WWF

BRIEFING

ZA

SEPTEMBER 2011

Living Planet Unit

IMPERATIVES FOR PRICING CARBON

The case for an early start

This Briefing Paper is the second in a series of six papers, commissioned by WWF-SA, and designed to facilitate deeper discussions around how to accelerate South Africa's transformation towards a more sustainable and equitable economic future.

This Pricing Carbon paper aims to summarise available thinking and research around the financial mechanism of putting a price on carbon as a tool that could reduce carbon emissions, and support local and international adaptation and mitigation efforts in response to climate change and unsustainable resource use.

In a comparative analysis, the paper highlights the advantages and disadvantages of two carbon pricing mechanisms — cap-and-trade and a carbon tax. If designed and implemented effectively, such mechanisms have the potential to ensure that South Africa remains competitive and resilient throughout its transformation to a low-carbon economy.

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This paper is the second in a series of six briefing papers commissioned by the WWF-SA and is aimed at deepening the discussions needed to facilitate South Africa's transformation to a low carbon economy.

THE GREEN GROWTH SOUTH AFRICA PROJECT IS FUNDED BY THE BRITISH HIGH COMMISSION.

British High Commission Pretoria

1. INTRODUCTION

Putting a price on carbon, in economic jargon, is about internalising externalities. It is recognition that the market price of a good or a service is not inclusive of all relevant factors, such as external costs (e.g. pollution) and that these costs have to be internalised. In a more formal sense the internalisation of externalities can be defined as the "[i]ncorporation of an externality into the market decision making process through pricing or regulatory interventions. In the narrow sense, internalisation is achieved by charging polluters (for example) with the damage costs of the pollution generated by them, in accordance with the polluter pays principle"[1].

Putting a price on carbon is therefore imperative to get the right pricing signal so that the market can take an informed decision as to how much or how little it desires to buy of a specific good or service. Without intervention regarding externalities, market participants are therefore likely to make uninformed and hence wrong choices based on wrong price signals. Pricing the carbon will protect the market participants from distorted price signals and their effects. As a financial mechanism this can be of great value in reducing emissions, as well as supporting adaptation and mitigation efforts locally and internationally. Such interventions could ensure that South Africa remains competitive and resilient throughout the transformation to a low-carbon economy.

There are two options for directly pricing carbon, namely:

i) a carbon tax, and

ii) a cap-and-trade system.

While the two options operate in fundamentally different ways, a hybrid model is also possible. A suite of market mechanisms could also include indirect measures, such as tax rebates to subsidise cleaner technologies. Here we discuss the advantages and the challenges of the direct pricing options, as well as the perspectives of various important stakeholders within South Africa on this matter. We also look at the possibility of an early start in the introduction of a price on carbon in South Africa and how the different players might receive such an early implementation.

Contents

2. CARBON EMISSION REDUCTION MECHANISMS

2.1 Carbon Tax

A carbon tax is a specific environmental tax that is levied on the volume of greenhouse gases, in most cases dominated by CO_2 emissions, which are released when combustion occurs. This tax can either be levied on:

i) the volume of the raw material used which has a known carbon content, e.g. the volume of coal used;

ii) the actual emissions; or

iii) the end consumer for the volume of the service purchased which has a carbon-intensive origin, e.g. on the kWh of electricity used.

A carbon tax would need to be adjusted for various changes, such as inflation, technological progress and changes in emissions. This tax, therefore, has to be revised regularly and requires on-going monitoring and evaluation. "Inflation increases abatement costs, so to achieve a target emission reduction the tax rate needs to be adjusted for inflation. Fixed emissions charges in the transition economies of Eastern Europe, for example, have been significantly eroded by the high inflation. Technological change generally has the opposite effect, reducing the cost of making emissions reductions."[2]

The National Treasury of South Africa supported the tax option through its Medium-Term Budget Policy Statement[3]. Even though there is not a comprehensive carbon tax policy yet, the National Treasury has developed a set of environmentally related taxes and tax incentives. Prior to the full implementation of a carbon tax, the energy policy authorities in conjunction with the National Treasury have to consider many issues. The choice of the recycling and the type of tax are important issues that determine who carries the burden and who benefits from such a tax, i.e. the distributional impacts of the tax. Among other issues to be considered are the following:

- the collection point;
- the tax base;
- the variation or uniformity among sectors;
- the association with trade;
- employment impacts;
- use of revenue;
- R&D policies; and
- the exact form of the mechanism (e.g. an emissions tax alone or in conjunction with other policy measures).

The one potential negative aspect of carbon taxes is that they are, by nature, regressive. This means that they disproportionally affect low-income groups. To counter this impact it is possible to design a tax recycling scheme whereby the tax revenue is deployed in favour of low-income populations[4]. Hence, the recycling of the revenue is one of the most important elements of a carbon tax. Some tax recycling options are presented in Table 1.

South Africa will also not be the first country to introduce such a tax as various countries have already done so, or are in the process of implementing some or other form thereof (see Table 2).

TABLE 1: REVENUE RECYCLING OPTIONS

Revenue Recycling
• National adaptation fund • National vehicle for financing renewable energy • Changes or exemptions in corporate taxes, income taxes and VAT • Provision of subsidies for basic energy services • Increased social spending, e.g. education and health • Inclusion of the revenue to the country's general fiscus

2.2 Cap-and-trade System

The main aim of a cap-and-trade system is to decrease emissions of the economy in a cost-effective manner[5], by creating a market that puts a price on emissions[6]. Such a system has three main elements: i) the cap; ii) the tradable credits or allowances; and iii) the means for allocation and distribution of allowances[7].

Under such a system, an institution should take responsibility to implement, monitor and regulate the introduction and operation of the system. This institution could be a government department or agency, an energy-related institution such as the energy regulator, or a new institution mandated exclusively with the regulation of the cap-and-trade system. Hereafter we refer to this institution as "the regulator" irrespective of where it might be housed.

The regulator of the cap-and-trade system would manage a process to establish a total country-wide cap and the allocation of the cap to the market participants, for a specific time period. This cap would be determined by a targeted reduction in emissions or other indicator, such as carbon intensity. Alternatively, international standards can be used as a benchmark. Should the "cap" be perceived by participants as unachievable, there might be strong resistance to implement the system.

However, if the "cap" is too low, most participants will meet it easily and hence the system will not achieve any substantial change to the status quo. There are also questions on whether the "cap" should differ for each sector or a universal "cap" should be applied[8].

Once a cap has been established, the regulator either allocates or sells permits, or "allowances", to the participants. The two leading methods for allowance distributions are grandfathering (allocation based on historical/previous emissions of the sector or company) and auctioning directly to polluting companies which could be applied to a limited portion of total allowances. More complex schemes have been proposed to include a 'per capita' component for (some) equal distribution among the population. The regulated participants (generally companies, though this could be sectoral associations or countries at an international level) can use their allowances, i.e. they are redeemed against emissions, or trade them with each other[9]. Participants that emit less than the allowances they hold can sell their surplus to those that emit more than their allowances cover. The system, therefore, financially rewards the participants that achieve the greatest emissions reductions.

Cap-and-trade systems are neither new nor recent. The predecessors of the current cap-and-trade systems were first used in the 1980s, as a method to curb local pollutants (SO_x and NO_x).

Table 2 summarises the most important global applications of cap-and-trade systems.

Key success factors of any cap-and-trade system include the following:11

i) Ability to measure, report and evaluate the progress;

ii) Proper penalty system;

iii) Transparency of the decisions, i.e. the selection of cap;

TABLE 2: INTERNATIONAL APPLICATIONS OF CAP-AND-TRADE SYSTEMS

Programme	Year	Place	Targeted indicator
Leaded Gasoline Phasedown Program	1980s	United States	Gasoline
US Clean Air Act Amendments	1990	United States	SO_2 and NO_2
Regional Clean Air Incentives Market (RECLAIM)	1994	Los Angeles	NO_x and SO_x
Acid Rain Program — US SO_2 Trading Program	1995	United States	SO_2
North-Eastern NO_x Budget Program	1999	USA	NO_x
NO_x Budget Program (SIP)	2003	USA	NO_x
European Emissions Trading System	1998	EU	GHG emissions
Carbon Pollution Reduction Scheme	2010	Australia[10]	GHG emissions (outside agriculture)
Regional Greenhouse Gas Initiative (RGGI)	2003	North Western US states	CO_2

TABLE 3: SOME EXAMPLES OF COUNTRIES WITH CARBON TAX SYSTEMS

Country	Instrument name	Tax base	Rates	Exemptions/exclusions
Canada-British Columbia	Carbon tax	Fossil fuels (gasoline, diesel, natural gas, heating fuel, propane and coal)	C$10 per ton of CO_2e	The carbon tax does not apply to Co_2 emissions from: - Industrial processes including the production of oil, gas, aluminium and cement; - Emissions of other GHGs such as methane and nitrous oxide from the disposal of solid waste and the agricultural sector; - Fuels exported from British Columbia and fuels used for inter-jurisdictional commercial marine and aviation purposes.
Denmark	Energy, carbon and sulphur tax	- Fossil fuels, oil products and coal; - Electricity; - Industrial space heating	- Euro 12c/ton; - Euro 1.2c/kWh; - Euro 80c/ton	Industries entered into binding agreements to undertake energy efficiency measures levied 3% of standard rate (3% of Euro 12c/ton).
Finland	Carbon/ energy tax	Fuels	- Energy content (3.5Mk per MWh); - Carbon tax (38.3Mk)	- Energy intensive industries with a carbon/tax burden in excess of 3.7% of value added received substantial reduction (85%) in carbon taxation; - Products used as raw materials for industrial production or as fuel for planes and certain other vessels are exempt from the tax; - Energy production from peat is also exempt.
Germany	Eco tax	Motor fuels	- Diesel fuel (47.04c/l); - Petrol (65.45c/l); - Natural gas (8c/l); - Liquid Petroleum Gas (LPG) (8c/l)	- Agricultural and forestry operations pay only 25.56c/l for diesel fuel they use (agricultural diesel); - local public transportation sector pays a reduced mineral oil tax rate of 60.05 c/l on petrol, 41.54c/l on diesel fuel, 16.7c/l on LPG and 1.38c/kWh on natural gas.
India	Carbon tax	Coal	Rs50/ton of produced and imported coal	

SOURCE: NATIONAL TREASURY AND MINISTRY OF ENVIRONMENT AND FORESTS OF INDIA

iv) Choice of companies/sectors/ countries to participate;

v) Type of indicator to be targeted; and

vi) Clarity of the mandate and organisational competence of regulator.

2.3 Comparing the two options

Although the differences between price (carbon tax) and quantity (cap-and-trade) instruments are fundamental, some studies argue that a well-designed and well-specified cap-and-trade system will have similar results to an equivalent implementation of a carbon tax[12]. When comparing the two approaches it is interesting to note that, in most cases, the advantages of the one can be perceived as disadvantages of the other. The two options are compared in Table 4 according to six criteria[13].

TABLE 4: COMPARATIVE EVALUATION OF CARBON TAX AND CAP-AND-TRADE SYSTEMS (Advantages A and Disadvantages D)

Criterion	Carbon tax	Cap-and-trade
Economic efficiency	**A:** Firms allowed greater flexibility to decide the timing of emissions reductions under varying economic conditions. It is a more straight forward approach not allowing for price volatility. **D:** Built-in policy adjustments for inflation might affect the economic efficiency of a carbon tax. Also, the participants will have to pay the tax AND the costs of investing in more efficient production technologies.	**A:** A cap-and-trade system that makes provision for price floors and ceilings can contain prices within a known band and thus avoid price volatility. Also trading allows the participants to choose more cost-effective mitigation options. **D:** An inflexible cap-and-trade system defines the time period in which the participants can change their behaviour even if the economic conditions are not appropriate. The price of credits can vary substantially[14].
Environmental efficiency	**A:** With appropriate revenue recycling, a carbon tax can achieve similar results as the cap-and-trade with regards to the reduction of emissions. **D:** A carbon tax can be proven less certain in achieving specific emissions reductions[15], especially in the short-run, and can be advantageous to high income users, i.e. they can afford to pay the tax without striving to reduce their emissions or change their behaviour[16] [17].	**A:** An inflexible cap-and-trade system is able to achieve specific emission targets, without dealing with the price of the reduction. This type of system offers a better fit with global agreements focused on time-constraints of emission reduction agreements. **D:** A low price can be unattractive for market participation. Also, if the cost of credits is a small ratio to the company's total operating costs, there will be no incentive for improving their emission profile.
Public finance considerations	**A:** Carbon tax can raise public revenue directly. This revenue can be predictable and relatively stable due to lack of price volatility. **D:** A carbon tax has a limit in the government revenue it can collect, while in a cap-and-trade system, depending on the amount of credits to be auctioned and the price of the credit the revenue does not have a certain limit.	**A:** Cap-and-trade systems can raise revenue by auctioning (part of or all) the tradable permits. **D:** Cap-and-trade systems by definition create a new market for carbon credits. They do not raise revenue for the government. The price volatility can also be responsible for unexpected changes in revenue.
Welfare impacts	**A+D:** Any pricing option will influence government welfare distribution. The burden of a carbon tax can be carried by producers and consumers (indirectly through price increases). Of course, the way of recycling the revenue will play a significant role in the re-distribution to low-income groups' benefits.	**A+D:** Any pricing option will influence government welfare distribution. The burden of a carbon tax can be carried by producers and consumers (indirectly through price increases). Of course, the way of recycling the revenue will play a significant role in the re-distribution to low-income groups' benefits.
Administrative complexity	**A:** Carbon tax can be implemented based on already established taxation mechanisms and hence the administrative burden will be relatively low. Also, South Africa's existing taxation system will prevent corruption incidents[18]. **D:** The administrative complexities of a carbon tax stem from the fact that monitoring the emissions to be taxed is not a straightforward exercise. Currently, the electricity levy has helped overcome the problem but the transition to taxing emissions might be problematic.	**A:** Past applications of the system have shown that the cost can be moderate enough if already established regulators take the market as part of their mandate. **D:** A cap-and-trade system will require the establishment of new administrative infrastructure. Concerns have also being expressed about the corruption susceptibility of quantity-type regimes[19], especially when quotas are compared with tariffs in international applications.
Global implementation	**A:** After finding a way to deal with different currencies, a carbon tax can be a fair instrument between developed and developing countries: all pay according to their emissions. **D:** The implementation of global carbon taxes will be difficult due to differences in taxation systems as well as currency rates dissimilarities.	**A:** Cap-and-trade systems can be (and have been) implemented easily in multi-country environments. **D:** An international market has the disadvantage of creating losers and winners among countries.

3. STRUCTURING THE INTERVENTION

The choice and correct timing of a policy instrument that will impose a "price" on carbon emissions in the South African economy has recently attracted much debate due to the country's provisional international commitment for reduction of carbon emissions. Also, the National Climate Change Response policy development process, due to be concluded ahead of South Africa hosting the 17th Conference of the Parties to the UNFCCC at the end of 2011, is expected to identify the most appropriate measures for achieving the country's environmental targets. However, voices from the financial and industry sectors have expressed concerns on the level of maturity of the economy to accommodate direct pricing of carbon.

In an interview with Dr Laurraine Lotter from the Chemical and Allied Industries' Association she states that "[the decision for an early start] should not be considered in isolation. Firms need time to adjust and early introduction outside a holistic approach to mitigation is not considered an appropriate way to work". She also argues that "[t]here are (sic.) a range of policy instruments that could be used and the benefits and costs of all should be evaluated before a decision is made to select a single one." On this, a concern raised from the financial sector is the lack of established appropriate monitoring, measuring and legislation mechanisms. Individuals from the financial sector state that all these should be in place before the implementation of any pricing instrument. The clarification of which type of emissions[20] should be included is imperative before an appropriate instrument can be selected.

Discussions with various stakeholders showed a general trend towards supporting a carbon tax regime for the South African case. The reasons varied from the acknowledgement of its administrative ease to the dissatisfaction with the creation of a new market for carbon through a cap-and-trade approach. From an interview with Mr Malcolm Gray from Investec he expressed support for an implementation of a carbon tax initially, followed by a choice of a hybrid combination of the two policy instruments for the future. Gray further argues that the number of high emitters in South Africa is not big enough to allow for a broad implementation of a trading system.

According to economic theory, imposing a price on a negative externality aims at internalising it by incorporating the social external costs to the producers' private costs. Hence, it is expected that the society should benefit from the tax revenue. Bishop Geoff Davies from the Southern African Faith Communities' Environment Institute (SAFCEI) mentioned in an interview that some revenue collected can benefit low-income groups by providing subsidies for access to energy. Mr Gray states that a certain reduction in any type of taxation would not serve the environmental purposes of a carbon pricing instrument although, depending on the design of the reduction, might impact the taxpayer positively. The government's political priorities are also crucial for the re-allocation of the revenues. A tax can be used as part of the redistributive mechanism and, as National Treasury proposes, there are a number of revenue streams in the country such as the Unemployment Insurance Fund (UIF), the Road Accident Fund, the skills development levy and others[21]. Also, in a more indirect way, poor households need to be protected from the electricity price hikes that may result from the proposed carbon tax.

Additionally, as also stated by the National Treasury[22], "the overall impact of a carbon tax depends largely on how government recycles the carbon revenues as well as the availability and affordability of greener technologies." During discussions with various stakeholders, we found that there is a general notion towards supporting energy saving-related activities as well as the creation of a national vehicle to promote investment for renewable energy activities from recycled revenue. National Treasury[23] also supports the notion that the introduction of the carbon tax can encourage the use of greener technologies. Improving the availability and affordability can assist in the complete offset of any carbon tax disadvantages.

As far as exemptions and rebates are concerned, with the exception of charitable institutions and maybe low-income groups, those interviewed argued for a "no exclusion policy". The main reason for this is the creation of distortions and ambiguities within the system. Also, unnecessary administrative complexity might cause distrust of the system. The possibility of rebates is cautiously discussed and support would be highly dependent on the design and criteria for recipients to qualify for any rebate. International applications have shown that exemptions are of importance or value to the system only when they are linked to an ambitious energy efficiency programme and full and independently monitored disclosure of emissions[24].

Finally, even if there was a general consensus on the pricing instrument, an important question to answer is "what is the real price of CO2?". It is admittedly difficult to measure the social cost with precision and as Mr Gray from Investec points out "how does one measure the long duration and intergenerational impacts?". This, however, has been done by many authors in the past. Tol (2005)[25], after reviewing 28 studies regarding the damage cost of climate change,

found that the mean is $93/tC ($25/tCO2[26]). He concludes that "the marginal damage costs of carbon dioxide emissions are unlikely to exceed $50/tC ($13.6/tCO2), and probably much smaller". In 2009 he conducted another review,[27] this time of more than 200 studies, in which he concludes that "the expected value is $50/tC ($13.6/tCO2), which is much lower than the price of carbon in the European Union but much higher than the price of carbon elsewhere." In another paper, Anthoff et al state that the most likely social cost of carbon is approximately $41/tC ($11/tCO2) [28]. Internalising such externality, a carbon tax of the same magnitude should be imposed. The Energy Research Centre (ERC) of the University of Cape Town, in their comments[29] with regards to the Integrated Resource Plan (IRP) 2010, mention that the difference in costs of electricity supply in South Africa between new coal plants and low carbon technologies is around 20–40c/kWh, which equates to a price of R200–R400/tCO2 ($28-$57/tCO2).

A carbon tax should apply to both local products and imports, through a border carbon tax adjustment (BCA). A BCA would take into account that nations without a carbon price might contribute substantially to global emissions. "Such an adjustment can only be lawfully applied against the difference between the exporter and importer country carbon prices. The impact on the consumer price (and therefore product competitiveness) in an export market is the same whether carbon is priced through a domestic tax or a BCA. The key advantage of domestic pricing over border pricing is that revenues are retained at home."[30]

4. CONCLUSION

Market prices act as information signals. They tend to reflect society's appetite for specific goods or services. Often, however, that price does not reflect the true cost of producing such a good or a service and it becomes necessary, no – imperative – to internalise those external costs. With respect to carbon there are essentially two major families of policy instruments available to internalise the negative externalities related to the carbon emissions. Although indirect measures such as tax rebates to subsidise cleaner technologies are available, there is a general tendency for more direct interventions in order to put a price on the externality. This paper examined the case of two such direct pricing instruments: carbon tax and a cap-and-trade system for the case of South Africa.

Although the two approaches theoretically offer the same results under certain conditions, the practical differences are important. Carbon tax provides a fixed price for carbon, has the potential for a wider inclusion of participants, is relatively easy to administer, and revenue collection will be relatively easy and stable. Its main disadvantage is that it cannot provide certainty in the achievement of the targeted emissions reduction. On the other hand, cap-and-trade systems can provide a higher certainty of reaching specific emissions targets, but at the expense of more volatile prices and revenues, and possible administrative difficulties.

Following a range of interviews and considering a variety of sources it seems as if there is convergence on the matter that an intervention to reduce the country's carbon emissions and to achieve the environmental targets as per the country's commitment is needed. However, discussions with various stakeholders showed that although the necessity for a pricing system is appreciated, there are concerns with regards to the maturity of the energy system of the country. A lack of implemented monitoring, measuring and legislation mechanisms should be addressed to avoid a failure of any of the pricing instruments.

In general, the stakeholders who have been consulted and the literature studied seem to indicate that the South African industry, financial sectors and NGOs prefer a carbon tax instead of a cap-and-trade system. The reasons varied from the administrative ease of a carbon tax to the distrust in the creation of a carbon market. Such an intervention should be considered a social contract and awareness should be raised. Regardless of which instrument is selected (or a combination of the two), the policy should be careful not to create an unfair burden to some participants and should be based on motivating the participants to improve their production technology as well.

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