Integrating the carbon tax and carbon budgets in South Africa

Draft Report for consultation process prepared for DEA, NT and PMR

Draft Report
July 2016
Disclaimer

This draft report has been prepared by Vivid Economics, DNA Economics and Emily Tyler for the purposes of supporting a stakeholder consultation exercise organised by the Department of Environmental Affairs and with the support of the National Treasury. The draft report has been prepared with the generous financial support of the Partnership for Market Readiness. Nothing in the report should be taken as representing the views or policy position of either the Department of Environmental Affairs or the National Treasury. It is not for publication and should not be quoted in any form.
Contents

1 Introduction ........................................................................................................... 6
2 Principles to assess interface options .............................................................. 8
3 Planned design features of each instrument.................................................... 18
4 Properties of budgets and taxes and insights on integration ................. 21
5 Interface options ............................................................................................... 27
6 Option assessment ............................................................................................. 29
7 Conclusions [to be completed] ...................................................................... 49

References ......................................................................................................... 50

Appendix A: National Documents .................................................................. 51
List of tables

Table 1. Full list of principles to assess interface options.................................11
Table 2. A comparison of the strengths and weaknesses of carbon taxes and carbon budgets ................................................................................................................24
Table 3. Layering sacrifices cost effectiveness to achieve higher environmental effectiveness .................................................................................................32
Table 4. Budget with tax on emissions in excess of budget.................................35
Table 5. Budget with tax on all emissions if budget is exceeded scores particularly poorly on cost effectiveness .................................................................36
Table 6. ETS with price floor and/or ceiling scores well on environmental effectiveness, certainty and cost effectiveness but generates potentially less revenue than other interface options to increase fairness and equity ........................................................................................................40
Table 7. Baseline and Credit scores almost as well as Emissions Trading Scheme .........................................................................................................................43
Table 8. There is no clearly superior interface instrument; trade-offs across different principles need to be made .................................................................48

List of figures

Figure 1. 14 principles grouped into three categories .........................................10
Figure 2. Budgets and Taxes fall into different instrument categories and target emissions quantity and price, respectively ....................................................22
Figure 3. Market based instruments have significantly lower cost than regulatory, command and control, instruments .........................................................23
Figure 4. We analyse four main interface options ..................................................27
Figure 5. Three categories of national documents have been considered ............51
List of boxes

Box 1. National Development Plan ................................................................. 52
Box 2. National Climate Change Response White Paper .................................. 54
Box 3. Carbon Budget Design Document .......................................................... 56
Box 4. Carbon Tax Options discussion paper .................................................. 57
Box 5. Environmental fiscal reform paper ........................................................ 58
1 Introduction

In 2009, at the UNFCCC Conference of the Parties (COP) in Copenhagen, South Africa made a voluntary commitment to reduce its greenhouse gas (GHG) emissions by 34 per cent in 2020 and 42 per cent in 2025 relative to business-as-usual. This was part of a wider commitment by South Africa to contribute to the global effort in mitigating anthropogenic climate change and to transition to a green economy. This was reaffirmed in its intended nationally determined contribution (INDC) submission to the UNFCCC, in advance of COP 21 in Paris in 2015, which envisages that emissions will peak by 2025, plateau for approximately a decade, before beginning to decline in absolute terms from 2036 (South African Government, 2015).

Among a suite of different policies, two, in particular, have been designed with the intention of delivering a significant proportion of these emission reductions:

- A carbon tax designed by the National Treasury to provide a price signal to producers and consumers of carbon-intensive products, creating an incentive to invest in cleaner technology and reduce emissions. The carbon tax is expected to come into operation in 2017 at a headline rate of R120/tCO₂e, although the effective tax rate will be lower as a result of a series of tax free allowances to be provided initially.

- A series of carbon budgets designed by the Department of Environmental Affairs (DEA) which is envisaged to be a GHG emissions allowance (i.e. cap), against which physical emissions arising from the operations of a company during a defined time period will be tracked. In the period to 2020, the carbon budgets will not be a compliance instrument but rather will be used to increase understanding of the emissions profile of participating companies, and to improve monitoring, reporting and verification (MRV) processes. Beyond 2020, they are intended to become compulsory.

In the period to 2020, the integration between the two instruments has been established. Firms that have been allocated carbon budgets by the DEA will be entitled to an additional 5 per cent tax free allowance. This is in addition to a basic tax free allowance of 60 per cent plus other allowances that will be provided for firms if, for example, they are considered to be exposed to the risk of carbon leakage or if they have significant process emissions.

The objective of this assignment is to review the principles used in approaching greenhouse gas emission reduction in South Africa and of combining the carbon budget and carbon tax; and assess the appropriateness and effectiveness of combining the carbon budget with the carbon tax in achieving South Africa’s emission reduction goal beyond 2020. While both instruments have merits, economic theory would suggest that there could be risks associated with applying both instruments to the same emissions at the same time. There is a desire to understand how they may be aligned to ensure that South Africa’s mitigation policy is placed on a coherent footing on the longer term, so that it can help deliver the emission reductions to which the country has committed. The South Africa’s mitigation system is reiterative work which will be refined over time. This analysis will be considered as an input to inform the second phase of the mitigation system.

The remainder of this paper is structured as follows:
Section 2 outlines some key principles from South Africa mitigation policy that can help guide how to assess different ways to establish an interface between the two instruments.

Section 3 provides outlines the current planned design features of each of the policy instruments.

Section 4 identifies some of the underlying economic principles associated with the use of these two instruments and insights from international experience on integrating multiple mitigation policies.

Section 5 outlines the different integration options considered.

Section 6 specifies the advantages and disadvantages of these different options.

Section 7 concludes [the in subsequent drafts following receipt of comments from DEA/NT and stakeholders].

The appendices provides more information on the background to the principles assessment presented in section 2 and some of the international precedents that have informed the analysis [the latter will be completed in subsequent draft].
2 Principles to assess interface options

This section sets out a range of principles that guide South Africa’s mitigation policy. These principles can be used to assess different ways in which to interface the two instruments; options for interfacing the two instruments that are consistent with or promote a particular principle are likely to be considered more desirable than options which are inconsistent with the principle.

The bulk of the principles are derived explicitly from various South African policy documents but these have been corroborated by international analysis. The key documents that have been explored from the South African context are:

- Overarching national policy documents, especially Chapter 5 of the National Development Plan
- Various documents published by the DEA including the National Climate Change Response White Paper and the Carbon Budget Design Document
- Documents published by the National Treasury including the Environmental Fiscal Reform Paper, the Carbon Tax Options discussion paper and the Carbon Tax Policy Paper

Many of the principles expressed in these documents are consistent with one another. Therefore, to avoid significant repetition, in section 2.1 we briefly describe the key distinctive features of the principles from each of these documents. A full list of principles associated with each document is provided in Appendix A. In section 2.2, these are synthesised and core principles relating to this study are expressed.

2.1 Summary of principles from existing documentation

The National Development Plan identifies 14 explicit principles. These are at a very high level of abstraction, reflecting the status of the document as one which guides South Africa’s overall development trajectory. Among the most relevant for emission mitigation policy are:

- **Ecosystems protection.** Acknowledging that human wellbeing is dependent on the health of the planet.
- **Full cost accounting.** Internalising both environmental and social costs in planning and investment decisions, recognising that the need to secure environmental assets may be weighed against the social benefits accrued from their use.
- **Transformative.** Addressing the structural and systemic flaws of the economy and society with strength of leadership, boldness, visionary thinking and innovative planning.
- **Delivering a managed transition.** Building on existing processes and capacities to enable society to change in a structured and phased manner.

The National Climate Change Response White Paper has a series of nine explicit principles and also identifies a further six factors that will guide its overall approach to climate change response that in many ways resemble principles. The nine explicit principles place a strong emphasis on considering the distributional implications of both climate change and the associated policy response across multiple
dimensions. This includes recognising the importance that countries should take climate action according to their common but differentiated responsibilities and respective capabilities; that equity is crucial and policy should address the needs of the most poor and take into account the special needs and circumstances of localities and people who are particularly vulnerable to the adverse effects of climate change; and that it is necessary to take account of intra- and inter-generational sustainability. The principles also acknowledge the polluter pays principle. The six factors that guide how South Africa should structure its climate response including recognition that climate change policy should also be developmental such that it has significant economic growth, job creation, public health, risk management and poverty alleviation benefits, and that policy should be balanced and cost-effective.

The Carbon Budget Design Document provides a series of more detailed principles guiding the design of this instrument. This recognises the importance of consistency between allocation of the carbon budget and subsequent accounting and reporting of emissions against that budget. It also identifies the sectors in which carbon budgets might be set and that, for Phase I of the carbon budget process up to 2020, that they should provide support to existing and planned future operations.

The 2010 carbon tax discussion paper identifies seven ‘issues which must be carefully addressed in carbon tax design'; these can be considered as principles. These include ensuring environmental effectiveness, that distributional and competitiveness issues should be taken into account, the importance of technical and administrative feasibility and the need for alignment with other policy options. Many of the same principles are also found in the Environmental Fiscal Reform paper, which also acknowledges the importance of public support for the tax.

A review of international documentation suggests close overlap between the principles expressed in South African policy documents and those used in other jurisdictions. These documents place a strong emphasis on environmental and cost effectiveness, feasibility (both technically and politically), equity, including the idea of the polluter pays principle, and the need to carefully consider policy overlaps to ensure that perverse incentives are not created.

2.2 Synthesis and identification of principles related to policy integration

We have identified fourteen principles that are relevant for considering the strengths and weaknesses of different ways to interface the carbon tax and carbon budget. This list starts from the long-list of principles summarised above and described in more detail in Appendix A. It then focuses on those that are relevant for considering how South Africa might seek to achieve emission reductions objectives - rather than what those objectives might be (which has already been determined into the medium term). This means, for instance, that principles such as common but differentiated responsibility and respective capabilities or inter-generational equity are not considered in this list. We also seek to aggregate principles with broadly common intent even if they are expressed somewhat differently across different documents as well as to give more attention to those that are common across many or all of the documents reviewed. It should be stressed that this synthesis is done purely for the purposes of supporting and simplifying the analysis in this study, it is not intended in any way to replace the principles articulated in the various documents.
These 14 principles are grouped into three main categories: design features, implementation and integration (Figure 1). These three categories are design features that is principles that relate to the way in which instruments might be designed; implementation that is principles that relate to the way in which instruments might be decided upon and introduced; and integration, that is principles that relate to the way in which different policies should be combined. This is intended as a heuristic device only.

**Figure 1.** 14 principles grouped into three categories

<table>
<thead>
<tr>
<th>South African principles</th>
<th>International principles</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Design features</strong></th>
<th><strong>Implementation</strong></th>
<th><strong>Integration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>environmental effectiveness</td>
<td>policymaker flexibility</td>
<td>policy integration</td>
</tr>
<tr>
<td>cost effectiveness</td>
<td>accountability and transparency</td>
<td>contextualised by other policy priorities</td>
</tr>
<tr>
<td>certainty</td>
<td>consultation and stakeholder support</td>
<td></td>
</tr>
<tr>
<td>fairness and equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>polluter pays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feasibility and simplicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sensitive to international competitiveness issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>strategic approach and structural transformation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>builds on existing processes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

Table 1 provides further detail on each of these principles and how they relate to various South African policy documents.
Table 1. Full list of principles to assess interface options
<table>
<thead>
<tr>
<th>Principle</th>
<th>Description as it relates to this study</th>
<th>Examples from national policy making documents</th>
<th>Example from DEA policy documents</th>
<th>Examples from NT policy documents</th>
<th>International experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental effectiveness</td>
<td>The integration of the two instruments should promote emission reductions in line with South Africa’s targets</td>
<td>Acknowledge that human wellbeing is dependent on the health of the planet.</td>
<td>Managing our ecological, social and economic resources and capital responsibly for current and future generations.</td>
<td>Environmental effectiveness ‘key principle to be addressed in carbon tax design’.</td>
<td>Common and core principle found in all major publications to achieve intended targets</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>The integration of the policy instruments should seek to reduce the economic cost imposed on society for each tonne of emission reductions</td>
<td>Look for synergies between sustainability, growth, competitiveness and employment creation… Invest early in low-carbon technologies that are least-cost.</td>
<td>Prioritising climate change responses that have both significant mitigation and adaptation benefits and that also have significant economic growth … benefits Implementing a balanced approach…in terms of cost-benefit, prioritisation, focus, action and resource allocation.</td>
<td>The impact of environmentally-related taxes on domestic industries and other aspects of the economy such as employment and inflation are of critical importance. Documents also note that market based instruments score well on static and dynamic efficiency.</td>
<td>Common and core principle found in all major publications to ensure maximisation of benefits and reduction of costs</td>
</tr>
<tr>
<td>Emissions certainty</td>
<td>The integration of the policy instruments should give policymakers confidence that a certain emission reduction will be achieved (note that this is different from effectiveness as a policy combination might provide for high expected emission reductions but with high variability)</td>
<td>Not explicitly mentioned</td>
<td>Not explicitly mentioned</td>
<td>Not explicitly mentioned</td>
<td>Reasonably common principle used to assess policies</td>
</tr>
<tr>
<td>Fairness and equity</td>
<td>The interface of policy instruments should seek a progressive distribution of costs across different parts of South African society</td>
<td>Just, ethical and sustainable-recognise the aspirations of South Africa as a developing country and remain mindful of its unique history.</td>
<td>Climate change policies and measures should address the needs of the poor and vulnerable.</td>
<td>Government should take measures – either in tax design or through complementary expenditure programmes – to offset the burden such a tax will place on poor households.</td>
<td>The distribution of impacts and fairness is a standard measure to analyse and compare policies</td>
</tr>
<tr>
<td>Principle</td>
<td>Description as it relates to this study</td>
<td>Examples from national policy making documents</td>
<td>Example from DEA policy documents</td>
<td>Examples from NT policy documents</td>
<td>International experience</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Polluter Pays</td>
<td>The interface option should ensure that environmental cost are internalised and that increase or higher levels of emissions lead to higher cost.</td>
<td>Internalise both environmental and social costs in planning and investment decisions, recognising that the need to secure environmental assets may be weighed against the social benefits accrued from their use.</td>
<td>Those responsible for harming the environment paying the costs of remedying pollution and environmental degradation and supporting any consequent adaptive response that may be required.</td>
<td>The tax should, over time, be equivalent to the marginal external damage costs of carbon.</td>
<td>Common principle, often grouped with fairness in international literature</td>
</tr>
<tr>
<td>Feasibility and simplicity</td>
<td>The interface option should be technical and administratively feasible and its design simple. It should have reasonable administrative cost</td>
<td>Develop coherent and aligned policy that provides predictable signals, while being simple, feasible and effective.</td>
<td>Aligning our domestic measures to reduce the country’s GHG emissions and adapt to the adverse effects of climate change with our unique national circumstances, stage of development and capacity to act..</td>
<td>Identifies need for carbon tax design to be technically and administratively feasible.</td>
<td>Technical, administrative, financial and political feasibility are common principles</td>
</tr>
<tr>
<td>Sensitive to international competitiveness issues</td>
<td>The interface should consider cost impacts on sectors, particular to sectors facing international competition.</td>
<td>Look for synergies between sustainability, growth, competitiveness.</td>
<td>Competitiveness – to address potential negative impacts on industry competitiveness, the introduction of carbon taxes at initial low rates.</td>
<td>Competitiveness – Industries that participate in international trade might be at a disadvantage when competing with countries that do not price carbon.</td>
<td>All explicit carbon pricing policies include some form of support for sectors and firms considered to be at risk of carbon leakage/at risk of being subject to ‘unfair’ international competition</td>
</tr>
</tbody>
</table>
### Principle

<table>
<thead>
<tr>
<th>Strategic approach that promotes structural transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description as it relates to this study</strong></td>
</tr>
<tr>
<td>The interface should provide the ability to incentivise structural transformation, such as channelling investment into specific priority areas.</td>
</tr>
<tr>
<td><strong>Examples from national policy making documents</strong></td>
</tr>
<tr>
<td>Look for synergies between sustainability, growth, competitiveness and employment creation. Follow a systematic approach that is responsive to emerging risk and opportunity, and which identifies and manages trade-offs. Address the structural and systemic flaws of the economy and society with strength of leadership, boldness, visionary thinking and innovative planning.</td>
</tr>
<tr>
<td><strong>Example from DEA policy documents</strong></td>
</tr>
<tr>
<td>Strategic approach for South Africa's climate change response is needs driven and customised; developmental; transformational, empowering and participatory; dynamic and evidence-based; balanced and cost effective; and integrated and aligned. Implementing policies and measures to address climate change at a “scale of economy” … fundamentally underpinned by a major shift towards sustainable consumption and production patterns, which decouples growth and development from any negative impacts on the environment and society.</td>
</tr>
<tr>
<td><strong>Examples from NT policy documents</strong></td>
</tr>
<tr>
<td>Not explicitly mentioned although, as discussed below, carbon taxes are intended to set strong dynamic incentives for action.</td>
</tr>
<tr>
<td><strong>International experience</strong></td>
</tr>
<tr>
<td>Many countries aim to adopt a strategic approach to policies, although it is not always mentioned explicitly in international guidance.</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Builds on existing processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The interface should use existing infrastructure (technical and administrative) and processes and integrate sectors with broader national climate change targets.</strong></td>
</tr>
<tr>
<td><strong>Build on existing processes and capacities to enable society to change in a structured and phased manner.</strong></td>
</tr>
<tr>
<td><strong>Recognising that this policy has not been developed in a vacuum and many sectors have already researched and have experience in implementing policies and measures to address the challenges of climate change.</strong></td>
</tr>
<tr>
<td><strong>Not explicitly mentioned</strong></td>
</tr>
<tr>
<td><strong>Not explicitly mentioned</strong></td>
</tr>
<tr>
<td>Principle</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Policymaker flexibility</td>
</tr>
<tr>
<td>Accountability and transparency</td>
</tr>
<tr>
<td>Consultation and stakeholder support</td>
</tr>
<tr>
<td>Policy integration</td>
</tr>
<tr>
<td>Principle</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Contextualised by other policy priorities</td>
</tr>
</tbody>
</table>

*Source:* Vivid Economics, DNA Economics and Tyler
Discussions with NT and DEA have led to a particular focus on four key principles. While all of the principles discussed above are used to assess the different interface options to the extent possible\(^1\), it was agreed with the NT and DEA that four principles should be given particular attention. These are:

1. Environmental effectiveness
2. Environmental certainty
3. Cost effectiveness
4. Fairness and equity

\(^1\) As discussed on more detail in the subsequent sections, assessment of some of these design aspects requires a granularity on the design of the instruments beyond 2020 that is not currently available.
3 Planned design features of each instrument

This section provides more detail – to the extent available – on how it is expected that each instrument, in isolation, might be expected to operate in 2020. In order to determine the effectiveness of different integration options it is important to understand how it is expected each instrument is expected to evolve in the period to 2020. This can also help inform how much the design of each option may need to be adjusted to ensure effective integration beyond 2020.

3.1 Carbon tax

The design of the carbon tax is intended to balance South Africa’s mitigation goals with the need to reduce poverty and maintain trade competitiveness. While providing a price signal to encourage the transition to a low-carbon economy, the proposed policy is also intended to reduce the risk of negative competitiveness implications and leakage through special provisions for sectors considered to be at risk. In addition, it is proposed that revenues raised from the tax be recycled back into the economy during the first phase to help address any potential negative impacts on the welfare of poorer households.

Specifically, the key features of the proposed tax policy, as laid out in the Carbon Tax Policy Paper 2013 and the draft Carbon Tax Bill (2015), are the following:

- the tax is to be levied on Scope 1 emissions – these are emissions that result from fuel combustion, gasification, fugitive emissions and non-energy industrial processes;
- the tax will be levied at R120/tCO₂-equiv, with the Carbon Tax Policy Paper envisaging that it would increase by 10 per cent per annum over the first five years;
- a 60 per cent basic tax-free allowance will apply to all sectors during the first phase;
- a further tax-free allowance of up to 10 per cent is available to firms in ‘trade-exposed’ sectors;
- a further 10 per cent tax-free allowance will be provided to firms in sectors where there is a structural or technical inability to make reductions (i.e. process and fugitive emissions);
- firms will be able to use domestic offsets in relation to 5 or 10 per cent of their gross tax liability (i.e. before the impact of exemptions);
- a ‘Z-factor’ will reward firms that have lower emissions relative to an agreed benchmark, with a further tax-free allowance of up to 5 per cent;
- an additional 5 per cent tax-free allowance will be available to companies having received carbon budgets;
- there will be a full exemption during the first phase for the agriculture, forestry and other land use activities as well as waste management sectors;
- revenue from the tax will be recycled to support the transition to a low-carbon economy and to protect poorer households and vulnerable sectors from the impact of energy price increases;
- during the initial phase of the carbon tax a combination of revenue-recycling measures that is, reduction in the levy on electricity from non-renewable sources and a credit for the premium charged for renewable energy will be used to ensure the carbon tax does not lead to an increase in the price of electricity.
In November 2015, the media statement accompanying the Draft Carbon Tax Bill identified more specifically how the revenue raised by the carbon tax would be recycled. It outlines the following measures (South Africa National Treasury, 2015):

- funding for the energy efficiency tax incentive already being implemented;
- a reduction in the electricity levy;
- additional tax relief for roof top (embedded) solar PV energy as already provided for the in 2015 tax legislation;
- a credit for the premium charged for renewable energy (wind, hydro and solar, as per the Integrated Resource Plan);
- additional support for free basic electricity to low-income households; and
- additional allocations for public transport.

It also confirms that measures to encourage the shift of some freight from road to rail will be supported.

3.2 Carbon budgets

Company-level carbon budgets were introduced in the National Climate Change Response Policy as a mechanism through which South Africa’s mitigation commitments could be translated into emissions targets for sub-sectors and companies. A carbon budget is defined in the Carbon Budget Design Document as (Department of Environmental Affairs, 2015):

...a greenhouse gas (GHG) emissions allowance, against which direct emissions arising from the operations of a company, during a defined time period will be accounted. The term “carbon” in carbon budget is shorthand for carbon dioxide, and further, for all GHGs accounted for in the latest South African inventory (2010)

The first phase of carbon budgets in South Africa (2016 – 2020) is being implemented as a voluntary pilot to allow companies and the regulator (the DEA) the opportunity to prepare for a second mandatory phase to commence in 2021. Phase 1 does not include compliance measures; and the most important element of this phase is enhanced reporting requirements. The decision to start with a voluntary phase was influenced by a lack firm-level emissions data, a lack of experience in allocating carbon budgets, and the desire to build sufficient capacity in both the DEA and companies to successfully implement a carbon budget system.

Carbon budgets were allocated to a selection of individual companies in the form of a cumulative target level of GHG emissions that they are permitted to emit over the five-year carbon budget period. The Carbon Budget Design Document states that while five years is a sufficiently long period of time to allow companies the flexibility to take into account fluctuations in market conditions and output while planning to meet their carbon budgets, it is not too long to allow the DEA to respond to developments in local and international conditions and the evolution of local mitigation policy. The companies participating in the first phase of the carbon budgets were selected from a set of target sectors based on whether they emit more than 100,000 tonnes of GHG emissions per annum, or produce the ‘same primary product’ as a company that falls within this category. Companies that did not meet this criteria, but still wished to participate, could voluntarily enter into negotiations with the DEA to also be allocated carbon budgets.

Phase 1 carbon budgets included the following design features:

- carbon budgets were allocated to companies to support both current operations and existing expansion plans;
there was no consideration of any national or sectoral mitigation targets when carbon budgets were set;

- companies are expected to report annually on their progress in terms of meeting their carbon budgets, and report at the end of Phase 1 on whether they have remained within or exceeded their carbon budgets, but there will be no legal consequences if companies exceed their carbon budgets;
- companies are not expected to undertake any additional mitigation actions not already planned when carbon budgets were allocated;
- no transfer of unused portions of carbon budgets from the first to subsequent phases will be allowed;
- no transfer of portions of their carbon budgets between companies will be allowed during Phase 1 (although trading will be considered in subsequent phases);
- only emissions from a company’s own operations (Scope 1 emissions) will be included in carbon budgets (but the possibility of creating a mechanism for dealing with Scope 2 emissions during subsequent carbon budget phases will be considered); and
- while the DEA intends to use the experience gained by implementing the first phase of carbon budgets to design the second and subsequent phases, all Phase 1 design elements will be re-evaluated when the next phase of carbon budgets is designed, and new elements may also be included in the next phase – the current design should thus be viewed as only indicative of the design of the second and subsequent phases of carbon budgets.

While there is no legal requirement for companies to remain within their carbon budgets, there are legal requirements regarding the reporting of mitigation actions. The Pollution Prevention Plan Regulations issues under the National Environmental Management: Air Quality Act (Act 39 of 2004) legally require companies to:

- describe interventions that will be implemented to reduce GHG emissions over the course of the next five years, and the expected mitigation impact that these actions will have, in a pollution prevention plan to be approved by the Minister of Environmental Affairs; and
- to submit annual progress reports that outline the mitigation actions that were implemented within the last year, and if relevant, details of any deviations from the approved pollution prevention and remedial action to address deviations.
4 Properties of budgets and taxes and insights on integration

This section discusses the key advantages and disadvantage of the different instruments acting in isolation. Broadly put, when combining the carbon tax and carbon budget, the intention is to maximise the advantages provided by each instrument operating in isolation while aiming to reduce some of the disadvantages of each instrument. However, to do this, it is necessary to understand the properties of each instrument and what can and cannot be identified about their comparative advantages and disadvantages.

It then provides a brief summary of the key insights provided by international experience in seeking to combine multiple mitigation policy instruments. Reflecting the international interest in carbon pricing as a policy instrument, this literature focuses in particular on the combination of carbon pricing instruments with other mitigation policies; given the context in South Africa, this section places particular attention on the insights from this literature in relation to combining carbon taxes with other policy instruments. It complements the international experience provided in Appendix B [tbc in next draft].

4.1 Advantages and disadvantages of the carbon tax and carbon budget

It is helpful to place the carbon budget and carbon tax in a simple policy taxonomy. This taxonomy is not comprehensive but rather seeks to highlight key features of mitigation instruments based on economic theory / literature that are relevant in the South African context. It distinguished policy instruments on two dimensions.

– **Command and control versus market-based.** Command and control instruments specify either the emission reductions that must be delivered by a particular firm or installation and/or the technologies that should be used to deliver reductions. The carbon budget is an example of a command and control instrument as it will specify the emission reductions that a firm must make. Such instruments are attractive if policymakers which to directly target investment activity in certain firms or sectors that are of importance to the economy. By contrast, market-based instruments, such as carbon taxes and ETSs, provide flexibility as to how much individual firms choose to emit and which technologies they choose to reduce emissions with. In the case of a carbon tax, for example, firms can either choose whether and how to reduce their emissions or, if all reductions are expensive, pay the tax at the designated rate.

– **Quantity versus price.** A quantity instrument reduces emissions by placing a fixed constraint on the amount of emissions from a certain source. The carbon budgets are a quantity instrument with the emissions defined at the locus of the individual firm, while an Emission Trading Scheme (ETS) places a fixed constraint on the total emissions from sources covered by the instrument. The attraction of this approach is that it provides certainty over emissions. By contrast, price instruments, such as the carbon tax, reduce emissions by letting emitters decided on whether they wish to pay the tax for each tonne of emissions for which they are responsible. Theoretical literature shows that pricing instruments are preferable to quantity instruments when there is relatively more uncertainty about how much it might cost to reduce emissions than how much damage those emission might do (Hepburn, 2006). They may also be better as incentivising low-carbon investment as the price is often stable and known in advance. Pragmatically, price instruments (taxes) can be relatively easily integrated into existing tax systems.
Figure 2 depicts the two main instruments of focus for this study on this simple taxonomy (in red). It also depicts ETSs as an instrument that share some similarities with carbon budgets - as they set an constraint on the total quantity of emissions - but also with carbon taxes - as they are a market based instrument that provides flexibility to individual firms as to how much they choose to abate. ETSs are discussed briefly further below.

Figure 2. Budgets and Taxes fall into different instrument categories and target emissions quantity and price, respectively

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon budget</td>
<td>Market based</td>
</tr>
<tr>
<td>ETS</td>
<td>Carbon Tax</td>
</tr>
<tr>
<td>Command and Control</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

The key advantage of the carbon tax is that it will deliver cost effective emission reduction. As the typology shows, taxes are market-based instruments. Theoretical and empirical literature shows that market-based instruments tend to reduce emissions at much lower cost to society per tonne of CO₂ than command and control instruments. For example, the OECD, in an international study (OECD, 2013), found that market based instruments reduced emissions at a cost of less than €30/tonne compared to up to more than €150/tonne for regulatory (command and control) measures in the electricity sector, as shown in Figure 3.

This is because market-based instruments provide the same incentive to reduce emissions across the economy and allow those subject to the regulation to determine whether this is a strong enough incentive to reduce emissions: faced with this signal some firms will find it easy to significantly reduce emissions and will choose to do so; others will choose rather to pay the tax.

By contrast, under a command and control instrument, the regulator decides how much each firm should reduce its emissions; without excellent information on the amount and cost of emission reduction in different parts of the economy, there is a risk that firms will be forced to reduce emissions even if it is extremely costly for them to do so (it could even lead to them exiting the market). It should be noted that the finding that carbon pricing reduces emissions at least cost is predicated on using the same carbon price across all sectors of the economy which, in order to address other important objectives particularly around fears of carbon leakage and lack of competitiveness (recognised as an important principle in section 2 above), is not a feature of the current South African carbon tax design.
Figure 3. Market based instruments have significantly lower cost than regulatory, command and control, instruments

Note: Although the OECD study refers to emissions trading, it would be expected that a carbon tax would have a very similar or identical level of cost effectiveness. There were no countries with examples of carbon taxes in the OECD study.

Source: OECD (2013) Effective Carbon Prices

There are other advantages of a carbon tax. These include that the revenues raised can be put to good use elsewhere in the economy; that it is a relatively transparent mechanism by which to regulate emissions (although this transparency is reduced in a system in which there is significant differences in treatment between different firms or sectors); and that potential new entrants have a clear understanding of how their emissions will be treated, promoting long-term efficient capital allocation and hence structural change.

The key advantage of a carbon budget is that it provides certainty over emissions. By setting a firm cap on emissions, policymakers can have confidence that emission reductions will be delivered. In the context of South Africa’s commitments to the international community, this certainty is of particular value. Moreover, setting this emissions cap at a company level provides opportunities for policymakers to target emission reductions from a particular source that, even if they are not the most cost effective in the short run (and so may not be delivered by a market-based instrument such as a carbon tax) are nonetheless crucial for the long-run decarbonisation of the economy.

It is the relative stringency with which both instruments are set that will determine which is more environmentally effective, not their overarching design principles. A stringent carbon budget could deliver more emission reductions than a carbon tax, by contrast a lax carbon budget would deliver fewer emission reductions. There are two caveats to this:

- A carbon tax provides a continuous incentive to reduce emissions. In other words a firm will decide whether for each tonne of emissions whether it is more or less costly to reduce that tonne or pay the tax. By contrast, once a firm is within the carbon budget it will face little incentive to continue to reduce its
emissions and, indeed, may face a disincentive if that would lead to a more stringent budget in subsequent years.

Some experience suggests that the lack of information possessed by a regulator will lead to it setting budget that deliver fewer emission reductions than a cap. This, for example, was the experience in the UK under the Climate Change Agreement/Climate Change Levy regime. (Martin, Preux, & Wagner, 2009) On the other hand, the ability to set different budgets for different firms may allow a regulator to extract deeper emission reductions from some firms as the stringency of the budget would only apply to that firm and would not ‘spillover’ to other firms in the economy who may have an ability to obstruct ambitious economy-wide policies.

The difficulty in comparing the relative environmental effectiveness of both instruments makes it somewhat more challenging to consider the interface options in sections 5 and 6, as, to a certain extent, the nature of the some of the interaction options depends on the relative stringency of each instrument.

The advantages and disadvantages of the carbon tax and carbon budget are summarised in the Table 2. This uses a selection of the principles identified in section 2; for other principles, it is not possible to say at this level of abstraction whether one instrument is preferable to another. Those principles especially identified by the DEA and NT are highlighted in bold. It should be stressed that these results assume the two instruments are equal in their stringency, that enforcement is equivalent across instruments and that information asymmetry is high. It is a short-medium term assessment.

### Table 2. A comparison of the strengths and weaknesses of carbon taxes and carbon budgets

<table>
<thead>
<tr>
<th>Principle</th>
<th>Carbon tax</th>
<th>Carbon budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental effectiveness</td>
<td>? – although does provide continuous incentive to reduce emissions and the compliance mechanism used to enforce the tax (although this is well established)</td>
<td>? – this depends on the tightness of the budget and the compliance mechanism used to enforce the budget</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>*** - although somewhat reduced by having a range of different effective rates</td>
<td>* - unless regulator has very good understanding of the availability and costs of abatement</td>
</tr>
<tr>
<td>Emissions certainty</td>
<td>* - not in the short term, although some scope to calibrate the emissions tax rate over time</td>
<td>*** - budgets define a maximum of emissions</td>
</tr>
<tr>
<td>Fairness and Equity</td>
<td>** - through recycling tax revenues, although energy price rises may be regressive in some cases</td>
<td>* - unless budgets are calibrated according to the distribution of the firm’s consumers (which is difficult)</td>
</tr>
<tr>
<td>Accountability &amp; Transparency</td>
<td>** - although somewhat reduced by having a range of different effective rates</td>
<td>* - unless the budget process is very transparent and follows the same procedure across sectors</td>
</tr>
<tr>
<td>Promotes structural change</td>
<td>** – understanding of treatment of emissions from new entrants can promote structural change</td>
<td>*** – allows targeting of emission reductions that may be needed for the long run decarbonisation of the economy</td>
</tr>
</tbody>
</table>

**Notes:**  
*** - scores very well against criterion; ** -scores moderately against criterion; * - scores poorly against criterion

**Source:** Vivid Economics, DNA Economics and Tyler

Emissions trading systems offer an option of combining some of the advantages of the carbon price and the carbon budget. Emissions trading systems offer the prospect of emissions certainty across those
companies included in the system, while the ability to trade allowances, creating a carbon price, provides the cost effectiveness benefits of a market based instruments. This combination has proved compelling for a number of jurisdictions ranging from the EU to California, Kazakhstan and China. In the South African context, it would be possible to move towards an ETS by allowing carbon budgets for firm to be traded. This would create the flexibility that is the hallmark of a market based instrument – firms could either choose to reduce their emissions and sell their excess budget to other firms or, if abatement was considered too expensive, to choose to buy excess budget from other firms. The price at which emission budgets were traded would become the carbon price.

However trading approaches faces particular challenges in South Africa. However, in the South African context, challenges are created by two large entities – Eskom and Sasol – accounting for around 60 per cent of the emissions that are likely to be covered by the system. This raises concerns that these entities may be able to exercise market power in the allowance market and/or that relatively small proportional changes in the quantity of emission from these two firms could have very significant impacts on the availability of allowances, market prices, and market volatility. These reasons account for the decision to adopt a carbon tax rather than an ETS when different carbon pricing mechanisms were first being explored.

4.2 Insights from international practice in combining mitigation policy instruments

Many countries are exploring the challenges of combining multiple emission reduction policy instruments to reduce emissions. The insights gained from these challenges can be useful to South Africa as it considers its own options. These insights tend to consider how to combine a market-based instrument with other policies; as explained in the appendix, the practice of using budgets, especially at the firm level, is much rarer in international experience. Within this literature, where relevant, our focus is on the insights associated with integrating carbon taxes with other policy instruments; a host of different issues arise when combining carbon prices from emissions trading systems with other instruments.

It is possible to identify five key insights from relevant international experience.

1. The approach to addressing policy interactions needs to be informed by the overarching principles determining emission reduction strategies.
2. It is broadly recognised that a package of policy instruments is needed for an effective mitigation strategy; including, but not limited to, a carbon price.
3. In any package of instruments, it is vital to be clear about the different roles of different instruments: in general, there should be no more than one policy instrument for each policy objective
4. In packages with a carbon tax, the major integration concern is ensuring cost efficiency and avoiding policy redundancy
5. The way in which a carbon tax evolves over time is an important determinant of the long-term nature of any policy interaction

The approach to addressing policy interactions needs to be informed by the overarching principles determining emission reduction strategies. Different combinations, and way to combine instruments, will be more or less appropriate depending on the policy objectives that are being sought. This supports the rationale of this report which seeks to consider the most appropriate integration based on the principles underpinning South African mitigation policy.
It is broadly recognised that a package of policy instruments is needed for an effective mitigation strategy; including, but not limited to, a carbon price. It is sometimes suggested that a carbon price alone will be sufficient to deliver necessary emission reductions (del Rio & Labandeira, 2009). This is not backed up by more detailed analysis which recognises that a range of policy instruments, to tackle a range of barriers/market failures holding back emission reductions, will be required. For instance, Acemoglu, Aghion, Bursztyn and Hemous (2012) find that if only an immediate carbon tax is used, it needs to be 20 times higher than in the case of the combined instruments to achieve given target. Similarly, Fischer and Newell (2008) in a simulated model of the US electricity sector find that with a combination of policies, the carbon price necessary to achieve a particular emissions reduction falls by 36 per cent and the portfolio of policies generates surplus rather than costs.

In any package of instruments, it is vital to be clear about the different roles of different instruments: in general, there should be no more than one policy instrument for each policy objective. A common economics principle for policymaking is that one instrument should be used to tackle one policy challenge (market failure). If this is not followed, then there is a risk that one of the policies will be redundant, leading to unnecessary administrative costs and wasting scarce political capital. The corollary of this principle, however, is that multiple policy objectives can support the existence of multiple policy instruments. This implies that it is important to identify the objective of each policy (or what market failure is it seeking to address).

In packages with a carbon tax, the major integration concern is ensuring cost effectiveness and protecting against redundancy. As described above, one of the key attractions of a market-based instrument such as a carbon price is that it is typically a cost effective way to reduce emissions. When combining multiple policy instruments the biggest risk is that this cost effectiveness will be reduced and/or that the tax may become redundant. This is a different set of challenge compared to a situation where other policies are being combined with a carbon price provided by an emissions trading system.

The way in which a carbon tax evolves over time is an important determinant of the long-term nature of any policy interaction. By building in flexibility to the choice of the tax rate – as envisaged in the current South African policy tax design – it is possible to avoid some of the most damaging interactions, as policy can be adjusted as the impact of these interactions become clear. On the other hand, a lack of certainty over the future tax rate may increase investment uncertainty, which is why policymakers in some jurisdictions prefer to set an upfront tax rate path, identifying how the tax rate will evolve over time². In South Africa, the Carbon Tax Policy Paper envisages an increase in the tax rate of 10 per cent per annum over the first five years.

These insights are returned to in the context of South African policy debate in Section 6.

---

² This was the approach taken, for example, in British Colombia where an initial carbon tax of C$10/tonne was introduced in 2008, steadily increasing to C$30/tonne over the period to 2012.
5 Interface options

This report considers four categories of interface options, some of which have a range of different design options, as shown in Figure 4. These options were developed by the consultancy team, drawing on international experience, and in consultation with the DEA and NT. They do not cover the full range of permutations through which the instruments might be combined but are considered to be the most plausible at present and capture (and in cases expand on) many of the options being discussed in South Africa at present. It was agreed with both DEA and NT that options involving the elimination of one of the instruments should not be included in the analysis.

Figure 4. We analyse four main interface options

<table>
<thead>
<tr>
<th>Category</th>
<th>Design options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Layering:</strong> both tax and budget apply to all companies</td>
<td>— which emissions are taxed if budgets are exceeded</td>
</tr>
<tr>
<td><strong>Tax enforces budget:</strong> combination of budgets for all firms with tax as the stick if budgets are exceeded</td>
<td>a) ETS, trading of carbon budgets with tax determining minimum or maximum price of trade</td>
</tr>
<tr>
<td><strong>Hybrid:</strong> evolution into one hybrid instrument</td>
<td>b) Baseline and credit based on absolute emissions, with tax determining minimum or maximum cost</td>
</tr>
<tr>
<td></td>
<td>c) Baseline and credit based on emissions intensity, with tax determining minimum or maximum cost</td>
</tr>
<tr>
<td><strong>Differential instruments:</strong> different instruments or interfaces apply to different firms / sectors</td>
<td>— which firms or sectors have which instrument?</td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

- ‘Layering’ involves imposing both the tax and the budget to all firms that are currently expected to be regulated by each instrument, leading to a situation where many firms are subject to a budget and also have to pay a tax on all of their emissions.

- ‘Tax enforces budget’ refers to a situation where a firm incurs no tax liability if its emissions are below the budget but they become liable for the carbon tax if the budget is exceeded. In this interface option, there are important differences between an approach where, if a firm exceed its budget, it is only liable to pay the tax on the excess emissions compared with an approach where exceeding the budget leads to all emissions being taxed.

- **Hybrid:** this refers to interface options where design features of each instrument are merged to form one overall instrument. The three different designs considered here are an emissions trading system with a

---

3 For example, options where firms might be able to opt for regulation by either the budget or by the tax have not been included.
minimum floor price, a baseline and credit scheme using absolute emission baselines, and a baseline and credit scheme using emission intensity baselines.

- **Differential instrument application.** This is an interface option where different instruments are applied to different firms or sectors. The different instruments that might be considered are: a tax; a budget; one of the other integration options combining a tax or budget; or an entirely different policy instrument. For reasons explained below, we consider these options in relation to Eskom, Sasol and the rest of the economy.
6 Option assessment

These options are described and appraised systematically. In order to facilitate a thorough approach, we use the same 6 questions to guide the description. The questions are:

1. How will the interface option work?
2. What are the design features of this interface mechanism that would require a policy decision, and how is it enforced?
3. If the interface mechanism was to build directly on the carbon tax and budget process to 2020, what decision might be taken on these design features? How might it be enforced?
4. How would changing these design features influence the working of the interface option?
5. What existing features of the carbon tax and budgets would be preserved under this interface option? Which might not be compatible with the interface option?
6. Are there any international precedents similar to this option?

This then concludes with the allocation of a score against each of the four primary principles (environmental effectiveness, cost effectiveness, certainty and equity) followed by a qualitative discussion against the remaining principles. The four primary principles are scored on a scale of 1 to 5, with 1 being the lowest and 5 the highest score. The scoring itself focuses solely on these principles; further issues related to the option is provided below.

6.1 Layering

<table>
<thead>
<tr>
<th>Question</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How will the interface option work?</td>
<td>This interface option layers the budgets and tax on top of each other and leaves the current carbon tax and budget proposal unchanged. Each instrument is applied in its current form, although the budgets become compulsory, with the existing proposed scope and coverage. The key implication of this interface option is that, for a particular firm, only one instrument is ever binding: either the tax causes a firm to bring its emissions below the budget (in which case the budget is not relevant) or the budget causes a firm to reduce its emissions by more than it would under the tax (in which case the tax is not relevant). Regardless of which instrument is binding, firms incur the cost of the binding instrument, which is implicit if the budget is binding instead of the tax.</td>
</tr>
</tbody>
</table>
This interface option does not economise on the policy maker decisions that need to be taken for the carbon tax and budget individually. It requires setting the
- tax rate
- tax relief in the form of allowances,
- firm specific budgets, and
- design features of carbon budgets (trading, flexibility mechanism etc.).

<table>
<thead>
<tr>
<th>2</th>
<th>What are the design features of this interface mechanism that would require a policy?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The headline tax rate would be set at R120/tCO(_2) or higher as the need to achieve emission reductions increases in line with the national emissions target.</td>
</tr>
<tr>
<td></td>
<td>The budgets would build off the budgets currently being negotiated by the DEA but explicitly introduce a requirement to reduce emissions in line with South Africa’s mitigation targets.</td>
</tr>
<tr>
<td></td>
<td>The enforcement mechanism for the carbon tax would likely be enforced the Customs and Excise Act. The enforcement mechanism for the budget would need to be determined. International practice for enforcing environmental regulation suggests:</td>
</tr>
<tr>
<td></td>
<td>- levying a fine, either absolute or tied to the degree to which the budget is exceeded</td>
</tr>
<tr>
<td></td>
<td>- suspending and/or shutting down operations if the budget is exceeded too far or too frequently</td>
</tr>
<tr>
<td></td>
<td>Regardless of the precise mechanism used to enforce budgets, the analysis proceeds on the basis that breaching the budget is more costly than staying within the budgets. The possible dynamics created by a firm choosing to exceed the budget are explored in the ‘tax to enforce the budget’ interface option.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>If the interface mechanism was to build directly on the carbon tax and budget process to 2020, what decision might be taken on these design features?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Given that only one instrument binds, the main implication of changing the design of either the tax or the budget is that it changes the probability that this becomes the instrument that determines a firm’s emissions for example, increasing the tax rate would make it more likely that the tax would be the binding instrument on firm emissions. There are no further interaction effects between the instruments that might be affected by the way in which either instrument is designed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4</th>
<th>How would changing these design features influence the working of the interface option?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As the instruments operate independently in this interface option, it would be possible to keep almost all of the existing design features of each instrument. The only exceptions would be the 5 per cent tax free allowance for firms voluntarily participating in the carbon budget process which would be irrelevant as the carbon budgets became compulsory. A judgment would also have to be taken on whether to include the offset</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5</th>
<th>What existing features of the carbon tax and budgets could/would be preserved under this interface option? Which might not be compatible with the interface option?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As the instruments operate independently in this interface option, it would be possible to keep almost all of the existing design features of each instrument. The only exceptions would be the 5 per cent tax free allowance for firms voluntarily participating in the carbon budget process which would be irrelevant as the carbon budgets became compulsory. A judgment would also have to be taken on whether to include the offset</td>
</tr>
</tbody>
</table>
allowance, depending on whether there were significant sources of emissions not covered by either instrument which could therefore generate offsets. The table below summarises the treatment of the tax free allowances in the carbon tax proposal.

<table>
<thead>
<tr>
<th>Tax-free allowance</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% for process emissions and fugitive emissions</td>
<td>Keep</td>
</tr>
<tr>
<td>Up to 10% allowance for trade exposed sectors</td>
<td>Keep</td>
</tr>
<tr>
<td>up to 5% based on performance against emissions intensity benchmarks</td>
<td>Keep</td>
</tr>
<tr>
<td>5-10% carbon offsets allowance</td>
<td>Keep or remove (depending on whether there are significant sources of emissions that are not covered by either the budget or the tax)</td>
</tr>
<tr>
<td>5% tax-free allowance for companies participating in phase 1 of the carbon budgeting system</td>
<td>Remove</td>
</tr>
</tbody>
</table>

6 Are there any international precedents similar to this option? The closest parallel to this interface option is provided by the UK’s Climate Change Agreement/Climate Change Levy arrangement where firms in sectors that participated in a CCA (akin to a budget) would also pay the CCL (akin to a carbon tax). However, there are important differences with this interaction option as, in the UK case, the rate of the CCL would be lower for firms in sector with a CCA as an inducement for firms to agree to a CCA. By contrast, under this approach the budget process would be compulsory.

This interface option scores well on environmental effectiveness and certainty but poorly on cost effectiveness, as shown in Table 3.
## Table 3. Layering sacrifices cost effectiveness to achieve higher environmental effectiveness

| Principle               | Score | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
|------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------}
| Environmental effectiveness | ◁    | The feature of this interface option is that the more stringent of the two instruments is also the one that determines emissions i.e. if this tax rate is considered to be ‘too low’ then the budget can be set to generate greater emission reductions while if a budget is lax, firms may still find that the tax makes it financially worthwhile to reduce emissions. For this reason, this option can be considered to be highly environmentally effective.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Environmental certainty | ●    | Regulators could be confident that firm emissions would either be at the level of the budget (if the budget binds) or lower than the budget (if the tax binds). This gives a high level of confidence over the future profile of emissions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Cost effectiveness      | ○    | This mechanism is highly cost ineffective for two reasons:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  
|                         |       | (1) In the event that the budget is the binding instrument then there is a risk that this will require some firms to deliver highly cost ineffective emission reductions in the extreme possibly inducing closure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  
|                         |       | (2) For each individual firm, there is some possibility that the tax will determine emissions and the budget will not be binding. This will mean that the transaction costs – and political capital – associated with setting the budget would have been wasted. These costs could be saved by not proceeding with the implementation of one of the two instruments, although this possibility is outside the scope of this paper.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  
| Fairness and equity     | ◊    | The tax revenues from the carbon tax process could be used to promote fairness and equity. However, those subject to both regulations are likely to complain of ‘double regulation’. This would be particularly challenging in the case that the budget was the instrument that determined the emissions of a firm, but they nonetheless paid taxes on the emissions below the budget: in this case the tax would have no environmental benefit but could still represent a significant transfer of resources.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

Source: Vivid Economics, DNA Economics and Tyler

### In terms of the scoring against other principles important to South African mitigation policy, a number of insights, where the option scores either particularly well or particularly poorly can be made:

- two separate parallel instruments, with separate infrastructures and administration effort scores poorly on feasibility and simplicity;
- as it is always the more costly of the two instruments always binds a firm implies that it is not very sensitive to international competitiveness issues;
- the use of budgets creates an opportunity to target abatement activity in certain sectors or firms in the economy (which might be desirable for strategic reasons) and allows emission reduction effort by sector to be contextualised by other policy priorities, but these benefits may not always be realised if the tax becomes the binding instrument;
- there may be concerns over the accountability surrounding the setting of the budget; and
- the option scores very well in terms of building on existing processes.
### 6.2 Tax used to enforce the budget

**Tax used to enforce the budget** combines budgets and taxes by establishing a budget and requiring firms to pay a tax if the emissions exceed the budget. In effect, budgets provide desired emissions level of firms and/or sectors and the tax is used to ensure compliance.

**This interface option has two possible designs:**

1. Tax emissions in excess of the budget
2. Tax all emissions if the budget is exceeded

For both option the same questions apply and their detail is summarised below.

<table>
<thead>
<tr>
<th>Question</th>
<th>Detail</th>
</tr>
</thead>
</table>
| **1** How will the interface option work? | This option assigns a budget to each firm and establishes a tax rate – which, in the first instance, acts as an enforcement mechanism - for emissions in excess of the budget. There are two options that might be considered within this option:  
  - If the budget is exceeded, the tax rate applies to emissions in excess of the budget  
  - If the budget is exceeded, the tax rate applies to all emissions |
| **2** What are the design features of this interface mechanism that would require a policy decision (i.e. the carbon tax rate(s), the level of the budget, do companies or sectors need to be carved out from one instrument, and if so which and why)? | This option requires setting the:  
  - tax rate; and  
  - budget  
  - design features of carbon budgets (trading, flexibility mechanism etc).  
  The budgets in these options need to be assigned to firms, likely based in line with South Africa’s mitigation targets.  
  It would not require an enforcement mechanism to be set for the budget as this would effectively be provided by the tax.  
  Because the tax would be an enforcement mechanism in the first instance, it would almost certainly need to be higher than the current rate adjusted for exemptions. In the case where the tax is only paid on emissions in excess of the budget it could be set at R120/tCO\textsubscript{2} or higher, without any exemptions. However, our analysis is made on the basis that the tax rate, while higher than the current effective tax rate, would not be punitive so that it is plausible that some firms may choose to pay the tax rather than stay within the budget. In the case where the tax is paid on all emissions if the budget is exceeded then a lower tax rate might be used so that there is not such a large jump in tax liability when firms exceed their emissions.  
  The budgets could be set by reference to two data points: |
| **3** If the interface mechanism was to build directly on the carbon tax and budget process to 2020, what decision might be taken on these design features? |  
| **3** How is it enforced? |  

The budgets could be set by reference to two data points:
Integrating the carbon tax and carbon budgets in South Africa

– the existing budget set for the firm modified to account for firm/sector mitigation potential and SA mitigation targets;
– a conversion of the existing tax free exemptions into an absolute amount of emissions. For example, if a firm currently received a tax exemptions of 80 per cent, this could be converted such that the determination of the budget was informed by 80 per cent of firm’s current emissions. This data point alone would not be sufficient to ensure that South African was on track with regard to its national targets.

As explained below, the budget would likely need to contract significantly (potentially ultimately to zero) for this mechanism to be environmentally effective.

Tax payments would be enforced using the existing sanctions.

The major difference depends on whether only emissions in excess of the budget are taxed or, in the case that the budget is exceeded, all emissions are taxed. At the same tax rate, taxing only the excess emissions provides a weaker enforcement mechanism and is more likely to lead to the budget being exceeded. However, taxing all emissions once the budget is exceeded would lead to a big discontinuity in firm costs and would likely raise concerns over competitive distortions. This difference could be lessened by using a relatively higher tax rate in cases where only the excess emissions are taxed and a relatively lower tax rate if a model where all emissions are taxed when the budget is exceeded.

In addition, under this approach, the budget becomes an absolute threshold of tax free emissions. This creates very different dynamics to a situation where the tax free exemptions are provided as a percentage rebate on the tax rate (the current model). Under the current model all emission attract the same (relatively modest) tax rate of between 60-95 per cent of R120/tCO₂. By contrast, with an absolute tax free allowance, all emissions lower than the budget attract a zero tax rate and only those above the budget attract a higher tax rate. This means that firms will be able to emit up to the budget at no cost and only start considering whether it is cheaper to abate emissions or pay the tax when they reach the budget. If the budget is set close to business as usual emissions, this makes it very likely that firms will choose to exceed the budget and pay the tax on at least some emissions. To address this, either the tax rate would need to be very high (especially when only excess emissions are taxed) and/or the budget would likely need to contract significantly over time, potentially moving to zero. If the budget was reduced over time then the model would move from being one where the budget was the primary mechanism with the tax acting as an enforcement option to one where the tax became the primary instrument to reduce emissions.

One related option discussed in the academic literature would be to allow firms to trade their tax free thresholds, creating dynamics similar to those under an ETS. (Pezzey & Jotzo, 2012)
interface option? Which might not be compatible with the interface option? Because the carbon tax would effectively become an enforcement mechanism, at least initially, it would be less appropriate to have different tax rates for different firms or sectors. It would also raise challenges as to whether it was lower tax rate or higher tax rate emissions that were in excess of the cap. Instead, the same concept would potentially become reflected in the different budgets given to different firms or sectors.

Table 4. Budget with tax on emissions in excess of budget

<table>
<thead>
<tr>
<th>Principle</th>
<th>Score</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental effectiveness</td>
<td>☐</td>
<td>Depends heavily on the level of the budget and tax rate. However, assuming tax rate is not punitive and with budgets set at closer to BAU, firms would face little or no incentive to reduce emissions. If the budget covers an increasingly small proportion of each firm's emissions, and/or the tax rate was set at a high level, then the mechanism would become more effective. However, in this case there would still be little or no incentive for firms to reduce emissions below the budget.</td>
</tr>
<tr>
<td>Environmental certainty</td>
<td>☐</td>
<td>Because firms may elect to pay a tax on emissions above the budget, it is difficult to anticipate whether they will stay within the budget or not.</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>☐</td>
<td>The option to pay the tax, assuming it is set at rates close to the current headline rate or somewhat higher improves cost effectiveness as there is always an option to pay the tax rather than undertake very costly abatement to meet the budget. If the budget declined over time, with the carbon tax becoming the primary instrument the mechanism would become even more cost effective (especially if the same rate was used across all sectors of the economy).</td>
</tr>
<tr>
<td>Fairness and equity</td>
<td>☐</td>
<td>Unlikely to raise much revenue in the first instance as budgets need to be exceeded for the tax to create revenue. If the tax becomes the primary instrument by continually tightening budgets, the scope for raising revenue increases.</td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

A number of other principles important to South African mitigation policy are also germane to this option:
– budgets tie in with national mitigation targets and can be tailored to create the opportunity to target abatement activity in certain sectors or firms (which may be valuable for strategic reasons and could also be used to alleviate competitiveness concerns);
– however, budgets may face concerns over the accountability and transparency of setting the budget;
– the tie-in of budgets and taxes might reduce administrative efforts but still requires additional effort to monitor budgets and account for emissions above the budgets to be taxed, reducing feasibility and simplicity of the option;
– this interface scores well on building on existing processes as it preserves the principles of existing processes albeit with minor modifications, such as on which emissions the tax is levied; and
– budgets allow policy-maker flexibility.

The budget with tax on all emissions if budget is exceeded uses a stronger enforcement mechanism, the full cost of emissions, for budgets and scores slightly better on environmental certainty. However, it scores worse for cost effectiveness, as shown in Table 5 with additional commentary provided below.

### Table 5. Budget with tax on all emissions if budget is exceeded scores particularly poorly on cost effectiveness

<table>
<thead>
<tr>
<th>Principle</th>
<th>Score</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental certainty</td>
<td>☒</td>
<td>This design likely scores better than the budget with tax on excess emissions because the financial penalty of exceeding the budget occurs with a jump at the budget point, providing a strong incentive to stay inside the budget; the last abatement opportunities to stay within the budget would not be valued at marginal cost, but rather based on the total cost of exceeding the budget.</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>☐</td>
<td>As firms approach the budget, assuming that the tax rate is not set ‘too low’, they may take up high-cost abatement to avoid paying the tax on all emissions. This reduces cost effectiveness, in particular if the budgets are harder to achieve for some firms within a sector or across sectors. If the budget declined over time, with the carbon tax becoming the primary instrument the mechanism, the ‘threshold’ effect of the carbon tax may further reduce cost effectiveness, at least in the short term.</td>
</tr>
<tr>
<td>Fairness and equity</td>
<td>☒</td>
<td>Some scope to adjust budgets to reflect fairness and equity, for example, layer budgets on firms producing goods and services that account for a large proportion of low income household consumption. However, factoring this into budget negotiation process will make these negotiations more difficult. In addition, this approach is unlikely to raise much revenue in the first instance, reducing available public resources that might be made available to address equity concerns. If the tax becomes the primary instrument by continually tightening budgets, the scope for raising revenue increases.</td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

The budget with tax on emissions above budget has similar insights on other principles important to South African mitigation policy but differs in crucial aspects:
- similarities:
  - budgets tie in with national mitigation targets;
  - budgets can provide the opportunity for targeting abatement activity in certain sectors or firms, which may be valuable for strategic reasons but;
  - the tie-in of budgets and taxes might reduce administrative efforts but still requires additional effort to monitor budgets, reducing feasibility and simplicity of the option; and
  - this interface scores well on building on existing processes as it preserves the principles of existing processes albeit with minor modifications.
- differences:
  - the accountability and transparency of setting the budget may suffer as they define more critically the threshold at which additional costs occur;
  - the high costs faced by firms when budgets are exceeded creates additional competitiveness concerns.

Compared to the tax applying on excess emissions, this option creates greater environment certainty but is less cost effective. It may also add to concerns about how budgets are set and regarding competitiveness impacts.

6.3 Hybrid instruments with trading

The hybrid instruments introduce the concept of trading, either across the economy (emissions trading scheme or baseline and credit with absolute emissions threshold) or within sectors (baseline and credit with intensity thresholds). As laid out in section 4.1, trading potentially provides a way of combining emissions certainty with cost effectiveness. In these options, the carbon tax would be used as a price floor and/or ceiling to moderate some of the price volatility that may otherwise be created by trading options.

However, the potential role of Sasol and Eskom within emissions trading may create issues that render these options infeasible in practice, as discussed further in section 6.4.

6.3.1 Emissions Trading Scheme with tax as the floor and/or ceiling price

<table>
<thead>
<tr>
<th>Question</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How will the interface option work?</td>
</tr>
<tr>
<td></td>
<td>In an emissions trading scheme, the total amount of capped emissions, typically calculated by reference to the overall emission reduction commitment of the country, is converted into an equivalent amount of allowances that can then be freely traded across and within all sectors. Typically, some proportion of these allowances are freely allocated to firms, to reduce the absolute cost increase they face. Budgets would form the free allocation of allowances for each installation/firm.</td>
</tr>
</tbody>
</table>
### Question

The tax can be used as a floor and/or a ceiling for the price of traded emissions. Used as a price floor, it can ensure efficient long-term capital allocation and avoiding lock-in into carbon intensive capital stocks; used as a ceiling, it can limit the potential impacts on competitiveness high costs may create. Such price ceilings and floors are already in place in the UK and California.

The option retains the flexibility of budgets, such as that specific firms or sectors can achieve a different quantity of free allowances based on their characteristics, such as trade exposure, share of process emissions or observed cost pass-through rates. Depending on the detailed design of these free allowances, this might alleviate the cost-pressure on goods largely consumed by lower-income households and increase fairness and equity.

This option requires setting a number of different variables including the:

- the overall cap
- budget, which becomes the free allowance allocation allocated to either firms or installations; and
- tax rates, which evolve into a floor and/or ceiling price

### Detail

**What are the design features of this interface mechanism that would require a policy?**

A detailed system of monitoring, reporting and verification would be needed to ensure that firms surrendered allowances in line with their emissions. If the tax was used as a price ceiling, this would help with enforcement as firms could elect to pay the tax for some emissions. However, additional sanctions, such as the need to ‘make good’ any emissions for which allowances have not been surrendered or a tax paid, would need to be introduced.

**If the interface mechanism was to build directly on the carbon tax and budget process to 2020, what decision might be taken on these design features?**

Existing budgets might inform free allowance allocation; most ETSs start with free allowance allocation that is close to BAU emissions, which is similar to the basis on which budgets are expected to be set on the period to 2020. However, it may be necessary to make a downward adjustment to ensure that the total amount of allowances allocated for free is lower than the total amount of allowances under the cap. Alternatively, or in addition, the benchmarks used to determine the Z factor in the carbon tax could also be used to inform the free allowance allocation. For instance, other ETS such as in the EU and California provide a quantity of free allowances that covers a certain percentage of emissions of the least carbon intensive firms in the sector; dirtier firms then receive a small proportion of free allowances. This is intended to

---

*UK: The Carbon Price Floor acts as an explicit floor price of the EU ETS in the UK and the EU ETS Market Stability Reserve may private a ‘soft’ price ceiling, releasing additional emissions allowances if prices increase beyond a threshold.

*CA: An auction reserve price of almost US$11/tCO₂ determines the price floor and the Allowance Price Containment Reserve releases certain amounts of emission allowances at pre-determined prices (>US$40).*
<table>
<thead>
<tr>
<th>Question</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 How would changing these design features influence the working of the interface option?</td>
<td>The budget determines the free allocation and, as these emissions are traded, represent a monetary value. Changing the budgets directly affects the impact on installations and firms. A too high allocation can occur, either by mis-estimating emissions of the sector or due to unexpected factors, such as slower than expected growth across the economy or in specific sectors. A too high allocation can create windfall profits, as has been the case in the electricity sectors for the EU ETS. (Newbury, 2009) A too low allocation, particularly for trade-exposed sectors and sectors with a significant share of process emissions, may create competitiveness issues, which can be alleviated, however, by accounting for this in the budget, as is explained under question 5 below.</td>
</tr>
<tr>
<td>5 What existing features of the carbon tax and budgets would be preserved under this interface option? Which might not be compatible with the interface option?</td>
<td>This interface includes the possibility to generate government revenue without sacrificing environmental certainty. Some of the emissions allowances can be auctioned to generate revenue instead of being freely allocated to industries. This would generate revenue in additional to the ceiling price, but create higher costs for firms. The tax rates acting as the floor and ceiling price would determine the range for the carbon price signal to encourage efficient capital allocation. A too high floor price could create competitiveness issues, while a too low ceiling price reduces environmental certainty. This option requires new processes, although some aspects of the budget and tax design can be incorporated. The tax design features that provide differential treatment for firms or sectors specific characteristics would need to be incorporated into the budget setting, i.e free allocation, process. Carbon offsets can also be accommodated or enhanced as well The 5 per cent discount for companies participating in phase 1 of the carbon budgeting system would need to be removed as the budgets now form the free allocation and no discount on the floor or ceiling price are required.</td>
</tr>
<tr>
<td>6 Are there any international precedents similar to this option?</td>
<td>There are a wide number of emissions trading systems around the world, including ones which incorporate price floors and/or ceilings, such as in California.</td>
</tr>
</tbody>
</table>
The emissions trading scheme interface option scores well overall as shown in Table 6 but given the South African context may be infeasible. As discussed in section 4, emissions trading across the sectors requires careful consideration of the role of Sasol and Eskom and their influence in market prices and liquidity and may not be possible.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Score</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental effectiveness</td>
<td>◑</td>
<td>Emissions trading encourages the take-up of additional emissions reductions below budgets, as these emissions reductions can be traded. This has the potentially highest environmental effectiveness of all options as the ETS could cover all sectors of the economy.</td>
</tr>
<tr>
<td>Environmental certainty</td>
<td>◑</td>
<td>Environmental certainty is ensured by the emissions cap, which may be the sum of all budgets initially. The price ceiling can limit the costs associated with meeting the cap but at the same time reduce the certainty of meeting the cap</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>◑</td>
<td>Cost effectiveness is potentially greatest of all interface options as it allows the take-up of lowest-cost emissions reductions across all sectors due to trading of emissions.</td>
</tr>
<tr>
<td>Fairness and equity</td>
<td>◐</td>
<td>If allowances are allocated for free and assuming the price ceiling is not reached then limited opportunity to generate government revenue. Moreover the carbon price is the same across all sectors without consideration of its impact on consumer prices, including energy prices, this option is likely to score relatively poorly on fairness and equity.</td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

The scoring against other principles important to South African mitigation policy provides further insights:

– Even so some administrative and technical infrastructure will be developed to incorporate offsets into the carbon tax, this interface is likely to requires additional administrative and technical infrastructure, and be as such less feasible and simple
– the accountability and transparency of setting the budget (free allowances) may be low
– the price ceiling and budgets can be designed to limit competitiveness concerns while recognising the potential for windfall profits and redistribution across sectors;
– it represents a significant departure from current approaches and so does not build on existing processes;
6.3.2 Baseline and Credit

Baseline and credit schemes establish a benchmark level of emissions or emissions intensity for different firms. Firms with an emission performance better (lower) than the benchmark can trade this good performance with firms that exceed their benchmark. The benchmark may be set either on an absolute emissions basis or on an intensity basis (such as tCO₂ per tonne of product). In the option where intensity benchmarks are used, trading will be restricted to firms in the same sector. In addition, firms exceeding their benchmark may opt to pay a fee (tax) rather than trade with good performers. Because this option makes use of trading, it faces the same challenges in the South African context as an ETS.

<table>
<thead>
<tr>
<th>Question</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 How will the interface option work?</td>
<td>This option establishes a benchmark of emissions for firms, which either is an absolute emissions or emissions intensity benchmark.</td>
</tr>
<tr>
<td></td>
<td>The emissions intensity benchmark would be based on past or projected improvements in emissions intensity without considering production levels. This avoids potential issues with absolute emissions benchmarks, such as the cost to faster than expected growing installations/firms or the windfall gains for lower than expected growing installations/firms. However, it does not provide an absolute emissions ceiling and reduces environmental certainty.</td>
</tr>
<tr>
<td></td>
<td>This absolute emissions benchmark would be based on past or projected production of the emissions of each firm. The budget each installation receives is tied to its production but also provide an absolute emissions ceiling and associated environmental certainty and tie-in with national budgets.</td>
</tr>
<tr>
<td></td>
<td>This interface relies on trading of emissions. Firms below the benchmark can sell emissions to firms above the benchmark. The carbon tax can, as for the Emissions Trading Scheme interface option, play a role as a floor and/or ceiling price for emissions. Similarly, the ceiling price may create government revenue by being fee paid to the government to avoid purchasing emission certificates at a market price higher than the fee.</td>
</tr>
<tr>
<td>2 What are the design features of this interface mechanism that would require a policy decision (i.e. the carbon tax rate(s), the level of the budget, do companies or sectors need to</td>
<td>This option requires setting the:</td>
</tr>
<tr>
<td></td>
<td>– benchmarks on either an absolute emissions or emissions intensity basis; and</td>
</tr>
<tr>
<td></td>
<td>– tax rates, which evolve into a floor and/or ceiling price</td>
</tr>
<tr>
<td></td>
<td>The benchmarks in these options need to be assigned to installations, likely based on a sector budget, and may tighten over time.</td>
</tr>
<tr>
<td>Question</td>
<td>Detail</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>be carved out from one instrument, and if so which and why?</td>
<td>It would not require an enforcement mechanism to be set for the budget as this would effectively be provided by the tax. MRV of firm emission performance relative to the benchmark would be required and legal sanctions would be required for firms exceeding their benchmark who do not pay the tax/fee.</td>
</tr>
<tr>
<td>How is it enforced?</td>
<td></td>
</tr>
<tr>
<td>If the interface mechanism was to build directly on the carbon tax and budget process to 2020, what decision might be taken on these design features?</td>
<td>Existing budgets could be used to inform absolute emissions benchmarks adjusted downwards for South Africa’s national targets. The emissions intensity benchmark linked to the current Z factor within the carbon tax design could be converted in the emissions intensity thresholds for each sector and expanded to cover more sectors. The tax rate would definitely need to be adjusted in the case of an intensity model as it would need to be expressed per unit of product in a range of different sectors. It may also need to be adjusted with absolute emission benchmarks to reflect the idea that it is intended to contain excess volatility in prices, rather than be the regulatory instrument itself.</td>
</tr>
<tr>
<td>How would changing these design features influence the working of the interface option?</td>
<td>Changing the benchmark makes it more or less likely that firms will be able to meet the threshold. The tighter is the threshold, the more likely it is that firms will only be able to achieve compliance by paying the fee/tax to the government. In this sense, especially in cases where the benchmark is set on an absolute basis, it becomes more akin to the budget with tax on excess emissions.</td>
</tr>
<tr>
<td>What existing features of the carbon tax and budgets would be preserved under this interface option? Which might not be compatible with the interface option?</td>
<td>This option requires new processes, although parts of the budget and tax design can be incorporated. Concerns over competitiveness or difficulties in addressing leakage would need to be addressed through setting different benchmarks rather than through differences in the tax rate. Carbon offsets can also be accommodated or enhanced as well. The 5 per cent discount for companies participating in phase 1 of the carbon budgeting system would need to be removed as the budgets now form the free allocation and no discount on the floor or ceiling price are required.</td>
</tr>
<tr>
<td>Are there any international precedents similar to this option?</td>
<td>Alberta SGER currently uses an emissions intensity baseline and credit scheme, although it is discussing moving to a carbon tax. There is increasing discussion that Australia may move towards a baseline and credit scheme based on absolute emissions.</td>
</tr>
</tbody>
</table>
The dynamics created by this interface option are shown Table 7.

Table 7. Baseline and Credit scores almost as well as Emissions Trading Scheme

<table>
<thead>
<tr>
<th>Principle</th>
<th>Score</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute</td>
<td>Intensity</td>
</tr>
<tr>
<td>Environmental effectiveness</td>
<td>◐</td>
<td>◐</td>
</tr>
<tr>
<td>Environmental certainty</td>
<td>◐</td>
<td>◐</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>◐</td>
<td>◐</td>
</tr>
<tr>
<td>Fairness and equity</td>
<td>◐</td>
<td>◐</td>
</tr>
</tbody>
</table>

Source: Vivid Economics, DNA Economics and Tyler

In terms of the scoring against other principles important to South African mitigation policy, a number of insights, where the option scores either particularly well or particularly poorly can be made:

– the mechanism still allows the setting of targets by individual firm or sector which allow for a more targeted approach allowing policymakers to set tighter targets where they consider it more appropriate to focus emission reductions. This is one of the main differences between baseline and credit (absolute threshold) and an ETS. However, it is not necessarily the case that firms will decide to reach the target set.
– this interface requires additional administrative and technical infrastructure, more than other interface options, and be as such less feasible and simple;
– the accountability and transparency of setting the budget may suffer as they define the threshold at which additional costs occur;
  – this is particularly true for the absolute emissions benchmark, which requires projections of emissions at the firm level
– the price ceiling can be designed to limit competitiveness concerns;
– either approach would represent a considerable evolution from the current system and hence would not build on existing processes;

### 6.4 Differentiated instruments

<table>
<thead>
<tr>
<th>Question</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> How will the interface option work?</td>
<td>This interface option involves using different instruments for different firms in the sectors in the economy. Each firm would only be regulated by one instrument but that instrument would differ across different firms or sectors.</td>
</tr>
</tbody>
</table>
| **2** What are the design features of this interface mechanism that would require a policy? | The key issues associated with this interface option are to decide which instrument should apply to which firms. There are a very wide number of different permutations possible but the most important policy instrument options are:  
  – a carbon tax  
  – a carbon budget  
  – one of the other interface option that seek to combine aspects of the budget and tax  
  – an entirely different instrument  
  
  Given their relative contribution to South Africa’s emissions, it is most relevant to consider whether Eskom or Sasol might warrant a separate policy instrument to the rest of the economy.  
  
  Once different instruments had been assigned to different firms in the economy, it would still be necessary to reach decisions on the design of each of these instruments i.e. the tax rate for those firms regulated by the tax, the budget for those firms regulated through a budget or the interface features if some firms are regulated by one of the other interface options identified above. |
| **3** If the interface mechanism was to build directly on the carbon tax and budget process to 2020, what decision might be taken on these design features? | This would represent a significant departure from the current thinking and, as such, would not build directly on the processes to 2020.  
  
  However, if it was decided that some firms should be regulated by a tax then the tax rate might initially be expected to be set at R120/tCO₂, probably rising over time due to a need to accelerate emission reductions.  
  
  If it was decided that some firms were regulated by budgets then the budget for these firms would be informed by the budget set for the initial period (if the firm had participated in the voluntary process), with the budget likely to become increasingly stringent over time in line with the country’s emission reduction targets. |
Question | Detail
--- | ---
If some firms were regulated by one of the interface options discussed elsewhere in the paper then the design features of this option would be as discussed in the relevant table.

Enforcement would follow the existing approach.

Changing the design feature of any one instrument would have impacts on those regulated by that instrument i.e. increasing the tax rate would be associated with a reduction in emissions. However, it would have no direct impact on firms regulated by an alternative instrument.

Changing which firms were regulated by which instrument may or may not have implications for other firms. For example, if a firm was switched from being regulated by a tax to being regulated by a budget, then there would unlikely to be significant effects for other firms regulated by these instruments. However, in the event that a firm was switched so that it became regulated under a model that allowed for trading, then other firms also subject to regulation which allowed trading could become affected.

As the instruments operate independently in this interface option, and are just differentially applied to different firms, it would be possible to keep almost all of the existing design features of either the tax or the budget and just apply these to a narrower subset of firms. The only exception would be the 5 per cent tax free allowance for firms voluntarily participating in the carbon budget process as an individual firm would not be regulated by both a tax and a budget.

<table>
<thead>
<tr>
<th>Tax-free allowance</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% for process emissions</td>
<td>Keep</td>
</tr>
<tr>
<td>Up to 10% allowance for trade exposed sectors</td>
<td>Keep</td>
</tr>
<tr>
<td>up to 5% based on performance against emissions intensity benchmarks</td>
<td>Keep</td>
</tr>
<tr>
<td>5-10% carbon offsets allowance</td>
<td>Keep</td>
</tr>
<tr>
<td>5% tax-free allowance for companies participating in phase 1 of the carbon budgeting system</td>
<td>Remove</td>
</tr>
</tbody>
</table>

This is one of the commonest ways in which other economies integrate different mitigation policy instruments. For example, in France, some emissions are regulated by the EU ETS, emissions not subject to the EU ETS are subject to a carbon tax and sectoral level carbon budgets exist for sectors outside the EU ETS. Similarly, Switzerland allows emissions from smaller firms to be regulated by a voluntary agreement.
It is not possible to assess this interface option using the same scoring metrics as for the other options. This is due to the large number of different permutations that it provides; different permutations of instruments on different firms would be either more or less attractive on different criteria. Instead, we therefore explore the general strengths and weaknesses of this approach, and then consider some of the most obvious cases where this approach might be applied in the South African economy and the issues that this raises.

The general attraction of this interface option is that it is a transparent solution that avoids any of the distortions and economic/political economic challenges that can arise from layering (see section 6.1). It is also an approach that allows consistency with the international principle discussed in section 4.2 that different policy instruments should ideally be used in cases where there are different barriers/market failures that need to be overcome: for reasons of cost effectiveness, a carbon tax might be used in cases where the primary barrier to emission reductions is the lack of commercial incentive; budgets might be used in cases where non-price barriers are the more important explanation for holding back mitigation or where a targeted approach is desired to drive emission reductions that may not be cost effective in the short run (and so may not be realised by a carbon tax) but which are seen as necessary for the long term decarbonisation of the economy. The attractions of this interface option are reflected in the number of different countries who integrate different mitigation policy instruments by using different instruments on different emissions.

The downside of this interface option is that different instruments for different emissions will impose different costs across the South African economy, both raising the aggregate cost of meeting its emission reduction targets, as well as the possibility of creating competitive distortions. For example, one firm or sector may complain that it is unfairly penalised because it is being regulated by a carbon budget while its competitors are being regulated by a carbon tax (or vice versa). While this risk is already inherent in the use of company-specific carbon budgets, this only relates to the differential application of the same policy instrument; the risks are likely to be much greater when different instruments are applied to different firms.

It is most relevant to consider the issue of different instruments for different firms for the cases of Eskom and Sasol. The large proportion of South Africa’s emissions that come from these two companies make consideration of the effective regulation of these companies very important. Moreover, treating the emissions from these firms separately would increase the feasibility of using a hybrid instrument with trading elsewhere in the economy, which, due to the large proportion of emissions accounted for from these firms, could otherwise be challenging.

While there are a number of disadvantages to treating Eskom differently from other firms, there are also arguments that suggest that these downsides may be smaller than if such differential treatment was applied to other firms. The downsides relate to the challenges associated with applying different instruments to different emissions in the economy, as described above. However, it may be worth considering the separate treatment of Eskom under an approach more akin to

---

5 In addition to the intrinsic disadvantages associated with the use of each individual instrument in a particular context i.e. that carbon taxes do not provide emissions certainty, that carbon budgets may be cost ineffective.

6 In addition to the intrinsic advantages associated with the use of each individual instrument in a particular context i.e. that carbon taxes are cost effective, that carbon budgets provide emissions certainty.
Integrating the carbon tax and carbon budgets in South Africa

budget, while adopting a carbon pricing approach that involved trading elsewhere in the economy. There are a number of reasons may be valuable and/or may not be as problematic as a differential approach for other actors in the economy:

– A carbon price applied to the power sector would ordinarily be expected to be passed through into higher electricity prices. This is made challenging by the current and likely future economic context in South Africa. At the same time, if electricity prices are not passed through then one of the primary sources of abatement associated with a carbon price (demand side abatement) would not be realised.

– A carbon price relies on firms making commercial decisions in response to the price incentive it creates. The ownership structure of Eskom may mean that Eskom takes decisions according to a wide range of factors, balancing commercial and non-commercial. This may render the impact of the carbon price on its operational and investment decisions less effective than the same policy would on a privately owned firm. By contrast, planning documents, such as the Integrated Resource Plan (IRP), and which could form the basis of a carbon budget type instrument for Eskom and the rest of the electricity generation sector, may be a more effective instrument to change the firm’s behaviour.

– The large capital investments made by Eskom may be subject to carbon ‘lock-in’ which would not be effectively addressed by a carbon price, but which could be tackled by a more targeted approach.

– The nature of the South African power sector means that Eskom faces limited competition (especially as renewable production is supplied under long-term fixed price contracts) and so issues of competitive distortion may not be so prevalent.

For this approach to be credible, policymakers would need to be confident that the budget-type approach used for Eskom would be effective at reducing its emissions.

For Sasol, it may be considerably more difficult to justify separate treatment under a budget approach. While the large proportion of emissions, and risk of lock-in, is still significant, the larger number of competitors that Sasol faces, across a number of different sectors of the economy, may pose too great a risk in terms of competitive distortion, although this may be mitigated if Sasol would also be significantly more detrimentally impacted by a carbon tax than its competitors.
### 6.5 Scoring overview

Table 8 summarises the scores of all considered interface options.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Layering</th>
<th>Tax used to enforce the budget</th>
<th>Hybrid</th>
<th>Baseline and credit</th>
<th>Differentiated instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Budget with tax on emissions above budget</td>
<td>Budget with tax on all emissions if budget exceeded</td>
<td>Emissions Trading Scheme</td>
<td>Baseline and credit - absolute emissions</td>
</tr>
<tr>
<td>Environmental effectiveness</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
</tr>
<tr>
<td>Environmental certainty</td>
<td>●</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>○</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
</tr>
<tr>
<td>Fairness and equity</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
<td>◔</td>
</tr>
</tbody>
</table>
7 Conclusions [to be completed]
Integrating the carbon tax and carbon budgets in South Africa

References


Appendix A: National Documents

The South African principles to score interface options are based on several South African policy documents as well as international experience. Figure 5 shows the national documents used to derive the principles. The following provides an overview of the principles in each document which have been synthesised in Section 2.

Figure 5. Three categories of national documents have been considered

Overarching national policy documents
- National Development Plan (Ch 5)

DEA documents
- National Climate Change Response White Paper
- South Africa’s Intended Nationally Determined Contribution
- Carbon Budget Design Document

NT documents
- Environmental fiscal reform paper
- Carbon Tax Options discussion paper
- Carbon Tax Policy Paper

Source: Vivid Economics, DNA Economics and Tyler
Overarching national policy documents

**Box 1. National Development Plan**

The National Development Plan identifies 14 explicit principles

1. **Just ethical and sustainable.** Recognise the aspirations of South Africa as a developing country and remain mindful of its unique history.
2. **Global solidarity.** Justly balance national interests with collective action in relation to environmental risks and existential threats.
3. **Ecosystems protection.** Acknowledge that human wellbeing is dependent on the health of the planet.
4. **Full cost accounting.** Internalise both environmental and social costs in planning and investment decisions, recognising that the need to secure environmental assets may be weighed against the social benefits accrued from their use.
5. **Strategic planning.** Follow a systematic approach that is responsive to emerging risk and opportunity, and which identifies and manages trade-offs.
6. **Transformative.** Address the structural and systemic flaws of the economy and society with strength of leadership, boldness, visionary thinking and innovative planning.
7. **Managed transition.** Build on existing processes and capacities to enable society to change in a structured and phased manner.
8. **Opportunity-focused.** Look for synergies between sustainability, growth, competitiveness and employment creation, for South Africa to attain equality and prosperity.
9. **Effective participation of social partners.** Be aware of mutual responsibilities, engage on differences, seek consensus and expect compromise through social dialogue.
10. **Balance evidence collection with immediate action.** Recognise the immediate tools needed for informed action.
11. **Sound policy-making.** Develop coherent and aligned policy that provides predictable signals, while being simple, feasible and effective.
12. **Least regret.** Invest early in low-carbon technologies that are least-cost, to reduce emissions and position South Africa to compete in a carbon-constrained world.
13. **Regional approach.** Develop partnerships with neighbours in the region to promote mutually beneficial collaboration on mitigation and adaptation.
14. **Accountability and transparency.** Lead and manage, as well as monitor, verify and report on the transition.
DEA documents
**Box 2. National Climate Change Response White Paper**

The White Paper identifies 9 explicit principles:

1. **Common but differentiated responsibilities and respective capabilities.** Aligning our domestic measures to reduce the country’s GHG emissions and adapt to the adverse effects of climate change with our unique national circumstances, stage of development and capacity to act.

2. **Equity.** Ensuring a fair allocation of effort, cost and benefits in the context of the need to address disproportionate vulnerabilities, responsibilities, capabilities, disparities and inequalities.

3. **Special needs and circumstances.** Considering the special needs and circumstances of localities and people that are particularly vulnerable to the adverse effects of climate change, including vulnerable groups such as women, and especially poor and/or rural women; children, especially infants and child-headed families; the aged; the sick; and the physically challenged.

4. **Uplifting the poor and vulnerable.** Climate change policies and measures should address the needs of the poor and vulnerable and ensure human dignity, whilst endeavouring to attain environmental, social and economic sustainability.

5. **Intra- and Inter-generational sustainability.** Managing our ecological, social and economic resources and capital responsibly for current and future generations.

6. **The Precautionary Principle.** Applying a risk-averse and cautious approach, which takes into account the limits of current knowledge about the consequences of decisions and actions.

7. **The Polluter Pays Principle.** Those responsible for harming the environment paying the costs of remediing pollution and environmental degradation and supporting any adaptive response that may be required.

8. **Informed participation.** Enhancing public awareness and understanding of climate change causes and impacts to promote participation and action at all levels.

9. **Economic, social and ecological pillars of sustainable development.** Recognising that a robust and sustainable economy and a healthy society depends on the services that well-functioning ecosystems provide, and that enhancing the sustainability of the economic, social and ecological services is an integral component of an effective and efficient climate change response.

**And a further 6 factors that will guide the overall approach to its climate response**

1. **Needs-driven and customised** – Employing a wide range of different types of adaptation and mitigation approaches, policies, measures, programmes, interventions and actions consistent with the principles outlined above, but in particular, that meet the special needs and circumstances of those most vulnerable as well as being specifically tailored to the potential, best available solutions and other relevant conditions related to the specific actor, organisation, sector or sub-sector concerned;

2. **Developmental** – Prioritising climate change responses that have both significant mitigation and adaptation benefits and that also have significant economic growth, job creation, public health, risk management and poverty alleviation benefits;

3. **Transformational, empowering and participatory** – Implementing policies and measures to address climate change at a “scale of economy” that enables and supports the required level of innovation, sector and skills development, finance and investment flows needed to reap the full
benefit of a transition to a lower-carbon, efficient, job-creating, equitable and competitive economy. The transition will necessarily be supported and enabled by policies and measures to empower and promote the participation of all citizens through changing their behaviour to more sustainable lifestyles and livelihoods. This policy is therefore part of the broader social and economic transformation … and is fundamentally underpinned by a major shift towards sustainable consumption and production patterns, which decouples growth and development from any negative impacts on the environment and society;

4. **Dynamic and evidence-based** – Recognising that this policy has not been developed in a vacuum and many sectors have already researched and have experience in implementing policies and measures to address the challenges of climate change

5. **Balanced and cost effective** – Implementing a balanced approach to both climate change mitigation and adaptation responses in terms of cost-benefit, prioritisation, focus, action and resource allocation

6. **Integrated and aligned** – Providing for the integration of sector-related climate change responses into the relevant sector planning processes and their developmental policies and measures.
Box 3.  Carbon Budget Design Document

The Carbon Budget Design Document identifies principles in relation to coverage, company selection and budget allocation

Coverage principles

1. **Consistency between allocation and accounting** – coverage of gases and activities should be identical with respect to any emissions data which is used for allocating carbon budgets, and any emissions data which is used at the end of Phase 1 of the carbon budgeting period to determine whether a company has exceeded its budget or not.

2. **Consistency between accounting and reporting** – since the accounting process will be wholly dependent on the reporting process envisaged in the draft GHG reporting regulations:
   i. no data which is not reported will be eligible for use in the accounting process;
   ii. the basis for reporting and accounting should be identical with respect to gases, emission factors and common metrics.

Companies to be allocated carbon budgets

1. **Company definition** - person undertaking a greenhouse gas emitting activity as listed in the “IPCC Guidelines for National Greenhouse Gas Inventories (2006)”. To include:
   - Coal mining
   - Production and/or refining of crude oil
   - Production and/or processing of natural gas
   - Production of liquid fuels from coal or gas
   - Cement production
   - Glass production
   - Ammonia production
   - Nitric acid production
   - Carbon black
   - Iron and steel production
   - Ferro-alloys production
   - Aluminium production
   - Polymers production
   - Pulp and paper

Budget allocation in Phase 1

1. **Support for existing operations** – which means that CBs will be allocated to companies based on their existing emissions for their existing operations. No expectation that firms will undertake additional mitigation.

2. **Any planned changes to emissions as a result of a change in emissions intensity, planned expansion**. Allowance will be made for existing expansion plans for the budgeting period, based on the requisite information being provided by the company on planned expansions.
Box 4. Carbon Tax Options discussion paper

The 2010 carbon tax paper identifies 7 ‘issues which must be carefully addressed in carbon tax design’

1. **Environmental effectiveness** – The ability of the tax to reduce GHG emissions.
2. **Rate of tax** – To the degree possible, the tax rate should be aligned with the marginal external damage costs of each additional unit of CO2emissions.
3. **Distributional implications** – Government should take measures – either in tax design or through complementary expenditure programmes – to offset the burden such a tax will place on poor households.
4. **Competitiveness** – Industries that participate in international trade might be at a disadvantage when competing with countries that do not price carbon.
5. **Technical and administrative feasibility** – Consideration needs to be given to whether the tax is placed on carbon emissions or a proxy for such emissions (e.g. fuel inputs or outputs). The administrative and compliance costs of implementing the tax should be weighed against the need to create the correct incentives.
6. **Aligning policy objectives** – The tax should be aligned with other government policy interventions. For example, policies to reduce energy sector carbon emissions should not be accompanied by policy measures that seek to encourage such emissions.
7. **Legislative provisions** – Robust legislation should provide certainty to the taxpayer and minimise opportunities for tax avoidance and evasion.
The environmental fiscal reform paper identifies 8 criteria for assessing environmental taxes

- Environmental effectiveness. There should, as far as possible, be a clear environmental objective and the tax must be well targeted to that objective.

- Tax Revenue. The level of tax revenues and the way in which they are used are important considerations. Certain environmentally-related taxes will be capable of raising significant amounts of revenue, particularly where the demand for the good or service being taxed is price inelastic.

- Support for the tax. Taxes are necessary to fund government activities and the provision of public goods and services. With every tax reform, there are likely to be winners and losers and these groups of stakeholders need to be clearly identified.

- Legislative aspects. The Minister of Finance is responsible for the imposition of taxes, duties and levies. Different environmentally-related tax instruments may require different legislative amendments.

- Technical and administrative issues. Ideally, the tax base should be as close as possible to the environmental objective although in certain cases, a proxy may be required. Where there is a clear environmental objective, the tax rate should be set according to the level of the externality. Where this is not possible, the tax rate must be sufficient to achieve the environmental (and/or fiscal) objective. Minimising the possibilities of tax avoidance, tax evasion, compliance and collection costs are other important design considerations.

- Competitiveness effects. The impact of environmentally-related taxes on domestic industries and other aspects of the economy such as employment and inflation are of critical importance. Where impacts on competitiveness are deemed ex ante to be unacceptable, mitigation measures may need to be considered.

- Distributional impact. The possibility of making environmentally-related taxes progressive should be integral to the design of any proposed instrument. Where there are likely to be adverse impacts on income distribution, mitigation or compensation measures may need to be considered.

- Adjoining policy areas. The extent to which environmentally-related taxes can assist in meeting other government policy objectives is an important consideration. The extent to which environmentally-related taxes can be designed to contribute to policy goals such as job-creation, poverty alleviation and the expansion of basic services is also important.
Company Profile

Vivid Economics is a leading strategic economics consultancy with global reach. We strive to create lasting value for our clients, both in government and the private sector, and for society at large.

We are a premier consultant in the policy-commerce interface and resource- and environment-intensive sectors, where we advise on the most critical and complex policy and commercial questions facing clients around the world. The success we bring to our clients reflects a strong partnership culture, solid foundation of skills and analytical assets, and close cooperation with a large network of contacts across key organisations.