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South African Approach to Carbon Tax and Implications to the Cement Sector

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ABSTRACT

The South African Cabinet published the draft Carbon tax Bill in November 2015 to introduce fiscal measures to reduce greenhouse gas (GHG) emissions below business as usual by 34 per cent by 2020 and 42 per cent by 2025, as well as adaptation measures to complement other national climate response measures as outlined in the 2011 National Climate Change Response Policy (NCCRP) and the National Development Plan as outlined in South Africa's Intended Nationally Determined Contributions (INDCs) submitted to the United Nations Conference of Parties (COP) 21 of the United Nations Framework Convention on Climate Change (UNFCCC) in Paris.

The Price of carbon has been set at R120/ton CO₂ emissions. The purpose is for the polluter to

- Internalise the external costs of emitting carbon, and
- Contribute towards addressing the harm caused by such pollution.

The carbon tax regime has included various allowances, which includes the following:

- Basic allowance
- Process allowances
- Performance allowance
- Offset allowance
- Trade exposure allowance
- Carbon budget allowance, and
- Fugitive emissions allowance

Treasury has also indicated that the revenue collected will be utilized for revenue recycling and neutrality.

The paper describes the implications to the cement sector in South Africa.

INTRODUCTION

South Africa is planning to introduce a mix of measures to effectively curb greenhouse gas emissions (GHG) without compromising growth and economic development.

The South African Cabinet published the draft Carbon tax Bill in November 2015 (National Treasury 2015) to introduce fiscal measures to reduce greenhouse gas (GHG) emissions below business as usual by 34 per cent by 2020 and 42 per cent by 2025, as well as adaptation measures. This is to complement other national climate response measures as outlined in the 2011 National Climate Change Response Policy (NCCRP) (Department of Environmental Affairs 2011) and the National Development Plan (National Planning Commission 2014) as outlined in South Africa’s Nationally Determined Contributions (INDCs) submitted to the United Nations Conference of Parties (COP) 21 of the United Nations Framework Convention on Climate Change (UNFCCC) in Paris.

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The Carbon tax Bill has been informed by various stakeholders and activities carried out by different government Departments. For example, the Department of Environmental Affairs published the MPA (Mitigation potential analysis) in 2014 (Department of Environmental Affairs 2014), which set mitigation actions for 2020, 2030, and 2050. In the case of 2020, all interventions with a cost of zero Rands (or less) per ton are used as basis for desired emission reduction outcomes (DEROs). The Department of Environment is currently reviewing carbon budgets submitted by various Industries on a voluntary basis. This will provide better insight into sub-sectoral carbon emissions trajectories.

Table 1 below summarises the carbon tax implications for the cement sector.

Table 1. Carbon tax allowances applicable to the cement sector

Cement sector	Basic tax-free allowance for fossil fuel combustion emissions %	Basic tax-free allowance for process emissions %	Fugitive emissions allowance %	Carbon budget allowance	Trade exposure allowance %	Z-factor allowance %	Offsets allowance %	Maximum total allowances %
PROCESS	0	70	0	5	10	5	5	95
ENERGY	60	0	0	5	10	5	10	90

Table 2 below summarises the key mitigation measures included for the cement sector in the published MPA as informed by the mitigation action cost curves.

DISCUSSION: ANALYSIS OF THE CARBON TAX REGIME IN THE CONTEXT OF CEMENT PRODUCTION

As can be noted from Table 1 above, the carbon tax regime has incorporated various allowances, which includes the following:

- Basic allowance
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Table 2. Mitigation measures included for the cement sector in the published MPA

Abatement measure	% Sector uptake			
	2020	2030	2050	
TECHNOLOGY AND PLANT/KILN CAPABILITIES				
Multistage cyclone preheaters and precalciner <ul style="list-style-type: none"> Implement kiln systems with multistage cyclone preheaters and precalciner. 	0%	0%	0%	
Waste heat recovery from kilns and coolers/cogeneration <ul style="list-style-type: none"> Energy recovery from kilns and coolers for cogeneration (e.g. Conventional steam cycle process and Organic Rankine Cycle (ORC) process). Uses of recovered excess heat from clinker coolers or kiln off-gases to be explored (district heating?). <p style="text-align: right;"><i>Costs could be prohibitive</i></p>	0%	50%	50%	
THERMAL ENERGY				
Improved process control: Optimise clinker burning process <ul style="list-style-type: none"> To reduce the heat consumption, To improve the clinker quality Increase the lifetime of the equipment (the refractory lining, for example) by stabilising process parameters. Reduction of emissions, such as NO_x, SO₂ and dust, are secondary effects of this optimisation <p style="text-align: right;"><i>Costs could be prohibitive</i></p>	100%	100%	100%	
ALTERNATE FUELS AND RESOURCES (AFR): FUEL MIX				
Fuel mix Substitution of fuels with different hazardous and non-hazardous wastes materials with high enough calorific value and low moisture content (e.g. Wood, paper, cardboard, Textiles, Plastics, RD, Rubber/tyres, Industrial sludge, Municipal sewage sludge, Animal meal and fats, Coal/carbon) <p style="text-align: right;"><i>Security of supply depends on an enabling waste regulatory framework</i></p>	50%	100%	100%	
ELECTRICAL ENERGY				
Reduction of energy consumption (energy efficiency)	Energy monitoring and management system	100%	100%	100%
	Improved electric motor system controls and variable speed drives	50%	100%	100%
	Energy-efficient utility systems	50%	100%	100%
CLINKER SUBSTITUTES				
Reduction of clinker content of cement products by using extenders	50%	100%	100%	
Geopolymer cement production: <p style="text-align: center;"><i>Geopolymer cements have been commercialised in small-scale facilities, but have not yet been used in large-scale applications where strength is critical.</i></p>	50%	100%	100%	
CARBON CAPTURE AND STORAGE				
CCS - back-end chemical absorption: Post-combustion technologies: end-of-pipe mechanisms that would not require fundamental changes in the clinker-burning process, and so could be available for new kilns and in particular for retrofits: <p style="text-align: right;"><i>Costs could be prohibitive</i></p>	0%	0%	50%	
CCS – oxyfuelling: Oxyfuel technology (oxygen use instead of air in cement kilns, resulting in a fairly pure CO ₂ stream). <p style="text-align: center;"><i>Extensive research is still required to understand all potential impacts on the clinker burning</i></p> <p style="text-align: right;"><i>Costs could be prohibitive</i></p>	0%	0%	25%	

The following concerns have been expressed by the cement industry in South Africa:

- **Basic fossil fuel allowance**

The 60% allowance for fossil fuel combustion is appreciated for energy-based emissions. This is a general allowance provided to all sectors.

- **Basic Process allowances**

The 70% allowance for process related emissions is not considered appropriate by the cement sector as the emissions are chemistry based and consequently there is no opportunity for reducing emissions from the limestone related CO₂ when used as a raw material.

It is the sector's view that process related emissions must be exempted in cases where emissions are based on stoichiometry (limestone in the case of cement) and that the carbon tax focus on energy mitigation options. This will also facilitate the implementation of the national waste management strategy and use of alternate fuels and resources. South Africa is a developing country and suitable cost effective technology is recognized post 2030 by the Mitigation potential analysis (MPA) published by the Department of Environmental Affairs.

Significant reductions can only be made on the availability of suitable/advanced technology and or use of alternate cement materials replacing limestone based cement. Thus, the cement sector in South Africa has actively focused on mitigation actions that address combustion related emissions such as clinker replacement, alternative fuels, energy efficiency etc.

It is thus the cement sector's views that the carbon tax should not be applied to process emissions and only combustion and energy related emissions be subject to carbon tax.

- **Offset allowance**

Treasury published a position paper on offsets and defined an offset as "A carbon offset is an (external) investment that allows a firm to access GHG mitigation options in a manner that is cheaper than investment in its own operations (National Treasury. Carbon Offset Paper. 2013)

Carbon offsets typically involve investment in specific projects or activities that reduce, avoid, or sequester emissions. These projects are developed and evaluated under specific methodologies and standards, allowing carbon credits to be issued. Carbon offsets are also guided by principles that need to be fulfilled for a project to be awarded carbon credits under a specific standard.

The publication also provides direction to those projects that would be considered eligible vs those not eligible.

- **Trade exposure allowance**

The proposed carbon tax regime has only considered allowances for exports and the relief is calculated on a sliding scale based on the percentage of exported sales.

The sector has not agreed to the approach, as the cement producers are vulnerable to imports from countries that have preferential treatment in both their exports and environmental regulatory framework. This poses a major **a major challenge to domestic cement sector sustainability.**

Furthermore, exports from South Africa is difficult to undertake due to

- Transport network being a challenge: rail, road infrastructure requires development,
- Locality of cement producers is far from borders of the country.

It is thus the sector's view that trade exposure vulnerability must be informed by both the levels of imports and exports as well as socio-economic conditions.

- **Carbon budget allowance**

The carbon budget approach as part of the mix of measures is outlined in National Climate Change Response White Paper and entails the *use of quantity-based policy instruments to achieve 'desired emission reduction outcomes' (DEROS) at sector, sub-sector, company, or entity level* (Department of Environmental Affairs (DEA), National Climate Change Response Policy 2011).

Government is currently developing a position paper to align carbon tax, carbon budgets, DEROs, etc with the objective of refining the SA emissions trajectory.

Due to uncertainty of the alignment process, for the first phase (up to 2020) the tax regime has included a 5% allowance to companies that *submit* a carbon budget to inform future carbon tax approaches.

The sector has agreed to support the project to inform a revised cement sector trajectory.

- **Fugitive emissions allowance**

Not applicable for the cement sector

- **Performance allowance**

Treasury undertook some research to inform benchmarks for various sectors as a starting point to engage with sectors to best select an appropriate benchmark.

In the case of cement production their choice of benchmark points to heat consumption for clinker production (National Treasury. Benchmarks 2014).

The ACMP members reviewed various indicators and benchmarks and concluded that the following three key indicators could be considered to inform a suitable benchmark for South Africa. These include:

- CO₂ emissions per unit of cement produced
- Use of alternate fuels and resources
- Heat consumption for clinker production

These indicators are also included in the WBCSD-CSI cement roadmap and hence there would be alignment to international approaches (World Business Council. 2050 WBCSD-CSI cement roadmap. 2013).

Further review of these indicators to inform a national benchmark suggested that heat consumption for clinker production would be most appropriate. The other two indicators were excluded to inform a benchmark for the following reasons:

CO₂ emissions per unit of cement produced

As can be noted from figure 1 below, the South African sector is already in compliance with the 2050 WBCSD-CSI cement roadmap and hence would be not an appropriate benchmark to consider.

Use of alternate fuels and resources

As recognized by the WBCSD-CSI (World Business Council-CSI), developing countries are lagging behind in the use of alternate fuels and resources. This is also the case for South Africa as can be noted from Table 2.

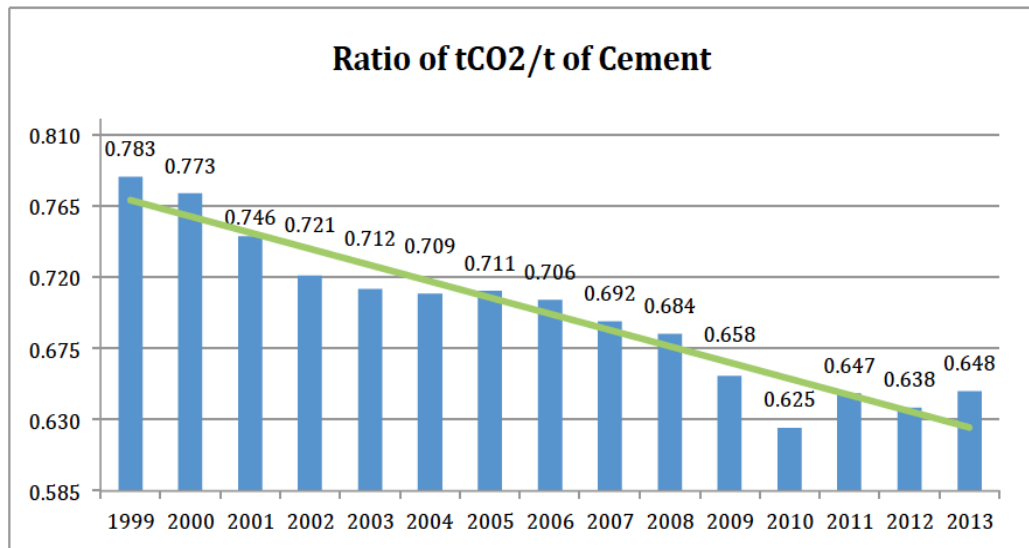


Figure 1. CO₂ emissions per unit of cement produced in South Africa

Table 2. Alternate fuels substitution rates

Year	Secondary Materials used as Energy (tonnes)*	Coal (tonnes)*	Coal Replacement *
2011	9 430	830 248	1.14 %
2012	8 759	824 851	1.06 %
2013	20 562	852 456	2.41 %

**Two members' figures*

The major contributing factor for the low substitution rates is the historic national approach to waste management, which favours landfilling. The national waste management strategy (NWMS) has recognized the hierarchy of waste principles and there is much focus being placed on establishing alternate waste management practices (Department of Environmental Affairs. National waste management strategy 2011).

There is thus a challenge to secure a steady state of alternate fuels and hence it would not be an appropriate benchmark, as the programme would be informed by external developments relying on the implementation of the hierarchy of waste principles. This benchmark could be reviewed in the future once the appropriate regulatory framework to implement sound waste management principles are in place. The ACMP is actively participating in supportin Government to develop various approaches. It is noteworthy that AFOLU and Waste sectors would not be subject to carbon tax for the first phase.

Use of national inventory to inform company based emissions

The national GHG inventory utilises IPCC methodology to determine sector-based emissions. However, for tax purposes it is important that *avoided emissions* due to appropriate mitigation actions be considered, as these emissions could otherwise be a consequence of landfilling and/or incineration.

CONCLUSION

The ACMP appreciates the approach adopted by Government to introduce a mix of measures in response to its action on climate change. While the national Treasury has committed to revenue recycling, it is apparent that the revenue collected will not have company level benefits but will address national initiatives to meet it's national challenges by ensuring that emitters

- Internalise the external costs of emitting carbon, and
- Contribute towards addressing the harm caused by such pollution

However, in the case of the current carbon tax design it does not adequately address challenges faced by the cement sector as well the developmental state of the country. Particular emphasis on exemption of limestone-based emissions should be considered. The Department of Environmental Affairs published MPA (Mitigation potential analysis) in 2014, which set mitigation actions for 2020, 2030, and 2050 summarises the key mitigation options and takes into account process related emissions cannot be mitigated unless the use of the raw material (limestone) is effected.

It is also noteworthy that Treasury will be relying on the data submitted to the national inventory in line with IPCC GHG reporting template. It is thus important that any tax regime designed allow for corrections concerning the following energy sources

- Biomass
- Alternate fuels and resources (AFR)

The WBCSD-CSI has made reference in the GHG GNR protocol to adjustments as follows:

- Subtracts biomass related emissions to inform **Gross emissions**
- Further subtracts alternate fuels and resources (AFR) to inform **Net emissions**

Thus, the approach to allow for avoided emissions based on net emissions requires an international approach to inform reviewing the IPCC guidelines accordingly to further inform the memo item to enable tax Authorities to confirm company level net emissions. The IPCC guidelines provide an excellent methodology to inform national inventories. It is thus recommended that the IPCC Guidelines consider including methodologies to account for adjustments to address company-based sequestration and avoided emission interventions thereby expanding the scope to better understand company mitigation actions in terms of net GHG emissions. This will provide some level of information on intersectoral GHG emission trajectories when comparing mitigation actions between IPCC defined sectors.

REFERENCES

Department of Environmental Affairs (DEA), National Climate Change Response Policy (NCCRP).
2011a. *National Climate Change Response White Paper*. Pretoria: DEA

Department of Environmental Affairs. Mitigation potential analysis (MPA): Department of Environmental Affairs, 2014: The South African Greenhouse Gas Mitigation Potential Analysis Pretoria, Department of Environmental Affairs.

Department of Environmental Affairs. National waste management strategy (NWMS). November 2011

Department of Environmental Affairs. South African Intended Nationally Determined Contribution to the UNFCCC 2015.

http://www.environment.gov.za/sites/default/files/legislations/national_climatechange_response_whitepaper.pdf

<http://www.poa.gov.za/news/Documents/NPC%20National%20Development%20Plan%20Vision%202030%20lo-res.pdf>

<http://www.treasury.gov.za/public%20comments/Carbon%20Tax%20Policy%20Paper%202013.pdf>

http://www.wbcscement.org/pdf/tf1_co2%20protocol%20v3.pdf

<http://www4.unfccc.int/submissions/INDC/Published%20Documents/South%20Africa/1/South%20Africa.pdf>

<https://www.environment.gov.za/sites/default/files/docs/mitigationreport.pdf>

https://www.environment.gov.za/sites/default/files/docs/nationalwaste_management_strategy.pdf

https://www.environment.gov.za/sites/default/files/docs/nationalwaste_management_strategy.pdf

<https://www.iea.org/publications/freepublications/publication/Cement.pdf>

National Planning Commission. National Development Plan 2030. Our Future-make it work.ISBN: 978-0-621-41180-5. Sherino Printers.

National Treasury. Benchmarks: Ecofys: Emissions intensity benchmarks for the South African carbon taxor inti Technic support study - Final Report – 28 October 2014.

http://www.treasury.gov.za/publications/other/GHG_Emissions_Intensity_Benchmarks_for_SA_Carbon_Tax.pdf

National Treasury. Carbon Offset Paper

National Treasury. Carbon tax Bill 2015: www.treasury.gov.za

World Business Council. 2050 WBCSD-CSI cement roadmap.www.wbcscement.org/technology ;

World Business Council-CSI. The Cement CO₂ and Energy Protocol. CO₂ and Energy Accounting and Reporting Standard for the Cement Industry. Version 3.0. 2011

www.iea.org/roadmaps/cement.asp ;