

# Reducing Greenhouse Gas Emissions Carbon Tax Design

*National Treasury*

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national treasury

Department:  
National Treasury  
REPUBLIC OF SOUTH AFRICA

## Introduction

- High levels of economic growth must be sustained to facilitate significant reductions in the levels of unemployment, poverty and income inequality.
- However, it's not just the quantity of growth that matters but also quality, and incorporating sustainable development considerations in policy development and decision making must actively be pursued.
- Market failure: market prices do not always reflect full economic costs of production or consumption / use;
- Government intervention necessary, e.g. through, regulations, taxes, incentives, 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.

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

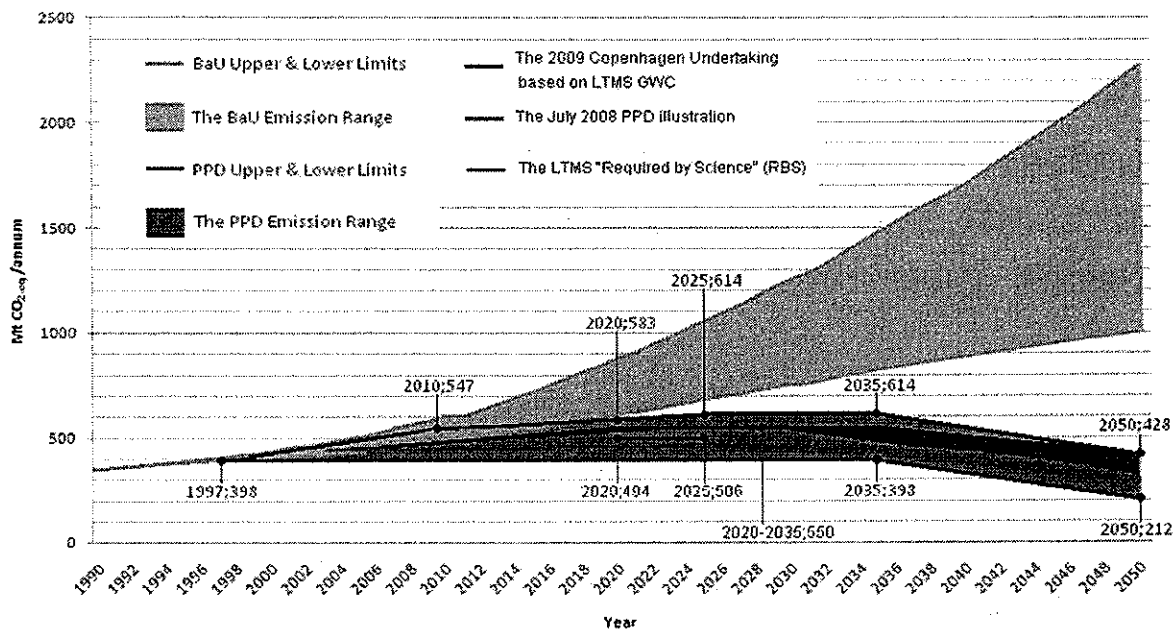
- Over the last century, the world has seen a sustained decline in the proportion of people living in poverty. However, there is a growing concern that climate change could slow or possibly even reverse progress on poverty reduction.
- This concern is rooted in the fact that most developing countries are more dependent on agriculture and other climate-sensitive natural resources for income and wellbeing, and that they also lack sufficient financial and technical capacities to manage increasing climate risk (adaptation).
- 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-related 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.

# GHG Inventory, 2000 (DEA)

	GHG emissions - 2000	Mt CO2e (A)	Mt CO2e (B)	%
1	Fuel combustion		265 245	57.5%
	a. Electricity generation	179 436		
	b. Petroleum refining	39 965		
	c. Chemicals	17 480		
	d. Iron & Steel	15 957		
2	Fugitive emissions (Oil, Coal mining)		71 177	15.4%
3	Transport		42 232	9.2%
	a. Road transport	39 511		
4	Agriculture, forestry and land		41 053	8.9%
5	Industrial Processes	32 079	32 079	7.0%
6	Waste		9 393	2.0%
	<b>Total (1)</b>	<b>(70%)</b>	<b>324 428</b>	<b>100.0%</b>
	Land (sequestration)		-20 560	
	<b>Total (2)</b>		<b>440 619</b>	

# GHG emissions - PPD

The desired South African climate change mitigation outcome - the "Peak, Plateau and Decline" (PPD) greenhouse gas emission trajectory - comparison with other popularised conceptions of PPD



# 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

## 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.

# National Climate Change Response White Paper (1)

- South Africa is a relatively significant contributor to global climate change with significant GHG emission levels from its energy-intensive, fossil-fuel powered economy .(page 8)
- Principles (9): The Polluter Pays Principle (page 11)  
*Those responsible for harming the environment paying the costs of remedying pollution and environmental degradation and supporting any consequent adaptive response that may be required.*
- Strategic Priorities (10): (pages 13 & 14)
  - Facilitated behaviour change  
*Prioritise the use of incentives and disincentives, including regulatory, economic and fiscal measures, to promote behaviour change towards a lower-carbon society and economy*
  - Resource mobilisation  
*... non-market and market-based instruments, etc.*
- Adaptation (pages 14 to 24)

# National Climate Change Response White Paper (2)

- Mitigation (pages 24 to 29)
  - Using the market
  - Defining carbon budgets for significant GHG emitting sectors and / or subsectors
- Mitigation potential (Energy & Transport) (page 26)
  - energy efficiency, demand management, less emission-intensive energy mix, (e.g. renewable energy)  
*... with the consequent economic benefits of improved efficiency and competitiveness as well as incentivising economic growth in sectors with lower energy (and emissions) intensity .*
  - A mix of economic instruments, including market based instruments such as carbon taxes and emissions trading schemes, and incentives, complemented by appropriate regulatory policy measures are essential to driving and facilitating mitigation efforts and creating incentives for mitigation actions across a wide range of key economic sectors.
  - Carbon capture and storage

# National Climate Change Response White Paper (3)

- Managing response measures (page 29)  
*....., South Africa may be economically vulnerable to measures taken both internationally and nationally, to reduce GHG emissions.  
... trade barriers, a shift in consumer preferences and a shift in investor priorities.*
- Market-based instruments (pages 39 to 41)
  - Carbon pricing
  - Carbon markets
  - Incentives
- Resource mobilisation (pages 41 to 46)
  - Finance
  - Education
  - Science and technology development

## Policy Context for Carbon Budgets in the UK

- The UK implements a suite of policy measures targeted at addressing climate change in a cost effective manner.
- These policies comprise:
  - **Regulatory measures:** legislated national target in terms of the UK Climate Change Act to reduce emissions by 80 per cent by 2050 below 1990 levels.
  - **Market-based instruments:** participates in the European Union Emissions Trading Scheme which covers scope 1 emissions and implements an energy based carbon tax, the UK Climate Change Levy.
- A system of **5 year carbon budgets** was adopted leading up to 2050 to ensure progress towards the national target, assess the effectiveness of policies and provide guidance on policy reforms needed to achieve the target.
- In terms of the UK Climate Change Act, the independent **Committee on Climate Change** was also established to advise government on the level of the carbon budgets and how these budgets may be achieved.

# UK Carbon Budgets

- Carbon budgets are set in advance (about 11 years) to provide medium to long term certainty on the government's commitment to the national target:
  - First 3 carbon budgets (2008-12, 2013-17, and 2018-22) were set in 2009.
  - 4<sup>th</sup> carbon budget for 2023-27 was set in June 2011.
- Setting of the first 3 budgets:
  - First 3 budgets were set in the context of the EU 2020 package which established 2020 emissions targets for Europe. The UK's carbon budget was set equivalent to its share of the overall EU target and takes into account current policies.
- For the 4<sup>th</sup> carbon budget, which goes beyond the EU framework, the budget was informed by extensive modelling to determine the least cost emissions pathway to the UK 2050 target. Reforms to existing policies was also required to meet the target.

# Design of the carbon budgets

- Carbon budgets were informed by extensive qualitative and quantitative analysis. The **UK 2050 Calculator** was vital to the budgeting process and was informed by energy, climate and economic models.
- **Carbon budgets** are developed for the **traded and non-traded sectors** separately.
  - Emissions from the traded sectors are covered by the EUETS and the allowances for the different sectors are used as the parameters for the Carbon Budget.
    - Scope 1 direct emissions from electricity generation, refineries, iron and steel, cement, chemicals are covered by the ETS.
  - Non-traded sector emissions are covered by domestic UK policies.
    - Includes mainly scope 2, indirect emissions.
    - Hence, CBs needed to be developed for these sectors.
- CBs developed for period of 5 years and allows for banking and borrowing between budgetary periods. Penalties do not apply for non-compliance with budgets.

## Lessons for South Africa and Interface between Carbon Budgets and Proposed carbon Tax

- The proposed sector exemption thresholds for scope 1 emissions under the carbon tax could be viewed as the carbon budgets for the respective sectors similar to the coverage of traded sectors under the UK system.
- For sectors that are not covered by the carbon tax such as certain industrial, agriculture, waste and households, there may be a case to develop CBs for these sectors taking into account current policies.
- These CBs to be informed by technical work and analysis and consideration should be given to developing a “2050 Calculator” for South Africa.
- Underpinning the CB is a mandated emissions target. As a non-annex 1 country SA does not face a such a target and we should seek to maintain that space for further development.
- It is important that South Africa pursues a climate change mitigation strategy that allows for emissions reductions at least overall cost to the economy to help facilitate the transition to a low carbon economy.

## Rationale for a carbon tax

- A carbon tax is a means by which government can intervene by way of a market based instrument to appropriately 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).
- 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.
- “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”.

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



## Environmental taxes - Political Economy Concerns

- “ ... a political impediment to the introduction of environmental taxes is the argument that they harm international competitiveness. Partly as a result of concerns regarding international competitiveness, many proposals for environmental taxes have been made at the international level. For example the European Community has proposed that a carbon tax be introduced in its member countries, but its implementation is dependent on other major countries introducing measures with comparable effect. These international agreements are inevitably difficult to complete”.
- David C . L. Nellor, Environmental Taxes, in Tax Policy Handbook, edited by Parthasarathi Shome, International Monetary Fund (IMF), page 111 (1995).

### **Carbon taxation and fiscal consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits Vivid Economics, May 2012 (for the European Climate Foundation and Green Budget Europe)**

- “If Europe, along with its international partners, is to achieve its goal of avoiding dangerous climate change, then it will have to persuade firms and households to emit fewer greenhouse gases. Markets operate through prices, and although there are market failures which limit the responsiveness of energy users to changes in prices, without those price signals, it will be difficult, if not impossible, to change behaviour. Carbon prices, in the form of taxes and trading are an essential part of the policy prescription, and they need to be sufficiently high and sufficiently stable to promote reaction from the market”. p.27

# 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

## 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.

## Budget 2012: Proposed carbon tax design features: (1)

- Percentage-based rather than absolute emissions thresholds, below which the tax will not be payable.
- A higher tax-free threshold for process emission, with consideration given to the limitations of the cement, iron and steel, aluminium and glass sectors to mitigate emissions over the near term.
- Additional relief for trade-exposed sectors.
- The use of offsets by companies to reduce their carbon tax liability.
- The tax will apply to carbon dioxide equivalent (CO<sub>2</sub>e) emissions calculated using agreed methods.
- A basic tax-free threshold of 60 per cent (with additional concession for process emissions and for trade-exposed sectors) and maximum offset percentages of 5 or 10 per cent until 2019/20 is proposed.

http://www.nationaltreasury.gov.za/pressroom/2011/12/15/budget2012/CarbonTaxDesignFeatures1.htm

## Budget 2012: Proposed carbon tax design features: (2)

- Additional relief will be considered for firms that reduce their carbon intensity during this first phase. The reduction in carbon intensity will be measured with reference to a base year or industry benchmark. Tax-free thresholds will be reduced during the second phase (2020 to 2025) and may be replaced with absolute emission thresholds thereafter. Alignment with the proposed carbon budgets as per the national climate change response white paper (2011) will be important.
- A carbon tax at R120 per ton of CO<sub>2</sub>e above the suggested thresholds is proposed to take effect during 2013/14, with annual increases of 10 per cent until 2019/20.
- Revenues from the tax will not be earmarked, but consideration will be given to spending to address environmental concerns. Incentives such as the proposed energy-efficiency tax incentive and measures to assist low-income households will be supported.

http://www.nationaltreasury.gov.za/pressroom/2011/12/15/budget2012/CarbonTaxDesignFeatures2.htm

## Budget 2012: Proposed carbon tax design features: (3)

Table C.13 Proposed emissions thresholds for sectors

Sector	Basic tax free threshold (%) below which no carbon tax will be payable during the first phase (2013 to 2019)	Maximum Additional allowance trade exposure	Additional allowance for "process" emissions	Total	Maximum offset percentage
Electricity	60%	-	-	60%	10%
Petroleum (coal to liquid)	60%	10%	10%	80%	5%
Petroleum – oil refinery	60%	10%	10%	80%	5%
Iron and steel	60%	10%	10%	80%	5%
Aluminium	60%	10%	10%	80%	5%
Cement	60%	10%	10%	80%	5%
Glass & ceramics	60%	10%	10%	80%	5%
Chemicals	60%	10%	10%	80%	5%
Pulp & paper	60%	10%	0%	70%	10%
Sugar	60%	10%	0%	70%	10%
Agriculture, forestry and land use	60%	-	40%	100%	0%
Waste	60%	-	40%	100%	0%
Fugitive emissions: coal	60%	10%	10%	80%	5%
Other	60%	10%	-	70%	10%

## Budget 2012: Proposed carbon tax design features: (4)

- In addition to the proposed percentage thresholds in Table C.13, firms will be encouraged to reduce the carbon intensity of their products during the first phase of the scheme.
- This could be accommodated by adjusting the basic percentage tax-free threshold (60%) by increasing or decreasing it by a factor (Z).
- The overall tax-free allowance for an entity will be capped at 90 per cent of actual verified emissions.

## Adjustments to the (60%) basic percentage tax-free threshold

- Percentage thresholds will be used to quantify the carbon tax liability of an entity or firm based on the absolute emissions for that year.
- A formula is proposed to adjust the basic percentage tax-free threshold to take into account efforts already made by firms to reduce their emissions and to encourage firms to invest in low-carbon alternatives. The basic percentage threshold below which the tax will not be payable may be adjusted using a carbon emissions intensity factor for output compared to an agreed sector benchmark. A formula is proposed to calculate a factor Z, which will then be used to adjust (increase or decrease) the basic percentage tax-free threshold as described below:
- $Z = Y / X$ 
  - X is the average measured and verified carbon intensity of the output of a firm.
  - Y is the agreed benchmark carbon intensity for the sector.
- The adjustment to the tax-free threshold is then determined by multiplying the original percentage threshold by Z.

## Energy Sector

- Pricing energy appropriately is important to ensure that the external costs of climate change and other environmental damages are reflected in the price of energy and that the relative prices between carbon intensive and low carbon technologies are correctly reflected.
- Energy sector's environmental externalities include GHG emissions and local air pollution damages (emissions of SO<sub>x</sub>, NO<sub>x</sub>)
- Electricity sector – high emission intensive power stations to be phased-out over time, support transition efforts to low carbon electricity sector (e.g. renewables).
- Given the regulatory environment of the electricity and liquid fuels sectors, and therefore electricity and fuel prices, some consideration must be given to the pass through mechanism as a results of the carbon tax so as to ensure that appropriate incentives are maintained for changes in both production and consumption patterns.

# Revenue Use

- 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) other taxes}.

# 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.

# Border Carbon Adjustments (BCA) – 1

**Beyond 2020:** Carbon taxation and fiscal consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits Vivid Economics, May 2012 (for European Climate Foundation and Green Budget Europe) (pages 110 to 122)

- “BCAs are adjustments to prices of traded goods based on some measure of the greenhouse gases embodied in the good. They can be applied to imports (as a tariff) and / or to exports (as a rebate). Although politically controversial, it is an important option for addressing leakage and declining competitiveness caused by carbon pricing. They allow the substantial revenues currently tied up in free allowances to be recovered by governments.
- If BCAs are to replace free allowances then it will be necessary to show that they are both as or more effective than free allowance allocation at addressing leakage and to show that they will not provoke retaliatory action and a trade war with countries outside the EU”.
- The paper argues that BACs are potentially compatible with WTO rules, depending on the design and implementation thereof, p.114.
- BCAs are best suited to homogenous outputs as it contains the administrative complexity and costs of a BCA (e.g. steel, aluminium & cement, etc.?).

# Border Carbon Adjustments (BCA) – 2

**Beyond 2020:** Carbon taxation and fiscal consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits Vivid Economics, May 2012 (for European Climate Foundation and Green Budget Europe) (pages 110 to 122)

- One way of resolving certainty about the legality of BCAs is to deliberately choose to apply a BCA early in a sector where this may be controversial. This could mean that a WTO challenge occurs earlier and a more definitive view of legality is obtained quickly.
- The principal question (here) is whether to cover just the emissions directly associated with the production of the good, or to include ‘indirect’ emissions from the electricity consumed in production.
- ..BCA should first be introduced for goods for which direct emissions can be relatively easily determined, such as less elaborately transformed goods for which there are a limited number of technologies for production.
- ... the carbon costs that domestic producers incur from electricity depend on the proportion of costs passed through from generators, a proportion which may vary over time or between locations. (p. 119)
- What about the CBDR (common but differentiated responsibility principle) ?

# 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 (3.5 c/kWh)
- **Motor vehicle emissions tax** – purchase tax of R75 gCO<sub>2</sub>/km for each emission exceeding 120gCO<sub>2</sub>/km (passenger vehicles) and double cabs subject to tax of R100 for emissions exceeding 175gCO<sub>2</sub>/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 ...)

## Tax Incidence and Distributional Impacts

- Two main concerns of environmental taxes are their impacts on income distribution and international industrial competitiveness.
- In the case of carbon taxes that raise the cost of domestic energy, these taxes may have a regressive impact on low income households.
- The design of tax instruments and expenditure programmes could incorporate compensating measures that could offset potential regressive impacts. Such measures will ensure access to energy at affordable prices for low income households.



## Competitiveness impacts

- Potential adverse impacts on international competitiveness of trade exposed industrial sectors.
- Carbon tax seeks to:
  - Level playing field between carbon intensive (fossil based firms) and low carbon emitting sectors.
  - Result in a contraction in the long run of carbon intensive sectors and contribute to net ghg emissions reductions.
- First mover competitive advantage gains:
  - Early adoption of low carbon intensive growth path can result in competitive advantage in low carbon technologies
  - Incentives created for research, development, innovation etc.
- Measures to mitigate competitiveness impacts could include:
  - Longer period of phasing in of the tax rate

## Transitional support measures

- Under the **National Climate Change Response White Paper**, several **priority flagship programmes** have been identified in the **energy, transport, water and waste sectors**.
- To complement these initiatives, consideration will be given to support for households and business as detailed below:
- **Households**
  - enhanced free basic electricity allocation
  - improved public transport
- **Businesses**
  - tax relief for CER credits
  - Research and development tax incentive
  - Implementation of the energy efficiency savings tax incentive

# Carbon tax – suggested process / timelines

1	Initial carbon tax design features	Feb 2012, Budget
2	Carbon tax policy paper, internal Gov. comments	July 2012
3	Submit to Cabinet	August 2012
4	Publish Policy Paper for comment	September 2012
5	Consultation & processing of comments	Sept to November 2012
6	Budget announcement	February 2013
7	Legislation for comment	Late 2013
8	Implementation	Late 2014

## Background slides

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## Green Growth, Green Economy (1)

- “A Green Economy is one in which business processes are configured or reconfigured to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using fewer natural resources, creating less waste and reducing social disparities”.
- “Thus, a Green Economy grows by reducing rather than increasing resource consumption”.
- “We have committed ourselves to our people as a government to work towards an inclusive, green, and sustainable growth. However we are not waiting for an agreement in Durban before achieving green, sustainable and inclusive growth”.
- “We are forging ahead with our programme of greening the economy to improve the economic, social and environmental resilience of the country in the face of climate change”.

## Green Growth, Green Economy (2)

- “Africa and many developing countries boast most exciting opportunities for green growth, by virtue of their largely abundant natural resources. There are many initiatives that we can pursue together to protect the future, while not destroying industries and jobs”.
- “In promoting this new green, sustainable and inclusive growth focus, we are putting together some policy proposals that will impact on the business sector”.
- “These may include putting a price on carbon and other pollution or on the over-exploitation of a scarce resource through mechanisms such as taxes, natural resource charges or tradable permit systems”.
- “Let me reiterate that we see in the threat of climate change, an opportunity to develop our green, inclusive, sustainable and shared growth”.
- “This would be growth that provides jobs and which improves infrastructure, health, education and all basic services that our communities need to have an improved quality of life”.

- Source: President Jacob Zuma, *The World Climate Business Summit*,  
Elangeni Hotel, Durban, 03 December 2011

# Fiscal policy to mitigate climate change: A guide to policymakers.

Michael Keen, Ian Parry and Ruud de Mooij (editors) IMF, 2012 forthcoming

- “.. carbon pricing should ideally form the centerpiece of mitigation efforts...”
- “Carbon pricing also strikes the cost-effective balance between different emission reduction opportunities because all behavioral responses are encouraged up to where the cost of the last tonne reduced equals the emissions price.
- Moreover, the carbon price provides a strong signal for innovations to improve energy efficiency and reduce the costs of zero- or low-carbon technologies.
- By definition, regulatory policies on their own, like mandates for renewable fuel generation and energy efficiency standards, are far less effective as they focus on a much narrower range of emission reduction opportunities.
- A reasonable minimum price to aim for seems to be around \$20 per tonne, under either least-cost climate stabilization or damage valuation approaches.
- Establishing a credible time path for progressively rising carbon prices is also important to create stable incentives for long-term, clean energy investments”.

## ANC Resolution on Climate Change, 2007

- *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;*

## Green Rules to Drive Innovation, by Daniel C. Esty and Steve Charnovitz (March 2012, Harvard Business Review) (1)

- ..... incoherent U.S. energy policy has also had damaging effects.
- First, in the absence of a mechanism to make producers and consumers pay for the harm from their pollution—that is, in the absence of a mechanism that “internalizes externalities”—U.S. companies overuse polluting fuels and fail to optimize investments in efficient production and product and service design.
- Second, because many of the government’s subsidies are haphazard, wasteful, and counterproductive, investments meant to deliver cleaner and cheaper energy underperform. Both factors are diminishing U.S. competitiveness.

## Green Rules to Drive Innovation, by Daniel C. Esty and Steve Charnovitz (March 2012, Harvard Business Review) (2)

- Environmental policies must be carefully structured and predictable if they are to enhance rather than undermine competitiveness.
- Without a coherent framework for pricing greenhouse gas emissions, American companies have been unable to make rational decisions about investments that carry significant energy implications, such as spending on factories, equipment, and product design.
- **Price signals** give companies a clear incentive to change their behavior and to invest in new technologies that avoid environmental harm.
- Therefore, we propose an emissions charge that would directly attack damaging market failures and spur clean-energy innovations. Emissions charges are administratively straightforward and transparent. Subsidies, by contrast, are hard to deploy productively and are often subject to political influence.

## Green Rules to Drive Innovation, by Daniel C. Esty and Steve Charnovitz (March 2012, Harvard Business Review) (3)

- We propose that the charge be levied at the first point of sale of a fossil fuel—that is, coal, oil, and gas companies would pay on the basis of the carbon content of the fuel they deliver.
- Specifically, we propose a charge of \$5 per ton of carbon emissions, beginning after the economy has recovered (perhaps in 2013) and rising by \$5 a year to a maximum of \$100 per ton.
- Even China has announced plans for pricing carbon emissions. A slow but steady escalation from a very low base would minimize the initial economic burden while changing investment behavior immediately.
- To avoid even short-term impacts on competitiveness, we propose holding off on actually imposing a charge until other major economies, including China and India, have enacted broadly comparable policies. We believe that if the U.S. passes carbon-charge legislation, other countries will follow suit, making reduced global emissions a realistic goal in the next round of climate-change negotiations.

## Saving the planet, A tale of two strategies by Roger Martin and Alison Kemper. (1)

Harvard Business Review, April 2012 (pp. 48-56)

- Thomas Malthus advised restraint; Robert Solow promotes innovation. Let's pursue both to solve the environmental crisis.
- The Kyoto Protocol provides a cautionary tale. Its framers, using an implicitly Malthusian conceptual structure, hoped that measuring and pricing carbon emissions would encourage incremental reductions. But they also hoped that gradually increasing the cost and decreasing the amount of emissions allowed would generate Solovian innovation in alternative energy systems and products along with carbon trading. **Kyoto has produced little of either.**
- Instead we have created expensive new industries devoted to auditing emissions, assessing the ability of tropical forests to absorb carbon, and burying liquid CO<sub>2</sub> in abandoned mines. Our economies are still locked into burning fossil fuels, and the concentration of CO<sub>2</sub> in the atmosphere continues to rise.

## Saving the planet, A tale of two strategies by Roger Martin and Alison Kemper. (2)

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- The world's leading environmental economist, William Nordhaus, has termed Kyoto's mechanisms "inefficient and ineffective" and urged their replacement with a global carbon tax that would force consumers and companies, not governments, to innovate (pp. 52-53).
- The biggest challenge for innovation in energy is that substantial vacillation in the price of oil, which discourage large-scale investment in substitutes. The carbon offset pricing featured in cap-and-trade programs, which does nothing to dampen profitability swings for alternative technologies, is therefore not the answer. Far preferable would be a variable gap-filling carbon tax to preserve a floor price for a barrel of oil.
- The European Automobile Manufacturers' Association has advocated that: "CO<sub>2</sub> should be the key criterion for taxation to provide incentives to buy lower CO<sub>2</sub> emitting cars." At a minimum, corporations can help by not fighting governmental attempts to create such a context.

## Saving the planet, A tale of two strategies by Roger Martin and Alison Kemper. (3)

Harvard Business Review, April 2012 (pp. 48-56)

- The key factor determining its success is a broad commitment to reduce, reuse, and recycle, which holds for both individuals and corporations. That commitment is generated essentially in three ways: regulation, economic incentives, and social or moral pressure (p.54).
- Mixing regulation with economic incentives can give history a shove.
- .. responsible energy consumption need not imply long-term restraint in economic growth. Rather, government should intervene to create pricing conditions that reward companies for innovation. That is what the German government did with solar energy. If governments pour their resources into regulation and subsidies in an effort to change behaviour rather than stimulate new technologies, society may be worse off. Similarly, if corporations are motivated to make existing technologies more efficient only in small increments, they will miss out on the quantum leap in productivity that disruptive innovation can bring.
- Malthusian restraint can buy time for Solovian innovation (p. 56).

# Reforming the EU ETS:

Carbon taxation and fiscal consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits Vivid Economics, May 2012 (for European Climate Foundation and Green Budget Europe) (pages 100 to 108)

- The key mechanism to reach a more ambitious emissions reduction target would be a tightening of the EU ETS cap, accompanied by carbon energy tax measures covering non-EU ETS emissions.
- The EU ETS covers approximately 50 per cent of the EU's CO<sub>2</sub> emissions.
- EU ETS reform must be accompanied by Energy Tax Directive reform, covering the remaining 50 per cent of emissions, to deliver abatement incentives throughout the entire economy.
- A key feature of the way in which free allowances are allocated under the EU ETS is that, except in the event of closure, the quantity of allowances received by an installation are fixed and do not vary according to output changes within the period, i.e. they are a lump sum transfer. (Australia and New Zealand seems to follow a different model of allocating allowances).
- The paper argues that free allowance allocations is an "expensive" way to provide assistances to companies and that post 2020 all allowances within the EU ETS should be auctioned with border carbon adjustments (BCA) to be considered as a means to provide assistance / protection against possible carbon leakage – to address competitiveness concerns.