Reducing Greenhouse Gas Emissions Pricing Carbon – The Carbon Tax Option

National Treasury

Cecil Morden & Sharlin Hemraj | Economic Tax Analysis | March 2011

national treasury

Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

Introduction

- A high(er) level of economic growth is a necessary but not sufficient requirement to ensure significant reductions in the levels of unemployment, poverty and income inequality AND improvement in the economic welfare of all South Africans.
- Sustainable development requires that not only profitability and efficiency considerations are important but human development and the needs of future generations should increasing be taken into account in today's policy decisions.
- Market prices do not always reflect the full economic costs of production or consumption / use;

The importance (and limitation) of markets (price signals)

- In general, markets provide an efficient (although not necessarily the most equitable) means of allocating scarce resources.
- However, some markets are subject to failures, particularly with respect to environmental goods and services due to the public good nature of these goods.
- This can lead to insufficient consideration of environmental issues in production and consumption decisions.
- Government intervention necessary – regulations, standards, taxes, etc.

Environmental Challenges

- South Africa faces a number of environmental challenges that is likely to be aggravated as the economy grows if natural resources are not properly managed and protected. These include:
  - emissions of local air pollutants that manifest in poor air quality with adverse impacts on society;
  - excessive emissions of greenhouse gases that contribute to global warming (Climate Change);
  - inappropriate land-use that results in land degradation;
  - biodiversity loss and damage to terrestrial ecosystems;
  - deteriorating water quality with severe impacts for South Africa as a water stressed nation; and
  - increasing levels of solid waste generation comparable to many developed countries.

Polluter Pays Principle

Vito De Lucia (Lead Author);Richard Reibstein (Topic Editor) "Polluter pays principle". In: Encyclopedia of Earth

- "The Polluter Pays Principle (PPP) is an environmental policy principle which requires that the costs of pollution be borne by those who cause it. In its original emergence the Polluter Pays Principle aims at determining how the costs of pollution prevention and control must be allocated: the polluter must pay.
- Its immediate goal is that of internalizing the environmental externalities of economic activities, so that the prices of goods and services fully reflect the costs of production. Bugge (1996) has identified four versions of the PPP: economically, it promotes efficiency; legally, it promotes justice; it promotes harmonization of international environmental policies; it defines how to allocate costs within a State.
- The normative scope of the PPP has evolved over time to include also accidental pollution prevention, control and clean-up costs, in what is referred to as *extended Polluter Pays Principle"*.

Polluter Pay Principle (2) - Application

- “The PPP is normally implemented through two different policy approaches: command-and-control and market-based. Command-and-control approaches include performance and technology standards. Market-based instruments include pollution taxes, tradable pollution permits and product labeling. The elimination of subsidies is also an important part of the application of the PPP.
- At the international level the Kyoto Protocol is an example of application of the PPP: parties that have obligations to reduce their greenhouse gas emissions must bear the costs of reducing (prevention and control) such polluting emissions”.
- *Vito De Lucia (Lead Author);Richard Reibstein (Topic Editor) "Polluter pays principle". In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth August 22, 2008; Last revised Date October 17, 2010; Retrieved March 13, 2011 <http://www.eoearth.org/article/Polluter_pays_principle>*

Options for Intervention

- **Command-and-control measures**:
  - Use of legislative or administrative regulations that prescribe certain outcomes;
  - Usually target outputs or quantity, e.g. minimum ambient air quality standards, within which business must operate.
- **Market-based instruments**:
  - Policy instruments that attempt to internalise environmental externalities through the market by altering relative prices that consumers and firms face;
  - Utilise the price mechanism and *complement* command-and-control measures. Under certain circumstances MBIs are considered more efficient than command-and-control measures

Externalities & Pigovian Tax

- “Externalities refers to situations when the effect of production (and) or consumption of goods and services imposes costs or benefits on others which are not reflected in the prices charged for the goods and services being provided”.
- “A Pigovian tax is a tax imposed that is equal to the negative externality. The result is that the market outcome would be reduced to the efficient amount. A side effect is that revenue is raised for the government, reducing the amount of distortionary taxes that the government must / should impose elsewhere”.

Market based instruments

- 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 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.

Policy matrix of interventions to correct for - environmental - market failures

Market based instruments	Creating markets	Environmental regulations / (command-and-control)	Engaging 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

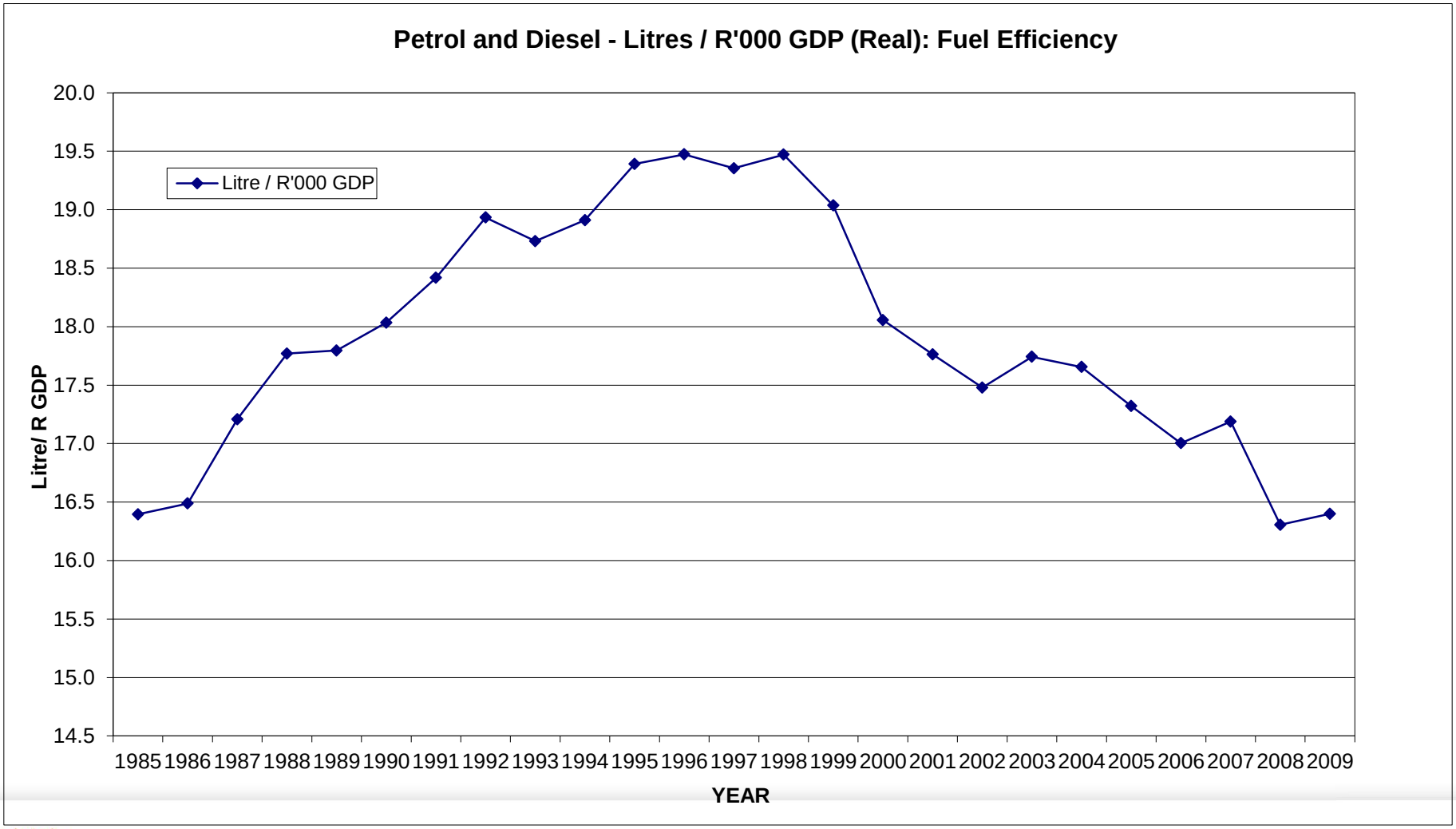
Criteria / Design Considerations

- **Environmental effectiveness** – linked to the environmental externality and aim for best design possible;
- **Tax rate & revenue** – tax rate to be phased-in, consider appropriate revenue recycling options, budget priorities, etc.
- **Support for the tax** – public support and acceptance is important (e.g. tax payer morality);
- **Legal, technical & administrative feasibility**:
  - *Define taxable commodity - tax base*; or nature of incentive;
  - *Setting the tax rate;*
  - *Tax avoidance and evasion;*
  - *Collection costs; and*
  - *Compliance costs.*
- **Competitiveness impact**s – may require phase in approach to allow adequate time for adjustments;
- **Distributional impacts** – compensating measures may need to be considered; and
- **Adjoining policy areas** – is the instrument capable of contributing to other social and economic objectives?

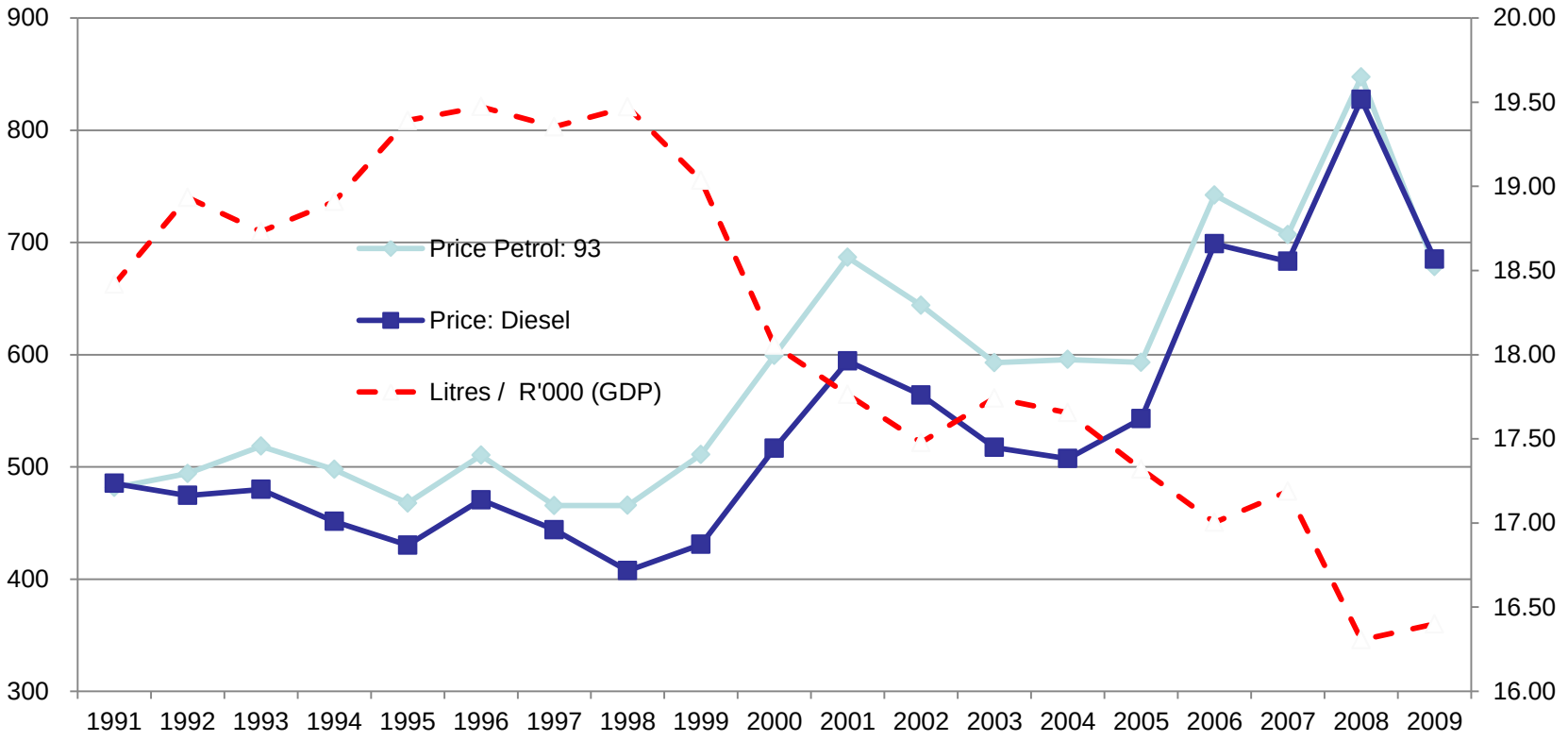
Petrol, Diesel, GDP & Fuel Efficiency

Year	R mn: 2000	Million Litres				Litres / R'000 (GDP)
	GDP: Real	PETROL	DIESEL	TOTAL	DIESEL %	Litres
1991	762,097	8,906	5,130	14,036	36.5%	18.418
1992	745,811	9,171	4,950	14,121	35.1%	18.934
1993	755,011	9,202	4,940	14,142	34.9%	18.731
1994	779,429	9,629	5,110	14,739	34.7%	18.910
1995	803,713	10,153	5,432	15,585	34.9%	19.391
1996	838,327	10,566	5,759	16,325	35.3%	**19.473**
1997	860,516	10,785	5,869	16,654	35.2%	19.354
1998	864,968	**10,883**	5,959	16,842	35.4%	19.471
1999	885,365	10,861	5,993	16,854	35.6%	19.036
2000	922,148	10,396	6,254	16,650	37.6%	18.056
2001	947,373	10,340	6,488	16,828	38.6%	17.763
2002	982,121	***10,335***	6,831	17,166	39.8%	17.478
2003	1,010,603	10,667	7,263	17,930	40.5%	17.742
2004	1,057,090	10,985	7,678	18,663	41.1%	17.655
2005	1,113,116	11,165	8,115	19,280	42.1%	17.321
2006	1,175,451	11,279	8,708	19,987	43.6%	17.004
2007	1,240,100	**11,558**	9,757	21,315	45.8%	17.188
2008	1,285,984	11,072	9,897	20,969	47.2%	16.306
2009	1,262,836	11,115	9,595	20,710	46.3%	16.400

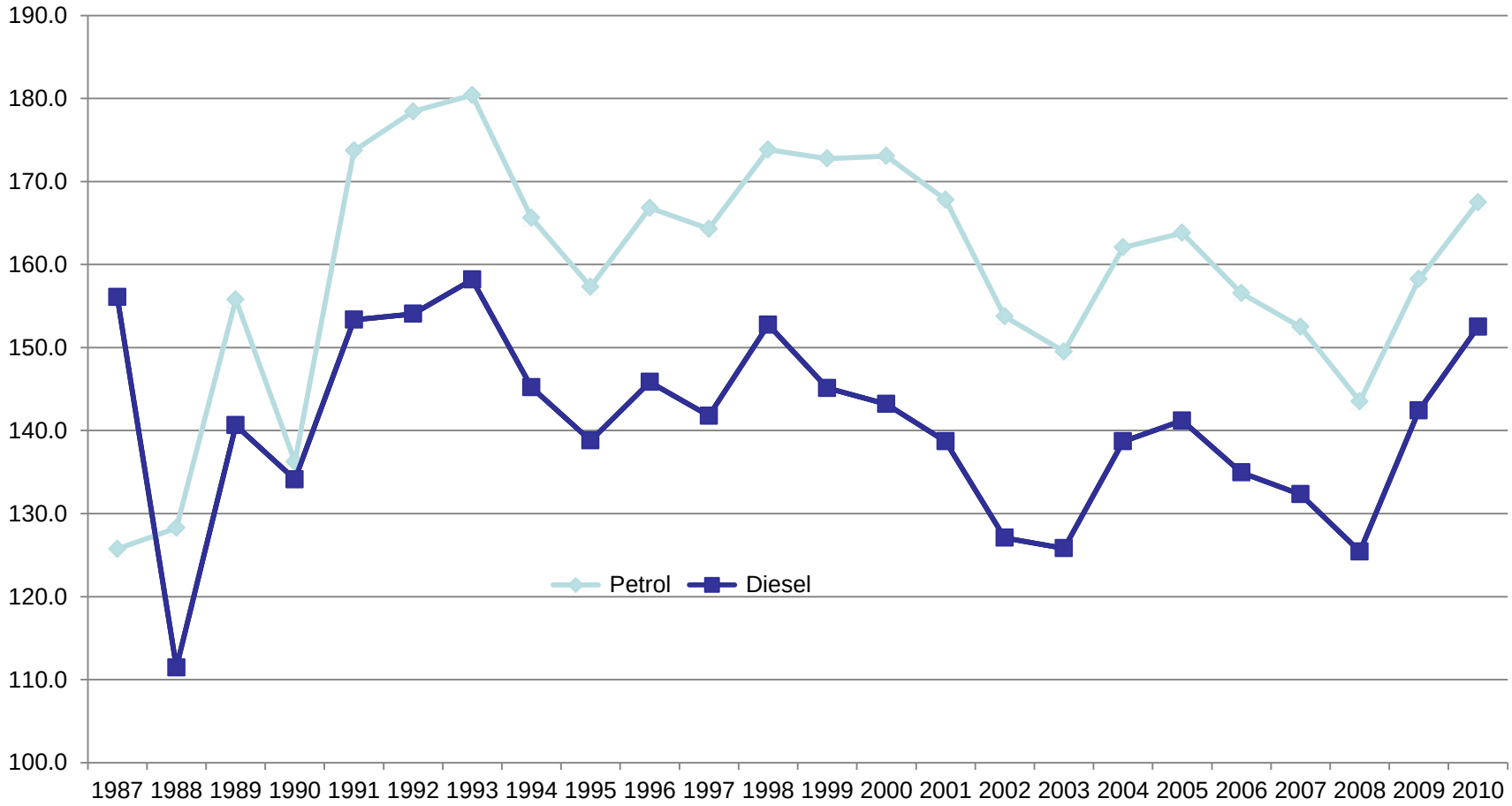
Fuel (petrol & diesel) efficiency



Fuel (petrol & diesel) price (lhs c/l) vs. fuel efficiency, litres/R'000 of GDP (rhs)



General Fuel Levy (Real 2010 = 100)



General Fuel Levy & Prices (Real, 2010 prices)

YEAR	REAL: GENERAL FUEL LEVY (GFL)		Retail Selling Price: 1 Feb	Wholesale Selling Price: 1 Feb	GFL: as a % PRICE	
	Petrol	Diesel	Price Petrol: 93	Price: Diesel	Petrol	Diesel
1991	173.7	153.3	482	485	**36.1%**	31.6%
1992	178.4	154.1	494	475	36.1%	32.5%
1993	180.4	158.2	518	480	34.8%	**33.0%**
1994	165.6	145.2	498	451	33.3%	32.2%
1995	157.3	138.8	468	430	33.6%	32.3%
1996	166.8	145.9	510	471	32.7%	31.0%
1997	164.3	141.8	465	444	35.3%	31.9%
1998	173.8	152.8	466	407	**37.3%**	**37.5%**
1999	172.8	145.1	511	431	33.8%	33.7%
2000	173.1	143.2	599	516	28.9%	27.7%
2001	167.8	138.7	687	594	24.4%	23.3%
2002	153.7	127.1	644	564	23.9%	22.5%
2003	149.5	125.8	593	517	25.2%	24.3%
2004	162.1	138.7	596	507	27.2%	27.3%
2005	163.8	141.2	593	543	27.6%	26.0%
2006	156.5	134.9	742	699	21.1%	19.3%
2007	152.5	132.3	707	683	21.6%	19.4%
2008	143.5	125.4	848	828	16.9%	15.2%
2009	158.3	142.4	678	685	23.3%	20.8%
2010	167.5	152.5	785	702	21.3%	21.7%

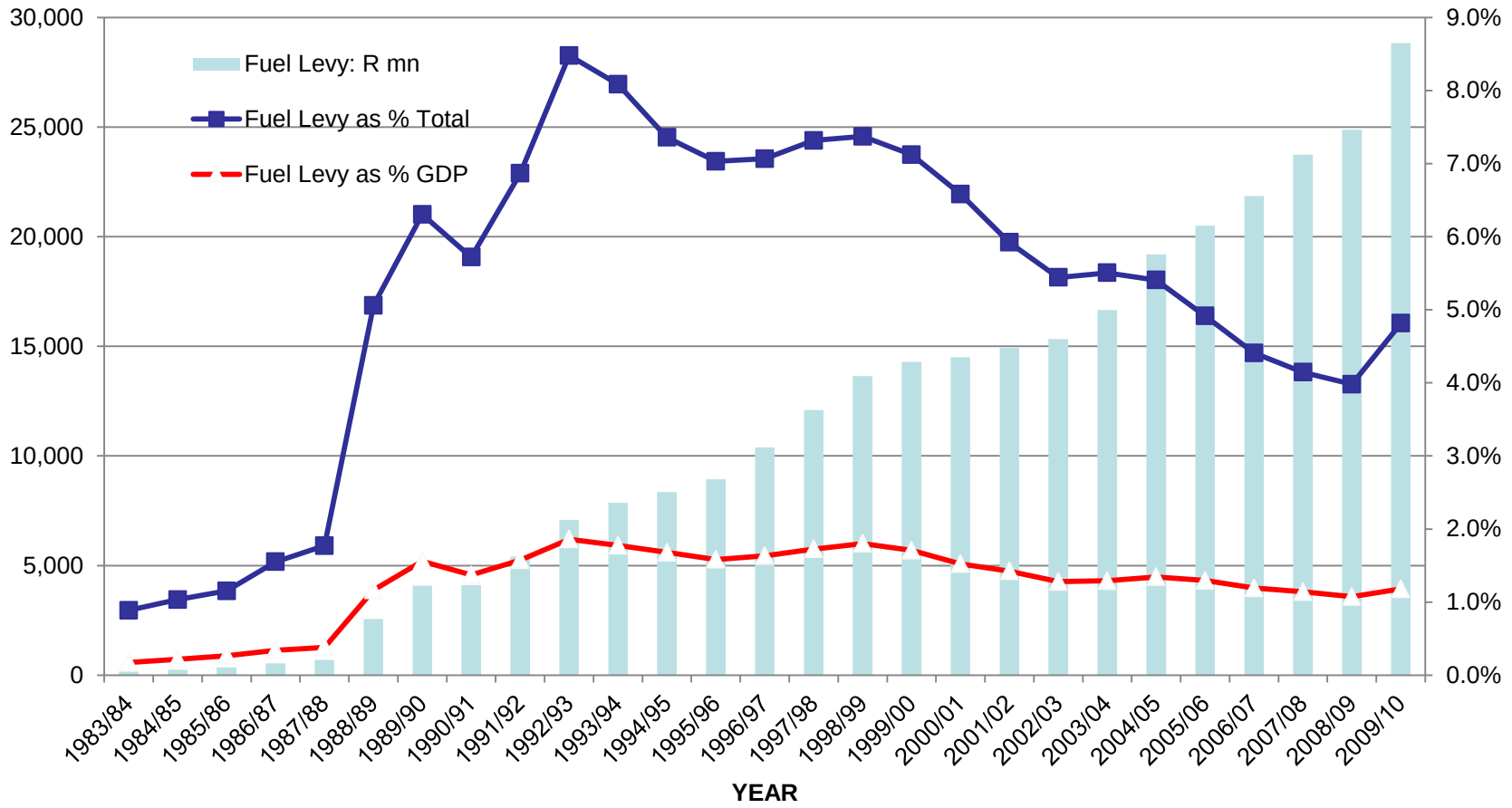
General Fuel Levy & Prices (Real) - % Change

% CHANGE (Real)				
YEAR	GENERAL FUEL LEVY		Price - Feb: (estimated)	
	Petrol	Diesel	Petrol: 93	Diesel
1991	27.5%	14.3%	-4.5%	2.3%
1992	2.7%	0.5%	2.6%	-2.2%
1993	1.1%	2.7%	4.9%	1.1%
1994	-8.2%	-8.2%	-4.0%	-5.9%
1995	-5.0%	-4.4%	-6.0%	-4.7%
1996	6.0%	5.1%	9.1%	9.4%
1997	-1.5%	-2.8%	-8.8%	-5.7%
1998	5.8%	7.7%	0.1%	-8.2%
1999	-0.6%	-5.0%	9.7%	5.8%
2000	0.2%	-1.3%	**17.3%**	**19.8%**
2001	-3.0%	-3.1%	**14.6%**	**15.1%**
2002	-8.4%	-8.4%	-6.2%	-5.1%
2003	-2.8%	-1.0%	-7.9%	-8.3%
2004	8.4%	10.2%	0.5%	-1.9%
2005	1.1%	1.8%	-0.4%	7.0%
2006	-4.4%	-4.4%	25.2%	28.7%
2007	-2.6%	-1.9%	-4.7%	-2.2%
2008	**-5.9%**	**-5.2%**	**19.9%**	**21.1%**
2009	10.3%	13.5%	-20.0%	-17.2%
2010	5.8%	7.1%	15.7%	2.5%

Price & Income Elasticity of Demand: Petrol and Diesel (1993 to 2008: n = 62)

	Petrol	Diesel
Price (short run)	-0.22	-
Price (long run)	-0.36	-
Income (short run)	0.35	1.00
Income (long run)	0.56	1.09

Revenues from general fuel levy (1983/84 – 2009/10): Nominal & as % of Total tax revenue and GDP



Climate change and environmental degradation are a threat to South Africa's sustainable development and in parallel, their economic implications are a cause for significant concern

World Map Reflecting Mortality Related to Climate Change

"South Africa's vulnerability to the direct and indirect impacts of climate change, including the costs of mitigation and adaptation, the potential loss of markets, and the consequent impact on sustainable development and poverty alleviation underline the need to create a balance between adaptation, mitigation and managing the socioeconomic impacts of climate change response measures" – Environmental Affairs Minister Marthinus Van Schalkwyk (2005)

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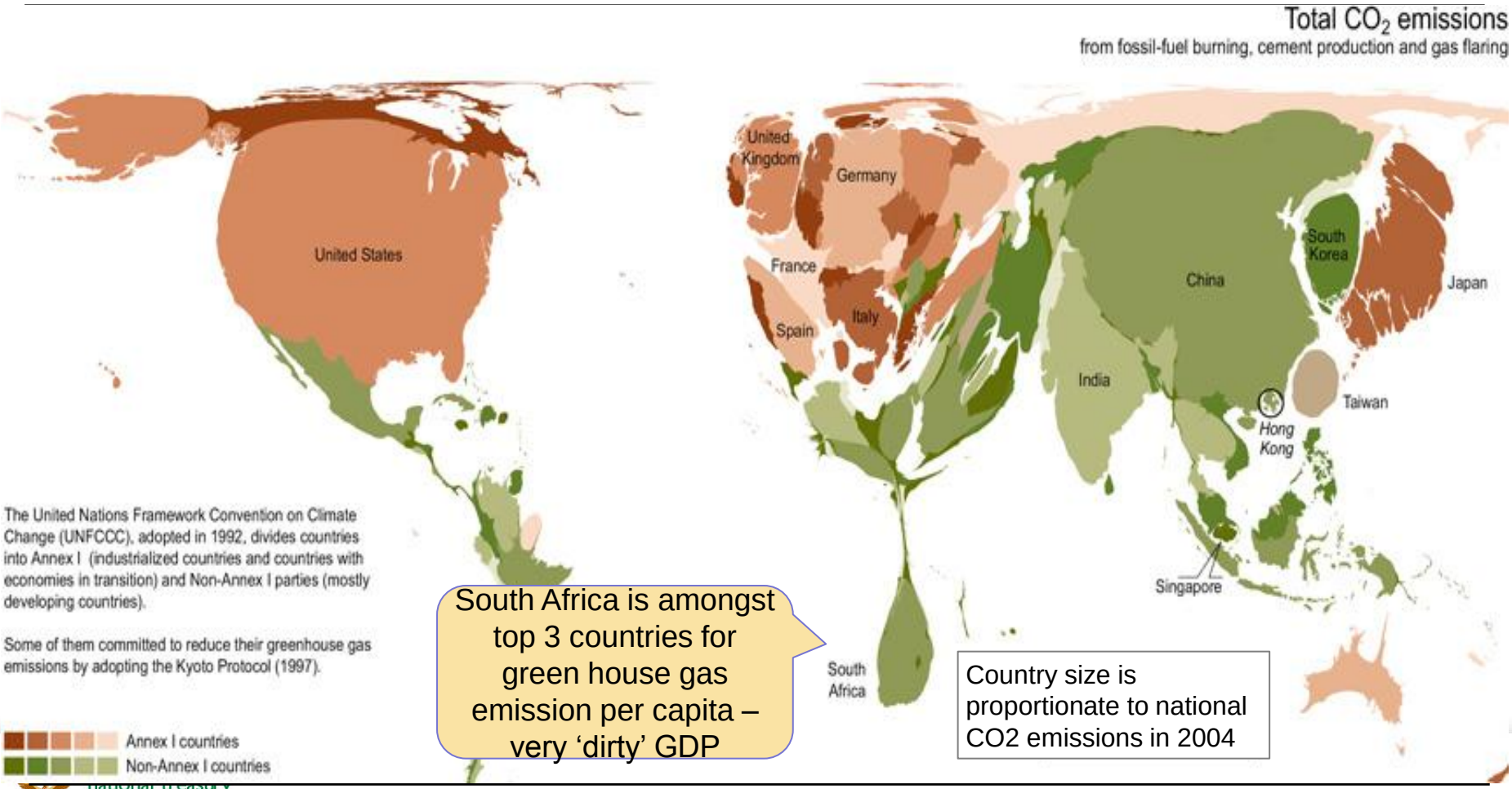
Source: Human Impact Report – Climate Change: The Anatomy of a Silent Crisis, Global Humanitarian Forum Geneva, 2009

South Africa ranks among the <u>world's 20 biggest GHG emitters,</u> with total emissions per capita ranked at top 3



South Africa is amongst top 3 countries for green house gas emission per capita – very 'dirty' GDP

Country size is proportionate to national CO2 emissions in 2004

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Source: "Climate Change - South Africa", Sealthedeal website - http://www.sealthedeal2009.org/climate-change-south-africa

Sectoral GHG emissions for SA – DEA GHG Inventory Report (2009)

Sector	GHG emissions CO_2e (Gg – gigagrams)							
	1990	% of total	1994	% of total	2000	% of total	2000 % change from 1994	2000 % change from 1990
Energy	260 886	75.1	297 564	78.3	344 106	**78.9**	15.6	31.9
Industrial processes and produce use	30 792	8.9	30 386	8.0	61 469	**14.1**	102.3	99.6
Agriculture	40 474	11.6	35 462	9.3	21 289	**4.9**	-40.0	-47.4
Waste	15 194	4.4	16 430	4.3	9 393	**2.1**	-42.8	-38.2
Total (without LULUCF)	**347 346**		**379 842**		**436 257**		**14.8**	**25.6**

GHG emission trends for SA – DEA GHG Inventory Report (2009)

GHG emissions CO_2e (Gg)	1990	% of total	1994	% of total	2000	% of total	2000 % change from 1994	2000 % change from 1990
CO_2	280 932	80.9	315 957	83.2	353 643	**81.1**	11.9	18.6
CH_4	2 053	12.4	2 057	11.4	3 624	**17.2**	76.2	76.5
N_2O	75	6.7	67	5.4	76.7	**1.3**	14.5	2.7
CF_4	-	-	-		0.303	**0.5**	-	-
C_2F_6	-	-	-		0.027	**0.06**	-	-
Total CO_2eqGg (without LULUCF)	**347 346**		**379 842**		**436 257**		**14.8**	**25.6**

Policy synergy and the context for a carbon tax

- National Environmental Management Act (Act No. 107 of 1998). Air Quality Act (Act No.39 of 2004)
- Environmental Fiscal Reform (2003 – 2006)
- LTMS (2007 - 2008)
- ANC Resolution on Climate Change, 2007
- Climate Change Response Document (2010)
- IRP2 (2010/11)
- SARI
- Global Sustainability Panel
- COP17

A framework for considering market-based instruments to support environmental fiscal reform in South Africa, April 2006 (p.17)

- 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 the Department of Minerals and Energy (DME) 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 was adopted in 2004 that highlights potential areas for government intervention to both mitigate and adapt to the effects of climate change.

April 2006 (p.79): Table 9 Options for developing new environmentally-related taxes

Theme	Instrument	Incentive mechanism	Key technical considerations
Electricity	Electricity consumption tax	▪ Increase the price of electricity, thereby suppressing demand; ▪ Indirectly reduce air pollution emissions; and ▪ Encourage fuel efficiency and demand-side management.	▪ 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	▪ Increase the price of certain fuels relative to others; ▪ Encourage greater fuel efficiency and energy conversion ratios; and ▪ Indirectly reduce air pollution emissions.	▪ 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.

Long Term Mitigation Scenarios (Wedges) – rank emission reductions

- Limit use of SUVs (36)
- Passenger modal shift (16)
- Improved vehicle efficiency (14)
- SWH subsidy (25)
- Industrial, Commercial, Residential energy efficiency (5, 22, 21)
- Renewables with learning extended (subsidy) (6, 7)
- Nuclear (12, 8)
- Cleaner coal (28)
- Land use: afforestation (27)
- Escalating CO_2 tax (1)
- Nuclear and renewables extended (2)
- CCS (2 Mt & 20 Mt) (26, 19)
- Electric vehicles with nuclear, renewables (3)
- Biofuel subsidy (29, 15)
- Hybrids (23)
- Synfuel CCS (2Mt) (32)

ANC Resolution on Climate Change, 2007 (A)

- *Our vision of the future includes a sustainable economy where all South Africans, including present and future generations realise their right to an environment that is not harmful to their health or well-being.*
- *We must take up the challenge … and act together to save tomorrow by what we do today.*
- *South Africa is responsible for about 1% of the world's greenhouse gas emissions. This is a relatively small proportion, but it means that we are the world's 14th largest producer of greenhouse gases and along with India and China we are seen as one of the "large" developing country emitters. The reason for this is our country's heavy reliance on coal as the main source of our energy. This places an obligation on South Africa, in terms of fulfilling our international responsibilities, to demonstrate our seriousness and commitment to greenhouse gas reduction.*

ANC Resolution on Climate Change, 2007 (B)

- *Recognise that the evidence for climate change is indisputable and that immediate action by all governments and the public as a whole is needed.*
- *Set a target for the reduction of greenhouse gas emissions as part of our responsibility to protect the environment and promote sustainable development, and to participate in sharing the burden with the global community under a common framework of action.*
- *Support the meeting of the target through:*
  - *a) energy efficiency improvements in industry, in households and by setting vehicle fuel efficiency standards;*
  - *b) diversifying energy sources away from coal, including through nuclear energy and renewables - especially solar power;*
  - *c) putting a price on the emission of carbon dioxide and other greenhouse gases;*

ANC Resolution on Climate Change, 2007 (C)

- *d) allocating significant additional resources for the research and development of innovative clean and low-carbon technologies, including by retrofitting existing technologies;*
- *e) further exploration and development of carbon capture and storage methods;*
- *f) the introduction of a tariff system that promotes the efficient use of electricity; and,*
- *g) the promotion of affordable public transport, the expansion of rail logistics and the reversal of the apartheid spatial legacy.*

Minister of International relations and Cooperation, Ms Nkoane-Mashabane: Global Sustainability Panel, 24 Feb 2011

- Global Sustainability Panel, set up by the SG of the UN, Ban Ki-Moon : " …*to formulate a new vision for sustainable growth and prosperity in a carbon constrained world*"
- The Panel is addressing both development and climate change. If we are to be successful in the fight against global poverty, we must also address climate change. Need to:
  - Clarify the relationship between the emerging concept of a green economy, and the 2 decades of work on sustainable development
  - Debate the delinking economic growth from the natural resource base
  - Shift towards energy efficiency and renewable energy technologies
- Consider the need for a new generation of policy instruments that promote complementarities between economic growth and management of the natural resource base.
- SARI
- Transition to a lower carbon and more resource efficient economy.

The Poverty Impacts of Climate Change, Economic Premise, The World Bank, March 2011. Number 51

- Over the last century, the world has seen a sustained decline in the proportion of people living in poverty. However, there is a growing concern that climate change could slow or possibly even reverse progress on poverty reduction.
- This concern is rooted in the fact than most developing countries are more dependent on agriculture and other climate-sensitive natural resources for income and wellbeing, and that hey also lack sufficient financial and technical capacities to manage increasing climate risk.
- Climate change is likely to lead not only to changes in the mean levels of temperatures and rainfall, but also to a significant increase in the variability of climate and in the frequency of extreme weather-ralted shocks.
- ...much of the poverty impact is expected to be concentrated in Africa and South Asia, both of which would see more substantial increases in poverty relative to a baseline without climate change.

Economics of Climate Change

- Economic theory suggests that well functioning markets tends to ensure an optimal allocation of scarce resources.
- Through the price mechanism, incentives are created for all participants in the economy to optimise resource use.
- However, the market often fails to put an adequate price on the use of environmental resources.
- Why:
  - *environmental resources such as air; climate and biodiversity are non-rival and non-excludable in consumption ("public goods").*

Rationale for a carbon tax

- The external costs of GHG emissions are not reflected in the market prices of certain goods and services, e.g. energy

- A carbon tax is a means by which government intervene by way of a market based instrument to appropriate take into account the social costs resulting from carbon emissions

- A carbon tax seeks to level the playing field between carbon intensive (fossil fuel based firms) and low carbon emitting sectors (renewable energy and energy efficient technologies).

- An alternative or in some instance complementary mechanism to prices carbon by way of an emission trading scheme can be considered over the longer term, however such a mechanism is probably not feasible in South Africa over the medium term

Carbon Disclosure Project 2009, South Africa JSE 100

- “Whilst recognising the principle of common but differentiated responsibilities, which places the greater burden on developed countries to reduce emissions, it is nevertheless clear that if we are to contain emissions within the required levels then energy intensive sectors in developing countries will need to be included as soon as possible within global climate mitigation activities:p.28”

Carbon Pollution Reduction Scheme Australia's Low Pollution Future, White Paper Volume 1, December 2008

- "The consequent economic cost (*of GHG emissions*) is not currently reflected in the costs of business or the price of goods and services – because firms face no cost from increasing emissions, the level of emissions is too great. Unless businesses and individuals bear the full responsibility for their consumption and production decisions, the level of carbon pollution will remain too high (page xxv)".

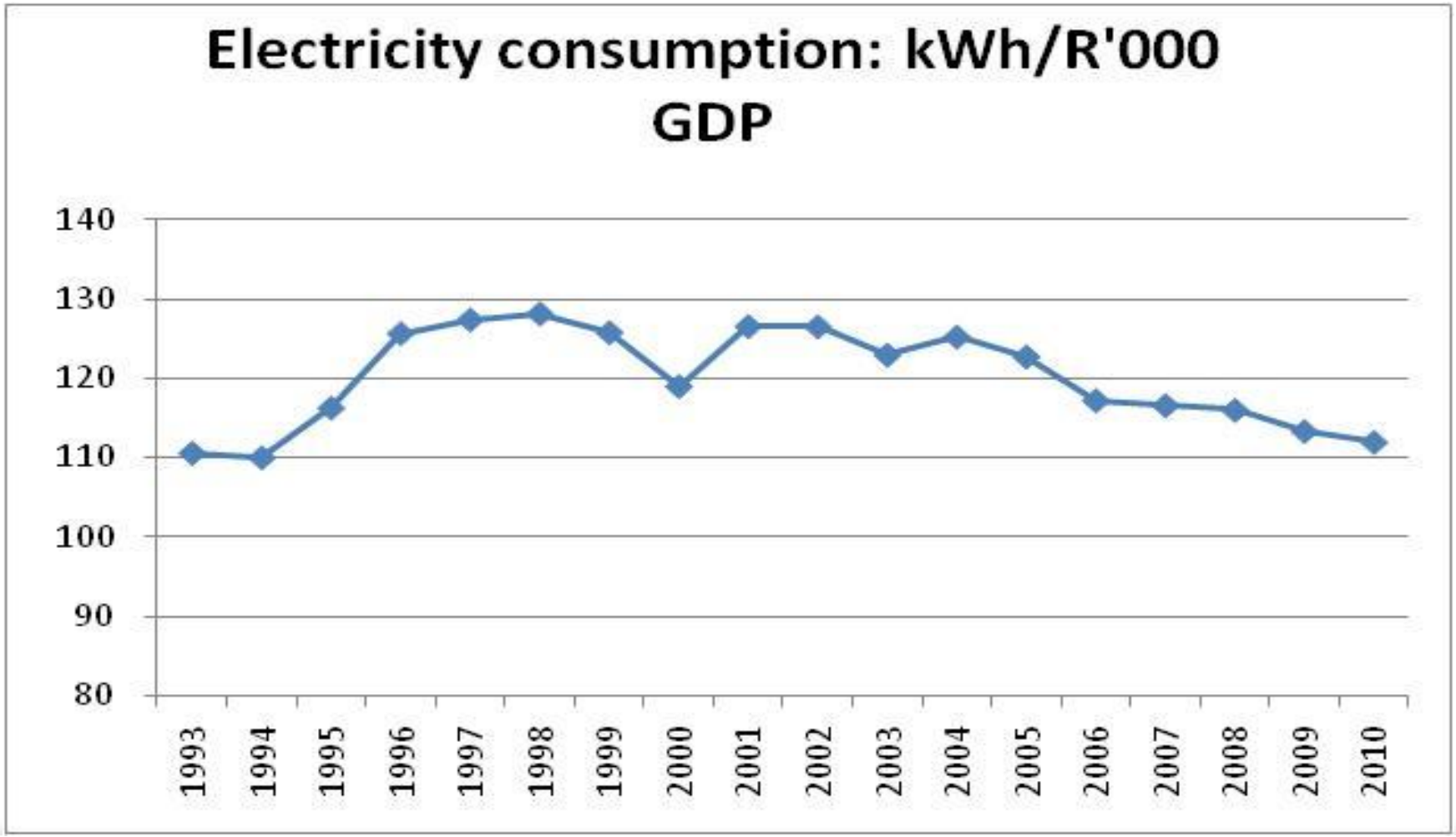
- "Placing a limit, hence **a price**, on emissions has the potential to change the things we produce, the way we produce them, and the things we buy (page xxvi)".

- "The introduction of a carbon price will change the relative prices of goods and services, making emission-intensive goods more expensive relative to those that are less emissions intensive. This provides a powerful incentive for consumers and businesses to adjust their behaviour, resulting in a reduction of emissions (page xxviii)".

Electricity – final consumption

Final Consumption: Electricity						
	Industry	Transport	Agriculture	Commerce	Residential	Total
1992	60.2%	3.7%	3.2%	13.8%	19.2%	100.0%
1993	64.2%	3.4%	2.6%	11.5%	18.3%	100.0%
1994	62.5%	3.6%	4.0%	11.6%	18.3%	100.0%
1995	61.1%	3.3%	4.0%	13.1%	18.5%	100.0%
1996	60.5%	2.9%	3.4%	13.3%	19.9%	100.0%
1997	59.2%	3.0%	3.6%	14.3%	19.9%	100.0%
1998	65.2%	3.0%	3.6%	8.9%	19.3%	100.0%
1999	63.5%	2.8%	3.7%	11.3%	18.8%	100.0%
2000	64.4%	3.5%	2.6%	11.1%	18.5%	100.0%
2001	63.0%	3.3%	2.5%	10.8%	20.5%	100.0%
2002	66.0%	3.6%	2.6%	10.4%	17.3%	100.0%
2003	62.5%	3.2%	2.9%	12.0%	19.4%	100.0%
2004	64.6%	3.0%	3.0%	12.0%	17.4%	100.0%
2005	60.1%	2.9%	2.9%	14.4%	19.6%	100.0%
2006	60.0%	1.8%	3.0%	14.8%	20.4%	100.0%
Average	**62.4%**	**3.1%**	**3.2%**	**12.2%**	**19.0%**	**100.0%**

Electricity intensity



Carbon Tax vs. Emissions Trading

Carbon Tax

- Price certainty – fixed price
- Emission reductions – **quantity uncertain**
- **Administration** and compliance – piggy back on existing administrative systems
- **Visibility** of tax
- **Design** – tax base, collection point, price level

Emissions trading

- **Price uncertainty** – volatility
- Emissions are capped – **quantity certain**
- **Complexity** – negotiations, high transaction costs, new institutions.
- Some costs (and benefits) are **hidden**
- **Coverage**, point of obligation, cap level

A carbon tax for South Africa - work in progress

- A carbon tax: on emissions or carbon tax base proxies are being explored.
  - Although this option does not set a fixed quantitative limit to carbon emission over the short term, a carbon tax at an appropriate level and phased in over time to the “correct level” will provide a strong price signal to both producers and consumers to change their behaviour over the medium to long term.

Carbon Tax: Design Considerations

1. Carbon Emissions Tax

Actual measured emissions; or

2. Proxy tax bases:

A. Fossil Fuel Input (Upstream):

where fuels enter the economy based on the carbon content of the fuel.

B. Output Tax (Downstream):

(i) At point where fuel is combusted.

(ii) May be based on average emissions of production processes.

Tax Design Considerations (2)

- **Actual measured emissions**
  - Can be precisely targeted – as emissions rise, polluters tax liability rises.
  - Administratively challenging: a large number of emission sources need to be monitored and measured.
  - Requires technological capacity, systems and human resources to measure and monitor

- **Upstream Taxes**
  - Close correlation between energy source carbon content and eventual levels of emissions.
  - Upstream – involves fewer taxpayers. Lower administrative costs if carbon tax is levied upstream on producers rather than downstream on fuel users.
  - Piggyback on existing tax systems.
  - Upstream tax systems should be combined with a crediting system to encourage development and adoption of carbon capture and storage technologies.

Carbon dioxide emissions factors (IPCC and EIA)

Carbon Dioxide Emission Factors for Stationary Combustion			Default net calorific value
Fuel	IPCC CO_2 kg / TJ	EIA CO_2 kg / TJ	IPCC TJ / Gg
Coal			
Anthracite	98 300	98 211	26.7
Bituminous	94 600	88 581	25.8
Sub-bituminous	96 100	92 021	18.9
Lignite	101 000	91 396	11.9
Industrial Coking	94 600	89 074	28.2

Source: Intergovernmental Panel on Climate Change & Energy Information Administration

Measuring, monitoring and verification – EU (1)

- Regardless of whether a carbon tax or an emissions trading scheme is used, accurate information of firm-by-firm emissions data is required.
- It is the responsibility of firms participating in the **EU ETS** to apply for a permit from its regulating authority to cover the six GHG emission covered in the Kyoto Protocol. This permit certifies that a firm is capable of producing an emission report and can accurately monitor its GHG emissions. Each firm must them submit a report on its emissions on an annual basis. This report must be verified by an independent verification body.
- Experience has shown some divergence in Member States' monitoring, reporting and verification practices. The current guidelines will be replaced by harmonized regulations from 2013. Verifiers will be able to seek a single accreditation that is valid in all EU Member States.

Measuring, monitoring and verification (2)

- The **United States** Environmental Protection Agency (EPA) has issued the Mandatory Reporting of Greenhouse Gases Rule. The rule requires reporting of greenhouse gas (GHG) emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions.
- The EPA decided upon a combination of direct emission measurement and facility-specific calculations.
- In **Australia** the National Greenhouse and Energy (NGER) Act, 2007 states that all businesses must apply for registration with the Greenhouse and Energy Data Officer. Registered corporations must then report their greenhouse gas emissions and energy use and production for each year in which they meet a threshold.
- The National Greenhouse and Energy Reporting (Measurement) Determination, 2008 introduced a single national reporting framework for the reporting and assurance of information related to greenhouse gas emissions, greenhouse gas projects, energy consumption and energy production
- For **South Africa**:
  - Greenhouse gas inventory being developed by DEA
  - Is it possible to legislate that firms should report greenhouse emissions to enable smooth implementation of regulatory and market-based policy interventions.

Border tax adjustments (BTAs)

- BTAs forms part of policy proposals by developed countries targeted at countries not participating in global emissions reduction agreements.
- What are BTAs?
  - Taxing imports according to emissions associated with their production at the same carbon price as domestically produced goods and services.
  - Imports will be taxed at a rate equal to the “domestic” carbon tax / carbon price.
- BTA’s seek to achieve two objectives:
  - Provide competitiveness offsets for domestic producers.
  - Address possible carbon leakage concerns – reduction of emissions in a taxing country results in increases in emissions in other countries.
- BTA’s
  - Will impact negatively on countries that don’t take appropriate action to price carbon.
  - Might also impact negatively on global trade.

LTMS & the tax rate

- The Long Term Mitigation Scenarios (LTMS) work involved an energy modelling exercise and analysis of various mitigation options using the Markal Energy model.
- Results from this model were used to inform policy shocks in an economy wide (CGE) model.
- Modelled impacts of various “carbon taxes” that could assist changing behaviour towards less carbon intensive technologies.
  - Carbon tax modelled as a tax on *coal, natural gas, and crude oil* used as intermediate input into production process.
- Technological options modelled included energy efficiency measures; and shift from coal based to renewable energy.
- Scenarios modelled involved
  - Price of R100 ton CO_2 in 2008
  - R250 in 2020
  - R750 from 2040 to 2050.

Tax Policy to Reduce Carbon Emissions in a Distorted Economy: Illustration from a South Africa CGE Model.

Shantayana Devarajan, Delfin S. Go, Sherman Robinson and Karen Thierfelder, 2011

- From Pigou (1920), we know that a direct tax on carbon emissions is the most efficient instrument for CO_2 abatement.
- …we compare the effects of different tax instruments that achieve the same amount of carbon reduction (1) a tax on pollution directly using a 'pure' carbon tax; (2) a proxy tax on energy commodities (coal, petroleum, and electricity); and (3) a proxy tax on pollution intensive commodities.
- Three key results: (1) a direct tax on carbon emissions imposes the lowest distortion, (2) welfare cost is very sensitive to factor distortions. If South Africa were able to remove some of the distortions in the labour market, the cost of using tax policy to reduce CO2 emissions would be smaller, and (3) the effects on equity differ from the ranking of tax policies by the aggregate welfare effects.

Revenue

- Revenue recycling
- Budget neutrality
- Revenue neutrality
- Earmarking of revenue
- Environmental Funds

  - For many stakeholders, there is a link between revenues from environmentally-related taxes and spending on the environment.
  - In general, “full” earmarking is not in line with sound fiscal management practices.
  - Need to consider different incentive / revenue use options {revenue recycling such as “soft” earmarking (on budget allocations) or reducing (or not increasing) payroll taxes}.

Existing environmentally related (with some climate change elements) fiscal measures

Taxes

- **General fuel levy** applied to petrol, diesel (a component ?)
- **Electricity generation tax** applied to non-renewable based electricity generation (2c/kWh)
- **Motor vehicle emissions tax** – purchase tax of R75 gCO_2/km for each emission exceeding120gCO_2/km (passenger vehicles) and double cabs subject to tax of R100 for emissions exceeding 175gCO_2/km
- **Incandescent globe tax** of R3 per globe

Tax Incentives

- **Tax exemption for revenues earned from CERs** (CDM projects)
- **Accelerated depreciation allowances** for renewable electricity generation and biofuels production
- **R&D** tax incentives (**including green technologies**) - 150 per cent income tax deduction for R&D expenses
- Tax incentives for **biodiversity conservation**
- **Energy efficiency savings** tax allowance (in process …)

Summary

- In the short term, the tax does not guarantee a fixed quantitative reduction in carbon emissions, but a carbon tax at an appropriate level and phased in over a specific time period to the 'correct' level will provide strong price signals and certainty to both producers and consumers to change behaviour over the medium or long term.
- In the South African context a carbon tax seems to be the more appropriate mechanism to price carbon and thereby begin to internalise the negative externalities associated with GHG (CO_2) emissions.
- Carbon taxes affords firms the flexibility to undertake emissions reductions according to their specific processes and provide the long term price certainty which is essential for investment decisions.

Summary (2)

- The development of a carbon taxation policy regime for South Africa should be informed by the following key principles:
  - Measuring and monitoring of direct (GHG / CO_2) emissions might be a challenge (GHG inventory) over the short-term.
  - A proxy tax base could be considered and the tax should be levied according to the carbon content of fossil fuels i.e. a fuel input tax.
  - The tax rate should over time be equivalent to the marginal external damage costs of carbon to effect appropriate incentives.
  - The level of the tax can be phased-in over time. Such a price trajectory will provide certainty.
  - Distributional and competitiveness concerns to be dealt with in a transparent manner.
  - Relief measures (if any) to address competitiveness concerns should be minimized and be of a temporary nature.

Summary (3)

- In the absence of an international climate change agreement and therefore a global emissions pricing system, a partial as opposed to a full internalisation of the externality should be targeted as an interim measure.
- The full earmarking of revenues is not in line with sound fiscal policy principles although some form of on-budget funding for specific environmental programmes should be considered. Depending on revenue requirements some form of limited tax shifting could be considered.
- A carbon tax based on measured and verified emissions is preferred, although a proxy tax base based on the carbon content of fuel inputs could be considered.
- It would appear that a tax of R75 (10 US$) per ton CO_2 and increase to around R200 (30 US$) per ton CO_2 (at 2003 prices) would be both feasible and appropriate to achieve the desired behaviourial changes and emissions reduction targets.

Next steps

1	Process written comments	March to May 2011
2	Develop carbon tax policy paper, including detailed design options, economic impact analysis (modelling) and revenue recycling options	April to July 2011
3	(Re)-submit to Cabinet	September 2011
4	Publish draft policy paper for comment	November 2011
5	COP 17 - possible presentations	November 2011
6	Budget announcement	February 2012
7	Legislation for comment	May 2012
8	Discussion document on emission trading: sectoral trading, emission credit mechanisms, etc.	August 2012

Australia: Carbon Price Framework, 24 Feb 2011

Start date

- The mechanism could commence as early as 1 July 2012, subject to the ability to negotiate agreement with a majority in both houses of Parliament and pass legislation this year.

Length of fixed price period

- The fixed price phase could be of between three and five years, with the price increasing annually at a pre-determined rate. The initial fixed price could begin to drive economic transformation and investment in low emission technologies, and ensure greenhouse gas emission reductions.

Transition arrangements

- At the end of the fixed price period, the clear intent would be that the scheme convert to a flexible price cap-and-trade emissions trading scheme. In relation to the transition to a flexible price, it would be important to design the arrangements so as to promote business certainty and a smooth transition from the fixed to flexible price.

The Australian, February 25, 2011 (James Mossola and Joe Kelly) - 1

- In an election-eve interview with **The Australian**, Ms Gillard said: “I rule out a carbon tax.”
- She also told Channel Ten: “There will be no carbon tax under the government I lead.”
- But Ms Gillard said she'd consistently argued during the election campaign that a price on carbon was needed to tackle climate change.
- “I'm not going to get hung up on word games about how you describe various pricing mechanisms,” she told reporters today.
- “And I've been very upfront with people with a fixed price. It's effectively like a tax taking you to an emissions trading scheme.”
- Tackled by 3AW's Neil Mitchell, Ms Gillard said she didn't want to get into a pointless debate on whether the carbon price was a tax.
- “Now, there was going to be this silly semantic debate break out about whether or not that was effectively like a tax,” she said.

The Australian, February 25, 2011 (James Mossola and Joe Kelly) - 2

- “And I'm happy to say for the first few years with a fixed price, it's effectively like a tax. But Neil, this is the right thing to do.”
- A carbon price is yet to be set, but studies suggest a $26 a tonne price would raise power prices by $300 a year and petrol prices by 6.5c a litre.
- Mr Abbott branded the tax an assault on people's standard of living.
- “Julia Gillard has never seen a tax she didn't like and Labor has never had a tax it wouldn't hike,” he said.
- He said the broken carbon tax promise would “haunt this Prime Minister to her political grave”.
- But Ms Gillard said she was braced for a tough fight and backed her ability to win the political debate.
- “We will be out there advocating in this debate,” she said.
- “We will be out there arguing for the government's position. And I expect that this will be a fairly fast and furious debate and at times it will be a little bit torrid. And in that debate I intend to give as good as I get.”

The Australian, February 25, 2011 (James Mossola and Joe Kelly) - 3

Comment 22 of 38

kenny of act *Posted at 4:01 PM Today*

- The children have the most to loose if we don't take action on carbon emissions soon. They have no voice,no vote, but depend on us to make the right decisions for their future now. With all the evidence that carbon emissions are contributing to climate change they will have the right to charge us with criminal negligence in the future if we don't take action soon.

Comment 28 of 38

Furious with Ju-liar of North Sydney *Posted at 4:16 PM Today*

- To the few who vehemently defend the PM,s about turn in the face of her "there will be no carbon tax" pledge before the election, I would like to remind you this is (supposedly) a democracy and as such the people of Australia should have the final say. The PM does not have a mandate for a carbon tax. She must call an election and seek one as John Howard did with the GST.

Written comments (79 to date)

No	Comments received from:	Organisation
1	Chris Zweigenthal (Chief Executive)	Airlines Association of Southern Africa (AASA)
2	Zohra McDoolley-Aimone	ALSTOM - South Africa
3	Godfrey Gomwe (Executive Director)	Anglo American South Africa
4	Dirk van Vuuren (Group Tax Manager)	ArcelorMittal
5	Dr Dhiraj Rama (Executive Director)	Association of Cementitious Material Producers (ACMP)
6	Laurraine Lotter	Business Unity South Africa (BUSA)
7	Mary Jean Thomas-Johnson	Cape Chamber of Commerce
8	Oliver Stotko (Environmental Engineer)	Carbon & Energy Africa (Pty) Ltd
9	Wiebe van der Laan	Carbon Credit Creations
10	Roger Baxter	Chamber of Mines of South Africa
11	Laurraine Lotter	Chemical and Allied Industries Association (CAIA)
12	Tandokazi Nquma	COEGA
13	Yvette Abrahams (Commissioner)	Commission For Gender Equality
14	Dr Hanlie Kotzé	Consensi Consulting
15	John Bexley	Consol Glass
16	Dr Rodney Milford	Construction Industry Development Board (cidb)
17	Anton Nahman	CSIR: Natural Resources and the Environment
18	David Silverstein	David Silverstein (individual comments)
19	RD Hughes (General Manager)	Duferco Steel Processing (Pty) Ltd
20	Amar Sooklal	Durban Chamber of Commerce and Industry
21	Tristen Taylor	Earth life Africa
22	Leena Ackbar	ECA Consulting
23	Alan Murphy	ECOPEACE
24	Mansoor Parker	Edward Nathan Sonnenbe rgs Inc
25	Prof Philip Lloyd	Energy Institute, Cape Peninsula University of Technology
26	Prof. Harald Winkler	Energy Research Centre, University of Cape Town

Written comments

27	Stephen Law (Director)	Environmental Monitoring Group (EMG)
28	Mark Heaton	Envirotrade Carbon Limited
29	Willie Du Plessis (Gen Manager-Legal)	Eskom
30	Emily Tyler	Emily Tyler & Brent Cloete - Climate Change Economists
31	Ernst Venter (Executive Gen Manager)	Exxaro
32	Lushen Govender	General Motors South Africa (GMSA)
33	BUSA	Genesis
34	Linden Bradfield	Global Railway Engineering
35	Manfred Braune	Green Building Council of South Africa (GBCSA)
36	Harmke Immink	Group Five
37	Dr. Miriam Altman	Human Sciences Research Council (HSRC)
38	Ian Parry	IMF
39	Andre Ferreira	Iinvestment Property Databank (IPD) South Africa
40	Gerald Rudman (Director)	Imperial Logistics
41	Mike Rossouw (Chairman)	Industry Task Team on Climate Change (ITTCC)[1]
42	Andreas Hardeman	International Air Transport Association (IATA)
43	Kris Devan	Law Society of South Africa
44	Leandro Gastaldi, CFA	LLANDUDNO Fund Managers
45	Susanne Akerfeldt	Ministry of Finance Stockholm
46	Marthinus Van Schalkwyk, MP	Minister of Tourism
47	Jason Schäffler (Secretary General)	MTN Group Ltd
48	Valerie Geen	National Business Initiative (NBI)
49	Bernard van Rooyen (Director)	Northam Platinum Limited
50	Paolo Gianadda	PAMSA
51	Alison Futter	PetroSA

Written comments

52	Richard Garlick	PFG Building Glass
53	Kyle Mandy (Head: National Tax Technical)	PwC
54	Jason Schäffler (Secretary General)	Renewable Energy Certificates South Africa (RECSA)
55	Duncan Ayling	RES
56	Sharmini Naidoo	Road Freight Association (RFA)
57	Norbert Behrens (Group Gen Manager- Strategy & Planning)	SASOL
58	Ivan Collair	Shell South Africa
59	Rob Baker	South Africa Travel Online
60	Dr (Prof) A D Surridge (Senior Manager: Advanced Fossil Fuel Use)	South African Centre for Carbon Capture and Storage (SACCCS)
61	Barry MacColl	South African Centre for Carbon Capture and Storage (SACCCS)
62	Chris Lötter	South African Chamber of Commerce and Industry (SACCI)
63	Liziwe McDaid	South African Faith Communities' Environmental Institute (SAFCEI)
64	Faith Ngwenya (Technical Executive)	South African Institute of Professional Accountants (SAIPA)
65	John Nel (Acting Gen Secretary)	South African Iron & Steel Institute (SAISI)
66	Marilyn Govender	South African Sugar Association (SASA)
67	Lorraine Wagner (Communication Officer)	Southern African Bitumen Association (SABITA)
68	Standford Mwakasonda	Stanford Mwakasonda (Individual comments)
69	Njabulo Mkhize	Steel & Engineering Industries Federation of South Africa (SEIFSA)
70	Ouma Rasethaba (Chief of Corporate Governance)	Telkom
71	Manfred Braune	The Green Building Council of South Africa (GBCSA)
72	Muneer Hassan (Project Director: Tax)	The South African Institute of Chartered Accountants (SAICA)
73	David Le Page	The Sustainability Action Movement
74	Peet du Plooy (Programme Managerg: Sustainable Growth)	Trade & Industrial Policy Strategies (TIPS)
75	Nico Stolz	Tsb Sugar
76	Nishal Ramloutan	UBS Investment Bank
77	Aleksandra Tomczak (European Gen Manager)	World Coal Association (WCA)
78	James Macgregor	Worley Parsons
79	Richard Worthington (Manager: Climate Change Programme)	WWF

Comments (1)

- “I support the overall policy direction and favour a carbon tax over emissions trading”.
- “I fully share your analysis that inaction would not be environmentally, economically or politically sustainable. The world is moving towards a common price on carbon. Even if multilateral negotiations had to fail, tariffs on imports from countries with no emissions controls will likely become a reality. A more stringent and punitive global climate regime creates the risk of uncompetitive or even stranded assets in 20 or 40 years’ time, and, in the shorter term, the country’s exporters could face new tariff barriers as a result of the carbon embedded in their exports”.
- Consider all revenue recycling options
- A tax has a clear advantage if the policy priority is price stability, providing long-term policy signals to investors; transparency of pricing; stability of fiscal revenues, and an economy-wide coverage of emissions, and, given the existing administrative tax collection efficiency, entails lower transaction costs as well”.

Comments (1)

- "…. emissions' trading requires a competitive market with a relative large number of market players. High market concentration like we find in SA would distort economic efficiency, and is likely to lead to price manipulation".
- "The potential for linking markets (and the spectre of border trade measures in their absence) means that the option of cap-and-trade should not be definitively rejected. Should the international climate change negotiations evolve to such an extent that domestic emissions trading regimes are linked, South Africa may well wish to consider ways in which a tax regime can either be linked to such an international regime, or be regarded as a first step in a staggered approach".

Comments (2)

- “The paper on carbon tax is considered too theoretical and does not take sufficient cognizance of South African circumstances to balance the need to reduce greenhouse gasses while keeping the economy on a job creating growth path. Rather, it is a one one-dimensional focus on generating tax revenue with potentially major negative implications for the country. The paper does not consider the broad range of regulatory and market mechanisms available to reduce greenhouse gas emissions in the country. While it mentions some of the other options available, the Paper focuses on the carbon tax option rather than being what is need at this stage, a policy paper, which set out the range of policy options that could be used to reduce carbon emissions”.
- “There is also the question of the extent to which South Africa, as a developing country with significant developmental challenges, should take the lead in aggressively mitigating emissions, particularly in the absence of a global climate change agreement”.
- “We … strongly urges that Government expedite the implementation of the current tax allowance for energy efficiency savings and further accelerate budgetary support for renewable energy”.

Comments (2)

- “Business is of the opinion that South Africa does not need to take a global lead on this issue; rather the focus should be on job creation and development”.
- “In Denmark and the UK for example, an exemption regime exists under which companies or industry sectors can make voluntary commitments to reduce emissions in exchange for a tax exemption. This is a much more appropriate approach for a developing country, like South Africa, which will not have a legally binding reduction target”.
- “More research is required, taking into account international standards and benchmarking the effect that the proposed carbon tax will have on doing business in South Africa compared to doing business in other developing countries” (p.7).
- “The carbon tax proposals follow the same policy formulation process that has now been discredited in South Africa by starting with international benchmarks which are entirely first world based, ignoring the developing world context and then cherry picking lessons and policy implications for South Africa. The carbon tax proposal is not based on careful analysis of the local context but rather a combination of inappropriate international examples taken out of context”(p.3/4).

Comments (3)

- “It is crucial that there is policy coherence between government’s industrialization, growth, job creation, energy security and beneficiation policies and its policy on addressing climate change”.
- “The critical question is what to do about global warming, which will at the same time enable South Africa to realise its developmental, economic, energy security, beneficiation and job creation objectives? It would be unwise for South Africa to rush into a ***front-runner*** position of making firm carbon reduction commitments if a global agreement has not been reached and the major emitters of GHGs continue growing emissions unabated (the carbon leakage problem)”.
- “An effective response to climate change is not just about the policy content of the response, but the realistic sequencing of the introduction of measures to address climate change”.

Comments (3)

- “The … believes that South Africa can be a world leader in addressing the challenge of GCC, but this does not mean the country has to be a front runner on firm CO_2 reduction targets or the immediate introduction of high carbon taxes. Rather, it would be appropriate to focus the effort on becoming a world leader in pushing for a global collective agreement, in creating a facilitative domestic environment for reducing the carbon intensity of the economy, by enabling the development of technologies that reduce GHG emissions while gradually introducing a comprehensive suite of measures intended to pragmatically tackle climate change”(p.3)

Comments (3)

- “At the international level many of South Africa’s major competitors have made limited progress on implementing carbon taxes. The cap and trade scheme in the USA has been rejected for the fourth time in seven years. Canada will not act until the USA scheme is agreed. The Australian CPRS system has been rejected and sent back to the drawing board. The European ETS only commences in 2013 and provides significant concessions to export industries.
- South Africa has just joined the BRICS grouping and only one of these countries has introduced a carbon tax (India). We must compare ourselves to our major international competitors and not just Europe” (p.7).
- “In the absence of a credit system, taxation of CO_2 at source would not incentivise carbon capture and storage” (p.9).