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Carbon taxation in South Africa and the risks of carbon border adjustment mechanisms

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Abstract

South Africa has a high carbon intensity and a very low effective carbon price. This exposes the country to adverse economic shocks from carbon border adjustment mechanisms (CBAM) and changing consumer sentiments. Current impact assessments of the European Union's CBAM suggest small initial impacts, but these are likely to increase as (1) more goods and services become subject to the adjustment, (2) more countries implement such mechanisms, and (3) consumer choices shift away from carbon- intensive products. South Africa needs a higher, more predictable, and effective carbon price to drive the green transition and avoid revenue leakage. The additional government revenues can promote clean investment and reduce some of the negative impacts associated with carbon taxation. Economic and financial frictions to transitioning should be reduced by using a combination of price and non-price instruments. The focus of policy should be on how to position South Africa as a green production destination relative to other countries and consequently, reduce the exposure to CBAM's and changing consumer sentiments.

1. Overview

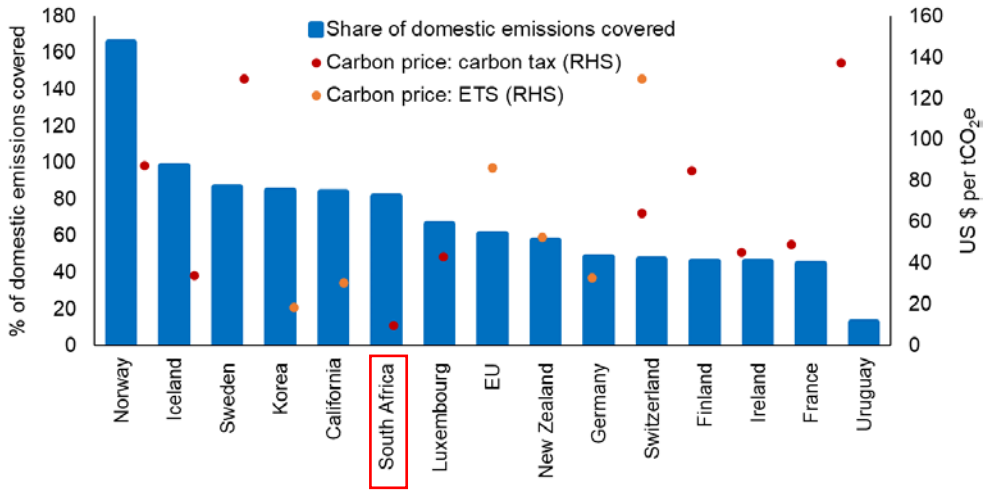
South Africa's carbon intensity remains high, but its domestic carbon price is low compared to its major trading partners in advanced economies. This exposes the country's exports to climate-related trade restrictions such as the European Union's carbon border adjustment mechanism (EU CBAM). Other countries such as the US, Canada and Japan are also considering the implementation of carbon border adjustment measures (Merven et al, 2023).

In this note, we discuss the implications for South Africa's exports from the introduction of the EU CBAM – South Africa's largest trading partner bloc. The results suggest small impacts initially, but these are likely to increase as the coverage of the adjustment mechanism increases. The impacts can be offset if South Africa reduces the carbon intensity of production more rapidly or introduces a higher carbon tax to reduce the revenue leakage associated with low domestic carbon prices and border adjustment mechanisms. Effective use of this additional tax revenue can accelerate the green transition and position South Africa as a green producer.

2. South Africa's carbon problem

South Africa's 1% share of global greenhouse gas (GHG) emissions is the lowest among the top fifteen emitters[1] (World Resource Institute, 2023). Carbon intensity of output, however, is one of the highest in the world, making South Africa a net exporter of carbon (Deidda and Harris, 2022). At the same time, the effective carbon tax[2] is one of the lowest (Figure 1 below).

Figure 1: Carbon pricing in selected economies



Source: IMF (2023), and authors calculations.

South Africa's carbon tax was introduced in June 2019 in a phased approach to ease the transition to net zero. The official tax was set at a rate of R120 (or about US$7) per tonne of CO_2e in phase one and increased to R134 (or about US$8) by the end of 2022 (National Treasury, 2018 and Qu et al, 2023). However, the tax-free allowances to cushion the potential adverse impacts on energy intensive sectors such as mining, and iron and steel (see annexure A for the full list of allowances), the coverage of only direct emissions[3] and the exemption of Eskom[4] implied an initial effective carbon tax rate range as low as R6 to R48 (or about US$0.30 to US$2.60) per tonne of CO_2e. This compares with a global average of US$6 by the end of 2022 (Parry et al., 2022).

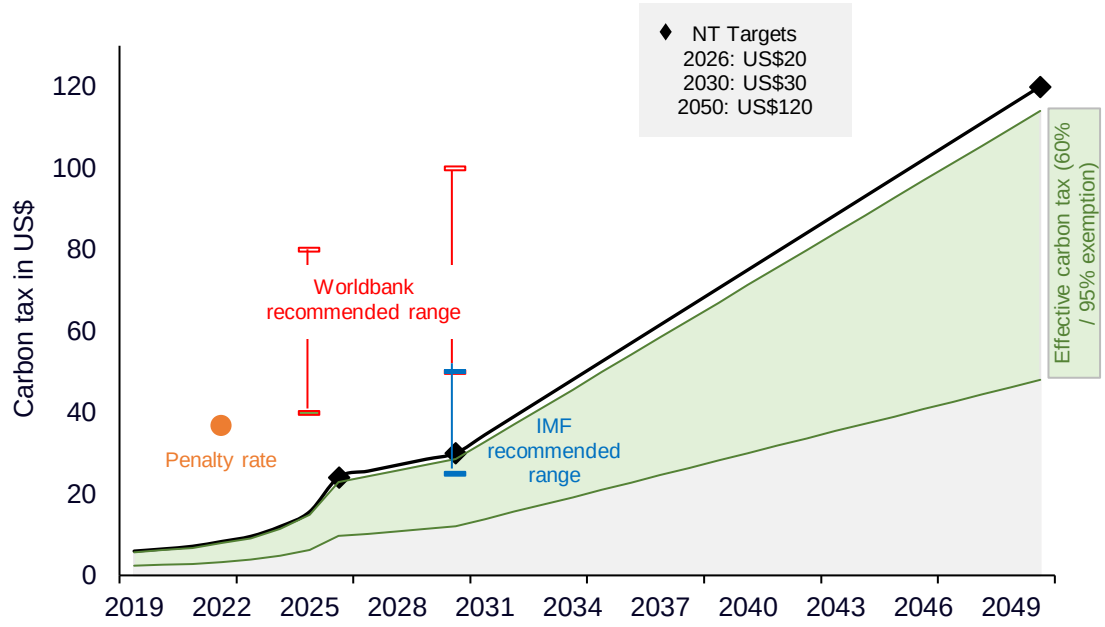
1 Climate Watch (World Resource Institute climate data platform) as of March 2023.

2 The price of carbon remains low even if we consider the impact of non-price instruments, see for example, Mavundla and Makrelov (2023).

3 The technical term is *scope 1* emissions. They result directly from fuel combustion and gasification, and from non-energy industrial processes. This includes include carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride.

4 Eskom is South Africa's primary electricity provider and largest carbon emitter (80% of total emissions). It's exclusion from phase one of the carbon tax is mainly driven by financial limitations and debilitating debt (National Assembly, 2021).

Figure 2: South Africa's carbon tax



Source: IMF (2023), World Bank (2023) and the National Treasury (2022).

The National Treasury is targeting an increase to US$30 by 2030 as shown in Figure 2 above. However, the extension of South Africa's phase one carbon tax from the end of 2022 to the end of 2025, together with an uncertain future trajectory and lack of clarity on future exemptions and the use of carbon budgets points to an effective carbon tax rate that is likely to remain well below the IMF's recommended US$50 by 2030 for emerging markets (Parry et al., 2022), and far below the implied carbon price of above €90 per tonne CO_2e (or US$100) currently traded on the EU ETS carbon market (Ember Carbon Price Tracker, 2023).

3. A brief overview of the EU CBAM

The European Parliament in April 2023 approved the design and implementation of a phased-in CBAM to replace the free allocation of allowances under the current emission trading system (ETS)[5] for the most trade-exposed emitting sectors: iron and steel, cement, fertiliser, aluminium, hydrogen, and electricity (see Annexure B for the complete list of goods covered under the EU CBAM).

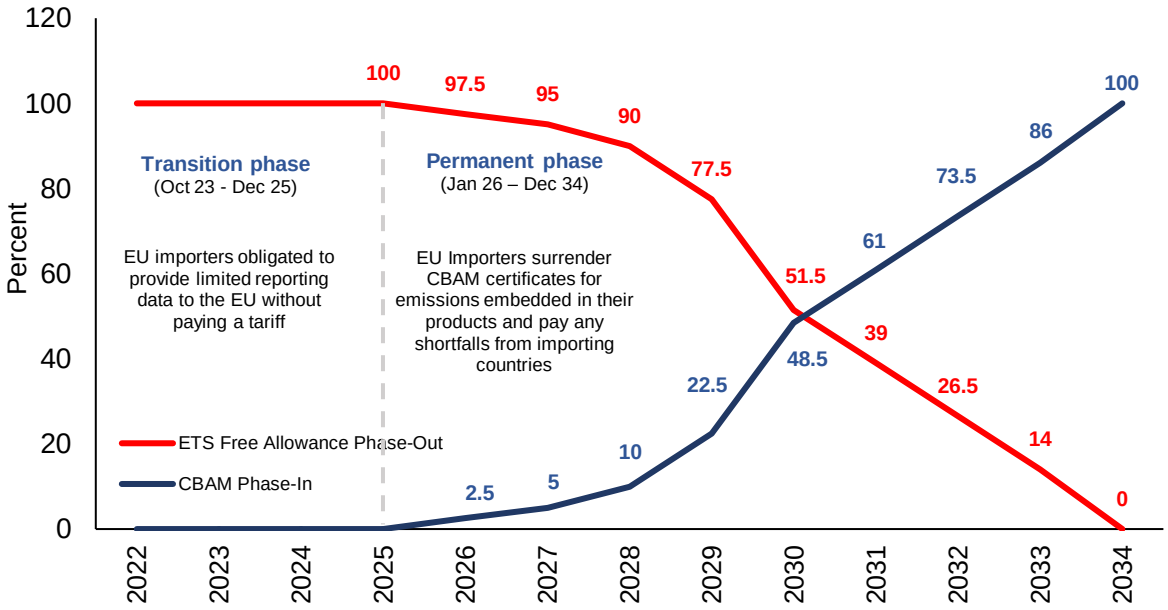
The CBAM aims to preserve the competitiveness of EU exports and prevent carbon leakage[6] by equalising the price of carbon between domestic products and imports in selected sectors. It will therefore function as a carbon price levied on the embedded carbon content of imports to the EU for which the embodied carbon emissions price is below the EU price. It is also intended to increase global climate action by encouraging countries that are subject to the EU

5 The EU ETS was established in 2005. It is a cap-and-trade system that sets an annual cap on the level of permissible emissions, with prices emerging indirectly from the auction of available allowances in the EU carbon market. As a result, the ETS price changes daily, both increasing and decreasing depending on supply and demand.

6 The European Commission (2023a) defines carbon leakage as a situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints. This could lead to an increase in their total emissions.

CBAM to raise their emissions targets and increase their own carbon price to allow them to both eliminate their export liability and benefit from the higher tax revenue for use in their own countries.

Figure 3: EU CBAM implementation timeline



Source: PWC (2022) and the European Commission (2022).

Over the transitional 2023-2025 period, traders will only have to report on the emissions embedded in their imports subject to the mechanism without paying any financial adjustment. This will give time for businesses to prepare as well as provide the necessary information to fine-tune the definitive methodology. From 2026 onwards, traders will need to disclose and pay for the emissions embedded in their imports using CBAM certificates. Payments will increase gradually as ETS free allowances are phased out, a process that will finish in 2034 at which point importers will become responsible for paying for 100 per cent of the carbon embedded in imported products (European Commission, 2023b).

4. Potential Impacts of EU CBAM on South Africa

The introduction of the EU CBAM will increase the cost of South African exports to European markets. This will reduce their competitiveness and hence the value of future exports to the EU. There are several studies that try to assess the impacts. This section combines the results of these studies to show the potential impact of CBAM for South Africa under three scenarios:

1. What happens to South African exports under the current EU CBAM proposal?
2. What happens to South African exports if the EU CBAM is extended to cover all goods and services and all direct and indirect emissions from upstream value chains?
3. What happens to South African Exports if all countries impose a CBAM?

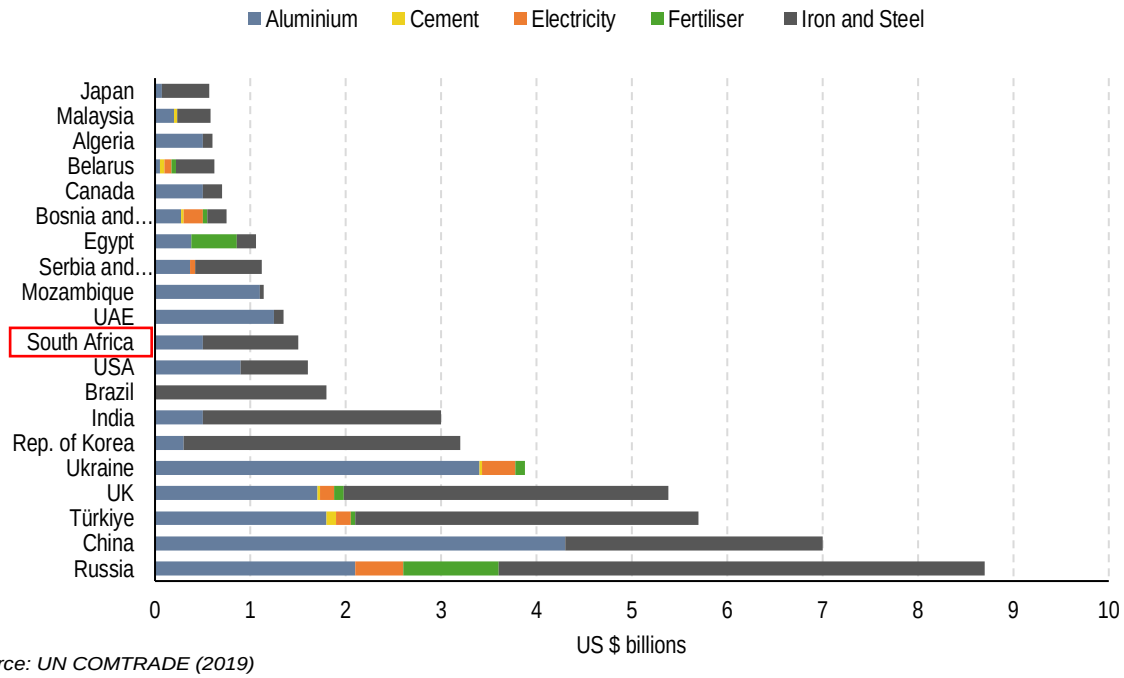
Our focus in answering these questions is on two studies that generate quantitative results for South Africa: Xiaobei et al., (2022) in a joint study by the IMF and The Task Force on Climate Development (TCD) and Merven et al. (2023) in a forthcoming working paper by the Transforming Social Inequalities through Inclusive Climate Action (TSITICA) project.

4.1 A brief overview of the literature

The European Commission conducted an impact assessment study that accompanied the EU CBAM proposal to assess the potential global spillover effects. So too the Banque de France (Bellora and Fontagné, 2022), however, their modelling analysis does not provide specific results for South Africa. The AFD (Magacho et al., 2022), UNCTAD, and Eicke et al. (2021) close this gap by identifying the most exposed EU trade partners and the export sectors at risk under the current agreement. The Presidential Climate Commission (PCC, 2023) and TIPS (Monaisa and Maimele 2023) do the same for South Africa, but there's no modelling work to quantify the impacts. Only two studies do this: Xiaobei et al., (2022) and Merven et al., (2023).

The results show that the current version of the EU CBAM will lead to a decline in trade flows to the EU by 2030 relative to a baseline with no CBAM. The most exposed countries are fellow BRICS nations Russia, China, and India as well as the Republic of Korea, Ukraine, and Türkiye (Eicke et al., 2021; UNCTAD, 2021; and Magacho et al., 2022). The impacts are set to be primarily channelled through the iron and steel, and aluminium sectors due to their high reliance of coal-powered electricity (PCC, 2023; Xiaobei et al., 2023; and Monaisa and Maimele, 2023) (Figure 4).

Figure 4: Exports to the EU in selected CBAM sectors, 2019 (excl hydrogen)



Source: UN COMTRADE (2019)

4.2 South African exports are at risk

The EU is South Africa's largest trading partner. In 2019, the share of total exports to the region was 19%, and the total value of exports subject to the EU CBAM was roughly US$1.5 billion or 1.6% of total exports (Monaisa and Maimele, 2023: 3 and Deidda and Harris, 2022). This has earned South Africa a spot in the list of top-20 countries most exposed to the EU CBAM (UNCTAD, 2021 and Magacho et al., 2022). However, the net impact on trade will depend on the ease of substitution of exports with less carbon-intensive options.[7] It will also depend on the ability to shift exports to other destinations with less stringent climate-related trade restrictions.

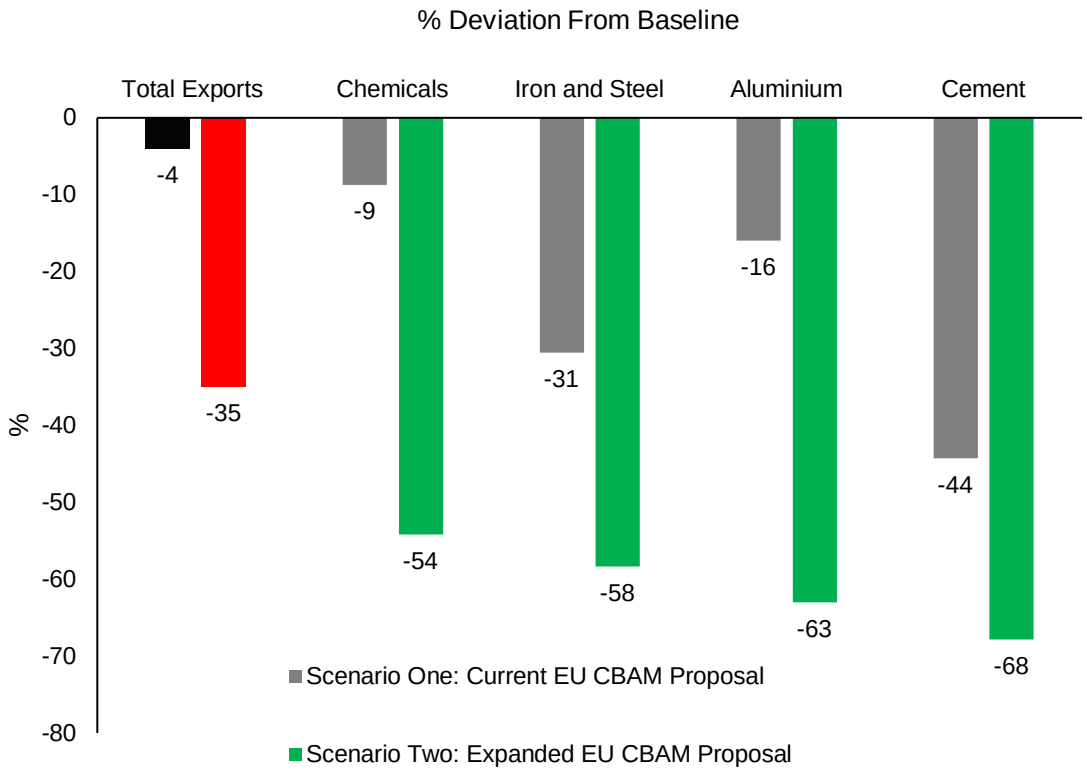
4.3 What happens to South African exports under the current EU CBAM proposal?

This scenario simulates the effect of the current EU CBAM proposal relative to a baseline with no CBAM in 2030 and the results are taken from Xiaobei et al. (2022). Their model builds on the dynamic CGE models by Van der Mensbrugghe (2019) and Zhai (2018) and is calibrated to the Global Trade Analysis Project (GTAP) database 10.0. Their simulation assumes an EU carbon price of €67 (or US$75) that is imposed from 2026 on the embedded carbon content of only direct emissions in line with the current EU proposal. The carbon price and emissions data for South Africa are taken directly from the World Bank Carbon Pricing Dashboard.

The results show that the current version of the EU CBAM could lead to a reduction in total exports to the EU of 4% in 2030 (or 0.02% reduction in GDP) relative to a baseline with no CBAM. The decline is mostly driven by the cement and iron and steel sectors that both see declines of more than 30% (Figure 5). Still, the overall results suggest small impacts initially, but these are likely to increase as the coverage of the adjustment mechanism increases.

[7] Two countries may have the same exposure to a CBAM, but the country with a high degree of carbon lock-in will be more vulnerable than one that is on a clean pathway (Eicke et al., 2021).

Figure 5: Impact of CBAM Proposal on South African Exports to the EU in 2030



Source: Xiaobei et al. (2022) in a joint study by the IMF and TCD.

4.4 What happens to South African Exports if all sectors are covered by EU CBAM?

This scenario simulates a more extreme case by assuming that the current EU CBAM proposal expands to cover all imported goods and services, and all indirect emissions from upstream value chains when calculating embedded carbon contents. The results are again taken from Xiaobei et al., (2022). The carbon price remains at US$75 and sectoral level carbon emission data for South Africa are taken directly from the World Bank Carbon Pricing dashboard.

The decline in total exports to the EU rises to 35% (or 0.3% reduction in GDP) in 2030 in this scenario relative to a baseline with no CBAM. The decline is led by the cement and aluminium sectors, and all CBAM export categories see a more than 50% decline (see Figure 5 on previous page). That is, exports of the affected categories more than half, and total exports to the EU decline by more than a third.

4.5 What happens to South African Exports if more countries impose a CBAM?

Countries like the US, Canada and Japan are also considering the implementation of carbon border adjustment measures, thereby exposing South Africa to more transition risk (Merven et al., 2023 and European Commission, 2023). We turn now to the study by Merven et al. (2023) that uses a linked energy-economic model for South Africa and an accounting-based microsimulation module to assess the distributional impact of CBAM on all economic sectors.

They consider in principle the same two scenarios as Xiaobei et al., (2022) above, but there are important differences in the design of the scenarios and the assumptions underpinning them. First, their carbon price is phased in over four years from 2026 and is set at €85[8] per tonne of CO_2e (or US$95). This is slightly higher than the average €67 (or US$75) used by Xiaobei et al. (2022). Second, they assume that all countries (not just the EU) impose a CBAM that looks like the EU's in design and implementation. Lastly, they account for South Africa's emissions and mitigation targets as outlined in the updated NDC[9] through the implementation of a least-cost energy plan that replaces ageing coal plants with cheaper renewables. This allows them to account for the expected structural changes as the economy transitions to a lower carbon path. The results are summarised in Table 1 below.

Table 1: Estimated Economic Impacts of CBAM

	Scenario One (All countries impose a carbon border tax like EUs CBAM in design and implementation)		Scenario Two (All countries extend coverage of their carbon border tax to all exports and direct emissions)	
	2030	**2050**	**2030**	**2050**
% difference in level from baseline scenario				
Total GDP	**-0.3**	**-0.9**	**-1.8**	**-9.3**
Agriculture	0.9	-0.6	0.4	-3.3
Mining	0.8	2.9	-1.4	-17.3
Manufacturing	0.3	-1.4	0.7	-4.8
Electricity	-1.7	-1.5	-3.8	-8.7
Services	-0.4	-1.2	-2.1	-9.5
level difference from baseline scenario (thousands)				
Total Employment	**-61**	**-351**	**-581**	**-3999**
Agriculture	23	-8	7	-81
Mining	15	55	-12	-213
Manufacturing	6	-56	9	-260
Electricity	-43	-63	-232	-811
Services	-61	-280	-353	-2635
% difference from baseline scenario				
Total Exports	**0.0**	**0.1**	**0.6**	**-10.1**
Agriculture	3.6	-0.4	-0.9	-1.7
Mining	2.7	6.6	-0.5	-22.1
Manufacturing	-3.8	-6.1	6.0	4.7
Electricity	-55.6	-16.8	-55.0	-16.2
Services	2.0	-1.3	-1.6	-10.0

Source: Merven et al., (2023).

Once again, the initial impact on total exports appears small relative to a baseline[10] with no CBAM, but this masks significant variation at the sector level. Some sectors like agriculture and mining and services see an increase in their exports in 2030 (and therefore employment and GDP) due to a reallocation of resources away from fossil-fuel dependent sectors like

8 The €85 per tonne CO_2e is based on the spot ETS price on the 5th of May 2023. The IMF study was published in March 2022 with an assumed average carbon price of €67/US$75 between 2022 and 2030. This is a conservative assumption by their own admission given recent developments and historical breach of the €100 mark (see EEX)

9 South Africa has committed to the global ambition to reduce emissions. In its Updated Nationally Determined Contribution, South Africa agreed to reduce emissions to between 398-510 Mt CO_2e (-4% and -25% relative to 2017) and 350-420 Mt CO_2e (-21% and -34%) by 2025 and 2030, respectively.

10 The baseline assumes a business-as-usual case where South Africa's Updated NDC emissions targets are met in a least-cost energy plan. A moderate growth rate of 2.7% is assumed from 2020 to 2050 in line with the growth projection of the NDC, but short-term forecasts have been updated to reflect recent downgrades to the outlook.

manufacturing and electricity. But the net reduction in GDP is larger at 0.3% by 2030. This mostly reflects the knock to both exports and GDP in the hard to abate electricity sector as more countries consider similar mechanisms.

This is because South Africa has no reported trade in electricity with the EU, but electricity exports are severely affected if other countries in the SADC[11] region adopt a CBAM. This is illustrated in the second scenario where the impacts are more negative, especially in the long-term. All export sectors experience declines as coverage of the CBAM extends to all sectors of the economy and all direct and indirect emissions from upstream value chains. Total exports fall by 10.1% in 2050 and GDP declines by 9.3% relative to the baseline.

The employment effects too are large: 350 000 jobs are lost by 2050 if more countries adopt a CBAM. This number rises to 2.6 million if all exports are subject to a CBAM (Merven et al., 2023). Poverty and inequality also rise, with negative consequences for household welfare. The results show that under different assumptions the results are different. However, the costs will be large and negative in the absence of any mitigating action.

4.6 Changing Consumer Preferences

South Africa's exports also face another threat from changing consumer sentiments. A variety of non-price instruments such as labelling requirements aim to increase consumer awareness and shift demand away from more carbon-intensive products. A survey[12] by Deloitte (2022) on consumer sentiments shows that climate consideration is becoming more important. Thøgersen (2021) reviews the literature and identifies climate communication with strong emotional content and carbon footprint labelling as effective instruments to drive substitution. If South Africa does not reduce its carbon intensity of production, foreign consumers can reduce demand for its products as consumption patterns shift.

5. Conclusion and policy implications

South Africa has a high carbon intensity and low effective carbon tax. This combination exposes the country to import carbon adjustment mechanisms that can significantly reduce demand for South African exports. Even if South Africa manages to negotiate exemptions from the EU, changing consumer sentiments pose an additional risk to the country's exports. Other countries transitioning faster in response to the CBAM or having higher carbon prices may also put South Africa at a disadvantage in the medium term as they position themselves as green production destinations. Mitigating against this risk requires a higher and more predictable carbon tax that will also generate significant financial resources to help the economy transition and possibly offset any negative impacts from having a higher carbon price.[13] Economic and financial frictions to transitioning should be reduced by using a combination of price and non-price instruments. These include for example the removal of

[11] The main destination of electricity exports from South Africa are: Mozambique, Namibia, Eswatini, Zimbabwe, and Botswana. Mozambique is the most exposed country (with more than 6% of output at risk on account of the importance of its aluminium and iron and steel exports to the EU (Xioabei et al, 2023 and PCC 2023).

[12] Online survey with a nationally representative sample of more than 2,000 UK adults aged 18+ between 1 to 2 June 2022.

[13] See for example Alton et al. (2014).

regulatory and trade barriers that can hinder electricity generation from renewable sources or the use of electric vehicles. The focus of policy should be on how to position South Africa as a green production destination relative to other countries and consequently, reduce the exposure to CBAM and changing consumer sentiments.

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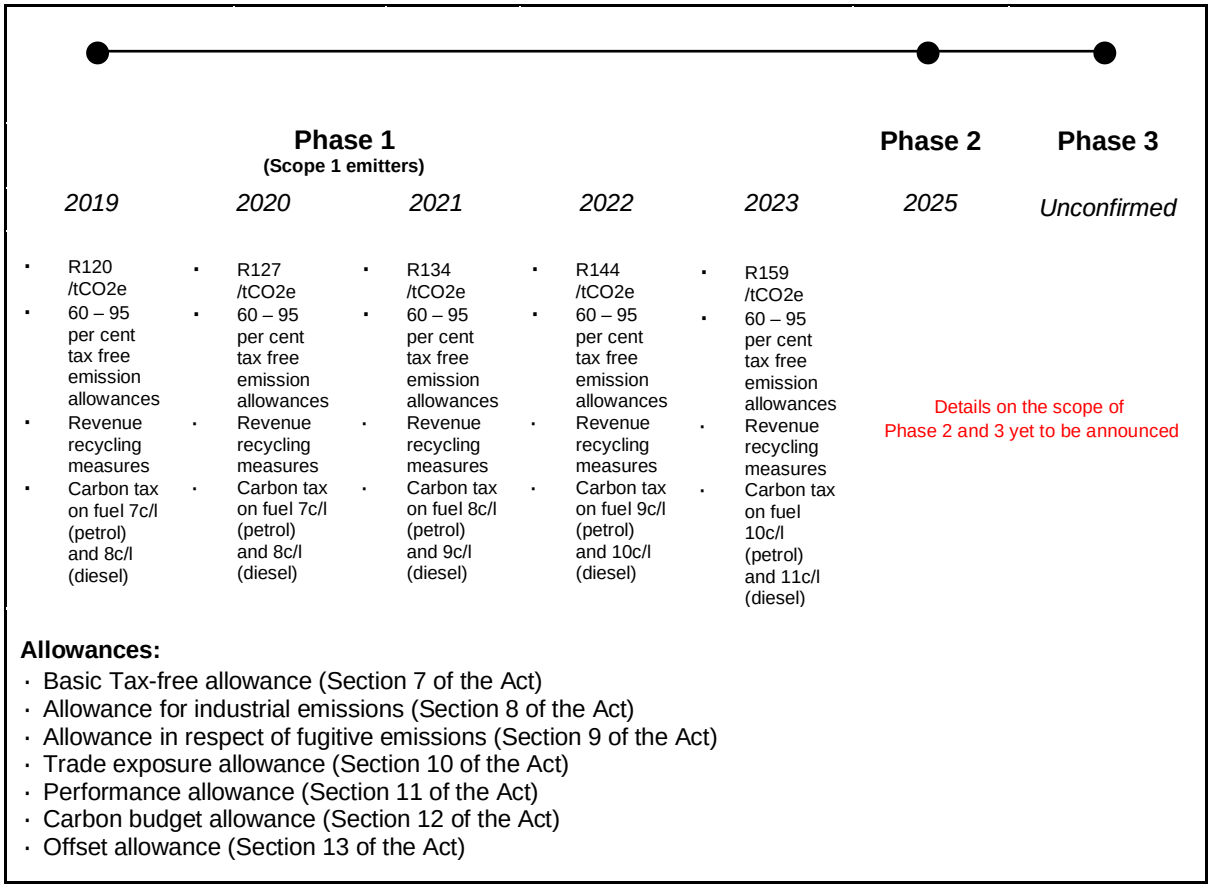
Annexure A – South African Carbon Tax timeline



Source: Carbon Tax Act (2019) and the Budget Review (2019 – 2023).

Annexure B – List of goods and corresponding GHG under the CBAM (excl hydrogen)

CN CODE	GREENHOUSE GAS
Cement	
2523 10 00 – Cement clinkers	Carbon dioxide
2523 21 00 – White Portland cement, whether artificially coloured	Carbon dioxide
2523 29 00 – Other Portland cement	Carbon dioxide
2523 90 00 – Other hydraulic cements	Carbon dioxide
Electricity	
2716 00 00 – Electrical energy	Carbon dioxide
Fertilisers	
2808 00 00 – Nitric acid; sulphonitric acids	Carbon dioxide and nitrous oxide
2814 – Ammonia, anhydrous or in aqueous solution	Carbon dioxide
2834 21 00 - Nitrates of potassium	Carbon dioxide and nitrous oxide
3102 – Mineral or chemical fertilisers, nitrogenous	Carbon dioxide and nitrous oxide
3105 – Mineral or chemical fertilisers containing two or three of the fertilising elements nitrogen, phosphorus and potassium; other fertilisers; goods of this chapter in tablets or similar forms or in packages of a gross weight not exceeding 10 kg **Except** 3105 60 00 – Mineral or chemical fertilisers containing the two fertilising elements phosphorus and potassium	Carbon dioxide and nitrous oxide
Iron and Steel	
72 – Iron and steel **Except** 7202 – Ferroalloys and 7204 – Ferrous waste and scrap; remelting scrap ingots and steel	Carbon dioxide
7301- Sheet piling of iron or steel, whether drilled, punched or made from assembled elements; welded angles, shapes and sections, of iron or steel	Carbon dioxide
7302 – Railway or tramway track construction material of iron or steel, the following: rails, checkrails and rack rails, switch blades, crossing frogs, point rods and other crossing pieces, sleepers (crossties), fish- plates, chairs, chair wedges, sole plates (base plates), rail clips, bedplates, ties, and other material specialised for jointing or fixing rails	Carbon dioxide
7303 00 – Tubes, pipes, and hollow profiles, of cast iron	Carbon dioxide
7304 – Tubes, pipes, and hollow profiles, seamless, of iron (other than cast iron) or steel	Carbon dioxide
7305 – Other tubes and pipes (for example, welded, riveted or similarly closed), having circular cross-sections, the external diameter of which exceeds 406,4 mm of iron or steel	Carbon dioxide
7306 – Other tubes, pipes and hollow profiles (for example, open seam or welded, riveted or similarly closed), of iron or steel	Carbon dioxide
7307 – Tube or pipe fittings (for example, couplings, elbows, sleeves), of iron or steel	Carbon dioxide
7308 – Structures (excluding prefabricated buildings of heading 9406) and parts of structures (for example, bridges and bridge-sections, lock- gates, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, shutters, balustrades, pillars and columns), of iron or steel; plates, rods, angles, shapes, sections, tubes and the like, prepared for use in structures, of iron or steel	Carbon dioxide
7309 – Reservoirs, tanks, vats, and similar containers for any material (other than compressed or liquefied gas), of iron or steel, of a capacity exceeding 300 l, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment	Carbon dioxide
7310 – Tanks, casks, drums, cans, boxes, and similar containers, for any material (other than compressed or liquefied gas), of iron or steel, of a capacity not exceeding 300 l, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment	Carbon dioxide
7311 – Containers for compressed or liquefied gas, of iron or steel	Carbon dioxide
Aluminium	
7601 – Unwrought aluminium	Carbon dioxide and perfluorocarbons
7603 – Aluminium powders and flakes	Carbon dioxide and perfluorocarbons
7604 – Aluminium bars, rods, and profiles	Carbon dioxide and perfluorocarbons
7605 – Aluminium wire	Carbon dioxide and perfluorocarbons
7606 – Aluminium plates, sheets, and strip, of a thickness exceeding 0,2 mm	Carbon dioxide and perfluorocarbons
7607 – Aluminium foil (whether printed or backed with paper, paperboard, plastics or similar backing materials) of a thickness (excluding any backing) not exceeding 0,2 mm	Carbon dioxide and perfluorocarbons
7608 – Aluminium tubes and pipes	Carbon dioxide and perfluorocarbons
7609 00 00 – Aluminium tube or pipe fittings (for example, couplings, elbows, sleeves)	Carbon dioxide and perfluorocarbons

Source: Explanatory memorandum for a Regulation of the European Parliament and of the Council establishing a Carbon Border Adjustment Mechanism (2021).