WWF UPDATE 2012

Authored by Brent Cloete (DNA Economics)
and Emily Tyler (Independent economist)

February 2012

WWF South Africa

Carbon Tax Design Options – A Discussion Document

TABLE OF CONTENTS

Executive Summary

1. SA's economy is based on abundant, high carbon energy options and valuable, internationally sought-after minerals deposits. **The transition to a low-carbon future must employ strategically designed policy approaches** to continue to facilitate economic growth, reducing poverty and inequality.
2. **While broad-based carbon pricing is not yet in place in developing countries, this may change soon.** Strong interest in the use of both carbon taxes and trading mechanisms, for instance, is evident in India and China.
3. Locally, the carbon pricing debate has moved from considering the merits of different carbon pricing instruments to **ensuring that the carbon pricing framework supports South Africa's low-carbon transition.**
4. **SA has structural impediments to an effective carbon pricing regime which must be accounted for in the regime design**, including a monopolistic and regulated electricity sector, and an oligopolistic and regulated liquid fuels sector. In addition, transitioning to a low-carbon economy will require the development of large, expensive, risky and lumpy (i.e. requiring large, once-off investments) greenhouse-gas mitigation options.
5. Electricity emissions represent just under half of SA's total emissions. **Sharply rising electricity prices work against the near-term effectiveness of a carbon price**.
6. **There is a need for policy relevant information around mitigation potential and cost**. A carbon price provides a useful mechanism for generating this information if appropriately designed, and this may be one of the most important contributions of such a regime in its early years of operation.
7. The **proposed approach to carbon pricing is the use of a low and escalating carbon tax, together with revenue recycling**. While this approach has a number of attractive features, it may not be nuanced enough on its own to deal with South Africa's particular context.
8. **A number of South African firms and sectors are expected to be disproportionately vulnerable to carbon pricing**. Based on international experience and local development imperatives, it is likely that relief from carbon costs will be provided to these firms in the short to medium term.
9. **Temporary mitigation support agreements (T-MSAs) may provide the required relief to highly vulnerable firms while strengthening the broader carbon tax framework**. T-MSAs are flexible instruments that can incentivise early mitigation action while generating detailed information on mitigation costs and opportunities.
10. T-MSAs require firms to undertake mitigation or related activities to qualify for temporary relief from carbon pricing, and are thus **likely to be more acceptable to policymakers** than simple time-bound relief mechanisms.
11. **Public and private sector capacity constraints may, however, limit the effectiveness of T-MSAs.** T-MSAs should therefore be restricted to a small set of commitments that are easily verifiable, the number of sectors included in the scheme should be kept to a minimum, and reporting requirements should be simplified.
12. The government has committed to a carbon budget approach to mitigation policy. **The carbon budgeting policy approach requires significant new institutional capacity (both in the private and public sectors) to be developed**, and must be closely integrated with any carbon pricing initiative.
13. **The institutional capacity required to effectively implement T-MSAs closely mirrors that required to develop sectoral carbon budgets**. Sharing capacity could strengthen both these processes.
14. T-MSAs provide a useful **mechanism for aligning carbon pricing with a carbon budget approach.**

1. Introduction

South Africa has indicated its intent to implement a carbon price in the form of a carbon tax as a long-standing element of the national policy direction (see National Treasury (NT), 2006; Environmental Fiscal ANC Polokwane Resolution, 2007; Cabinet Vision, 2008; Climate Change Response White Paper, 2011; and the National Planning Commission (NPC), 2011).

In December 2010, the National Treasury tabled a discussion document for public comment on the carbon tax option for reducing greenhouse gas emissions, indicating that a similar document on emissions trading would be forthcoming. The tax discussion document elicited an overwhelming number of responses (79 in total), indicating how seriously stakeholders are taking the issue of carbon pricing. A policy document containing more details on the tax design is anticipated early in 2012.

The carbon pricing section in the White Paper on Climate Change Response (2011), released after Treasury's carbon tax discussion document, is largely aligned with the Treasury document, and in some aspects could be interpreted as revealing government's further thinking on the issue. Taken together, the following preferences around carbon price design can be ascertained:

- Market-based instruments to be part of a suite of policy instruments used to support the transition to a low-carbon economy
- Strong preference for the use of a carbon tax over an emissions trading scheme in the short term, while an emissions trading scheme may be a suitable medium to long term carbon pricing instrument
- The primary objective of the tax is to change behaviour, with a secondary objective to generate a revenue stream for climate change policy and sustainable development objectives
- The price level will reflect the partial internalisation of the carbon emissions externality until such time as there is an international agreement on carbon pricing (i.e. the carbon price will not initially account for the full expected negative impact of climate change)[1]
- While a direct CO_2 tax is favoured, technical and administrative considerations may result in the decision to levy an input tax based on the carbon content of fossil fuel inputs
- Universal coverage of sectors is desirable (although this may only be achieved over time)
- Measures to support the poor will be required to counter the regressive impact of a carbon tax
- Gradual escalation of the tax off a low level is preferred as a means of providing relief to sectors vulnerable to a loss of competitiveness as a result of a carbon tax (largely to avoid lobbying when relief measures are designed)
- Any relief for competitiveness impacts should be minimal and temporary
- Full earmarking of tax revenues is not supported, but soft earmarking (on-budget

[1] The additional costs that GHG emissions place on society (in the form of the costs/impacts of man-made climate change due to natural disasters, changes in agricultural production, increased prevalence of diseases, etc) are referred to as 'externality costs' since the emitters of GHG emissions do not carry this cost (i.e. the costs of climate change are incurred by parties that are removed/external from the parties that benefit from the activities that emit GHG emissions). Forcing the parties that are responsible for emitting GHG emissions to carry the cost that result from man-made climate change is referred to as 'internalising' the externality costs.

revenue recycling for specific environmental programmes) together with some form of tax-shifting to reduce other taxes in the economy may be desirable.

This discussion paper aims to add to the carbon pricing dialogue by highlighting aspects of the South African context which are pertinent to the optimal design of the carbon price. It also proposes considering the inclusion in the tax design of a mechanism that specifically supports emissions- and energy-intensive firms' transition to lower carbon production while also providing an incentive for early mitigation action. In conclusion, the paper highlights the fact that a carbon tax is a very flexible policy instrument that can be designed to address the objectives and concerns of both government and the private sector in supporting an efficient transition to a low-carbon economy.

2. Carbon Pricing Basics

2.1 The economic rationale for carbon pricing

The private cost of activities that emit greenhouse gas (GHG) emissions is below the social cost of these activities (which includes the costs of man-made climate change).[2] Because GHG emitters receive all the benefits of activities that emit GHGs, but only carry part of the cost, emitters will emit more than the socially beneficially level of GHGs. The additional costs that GHG emissions place on society (in the form of the costs/impacts of climate change owing to natural disasters, changes in agricultural production, increased prevalence of diseases, etc), is referred to as an 'externality cost' since the emitters of GHG emissions do not carry this cost (i.e. the cost of climate change is incurred by parties that are removed/external from the parties that benefit from the activities that emit GHG emissions). Economic instruments to mitigate climate change, whether carbon taxes or different forms of trading schemes, aim to address this problem by placing a price on carbon to account for social costs. This affects the relative cost structures, of sectors within an economy and between economies internationally, by effectively making carbon "a factor of production that needs to be paid for in the same way as labour or raw materials" (Smale et al., 2006:33; Wooders et al., 2009). When GHG emissions carry a cost and become a 'factor of production', the cost of the climate change externality linked to GHG emissions is internalised into production process and the level of GHG emissions is reduced to a point closer to the optimal amount of GHG emissions from society's perspective.

The presence of a carbon price creates incentives to reduce GHG emissions. Upstream producers are incentivised to mitigate their GHG emissions (which now carry a real cost) as far as possible. They will also try to pass the costs of mitigation activities, as well as the residual tax paid after they have reduced their emissions to the optimal level, on to their customers. Downstream firms are thus incentivised to either make more efficient use of the relevant high-carbon inputs/products they purchase, switch to lower carbon substitutes, look for cost-savings elsewhere to counterbalance the impact of increased carbon costs, or reduce their production of carbon-intensive goods (thereby reducing the volume of carbon-intensive inputs required). Consumers face a similar decision: either use less of the product (through more efficient use, switching to alternatives or simply consuming less of the product), or keep consumption levels constant and increase expenditure. The extent to which some or all of these outcomes occur depends on price-elasticities[3] and market power throughout the value chain.

[2] The cost of natural disasters, changes in agricultural production, increased prevalence of diseases, etc is borne by society as a whole, and not the producers of the GHG emissions that lead to man-made climate change. The costs linked to the effects of climate change are thus referred to as 'social costs'.

[3] The price elasticity of demand refers to the change in the demand for a firm's product in response to a change in the price of the product. Price elasticities vary from perfectly inelastic to perfectly elastic. In a situation where the product

Carbon pricing works best where there is some competition between upstream producers that prevents them from passing on the full cost of carbon. This will incentivise them to implement as many available mitigation options as possible to keep cost increases low, relative to that of competitors. However, even if there is no competition upstream, as long as the demand for a firm's products is not perfectly inelastic, there is an incentive to try and reduce cost pass-through (preferring to implement mitigation measures to reduce carbon tax liability) to reduce the decline in demand for the firm's products.[4] Thus, only firms selling products that are completely price-inelastic are likely to consider passing on carbon costs fully without undertaking any mitigation action.[5]

From an environmental perspective, it is important that the 'effective incidence' (who actually bears the tax - a product of market structure and elasticities) falls on those who are best able to change their behaviour in a way that will achieve the desired environmental outcomes (i.e. reduce GHG emissions) (Milne, 2008).The most efficient point, with least possible distortion in incentives, to implement a carbon price is on direct emissions. The inconsistent implementation of methodologies to measure emissions on a company and sectoral basis (Hanks, 2011), however, means that it may be administratively difficult to level a carbon price directly on GHG emissions in South Africa at present. According to Devajaran et al (2009), the next best solution in the South African context is a price on the carbon content of fossil fuel inputs, levied on fossil fuel producers or importers (an 'upstream proxy tax'), with credits given for carbon sequestrated in products or through end-of-pipe technologies such as carbon capture and storage (CCS).

The objective of a carbon price is twofold. Firstly it aims to change the behaviour of both producers and consumers, and secondly it provides a signal of the future price of the externality to allow investors to make appropriate decisions regarding future capital investment. A clear and credible future carbon price pathway is therefore arguably as important as the current carbon price. This is particularly so in a developing country with an infrastructure backlog. While the challenge to developed countries is to transform existing infrastructure, developing countries have to make sure their future infrastructure is built in line with expectations of future carbon costs to avoid stranded assets that may have to be retired before the end of their useful lives.

2.2 Tax versus trading – the debate has moved on

Historically, there has been a vigorous debate concerning the relative merits of taxes and emissions trading schemes (ETS). From a theoretical perspective, however, the two instruments are actually very similar. In a perfect world, a tax (which sets a price for carbon directly and then lets the market decide on the amount of GHG to emit) and an ETS (which

---

is a necessity and there are no substitutes available, the demand for a product will be unaffected by an increase in price. The price elasticity of demand is said to be perfectly inelastic if a change in price does not affect demand for a good. At the other end of the elasticity spectrum, where products are commodities (i.e. undistinguishable from other products) and a supply of perfect substitutes are readily available, even a small increase in price will lead to the demand for a firm's goods falling to zero. When this happens, the price elasticity of demand is referred to as perfectly elastic.

[4]In a market that lacks competition firms will be operating at a production level that maximises their profits. A reduction in demand would thus lead to reduced profits.

[5]But this is not a definite outcome. If it is difficult to calculate the amount of the true cost increase of carbon pricing, and firms have market power, firms may attempt to pass on price increases that exceed the impact of carbon costs and the cost of mitigation actions undertaken in order to increase their overall profits. This happened in the early phases of the EU-ETS where utilities that received free allocations of certificates passed on the full costs of the free certificates (as if they had bought them) to customers (Sijm et al, 2006). This tactic, however, will only be successful if demand for a firm's products is relatively price inelastic.

sets the amount of GHG to emit directly and then lets the markets set the carbon price) – are flipsides of the same coin. Both instruments can be used to set the socially-optimal level of emissions.

In practice, both instruments have advantages and disadvantages, but these are very narrowly linked to the local context and it is difficult to make broad generalisations. It is a fallacy, for instance, to think that a trading scheme is equivalent to a carrot while a carbon tax is a stick. Full auctioning of permits under a trading scheme essentially imposes a cost on producers akin to a carbon tax. And a low and escalating tax, as proposed for South Africa (NT, 2010), is almost identical in effect to a "grandfathered" trading scheme[6] that moves to full auctioning over time and in which the carbon price increases slowly over time. Furthermore, the revenues from auctioning permits and imposing a carbon tax both accrue to the national fiscus, and the revenue profile of a grandfathered trading scheme moving towards full auctioning over time closely matches that of a low and escalating carbon tax. Opting for a trading scheme over a carbon tax is thus no guarantee that, as many commentators fear, a carbon pricing framework will not turn out to be a revenue-raising tool disguised as an environmental policy instrument.[7]

Carbon taxes and ETS are no longer viewed as 'either/or' options. A number of countries in Europe (like the UK and Denmark) have local carbon taxes that operate in conjunction with the EU-ETS. The carbon pricing framework in Australia has also highlighted the narrow distinction between carbon taxes and trading schemes. Given that the certificates in the initial three years of the scheme's existence will not be tradable, the scheme essentially functions like a carbon tax that transitions to an ETS over time.

As a result of the growing realisation of the blurred lines between carbon taxes and ETS, **the local carbon pricing debate has shifted from weighing the pros and cons of carbon taxes and ETS, to ensuring that a carbon pricing framework is designed in a way that supports a carbon-efficient and competitive local economy**. In SA, the concentration of emissions in a few companies (notably Eskom and Sasol which account for just under 60% of South Africa's emissions[8]) currently precludes the effective functioning of a market-based emissions trading scheme since the level of market liquidity required for an emissions trading scheme to function effectively is unlikely to be achieved. Thus, by default, it is likely that the mainstay of SA's mitigation policy suite will look more like a tax than a trading scheme in the near future.[9] This does not, however, mean that there is no scope for integrating ETS elements within a broader carbon tax framework.

3. Economic Instruments in Developing Countries

The use of economic instruments to address environmental issues in developing countries is not new. In the area of climate change, economic instruments have mostly focused on generating revenue rather than directly influencing behaviour. Costa Rica, for instance, has implemented an 'ecotax' on the consumption of fuels and other crude oil derivatives since 1996. Two-thirds of the revenue were earmarked for road maintenance, with another third earmarked for paying small forest owners for the environmental services (including acting

[6] An emissions trading scheme in which a set number of emissions permits is allocated free to participants based on their historical emissions.
[7] See, for instance, Deloitte (2009) and Rycroft (2011).
[8] Authors' calculation based on Carbon Disclosure Project 2009 data.
[9] This may change if the structure of energy markets evolve (the government is aiming for 30% of electricity to be supplied by Independent Power Producers (Eskom, 2009), and as international emissions trading becomes more of a reality.

as carbon sinks) provided by their landholdings (Heindrichs, 1997; Pagiola, 2005).[10]

Recently, however, there has been more interest in the use of economic instruments to drive climate change mitigation in developing countries rather than just raise revenue. In addition to a tax of 50 rupees per metric tonne of coal mined in or imported into India (predominantly aimed at raising revenues earmarked for funding of renewable energy projects directly, or the upgrading of the national grid to allow greater renewables penetration) implemented in July 2011(Pearson, 2011), India is planning to implement a white certificate trading scheme (the Perform, Achieve and Trade (PAT) scheme) aimed at increasing energy efficiency.[11] The mechanism, which was originally scheduled to commence operation in April 2011, is currently awaiting authorisation by the Ministry of Law (BS Reporter, 2011).

China, after implementing a number of piecemeal policies to reduce the energy intensity of its economy (including a national 'resource tax' on oil and gas, regulatory measures closing down more than 2000 outdated and energy intensive factories in 18 sectors, and significantly increasing electricity surcharges on firms in eight energy-intensive sectors), is starting to move towards broad-based carbon pricing (Bay and Yam, 2010; GT, 2010; Taylor, 2011). China is planning to roll out pilot emissions trading schemes in six regions and cities by 2013 (each pilot will be based on different scheme designs from the EU, California and Australia), and to move to a unified national trading scheme by 2015 (Stanway, 2011). Furthermore, local sources have indicated that the Chinese government is considering turning the aforementioned resource tax into a fully-fledged carbon tax during the period covered by China's 12th Five-Year Plan (2011-2015) (Fu, 2010; Buckley, 2010).

While broad-based carbon pricing is not yet in place in developing countries, and thus cannot serve to inform the design of a South African carbon pricing regime, it is interesting to note that there is a strong interest in the use of both carbon taxes and trading mechanisms in India and China. Broad-based carbon pricing in the developing world, it would seem, is moving closer to becoming a reality.

4. The South African Context

Economic theory on carbon pricing rests on the assumption that markets are perfectly competitive. Under this assumption, no market participant is large enough to influence product prices, there is perfect factor mobility between firms and sectors, transaction costs are zero, there are no barriers to entry, all players have perfect information, products are homogenous, there is no collusion between firms, and all participants have free access to technology.

A carbon price implemented under these conditions will incentivise a cost-effective level of mitigation among producers in each sector, who will then pass a portion of the resulting cost increases through to the consumer, facilitating cost effective mitigation at both the production and consumption level.

Clearly, however, the assumption of perfect competition does not hold in the real world. Markets are typically imperfectly competitive and low-carbon technologies and substitutes are not uniformly available between firms and between sectors. In some sectors, low-carbon

[10]In 2001 the myriad of local fuel taxes administered by numerous agencies was replaced by a single fuel tax, 3.5% of which is earmarked for this purpose (Blackman, 2009).
[11]The scheme will cover about 570 'designated consumers' in 8 energy intensive industries (BEE, 2011).

production alternatives are still either lacking or prohibitively expensive. Investments in capital stock such as coal-fired power plants or freeways can last decades, and cannot be instantaneously converted into low-carbon alternatives, implying a significant timing aspect to a transition to a low-carbon economy. Energy markets in particular tend to be dominated by natural monopolies and are often subject to regulated pricing, a far cry from the perfect competition which carbon pricing theory assumes. Economies are also interlinked at a global level, and there is not yet a global carbon pricing regime in place. This creates an uneven playing field, eroding the competitiveness of carbon-intensive exports from countries that have implemented a form of carbon price. Transaction costs and structural rigidities also complicate transformation, and economies take time to adjust to shocks. Labour and capital will not, in reality, move instantly and without cost to more efficient and low-carbon applications.

Applying a carbon price in its theoretically optimal form is therefore likely to produce distortions and unintended consequences in practice. Thus, it is critical that the particular context and characteristics of an economy are considered in order to design an efficient and effective carbon price. Some key country-specific factors that could complicate the implementation of a local carbon price are presented below.

4.1 Lack of data

There is a lack of policy-relevant data relating to current emissions sources, and the cost, risk and commercial viability of mitigation options at a sector (and particularly sub-sector) level in South Africa (Cloete et al, 2010; NPC, 2011). This has been identified as an urgent 'gap' by the National Planning Commission (NPC) in their draft National Development Plan (2011b) as it makes optimal policy design difficult and increases the potential for information asymmetries and gaming as a carbon price is developed.

4.2 South Africa's mitigation profile

South Africa has a particular economic structure, from which follows a specific emissions structure and mitigation profile. The energy-intensive export sector, dominated by mining and minerals, plays a significant role in the economy. It has developed on the back of a cheap and plentiful supply of coal and electricity, and from a political economy perspective is perpetuated by a 'minerals and energy complex'. This renders the economy highly emissions-intensive (NPC, 2011a). In addition, the country does not yet have an interim energy source with lower emissions, such as Europe's natural gas, which could bridge the gap between the current reliance on coal, and a future based on renewables or nuclear.

The Long Term Mitigation Scenario planning process (LTMS) scoped South Africa's mitigation profile using the Socolow-Pacala wedge approach. This remains the foundation of mitigation policy, although further analysis is slowly emerging (Cloete et al, 2010, National Treasury, 2011; UN-WIDER, 2011; Cloete et al, 2011).

4.2.1 Low and no cost mitigation options

While initial work done on mitigation options in the LTMS identified a number of these as being of no- or low-cost, particularly relating to energy efficiency (SBT, 2007), recent research suggests that the situation may be more complex. An analysis of the mitigation options in a number of focus sectors, found relatively few negative cost options (Cloete et al, 2010). Since 2008, the local price of electricity has increased significantly, which has led to the implementation of a number of energy efficiency options and other mitigation measures that enabled firms to adjust to higher energy prices (Cloete et al, 2011). All sectors have, however, not implemented energy-related mitigation actions to the same extent, and firms are also at different stages of implementation (Cloete et al, 2011). While

this may be the result of normal differences in cost structures between firms (which influences the way firms respond to all price shocks, not just from energy), this may also suggest that there are non-price barriers to energy efficiency interventions in the industrial sector, particularly with respect to smaller firms.[12] If this is the case, these non-price barriers need to be better understood if a carbon pricing mechanism is being considered to incentivise the uptake of energy-related mitigation actions. The National Energy Regulator of South Africa (2011) also mentions that energy prices have increased to levels where some electricity consumers are responding in perverse ways that do not lead to reduced electricity consumption (like bypassing electricity meters, for instance).

The uncertainty regarding the extent to which 'low-hanging' fruit are still available complicates efforts to model the environmental and economic efficiency of a carbon price. Despite the outputs of modelling work (LTMS in SBT, 2007; National Treasury, 2011), it is not entirely clear how long it will take before a low and escalating carbon tax ratchets up to a level where it will lead to the required behavioural changes.[13]

4.2.2 Large, lumpy and concentrated medium-term mitigation options

South Africa's most significant medium- to long-term mitigation options are concentrated in upstream sectors, particularly those of electricity generation, transport and liquid fuels. Many of these options are characterised as high risk owing to technological immaturity, and high upfront capital cost. They are also often 'lumpy' in that they require large up-front investments.

Their development is therefore constrained by capital availability and development timeframes (e.g. carbon capture and storage (CCS), concentrated solar power (CSP), nuclear, renewable electricity imports, and natural gas imports or the discovery of new local reserves).

While a carbon price may go some way towards incentivising energy efficiency and other relatively low-cost mitigation options, emitters constrained by a larger, lumpier mitigation profile will have no choice but to pay the tax in the short to medium term, reducing the capital base from which they will have to finance the transition to newer, cleaner investments in the future.

4.3 Structure of South Africa's energy sector

The SA energy sector contributes 79% of South Africa's total emissions (RSA 2010), and is characterised by uncompetitive market structures. Electricity is a natural monopoly, liquid fuels an oligopoly and the main primary energy markets are also highly concentrated. Both electricity and liquid fuels are subject to price regulation. This structure affects how a carbon price affects behaviour, and how it is transmitted from producer to consumer. Specific dynamics within these sub-sectors, and two additional factors that can complicate the transmission of a carbon price in this sector, are addressed below.

4.3.1 Electricity Sector

The Integrated Resource Plan (IRP2010) is the regulatory instrument that aims to direct the electricity build plan until 2030, and therefore to a large extent its emissions profile. In that

[12]The issue of non-price barriers, however, is complicated. In the case of asymmetric information, for instance, firms and consumers may not be aware of the full benefits of energy efficiency and/or all the options for implementing energy efficiency measures. But as energy costs increase the incentives to look for, and understand, the alternatives also increase, thereby reducing the impact of this barrier. The same is true of lack of access to capital (although this may remain a significant issue for smaller firms and consumers that have difficulty accessing financing in the first instance): as the benefits/return (in the form of saving ever more costly energy) from investments increase, the more likely projects are to qualify for external financing.

[13]The issue is further complicated by the fact that future expected carbon prices, rather than current actual carbon prices, are likely to have the biggest influence on investment decisions.

the IRP2010 requires a build scenario that is not "least cost", but aims to reduce GHG emissions through the use of relatively expensive low-carbon generation options, the IRP itself can be viewed as a climate-mitigation regulatory instrument applied to the electricity sector. The IRP will be regularly updated. A carbon price with a clear future price path applied in the economy is anticipated to be taken into account in this iterative planning process, as it will alter the relative costs for different generating options going forward. It is critical that the planning methodology used in the IRP process accepts and plans according to the announced future carbon price path, and that firms in the sector are legally bound to adhere to the IRP plan. Any deviation from the IRP, or failure to fully account for a carbon price, will reduce the ability of a carbon tax to set an effective carbon price and investment signal, and introduce distortions and inefficiencies in a sector that is critical from both an emissions and future competitiveness perspective.

The twin circumstances of a state-owned monopoly operating within a context of regulated prices results in further obstacles to the optimal functioning of a carbon price driving mitigation. The ability of Eskom to pass through the cost burden of a carbon price is determined by the electricity pricing regulatory framework governed by the Multi-Year Price Determination (MYPD). At present, 'taxes and levies' (such as a carbon tax levied directly on Eskom's emissions) are proposed to be automatically passed through to the consumer (Nersa, 2011a). While it is clear how this will be applied in the case of a direct CO_2 emissions tax, it is not clear whether or how this applies in the case of a proxy upstream carbon tax, which increases the price of fossil fuels like coal. How the portion of any increase in Eskom's contracted coal supply price attributable to the carbon tax will be determined is uncertain. Eskom is both vertically integrated and a major purchaser of coal. It is also not clear whether carbon costs will be passed through indefinitely, or whether the pass-through will end if the costs of generation from coal (including the carbon tax) become higher than that of other generation options.

It is important that the issues outlined above are taken into account in the design of a carbon pricing framework. Should these issues have a significant impact on the functioning of the price in the electricity sector, or the regulatory framework prove to be too fluid or incomplete to provide a certain carbon price, this sector may need to be singled out for special treatment under the carbon tax framework.

4.3.2 Liquid fuels sector

The liquid fuels sector is comprised of a small number of refineries producing fuels from either imported crude oil or coal, non-homogenous processes that have very different emissions profiles and unique implications for national energy security and the trade balance[14]. Some level of producer cost pass-through is required, both in order to provide sufficient incentive for investment in the sector going forward, and to assist in incentivising a change in consumer behaviour. However, the impact of a carbon price in the transport sector is expected to be relatively weak. If all emissions linked to the use of liquid fuel are included in the carbon tax base, a carbon price of R100/tonne (roughly equal to the R75/tonne at 2005 prices mentioned in NT (2010)) is expected to lead to an increase of less than 5% in average retail prices of diesel and petrol.[15]

[14] Crude oil refineries require oil to be imported, whereas the coal used in coal-to-liquid refineries is obtained locally.
[15] Based on the expected impact of having to pay a carbon tax on process emissions on liquid fuel prices (taken from Winkler and Marquard (2009)) and applying the indicative tax rate to tail-pipe emissions (obtained from CCC (2010). Average November 2011 liquid fuel prices were used to evaluate the quantum of the price increase (obtained from http://www.energy.gov.za/files/esources/petroleum/Nov%202011/Fuel%20Price%20History.pdf).

4.3.3 Downstream impact of regulated energy prices

Energy-intensive industry typically uses a number of energy sources such as coal, electricity, gas and oil. In order to avoid distortions to decision-making, it is important that the price of carbon attributable to these fuels reflects their carbon-intensity. The structure and regulated pricing issues in the electricity and liquid-fuels sectors described in this section could disconnect the carbon price from the carbon intensity of electricity and liquid fuels compared to other energy carriers. For example, if the carbon price associated with electricity was relatively lower (owing to partial pass-through in the regulated electricity price), this may result in increased industrial electricity demand compared to coal for onsite generation, with security of electricity supply implications.

Regulated gas pricing presents a barrier to investment in natural gas prospecting and development. Natural gas is a lower carbon fuel than coal or oil, and therefore demand for gas would be anticipated to increase in the face of a carbon price. However, under regulation, the price of gas will not be able to rise in response to this increase in demand, reducing the incentive for investment in increasing its supply, particularly if this involves costly and risky activities such as exploration.

It is important that regulated prices are able to reflect new conditions of supply and demand post the implementation of a carbon price, so that investment patterns can adjust accordingly.

4.3.4 Escalating electricity prices

As a result of Eskom's capacity expansion programme, the baseline electricity tariff has increased significantly since 2008, and price increases look set to continue for the next few years (excluding any pass-through from a carbon tax). This in itself provides a strong price signal for energy efficiency. The ability of the residential, commercial and industrial sectors to respond to this is described above as not being well understood. In a situation of escalating baseline electricity costs, it is therefore not clear whether any additional pass-through from a carbon tax will serve to further incentivise energy efficiency, as opposed to simply accentuating the existing cost pressures – which will hit the poor particularly hard. Internationally, however, it is interesting to note that countries have implemented carbon pricing at the bottom of energy price cycles (as was the case in the UK when the Climate Change Levy was introduced – see NAO (2007)), as well in periods of sharply increasing electricity prices (as is the case currently in Australia, see Garnaut (2011) and Mountain (2011)).

4.4 Economic structure

South Africa has a particular starting point when considering the challenge of transitioning to a low-carbon economy (NPC, 2011b). It has an energy sector dominated by coal, with few other significant short- to medium-term energy options. It also has some of the world's richest mineral deposits, currently in high demand from industrialising economies. The important role of the minerals and energy complex in the economy, requiring a significant transition of labour and capital to support the emergence of less resource-intensive sectors. Exacerbating this, the steep electricity tariff increases over the next few years provide a particular context within which to consider the introduction of a carbon price (see Section 4.3.4). Finally, South Africa has pressing development needs, particularly the need to raise growth to create employment in the short and medium term.

International experience shows that broad-based carbon price frameworks have typically included support for sectors and firms that are disproportionately vulnerable to competitiveness impacts as a result of having to bear carbon costs. A carbon price in any

economy will impact firms and sectors differently, depending on their mitigation opportunities, flexibility in migrating to lower-carbon products and processes, and the price elasticity of demand for their product. Energy-intensive, trade-exposed sectors are particularly vulnerable in the South African context given the carbon-intensive nature of our energy supply. A carbon price will raise the production costs for these firms, who will then have to compete with countries that do not yet have carbon prices in place. Given the importance of upstream, emissions-intensive sectors to the South Africa's economy, it may be strategic to protect these sectors from the full impact of a carbon price for a limited period of adjustment while their competitiveness may be at stake. Similarly, companies that face particularly high carbon costs that they cannot pass on, or only have high-risk and/or high-cost mitigation options available to them, may also justify a period of relief to develop more attractive mitigation options.

4.5 Protecting the poor

The poor will also require protection from the impacts of a carbon price. In South Africa, energy costs comprise a large portion of the total household expenditure of poorer households in the form of fuel for heating and cooking, and transport costs. In addition, many of these households are still using inappropriate, dirty and dangerous fuels for energy purposes, and endure unsafe and unreliable transport options. Numerous government measures exist to address these issues, and protection from a carbon tax for the poor should be considered within this policy context, to both strengthen these measures and to avoid either exacerbating existing inefficiencies and distortions, or introducing new ones.

4.6 Existing/additional climate change mitigation policy instruments

Theoretically, a carbon price should be broad, covering as many emitting activities as feasible, at the same rate, in order to effectively internalise the emissions externality, and avoid any unintended outcomes. In South Africa, the characteristics of different greenhouse gases and emitting processes and contexts suggest that it may be more efficient to address some of these through alternative policy instruments, such as technology standards or direct emissions caps.

Data availability is an issue. For example, it is notoriously difficult to estimate methane emissions from landfills, and given the limited number of these in South Africa they may be better dealt with via regulation that specifies how landfill sites are managed. Administration is another determinant. The complexity and cost of including very small emitters may outweigh the gains to be had from including them in a pricing scheme.

South Africa has already implemented a number of mitigation policy instruments (SA, 2011), some of which are partial carbon prices, while others are more regulatory in nature. The country has a partial carbon price in the form of the 2,5c/kWh levy on electricity generated from non-renewable resources, tax allowances for investments in energy efficiency, and a tax on new motor vehicles according to their emissions specifications. Direct support is given to mitigation actions through the Demand-Side Management fund managed by Eskom. As has been discussed earlier in this section, the IRP 2010 could be understood to be a regulatory mitigation instrument, in that it effectively adds a 'green' premium to electricity tariffs. Energy-efficient building standards and by-laws stipulating that new houses are built with solar water heaters, and which specify standards for heat gain or loss, are expected to come into effect shortly (Lazenby, 2011). Additionally, firms are facing a number of environmental costs owing to regulation in other areas, such as upgrading the country's liquid-fuel specifications, and minimising other pollutants at source. These cost pressures should also be considered to understand the impact of a carbon price.

Imposing a broad-based carbon price on top of these may result in distortions if they are not explicitly taken into account in the instrument design. While it can be anticipated that a broad-based carbon price will be supported by a suite of additional policy measures, it is important that these are considered as part of a comprehensive mitigation policy package, and are not developed in isolation of each other. The Climate Change Response White Paper provides a high-level mitigation policy direction, but much of the detail on instrument interaction and implementation remains to be developed. There is therefore a pressing need for policy co-ordination between areas such as industrial policy, economic development and energy policy (Trollip and Tyler, 2011). Importantly, existing subsidies, particularly in energy and industry will need to be aligned.

The Climate Change Response White Paper has introduced a carbon budgeting approach as central to the mitigation policy response. Allocations of emissions space will be identified for individual sectors and possibly even high-emitting individual firms within the next two years. While the implementation of a carbon budget approach is not detailed or elaborated on in the White Paper, and it is not clear whether the budget will act primarily as a target or as the basis for a regulatory approach to reducing emissions, it essentially implies a set limit on the total quantity of emissions. This is a different type of policy approach to a carbon tax, which establishes a price, but not an overall quantity. How these two instruments are intended to interact is unclear from the White Paper. International examples of prices and ETS interacting suggest that this is certainly possible (see Sections 6.1 and 6.2).[16]

4.7 Additional measures to support high-risk mitigation options

Important supportive measures to a future carbon price include clear, certain and co-ordinated regulatory frameworks for the natural gas and the electricity sectors, as well as nascent technologies like CCS, in order to support the development of high-risk mitigation technologies. Certain mitigation actions which are high-risk and capital-intensive may require direct public investment and support, including Concentrated Solar Power (CSP), nuclear and CCS. Other areas where public sector intervention will be required include supporting the transition of labour and capital out of highly carbon-intensive sectors into those expected to grow in a future low-carbon South Africa, minimising the regressive impacts of the tax, and supporting those sectors which are vulnerable to a significant short-term loss in competitiveness as a result of carbon pricing. An efficiency-cost trade-off exists between providing support outside of a pricing framework, and providing exemptions and relief within the framework. This needs to be explored for each additional instrument considered. These issues are addressed further in the section below.

5. Low Carbon Transition: Current Carbon Tax Policy Design Preferences

Given South Africa's economic structure, special attention has to be paid in the design of a carbon tax to allow the country's economic competitiveness to evolve gradually, supporting ongoing economic growth during the structural transition. There are a number of ways to deal with this. The government's design proposals to date appear to be centred on two options; ensuring the tax starts off from a very low base and escalates slowly, thus allowing the economy time to adjust, and using revenue recycling to support vulnerable sectors. These two options are addressed in this section, considering their advantages and disadvantages in the South African context. An additional option that has received relatively little attention in the South African carbon tax debate, the use of temporary mitigation

[16]Winkler and Marquard (2009) suggest a useful methodology for using a carbon price to meet a pre-defined quantitative emissions path.

support agreements, is addressed in the subsequent section.

5.1 A low and escalating carbon tax

Introducing the tax at a rate that is low enough to have little impact on vulnerable sectors in the short term, particularly during the years of steep electricity-tariff increases, allows firms (and consumers) time to adjust to the impact of carbon pricing. Firms thus have time to investigate, develop or customise mitigation technologies and new production processes. It is critical that the price path of the tax is made clear up-front, and that this is credible, in order to correctly influence medium- to long-term investment decisions.

The extent to which the first objective of a carbon tax, that of changing behaviour, is met, depends on the level at which the tax is initially set and also the future path of taxes. In South Africa there are a small number of low-cost and price-sensitive energy-efficiency mitigation options in the industry, commerce, residential and transport sectors, and scattered smaller opportunities elsewhere (for example, landfill methane capture projects, solar water heater implementation and fire control). These could be incentivised through a low level carbon tax. However, given that many of these are electricity-related, and the electricity tariff is rising so swiftly even in the absence of a carbon tax, it may be that the tariff increases on their own are sufficient. Depending on the pace at which the carbon tax ramps up over time, it is thus not clear how much additional mitigation will be implemented as a result of a low and escalating tax in the short to medium term.

Firms could thus decide to pay the initial low levels of carbon tax[17] rather than investing in additional costly and high-risk mitigation options (over and above mitigation actions already incentivised by increasing electricity prices), which will generate little information about emissions sources and mitigation costs. If this happens, revenue that could have been retained by the private sector to fund medium- to long-term mitigation options will be transferred to government. Even if this revenue is recycled back to the private sector (see Section 5.2) the onus for picking the most promising private-sector mitigation options to develop will rest on a state with severe capacity constraints and an unconvincing record of 'picking winners' via industrial policy interventions (NPC, 2011a).
A low and escalating tax is administratively relatively simple to implement, and does not allow for lobbying in the way a more complex system of relief would. Given that all sectors are not equally vulnerable to potential negative short- to medium-term competitiveness impacts as a result of carbon pricing, a low and escalating carbon tax is a relatively blunt instrument when it comes to providing relief to competitiveness concerns. The level at which a carbon tax is considered 'low' is likely to vary significantly between sectors.

In the context of a tax designed to start off at a low rate and escalate slowly over time, the argument for additional protection for certain sectors and firms to facilitate adjustment will be closely related to the eventual rate of the tax and to other contextual factors such as the current sharp rise in electricity prices in South Africa.

5.2 Revenue recycling

How carbon tax revenues are applied, known as revenue recycling, is a critical element of tax design, and will have a significant influence on the overall impact of the tax on the economy (Devarajan et al, 2009).Theoretically, a pigouvian tax should aspire to revenue neutrality (when carbon tax revenues are fully offset by reductions in other taxes) (Sumner et al, 2009), in that its objective is to change behaviour, not to raise revenue. The revenue neutrality goal can be achieved through tax relief from other taxes, or a weaker form of neutrality can be achieved on the expenditure side of the budget by spending on areas directly related to the tax such as mitigation technologies or transfers to the poor. The provision of relief from other taxes could enhance the overall efficiency of the tax system, providing a 'double dividend' of increasing growth prospects and reducing negative environmental impacts (Clarke, 2010).

[17] Particularly if the initial levels are set at very low rates (i.e. rates that would not impact the competitiveness position of even disproportionately vulnerable sectors).

In South Africa, as with many other countries, this has also become an important aspect of tax design from the perspective of its political acceptability (ITTCC, 2011). However, some level of revenue generation is both realistic and necessary for the administration of the carbon price, offsetting its overall impact on the economy by reducing other more distortionary taxes, implementing measures to counteract its regressivity, providing support to sectors that will find it particularly difficult to transition to low-carbon production[18], and allowing expenditure on the development of mitigation options for the economy (Clarke, 2010). It is thus unlikely that a carbon tax will be rendered revenue neutral through the reduction in other taxes alone, and at least some form of revenue recycling via the expenditure side of the budget seems inevitable.

Using the expenditure side of the budget to address distributional issues is generally believed to be more efficient than exemptions or differentiated tax rates (Ebrill et al, 2002).[19] Within the context of environmental taxes, a broader tax base ensures that prices accurately reflect the internalised carbon externality within a broad range of sectors, fuels and processes/applications – keeping the carbon price signal intact throughout the economy. Importantly, however, revenues generated by a carbon tax are finite. The higher the percentage of additional revenues applied to countering the negative distributional impact of a tax, for instance, the less additional funding will be available for providing relief to vulnerable firms, and vice versa. To reduce the economic impact of a carbon tax in the short to medium term, Devarajan et al (2009) show that a significant proportion of the additional revenues may have to be spent on measures that increase demand within the local economy (by reducing other taxes, for instance). Additional funding, as is currently being made available through government departments and development finance institutions (like the Industrial Development Corporation and Development Bank of South Africa) in the absence of a carbon tax, may still be required to support the transition to a lower-carbon local economy.

Revenue recycling through a reduction in other taxes will increase demand overall in the economy, but has its complications in an economy which relies so heavily on its energy-intensive sector for export revenues, jobs and economic linkages. It is a fairly blunt tool which does not address the particular issues of sector competitiveness, and does not facilitate information generation around mitigation costs. However, the approach does have advantages in that it need not entertain lobbying, and is administratively relatively straightforward. Revenue recycling via direct support for vulnerable sectors is problematic at best since it requires the government to 'pick' the sectors to receive support. Both the choice of sector and the level of support provided, are open to lobbying.

6. Low carbon transition: Temporary Mitigation Support Agreements

A third approach to supporting the transition to a low-carbon economy, which has received little consideration in South Africa to date, is the provision of temporary relief from carbon pricing to vulnerable sectors and firms structured in a way which also incentivises early mitigation action.

Relief could be granted through partial or full exemptions from the tax, or rebates to counter the increased costs of taxable inputs (such as fossil fuels). There are numerous forms of this type of relief, appropriate to different sectors and contexts. The defining feature is that firms or sectors receive relief based on their specific characteristics (i.e. being disproportionately vulnerable to losing competitiveness relative to other sectors or imports in the short to medium term). Incentives for mitigation can be approved, however, by also

[18]Including measures to assist the migration of employees from sectors that are declining to ones that are growing in the long term, like skills development and training.

[19] International experience, however, has shown that temporary exemptions may be required to secure sufficient buy-in from stakeholders to allow a carbon pricing mechanism to be implemented. This is evident in that, despite the draw-backs, no broad-based carbon pricing instrument has been implemented at a national level without exemptions for vulnerable firms.

linking support to mitigation actions.

The advantages of this approach are that the particular characteristics of the economy in which the tax is being applied, and the mitigation options open to firms, can be accounted for. The design of these mechanisms is all-important, but when well-designed, they are likely to result in greater mitigation than the straight application of a low and escalating carbon tax. Tax revenue obviously suffers, but need not disappear, and the revenue may actually be more efficiently spent if retained in the private sector and linked to developing medium- to long-term mitigation options. The approach could avoid the need for costly subsidies or other support mechanisms to address sector vulnerability that may be difficult to reverse in future. It also lends itself to fostering co-ordination of mitigation policy, in that many mitigation instruments could be linked to the tax for enforcement (if there is no compliance, emitters pay the tax). The onus is on emitters to disclose both emissions and mitigation activities, and there is potential for detailed information generation.

Most countries have opted for a combination of relief measures (low initial tax levels, revenue recycling, temporary exemptions and direct support to vulnerable sectors). And as mentioned above, no broad-based carbon pricing framework has as yet been implemented internationally without significant support for firms that are deemed vulnerable to significant short- to medium-term competitiveness effects.[20] It would therefore appear prudent for South Africa to consider some type of relief scheme in the design of its carbon tax. This is especially so given the country's starting point, and also its position as a developing country in a context where there is still no internationally-agreed, legally-binding commitment to mitigation.

The proposed approach for combining firm or sector characteristics and firm or sector actions to qualify for temporary support, referred to in the remainder of the document as the use of 'Temporary Mitigation Support Agreements' (T-MSAs), is outlined in more detail in the remainder of this section.

6.1 Voluntary agreements within carbon pricing frameworks

Voluntary agreements (VAs)[21] aimed at reducing energy use in industry have been common policy tools for a number of industrialised countries since the early 1990s (IEA, 1997). The length of agreements has tended to stretch between five and ten years to create policy and investment certainty (Price, 2005). VAs have traditionally been completely voluntary in nature, providing for no penalties or incentives to encourage emissions reductions or greater energy efficiency. As the climate change policy landscape has evolved, however, VAs evolved into Temporary Mitigation Support Agreements (T-MSAs) used in addition to existing carbon pricing tools such as taxes or trading schemes (Price, 2005), whereby the 'penalty' of not complying with the agreements is the full payment of the carbon price in any agreement period.[22][23]

Full or partial exemption regimes form part of many international carbon-tax regimes (including, inter alia, Denmark, Finland, Germany, the United Kingdom, Sweden and Switzerland). Two of the most well-known current examples of the use of voluntary

[20]Vulnerable sectors are commonly identified by proxy as being emissions or energy-intensive and trade-exposed (EITE). A number of additional criteria, however, are also typically used to identify firms that may be disproportionately vulnerable to carbon pricing (like the inability to pass on carbon costs for reasons other than being trade-exposed, for instance).

[21]The International Energy Agency (IEA) defines voluntary agreements as "essentially a contract between the government and industry, or negotiated targets with commitments and time schedules on the part of all participating parties" (IEA, 1997 quoted in Price et al, 2005:1).

[22]Agreement periods, as mentioned earlier, typically stretch over a number of years. Performance against agreed milestones can typically only be measured at the end of the agreement period. If firms don't meet their agreement requirements, they are liable for the carbon costs incurred over the full multi-year agreement period. See Section 6.2 for more detail on the performance criteria on which T-MSAs can be based.

[23]In order to distinguish between purely VAs implemented without any formal compliance mechanisms (apart from potentially the threat of future regulation), VAs that are used within carbon pricing frameworks will be referred to as T-MSAs in the remainder of this document.

agreements to provide exemptions from carbon-pricing regimes are the United Kingdom and Denmark. In addition, the Australian Carbon Pricing Mechanism includes a provision whereby continuing support to vulnerable industries is linked to reporting requirements and firms moving towards best-practice levels of energy efficiency (AG, 2011; PCA, 2011). The conditional nature of this support can be viewed as T-MSAs.

The length of T-MSAs has typically been a lot shorter than that of traditional VAs to allow a closer relationship between mitigation performance and relief from carbon prices. In the UK and Denmark, for instance, agreement periods are two and three years respectively.

Voluntary agreements in the Australian Carbon Pricing Mechanism

The Australian Carbon Pricing Mechanism announced in July 2011 includes de facto voluntary agreements for firms designated as emissions intensive and trade-exposed (EITE) to address competiveness concerns. Firms that meet specified EITE criteria are eligible for significant relief from the carbon price under the Jobs and Competitiveness Programme (94.5% relief for the most emissions-intensive and trade-exposed activities and 66% relief for less exposed firms) (Parliamentary Library, 2011). Firms are required to keep detailed records on their greenhouse-gas emissions, and may be required to submit detailed reports to the relevant regulator, to qualify for the support. Firms may also be requested to provide information relating to activities that do not currently qualify for support, but may do so in future. Failure to comply with such a request will render a firm ineligible to receive support for two years. Support levels will be fixed for five years to provide investment certainty to firms. From the third year that the carbon pricing regime is in place, however, the support programme is open to review by the Productivity Commission. The Programme may then be amended, provided that notice of any change that may negatively impact firms is provided at least three years before the change takes effect. The Commission will assess whether levels of support are still appropriate given local and international developments. The review will focus on whether firms are adequately compensated to retain their international competitiveness, and on whether the Programme is "supporting Australia's long-term emissions reduction objectives" (PCA, 2011:179). The latter will depend on whether the emissions from sectors receiving support are consistent with the national emissions cap included in the Mechanism. The review will also assess firms' "progress ... towards achieving [sector-specific] best practice for energy and emissions efficiency" PCA (2011:178).

The upshot of this is that mitigation efforts will directly feed into the review that will determine what level of support a sector receives in future. Support for EITE industries beyond the initial five-year period is thus conditional upon both reporting requirements and mitigation efforts. If it is found that mitigation efforts within a specific industry are not sufficient, and are thus reducing the effectiveness of the overall Carbon Pricing Mechanism, support to that sector can be reduced to expose the industry to a stronger carbon price signal.

6.2 Weighing the attractiveness of Temporary Mitigation Support Agreements

6.2.1 Potential benefits of Temporary Mitigation Support Agreements

T-MSAs can ensure that sectors remain competitive in the short to medium term, to provide them with the maximum opportunity to transition to low-carbon production; and create strong incentives for firms to reduce their GHG emissions while receiving support. Consequently, T-MSAs are likely to be politically more palatable than exemption schemes that simply reduce the burden of a carbon price on selected industries to conserve their

competitiveness, without incentivising them to abate. It is important that the second objective of voluntary agreements (to incentivise mitigation action) is highlighted by, for instance, using terminology like T-MSAs rather than simply voluntary agreements. This will allay fears that support is simply an unjustified hand-out to firms in response to lobbying.

The role of T-MSAs within carbon pricing frameworks is to reduce the impact on the competitiveness of emissions-intensive firms, and T-MSAs should thus only be available to industries that have been identified as disproportionately vulnerable to competitiveness issues. Also, because addressing competitiveness issues necessarily involves sacrificing environmental efficiency to increase economic efficiency (i.e. reduce the overall cost of abatement), they should only be allowed for a limited period of time while firms adjust (Smith and Swierzbinsk, 2007). While firms that are party to T-MSAs are expected to abate relatively less than firms not party to T-MSAs, the implicit assumption is that the marginal cost of additional abatement would outweigh the additional environment benefit to society.

When a carbon price starts off low and is slowly increased over time, the trade-off between environmental and economic efficiency may be relatively small. The reason for this is that many firms may undertake limited mitigation action initially, and instead simply pay the carbon price while it is still relatively cheap to do so. Environmental efficiency is thus expected to be low initially anyway, and the addition of T-MSAs will mostly likely not have a significant negative impact on environmental efficiency during the early years of the carbon pricing scheme. The impact in practice will depend on the shape of the abatement cost curves of the industries in question and the expected future path of carbon prices.[24]

Compared to unconditional time-bound tax exemptions[25], T-MSAs have the potential to **incentivise early mitigation action**. By focussing firms' attention on energy and/or emissions efficiency issues and forcing them to assess their mitigation options, T-MSAs could incentivise increased early mitigation effort, particularly among relatively smaller (but still large) energy-intensive firms. Also, since firms that qualify for entering into T-MSAs will by definition be emissions-intensive firms and thus liable for significant carbon costs, they should be willing to undertake significant mitigation action in order to avoid paying the full carbon cost they would be liable for without support. In the case of time-bound exemptions, it is likely that firms will only start investing significantly in mitigation actions towards the end of the exemption period (unless the mitigation actions in question have particularly long lead times). It is thus likely that, through the use of T-MSAs, vulnerable firms can be incentivised to bring forward investments in mitigation options. A T-MSA scheme based on a path towards best practice energy and/or emissions intensity that includes quantitative and qualitative criteria initially, would have the additional benefit of generating significant information that will help reduce concerns around asymmetric information in future periods.

Looking at the experience of the UK, Denmark and the carbon-pricing framework in Australia, it is clear that **T-MSAs are flexible tools that can be used within a number of different carbon pricing options** (i.e. carbon taxes and emissions trading schemes). In Denmark, T-MSAs were initially used in conjunction with a CO_2 tax and an energy tax (Ericcson, 2006). At present they are used in conjunction with a single energy-efficiency tax

[24]The benefit of mitigation action extends not only to the current period, but also to future periods. So the expected pace at which the carbon price increases over time will also impact on when firms initiate mitigation actions. It is thus not the current carbon price and abatement costs only that influences mitigation actions, but rather the relationship between the abatement costs (which are generally calculated in present value terms) and the present value of all future carbon cost savings that originate from a mitigation activity.

[25] Schemes whereby sectors or firms are provided relief from carbon pricing for a fixed period of time without any obligations.

that is levied on electricity use (Togeby et al, 2009; DEA, 2011).[26] In return for implementing selected actions, firms receive a significant rebate on the Energy Conservation Tax (ECT) (and received large rebates on the CO_2 and energy taxes that preceded it). In the UK, firms that meet their Climate Change Agreements (CCA) targets receive a rebate on the Climate Change Levy (CCL), a downstream levy charged on energy carriers used as fuel, including electricity, natural gas, petroleum and coal (HMRC, 2011). In Australia, in contrast, firms in qualifying industries will be provided with free carbon permits to cover their emissions (AG, 2011).[27] The continuation of support, however, is linked to mitigation outcomes.

T-MSAs can be used in conjunction with more than one operating carbon pricing instrument. While the current Danish Voluntary agreements are simply overlaid on the EU-ETS (see footnote 26), the UK CCAs are fully integrated with the UK-ETS and the CCL. Firms participating in a CCA are able to make up for any target shortfall by purchasing allowances in the UK ETS market, while firms that overachieve against targets are able to trade these allowances within the UK ETS framework (DECC, 2011).[28] Carbon allowances can also be purchased from the EU-ETS to meet commitments. Unlike the UK -ETS, however, overachievement on agreement targets did not generate credits that could be traded in the EU-ETS (NAO, 2007).

The **eligibility criteria to qualify for T-MSAs can be defined in a flexible manner** to ensure that firms that are disproportionately vulnerable to carbon pricing are covered. In the UK, an official list of industries that qualify for T-MSAs is provided. Industries not listed, however, can still qualify for T-MSAs based on energy intensity and import penetration thresholds (see Appendix for a list of the industries covered in the 2007-2008 and 2009-2010 periods).[29] In Denmark, individual companies are eligible for T-MSA if they carry out any of 35 listed 'heavy processes'. Companies engaging in a second set of 'light processes' are also eligible for T-MSAs, but only if they meet a set carbon-tax liability threshold (DEA, 2002).[30]

The commitments that underlie T-MSAs range from explicit quantitative targets to explicit qualitative targets, and can include a mix of implicit quantitative and qualitative elements. In the UK, commitments are defined as individual or sector-level quantitative energy efficiency or CO_2 emissions reduction targets, which can be expressed either in absolute or relative (per unit of output) terms (Glachant and De Muizon, 2006). T-MSAs in Denmark require firms to meet a number of qualitative actions and do not include specific energy or emissions reduction targets. Actions required include implementing an energy management system (EMS), conducting energy audits or less stringent energy flow

[26]The separate CO_2 and energy taxes were replaced by the "Energy Conservation Tax" (ECT) to prevent double taxation of emissions covered by the European Emissions Trading Scheme (EU-ETS), which is now viewed as the instrument responsible for incentivising reductions in direct GHG emissions in Denmark (DEA, 2011; Togeby et al, 2009). The ECT is levied as an additional cost on the price of electricity (which already includes the carbon price created by the EU-ETS) as a way of incentivising additional electricity saving.

[27]Under the proposed Australian Carbon Pricing Mechanism, firms will need to buy permits that cover the amount of carbon they emit and surrender it to the government. During the first three years of the mechanism the carbon price will be fixed and permits will not be tradable - effectively mimicking a carbon tax. After this period, the permits will become tradable and the Mechanism will become a function emissions trading scheme.

[28]While the UK ETS closed to direct participants in 2007, the scheme continues to operate as part of CCA and the Emissions Trading Registry was re-branded the CCA Trading Registry to reflect its CCA focus from 2007 onwards.

[29]Energy intensity is defined as energy expenditure as a percentage of the production value for the sector, while import penetration is defined as the total value of imports for a sector divided by the total value of UK sales for the sector plus the sales value of imports minus the total value of exports for the sector (DECC, 2008).

[30]Defined as the carbon tax liability expressed as a percentage of total value-added.

screening, and conducting special investigations into promising energy savings options identified by the energy audits or energy flow screening (Ericsson, 2006). In addition, energy savings projects which are identified as meeting set profitability criteria must be implemented. The Australian case is interesting in that no clear commitments or targets are linked to support up front. Rather, the support programme (and level of support) is open to review by the Productivity Commission. The Commission will be tasked with assessing whether levels of support for different sectors are still appropriate, given local and international developments. The review will not only focus on whether firms are adequately compensated to retain their international competitiveness, but also on whether the support program is "supporting Australia's long-term emissions reduction objectives" (PCA, 2011:179). In this regard, the review will consider whether the growth in emissions from a sector receiving support is consistent with the overall emissions cap included in the carbon pricing regime. Furthermore, the review will also assess firms' "progress ... towards achieving [sector-specific] best practice for energy and emissions efficiency" (PCA, 2011:178). Given the broad nature of the review criteria, it is likely to include both quantitative (changes in absolute emissions and relative emissions and energy intensities) and qualitative (adoption of best-practice technology) dimensions.

T-MSAs can be binding at a sector or individual firm level. In both the UK and Denmark agreements are entered into by the state and individual firms. To reduce administrative complexity, both jurisdictions make provision for the agreements to be negotiated at a sector level. In the UK, the CCAs are administered by sector associations on behalf of individual firms (Glachant and De Muizon, 2006). Performance against agreements have historically been measured at a sector level in the UK, but the Department of Energy & Climate Change is considering requiring firms to also meet individual targets (in addition to sectoral targets also being met) (DECC, 2011a). In Denmark performance against agreements are typically measured at a firm level, but provision is also made for collective agreements that allow for the pooling of funding and the joint implementation of activities like energy benchmarking or the investigation of new technologies (DEA, 2002; 2011).

T-MSAs are compatible with non-carbon pricing regulatory frameworks like carbon budgets. In addition to being directly integrated with a carbon budget approach by, for instance, basing quantitative emissions targets of sectors on their carbon budget allocations, T-MSAs can also be adjusted over time in a way that is consistent with a carbon budget. As mentioned earlier, one of the criteria that will be used to review the relief provided within the proposed Australian Carbon Pricing Mechanism is whether the emissions patterns of sectors receiving support are consistent with an overall emissions cap. Support to sectors that overshoot their carbon budget allocations can thus be reduced over time to incentivise greater mitigation effort (which may include making certain activities uneconomical in extreme cases).[31]

T-MSAs can play a strong information sharing and coordination role in driving mitigation. A heavy emphasis was placed on information-sharing between the public and private sectors regarding emissions and mitigation issues in both the Danish and UK schemes. Numerous rounds of consultation were entered into, and the characteristics of the

[31]Adjusting the level of support to keep sectors within a specific carbon budget is analogous to Winkler and Marquard (2009)'s proposed methodology of changing the level of a carbon tax to keep the economy as a whole on a predetermined emissions path (which corresponds to remaining within a carbon budget) in order to mimic the emissions certainty provided by emissions trading schemes. If a carbon tax is thus implemented, and Winkler and Marquard (2009)'s methodology is followed, the changes in the carbon tax can be supported by (general or sector-specific) changes in the level of support to EITE sectors to keep the economy within a set carbon budget.

voluntary agreement regimes have evolved and continue to evolve over time in both jurisdictions. In the Danish case, the main mechanism through which the T-MSAs aimed to incentivise mitigation actions is by forcing firms to overcome information blockages, and ongoing reporting to authorities also helps to reduce information asymmetries between the private and public sectors. In the UK consultation mostly happens as new targets are negotiated for upcoming compliance periods. The proposed Australian support scheme includes reporting and record-keeping requirements. And it is likely that significant consultation between the Productivity Commission and individual sectors will happen as part of the periodic review of the scheme.

Even though firms that meet their T-MSA commitments will not be required to pay the (full) carbon tax, they will still face the full carbon tax as the penalty of not meeting their commitments. Firms are thus still acutely aware of the level and path of the carbon tax even during the period that they receive an exemption from the tax. Although a carbon price does not remain intact (in the sense that it influences relative prices) in the presence of T-MSAs, **a carbon price continues to influence mitigation decisions within a T-MSA framework while the scheme is in place**. The same cannot be said about an unconditional time-bound exemption.

6.2.2 Potential drawbacks of Temporary Mitigation Support Agreements

The potential disadvantages linked to T-MSAs primarily relate to the impact of asymmetric information, increased complexity (design and administrative), loss of the revenue generating capability of the tax, and the potential for lobbying by sectors and firms. The availability of government and private sector capacity also influences the feasibility of T-MSAs.

Asymmetric information is a concern in T-MSA schemes based on both qualitative and quantitative targets. In Denmark, the issue is addressed by requiring mandatory verifications of the energy management systems that form the basis of mandatory reporting, by accredited agencies, and through the monitoring and verification of submitted reports by the authorities. Asymmetric information is also a concern within the UK CCA scheme when CCA targets are negotiated. The problem of **asymmetric information may be exaggerated**, however. Over time, as more information is generated and firms (and thus also their relevant government counterparts) have gone through a number of T-MSA negotiations (which require significant data disclosure and assessment of mitigation options), it is likely that the risk of mitigation outcomes being negatively affected by asymmetric information is reduced (Ericsson, 2006). In theory, at least, it should be more difficult to 'game' the system without being caught out. Given that support is only temporary and T-MSAs will be periodically re-negotiated, firms and sectors will also be open to corrective measures in future (like the removal of support) should it transpire that they wilfully provided incorrect information during earlier negotiations. The UK experience does, however, highlight the importance of generating information in a timely fashion and properly sequencing negotiations to improve the quality of information available to negotiators. CCA targets for 2006, 2008 and 2010 were renegotiated in 2004 (which was the end of a milestone period). Since the milestone period was not finished, 2004 information was not available at the time of negotiation. After the negotiations had been concluded and new targets put in place, it came to the fore that most sectors had easily achieved their 2004 targets, and a number of sectors had managed to negotiate targets for 2010 that they had already surpassed at the end of 2004. At least part of the discrepancy between the estimated potential mitigation opportunities embodied in CCAs (i.e. the level at which targets are set) and the actual mitigation performance of firms (who in many cases

exceeded CCA targets easily), however, is likely to have been the result of incomplete information on the part of firms rather than gaming (NAO, 2007).[32]

Compared to alternative ways of proving support to vulnerable sectors, or alternative tax design, suggestions to address vulnerability (like the use of a "threshold tax"[33], for instance), linking support to both firm characteristics and actions may not actually increase the administrative complexity of the carbon tax framework significantly. It does, however, significantly increase complexity and administrative costs compared to a carbon tax framework with no exemptions (or simple time-bound exemptions only). **The administrative burden on government and firms can be reduced** by favouring agreements negotiated at a sector level. Both the UK and Denmark favour sector-level agreements. Also, in both regimes the monitoring and verification role is split from the administration of revenue collection and rebates. The administration of the carbon pricing regime per se is thus not unduly complicated, since the administration of the voluntary agreements is undertaken by an entity better suited to the task than the revenue authority. Within the proposed Australian carbon pricing regime, the responsibility for administering the Carbon Pricing Mechanism will fall on the Clean Energy Regulator, while the Productivity Commission will review the working of the Jobs and Competiveness Program – the main vehicle through which support to EITE firms will be provided. The Productivity Commission is thus responsible for monitoring if sectors expended enough mitigation effort in order to continue receiving support at predetermined levels. This has an additional benefit of developing institutional capacity appropriate to a low-carbon economy. The administrative complexity of T-MSAs can also be reduced by following the Danish example of requiring that the systems generating firm-level data, rather than the data itself, be verified.

The temporary support provided to firms may reduce price increases passed on to consumers (since the carbon tax burden on sectors that have no choice but to try and pass on costs is reduced)[34], in which case **less revenue may be required to address negative distributional impacts**. The problem of reduced revenues may thus not be that significant once the reduced need for revenues is taken into account.

Any form of direct support to sectors (including revenue recycling) is subject to lobbying. The benefit of the T-MSA approach is that the support that is provided will be transparent and linked to verifiable actions. It will thus be clear what concessions firms made (if any) in order to receive compensation. The risk of lobbying can also be reduced by limiting or standardising the benefits that can accrue under T-MSAs. Rules relating to the equality between firms and sectors can also be included in the T-MSA design. Lobbying can be further reduced by setting strict vulnerability criteria that need to be met before firms can qualify for support.

[32]What firms believe they can do in terms of mitigation when they negotiate CCAs, and what they can actually do when they apply themselves in practice, are not likely to be the same, because firms experience the very informational and organisational blockages that VAs (and to a certain extent carbon pricing) aim to remove.

[33]Under a threshold approach, as it has been proposed in South Africa (see Salgado (2011)), firms only pay carbon tax on the incremental amount of CO_2 they emit beyond the minimum level of carbon that is required to produce a good or service according to international best practice. Firms thus effectively face a benchmark/intensity threshold above which they pay a carbon tax on every additional unit of CO_2 emitted. The main drawback of this approach is that detailed information is required to benchmark industries against international best-practice. This process will be administratively complex since, apart from having to generate this information for every sector, it is very difficult to benchmark sectors in which a range of different production processes are used. Since different sectors will have different benchmarks, a uniform carbon price is also not created throughout the economy.

[34] This outcome is contingent on the mitigation actions undertaken by firms to comply with agreements being less costly than the carbon tax that is avoided. Given that T-MSAs will be voluntary, this is likely to be the case.

The issue of institutional capacity within both the public and private sector needs to be carefully addressed when designing a T-MSA framework. The UK experience mentioned earlier not only highlights the importance of having timely information available to negotiate T-MSAs, but also that the government body negotiating T-MSAs must have the capacity to process and effectively analyse the information quickly. Ideally the government negotiators should also have an understanding of the mitigation potential in relevant sectors. Counterpart capacity becomes a bigger issue the more sectors are included within the T-MSA framework. In order to ensure that the requisite skills are available in government, it is advised that the government counterpart responsible for negotiating T-MSA conditions be intimately involved in designing and implementing climate change mitigation policy at a sectoral level. The added benefit of this linkage is the development of institutional capacity aligned with a low-carbon and energy-efficient future. By the same token, the private sector must also have the capacity to generate and analyse emissions data in a timely fashion. T-MSAs will also be more effective if firms have access to detailed knowledge of the cost, feasibility and emissions reduction potential of the mitigation options open to them.

If government and/or private sector capacity is weak in any of the areas mentioned above, it is suggested that T-MSA conditions are restricted to a relatively small set of commitments that are easily verifiable (i.e. a small range of absolute or relative quantitative targets linked to vulnerability criteria and available mitigation options) and that the sectors qualifying for T-MSAs are minimised.

6.3 Temporary structured mitigation agreements in South Africa

There is still a lot of uncertainty around the scope of available options to reduce GHG emissions, and the cost of mitigation, in a number of South African sectors.[35] Cloete et al (2010), for instance, highlighted the need to generate more detailed information about the cost and scope of available mitigation options, and as highlighted in Section 4.1, there seems to be uncertainty about how much of the significant low or negative-cost energy-efficiency opportunities identified in the LTMS remain. This has led commentators like ITTCC (2011:14) to suggest that carbon pricing be delayed until a sufficient "fact base" is in place. One way of generating more detailed information about the abatement costs curves in a number of sectors, without delaying the implementation of a carbon price, would be the use of T-MSAs. If designed correctly, the T-MSAs could generate the detailed information required to 'fine tune' carbon pricing (and climate-change mitigation policy in general) over time without running the risk of disproportionately affecting sectors that are vulnerable to competitiveness impacts as a result of carbon pricing. In fact, it is possible that a T-MSA regime will generate more detailed information, and generate it faster, than a low-level carbon tax that slowly ramps up over time.[36] As has happened internationally, the use of **T-MSAs can make a slowly escalating carbon price a more effective information generating and coordination tool** during its initial phases. The timing of T-MSA development could mirror that of the proposed carbon budget approach (as proposed in the National Climate Change Response White Paper), with T-MSAs being up and running by the end of 2013.

Past research into the potential impact of carbon pricing in South Africa has shown that in South Africa, as in all countries internationally where similar analyses have been

[35] This paucity of information regarding available mitigation options indicates that the private sector may face capacity constraints when negotiating T-MSAs.

[36] In the early stages of a relatively low carbon tax that ramps up over time, it may take some time before firms start significantly changing their behaviour and thus signalling their relative abatement costs. In the early stages of the tax, if most firms simply end up paying the tax, only information about their emissions (which would need to be reported on directly, or in the form of input proxies) will be generated.

undertaken, there are a number of sectors that are likely to be disproportionately impacted by carbon pricing. The short-to medium-term competiveness of these sectors may be jeopardised by carbon pricing, and these sectors are thus natural candidates for T-MSAs. Based on relative trade and energy intensities, Cloete and Robb (2010) identify the liquid fuels, non-ferrous metals, iron and steel, basis chemicals, rubber products and other chemicals sectors as potentially vulnerable to carbon pricing. Winkler et al (2010), considering both sectors that are very energy-intensive, and sectors that are both energy-intensive and trade-intensive, indentify the iron and steel, non-ferrous metals, gold, uranium and coal mining, other mining, chemicals, petrochemicals, and non-metallic minerals sectors as potentially disproportionately vulnerable to carbon pricing. The sectors listed above are indicative only, and the firms and/or sectors that qualify for T-MSAs in practice would need to be determined by the eligibility criteria chosen as part of the T-MSA framework design. The choice of firms/sectors that are eligible for T-MSAs may be influenced by a national carbon budget allocation process.

Because of their flexibility, **T-MSAs could be designed to be compatible with whatever form of carbon pricing is chosen**. If a direct tax on carbon emissions is chosen, support could be provided in the form of tax rebates paid to firms after their compliance with the T-MSAs (as already happens with most of the industrial incentives available in South Africa). In the case of a carbon tax on proxy emissions (i.e. inputs), tax credits (also provided once compliance has been confirmed) can be used to provide support.

In South Africa there is a precedent for a split in responsibilities between the fiscus/tax authorities and third parties that must authorise the payment of tax rebates. The Department of Trade and Industry, for instance, must certify a project as meeting industrial policy objectives for firms to receive the relevant tax rebate, and the National Energy Efficiency Agency must certify energy efficiency improvements in projects to qualify for enhanced support. Should voluntary agreements be used in a South African carbon pricing framework, depending on the carbon pricing base used, it is likely that the Department of Environmental Affairs or the Department of Energy (or one of their agencies) will be responsible for the monitoring and verification of agreement conditions. This capacity should dovetail with that developed for the design and implementation of the carbon budget approach.

T-MSAs can easily be incorporated into a low and escalating carbon-tax trajectory. By reducing the amount of support provided over time, vulnerable firms can start off facing a lower cost than non-vulnerable firms within an escalating carbon price path. Over time, as the support is reduced, the two carbon price paths will diverge and eventually the economy will face a single escalating carbon price path. Should firms not meet their T-MSA obligations (which can be seen as the quid pro quo for support), they can immediately be forced onto the higher carbon price path.

Explicit quantitative targets make it easier to assess whether firms are meeting their T-MSA obligations, and should as far as possible underlie T-MSAs. The use **of qualitative criteria, however, may provide additional flexibility** in an environment where certain sectors may find it difficult to reduce their absolute emissions or even their emissions intensity. The additional flexibility provided by qualitative criteria seems to be the reason why Australia has opted for the relatively vague review criteria for mitigation effort in the Jobs and Competitiveness Program. Should the flexibility of an approach that goes beyond absolute or relative (focusing on decreases in intensity) quantitative emissions targets be required in certain cases, it would, however, be preferable to **agree on a path towards best-practice energy and/or emissions intensity** at the beginning of the assessment

period that could include quantitative and qualitative markers over time to provide certainty to firms.

As mentioned in Section 6.2.1, **T-MSAs could potentially incentivise increased early mitigation effort** among relatively smaller energy-intensive firms (by focusing firms' attention on energy and/or emissions efficiency issues and forcing them to assess their mitigation options) and also among larger firms that may already be relatively up-to-date with their mitigation options (by allowing them to avoid the full carbon tax if they meet their T-MSA objectives).

It is, however, important that the measures to **address administrative complexity and public and private sector capacity** highlighted in the previous section are implemented. There are significant synergies between the negotiation of T-MSAs and the development of carbon budgets for individual sectors. If the same, properly capacitated organ of government is responsible for both these activities, then the additional administrative costs of including T-MSAs in the carbon tax framework is likely to be low. In fact, combining these two responsibilities will probably significantly strengthen the institutional capacity of the institution in question and support the development of high-quality climate change mitigation policies. If a new institution has to be created for the purpose of monitoring T-MSAs, or if the institution responsible for developing sector carbon budgets (or other detailed sector-level mitigation policy) is not properly capacitated or resourced, then it is unclear whether the inclusion of T-MSAs will lead to a net increase in the efficiency of a carbon tax framework. Provided that the T-MSAs can be restricted to a relatively small set of commitments that are easily verifiable, the number of sectors included in the scheme is kept to a minimum, and information gathering requirements to enable monitoring of compliance and re-negotiation of commitments for future periods are minimised (by, for instance, requiring verified systems at firm-level generating standardised data outputs), T-MSA may still increase the overall economic and environmental efficiency of the eventual carbon tax framework.[37]

The feasibility of T-MSAs in South Africa

The flexibility inherent in T-MSAs makes this approach well suited to the uncertain and fluid environment in which mitigation policy is currently being implemented in South Africa. The approach offers a number of potential benefits that make it an attractive policy option, the primary of which is the ability to protect the competitiveness of firms or sectors that may be disproportionately vulnerable to carbon pricing in the short to medium term while still incentivising them to engage in early mitigation action. The approach does have a number of potential shortcomings, but the necessary institutional building blocks can be put in place to address these shortcomings, supported by the intelligent design of T-MSAs.

The one area where significant institutional effort will be required, however, is in the area of public and private sector capacity to negotiate and implement T-MSAs. It is believed that neither the public nor the private sector at present have the required capacity to implement complicated T-MSAs locally. It is thus suggested that should T-MSAs be implemented, they be restricted to a relatively small set of commitments that are easily verifiable, the number of sectors included in the scheme is kept to a minimum, and information gathering requirements to enable monitoring of compliance and the re-negotiation of commitments for future periods are minimised (by, for instance, requiring verified systems at firm-level generating standardised data outputs).

[37]The expected practical cost and benefits of using T-MSA would, however, need to be careful analysed through the use of a regulatory impact assessment or another cost-benefit analysis methodology.

The skills required in the public and private sectors to effectively negotiate more complicated T-MSAs closely mirrors that required to develop sectoral carbon budgets. These skills include an understanding of not only the emissions profile of relevant sectors, but also the cost, feasibility and emissions reduction potential of mitigation options. Combining these two responsibilities will significantly strengthen the capacity of stakeholders in the public and private sectors to implement both processes, and also to jointly develop high-quality climate change mitigation policies.

Conclusion

A broad-based carbon price instrument like a carbon tax is widely considered one of the most effective instruments in forcing economic actors to internalise the externality costs of GHG emissions, and is increasingly being viewed as an appropriate policy instrument in developing economies. A broad-based carbon price will ensure that relative prices throughout the economy will reflect the climate change externality inherent in GHG emissions, and in doing so steer the economy towards a low-carbon growth path. By changing the behaviour of actors throughout the economy, it reduces the need for centrally-planned interventions to facilitate a structural change to a low-carbon economy. This is an attractive policy characteristic for a government that is operating under capacity constraints.

In order to ensure that a carbon price creates the requisite price signal to incentivise low-carbon investment and production processes, it is important that carbon costs permeate throughout the economy. Within the South African context, there are a number of structural issues that may complicate the way carbon price signals are transmitted, not least of which is the way in which long-term investment decisions in the electricity sector are made and electricity prices are set. The electricity sector is critical to the country's successful transition to a low-carbon economy, and therefore must be subject to a carbon price in some form. It is important to understand exactly how the IRP process and MYPD methodology interact and what the implications of this may be for carbon tax design.

In addition to the structural issues that complicate carbon tax design, it is also important to take heed of socio-economic and political economy factors that may complicate the design of a carbon tax. Internationally, broad-based carbon pricing instruments at a national level typically include exemptions to limit the impact of carbon prices on sectors that are disproportionately vulnerable to a loss of competitiveness as a result of carbon pricing. Given the socio-economic conditions in South Africa, and the discourse around the creation of new employment opportunities in the short to medium term, it is likely that this will also be the case should a carbon tax be implemented in the near future.

A low-level carbon tax that increases over time, coupled with revenue recycling to address fears of negative distributional impacts and counteract any potential contraction in the economy as a result of increased production costs, will provide a credible future carbon price path in South Africa and will provide the majority of South African sectors with sufficient time to adjust to carbon pricing without experiencing undue competitiveness impacts. For a minority of highly carbon-intensive sectors, however, this approach may not shield firms from significant negative competitiveness impacts in the short to medium term. Under a specific set of circumstances, temporary mitigation support agreements (T-MSAs) may provide the required relief to these highly vulnerable firms while also strengthening the broader carbon tax framework.

T-MSAs are very flexible instruments that can potentially incentivise early mitigation action while also generating the detailed information about mitigation costs and opportunities that

are required to develop successful climate change mitigation policy. Given that T-MSAs require firms to undertake mitigation or related activities to qualify for temporary relief from carbon pricing, they are likely to be more acceptable to a wider range of stakeholders than time-bound exemptions that do not require any action from firms receiving relief. By creating an opportunity cost (equal to the carbon tax) to not implementing agreed-upon mitigation actions, T-MSAs also help to preserve carbon price signals throughout the economy to a greater extent than pure time-bound exemptions.

Finally, T-MSAs provide a useful mechanism for aligning a carbon tax with other climate change policy mechanisms like the carbon budget approach suggested in the National Climate Change Response White Paper.

For these reasons, it is suggested that the cost and benefits of including T-MSAs in the forthcoming South African carbon price are worthy of serious consideration.

Bibliography

AEA. 2009. *Climate Change Agreements - Results of the Fourth Target Period Assessment*. Prepared for Department of Energy & Climate Change (DECC). November 2009. Available [online]: http://www.decc.gov.uk/assets/decc/What%20we%20do/Global%20climate%20change%20and%20energy/Tackling%20Climate%20Change/ccas/175-cca-4th-target.pdf

AEA. 2011. *Climate Change Agreements: Results of the Fifth Target Period Assessment*. Report for Department of Energy & Climate Change (DECC). October 2011. Available [online]: http://www.decc.gov.uk/assets/decc/11/cutting-emissions/cca/3366-cca-5th-target.pdf

African National Congress, 2007. *52nd National Conference 2007 Resolutions: Climate Change* Australian Government (AG), 2011. *Securing a Clean Energy Future: The Australian Government's Climate Change Plan*. Available [online]: http://www.cleanenergyfuture.gov.au/wp-content/uploads/2011/07/Consolidated-Final.pdf

Bai, J. and Yam, P. 2010. China to Raise Power Prices for Energy-Intensive Sectors. *International Business Times*, 13 May, 2011. Available [online]: http://www.ibtimes.com/articles/23533/20100513/china-to-raise-power-prices-for-energy-intensive-sectors.htm

Bertoldi, P and Rezessy, S. 2010. *Voluntary agreements in the field of Energy Efficiency and Emission Reduction: Review and analysis of the experiences in member states of the European Union*. Prepared by the Joint Research Centre of the European Commission.

BS Reporter, 2011. Energy Consumption Mechanism Soon. *Business Standard*, 29 August, 2011. Available [online]: http://www.business-standard.com/india/news/energy-consumption-mechanism-soon/447325/

Buckley, C. 2010. *China Ministries Propose Carbon Tax from 2012 –Report*. Reuters Africa. 11 May 2010. Available [online]: http://af.reuters.com/article/energyOilNews/idAFTOE64A04C20100511

Bureau of Energy Efficiency (BEE) 2011. *PAT Consultation Document 2010-11*. Draft. Available [online]: http://220.156.189.23/NMEEE/PAT%20Consultation%20Document_10Jan2011.pdf

Carbon Disclosure Project, 2009. South Africa Report, JSE Top 100. Accessed online 17 August 2011 Available [online]: http://www.cdproject.net

Clarke, H., 2010, *Some Basic Economics of Carbon Taxes*. CCEP Working Paper 4.10, Centre for

Climate Economics & Policy, Crawford School of Economics and Government, The Australian National University, Canberra.

Cloete, B., B. Cohen, S. Chisadza, K. Mason-Jones, Y. Ramkolowan and C. Ras. 2011. *Ability of firms to adjust to higher energy costs: Executive Summary*. Report prepared for the National Treasury by DNA Economics.

Cloete, B. and Robb, G. 2010. Carbon Pricing and Industrial Policy in South Africa. *Climate Policy*, 10 (5): 494-510.

Cloete, B., G. Robb, E. Tyler, W. Engel, B. Cohen, P. Notten, M. Ncwadi and S. Thorne. 2010. *Study to Provide an Overview of the Use of Economic Instruments and Develop Sectoral Plans to Mitigate the Effects of Climate Change*. Report prepared for Nedlac"s Fund for Research into Industrial Development, Growth and Equity (FRIDGE) by Genesis Analytics. Available [online]: http://www.dti.gov.za/fridge/FRIDGE_Final%20Report.pdf

Confronting Climate Change (CCC), 2010. *The South African Fruit & Wine Industry Carbon Calculator – The Protocol.* Version 2, November 2010. Confronting Climate Change: A South African Fruit & Wine Initiative. Available [online]: http://www.climatefruitandwine.co.za/download/SAFruitWineProtocolV2_Nov_10.pdf

Danish Energy Agency (DEA). 2002. *Voluntary Agreements on Energy Efficiency – Danish*

Experience. Danish Energy Agency. Available [online]: http://www.ens.dk/da-DK/ForbrugOgBesparelser/IndsatsIVirksomheder/TilskudtilCO2afgift/Documents/voluntary_agreements%20version1.pdf

Danish Energy Agency (DEA). 2011. *Discussion with C.K. Ekman*, Energy Efficiency and Planning, Department of Energy Affairs, Denmark, 07 Sep 2011.

Department of Energy and Climate Change (DECC). 2011. *UK Emissions Trading Scheme. DECC website*. Available [online]: http://www.decc.gov.uk/en/content/cms/emissions/ccas/uk_ets/uk_ets.aspx

DECC. 2011a. *Consultation on simplifying the Climate Change Agreements Scheme*. September 2011, Department of Energy and Climate Change, London, UK.

Deloitte. 2009. *Is a Carbon Tax the Best Way to Reduce Carbon Emissions?* Available [online]: *http://www.sustainabilitysa.org/LinkClick.aspx?fileticket=ioWU6RoZazE%3D&tabid=74*

Department of Environmental Affairs and Tourism (DEAT) 2009. *Greenhouse Gas Inventory South Africa, 1990 – 2000*. Pretoria:DEAT

Devarajan, S., D.S. Go, S. Robinson and K. Thierfelder. 2009. *Tax Policy to Reduce Carbon Emissions in South Africa*. World Bank. Policy Research Working Paper 4933. Available [online]: http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000158349_2009051809355

Ebrill, L., M. Keen, J. Bodin and V. Summers. 2002. The Allure of the Value-Added Tax. *Finance & Development*, Volume 39, Number 2.

Ericsson, K. 2006. *Evaluation of the Danish Voluntary Agreements on Energy Efficiency in Trade and Industry*. AID-EE, ECOFYS.

Eskom. 2009. *Annual Report*. Available [online]: http://www.eskom.co.za/annreport09/ar_2009/downloads.htm

Fu, J. 2011. Carbon Tax Likely, Expert Forecasts. *China Daily*. 10 May 2010. Available [online]: http://www.chinadaily.com.cn/china/2010-05/10/content_9826546.htm

Garnaut, R. 2011. *Transforming the Electricity Sector. Garnaut Climate Change Review – Update 2011*. Update Paper Eight. Available [online]: http://www.garnautreview.org.au/update-2011/update-papers/up8-transforming-electricity-sector.pdf

Glachant, M and de Muizon, G. 2006. Climate Change Agreements in UK: A Successful Policy Experience? In Morgenstern, R.D. and Pizer, W.A. (eds). 2007. *Reality Check: The Nature and Performance of Voluntary Environmental Programs in the United States, Europe, and Japan*. London: RFF Press

Global Carbon Exchange, 2009. *Sasol, Eskom top SA's pollution list.* Available [online]: http://www.globalcarbonexchange.com/sasol-eskom-top-safrica-s-pollution-list.html

Global Times (GT), 2010. China to Shut Down 2000 Energy-Intensive and Polluting Factories. *Global Times*, 10 August, 2010. Available [online]: http://www.whatsonxiamen.com/news13896.html

Government of the Republic of South Africa, 2011. *National Climate Change Response White Paper*. Pretoria: Government Printer.

Hanks, J. 2010. *Lessons from the CDP for Treasury's Policy Process*. Presentation at National Treasury Carbon Tax Workshop, Midrand, 16 March 2011. Available [online]: http://www.treasury.gov.za/divisions/tfsie/tax/CarbonTaxWorkshop/default.aspx

HM Revenue and Customs (HMRC), 2011. *Climate Change Levy: Reform of Climate Change Agreements*. Tax Information and Impact Note 23 March 2011.

Industry Task Team on Climate Change (ITTCC), 2011. *A Response by The Industry Task Team on Climate change to National Treasury's Carbon Tax Discussion Paper*.

International Energy Agency (IEA). 1997. *Voluntary Actions for Energy-Related CO2 Abatement. Paris: OECD / International Energy Agency*

Jordan, T. and Zahres, M., 2011. *Deutsche Bank Economics and Politics Research Briefing: Australian Carbon Scheme*

Lazenby, H. 2011. New Energy Efficiency Regulations to Boost Job Creation. *Engineering News*, 14 October 2011.

Milne, J. 2008. Carbon Taxes in the United States: the Context for the Future. *Vermont Journal of Environmental Law*, Vol. 10, pp1-30.

Mountain, B.R. 2011. *Australia's Rising Electricity Prices and Declining Productivity: The Contribution of its Electricity Distributors*. Energy Users Association of Australia: Melbourne. Available [online]: http://www.euaa.com.au/publications/papers/files/110523%20FINAL%20PUBLIC%20RELEASE%20productivity%20decline%20and%20electricity%20distributors.pdf

National Audit Office (NAO),. 2007. *The Climate Change Levy and Climate Change Agreements: A Review by the National Audit Office*. London: National Audit Office.
National Treasury, Tax Policy Chief Directorate., 2006. *Framework for Considering Market-Based Instruments to Support Environmental Fiscal Reform in South Africa,* Draft Policy Paper.

National Treasury (NT), *A Framework for Considering Market-based Instruments to Support Environmental Fiscal Reform in South Africa*. Draft Policy Paper.

National Treasury (NT), 2010. *Reducing Greenhouse Gas Emissions: The Carbon Tax Option*. Discussion Paper for Public Comment.

National Treasury (NT), 2011. *Economic Impacts of Introducing a Carbon Tax in South Africa: Provisional Results*. Presentation to the Stakeholder Workshop on the Carbon Tax Option in South Africa by Chief Directorate Modelling and Forecasting.

NERSA. 2011a. *Comments on Carbon Tax Discussion Paper*. Presentation at National Treasury Carbon Tax Workshop by Thembani Bukula, Midrand, 16 March 2011 Available [online]: http://www.treasury.gov.za/divisions/tfsie/tax/CarbonTaxWorkshop/default.aspx

NERSA, 2011b. *NERSA Consultation Paper: Eskom Multi-Year Price Determination Methodology*. Available [online]: http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Consultation/Documents/Consultation%20Paper%20MYPD%20Methodology%20Final.pdf

Parliament of the Commonwealth of Australia (PCA), 2011. *Clean Energy Bill 2011 No._. 2011 (Climate Change and Energy Efficiency)*. Exposure Draft (28/07/2011). Available [online]: http://www.climatechange.gov.au/government/submissions/clean-energy-legislative-package/~/media/publications/clean-energy-legislation/exposure-draft-clean-energy-bill-2011-pdf.pdf

Parliament of Australia Parliamentary Library (Parliamentary Library), 2011. *Carbon Pricing Mechanism Brief: Carbon Pollution Reduction Scheme and Carbon Pricing Mechanism: Comparison of Selected Features*. Available [online]: http://www.aph.gov.au/library/pubs/ClimateChange/index.htm

Pearson, N.O. 2011.*India's $555 Million Coal Tax May Fund Electricity Lines*. Bloomberg. 21 February, 2011. Available [online]: http://www.bloomberg.com/news/2011-02-21/india-coal-tax-may-be-used-to-fund-transmission-lines-for-renewable-plants.html

Price, L. 2005. *Voluntary Agreements for Energy Efficiency or GHG Emissions Reduction in Industry: An Assessment of Programs Around the World*. Proceedings of the 2005 ACEEE Summer Study on Energy Efficiency in Industry, New York.

Rycroft, M. 2011. The Carbon Tax – Just Another Tax? *Energize*, April 2011. Available [online]: http://eepublishers.co.za/article/energize-april-2011.html

Salgado, I. 2011. Steel Maker will Seek a Tax-Free Coal Allocation. *Business Report*, 3 June 2011. Available [online]: http://www.iol.co.za/business/companies/steel-maker-will-seek-a-tax-free-coal-allocation-1.1078439

Scenario Building Team (LTMS) 2007. *Long Term Mitigation Scenarios: Technical Summary*, Department of Environment Affairs and Tourism, Pretoria, October 2007

Sijm, J., K. Neuhoff and Y. Chen. 2006. CO2 Cost Pass-through and Windfall Profits in the Power Sector. *Climate Policy*, Vol. 6, pp.49 – 72. Available [online]: http://faculty.ucmerced.edu/ychen/climate_policy_2006.pdf

Smale, R., M. Hartley, C. Hepburn, J. Ward and M. Grubb. 2006. The Impact of CO2 Emissions Trading on Firm Profits and Market Prices, *Climate Policy*, 6, 29–46.

Smith, S. and Swierzbinsk, J. 2007, Assessing the performance of the UK Emissions Trading Scheme. *Environmental Resource Economics*, 37:131–158.

South African Cabinet (2008), *Media Release by Van Schalkwyk, M., Minister of Environmental Affairs and Tourism*, Available [online]: http://www.info.gov.za/speeches/2008/08072816451001.htm

South African National Planning Commission, 2011a. *Diagnostic Report*. Available [online]: http://www.info.gov.za/view/DownloadFileAction?id=147192

South African National Planning Commission, 2011b. *National Development Plan, Vision for 2030*. Available [online]: http://www.npconline.co.za/medialib/downloads/home/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf

Stanway, D. 2011. *China Planning Emissions Trading in 6 Regions -Point Carbon*. Reuters Africa, 11 April, 2011. Available [online]: http://af.reuters.com/article/energyOilNews/idAFL3E7FB1Q320110411

Sumner, J., L. Bird and H. Smith. 2009. *Carbon Taxes: A Review of Experience and Policy Design Considerations*. National Renewable Energy Laboratory Technical Report NREL/TP-6A2-47312. Available [online]: http://www.nrel.gov/docs/fy10osti/47312.pdf

Taylor, L. 2011. China to Tax Biggest Polluters. *Brisbane Times*, 30 March 2011. Available [online]: http://www.brisbanetimes.com.au/national/china-to-tax-the-biggest-polluters-20110330-1cgb3.html

Trollip and Tyler., 2011. *Is South Africa's Economic Policy Aligned with Our National Mitigation Policy Direction and a Low Carbon Future: An Examination of the Carbon Tax, Industrial Policy, New Growth Path and Integrated Resource Plan?* A research paper for the National Planning Commission second Low Carbon Economy workshop, July 2011.

United Nations University (UNU-WIDER), 2011. *Economic Implications of a Carbon Tax in South Africa*. A presentation by Rob Davies and James Thurlow at the University of Cape Town.

Winkler, H., M. Jooste and A. Marquard. 2010. Structuring Approaches to Pricing Carbon in Energy- and Trade-intensive Sectors in South Africa. *Climate Policy*, 10(5): 527-543.

Winkler, H. and Marquand, A. 2009. *Analysis of the Economic Implications of a Carbon Tax*. Energy Research Centre, University of Cape Town. Available [online]: http://www.erc.uct.ac.za/Research/publications/09Winkler-Marquard-carbon_tax.pdf

Wooders, P., J. Reinaud and A. Cosbey. 2009. *Options for Policy Makers: Addressing Competitiveness, Leakage and Climate Change*, International Institute for Sustainable Development (IISD). Draft for Discussion as part of IISD's "Bali to Copenhagen" Trade and Climate Change Project. Available [online]: http://www.iisd.org/pdf/2009/bali_2_copenhagen_bcas.pdf

WWF Contacts

- Saliem Fakir, WWF Living Planet Unit Head, sfakir@wwf.org.za, +27 21 657 6600
- Brent Cloete, DNA Economics, brent.cloete@dnaeconomics.com, +27 84 987 4460
- Emily Tyler, Independent Climate Change Economist, emily@tyler.co.za, +27 72 225 5619

Appendix: Sector coverage of the UK CCAs

Sectors included in the 4th (2007-2008) and 5th (2009-2010) Target Periods	
Aerospace	Leather
Agricultural Supply	Lime
Aluminium	Maltsters
Brewing	Metal Forming
Calcium Carbonate	Metal Packaging
Cathode Ray Tubes	Mineral Wool producers
Cement	Motor Manufacturers
Ceramics: Non-fletton	Non-Ferrous Metals
Ceramics: Fletton	Packaging and Industrial Films
Ceramics: Refractories	Paper
Ceramics: Whitewares	Pig Farming (NFU)
Ceramics: Materials	Poultry Meat Processing
Chemicals	Poultry Meat Production (NFU)
Cleveland Potash	Poultry Meat Rearing
Coldstores	Printing
Craft Baking	Red Meat Processing
Dairy Processing	Renderers
Egg Processing	Rubber Tyre Manufacturing
Egg Production (NFU)	Semi-conductor Manufacture
Food & Drink	Slag Grinding
Foundries	Spirits
Geotextiles	Steel
Glass	Supermarkets
Glass Manipulator	Surface Engineering
Gypsum Products	Textiles
Heat Treatment	Textiles (Energy Intensive)
Horticulture (NFU)	Vehicle Builders and Repairers (*not in 5th Target Period*)
Industrial Gases	Wallcoverings
Kaolin and Ball Clay	Wood Panel Manufacture
Laundries *(not in 4th Target Period)*	

Source: AEA(2009, 2011)