and is in line with the idea that it is generally preferable to try to prevent environmental issues from arising rather than to try to mitigate them once they have occurred (i.e. prevention rather than cure). In practice, the application of these principles can be complex and the relative costs and benefits associated with different levels in the hierarchy may not always follow such a logical sequence.

Figure 4: Waste management hierarchy

Hierarchy	Description / Attribute	Outcomes
↑		
Avoidance	Preventative measures taken to avoid the generation of waste altogether.	Most Desirable
Minimisation	Partly a preventative measure. Where waste has to be produced, efforts should be taken to reduce its generation.	
Recycling / reuse	Partly a preventative measure. Waste can be recycled and/or reused in a variety of different ways and these should be explored in advance of disposal.	
↓		
Treatment	Where the possibilities for prevention, minimisation and recycling have been exhausted, the next priority is to reduce the amount of non-recyclable waste.	Least Desirable
Disposal	Finally, where all other alternatives have been exhausted, waste should be disposed of in the correct manner.	

Environmentally-related taxes and charges can be used in different ways to facilitate improved waste management practices and can be linked to all the different stages in the waste hierarchy. To be effective, every option must be considered in the context of wider waste management strategies. The main instruments can be broken down into four broad categories:

Product Taxes By taxing a particular product or product component, incentives can be created to reduce the amount of waste generated. One of the best environmental examples is the Irish *plastax* on the use of plastic shopping bags, which aims to directly reduce overall consumption of this item.

When considering the use of product taxes, it is important to clearly identify the source of externality. In some cases, it may be desirable to focus on directly reducing the consumption of a particular good and a strong incentive effect is required. In other cases, it is not necessarily the use of a good that needs to be discouraged, but what happens to the product once it has reached the end of its useful life. It is, therefore, the way in which the product is disposed of that imposes external costs that are not reflected in the price of the product. Several European countries impose product taxes with the aim of raising revenue to cover appropriate disposal / recycling practices. These interventions are aimed at the middle tiers of the waste hierarchy and are mainly implemented as part of extended producer responsibility regulations or agreements.

Where recycling targets or changes to disposal practices are an explicit objective, the role of government needs to be carefully considered. In certain cases, it may *not* be necessary for government to intervene with a tax instrument. Instead, the producers of a product may be able to adequately respond to a negotiated agreement. Where this is not the case and extra revenue is required, it may be more cost-effective simply to use on-budget funding. The case for developing a completely new tax instrument has to be carefully considered in this context.

Currently in South Africa, the only explicit environmentally-related product tax is the recently imposed levy on plastic shopping bags (see section 4.2). There are potential opportunities to expand product taxes at the national level to other goods such as packaging, tyres, batteries, electronic equipment and white goods, fluorescent tubes, and paper and card. For many of these products, the main environmental externalities relate to the way in which these products are disposed of rather than their use. Such possibilities need to be explored in more detail and due recognition needs to be given to the existing waste management initiatives being undertaken by the private sector and community organisations.

Deposit-refund systems Deposit-refund systems operate on a relatively straightforward principle. A charge (deposit) is imposed at the point of sale. When a product has reached the end of its useful life, the consumer is able to claim a refund (equal to the deposit paid) by returning the product to a relevant place. In this way, deposit-refund systems reward desirable behaviour, rather than penalising inappropriate behaviour. Although these systems do not provide incentives for waste avoidance or minimisation directly, they are useful mechanisms for ensuring that products are returned to an appropriate recycling point.

Deposit-refund systems are most suitable for products that:

- Are easy to identify and handle;
- Are feasible to reuse and/or recycle;
- Require careful disposal (e.g. batteries); and
- Where cooperation is feasible between producers, retailers and consumers.

South Africa has a number of locally-based deposit-refund schemes in operation, particularly relating to glass / plastic beverage containers. International experience indicates that deposit-refund systems can be successfully applied to a wide range of other products such as batteries, reusable chemical containers and even car bodies. One major criticism of these instruments is that the administrative and compliance costs can be high in comparison to alternative options. This may partially explain why, in many countries, the number of private sector programmes have generally declined over time. In considering any further use of deposit-refund systems, administrative and compliance costs should be taken into account, including any possible knock on impacts for other waste management services.

**Disposal
Taxes**

Disposal taxes are linked with the final stage in the waste management hierarchy. The basic principle behind these instruments is that by discouraging the disposal of waste or certain forms of waste streams, other options for waste management will be incentivised further up the hierarchy. In addition, incentives can be provided according to the method of disposal (e.g. encouraging incineration over landfill) or the disposal site (e.g. by differentiating rates according to the quality of the disposal facility).

The use of these instruments has grown in many European countries and has mainly formed part of tax shifting exercises. Their appropriateness for South Africa should be investigated and must be considered in the context of broader waste management strategies. However, such taxes have been demonstrated to create perverse incentives for people to dispose of waste through illegal or semi-legal channels. Consequently, adequate enforcement measures could result in substantial costs to deal with illegal waste disposal. Perhaps of greater immediate importance is ensuring that more waste is disposed of through formal channels and that adequate collection and disposal systems are expanded to those groups that currently do not have access.

**Differential
tariffs for
waste
services**

The way in which tariffs are applied for waste collection services, treatment and disposal can provide strong behavioural incentives for waste producers. As far as possible differential charging or *pay-as-you-throw* principles are widely advocated for collection services to encourage improved waste minimisation and to increase the amount of waste collected that is suitable for recycling, reuse and composting.

In South Africa, the way in which local governments finance and charge for municipal solid waste services varies greatly between local jurisdictions. At

one extreme, some municipalities fund these services entirely via property taxes whilst at the other extreme, costs are recovered almost entirely through a system of user-charges. Many municipalities use a combination of these two options, which is logical since there are public and private good components to solid waste services. In certain cases, funding for waste management is topped up through the equitable share allocations⁵³. Where user-charges are applied, many municipalities base their charges on income or plot size, whilst others charge according to the frequency of collection or per container.

Whilst there is scope for refining existing systems to better include differential charging, any initiative must be seen in the context of cost recovery objectives, current financing arrangements and the right of municipalities to determine their own tariff structures.

6.3 Options for developing environmentally-related taxes

Many different options exist for introducing new environmentally-related taxes. In the following sections, some of the options (summarised in Table 9) are discussed in relation to electricity, water supply and use, and waste water. In the case of electricity and to a certain extent waste water, the consideration of environmentally-related taxes is closely linked to other policy processes. For water supply and use, the option of using taxes to help manage demand must be considered in the context of other potentially suitable mechanisms (as outlined in chapter 4). In each case, the main focus is to review the extent to which new environmentally-related taxes could be used to improve environmental outcomes and / or contribute to revenue raising requirements. In order to consider the options in more detail, the assessment criteria outline in chapter 5 would need to be rigorously applied.

6.3.1 Electricity

The generation of electricity in South Africa results in significant environmental externalities. These externalities occur at all points in the life-cycle of electricity production, i.e. raw materials extraction, processing, transportation, construction of generation facilities, and the actual generation process. Coal-based electricity generation accounts for a large proportion of national greenhouse gas emissions⁵⁴ (approximately 40 per cent of all carbon dioxide emissions) and is a large source of sulphur dioxide, nitrogen oxides and particulate emissions. A number of studies have attempted to estimate the cost of these atmospheric emissions (see section 2.4), suggesting a range of between R4-30 billion per year⁵⁵.

⁵³ DEAT (2002) "Municipal Solid Waste Tariff Strategy", a report by Palmer Development Group.

⁵⁴ DEAT (2000) "Initial National Communication under the United Nations Framework Convention on Climate Change", Government of South Africa.

⁵⁵ Note that the increased use of electricity in low-income households is likely to have some, although limited, positive effects in terms of reducing the current air pollution externalities associated with the use of wood, coal and paraffin. These positive impacts have been included in the external cost estimates.

Table 9: Options for developing new environmentally-related taxes

Theme	Instrument	Incentive mechanism	Key technical considerations
Electricity	Electricity consumption tax	<ul style="list-style-type: none"> ▪ Increase the price of electricity, thereby suppressing demand; ▪ Indirectly reduce air pollution emissions; and ▪ Encourage fuel efficiency and demand-side management. 	<ul style="list-style-type: none"> ▪ Difficult to distinguish between different energy sources; ▪ Relatively far removed from the main source of externality; ▪ Complementary policies required to increase its environmental effectiveness; and ▪ Potentially regressive although possibilities exist to reduce the economic burden for certain groups.
	Fossil fuel input tax	<ul style="list-style-type: none"> ▪ Increase the price of certain fuels relative to others; ▪ Encourage greater fuel efficiency and energy conversion ratios; and ▪ Indirectly reduce air pollution emissions. 	<ul style="list-style-type: none"> ▪ Difficult to reduce the economic burden of the tax for certain groups; and ▪ May disadvantage domestically generated electricity (although imports are currently small) – boarder tax adjustments would be difficult.
Water Supply and Use	Taxes on water use	<ul style="list-style-type: none"> ▪ Increase the price of water and suppress demand; and ▪ Could be differentiated according to different users and contribute to re-allocation initiatives; 	<ul style="list-style-type: none"> ▪ Potentially complex to administer and ensure reliable monitoring of water use; and ▪ Alternative market-based instruments such as tradable water use permits may be more appropriate to perform allocative functions.
Waste Water	Effluent taxes	<ul style="list-style-type: none"> ▪ Increase the price of water and encourage more sustainable use; and ▪ Could encourage the reduction in both the volume and load of water effluent. 	<ul style="list-style-type: none"> ▪ Potentially complex to administer; ▪ Difficult to ensure reliable monitoring of water discharges; and ▪ Difficult to capture all forms of water pollution, particularly from diffuse sources.

For both environmental and fiscal reasons, many countries have imposed taxes on electricity generation, consumption and, to a lesser extent, emissions (see Box 10). From a revenue raising perspective, electricity has advantages over other environmentally-related tax bases due to its broadness and its relatively low price elasticity of demand (although this is likely to vary significantly between different user groups). In most OECD countries, consumption taxes on electricity constitute a large proportion of total environmentally-related tax revenues. Few countries in the EU tax electricity generation directly due to the competitive pressures of the single European Electricity Market. Outside of OECD countries, electricity is taxed only in a few countries, including India which applies a tax on the consumption of electricity at a state level and in Zambia which imposes a 5 per cent duty on electricity sales which, is used to fund the national electrification programme and for general government spending needs.

Box 10: Sweden's refunded NO_x emissions payments

Nitrogen oxides (NO_x) give rise to several environmental problems. Together with sulphur dioxide (SO₂), they are the main causes of acidification and eutrophication, which impacts negatively on water resources, forests and agricultural production. In addition, NO_x contribute to the formation of ground level ozone and impacts negatively on human health.

Unlike sulphur, NO_x does not come from an impurity in combustion fuels but is instead formed by the effect of high temperatures on atmospheric nitrogen. As a result, NO_x emissions can be more unpredictable and require intensive monitoring efforts.

In an attempt to reduce NO_x emissions from boilers, stationary combustion engines and gas turbines, in 1990, the Swedish Environmental Protection Agency introduced a tax on NO_x emissions at a rate of Euro 5 per kg. The tax revenues, rather than flowing into the national revenue account, are refunded to the participating plants (minus regulatory costs) in proportion to their final production of useful energy. Those with lower emissions per unit of energy output are therefore net beneficiaries of the system where as those with higher emissions per unit of energy output are net payers. To date, the system has been successful in reducing NO_x emissions from the participating power plants by approximately 60 per cent. Currently, Sweden is considering how to extend the system to include other sources of NO_x emissions.

Unfortunately, such systems cannot currently be considered for use in South Africa due to the monopolistic structure of the electricity industry but may become more relevant after the industry restructuring process has been completed.

Source: Sterner (2003) and SEPA (2000)

Debates concerning the potential future taxation of electricity in South Africa are closely related to the electricity industry restructuring process, the need to expand services to households that do not yet have access and to encourage the use of electricity in low-income households that do have access. As part of the restructuring process, Eskom distribution and those municipalities currently distributing electricity will be consolidated into six Regional Electricity Distributors (REDs). The REDs will be charged with supplying electricity to all consumers using less than 100 GWh per annum (or about 60 per cent of all electricity consumed). It is intended for the 130 large industrial users currently consuming more than 100 GWh of electricity per annum, to continue being supplied directly by Eskom generation and by-pass the REDs network.

Currently, municipalities that operate as electricity distributors generate *surpluses*, i.e. they generate revenues that exceed the costs incurred to provide the service. This *hidden* surplus could be viewed as an *implicit* tax, the extent of which varies considerably between jurisdictions. In 2005, in excess of R 1.4 billion was estimated to have been generated. Under the electricity distribution industry restructuring process, local governments will lose this revenue stream and, so as not to adversely impact on local government finances, need to be compensated for this loss.

One of the options to compensate municipalities would be to formalise and restructure the existing implicit tax on electricity distribution. In considering any tax on electricity consumption, it will be important to ensure environmental considerations are effectively

integrated into the design of the instrument, regardless of whether it is implemented at a national or local level. Including the 130 large users in the tax net in some way will be an important consideration from an equity as well as environmental point of view. From this perspective, there are likely to be advantages of implementing the tax at a national level.

A more direct way of integrating environmental considerations would be to impose a fuel input tax rather than an electricity consumption tax. This would have to be administered at the national level. Where as a consumption tax seeks to achieve environmental outcomes via a reduction in demand for electricity, a tax on fuel inputs used in the combustion process is likely to create more targeted environmental incentives whilst also raising the required level of revenues. For example, a tax on the use of coal as an input into electricity generation will create incentives for improved fuel conversion ratios in the long-run and, other things being equal, indirectly reduce harmful emissions of carbon, sulphur and particulates into the atmosphere. A fuel input tax would also, by definition, exclude electricity generated from environmentally beneficial forms such as solar or wind energy, where as special provisions would have to be made for these generating technologies under a consumption tax scenario which is complicated from a design perspective.

Although an input tax would be superior from an environmental perspective, the following factors (as outlined in chapter 5) are of relevance when considering the different approaches:

- **Distributional issues** are of particular importance for both instruments. Due to the need to encourage the use of electricity in low-income households, the need to move away from traditional biomass energy sources and for general equity concerns, the economic incidence of either instrument should be minimised for these groups. This could be done more easily through a tax on consumption (i.e. consumption thresholds or exemptions) than through a fuel input tax;
- **Competitiveness issues** are also of relevance to both instruments. To the extent that the instruments are seeking to replace current local government surpluses, the overall effect is likely to be neutral. However, if the tax base is broadened to include current Eskom customers and large industrial electricity users, there will be winners and losers from the process. Identifying the impacts of both tax scenarios on different user groups and related industries (such as coal mining) and how the tax will impact upon them will form a critical part of future analysis. Where adverse impacts on competitiveness are likely to occur, there may be a case for considering reduced tax rates, tax ceilings or in certain cases complete exemptions. Again, such provisions would be much easier in the case of a consumption tax; and
- **Administrative considerations** such as tax avoidance and evasion, collection costs, and compliance costs would need to be assessed for each instrument.

6.3.2 Water supply and use

Over recent years DWAF and local governments have undertaken major reforms in the water sector with the aim of increasing the cost recovery of water schemes and expanding access to previously disadvantaged groups. South Africa is a water scarce country and

one of the key environmental and economic issues relates to the availability of water and how best to allocate water use between different sectors and groups in society. This is a complex policy issue, which is further complicated by high variations in water availability and accessibility across the country. Since the opportunities for securing new supplies at reasonable cost are limited, demand management is an important component of current and future water policy.

Water pricing and allocation is a central issue in ensuring that long-term supply and demand are better balanced and that sufficient water remains available to support ecological processes. Currently, DWAF allocates water use rights through a licensing system. Table 10 shows water use by different sectors in South Africa in 1996 and the predicted water demand in 2030.

Table 10: Water use by sector in South Africa

Sector	1996 (millions of m ³)		2030 (millions of m ³)	
	Volume	Percentage	Volume	Percentage
Urban and domestic	2171	10%	6936	23%
Mining and industry	1598	8%	3380	11%
Irrigation and afforestation	12344	62%	15874	52%
Environmental	3932	20%	4225	14%
Total	20045	100	30415	100

Source: DEAT (1999)

Moving towards an allocation and pricing system that reflects the scarcity value of water (i.e. marginal rather than average cost) is important so that the right incentives are given concerning resource use and conservation. An overview of the current water pricing strategy is presented in section 3.5.5. The major components of Tier 1 pricing are the Water Resource Management Charge (WRMC) and the Water Resource Development and Use of Water Works Charge (WRDUWC), which are essentially flat rate charges, differentiated according to different sectors and / or geographical areas. Currently, raw water is *free* in the sense that the charges imposed seek only to recover the costs incurred by DWAF in supplying water and do not reflect the opportunity cost of the way in which water is used.

Further down the pricing structure, many municipalities operate variable tariff systems where by progressively higher levels of consumption are subject to higher charge rates. Such pricing systems are mainly limited to the domestic sector, which accounts for a relatively small proportion of total water use.

Internationally, taxes and other market-based instruments are used to try to encourage water conservation and to better reflect the scarcity value of water in the prices paid by end users. In Denmark, taxes on water consumption are used as part of a tax shifting exercise to lower income taxes on households. Between 1994-1999, it is estimated to have induced water savings of 13 per cent in the domestic sector⁵⁶.

⁵⁶ Eunomia Consulting (2003) "Development of a Framework for Market-based Instruments for Environmental Fiscal Reform in South Africa, Report for the South African National Treasury, Unpublished Document.

The possible use of taxes in South Africa to encourage water conservation and demand management has to be considered carefully in the context of:

- The systems governing how water is currently allocated;
- The need to expand water supply services to those that currently do not have access; and
- The provision of free basic services.

Taxing water use would perhaps be most suitable for checking the growth in demand for water and / or encouraging the adoption of water conservation measures in specific sectors. In terms of water allocation, taxes could only indirectly influence water use and value judgements may still have to be made by government concerning the amounts allocated across different sectors. In seeking to better capture the scarcity value of water and ensure that it is allocated to the most productive uses, a system of tradable permits may have advantages in that the market is allowed to determine the most productive uses of water. Under such a system, water users will be in a position to purchase water use licenses according to their marginal returns to water use. Tradable permit systems have been implemented with a degree of success in Chile (see Box 11). Indeed, the National Water Act provides the basis for the development of markets for water in South Africa and makes provision for the legal transfer of water use licenses as an option for water allocation. Due to the large differences in marginal returns to water use between different sectors and a degree of equity, strong government oversight will be necessary should such a system be deemed appropriate.

Box 11: Tradable water rights in Chile

Like South Africa, Chile is a water scarce country. In order to allocate water more effectively, in 1981, the government introduced a water rights trading scheme for both consumptive and non-consumptive water uses which are issued separately from land rights. The government maintains control over how water is initially allocated, which for permanent water rights was done according to historic use levels whilst temporary water rights are allocated based on user applications. Once water rights have been allocated, users are free to trade those rights as they see fit. Although the system is widely regarded as being a success and has avoided political disputes over water allocation, relatively little trading has actually taken place (in Santiago approximately 3 per cent of total water consumption tends to be traded). The system has also been criticised on environmental grounds for failing to take proper account of the environmental implications of water trading. In addition, Chile has a long tradition of clear and enforceable property rights over water use (often at an informal level), which is the backbone of their trading system. In seeking to replicate the system elsewhere, such factors need to be taken into consideration.

Source: Alvery-Rivero et al (1999)

6.3.3 Waste water – the Waste Discharge Charge System

In the 1998 National Water Act, the definition of water use was expanded to include, amongst other things, the discharge of waste or heated water effluent either directly to a water resource or in a manner that may impact on the water resource (such as disposal

on land)⁵⁷. As part of the Water Pricing Strategy, DWAF is currently in the process of developing the Waste Water Discharge Charge System (WDCS), the aim of which is to recover the costs associated with different water treatment and water quality management programmes and to provide incentives for water users returning water back to the water resource to reduce their pollution concentrations.

There are likely to be several components to the WDCS:

- **Component 1** – a cost recovery charge aimed at recovering the costs associated with mitigating the impact of waste water discharges including the costs of regional and specific water treatment programmes and quantifiable downstream costs imposed on other users. The base of the charge will either be the authorised volume or effluent load; and
- **Component 2** – deterrent taxes aimed at encouraging polluters to reduce the effluent load of water returned to the water resource. The tax base will be the (monitored) effluent load of water discharges and is likely to be representative of the following pollution forms: salinity; nutrients; organic material; pathogens; and suspended solids. It is proposed that progressive tax rates be applied to pollution loads exceeding certain water quality management targets.

Internationally, taxes on water effluent are used in a range of countries to discourage water pollution. Notable examples include The Netherlands, Germany, Australia and Denmark although exemptions continue to hinder their overall effectiveness. The experience with water effluent charges in Chile, Brazil and Columbia has been less successful due to a lack of appropriate design, lack of information about impacts, incompatibility with available monitoring systems, and inadequate planning of their coverage⁵⁸.

Current proposals for the WDCS are conceptually sound from a tax policy perspective and based on a strong set of principles. The classification of the different tax and charge components is in line with accepted definitions. Perhaps the major obstacles relate to the implementation and administration of the WDCS and the need to keep the system sufficiently manageable, particularly with respect to accurate monitoring of effluent loads and the granting of sufficient independence of regulating bodies (likely to be the Catchment Management Agencies). Finally, the WDCS must be effectively integrated into the existing system of licensing and water use authorisations.

⁵⁷ Reed, D. & de Wit, M. (2003) "Towards a Just South Africa: The Political Economy of Natural Resource Wealth", WWF / CSIR.

⁵⁸ Richard, M. *et al* (1998) "Market-based Instruments for Environmental Policy Making in Latin America and the Caribbean – Lessons from Eleven Countries", World Bank Discussion Paper No. 381, World Bank.

6.4 Options for reforming non-environmentally-related tax laws with perverse environmental incentives

There are a few aspects of the income tax system and other taxes that are easily identifiable perverse environmental incentives. In many instances it is difficult to make generalisations concerning how certain tax incentives translate into specific environmental outcomes.

South Africa's tax legislation contains certain incentives aimed at encouraging private landowners to undertake sustainable land-use practices. However, similar to other existing non-tax environmental and conservation mechanisms, these are limited and may in certain respects undermine environmental and biodiversity conservation activities as outlined below⁵⁹. Table 11 provides an overview of some possible reform options.

6.4.1 Allowable deductions under the Income Tax Act

The income tax legislation provides that only those expenses incurred directly in the production of income can be deducted for the purposes of determining a person's annual taxable income. However, there are a number of provisions in the Income Tax Act that allow for the deduction of certain expenses for income tax purposes incurred in undertaking environmental / conservation-related activities. These include:

Pastoral, agricultural or farming operations

Any expenditure incurred in undertaking pastoral, agricultural or other farming operations in the eradication of noxious plants and the prevention of soil erosion can be deducted from income for the purposes of determining taxable income. This provision affords substantial benefits and incentives to farmers to undertake such conservation activities. However, this incentive is only available to persons undertaking pastoral, agricultural or other farming operations. It is, therefore, unavailable to any landowner that does not farm his or her land. This limitation potentially creates perverse incentives for landowners to cultivate land that could be of high conservation value in order to secure this tax benefit. Arguably, all landowners should be offered incentives to undertake these conservation measures on their land irrespective of whether or not it is under cultivation.

A further limitation of this provision is that it is restricted to a narrow range of conservation-related activities, namely, clearing alien invasive vegetation and preventing soil erosion. There is a far wider range of environmental and conservation activities, including activities such as the rehabilitation of land previously under cultivation, where the costs incurred could be allowed as deductions under the Income Tax Act.

⁵⁹ Paterson, S. and Winstanley, T. (2003) "Improving the Legislative Approach to Biodiversity Conservation and Sustainable Management of Natural Resources in South Africa", EnAct International.

Table 11: Possible reform options to reduce perverse environmental incentives

Tax Instrument	Fiscal incentive/ environmental incentive	Environmental aim and/or problem	Measure to improve environment outcomes
Income tax	Pastoral, agricultural or farming operations to eradicate noxious plants and prevent soil erosion can be deducted from taxable income. Farmers may in addition deduct a range of investment expenditure.	Actual environmental impacts could be positive and negative depending on specific circumstances. Could run counter to biodiversity conservation incentives. Only available for pastoral, agricultural or farming operations. Very narrow range of deductible activities.	Possibly encourages agricultural expansion over other land-use options. Could extend deductibility of conservation investments to other land-use practices to level the playing field. Could extend deductible activities to include wider environmental and conservation activities.
Customs and Excise taxes	Primary sector industries and non-road freight transport industries are allowed a diesel fuel tax refund. [Cost to fiscus of R476 million per annum (2002/2003)]	Increases international competitiveness of primary sectors, which possibly encourages expansion of primary sector activities at expense of conservation and environmental aims. Benefits non-road freight industries, thereby reducing road-related environmental costs.	Promotes primary sector activities that are responsible for greatest losses of biodiversity. Could extend diesel fuel tax refunds to conservation activities undertaken by non-primary sectors. Could promote those non-road freight industries with lower environmental costs.
Corporate tax	Tax treatment that favours company cars.	Increased use of company cars and car allowance schemes may lead to increase in road transport and liquid fuel consumption.	Road transport and liquid fuel use contribute significantly to emissions and noise pollution. However, company cars tend to have newer technology that may be more environmentally friendly.
Value added tax	Zero-rating of farming inputs, including pesticides and fertilizers	Possibly incentivises overuse of inputs, including pesticides and fertilizers.	Possibly encourages agricultural expansion over other land-use options. Alternatively, intensification of agricultural production could reduce the use of uncultivated land. Overuse of pesticides and fertilizers leads to land and water contamination.
	Zero-rating of paraffin. [Cost to fiscus of R300 million per annum (2001/2002)]	Possibly encourages increased use of paraffin, which has very high external costs for users.	A need to promote alternative safer and more environmentally beneficial fuels, e.g. LPG for household use.
Property rates	Municipalities are empowered under the Municipal Property Rates Act to levy different rates for different categories of rateable properties. Public and private conservation areas are exempted.	The scope for municipalities to consider relief from property rates to promote sustainable land use practices or biodiversity conservation could be widened.	Properties outside the scope of the Protected Areas Act and National Environmental Management: Biodiversity Act are not currently exempted. Municipalities should design their rates policies to encourage appropriate land use and conservation practices for these properties as well.

One of the threats to South Africa's current biodiversity is unrestricted agricultural and commercial forestry expansion. Allowing farmers to deduct their costs incurred in expanding production and infrastructure in these sectors creates a perverse incentive that potentially undermines the conservation of South Africa's biodiversity. Arguably such unrestricted agricultural and forestry expansion should be discouraged, possibly via the tax system.

Lessors of agricultural land for soil erosion works

Any person who lets land for pastoral, agricultural or other farming operations is entitled to deduct any expenditure incurred in the construction of soil erosion prevention works from any income earned for the purposes of determining his or her annual taxable income.

These deductions are limited to lessors who let land for pastoral, agricultural or other farming operations, whereas it should arguably be offered to the undertaking of conservation measures on all land, irrespective of whether or not it is under cultivation. In addition, the range of conservation activities for which lessors can claim a deduction is limited to soil erosion works, while it could be extended to a wider range of environmental and conservation activities.

6.4.2 Diesel refunds under the Customs and Excise Act

Currently, primary producers and non-road freight transport operators are allowed a diesel fuel tax refund. The diesel fuel tax concession scheme is applied as follows:

- Fishing, coastal shipping, offshore mining, offshore vessels conducting research in support of the marine industry, coastal patrol vessels and vessels servicing telecommunication cables along the coastlines of Southern Africa qualify for a full refund of the general fuel levy, Road Accident Fund levy and Equalisation Fund levy;
- Agriculture, forestry and onshore mining receive the concession in respect of 80 per cent of their diesel consumption, which is deemed to represent qualifying off-road consumption for primary production purposes. The qualifying consumption is exempted from 40 per cent of the general fuel levy and the entire Road Accident Fund levy; and
- Rail freight, harbour vessels and vessels used by in-port bunker barge operators are exempted from the entire Road Accident Fund levy.

The major beneficiaries of this rebate (primary sectors) are responsible for a significant proportion of national biodiversity losses. Whereas this concession may enable marginal primary activities to become viable, it contributes to the expansion of the primary sector to the detriment of wider environmental and conservation objectives. Diesel used for conservation activities undertaken by private landowners, such as alien invasive clearing and ecosystem rehabilitation, are not eligible for this concession.

6.4.3 Zero-rating under VAT

Under the VAT system, farming inputs such as pesticides and fertilisers are zero-rated in an attempt to minimise the impact of the value-added tax on the operating costs of the farming sector. However, the use of these chemicals contributes significantly to increased surface and groundwater pollution. Promoting the use of these chemicals should be considered with caution and be managed responsibly. Nevertheless, there may be some positive conservation outcomes associated with the intensification of agricultural production facilitated by the use of pesticides and fertilisers. The relative environmental / conservation costs and benefits of these divergent objectives need to be further analysed.

Illuminating paraffin, which has significant external costs associated with its use, is currently zero-rated for VAT purposes. The reason for the zero-rating is to assist the poor who rely on paraffin as a household fuel. However, from an environmental and health perspective the use of illuminating paraffin should actually be discouraged.

6.4.4 Property rates

If used creatively, property rates can lead to significantly improved conservation outcomes and land management practices by landowners. This could be achieved by implementing a differential rating system for those properties where the landowner has undertaken certain prescribed environmental / conservation activities, such as alien invasive clearing.

A municipality is empowered, in terms of the criteria set out in its rates policy, to levy different rates for different categories of rateable property. This provides a valuable mechanism through which a municipality could implement differential-rating systems to encourage landowners to adopt sustainable land-use practices. However, municipalities are not required to explicitly take conservation and biodiversity considerations into account in the establishment of their rates policies. Therefore, municipalities should be encouraged to design their rates policies in a manner that encourages appropriate conservation measures.

6.5 (Fiscal) incentives to improve environmental outcomes

Most countries offer tax incentives to encourage investment in certain activities and regions. Very broadly, tax incentives can be thought of as “*fiscal measures that are used to attract local or foreign investment capital to certain economic activities or particular areas in a country*”⁶⁰. There are opposing views in the literature as to whether or not *general tax incentives* (i.e. tax incentives that apply to all investments) should be categorised as incentives measures since they are not specifically targeted. On the other hand, focusing only on selective tax incentives may overlook potentially powerful broad-based incentives that are offered to all forms of investment. Currently, many countries are shifting away from selective to general incentives in an attempt to better promote investment in a more accountable and transparent manner⁶¹.

In comments on the discussion document released in 2003, a number of stakeholders raised the need to investigate the role that (tax) incentives could play in achieving environmental outcomes. Five broad and in some cases overlapping categories of incentive mechanisms have been identified as relevant for promoting positive environmental outcomes:

- Environmental funds;
- Partial or soft earmarking of environmentally-related tax revenues;
- Rehabilitation funds / guarantees;
- Accelerated depreciation allowances; and
- Review of specific tax provisions.

It is important to note that direct government subsidies have not been included, nor are they recommended. Subsidies (in the absence of complimentary disincentive measures such as taxes or charges) do not comply with even the most liberal interpretations of the polluter-pays principle and can lead to further economic distortions (see chapter 4). The incentive mechanisms identified above all embrace the polluter-pays principle to differing extents, which will vary according to specific circumstances. As a minimum condition, the costs imposed on the polluter would be equal to or greater than (but never be less than) the benefits received from an incentive measure.

6.5.1 Environmental funds

The use of environmental funds has grown significantly over recent years⁶². Examples include funds that have been developed at a global level (such as the Global Environment Facility (GEF) to deal with the provision of global public goods) and at national levels to address both acute and chronic environmental issues. In assessing the role of environmental funds, the arguments are fundamentally linked to broader debates around the relative advantages and disadvantages of earmarking (see section 6.6).

⁶⁰ Nathan-MSI Group (2002) “*Effectiveness and economic impact of tax incentives in the SADC Region*”, Technical Report to the SADC Tax Subcommittee.

⁶¹ Ibid.

⁶² Norris, R. ed (2000) “*The Inter-Agency Planning Group Handbook on Environmental Funds: A resource book for the design and operation of environmental funds*”, see www.geocities.com/shores_system/ef/ef_handbook.html.

In general, environmental funds can be defined as financial mechanisms or tools set up to achieve certain environmental objectives. More specifically, environmental funds can be thought of as institutions designed to channel public revenues earmarked for environmental protection purposes⁶³. Proponents of environmental funds argue that, in most cases, the funds go beyond performing the sole function of a financial mechanism and if designed properly, they can serve as important institutions in themselves, bringing together different stakeholders in society to achieve certain environmental objectives.

Environmental funds can be structured in a number of different ways, including:

- **Endowment funds** – a fund that spends only interest income, preserving the capital itself as a permanent asset;
- **Sinking funds** – a fund that disburses its entire principle and investment income over a fixed period of time; and
- **Revolving funds** – a fund that receives new income on a regular basis to replenish or augment the initial capital. In the context of environmentally-related taxes and charges, this type of fund is of particular relevance.

In determining whether or not an environmental fund may be an appropriate instrument to use, the Inter-Agency Planning Group⁶⁴ have suggested the following conditions⁶⁵.

Environmental funds may be appropriate where:

- The issues being addressed are long-term and require a sustained response over a number of years;
- Existing agencies cannot effectively manage the amount of funds needed to address the problem;
- There is a community of organisations able to effectively implement the range of activities needed to achieve the intended objectives; and
- There is support for the fund from all relevant stakeholders, particularly government.

Although these conditions are useful guiding principles, it is not possible to state at a generic level whether an environmental fund is appropriate or not. However, in general, environmental funds are not in line with efforts to consolidate budgetary practices and procedures. Assuming that environmental considerations are sufficiently reflected in the government's budgeting processes, it is difficult to see where additional financial mechanisms can add much value. This is perhaps the fundamental point in considering the appropriate role of environmental funds – an issue that is likely to be of greater importance in many developing countries where there is a need to ensure effective government budgeting frameworks.

In certain countries (such as Central and Eastern European Countries), environmental funds have featured heavily in environmental policies since the 1980s but their importance is declining as these countries emerge from economic restructuring and become members

⁶³ Speck, S., McNicholas, J. & Markovic, M. (2001) "Environmental funds in Candidate Countries", Regional Environmental accession Project.

⁶⁴ An informal group of donors and environmental fund managers.

⁶⁵ Norris (2001) op. cit

of the European Union. There is a general shift towards on-budget funding channels in line with other European member states⁶⁶.

Typically in Central and Eastern European countries, revenues from environmentally-related taxes and charges are wholly earmarked into national environmental funds, the revenues from which are distributed according to specific funding requirements or government priorities. However, it should be noted that the environmentally-related taxes and charges imposed in these countries (mainly atmospheric and water emissions charges and selective product charges) are designed more to raise resources for environmental spending purposes rather than to effect significant behavioural changes. Consequently, the quantum of the environmentally-related taxes are typically low. In this context, environmental funds have been a useful disbursement mechanism (both for environmentally-related tax revenues and other sources of domestic and international funding) and have responded well to addressing historically poor environmental performance. However, the unique environmental circumstances of Central and Eastern Europe should be noted.

The case for earmarking environmentally-related tax revenues where the instruments are designed with an explicit incentive effect to alter behaviour is less convincing as discussed below.

6.5.2 “Soft” earmarking and revenue recycling

Theoretically, an environmentally-related tax introduced at the correct rate can achieve an environmental objective *and* raise revenue in the process. Assuming that the environmental objective has been set appropriately and the incentive effect created by the tax is effective, no additional spending is required to meet that objective.

However, due to a variety of reasons, complimentary measures may be necessary in addition to the introduction of an environmentally-related tax. For example, as discussed in Chapter 5, for competitiveness reasons, it may be necessary to introduce mitigation or compensation mechanisms for certain industries or sectors. Under such circumstances, there may be a case to assist taxpayers to better respond to the tax instrument. This could be done in a variety of ways such as through reduced tax rates or reductions in other tax liabilities or by recycling tax revenues back to the affected industries via the annual budget. The Chinese system of pollution charges (see Box 7) and the Swedish NOx charge (see Box 10) are innovative examples of revenue recycling.

In most OECD countries, revenues from environmentally-related taxes are generally *not* earmarked which is in accordance with sound fiscal management practices (see section 6.6). “Soft” earmarking does take place but it is usually a relatively small proportion of the revenues generated. In a number of cases, revenues from environmentally-related taxes are used as part of tax shifting exercises to reduce taxes on labour (such as pay-roll taxes). In this way, environmentally-related taxes are often introduced in a revenue neutral way. Table 12 provides an overview of the environmentally-related taxes and the tax shifting, earmarking and incentive provisions in the UK.

⁶⁶ Speak *et al* (2000) *op. cit*

Table 12: Use of environmentally-related tax revenues in the UK

Instrument	Description	Related environmental programmes
Climate change levy	Per unit tax on energy use. Large energy user can apply for 80% tax rebate so long as they meet negotiated energy saving targets	-Revenues recycled through a 0.3% reduction in pay-roll taxes (National Insurance Contributions -NIC). -Introduction of enhanced capital allowances to assist key industries. -Funding of carbon trust to provide advice to business concerning energy efficiency.
Landfill tax	Tax on waste being disposed of to landfills (tax on landfill operators).	-Revenues recycled through a 0.2% reduction in pay-roll taxes. -Landfill tax credit scheme to fund “waste related programmes” by registered bodies (less than 6% of landfill tax revenues).
Aggregates levy	Tax on aggregates extraction to deal with noise, visual impacts, dust and biodiversity loss.	-Revenues recycled through a 0.1% reduction in pay-roll taxes. -Some revenues are channelled into a sustainability fund, which promotes the use of alternatives to virgin aggregates and funds projects to reduce the local impacts of aggregate extraction.
Fuel excise duties and differentials	Differentiated excise duty to reflect the environmental benefits associated with different fuel types	No revenue recycling but some related incentives are provided through the annual budget to facilitate improved responses to the tax differentials.
Graduated company car tax and annual road tax	Reformed to encourage the uptake of more fuel efficient vehicles. Annual road tax linked to CO2 emissions.	Emphasis on altering behaviour - No revenue recycling.
Green Technology Challenge	Enhanced capital allowances to encourage investment in energy-saving technologies and more recently in water efficiency technologies.	Measures introduced to facilitate a response to other taxes.
Diffuse water pollution	New consultations on how to deal with this – likely to result in voluntary agreements.	No revenue implications

Source: HMT (2002) “*Tax and the environment: using economic instruments*”, HM Treasury, UK.

In summary, it is not possible to make recommendations at a general level about the appropriateness of soft earmarking practices in relation to environmentally-related taxes. Nevertheless, it is recognised that, in some cases, there may be a legitimate need to assist certain taxpayers to better respond to the tax instrument but this needs to be assessed on a case-by-case basis and in consultation with the affected stakeholders. In assessing the need for expenditure on complimentary environmental programmes, it should ideally be subject to the discipline of the national annual budget process. Finally, the relative merits of recycling environmentally-related tax revenues by reducing taxes on labour should be considered favourable in the context of promoting employment opportunities.

6.5.3 Rehabilitation funds and guarantees

Some environmental issues can be very long-term in nature and / or may become of significance after certain operational activities have ceased. Examples include:

- Mining site rehabilitation upon closure (site restoration, groundwater contamination and the problem of abandoned mines);
- Nuclear power station decommissioning and the treatment of spent nuclear waste;
- Power station decommissioning; and
- Rehabilitation of landfill or waste reception sites upon closure.

In order to mitigate or prevent the eventuality of environmental problems arising from such activities, government and concerned stakeholders may require some form of assurance from those undertaking a specified activity. For some issues, government may find it necessary to prescribe certain forms of assurance or that certain financial provisions be made by those responsible during the operational life of the activity. In other cases, such provisions may be undertaken on a voluntary basis and the government may wish to incentivise such actions.

Rehabilitation funds, financial guarantees and insurance schemes form part of a menu of different mechanisms that could be used for this purpose. The implications of each option, both for the government and those responsible for the environmental liability, can differ greatly with rehabilitation funds providing perhaps the greatest degree of certainty. For the mining sector in South Africa, government prescribes that mining operations must establish rehabilitation funds that make financial provision for the adequate closure of mining sites once mineral extraction has finished (see section 3.5.6). In order to encourage such provisions, government allows contributions to such funds to be written off against taxable income. The context in which rehabilitation funds are used to address other specific environmental concerns (such as those outlined above) should be further explored.

6.5.4 Accelerated depreciation allowances

For income tax purposes the costs to acquire a fixed asset (e.g. buildings, machinery, etc.) are capitalized and written-off over the life of the asset. Theoretically, the period over which an asset should be written-off (as an expense against income) is the economic life of the asset. However, for various reasons, most jurisdictions allow fixed assets to be written-off over a much shorter period. The annual amount of a fixed asset that a taxpayer may write-off against taxable income is referred to as depreciation allowances. Where an asset is written-off to a zero net book value whilst it can still be gainfully employed by a business it could be argued that such a depreciation dispensation is an implicit tax incentive.

Annual depreciation allowances are calculated on either a straight line or a declining balance basis. In the case of the straight-line method, a fixed percentage of the original costs are written-off every year (e.g. 20 per cent per annum over five years). In the case of the declining balance method, the depreciation allowance for a particular year is a percentage of the net book value of the asset.

In South Africa the straight-line method of depreciation allowances is applicable to a range of fixed assets, including machinery, industrial buildings, hotel buildings, pipelines for transporting oil or gas and electricity transmission lines. Accelerated depreciation allowances are applied to incentivise business activity in various sectors including mining, agriculture and manufacturing. New plant and machinery used in manufacturing or a similar process qualifies for a depreciation allowance over a four-year period, 40 per cent in the first year and 20 per cent in the following three years.

In the case of farming, the costs of farming equipment, including machinery and implements used in farming operations is written-off over a three-year period, 50 per cent in the first year, 30 per cent in the second year and 20 per cent in the final year. In 2004, the depreciation regime applicable to farming activities was extended to plant and machinery used in the production of bio-fuels (bio diesel and bio ethanol), thereby incentivising the production of environmentally friendly renewable forms of energy. To ensure an equitable and sound tax policy system, a similar tax dispensation was granted to plant and machinery used to generate electricity from renewable sources in 2005. In the case of mining, a 100 per cent deduction is allowable in the first year.

An accelerated depreciation allowance scheme could possibly be extended to incentivise the use of pollution abatement technology in the production process, or where the adoption of certain technologies has been mandated, to alleviate the burden on the companies concerned. In the design of such an accelerated depreciation scheme, due consideration must be given to the activities or industries that may be targeted; synchronisation with any specific objectives such as the attainment of certain air quality standards, for example; the potential costs of pollution abatement technologies; and the economic life of the equipment used. These factors are important in determining the write off period of the costs and to ensure a fair, efficient and administratively feasible scheme. Box 12 provides an overview of recent amendments to New Zealand's tax depreciation rules to better encourage environmental performance amongst businesses.

Box 12: Recent amendments to New Zealand's tax depreciation rules

In August 2004, the New Zealand government announced that it intends to encourage more environmentally-friendly business behaviour through certain key tax changes. Under current tax provisions, businesses can claim deductions (over a 5 year period) for expenditure to prevent or combat pollution of the environment in 3 ways:

- Under the Income Tax Act (1994) for normal operating expenditure;
- Under the depreciation rules for certain types of capital expenditure, such as tanks, reservoirs, pipes, pumping machinery and screens; and
- Under a special section (DJ 10) that allows business taxpayers to claim deductions for the cost of constructing earthworks, ponds, settling tanks or other similar improvements primarily for the purpose of treating industrial waste.

Despite these specific provisions, only a subset of possible environmental expenditures are covered and there must be a discernible *improvement* made to land in certain cases. As they stand, the provisions do not take account of the treatment of *non-industrial waste* or for expenditure that does not give rise to identifiable land improvement. In order to address these issues, the New Zealand Government has introduced an amortisation deduction for other capital expenditure incurred in preventing or combating pollution, with no distinction made between industrial or non industrial waste. The provisions will also cover the costs of monitoring the extent and impacts of pollution and testing different options for addressing different environmental issues.

To encourage site restoration through the tax system, the government is considering a number of options, one of which is allowing companies (on a voluntary basis unless specifically mandated) to set up rehabilitation funds with the Inland Revenue Service. Payments into this fund would be deductible for income tax purposes and accessible by taxpayers on cessation of business to help meet restoration costs. Over the next five years, it is expected to cost the government NZ\$ 20 million in forgone revenue.

Source: Inland Revenue and New Zealand Treasury (2004) "*Repairs and maintenance to the tax depreciation rules – an officials' issues paper*", New Zealand Government.

6.5.5 Review of specific tax provisions to incentivise conservation activities

It has been argued that a need exists for the creation of mechanisms to allow individuals, communities and companies to form organisations to undertake environmental and conservation activities. These environmental and conservation organisations, which will predominantly be non-profit in nature, could significantly reduce the burden on government to undertake these activities. The tax provisions that have the greatest impact on the formation and activities of organisations of this nature are discussed below.⁶⁷

⁶⁷ Paterson & Winstanley (2003), op cit.

Table 13: Review of specific tax provisions to incentivise conservation activities

Tax Instrument	Fiscal incentive/ environmental incentive	Environmental aim and/or problem	Possible measure to improve environment outcomes
Income tax	Private conservation organisations cannot qualify as <i>public benefit organisations</i> , because they have to undertake income-generating activities.	Boost resources to the NGO and private sector conservation groups. This presumes they are effective vehicles for conservation.	Private conservation organisations that undertake income-generating activities for conservation could be re-classified as public benefit organisations.
	Conservation organisations cannot qualify as income tax exempt, because they are not designed to <i>promote commerce, industry or agriculture</i> .	Boost resources to the NGO and private sector conservation groups. Assumes that they are effective vehicles for conservation.	Conservation organisations should qualify for income tax exempt status, despite the fact they do not promote commerce, industry or agriculture.
	Conservation activities of mining sector are income tax deductible.	Specifically aimed at mining industry.	Should this be broadened to other primary and industrial sectors?
	Limited donations to trans-frontier conservation areas are tax deductible	Build on current incentive to support philanthropy towards conservation initiatives.	Threshold from deductions should be increased and should include land. Tax deductions should be extended to other conservation areas.
Donations Tax	Conservation organisations don't receive donations tax exemptions when they don't qualify as <i>public benefit organisations</i> .	Build on current incentive to support philanthropy towards conservation initiatives.	Private conservation organisations could be re-classified as public benefit organisations.
	Donations of less than R50, 000 are exempt from donations tax.	Build on current incentive to support philanthropy towards conservation initiatives, especially the donation of land.	Consider increasing threshold for deductions and the inclusion of land. Consider extending deductions to other conservation areas.
Transfer Duty	Public benefit organisations do not have to pay transfer duty on the sale and/or donation of land and/or a conservation servitude to another person.	Boost resources (particularly land) to NGO and private sector conservation groups. Presumes that they are effective vehicles for conservation.	Consider public benefit organisation status "privileges" for private conservation organisations. Management authorities for protected areas to be exempted from transfer duty.
Estate Duty	Parts of an estate left to a public benefit organisation or institutions exempt from paying income tax under section 30 of the Income Tax Act are deductible.	Boost resources to NGO and private sector conservation groups. Presumes that they are effective vehicles for conservation.	Consider public benefit organisation status "privileges" for private conservation organisations. Management authorities for protected areas to be included as organisations for which bequests of money or land are deductible.

6.5.5.1 Income Tax Act

Income tax exemptions

A number of organisations are exempted under the Income Tax Act from paying tax on income received from various sources. These sources could include donations, interest earned on their investments and / or income derived from their services. This creates an incentive for people to form these organisations. In so far as any environmental or conservation organisation falls within any of the following categories, it will be exempt from paying tax on any income received by it.

Institutions under Section 10(1)(cA)

Any institution, board or body (other than a company, closed corporation or trust) which has been established for the sole or principal object of: (aa) conducting scientific, technical or industrial research; (bb) providing necessary or useful commodities, amenities or services to the State; (cc) or carrying on activities designed to promote commerce, industry or agriculture or any branch thereof.

Environmental / conservation organisations may fall within the first two sub-categories of institutions. However, the third sub-category effectively excludes most organisations. Arguably organisations seeking to promote environmental or conservation aims are of equal importance to those that seek to promote commerce, industry or agriculture and consideration should be given to granting them a similar tax status.

Institutions under Section 10(1)(cH)

Any company, society, association, or trust with the sole object to discharge the legal obligations imposed on mining operations relating to rehabilitating disturbances of the surface of the land, preventing pollution and protecting the surface of the land and water resources.

This section of the Act provides an incentive for the formation of organisations to undertake certain environmental / conservation activities, but this is currently limited to the mining sector only.

Institutions under Section 10(1)(cN)

Any “public benefit organisation” that has been approved by the Commissioner of Inland Revenue in terms of section 30(3) of the Income Tax Act.

Section 30 of the Income Tax Act regulates “public benefit organisations” for the purposes of taxation. In order to qualify as a public benefit organisation, the organisation must comply with a number of substantive and procedural requirements. The majority of these requirements are necessary to limit the use of public benefit organisations as tax avoidance vehicles. However, it is argued that the requirements limiting the capacity of these organisations to undertake income-generating activities for the sole purpose of funding their public benefit activities have the effect of undermining the viability of a number of environmental and conservation organisations.

Many environmental / conservation organisations are frequently unable to secure the necessary local or foreign grants to fund their activities wholly. They are therefore compelled to undertake various ancillary income-generating activities to raise the necessary additional funding. These income-generating activities frequently disqualify them from being regarded as public benefit organisations and thereby exclude them from qualifying for any tax benefits to which they might otherwise have been entitled. These requirements therefore potentially discourage the formation of private environmental and conservation organisations and also jeopardise the viability of current organisations that are performing important environmental and conservation functions.

Donations to trans-frontier conservation areas

Any donation made by a person in cash or kind to certain specified organisations that are involved in the establishment or management of trans-frontier conservation areas, can be deducted from that person's income for tax purposes. The amount of any donation that is deductible is limited to the greater of five per cent of the person's taxable income or R1000, unless the Commissioner of Inland Revenue specifically allows a greater amount to be deducted having regard to the public interest and the purpose for which the relevant organisation wishes to accumulate the funds.

There are a number of aspects of this environmental / conservation incentive that potentially limit its effectiveness. The ceiling does not encourage the private sector to make significant donations (especially land) to these conservation organisations. Furthermore, the donations are only deductible for trans-frontier conservation areas. There are currently only four trans-frontier conservation areas, but there are many other conservation areas or conservation organisations that perform activities of equal conservation importance but are denied this incentive. Moreover, the deduction is effectively limited to donations in cash or kind. Many landowners privately contract their land to protected areas by way of written agreement ("conservation agreements"). The donation of rights over the land in terms of the conservation agreement has a value and should also possibly be regarded as a donation. In addition, once such a conservation agreement has been entered into, the commercial value of the land will decrease because of the fact that the landowner's rights are generally restricted and the area cannot be developed. Despite this loss of property value, no provision is currently made to allow private landowners to deduct the value of any such donation from their taxable income.

6.5.5.2 Donations Tax

Donations to public benefit organisations

Subject to certain exemptions, people who donate cash or property to another person are required to pay donations tax of twenty per cent of the value of any such donation. However, donations to certain institutions are exempted from donations tax. These institutions are essentially public benefit organisations as discussed above. Unlike the above exemption, there is no limitation imposed on the amount of these donations. Therefore, in so far as a person makes a donation to a conservation agency or organisation that qualifies as a public benefit organisation, the person will be exempted from having to pay donations tax on any such donation. The conservation agency or organisation will similarly be exempted from having to pay income tax on any such

donation. The benefit of this exemption is limited by the strict eligibility criteria for qualifying as a public benefit organisation. Because of the stringent requirements, the conservation agency or organisation may well not fall within the list of organisations to which donations are exempted.

Donations of less than R50 000

Any donation by natural persons and companies, to the value of R50 000 is exempt from donations tax. If a donation of this size were to be made to a conservation agency or organisation, irrespective of whether or not it qualified as a public benefit organisation, the donor would not have to pay donations tax on any such donation.

6.5.5.3 *Transfer Duty Act*

Any person purchasing property must pay transfer duty calculated according to the value of the property transferred. "Property" is defined to include any real right in land (such as ownership or servitude), certain leases and any mineral right. Transfer duty would, therefore, be payable on the sale and / or donation of conservation land and / or a conservation servitude to another person. However, no transfer duty is payable by the following organisations in respect of property acquired by them, the whole or substantially the whole of which will be used for the purposes of the public benefit activity undertaken by the organisation:

- Public benefit organisations approved in terms of section 30(3) of the Income Tax Act; and
- Any institution, board or body exempt from tax in terms of section 10(1)(cA)(i) of the Income Tax Act, which has as its sole or principal object the carrying on of any public benefit activity contemplated in section 30 of that Act.

The strict eligibility criteria for "public benefit organisations" prescribed by the Income Tax Act restricts the applicability of this incentive. For example, in terms of the Protected Areas Act, the management of South Africa's protected areas will be assigned to various management authorities. These management authorities will often not be public benefit organisations and not have access to this incentive. It will frequently be these same organisations that will be seeking to acquire land to extend the areas of their respective protected areas. This incentive should arguably also be available to all management authorities that wish to purchase land of high conservation value for inclusion in a protected area, irrespective of whether or not they are registered as a public benefit organisation under the Income Tax Act. There appear to be sufficient safeguards prescribed in the Protected Areas Act to ensure that such an extension of this incentive will not be subject to abuse⁶⁸.

⁶⁸ Paterson & Winstanley (2003), op cit.

Box 13: Tax measures to promote conservation in Australia

The Australian Government provides tax incentives to encourage the donation of property or encourage landowners to enter into conservation covenants for conservation purposes. Property such as land, buildings, shares, vehicles and machinery may be donated to an eligible environmental organisation subject to valuation by the Valuation Office. Donations of property valued at more than Aus\$5000 qualify for income tax deductions which can be spread over five years or a capital gains tax exemption is allowed for gifts of property bequeathed in a will to an eligible organisation. The deduction is available to any taxpaying entity.

For landowners entering into a conservation covenant, amendments to the tax legislation provide for the following two types of tax concessions to incentivise conservation. An income tax deduction for any decrease in the land value as a result of entering into covenant provided the landowner receives no payment for entering into it, or special capital gains tax provisions. To qualify for an income tax deduction a conservation covenant must be in perpetuity, approved by the Minister for the Environment and Heritage and result in a loss of market value of more than Aus\$ 5000. In practice, new capital gains tax provisions, would really only apply where a landowner receives money or property for granting a conservation covenant. When determining the capital gain from the grant of the conservation covenant, special CGT discounts for example, costs related reductions in the gain, specified exemptions and small business concessions. These provisions are applicable only when the environmental organisation is listed on the Register of Environmental Organisations that allows an environmental organisation to seek tax-deductible status.

Source: www.deh.gov.au/biodiversity/publication/fact_sheets/incentives.html

6.5.5.4 Estate Duty Act

The amount of estate duty that is charged on a person's estate is calculated according to tables annexed to the Estate Duty Act. The first R2.5m of the deceased's estate is exempt from estate duty. The Estate Duty Act allows various deductions in this regard. Of specific interest to environmental / conservation aims is the allowance that the value of any property, which has not been allowed as a deduction under any other provision of the Act, can be deducted if it is left to the following organisations:

- Any public benefit organisation approved in terms of section 30(3) of the Income Tax Act; and
- Any institution, board or body, which is exempt from tax in terms of section 10(1)(cA)(i) of the Income Tax Act, which has as its sole or principal object the carrying on of any public benefit activity contemplated in section 30 of that Act.

The strict eligibility criteria for public benefit organisations prescribed by the Income Tax Act limits this conservation incentive. As with transfer duties, management authorities responsibility for the management of protected areas will in practice not have access to this incentive and should probably be included. Also, estate duty is generally based on the fair market value of property in the estate. This is significant in situations where a conservation agreement exists to contract land into a special nature reserve, national park or nature reserve under the Protected Areas Act. These conservation agreements effectively constitute a form of servitude, and the value of the deceased's estate could be reduced according to the value of the donation to the conservation agency⁶⁹.

⁶⁹ *ibid.*

6.6 Revenue hypothecation

The mainstream approach to public finance policy and analysis separates the revenue and spending sides of government activities sharply to facilitate a transparent consolidated budget with the clear assignment of accountability. This approach has developed as a response to the modern budgetary environment with many specific tax allocations, legislated conditionalities, and many types of appropriations involving a complex structure of laws and prescriptions. Nonetheless, several large earmarked revenue and spending programmes exist on South Africa's budget, for example the Unemployment Insurance Fund, the Road Accident Fund, skills development funds and various regulatory levies, amongst others.

6.6.1 Advantages and disadvantages of earmarking

Earmarking can promote transparency, greater funding certainty and a more direct relationship between payments and benefits that may enhance both equity and efficiency. It should be noted that the South African process of budgeting in a Medium Term Expenditure Framework (MTEF) provides departments with greater certainty compared to the old annual budgeting cycle. It could thus be argued that in the South African context there is already a significant degree of transparency reflected in the current budget process and documentation. However, earmarked taxes tend to fragment and complicate the tax system and allow departments and agencies to escape the discipline of the budget process. In addition, dedicated funding sources can allow agencies to avoid prioritisation through the budget and political process.

Earmarking introduces much more complexity into the budget environment, as it provides sets of constraints intended to inhibit the Executive in a manner that serves public interest. An environment in which particular purposes, controls and earmarking are built into specific categories of tax revenues is one in which special interest-groups flourish. It is an environment in which special interest groups succeed in capturing particular kinds of revenue / appropriations. It is, therefore, necessary to weigh up the extent to which special interests succeed in capturing resources and exploiting them through monopoly power in the budget environment against the possibility that the broader public interest may be served through the kinds of constraints and controls that earmarking may put in place.

Requests for earmarking often stem from the hope that it will guarantee and possibly increase the source of funding for a particular cause. However, international experience has shown that the introduction of a hypothecated tax is almost universally ineffective in raising the level of expenditure on the service for which the tax is earmarked (over and above that which would have been spent if there was only general budgetary financing). This is because of the behavioural responses in private consumption and the reallocation of non-earmarked tax revenue. In the long term any initial gain in increased spending on the targeted service is generally lost as the government and the taxpayer re-negotiate the allocation of non-earmarked tax revenues. So it should not be assumed that the earmarking of certain revenue streams will provide straightforward solutions to the more complex challenges the budgeting process has to deal with.

6.6.2 Appropriateness of earmarking

As a general observation there is no specific framework that prescribes exactly when earmarking is appropriate. The theoretical debate about the relative merits of earmarked taxes is not conclusive in view of the various political, moral and economic arguments, but it has nonetheless become accepted practice that government decisions about general taxation should be made independently from decisions about expenditure. The rationale for this separation is that it will make it easier for the government of the day, subject to parliamentary approval, to pursue its distributional and economic stabilisation objectives. If there is confidence that the budget process broadly weighs up the full range of issues that need to be considered in public policy formation and in budget determination, and if there is confidence in the political oversight process, that the budget making is sound and can be relied upon to address environmental or any other issues appropriately, then there is no need for “unnecessary” constraints in the public finance terrain. If there is confidence in the budget process through which spending decisions are made, separate from revenue decisions, then there is no need to put in place special earmarking arrangements.

Where a revenue source (levy) closely resembles a tariff or a user-charge, there is a stronger case for earmarking. In such circumstances levy changes will usually be made to strike an appropriate balance between costs and benefits under the supervision of representatives or stakeholders who have a genuine interest in ensuring that costs and benefits are appropriately weighed against each other. In assessing earmarked levy proposals for regulatory functions of other departments, the National Treasury emphasises the importance of governance arrangements to ensure an appropriate balance between costs relative to benefits.

6.6.3 Full versus partial earmarking

The South African National Treasury has opted in recent years to effect spending changes associated with new revenue instruments without dedicating the flows outside of normal budget arrangements. For example, a new air passenger departure tax has been associated with significantly increased allocations for international tourism promotion. However, this has not been a strict earmarking exercise and has not removed the assignment of this revenue from the budget process. Spending decisions in this regard are made in the context of the normal budgetary allocations to the Department of Environmental Affairs and Tourism for tourism promotion and are considered with other spending proposals. There is nonetheless an association between the source of the revenue and the spending programme. A similar link exists in respect of the general fuel levy and allocations for the national road network where there is a loose association but no direct earmarking of funds. Such implicit or partial earmarking arrangements have the advantage that it avoids the capture of the revenue source outside of the budget environment while maintaining the oversight role of the Treasury in budgetary and fiscal decisions.

In short, full earmarking is not desirable, as it entrenches rigidities in the tax system that can create mismatches between resource needs and allocations, and obstacles to the continuous re-evaluation and modification of tax and spending programs. On the other hand, partial earmarking of funds to specific (e.g. environmental or social) purposes may be critical to promote the public and political acceptance of the benefits of the reform and hence create the necessary support to push it through. Once any such earmarking

arrangement is in force, the rationale for earmarking should be evaluated regularly to avoid the misallocation of tax revenues and other distortions.

6.6.4 Consolidation of the budget

It is important to recognise that the proper consolidation of the budget for planning and reporting purposes has not yet been achieved. When the Minister of Finance presents the Appropriation Bill and the National Budget framework to Parliament, what he presents at present is still incomplete. It leaves out the wider general government sector, although less so than used to be the case as it now includes the social security funds (e.g. the Road Accident Fund, the Unemployed Insurance Fund and Compensation Fund). The Skills Development Levy arrangements have also been consolidated into the budget through the national revenue fund since its inception.

The National Treasury is increasingly calling on departments to consolidate their off-budget agencies into their budget numbers for reporting purposes. The ultimate goal is to ensure that the spending information on departmental votes will reflect the consolidated outcome of spending, not just of the department but also of the agencies that are part of that minister's portfolio. It will probably take some time to complete this reform process, as most agencies report their accounts on an accrual basis while departments don't. Accounting reform will therefore have to happen before the consolidation of the budget can pierce through the veil of separate earmarking or dedicated funding arrangements.

CHAPTER 7: SUMMARY

Reducing unemployment, eradicating poverty, whilst at the same time ensuring sustainable development, are critical challenges facing South Africa. Like other economic and social assets, environmental assets form an integral component of human well being and it is important that they are managed wisely. However, unlike most other goods and services, environmental assets are not usually priced in the conventional sense and this can lead to insufficient consideration of environmental issues in everyday market activities. The key points from this paper are summarised as follows:

- 1. Market-based instruments, particularly environmentally-related taxes and charges, may have certain advantages over traditional regulatory (command-and-control) approaches and may be a more efficient way to address certain environmental concerns whilst also contributing to fiscal objectives**

In tackling environmentally-related market failures, the Government has a range of different possible options at its disposal. Currently, regulatory approaches form the backbone of Government's approach to dealing with environmental issues and establishing environmental standards. Market-based instruments, by seeking to correct market failures through the price mechanism, are likely to achieve certain environmental outcomes in a more efficient way. In addition, environmentally-related taxes and charges are capable of raising public sector revenues and contributing to wider fiscal policy objectives.

- 2. A coherent framework is presented to consider and evaluate the use of market-based instruments**

In considering the possible role of market-based instruments, it is important to have a coherent national approach and to provide sufficient certainty with respect to how government intends to utilise them. An overarching framework has been presented, outlining a process for considering the different intervention options. The consultative process in drafting this paper highlighted the importance of:

- Establishing clear goals and objectives – both environmental and where relevant fiscal objectives;
- Justifying the need for government intervention and clearly analysing the source of market failure or policy failure;
- A clear and early signal of government intent to address the environmental concerns; and
- A clear assessment of the different policy options that takes into consideration: design and administrative aspects, potential distributional impacts, potential competitiveness impacts, the appropriate sphere of government intervention, and compatibility with broader government policy objectives.

Departments that consider the use of market-based instruments to address certain environmental concerns should address the National Treasury from an early stage.

3. The development of environmentally-related tax proposals must be undertaken according to a specific set of criteria and should, as far as possible, be adequately integrated into existing government policies.

Where an environmentally-related tax instrument is deemed as being potentially suitable, the criteria listed must be applied to assess its appropriateness. The proliferation of levies (large or small) on an *ad hoc* or poorly conceived basis, at all spheres of government, needs to be avoided and it is important that environmentally-related taxes are developed in line with the generally accepted principles of good taxation. In considering specific proposals for environmentally-related tax measures, National Treasury will employ the framework as outlined in this document, giving special consideration to the possible impacts on income distribution and competitiveness.

4. Earmarking revenues from environmentally-related taxes is not in line with sound fiscal management practices

The way in which revenues from environmentally-related taxes should be used was raised as an important issue of contention. There are no clear-cut criteria to dictate when revenue hypothecation is appropriate or not. As a general observation, the *full* earmarking of selected tax revenues is not a preferred option due to the constraints placed on the budget process and the rigidities that tend to follow from earmarking. Earmarking can also lead to the inappropriate allocation of resources and may limit the extent to which environmentally-related tax revenues can be used as part of a tax shifting exercises.

Requests for earmarking will, therefore, have to be evaluated on a case-by-case basis, with on budget funding through the normal budgetary process being the first best option. In addition, the *partial* or *soft* earmarking of tax revenues could be considered in that revenues will flow via the fiscus with the provision that special consideration be given to fund certain activities but with no fixed commitment to allocate all the revenues from a specific source to such activities.

5. The possible future role of environmentally-related taxes has to be carefully considered, with specific emphasis given to the potential impacts on income distribution and competitiveness

A number of tax reform options have been flagged in this paper, some of which are being driven by a combination of policy processes such as the electricity distribution industry restructuring programme. Ensuring that environmental issues are effectively integrated into these reform processes constitute important mainstreaming opportunities. In addition, since many of South Africa's existing environmentally-related taxes were not developed with environmental issues in mind, there exists scope to improve the environmental outcomes of these instruments, particularly concerning vehicle taxation and the General Fuel Levy.

BIBLIOGRAPHY

Alvery-Rivero, T., Chipman, R. & Bryld, E. (1999) "*Promoting Sustainable Production and Consumption: Five Policy Studies*", DEAS Discussion Paper No.1, United Nations.

Blignaut, J and King. N. (2002) "*The Externality Cost of Coal Combustion in South Africa*", FEE Conference Proceedings.

Blignaut, J and de Wit, M. (2004) "*Sustainable Options: Economic Development Lessons from Applied Environmental Resource Economics in South Africa*", University of Cape Town Press.

Bovenberg, A.L. and Boulder, L.H. (1997) "Costs of Environmentally Motivated Taxes in the Presence of Other Taxes: General Equilibrium Analysis", in *National Tax Journal*, 50(1), pp 59-87.

Bureau for Economic Research (2003) "*The Feasibility of a Fuel Tax Levy in the Western Cape: Appendix B*", Report prepared for the Western Cape Provincial Treasury.

CSERGE (1994) "*Economic Values and the Environment in the Developing World, A Report to the United Nations Environment Programme*", Nairobi, Kenya.

Da Motta, R.S., Huber, R.M. and Ruitenbeek, H.J. (1998) "*Market-based Instruments for Environmental Policy Making in Latin America and the Caribbean – Lessons from Eleven Countries*", World Bank Discussion Paper No. 381, World Bank.

DEAT and DME (2003) "*Joint Implementation Strategy for the Control of Exhaust Emissions from Road-going vehicles in the Republic of South Africa*", Version 4, Final draft.

DEAT (1997) "*White Paper on Environmental Management Policy for South Africa*", Government of South Africa.

DEAT (2000) "*White Paper on Integrated Pollution and Waste Management for South Africa: A Policy on Pollution Prevention, Waste Minimisation, Impact Management and Remediation*", Government of South Africa.

DEAT (1998) "*National Environmental Management Act (No. 107 of 1998)*", Government of South Africa.

DEAT (1999) "*National State of the Environment Report*", Government of South Africa.

DEAT (1999) "*National Waste Management Strategy*", Government of South Africa.

DEAT (2000) "*Initial National Communication under the United Nations Framework Convention on Climate Change*", Government of South Africa.

DEAT (2002) "*Municipal Solid Waste Tariff Strategy*", a report by Palmer Development Group.

DFID, EC, UNDP & World Bank (2002) "*Linking Poverty Reduction and Environmental Management: Policy Challenges and Opportunities*", World Bank, Washington DC.
Dixon, J.A., Hamburg, S.P., Janetos, A.C., Moss, R.H. and Watson, R.T. (1998) "*Protecting Our Future Securing Our Planet: Linkages Among Global Environmental Issues and Needs*", Report for the United Nations Environment Programme, US National Aeronautics and Space Administration, and The World Bank.

Dixon, J.A., Scura, L.F., Carpenter, R.A. and Sherman, P.B. (2001) "*Economic Analysis of Environmental Impacts*", Earthscan, UK.

Ekins P. and S. Speck (1999), Competitiveness and Exemptions from Environmental Taxes in Europe, *Environmental and Resource Economics*, Vol. 13, pp. 369-396.

Eunomia Consulting, University of Pretoria (2003) "*Development of a Framework for Market Based Instruments to Support Environmental Fiscal Reform in South Africa*", Final Report for the National Treasury of South Africa, unpublished report.

Eunomia Consulting, University of Pretoria (2003) "*Development of a Framework for Market Based Instruments to Support Environmental Fiscal Reform in South Africa*", Companion Document to Final Report for the National Treasury of South Africa, unpublished report.

Freeman, P.N.W., Naude, C.M., Pretorius, J., Coovadia, T and Matjila, S.M. (2000) "*The Transport Sector - Energy Use and Environmental Impacts*", Report by DBSA for the GTZ funded Project WWF Macroeconomic Reforms and Sustainable Development in South Africa.

FRIDGE (2004) "*Study to Examine the Socio-economic Impact of Measures to Reduce Air Pollution from Combustion*", unpublished document.

Gaffen, M., Naude, C., Lombaard, P., Maasdorp, G., Taylor, A & Pretorius, J. (2000) "*Quantitative Analysis of the Full Cost Associated with Motor Vehicle Use in South Africa*", Report for the Department of Transport.

Hamilton, K. & Lutz, E. (1996) "*Green National Accounts: Policy Uses and Empirical Experience*", Environmental Economics paper No. 039, World Bank, Washington DC.

HM Treasury (2002) "*Tax and the Environment: Using Economic Instruments*", HM Treasury, UK.

HMCE (2002) "*Appraising Environmental Taxes: A Tool for Assessing New Proposals*", Environmental Taxation Department, Her Majesty's Customs and Excise, UK.

IMF (1995) "*Tax Policy Handbook*", Fiscal Affairs Department, IMF, Washington DC.

Inland Revenue and New Zealand Treasury (2004) "*Repairs and maintenance to the tax depreciation rules – an officials' issues paper*", New Zealand Government.

-
- IUCN (1999) *"Integrating Economics into NBSAPs in East Africa"*, IUCN, Nairobi, Kenya.
- Litvack, J and Seddon, J. (1999) *"Decentralising Briefing Notes No. 19683"*, World Bank Institute.
- Lloyd, P., Rukato, H and Swanepoel, R. (2002) *"Liquid Fuels Production"*, unpublished study report, initiated by the WWF, funded by GTZ, managed by the DBSA.
- Markandya, A., Harou, P., Bellu, L.G. and Cistulli, V. (2003) *"Environmental Economics for Sustainable Growth"*, Edward Elgar, UK.
- Metschies, G.P. (2001) *"Fuel Prices and Vehicle Taxation"*, GTZ, Germany.
- Nathan-MSI Group (2002) *"Effectiveness and economic impact of tax incentives in the SADC Region"*, Technical Report to the SADC Tax Subcommittee.
- Norris, R. ed (2000) *"The Inter-Agency Planning Group Handbook on Environmental Funds: A resource book for the design and operation of environmental funds"*, see www.geocities.com/shores_system/ef/ef_handbook.html.
- Perman, R., Ma, Y., McGilvray, J and Common, M. (2003), *"Natural Resource and Environmental Economics"*, Addison Wesley, UK.
- National Treasury (2000) *"Budget Review 2000"*, Government of South Africa.
- National Treasury (2003) *"Intergovernmental Fiscal Review"*, Government of South Africa.
- OECD (1997) *"Evaluating Economic Instruments for Environmental Policies"*, Paris and EC (1997) *Proposal for a Council Directive Restructuring the Community Framework for the Taxation of Energy Products*, COM (97)30 Final, Brussels.
- OECD (2001) *"Environmentally-related Taxes in OECD Countries: Issue and Strategies"*, OECD, Paris.
- Paterson, S. and Winstanley, T. (2003) *"Improving the Legislative Approach to Biodiversity Conservation and Sustainable Management of Natural Resources in South Africa"*, EnAct International.
- Reed, D. and de Wit, M. (2003) *"Towards a Just South Africa: The Political Economy of Natural Resource Wealth"*, WWF / CSIR.
- The Margo Commission Report (1987) *"Report of the Commission of Inquiry into the Tax Structure of the Republic of South Africa"*, RP34/1987, The Government Printer, Pretoria.
- Report of the UN Conference on Environmental and Development (Rio Earth Summit), Rio de Janeiro, June 1992.
- Schob, R. (2003) *"The Double-Dividend Hypothesis of Environmental Taxes: A Survey"*, CESifo Working Paper No. 946, University of Magdeburg, Germany.

Scorgie, Y and Annergarn, H. (2002) *"The Impact of Coal on People"*, Paper presented at the Coal and Sustainable Development Conference, a WSSD side-event.

SEPA (2000) *"Swedish Charge on Nitrogen Oxides"*, Swedish Environmental Protection Agency, Stockholm, Sweden.

Smith, S. (2003) *"Energy Taxation and Environmental Policy"*, Paper prepared for the SADC Conference on Excise Taxation, 11-13 June 2003, Pretoria, South Africa.

Spalding-Fecher, R. & Matibe, D.K. (2002) *"Electricity and Externalities in South Africa"*, Energy and Development Research Centre, University of Cape Town.

Speck, S., McNicholas, J. & Markovic, M. (2001) *"Environmental funds in Candidate Countries"*, Regional Environmental accession Project.

Sterner, T. (2003) *"Policy Instruments for Environmental and Natural Resource Management"*, RFF Press, Washington DC.

The Taylor Report: Committee of Inquiry into a Comprehensive System of Social Security for South Africa (2002) *"Transforming the present – Protecting the Future"*, A Report of the Committee of Inquiry into a Comprehensive System of Social Security for South Africa, CPD Print, South Africa.

Turpie, J., Joubert, A., van Zyl, H., Harding, B. & Lieman, T. (2001) *"Valuation of open space in the Cape Town Metropolitan Area"*, A pilot study to demonstrate the application of environmental and resource economic methods for the assessment of open space values in two case study areas: MetroSouth and Metro South-East, City of Cape Town.

Van Horen, C. (1996) *"The Cost of Power: Externalities in South Africa's Energy Sector"*, unpublished doctoral dissertation, University of Cape Town.

Visser, M., Spalding-fecher, R., and Leimann, A. (2002) *"Manufacturing and Economic Growth"*, unpublished report, study initiated by the WWF, funded by GTZ, managed by DBSA. Available from: www.dbsa.org/macroeconomic.htm.

Wang, H. and Chen, M. (1998) *"How the Chinese System of Charges and Subsidies Affects Pollution Control Efforts by China's Top Industrial Polluters"*, World Bank unpublished paper.

World Bank (2003), *"World Development Report – Sustainable Development in a Dynamic World, Transforming Institutions, Growth and the Quality of Life"*, The World Bank, Washington DC.

World Commission on Environment and Development (1987) *"Our Common Future"*, Oxford University Press, UK.

List of Websites

"Paraffin Association of South Africa", Available from: www.pasasa.org.

"World Summit on Sustainable Development", Available from
www.johannesburgsummit.org.

Government Communication and Information Centre (2003-2004) "South African Yearbook", Available from: www.gcis.gov.za/doc/publications/yearbook.htm.

DWAF (1998) "Water Quality Management in South Africa", Available from:
www.dwaf.gov.za.

The Rose Foundation (2001), Available from: www.rosefoundation.org.za.

Inter-Agency Planning Group - www.geocities.com/shores_system/ef/ef_handbook.html.

Australian Department of Environmental and Heritage -
www.deh.gov.au/biodiversity/publication/fact_sheets/incentives.html

ANNEX 1: TAX REVENUE TRENDS

Total tax revenue is the sum total of all tax revenue collected by the South African Revenue Service. Tax revenue is deposited into the National Revenue Fund, including payments (customs and excise collections) from members of the South African Customs Union (SACU). Budget revenue is defined as total tax revenue plus non-tax revenue (primarily dividends from Public Entities, administrative fees and user charges collected by various government departments) less payments to SACU countries. Whilst the overall tax revenue / GDP is both a useful and important variable to track, it remains critical to analyse its composition. Figure 1 provides an overview of the tax / GDP ratio in South Africa since 1983 / 84.

Historically, the six major revenue-raising tax instruments have been Personal Income Tax, Value Added Tax (VAT and before 1991 General Sales Tax), Corporate Income Tax, the General Fuel Levy and Customs and Excise Duties. Figure 2 provides a historical overview of the contribution of these six tax instruments towards total tax revenues. The share of these instruments, as a percentage of total tax revenue, increased to 95.3 percent in fiscal year 1991 / 92, declined somewhat in subsequent years and again reached the 95 percent level in years 1995 / 96 and 1997 / 98. Since 1997 / 98, the share has declined to around 92 percent in 2005 / 06.

Figure 1: Budget revenue and tax revenue / GDP ratio

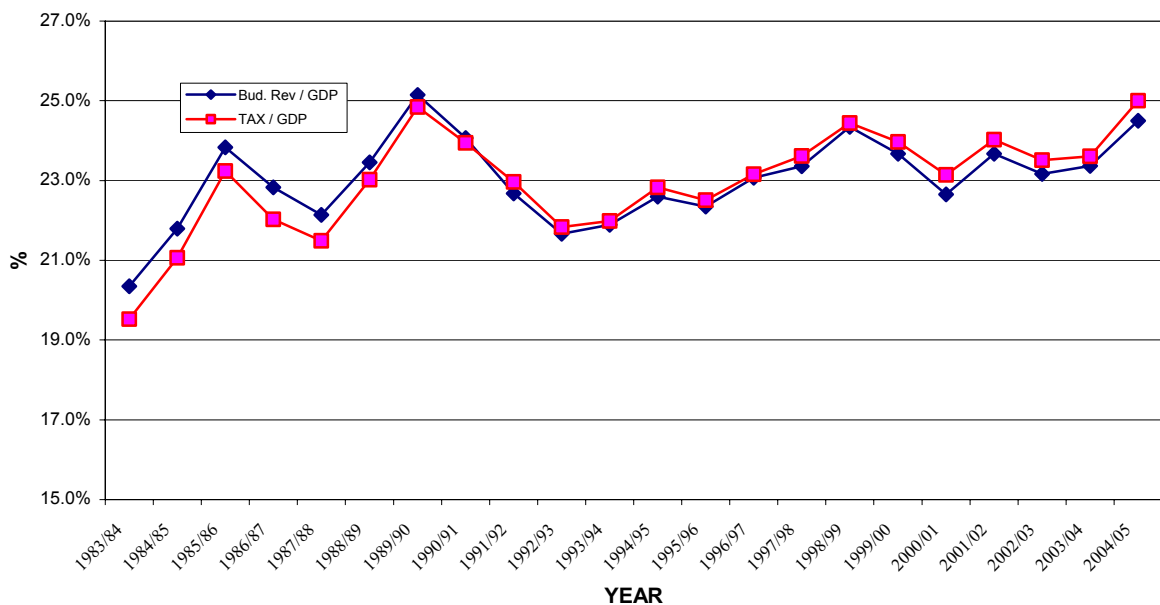


Figure 2: The six major tax instruments as a per cent of total tax revenue

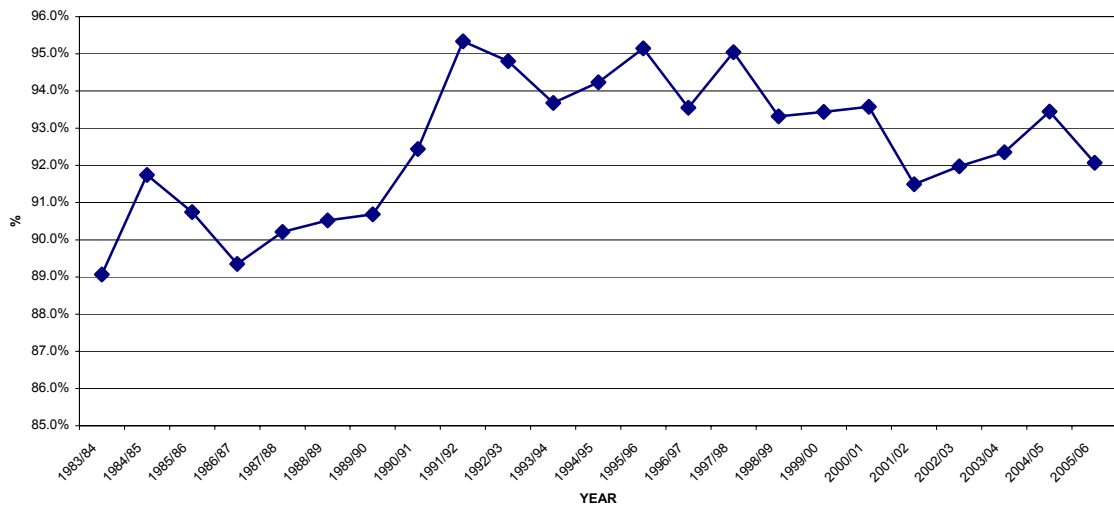


Figure 3: Tax / GDP Ratio

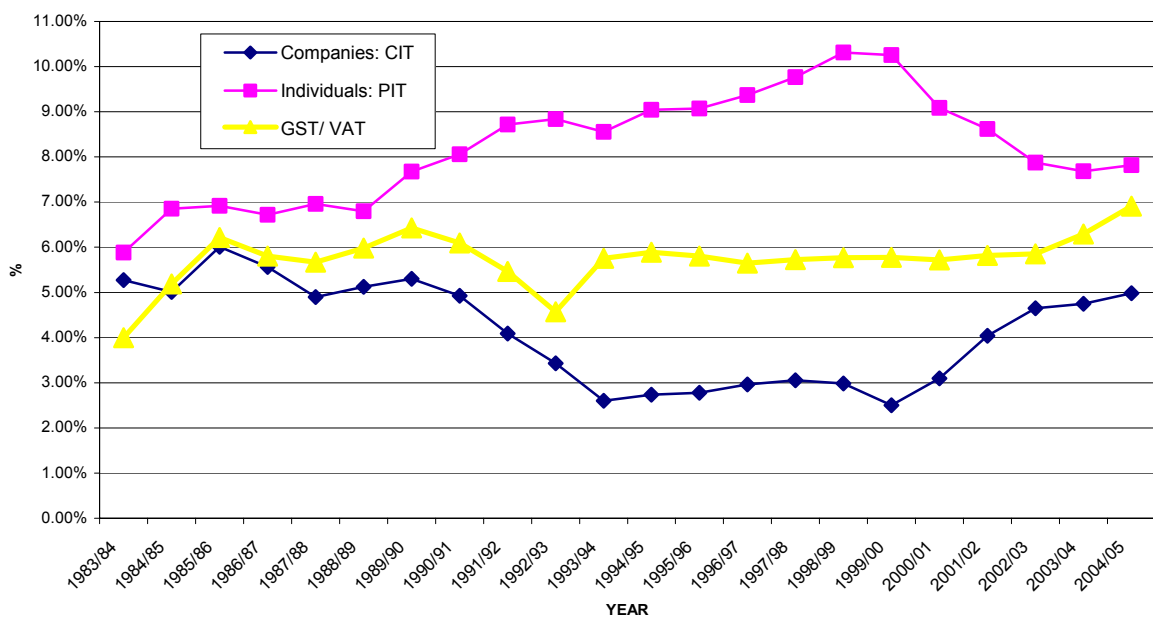


Figure 3 illustrates that tax revenue from PIT increased steadily from 5.9 percent of GDP in 1983/84 to 10.6 percent of GDP in 1999/00. Given the significant tax cuts for individuals over the past few years, this ratio has declined to 7.8 percent in 2004/05.

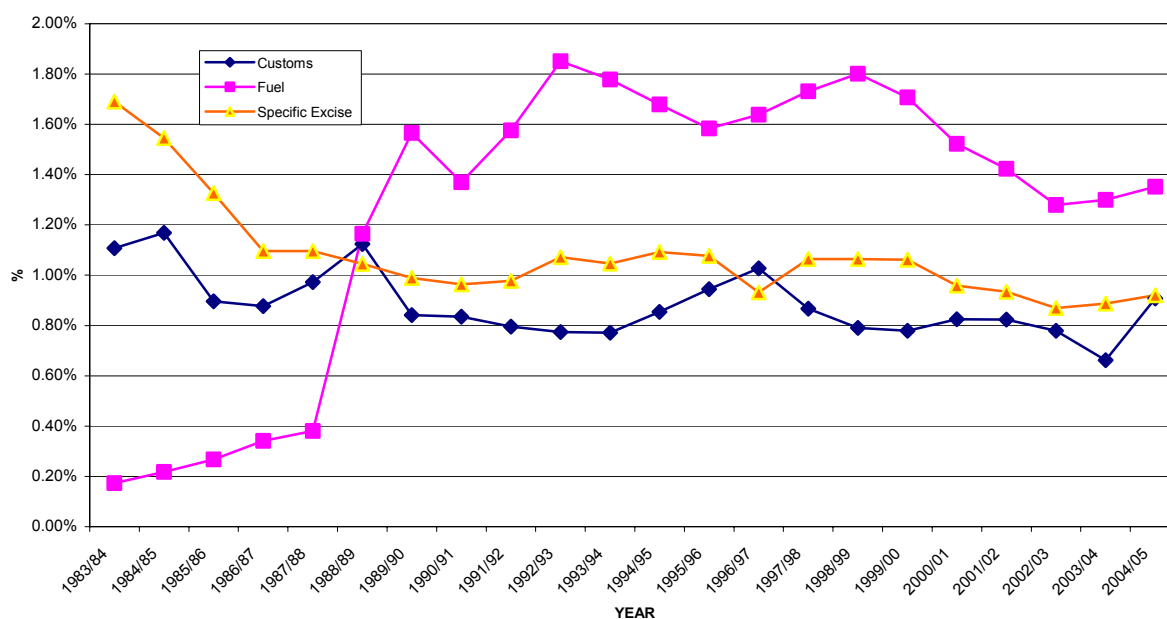
The changeover from GST to VAT in 1991/92 was accompanied by a significant drop in VAT revenue collections in 1991/92 and 1992/93. VAT revenue collections recovered in 1993/94 with the exception of fiscal year 1997/98, VAT revenue as a percentage of GDP recorded a steady increase from 5.8 per cent in 1993/94 to 6.1 percent in 2004/05. Given that the VAT rate has been constant at 14 per cent during this period it could be argued that there has been a steady increase in the efficiency of VAT revenue collections. The tax elasticity of nominal VAT revenue collections with respect to nominal GDP for the

period 1993 to 2001 is equal to 1.073. This figure suggests that, for the period 1993 to 2001, nominal VAT revenue increased more or less in line (slightly faster) with the rate of increase in nominal GDP.

CIT as a percentage of GDP declined from 6.0 percent in 1985/86 to 2.6 per cent in 1993/94. This ratio increased slightly in subsequent years but again decreased to 2.5 per cent in 1999/00. The last five fiscal years recorded a significant break in this declining / sideways trend and the CIT/GDP ratio increased sharply to 3.1 per cent in 2000/01 and to 4.98 per cent in 2004/05.

Figure 4 is a summary of the trends in Tax/GDP ratios for the fuel levy, specific excise duties and customs. The fuel levy became a significant source of revenue for the fiscus in 1988/89, at around 1.2 per cent of GDP. Tax revenue from the fuel levy as a percentage of GDP increased to a high of 1.8 per cent in 1992/3 and in subsequent years declined and / or moved sideways. For the last few years it declined from 1.8 per cent in 1998/99 to 1.35 per cent in 2004/05. Specific excise duties as a percentage of GDP declined from 1.7 per cent in 1983/84 to 1.1 per cent in 1986/87 and this ratio has fluctuated around the 1.0 per cent level since then. Customs revenue (which include import duties and excise duties on imported excisable products – both specific and *ad valorem* excise duties) as a percentage of GDP has been below 1 per cent for most of the period.

Figure 4: Tax / GDP Ratios



Four of the “smaller” tax instruments have become significant lately: they are secondary taxes on companies (STC), taxes on retirement funds, transfer duties and the Skills Development Levy. Stamp duties and MST / UST are the other significant “smaller” tax instruments.

Fiscal and tax policy proposals should take note of changes in composition of the total tax revenue mix. Some of the trends in the tax revenue /GDP ratio of individual tax instruments are more predictable (and desirable) than others and changes in the tax mix

could have significant distributional implications that should be investigated and monitored. It is also important to note that by including earmarked taxes such as the SDL (a new off-budget tax instrument) as part of total tax revenue (the National Revenue Fund) trends in the total Tax / GDP ratio should be interpreted with care.

In 2004/05 direct taxes and indirect taxes accounted for about 56 and 44 per cent respectively of total central government revenue (National Revenue Fund) collected in South Africa.

VAT is the most important indirect tax instrument in South Africa, accounting for 28,2 per cent of total tax revenue in 2004/05. The second most important indirect tax instrument is the general fuel levy, accounting for 5.5 per cent of central government tax revenue, excluding the RAF levy, in 2004/05.

Table 1: The contribution of different tax instruments to total revenue collection

	Tax Revenue %	1990/91	1995/96	1999/00	2002/03	2003/04	2004/05	2005/06
1	Individuals	33.5%	40.6%	43.3%	34.0%	32.7%	31.9%	31.8%
2	Total Companies	20.5%	12.4%	10.6%	20.1%	20.2%	20.3%	21.6%
3	STC	0.0%	1.0%	1.6%	2.3%	2.0%	2.2%	2.6%
4	Retirement funds	0.0%	0.0%	2.7%	2.5%	1.9%	1.3%	2.0%
5	Interest on overdue Income Tax	0.9%	0.6%	0.4%	0.4%	0.5%	0.4%	0.5%
6	Skills Development levy	0.0%	0.0%	0.0%	1.2%	1.3%	1.3%	1.2%
7	Donations tax	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8	Estate duty	0.1%	0.1%	0.2%	0.2%	0.1%	0.1%	0.2%
9	MST	0.3%	0.4%	0.6%	0.4%	0.3%	0.4%	0.5%
10	Transfer duties	1.1%	1.2%	0.9%	1.2%	1.7%	2.0%	1.3%
11	Demut. charge	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%
12	VAT / GST	25.3%	26.0%	24.4%	25.3%	27.0%	28.2%	26.6%
13	Specific excise	4.0%	4.8%	4.5%	3.8%	3.9%	3.8%	3.7%
14	<i>Ad valorem</i> excise	0.6%	0.3%	0.3%	0.4%	0.3%	0.3%	0.1%
15	Fuel levy	5.7%	7.1%	7.2%	5.5%	5.4%	5.5%	5.4%
16	Financial Services	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Air departure Tax	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
18	Other levies	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
19	Customs duties	3.47%	4.2%	3.3%	3.4%	2.8%	3.7%	3.6%
20	Import surcharges	2.88%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
21	Other	0.17%	0.3%	0.1%	0.1%	0.1%	0.1%	0.1%
22	Stamp duties	0.91%	0.8%	0.8%	0.6%	0.5%	0.3%	0.6%
23	NON TAX REV	3.00%	2.3%	2.4%	1.5%	2.2%	1.8%	1.3%
	Less: SACU payments	-2.50%	-3.1%	-3.6%	-3.0%	-3.2%	-3.8%	-3.2%
	TOTAL BUDGET REVENUE	100.00%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2: Changes in the rate of major tax instruments in South Africa 1965-2006

YEAR	Corporate Tax Rate %	STC %	PIT: Maximum Marginal rate %	Sales Tax %	VAT %	Fuel Levy Petrol Cents / litre
1965	30	-	50	-	-	-
1966	33.3	-	50	-	-	-
1967	33.3	-	50	-	-	-
1968	33.3	-	50	-	-	-
1969	40	-	45	-	-	-
1970	40	-	45	-	-	-
1971	40	-	60	-	-	-
1972	40	-	60	-	-	-
1973	40	-	60	-	-	-
1974	40	-	60	-	-	-
1975	40	-	60	-	-	-
1976	40	-	60	-	-	-
1977	40	-	60	-	-	-
1978	40	-	60	13	-	-
1979	40	-	60	13	-	-
1980	40	-	55	4	-	-
1981	40	-	50	4	-	-
1982	40	-	50	5	-	-
1983	42	-	50	6	-	-
1984	42	-	50	10	-	-
1985	50	-	50	10	-	-
1986	50	-	50	12	-	-
1987	50	-	50	12	-	-
1988	50	-	45	12	-	23.5
1989	50	-	45	13	-	22.9
1990	50	-	45	13	-	31.9
1991	50	-	44	13	-	31.9
1992	48	-	43	-	10	46.9
1993	48	15	43	-	14	54.9
1994	40	15	43	-	14	60.9
1995	35	25	43	-	14	60.9
1996	35	12.5	45	-	14	62.9
1997	35	12.5	45	-	14	76.6
1998	35	12.5	45	-	14	86.6
1999	30	12.5	45	-	14	90.6
2000	30	12.5	42	-	14	95.6
2001	30	12.5	42	-	14	98
2002	30	12.5	42	-	14	98
2003	30	12.5	40	-	14	101
2004	30	12.5	40	-	14	111
2005	29	12.5	40	-	14	116
2006	29	12.5	40	-	14	116

ANNEX 2: ENVIRONMENTAL VALUATION IN SOUTH AFRICA

The following table provides a summary of some of the major valuation studies conducted in South Africa (SA). These studies focus mainly on the external costs associated with transport and coal combustion, however valuation studies of other externalities are also included. The objective of the valuation study, the estimate obtained followed by an analysis of the methodology and the estimate, where appropriate, are provided.

Objective of Study / impact being valued	Technique used and monetary value obtained	Analysis of results	
Transport Externalities			
1	<p>Estimated the mitigation cost to reduce the impact of oil spills and emissions from refineries. Mitigation options and costs were considered and the estimates quantified.</p> <p>Lloyd, P., Rukato, H & Swanepoel, R. (2002) <i>"Liquid Fuels Production"</i>, Unpublished study report, initiated by the WWF, funded by GTZ, managed by the DBSA.</p>	<p>From this estimate a capital requirement of about R18,025 billion would be required to mitigate the oil spills and an operational requirement of R322 million per annum.</p>	<p>The study did not quantify the impacts of CO₂, oxides of nitrogen and sulphur. Looked at mitigation options only and not the physical impacts on environmental resources such as the damage to marine life and the health impacts associated with emissions from refineries. Therefore the monetary value obtained is a minimum estimate.</p>
2	<p>To quantify the external costs associated with transport and motor vehicles with the focus on human health impacts, based on the World Bank's estimate of air pollution costs in Chile. The health impacts associated with particulate matter, hydrocarbons and nitrogen oxides were quantified.</p> <p>Gaffen, M., Naude, C., Lombaard, P., Maasdorp, G., Taylor, A & Pretorius, J. (2000) <i>"Quantitative analysis of the full cost associated with motor vehicle use in South Africa"</i>, Report for Department of Transport.</p>	<p>Cost of illness Approach. R8,405 billion.</p>	<p>Quantifying the externalities associated with transport provided a once off estimate, which does not indicate the severity and uncertainty associated with these health impacts. The costs of treatment used are for the US healthcare sector. These results maybe inaccurate because of the differences in the health status of the two populations and the baseline concentrations of pollutants both indoor and outdoor. Furthermore, the study does not account for the effects of all pollutants especially, oxides of sulphur and the potential costs of damage to vegetation and property, cleaning and aesthetic costs. The value obtained is an underestimation of the full costs of</p>

			air pollution. The same applies to study (4) on lead pollution.
3	<p>Focused on calculating the human health costs of air pollution based on the World Bank project in Jakarta, Indonesia.</p> <p>Freeman, P.N.W., Naude, C.M., Pretorius, J., Coovadia, T & Matjila, S.M. (2000) "<i>The Transport Sector - Energy Use and Environmental Impacts</i>", Report by the DBSA.</p>	<p>Cost of illness approach</p> <p>R9,472 billion</p>	<p>It is unclear who the exposed or affected population was, and it does not seem realistic applying the dose response function to the entire population.</p>
4	<p>To quantify the human health impacts associated with atmospheric emissions of lead in transport. The EU lead dose response function was adapted for South Africa.</p> <p>Eunomia Consulting, University of Pretoria. (2003) "<i>Development of a Framework for Market based Instruments to support Environmental Fiscal Reform in South Africa</i>" Companion Document to Final Report for the National Treasury of South Africa".</p>	<p>Cost of illness approach.</p> <p>Range between R791 to R4236 million</p>	<p>Provides a minimum estimate, as only health costs are included in the calculation process.</p>
5	<p>To quantify contribution of CO₂ emissions associated with SA motor vehicle fleet to global warming using the marginal cost of CO₂ from road transport as calculated by the Intergovernmental Panel on Climate Change (IPCC). This study used the marginal damage cost of US\$5/ton for CO₂. Final estimate for global warming costs associated only with cars, light and heavy trucks, and buses and minibuses.</p> <p>Gaffen, M., Naude, C., Lombaard, P., Maasdorp, G., Taylor, A & Pretorius, J. (2000) "<i>Quantitative analysis of the full cost associated with motor vehicle use in South Africa</i>", Report for Department of Transport.</p>	<p>Global warming costs associated with motor vehicle use estimated at R391 million.</p>	<p>This estimate is unreliable due to the difficulty in isolating the impacts and attributing these impacts solely to CO₂ emissions considering the emission of other GHGs from the transport sector. In addition, there is limited knowledge of the possible impacts and a great deal of uncertainty about future technological and socio-economic development in mitigating these impacts on the atmosphere.</p>
6	<p>To determine the costs associated with CO₂, CH₄, and N₂O emissions in transport. Study used a unit damage cost of US\$5,45 per ton CO₂ to estimate total damages.</p>	<p>R1,549 billion</p>	<p>The previous study used US\$5 as the marginal damage cost of CO₂ per ton and this study uses US\$5,45. This reflects the uncertainty of the marginal damage costs of CO₂. The study also</p>

	Freeman, P.N.W., Naude, C.M., Pretorius, J., Coovadia, T & Matjila, S.M. (2000) " <i>The Transport Sector - Energy Use and Environmental Impacts</i> ", Unpublished study report, initiated by the WWF, funded by GTZ, managed by the DBSA.		included the impacts of methane and nitrous oxide emissions that were not quantified in the Gaffen et al. study.
7	<p>This study extended the Gaffen et al. (2000) study to include the external costs of CO₂ as well as nitrous oxide and methane from transport.</p> <p>Eunomia Consulting, University of Pretoria. (2003) "<i>Development of a Framework for Market based Instruments to support Environmental Fiscal Reform in South Africa</i>", Companion Document to Final Report for the National Treasury of South Africa.</p>	Estimates obtained at different rates of time preference ranging from R429 million to a high of R2, 886 billion.	The estimates obtained are based on the world average figures from Fund 2.0 and Fankhauser (1995) of marginal damage costs of CO ₂ . In contrast to the Gaffen study, which provided a once off estimate, this study provides a range of possible values of external costs.
8	<p>To quantify the external costs of noise pollution attributed to motor vehicle use. The damage cost factor was multiplied by the annual kilometres travelled by vehicle type for SA.</p> <p>Gaffen, M., Naude, C., Lombaard, P., Maasdorp, G., Taylor, A & Pretorius, J. (2000) "<i>Quantitative analysis of the full cost associated with motor vehicle use in South Africa</i>", Report for Department of Transport.</p>	Estimate of motor vehicle noise at R173million.	<p>Due to the lack in data availability, the accuracy and reliability of this approach is difficult to assess. The approach adopted is contestable, given that other method such as the hedonic pricing or defensive expenditure methodology should have been implemented. Furthermore, this study implements the US damage cost factors for vehicles in calculating the external costs of noise pollution in South Africa, which casts doubt on the accuracy and reliability of the final estimate.</p> <p>However, the hedonic pricing technique is also problematic as it may undervalue property and thus provides a minimum estimate of the external costs.</p>
9	<p>To provide an estimate of noise damages from motor vehicle use through reference to overseas estimates of damages that lie between 0.06% & 0.5% of GDP.</p> <p>Freeman, P.N.W., Naude, C.M., Pretorius, J., Coovadia, T & Matjila, S.M. (2000) "<i>The Transport Sector - Energy Use and Environmental Impacts</i>", Unpublished study report,</p>	Estimate for SA as 0.15% of GDP which using 1996 GDP figures gives an estimate of R 923 million.	Estimates not consistent with the previous study. There is no indication of the types of vehicles used in quantifying this value, may have included other modes of transport not just cars, trucks and buses and minibuses and this could explain the discrepancy in values obtained.

	initiated by the WWF, funded by GTZ, managed by the DBSA.		
10	<p>To estimate the external costs associated with traffic congestion on road infrastructure. These congestion costs were quantified by estimating the additional travel time caused by congestion as opposed to travel during free-flow conditions. Congestion costs were assumed to be a function of the value of time and the number of hours lost to congestion. The rate of R20 (1996 rands) per hour per vehicle from the Land Transport Pricing Study was used. To obtain the estimate for SA, it was assumed that congestion occurs mainly in urban centres and congestion is proportional to the population of urban centres.</p> <p>Eunomia Consulting, University of Pretoria. (2003) <i>"Development of a Framework for Market based Instruments to support Environmental Fiscal Reform in South Africa"</i>, Companion Document to Final Report for the National Treasury of South Africa.</p>	<p>The congestion costs incurred per urban centre were extrapolated from the costs calculated for Gauteng, considering the different population figures. The travel delay component of congestion was estimated at R527 million (1998 rands).</p>	<p>Congestion varies by the area of a country, by type of vehicle and road and the time of day and week. Consequently this impacts on marginal congestion costs, which may then vary considerably. And models are forced to engage in averaging of congestion costs per km to give a figure that does not reflect the costs imposed at a time when they are greatest.</p>
11	<p>To quantify congestion costs associated with transport. Study estimated the traffic volumes relative to road capacity and the value of time. Congestion costs were based on the calculated costs for Pretoria, which was then extrapolated for SA in terms of vehicle kilometres travelled for the main urban centres.</p> <p>Freeman, P.N.W., Naude, C.M., Pretorius, J., Coovadia, T & Matjila, S.M. (2000) <i>"The transport sector - Energy use and environmental impacts"</i>, Unpublished study report, initiated by the WWF, funded by GTZ, managed by the DBSA.</p>	<p>The total estimated congestion costs for SA was R10, 2 billion.</p>	<p>The final estimate obtained depends on the rate at which traffic congestion occurs (i.e. rate of traffic build-up or congestion) which may vary between cities. The other reason for the possible difference in values is the use of traffic volumes relative to road capacity and the value of time whereas the previous study uses the value of time and hours spent travelling to quantify congestion costs.</p>
Coal combustion externalities			
12	<p>To obtain an estimate of the contribution of CO₂ and CH₄ emissions from coal related activities to global environmental damage by using the following marginal damage costs of US\$5/ton CO₂ and US\$105/ton CH₄</p>	<p>Damages due only to CH₄ and CO₂ estimated to be R 11, 534 billion. These social costs</p>	<p>The marginal damage cost estimates appear to be very low considering there is not an upper bound estimate. Other international studies suggest higher values for CO₂ marginal damage costs.</p>

	<p>calculated on the basis that the global warming potential of CH₄ is 21 times that of CO₂. Valuation based on the volume of emissions with carbon emissions based on coal consumption by each sector in an attempt to calculate the social costs of methane and CO₂ emissions.</p> <p>Blignaut, J & King, N. (2002) "<i>The externality cost of coal combustion in South Africa</i>", FEE Conference Proceedings.</p>	quantified using sectoral emissions based on the amount of coal purchased.	
13	<p>Estimated the damage costs of sectoral CO₂ emissions using the following estimates of the marginal damage cost of CO₂ namely, R17/ton, R51.5 and R120.5/ton.</p> <p>Visser, M., Spalding-fecher, R., and Leimann, A. (2002) "<i>Manufacturing and Economic Growth</i>", Unpublished study report, initiated by the WWF, funded by GTZ, managed by the DBSA.</p>	Estimates provided per sector.	
14	<p>To estimate the damage cost of methane release during the production of coal using the quantity of methane produced multiplied by the global warming potential of CH₄, which is 21 times that of CO₂. Used CO₂ damage costs of R20, R60 and R140 per tonne emitted.</p> <p>Van Zyl, H., Raimondo, J and Leiman, T. (2002) "<i>Energy supply sector - coal mining</i>", Unpublished study report, initiated by the WWF, funded by GTZ, managed by the DBSA.</p>	Ranges from R180 million to R1.2 billion, during mining activity.	<p>Does not consider the time that GHGs spend in the atmosphere and the resulting damages and changes in environmental quality; the health impacts of GHGs; and specific impacts such as sea level rise. Therefore these estimates are an underestimation, as they also exclude the probability of methane releases with increased mining activity.</p> <p>Also calculated costs of cleanup of methane based on the cost of sequestering CO₂. Estimate range from R76.5 million to R198 million for carbon sequestration range of R8.5 to R22 per ton.</p>
15	<p>Study undertaken to determine the damage costs of electricity generation. The following marginal damage costs of CO₂ were used: R37 (low), R162 (central) and R374 (high).</p> <p>Spalding-Fecher, R. & Matibe, D.K. (2002) "<i>Electricity and externalities in South Africa</i>", EDRC, University of</p>	Range of values from R 1,625 to R 16,258 billion.	The study criticises IPCC for using average damage costs instead of marginal damage costs and specifically for using damage costs that are scaled across countries using per capita income, which presents equity issues. That is, the damages to the poor are worth less than damages to the rich.

	Cape Town.		Therefore the study uses marginal damage costs with equity weightings.
16	<p>To quantify the external costs associated with electricity generation using the following marginal damage costs of CO₂: \$5/ton, \$20/ton and \$33/ton.</p> <p>Van Horen, C. (1996) "<i>The cost of power: externalities in South Africa's energy sector</i>", Unpublished doctoral dissertation, University of Cape Town.</p>	<p>Estimates obtained range from R3,793 to R25,290 billion</p>	<p>Estimates close to those for Blignaut & King global externalities.</p>
17	<p>Quantify health impacts associated with particulates, sulphur dioxide and nitrogen oxides emissions attributed to electricity generation. Model used developed in the US and contains impacts from assumptions about emissions rates and changes in environmental quality through dispersion, to dose response rates for health impacts and valuation data. Dose response relationships based on international studies modified for local socioeconomic conditions. Estimates in 1994 rands were inflated to 1999 rands.</p> <p>Van Horen, C. (1996) "<i>The cost of power: externalities in South Africa's energy sector</i>", Unpublished doctoral dissertation, University of Cape Town.</p>	<p>Cost of illness approach Damage estimate range from R 852 to R1,450 million.</p>	<p>Less information is available on emissions from coal-fired power plants owned by municipalities, so these were not included in the externality valuation. They are likely to have a greater impact on human health because they are older and only used during peak periods and have lower smoke stack heights than Eskom Stations and are usually located in urban areas.</p>
18	<p>To quantify the net external damages of electricity generation. That is, the costs of air pollution and health and global warming less the health benefits of electrification.</p> <p>Spalding-Fecher, R. & Matibe, D.K. (2002) "<i>Electricity and externalities in South Africa</i>", EDRC, University of Cape Town.</p>	<p>Estimated avoided health costs for e year for all of the low income households that were electrified range from R 173 million to R 2324 million.</p> <p>The final estimate ranges from R2, 304 to R15, 379 billion.</p>	

Valuation of other externalities			
19	<p>To investigate the health impacts of coal burning in households, especially due to particulate matter in the Vaal triangle.</p> <p>Scorgie, Y & Annergarn, H. (2002) <i>"The impact of coal on people"</i>, Paper presented at the coal and sustainable development conference.</p>	<p>Cost of illness approach.</p> <p>Range from R 202 million to R 813 million.</p>	<p>Does not include health impacts of sulphur dioxide and other gases emitted. How do they separate the health impacts of these emissions for e.g. asthma attacks are synonymous with emissions of SO₂ and not particulate matter only. Therefore estimate may be misleading.</p>
20	<p>To determine the external costs of paraffin based on can Horen study (1996) using international morbidity and mortality models. These included effects of paraffin poisoning and fires.</p> <p>Lloyd, P., Rukato, H and Swanepoel, R. (2002) <i>"Liquid fuels production"</i>, Unpublished report, study initiated by the WWF, funded by the GTZ, managed by the DBSA.</p>	<p>Paraffin poisoning: Range from R 64 million to R 961 million.</p> <p>Fires: R 215 million to R 3,130 billion.</p>	<p>The estimates obtained need to be updated to reflect the current use patterns of this commodity.</p>
21	<p>To estimate the costs of sulphur pollution from coal mines in the Olifants Catchment Area.</p> <p>Van Zyl, H., Raimondo, J and Leiman, T. (2002) <i>"Energy supply sector - coal mining"</i>, Unpublished report, Study initiated by the WWF, funded by the GTZ, managed by the DBSA.</p>	<p>Preventative expenditure approach</p> <p>Damage costs calculated at R 17 million. To reduce the present water pollution, prevention costs will vary between R11.9 to R 562 million.</p>	<p>The estimate obtained is a minimum estimate of the external costs associated with sulphur pollution. Damage to plant and animal life is not quantified and downstream costs were not included in the estimate.</p>

ANNEX 3: MAKING GROWTH GREEN - ENVIRONMENTAL DUTY, THE WORLD BANK

“When the world’s leaders met at the Millennium Summit four years ago, they agreed on a set of goals aimed at cutting global poverty in half by 2015. They also set targets for the environment, as they understood its centrality to long-term economic growth, human development and stability of the planet.

The problem is that today, 10 years shy of when the 2015 goals are to be met, progress on the environment is alarmingly slow. So much more is possible.

The phasing out of ozone-depleting substances via the Montreal Protocol, for instance, shows what can be done when the world community works together. Thanks to the protocol, it is estimated up to 20 million cases of skin cancer and 130-million eye cataracts will be avoided.

This kind of success should encourage us. However, now we need to match our action with the scale of the challenge. Our world is endangered.

Deforestation is increasing, with almost 100 million hectares lost in the past decade alone – much of it due to millions of poor farmers in Africa and Latin America who cut down trees, having no other access to land or energy sources.

Meanwhile, carbon dioxide emissions are rising: the European Union’s target is to cut greenhouse gas emissions 8 per cent by 2010; but with current policies, only 0,5 per cent will be achieved. Of the world’s species, 12 per cent of birds, 24 per cent of mammals and 30 per cent of fish are either vulnerable or in immediate danger of extinction.

The environmental challenge is even starker in developing countries, where 5 billion of the earth’s 6 billion people live. In these nations, the environment is linked directly to human development – and to poverty.

More than 1 billion people in developing countries lack access to clean water, and more than 2 billion have no access to basic sanitation. Between 5 and 6 million people, mostly children, die each year due to waterborne diseases such as diarrhoea and air pollution.

On trends at present, we will miss millennium environment targets. What needs to be done?

As a starting point, we must recognise the fundamental imbalance in the global environmental equation. Richer nations do much of the environmental damage. Accounting for only 15 per cent of the world’s population, they cause 50 per cent of global carbon dioxide emissions.

The poorer countries, though, pay much of the “costs”, losing up to 8 per cent of their GDP a year because of environmental degradation, as well as suffering devastating effects on health and human welfare.

Rich countries larger contribution to environmental damage means that they must shoulder greater responsibility for fixing the problem. That means changing the way they produce and consume energy, reducing subsidies, ensuring appropriate pricing, and adequately taxing environmentally damaging products.

It also means providing more resources to developing countries for environmental conservation. Between 1990 and 2000, financing for environmental concerns followed about the same path as overall development assistance flows: it stagnated. Aid for the environment averaged about US\$ 2 billion a year, far short of what the international community, first at the Rio Summit in 1992 and then at the Johannesburg Summit 10 years later, said was needed. In terms of global priorities, this figure compares with the US\$ 900 billion that the world currently commits to military expenditures each year.

If the war on environmental degradation is to be won, we need a major turnaround. Three areas can help to speed up progress:

- Developed countries must set the example by moving toward environmentally friendly production and consumption patterns, including more control of greenhouse gas emissions and use of innovative mechanisms such as Carbon Funds to buy offsets (reductions in greenhouse gases) from developing countries. Richer countries must also increase aid commitments. Reversing the declining trend in contributions to the Global Environment Facility would be a good start. Since its inception in 1991, facility funding has declined by almost 10 per cent as a share of the combined GDP of the 38 contributing nations;
- The international community must make a much more serious commitment to renewable energy, efficiency, and other environmentally friendly energy sources. A business-as-usual approach would mean that by 2030 carbon dioxide emissions would be 70 per cent higher than today, and renewable energy would make up a mere 4 per cent of total energy usage, up from 2 per cent now;
- We need the kind of common effort launched a generation ago in agriculture that led to the Green Revolution;

Another 2 billion people will be added to global population in the next 25 years – the vast majority in poorer countries – with huge demands for energy and economic growth.

If that growth is not achieved in an environmentally sustainable way, its effects on poverty and human well being will be disastrous. It will be too late 25 years from now to make the right choices. We must act now.”

Project Syndicate

Wolfensohn is the World Bank president.

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