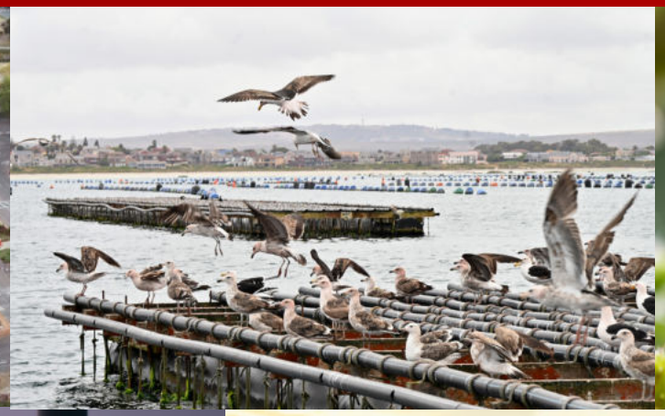
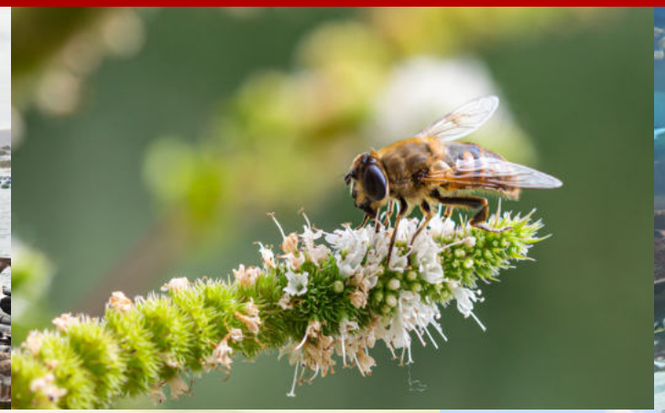







Vodacom South Africa

Climate-related financial analysis

(TCFD Phase III)

11 June 2025

Further together

Executive Summary

Vodacom South Africa (VSA) started its journey with the Taskforce for Climate-related Financial Disclosure (TCFD) recommendations in 2022, using its framework as a vehicle to understand climate-related risks and opportunities (CRROs) that are material to the company. This has included the implementation of climate governance structures; climate change scenario analysis; identification of CRROs; and, in this project, beginning to assess the short- and long-term financial implications of climate change on the company. In 2023, VSA developed a "Decarbonisation Roadmap" to meet its renewable energy and net-zero commitments as set by its parent company, Vodafone.

VSA has committed to achieving net-zero carbon emissions in alignment with the Paris Climate Agreement, which aims to limit global warming to well below 2°C, ideally closer to 1.5°C.

VSA's Planet Commitments include:

- 100% renewable electricity use by 2025 (Achieved through RECs)
- Reduce Scope 1 and 2 emissions by 100% by FY2035 (against a FY2020 baseline)
- Engage with suppliers to reduce scope 3 emissions
- Within the next two years, VSA is committed to setting a long-term science-based net zero target to reduce Scope 1, 2 and 3 emissions across our entire value chain

To identify key CRROs VSA has assessed the transition (to a low-carbon economy) and physical risks and opportunities that could be associated with three different climate change scenarios: These are:

1. **"Net Zero" scenario** that sees rapid decarbonisation leading to limited physical climate risks but high transition costs
2. **"NDCs" scenario** resulting in moderate decarbonisation and partial climate risk mitigation
3. **"Current Policies" scenario** where minimal decarbonisation takes place, resulting in higher physical climate risks

These scenarios were used by this project to evaluate the financial impact of three high priority CRROs identified by VSA in its 2023 TCFD report:

- **Transition opportunity** utilising one hundred per cent renewable energy
- **Transition risks** impact of South Africa's carbon tax regime on VSA
- **Physical risks** financial impact of increased flooding due to climate change

Due to the cumulative nature of climate change impact, where increased build-up of emissions in the earth's atmosphere has long term bearing, the three scenarios were analysed over different time periods up to 2050.

VSA aims to transition to renewable energy through the purchase of renewable energy from Independent Power Producers (IPPs); virtual wheeling agreements; and, the purchase of renewable energy certificates (RECs). Carbon Calculated and its climate mitigation and economics partner, Enuity, have developed a bespoke renewable energy model for VSA that considers the cost-savings potential under the three different climate change scenarios. Throughout 2024 and early 2025, Carbon Calculated and Enuity worked extensively with VSA to ascertain appropriate and accepted model inputs and assumptions (see Appendix A).

Under the "Net Zero" scenario of rapid renewable energy adoption, resulting in reduced exposure to increasing electricity tariffs, the model projects accumulated net present value (NPV) financial benefits to VSA of R60bn up to 2050. This is reduced to R11bn under the "NDCs" scenario of gradual renewable energy adoption. And, finally, the "Current Policies" scenario of no additional renewable energy investment other than that already undertaken by VSA, resulting in high reliance on fossil-fuel-based electricity, is least beneficial with cost savings of less than R1bn projected by the model.[1]

The renewable energy model also explores carbon tax implications for VSA, by mapping different carbon tax trajectories against VSA projected electricity, diesel and petrol demand (all of which are exposed to carbon taxation); the diminishing carbon intensity of the South African national electricity grid; and the different VSA renewable energy adoption scenarios.

For the carbon tax, two trajectories were modelled:

1. **"Net Zero"** scenario: aggressive carbon tax escalation to drive emissions reduction.
2. **"NDCs & Current Policies"** scenarios: more gradual carbon tax increases, in line with the South African National Treasury's current projections as articulated in its latest discussion paper (National Treasury, 2024).

In contrast to the renewable energy opportunity, South Africa's carbon tax policy poses a significant financial risk to VSA. The carbon tax model indicates that under a "Net Zero" scenario, VSA must implement renewable energy solutions aggressively to mitigate rapidly increasing carbon tax across all energy sources. This scenario incurs the highest carbon tax burden to VSA of a projected NPV accumulation up to 2050 of R4.6bn. This is predominately due to the rapid increase in the tax rate on diesel and petrol for VSA's generators and fleet.

1 VSA's Renewables Ambitions and the Just Energy Transition (JET) – page 13

Under the "NDCs" and "Current Policies" scenarios, continued reliance on fossil-fuel-generated electricity would result in sustained tax liabilities, although the increase in the carbon tax rate is lower.

The "NDCs" scenario projects a liability of R517 million due to a moderately paced decarbonisation of the South African electricity grid and a lower projected carbon tax rate, coupled with high renewable electricity uptake by VSA.

The "Current Policies" scenario projects a carbon tax liability of R2.4 billion. Even though the carbon tax rate remains low, this total cost is due to the continued high carbon intensity of the South African electricity grid and limited uptake of renewable energy by VSA.

Climate change is expected to increase the frequency and severity of floods in South Africa, thereby potentially impacting VSA's physical assets including network infrastructure, data centres, and offices. The project considered the financial implications of flood-related damage and disruptions under different scenarios:

- "Net Zero" Scenario: lower flood risks due to effective global climate mitigation efforts.
- "NDCs" & "Current Policies" scenarios: higher flood risks leading to increased operational costs, service disruptions, and potential revenue losses.

This analysis assessed whether, under the three climate scenarios, future flood events would be financially significant and what determines financial materiality within VSA's risk management framework.

Floods can damage critical telecommunications infrastructure, including base stations and fibre-optic networks and the electricity networks servicing these, leading to costly repairs, service disruptions, and lost revenue (TechCentral, 2022).

Additionally, large permanent assets like data centres and offices are at risk. Over the past three years (2023-2025), VSA has incurred financial losses due to damaged infrastructure; the cost of ensuring network re-connectivity; and, lost revenues from three major flood events, with total insurance claims exceeding R53 million. Two of these were in the KwaZulu-Natal province (2022 & 2024) and the other in the Western Cape Province's Overberg region (2024).

Despite increased flood frequency, VSA's insurance coverage is comprehensive, with an excess cap of R7.5 million per event. Compared to other extreme events like wildfires, floods are considered a lower financial risk. Vodacom Group's insurance policy, backed by international reinsurers, sufficiently mitigates financial exposure for VSA.

Rising extreme weather events globally are driving up insurance premiums. While specific flood-related contributions to VSA's insurance costs are unclear, industry trends indicate rising premiums due to climate change. However, flood risks remain a minor factor in overall premium increases.

A 2024 KPMG-led climate risk assessment for Vodafone analysed physical risks across various climate scenarios (1.5°C, 2°C, and 4°C warming) and across numerous geographies. For VSA specifically, projected maximum **annual financial impacts from flooding by 2050** are:

Surface water flooding:
up to
R28.6 million
low financial risk

Riverine flooding:
up to
R168 million
moderate financial risk

These costs were both covered by existing insurance policies, thereby not having a material financial impact on VSA.

Despite temporary disruptions, VSA has found that customer revenue remains resilient post-flood events. While floods can impact discretionary spending, demand for telecommunications services typically rises during emergencies. **VSA's dense network coverage also helps offset revenue losses by shifting traffic to nearby base stations.**

While this project and its models were not tasked with making recommendations of steps forward for VSA, the following should be considered due to their potential implications for the company:

- Prioritise virtual wheeling agreements to secure renewable electricity
- Proceed with caution in the purchase of RECs (to bridge the gap until full renewable transition is achieved) due to potential shortage of supply and resultant increase in cost
- Engage with policymakers and industry stakeholders to support South Africa's Just Energy Transition (JET)
- Develop a proactive carbon tax mitigation strategy, incorporating renewable energy investments
- Monitor policy developments and advocate for favourable regulatory frameworks
- Invest in infrastructure adaptation to mitigate flood risks where appropriate
- Collaborate with insurers to ensure ongoing levels of coverage against climate-related damages

Contents

Quick navigation tools:

This is an interactive report. Navigation tools at the top right of each page and within the report are indicated below.

Contents | Back | Previous page | Next page

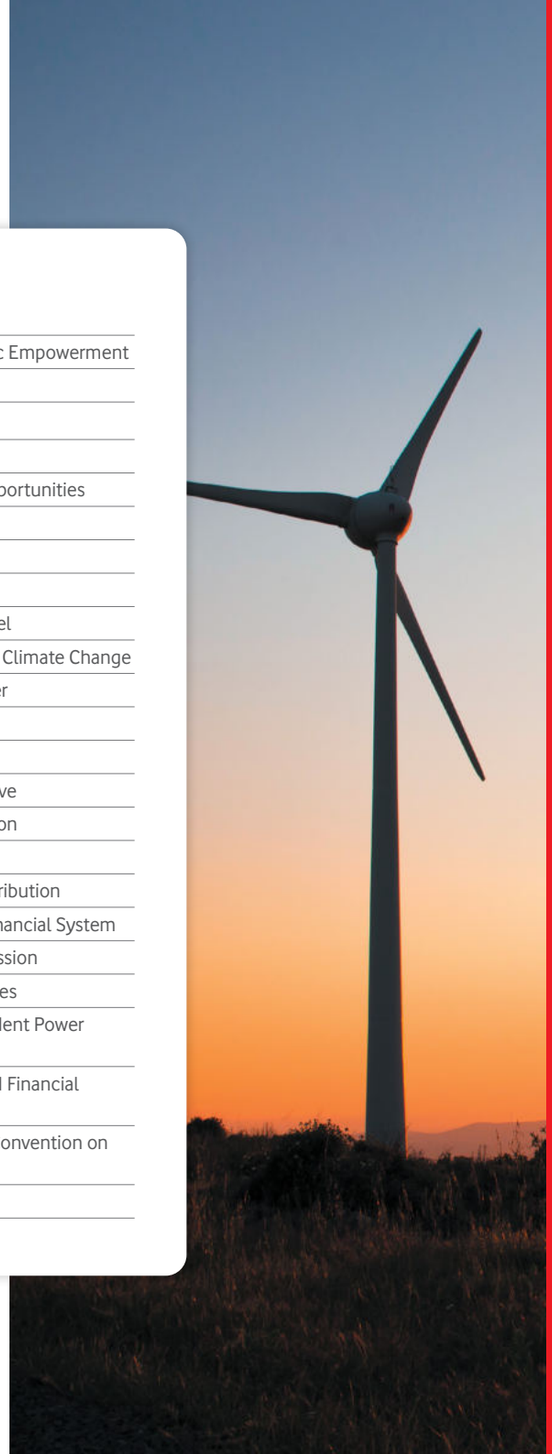
This report is best viewed in Adobe Acrobat for desktop, mobile or tablet.

Click to download or update to the latest Adobe Acrobat Reader

Adobe Acrobat Reader

Abbreviations

BBBEE	Broad-Based Black Economic Empowerment
°C	degrees Celsius
CO_2e	Carbon dioxide equivalent
CPI	Consumer Price Index
CRROs	Climate-related risks and opportunities
CTM	Carbon Tax Model
GHG	Greenhouse gases
GWh	Gigawatt hours
IAM	Integrated Assessment Model
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
JET	Just Energy Transition
SBTi	Science-based Target Initiative
MYPD	Multi-year Price Determination
NPV	Net Present Value
NDCs	Nationally Determined Contribution
NGFS	Network for Greening the Financial System
PCC	Presidential Climate Commission
RECs	Renewable Energy Certificates
REIPPP	Renewable Energy Independent Power Producers Programme
TCFD	Taskforce on Climate-related Financial Disclosure
UNFCCC	United Nations Framework Convention on Climate Change
VSA	Vodacom South Africa



Introduction
Approach to project
Financial analysis: adoption of renewable energy
Financial analysis: carbon tax
Financial analysis: flood events
Conclusion

Introduction

Background to VSA TCFD/ IFRS S2 journey

In 2022 Vodacom South Africa (VSA) embarked on its Taskforce for Climate-related Financial Disclosure (TCFD)[1] journey. In alignment with the TCFD framework, VSA is on a process of continual improvement in the understanding of climate-related risks and opportunities (CCROs); climate change scenarios; data collection improvement; and, ultimately, investigation into the short and long-term **financial impacts of climate change**.

> **"Once an organisation assesses its climate-related issues and determines its response to those issues, it can then consider actual and potential financial impacts on revenues, expenditures, assets and liabilities, and capital and financing."**
>
> TCFD

VSA have aligned their climate governance structures and strategy response with the TCFD reporting requirements. In addition, VSA has also developed a "decarbonisation roadmap" (2022), which outlines a strategic approach for VSA to meet its renewable energy and net zero commitments as set by Vodafone.

See page 14, VSA TCFD Report 2023

In 2023, VSA evaluated all potential CRROs that could impact the direct operations of the business under two climate change scenarios (see Understanding of the brief – page 7). Using the VSA risk management framework one opportunity and two risks were identified as potentially having material financial impact – those being the opportunity to utilise one hundred per cent renewable energy in alignment with VSA's Planet Target; the direct financial risk that the South African carbon tax regime places on VSA; and, the financial impact that increased frequency, duration and intensity of flood events in South Africa could have on VSA.

This report presents an assessment of the potential financial impacts of these three climate issues on VSA under the scenarios described below and, using information and assumptions provided by VSA.

It is important to highlight that VSA has undertaken all its climate strategy work specifically for operations in South Africa, and this work is independent of other climate-related analysis or TCFD reporting being undertaken for Vodafone, the international parent company, or the Vodacom Group which has operations throughout the African continent.

> **"By adhering to this globally recognised framework, we seek to enhance our understanding of climate-related risks and opportunities, strengthen our resilience, and drive informed decision-making throughout our organisation. Our TCFD Report offers a transparent summary of our approach to climate-related strategy in line with the TCFD framework. It details our progress and the opportunities and challenges we face in the journey to being a low-carbon, climate-resilient business."**
>
> Takalani Netshitenzhe and Sitholizwe Mdlalose, External Affairs Director and Managing Director, VSA (VSA TCFD Report, 2023)

Use of climate change scenarios and identification of priority VSA climate risks and opportunities

In the development of strategic responses, the TCFD recommends companies adopt the use of climate change scenarios, whereby plausible future transition and physical global states emerge based on the future generation of greenhouse gas (GHG) emissions and, hence, levels of global warming to be anticipated.

Transition risks and opportunities are those associated with a transition towards a decarbonised global economy and can include issues relating to policy and legislative change; energy efficiency standards; alternative and renewable energy sources; product and market development; consumer behaviour change; and reputation change.

Physical risks and opportunities are those relating to changes in physical climate events and can be acute, being an increase or decrease in extreme weather events (floods, droughts, high winds, etc), or chronic which is a change in long-term climate trends (increasing temperatures over time; changes in precipitation patterns, etc).

In short, scenarios of high transition impact, being policies and market conditions that aggressively reduce levels of GHGs, will result in less physical impacts of climate change. Scenarios that are weak on transition efforts will result in higher levels of GHG emissions and higher levels of global warming, climate change and extreme weather events.

Numerous climate scenario approaches exist in the climate science and corporate strategy fields. Despite being informed by numerous and various data fields and assumptions, important levels of complementarity exist.

1 The Taskforce for Climate-related Financial Disclosure (TCFD) was initiated by the global Financial Stability Board to provide a common framework for investors and companies to report the risk and opportunities that climate change poses to their operations and financial performance.
The recommendations of the TCFD have since largely been incorporated into the International Financial Reporting Standards (IFRS) sustainability reporting framework for climate change, known as IFRS S2.

Use of climate change scenarios and identification of priority VSA climate risks and opportunities continued

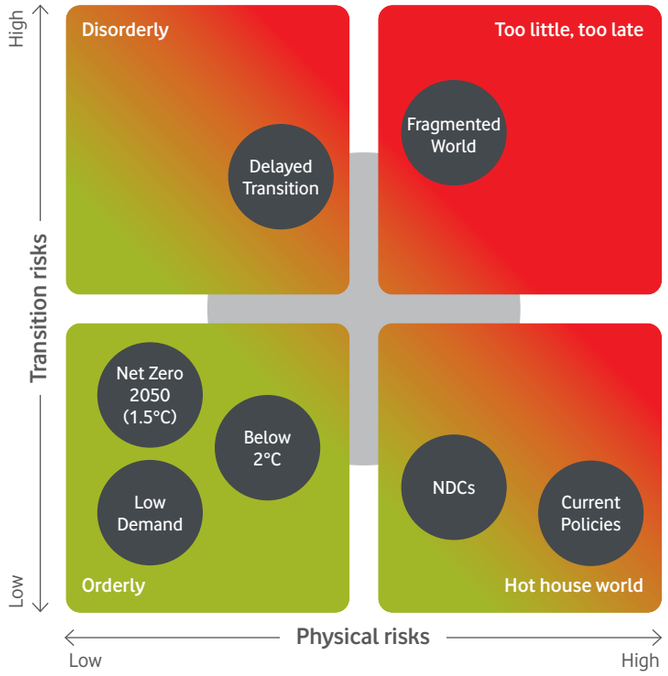
TCFD recommendations encourage companies to consider at least two future scenarios in their strategic response to climate change, with one that aligns with the goals of the Paris Climate Agreement of 2015[1] and results in an average global warming of less than 2° Celsius (C) and strives to achieve levels closer to 1.5°Celsius. The IPCC, in its deliberations on the mitigation requirements to meet a 1.5° world, indicates that a proactive but deliberate, global effort to half greenhouse gas emissions by 2030 and then reach a state of "Net Zero" emissions by 2050 is required (IPCC, 2018).

VSA has previously chosen to focus on three scenarios, with the other two being where all current GHG reduction policies and country Nationally Determined Contributions (NDCs) are successfully met. This is a scenario that will result in global warming of between 2°C and 2.7°C, with a likely median of approximately 2.3°C. Such scenarios are described by the NGFS as "NDCs" and "Current Policies" in a quadrant described as a Hot House World (Network for Greening the Financial System (NGFS), 2024).

Both the "NDCs" and "Current Policies" are scenarios that potentially result in lower transition impacts but result in higher levels of global warming, climate change and extreme weather events, as mapped out by climate projections from the IPCC, World Bank and numerous other scientific bodies.

1 The Paris Climate Agreement (2015) aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C. To date 195 countries have ratified the agreement.

Figure 1: NGFS scenarios framework in Phase V, 2024



Under the three scenarios explored ("NGFS Net Zero" and "NGFS NDCs" and "NGFS Current Policies"), VSA identified that of its identified CRROs:

1. The adoption of renewable energy (especially if VSA is to meet its renewable energy target) represents a material **transition opportunity**;
2. In the absence of any GHG mitigation activities by VSA, the implementation of South Africa's carbon tax regime represents a **transition risk**; and,
3. Increased incidences of flood events could represent **physical risk**, the damages from which might result in material financial impact to the company.

South Africa's Nationally Determined Contribution under the Paris Agreement

Nationally Determined Contributions (NDCs) are commitments made by individual countries that outline the actions they intend to take to reduce their GHG emissions and adapt to the impacts of climate change. They are a key component of the 2015 Paris Agreement.

NDCs may include GHG emissions reduction targets, adaptation measures, mitigation strategies and policies, and means of implementation. Countries are expected to update and enhance their NDCs every five years.

South Africa submitted its first NDC to the United Nations Framework Convention on Climate Change (UNFCCC) in 2016, with the first update being submitted in 2021. The updated NDC commits South Africa to an absolute GHG emissions reduction target of 398-510 million tonnes of carbon dioxide equivalent ($MtCO_2e$) by 2025, and 350-420 $MtCO_2e$ by 2030 – a 31% reduction – and, also, signals the intention to set a net zero emissions target by 2050.

It is important to highlight that South Africa's NDC targets are considered an **"insufficient"** contribution to limit global warming to 1.5°C by the Climate Action Tracker, an independent climate analysis project providing international policy-makers with detailed information since 2009.

Understanding of the brief

VSA requested the following activities to be undertaken by the project team:

Investigation of

the transition opportunity (renewable energy)

Evaluate the financial impact, in terms of costs and savings, of the adoption of renewable energy sources by VSA, in accordance with its renewable energy and decarbonisation commitments (see page 13, VSA 2023 TCFD Report), under the "Net Zero" and "Current Policies/NDCs" scenarios.

As per VSA's 2023 TCFD report, both a short-term (2020-2035) and medium-term (2035-2050) timeframe were to be considered.

In addition, recognition was to be given to the Just Energy Transition (JET) in the South African context. This includes understanding how meeting VSA's renewable energy target intersects with the findings of select private sector research bodies, as well as South Africa's Presidential Climate Commission (PCC), deliberations and the current understanding of the economic consequences of the JET.

transition risk (carbon tax)

Evaluate the financial impact of the South African carbon tax regime on VSA, taking its renewable energy and decarbonisation commitments into consideration (see page 1, VSA 2023 TCFD Report), under the "Net Zero", "NDCs" and "Current Policies" climate change scenarios.

As per VSA's 2023 TCFD report, both a short-term (2020-2035) and medium-term (2035-2050) timeframe were to be considered.

Recognition is to be given to the impact of carbon tax risk on a "Just Energy Transition" within the South African context, and how this might be influenced by the workings and outputs of various public and private sector agencies, including the South African PCC.

physical risk (flood events)

Evaluate the financial impact of future flood events on VSA physical assets, being VSA's network infrastructure, datacentres and offices (see page 10, VSA 2023 TCFD Report).

As per the 2023 VSA TCFD report, the "Net Zero" and "NDCs/Current Policies" climate scenarios were to be evaluated with consideration to both (2020-2035) and medium-term (2035-2050) timeframes.

Additional reflection was to be provided on any economic impact that extreme floods have on the purchasing power and decision-making of cellular services by VSA customers.

Approach to **project**

Assumptions about grid decarbonisation

Under the "Net Zero" scenario, which is what is required to meet a 1.5°C temperature target, the South African grid decarbonises rapidly, to be made up almost entirely of emissions-free energy sources by 2035.

The "NDCs" scenario also targets near zero electricity emissions sources by 2035, although the decarbonisation is at a slightly slower pace than under "Net Zero" and full decarbonisation occurs later.

Finally, the "Current Policies" scenario is more aligned with South Africa's existing electricity grid decarbonisation trajectory, without significant additional action taken. In the latter, the country does not achieve its existing NDC commitments and South Africa (and the world) will not meet their decarbonisation targets.

VSA's renewable electricity response

The NGFS scenarios are then matched with possible VSA renewable electricity responses. Under each of the "NDCs" and "Current Policies," two different renewable electricity variants (responses) are modelled.

"Net Zero"

VSA ramps up virtual wheeling over a period of five years from 2029 to allow for all its power to be met through virtual wheeling. Until that point, renewable energy certificates (RECs) are purchased to cover the residual between grid purchased electricity and renewable wheeled energy.

"NDCs"

VSA implements virtual wheeling, up to levels understood to have already been approved. The first variant here considers a situation where Vodacom does not meet its renewables target and does not purchase renewable energy certificates (RECs). The second variant is one where RECs are purchased from 2025 to meet the target.

"Current Policies"

VSA does not invest further in any additional renewables projects beyond what is already committed to in terms of onsite generation and wheeled PPAs. Virtual wheeling is assumed not to happen. This is aligned with limited global action on climate change. Once again, two variants are considered here, one where VSA does not purchase RECs to meet its decarbonisation target, and the other where RECs are purchased to meet targets.

What is virtual wheeling?

VSA has implemented a virtual wheeling agreement with Eskom to procure renewable electricity from Independent Power Producers (IPPs). In contrast to conventional wheeling, which relies on direct connections between an IPP and a single consumer, this system aggregates VSA's energy consumption across its different sites, which are supplied by a combination of municipalities, IPPs and Eskom itself.

The virtual wheeling platform facilitates the allocation of renewable energy from IPPs to VSA sites based on their demand. Metered data from both the IPPs and Vodacom's consumption points is then used to calculate the energy balance and allocate costs. The approach adds capacity to the national grid without requiring direct physical infrastructure between each generator and consumption site.

Modelling the carbon tax

Two scenarios as to how South Africa's carbon tax might evolve in future are explored in the models. Under the "Net Zero" model a more aggressive carbon tax is considered, being one that will allow South Africa to reach net zero CO_2e emissions by 2050. The carbon tax trajectory is based on the NGFS Net Zero 2050 scenario (see Carbon tax under "Net Zero" – page 14 for further details).

In the "NDCs" and "Current Policies" scenarios, the carbon tax model follows the current tax trajectory as indicated by National Treasury, with the carbon tax passed through to electricity prices from 2031 onwards (see Carbon tax under "NDCs" and "Current Policies" – page 15).

At present the current tax trajectory is the best information available regarding the government's position on a carbon tax response, and hence no further differentiation was made between these two scenarios.

Approach to flood risk financial analysis

Financial analyses of floods are complex processes that demand scientific, economic and engineering input. There are numerous uncertainties, none the least being that two weather events with equal rainfall, over the same time and with equal intensity, do not necessarily result in floods. Variables such as intact ecosystems (e.g. ground cover providing natural flood protection): topography (slope of water basin): densification of physical assets and economic activity (urban/rural, formal versus informal settlements); local service delivery; etc. can result in very different social and economic impacts.

To balance comprehensiveness and relevance, and to answer the financial materiality question, this project developed a customised flood financial risk assessment, covering as many relevant historical and future datapoints of impact as possible.

Relevant stakeholders consulted in the analysis included VSA network engineers; VSA facilities; VSA risk management; and Vodacom Group's insurance engineers, brokers and one of its leading syndicate insurance companies.

The outcomes of this assessment were tested against the findings of an internal KPMG Vodafone Climate Risks and Opportunities Assessment on potential financial impacts on South Africa from flooding under their chosen scenarios.

Financial analysis: adoption of renewable energy

Renewable energy model

To understand the financial implications (costs and savings) of the adoption of renewables by VSA, Carbon Calculated and Enuity designed a bespoke model to analyse the various relevant renewable energy supply options.

The model was used to determine the financial value to VSA of past and future adoption of renewable electricity as a replacement for electricity purchased from the South African electricity grid, as supplied by Eskom.

Four distinct renewable energy supply options were modelled under the different climate change scenarios.

- Electricity generating infrastructure owned by VSA
- Power Purchase Agreements (PPAs)
- Electricity purchased through off-site PPAs and wheeled through the grid
- Renewable electricity purchased via VSA's virtual wheeling platform:

  - In the **"Net Zero"** scenario it is assumed that after the initial two purchases, virtual wheeling is ramped up further linearly after 2028 for a period of 5 years, at which point it is meeting VSA's full demand.
  - The **"NDCs"** scenario assumes an initial virtual wheeling purchase of 14 GWh in FY 2027 and a larger second purchase of a further 150 GWh in FY 2028. This is what is understood to have already been approved by VSA.
  - In the **"Current Policies"** scenario, it is assumed that no virtual wheeling happens at all.

Renewable energy model findings

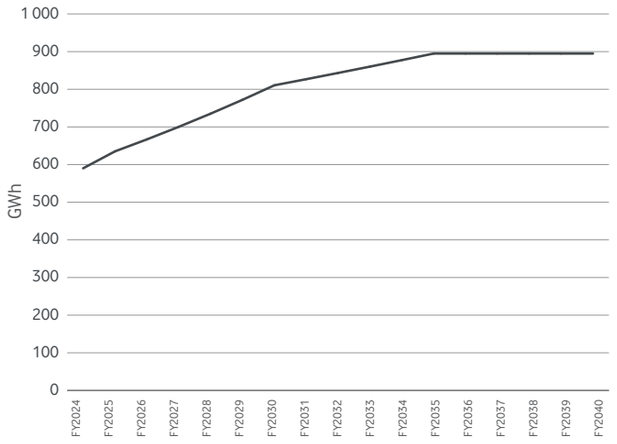
Growth in electricity demand

Figure 2 shows the projected overall demand for electricity to service VSA, with projections suggesting a growth from 590.1 GWh in 2024 to 873.1 GWh in 2040. This is based on the assumptions of 5% growth until 2030, 2% growth between 2031 and 2035 and no further growth thereafter.

These assumptions are in line with information provided to the modellers by VSA.

The 5% growth until 2030 is understood to be attributed to more energy intensive 5G technologies being introduced across the VSA network during this period, with declining growth thereafter being attributed to slower growth in roll out of the technology and increased efficiency of equipment in future.

Figure 2: Growth in VSA's electricity demand, 2024-2040 based on assumptions provided by VSA



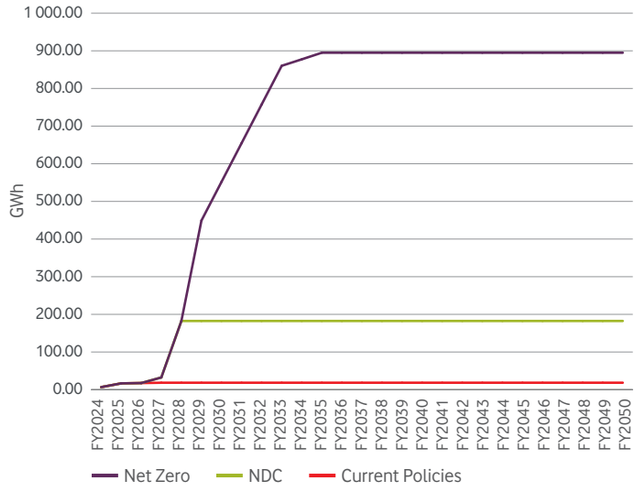
Meeting VSA's renewable electricity commitments

Renewable electricity supply

The total renewable energy supply from available sources under the three scenarios is illustrated in Figure 3.

The difference between the three scenarios is due to differing assumptions about uptake of virtual wheeling, with the "Current Policies" scenario assuming no virtual wheeling, the "NDCs" scenario assuming virtual wheeling up to what is understood to have been approved to date, and the "Net Zero" scenario scaling virtual wheeling over time to meet all of VSA's electricity demand.

Figure 3: Renewable energy uptake modelled for the three VSA climate change scenarios



Meeting VSA's renewable electricity commitments continued

Renewable Energy Certificates (RECs)

To meet VSA's 100% renewable energy target, RECs will be purchased to offset fossil-fuel based grid electricity where one REC represents one kWh of grid electricity generated using fossil fuel (e.g. coal).

The number of RECs to be purchased will thus not only depend on the GWh purchased from the grid, but also on the fossil fuel (carbon) intensity of the electricity grid as it decarbonises under the different scenarios. The fossil fuel contribution to the grid under these three scenarios is presented in Figure 4, showing the grid is largely decarbonised by 2035 under both the "Net Zero" and "NDCs" scenarios.

Figure 4: Fossil fuel (carbon) intensity of the South African electricity grid under the three VSA climate change scenarios

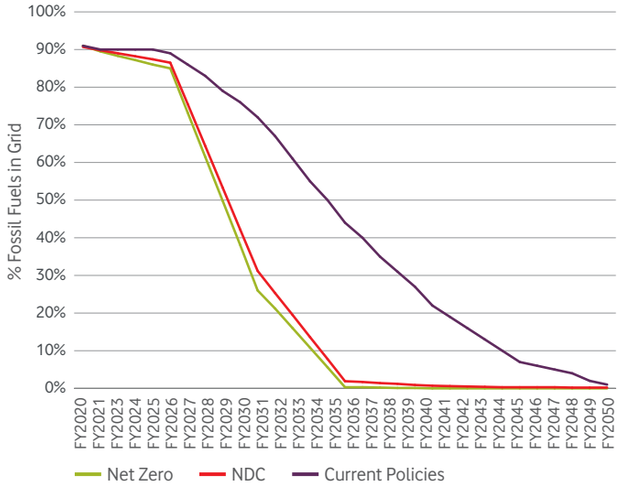
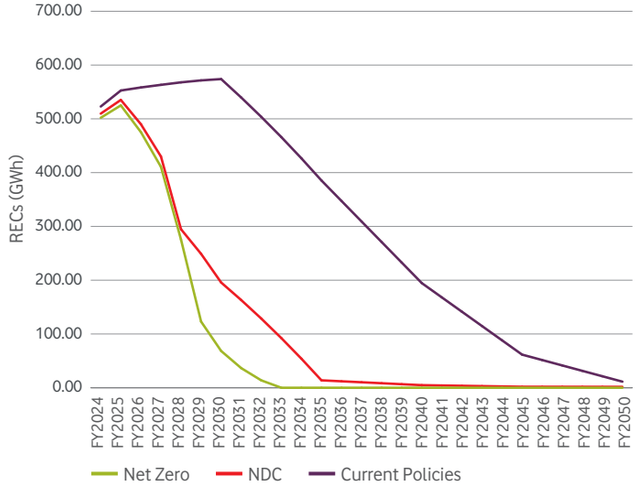


Figure 5 shows the resulting REC purchases over time. As indicated previously, the requirement for RECs is determined by both VSA's grid demand, and the electricity grid fossil fuel intensity. The "Net Zero" scenario's ramp up of virtual wheeling and rapid grid decarbonisation mean that RECs are only required for a relatively short period of time.

The "Current Policies" scenario, which sees no virtual wheeling uptake and slow grid decarbonisation requires the purchase of RECs all the way to 2050.

Figure 5: REC purchases over time



Financial implications of meeting the VSA renewable energy commitments

The financial costs and savings for VSA under the different scenarios were determined using the Carbon Calculated/Enuity Renewable Energy Model.

How are costs and savings calculated?

The cost model functions as follows:

To calculate the spend on renewable electricity for each scenario, the total electricity (in GWh) supplied by the different renewable electricity options is multiplied by the unit cost per GWh for each option in each year.

Renewable electricity spend = GWh supplied × R/GWh renewable electricity

The REC purchase costs are calculated by determining the residual grid purchases to meet VSA's demand once all the renewable electricity purchases have been subtracted. This figure is then multiplied by the percentage fossil electricity in the grid in each year to determine GWh that must be offset, and the projected costs of RECs.

REC spend = GWh supplied from grid × % fossil supply in grid × REC cost/GWh

Finally, total cost savings are calculated by taking the cost of renewable electricity plus RECs and subtracting what would have been the equivalent cost of electricity if that electricity had instead been purchased from the grid.

Cost savings = Renewable electricity spend + REC spend − equivalent cost of grid electricity

The information and assumptions used to populate the model were supplied by VSA. This includes the current and future cost of the different renewable energy options (PPAs and virtual wheeling); costs projections for RECs; and an assumption about the average current and future cost of grid electricity to VSA.

PG See Appendix 1 on Assumptions in the Models on Page 23.

The first set of results presented below show significant savings associated with purchasing renewable energy compared to the equivalent purchases of grid electricity from Eskom (Figures 6&7). This is as would be expected given that renewable electricity is cheaper than grid electricity.

The greatest savings can be seen in the "Net Zero" scenario, where VSA ramps up virtual wheeling to meet total demand, making it completely independent of the grid, and ultimately does not need to purchase RECs. This scenario sees an ultimate cost savings of about R11 billion per year.

The "NDCs" scenario also sees meaningful cost savings, ultimately reaching about R1.7 billion. The "Current Policies" scenario has the lowest savings given the limited renewable energy purchases. Whether VSA purchases RECs or not has little impact on the savings, given the relatively low cost of RECs compared to electricity costs.

Figure 6: Annual cost savings associated with renewable energy purchases as a replacement for grid electricity, taking into account REC purchases, and assuming an average grid electricity price of R2.40 per kWh

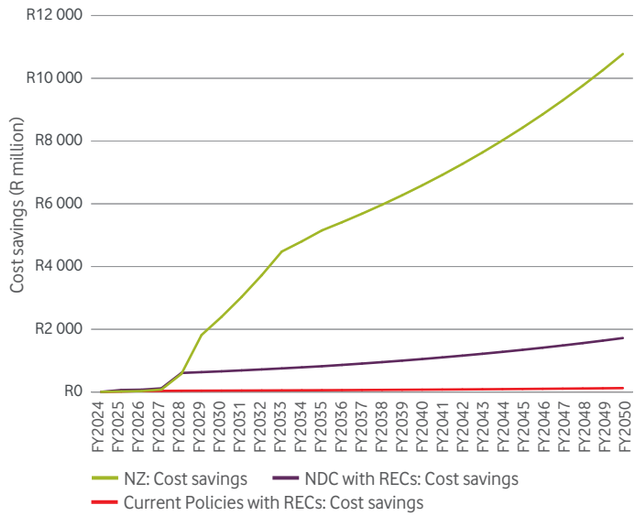
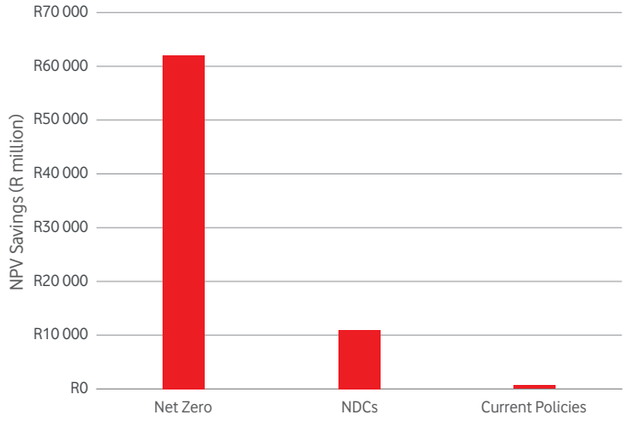


Figure 7: Net present value of cost savings associated with renewable energy purchases as a replacement for grid electricity, taking into account REC purchases, and assuming an average grid electricity of R2.40 per kWh



Future cost and availability of RECs

The Carbon Calculated/Enuity Renewable Energy Model assumes that the cost of renewable energy certificates (RECs) grows at half the rate of CPI. This assumption was based on input provided by VSA.

However, the global market for renewable energy certificates (RECs) is growing, driven by factors including corporate environmental action and the advancement of clean energy policies. As the market expands, and standards for certifying RECs become more rigorous, demand could increasingly outstrip supply, which in turn could lead to future prices that exceed the price trajectories included in this modelling work.

There is significant uncertainty of how far and fast the market will expand, and the implications for future pricing.

VSA's Renewables Ambitions and the Just Energy Transition (JET)

VSA's commitment to sourcing 100% of its electricity from renewable energy by 2025 can make a contribution to the development and growth of South Africa's renewable energy sector. The recognition of the links between growth in the renewables sector and Just Transition are well established.[1,2] By purchasing renewable electricity through the various supply options, VSA is directly supporting the expansion of clean energy generation capacity. This, in turn, can contribute to job creation, reducing air and water pollution, and improved human health outcomes due to a reduction in fossil fuel utilisation.

In making decisions about renewable energy procurement, VSA can potentially increase the positive impacts of its investments. Prioritizing suppliers with high Broad-Based Black Economic Empowerment (BBBEE) scores and those that are community-owned or have strong social and community ties can help ensure that the benefits of the renewable energy transition are distributed more equitably.

By purchasing excess power from renewable energy schemes owned and operated by local communities, VSA could help empower these communities and foster economic development.[3] Wheeling from Mpumalanga Province, in particular, could potentially have the advantages of leveraging existing grid infrastructure and facilitate the transition away from coal in the province where the economy is highly dependent on coal.

A potential downside of extensive virtual wheeling and reliance on PPAs is the risk of effectively privatising the benefits of South Africa's low carbon transition and slowing the overall decarbonisation of the national electricity supply. If numerous large corporations pursue zero-carbon targets through PPAs and virtual wheeling, the remaining users connected to the grid will not benefit from any carbon de-intensification, as the cleanest energy sources are effectively ring-fenced by the most well-resourced private players. These "remaining users" will not be able to capture the economic benefits of renewable energy supply (lower tariffs and avoidance of punitive carbon taxation costs) or lowering of their organisational or individual carbon emissions.

While VSA's individual energy footprint may be relatively small, widespread adoption of this approach by a well-resourced private sector could undermine broader efforts to reduce the grid's overall carbon footprint. VSA is already well aware of its potential positive impacts that could be achieved through its virtual wheeling platform.[4]

1 Presidential Climate Commission (2022), A Framework for a Just Transition in South Africa, available online at: https://pccommissionflo.imgix.net/uploads/images/22_PAPER_Framework-for-a-Just-Transition_revised_242.pdf.
2 DMRE, DTIC and DSI (2022), South African Renewable Energy Masterplan (SAREM): Draft, available online at: https://greencape.co.za/assets/SAREM-Draft-March-2022.pdf.
3 COSATU, NALEDI and Project 90 by 2030 (2018), Just energy transition: Community ownership, Jobs and the future of Renewable Energy Systems, available online at https://www.tips.org.za/just-transition/item/download/2062_298240ec9acde44e55eafbf0b28db7e5.
4 See for example https://www.vodafone.com/news/protecting-the-planet/vodacom-eskom-sign-agreement-address-energy-gap-south-africa

Financial analysis: carbon tax

Introduction to carbon tax in South Africa

The South African carbon tax came into effect as of 1 June 2019. The tax rate started at R120/tCO_2e in 2019 with an annual increase of the consumer price inflation plus 2% up until 31 December 2022, this was extended to the 31st of December 2025 (National Treasury, 2024). The second phase of the Carbon Tax begins on the first of January 2026 and will run until 2030.

The introduction of a carbon tax forms part of larger South African climate policy regime aimed at cost effectively lowering GHG emissions and transitioning towards a lower-carbon economy. If implemented in a rational and coherent way, the transition could create new business opportunities and force innovation within the economy (IMF, 2023).

The tax has been received with mixed responses, with three major concerns being identified. The first is potential negative impacts of competitiveness of industry; the second is increased cost burdens; and the third is that the carbon tax rate remains low, especially considering the tax-free allowances allocated to emitters which brings down the effective tax.

VSA and the Carbon Tax

VSA is registered as a carbon taxpayer; however, the company submits a zero-carbon tax account every year. The company's registration requirement is based on it exceeding the threshold for stationary combustion, due to the capacity of their diesel generators which operate when the electrical grid fails. The reason for submitting a zero-carbon tax account is that the carbon tax for the diesel consumed by VSA is part of the fuel levy, which is paid when the diesel is purchased. As such the company is not liable to pay carbon tax under phase 1 and has not paid carbon tax to date (Vodacom Group, 2023).

Carbon tax projections in South Africa

For the purposes of exploring the implications of the carbon tax for Vodacom, two different tax projections were considered, the first of which is used for "Net Zero" scenario and the second covers both the "NDCs" and "Current Policies" scenarios.

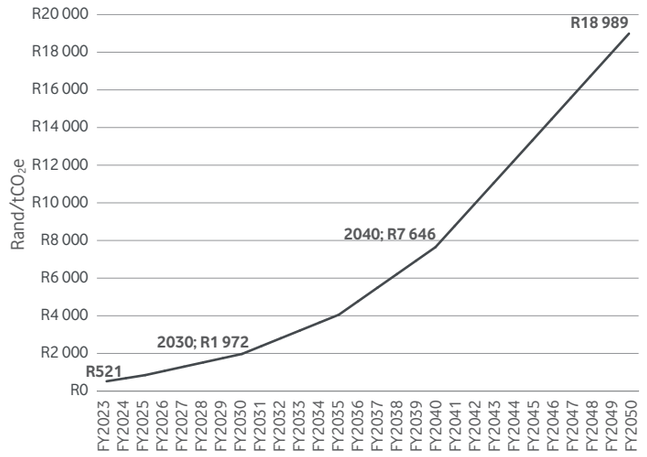
Carbon tax under "Net Zero"

South Africa's current carbon tax trajectory will unlikely enable South Africa to achieve net zero GHG emissions by 2050, as required by the NGFS Net Zero 2050 scenario. To develop a carbon tax trajectory consistent with "Net Zero," NGFS data was drawn upon, which includes estimates of "Net Zero" aligned carbon prices around the world.

Specifically, South African carbon prices trajectories consistent with a global temperature increase of 1.5°C above pre-industrial levels were extracted from the REMIND-MAgPIE integrated assessment model (IAM). Of the three IAM models included in the NFGS scenario suite[1], REMIND-MAgPIE best matches the planned evolution of a decarbonised South African electricity system to reach global net zero emissions by 2050.[2]

The 2050 South African carbon price trajectory under the "Net Zero" scenario (Figure 8) is significantly higher than those for the "NDCs" scenario as discussed on the next page.

Figure 8: "Net Zero" Scenario - South African carbon price trajectory
Source: © NGFS Phase 5 Scenario Explorer https://data.ene.iiasa.ac.at/ngfs



Notes: USD 2010 values inflated to USD 2024 values. USD translated to ZAR using average 2024 rate (Jan-Nov values from South African Reserve Bank and Dec value from Oanda.com).

1 IAMs enable climate analysis by combining macro-economic, agriculture and land-use, energy, water and climate systems into a common numerical analytical framework. For more detail, see https://climatedata.imf.org/datasets/2ca0bdfafa794355864b853dd2567efb_0/about.
2 Vivid Economics (2021) Transition Risk in TCFD Reporting: An example transition risk disclosure based on an illustrative South African portfolio. Report prepared as part of South Africa-UK PACT supported project 'Aligning South Africa's climate-related financial disclosure with global best practice'. South Africa-UK PACT. (Accessed: 6 June 2021). A copy of the report can be requested via email: sustainability@vodacom.co.za.

Carbon tax under "NDCs" and "Current Policies"

The "NDCs" and "Current Policies" scenarios both follow the current National Treasury carbon tax projection.

Impact of the carbon tax on electricity prices

Until 2025, when the first phase of the carbon tax ends, electricity providers receive total carbon tax allowances of 68.87% that reduce their effective carbon tax rate. The allowances are made up of the basic tax-free allowance (60%), a trade exposure allowance (4.87%), a carbon budget allowance (5%), and a carbon offset allowance (10%).[1]

To date, electricity providers have been able to offset their carbon tax liability against existing costs linked to a levy on electricity generated from non-renewable sources, and renewable energy premium. **Hence, the price of electricity has not been impacted by the carbon tax, and carbon costs have not been passed on to consumers**.

Impact of the carbon tax on liquid fuel prices

The carbon tax also applies to petrol and diesel use in South Africa and is charged through a carbon fuel levy. The levy is calculated based on the headline carbon tax rate, a basic tax-free allowance of 75%, and the greenhouse gas emissions associated with burning petrol and diesel. In 2024 the levy was 11c/litre for petrol and 14c/litre for diesel.

Because the carbon tax-free allowances applicable to electricity generation and liquid fuel use are different, the effective carbon tax rates for these energy carriers differ even though they are subject to the same headline carbon tax rate (see Figure 9).

Carbon Tax Discussion Paper on tax levels to 2030

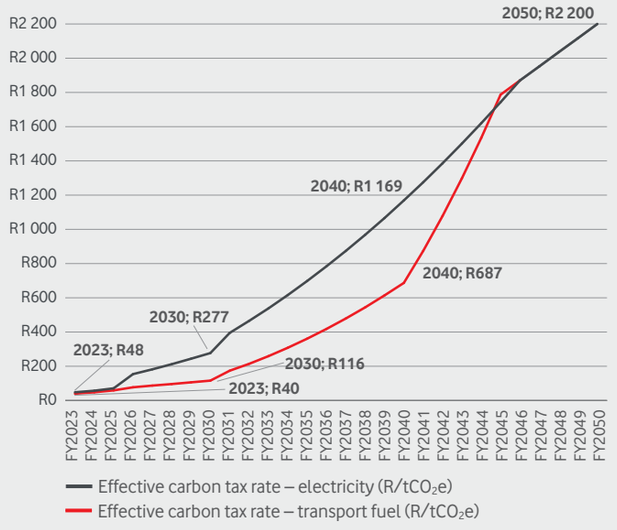
In 2024 the South African National Treasury published a discussion paper[2] outlining the proposed design of the second phase of the carbon tax (2026-2030) and beyond for comment. **While these proposals made in the discussion paper are not final, they provide the best current indication of what the carbon tax will look like after 2025**. The discussion paper proposes a gradual reduction in tax-free allowances from 2026 to 2035, and an increase in the headline carbon tax rate from R308/tCO_2e in 2026 to R462/tCO_2e in 2030.

From 2031 to 2035 the headline carbon tax rate[3] – the effective carbon tax after all allowances is accounted for – is shown to remain at the 2030 level. The discussion paper, however, reiterated a target price of US$120/$tCO_2e$ by 2050 as first stated in the *2022 National Budget Review*.[4] In the modelling presented here, this 2050 figure is converted to Rands using an exchange rate of R18.33/US$. A linear interpolation is used between 2035 and 2050.

The discussion paper also mentions estimates from several sources of the carbon prices required to make a fair share contribution to meeting global climate targets. These estimates are mostly much higher than the effective carbon tax levels (i.e. after allowances have been accounted for) proposed in the discussion paper. The discussion paper cites a study from the National Business Initiative (NBI) released in 2021 indicating South Africa would require carbon prices of US$40 in 2030, US$110 in 2040 and US$175/$tCO_2e$ in 2050, and research by the IMF released in 2023 showing South Africa needs a carbon price of US$120/$tCO_2e$ by 2030, in order to meet its NDC commitments and reach net-zero CO_2 emissions by 2050.

For the purposes of modelling the carbon tax for this work, a tax trajectory was developed using the guidance in the National Treasury discussion paper. The proposed carbon tax rates were used up to 2030, and the proposed allowances up to 2035 were included. The model assumed similar rates of decline in allowances, as per the discussion paper, from 2036 until 2050 (or when individual allowances reached zero). From 2031 the headline carbon tax rate is linearly increased to meet the National Treasury's target rate of US$120/$tCO_2e$ in 2050 (approximately R2 200/tCO_2e). The resulting effective carbon tax trajectory is shown in Figure 9 alongside.

Figure 9: Carbon tax trajectory used in the "Current Policies" and "NDC" scenarios modelling



1 In theory electricity providers are also eligible for a performance allowance of up to 5%, but since no performance benchmark was published for this sector, it could not be claimed in practice.
2 National Treasury (2024) Carbon Tax Discussion Paper: Phase Two of the Carbon Tax. Carbon tax discussion paper for public comment. Pretoria, South Africa: National Treasury. Available at: https://www.treasury.gov.za/public%20comments/TaxationOfAlcoholicBeverages/Phase%20two%20of%20the%20carbon%20tax.pdf (Accessed: 13 November 2024).
3 The headline carbon tax rate is the published carbon tax rate before any allowances have been taken into consideration.
4 National Treasury (2022), Budget Review 2022, available online at https://www.treasury.gov.za/documents/national%20budget/2022/review/FullBR.pdf.

Carbon tax model

The Carbon Calculated/Enuity Carbon Tax Model (CTM) was used to calculate VSA's direct (via diesel and petrol prices) and indirect (via electricity prices) carbon tax exposure using the above information and assumptions.

Carbon tax on electricity

The "NDCs" and "Current Policies" scenarios assume that the carbon tax is passed through into electricity prices only after 2030 in accordance with the National Treasury discussion paper (2024), whereas carbon prices increase the cost of electricity from 2026 in the "Net Zero" carbon tax trajectory.

To model the impact of the carbon tax on electricity between now and 2050, a projection of the emissions per unit of electricity is required. The carbon tax is levied on the GHG emissions released when electricity is generated, which in turn is determined by the technologies used to generate the electricity. Coal-fired electricity generation generates significant GHG emissions, whereas wind and solar are emissions-free. The carbon intensity of the grid a consumer obtains its electricity from (i.e. the amount of GHG emitted for every unit of electricity consumed) thus determines the amount of carbon tax that will be passed on per unit of electricity. Over time, the grid emissions intensity will change as the mix of technologies used to generate electricity moves towards lower emissions alternatives.

No official grid emissions intensity projections are available for South Africa up to 2050. In theory, this information should be extractable from the modelling underpinning South Africa's electricity sector build plan (the Integrated Resource Plan (IRP)), which also governs when old capacity is retired. The last officially accepted plan, IRP2019, does not supply this information, and significant uncertainty on the future grid composition remains.

Therefore, to develop a grid emissions intensity trajectory to inform the carbon tax model, a point estimate of the grid intensity of the South Africa grid published by the DFFE, the national generation grid emission factor for 2021,[1] was scaled by the change in the expected percentage of electricity generated in South Africa for every year from 2024 to 2050 from fossil fuels (relative to 2021) for the different scenarios, as described in the renewable electricity model.

The CTM enables VSA's carbon tax impact to be considered under the different scenarios shown in Table . To be noted is the fact that the purchase of RECs does not impact the carbon tax costs that VSA is exposed to, as RECs cannot offset the carbon tax. As such, the two different scenarios included for the renewable energy analysis, which consider whether RECs are purchased, was not presented here.

In each of the scenarios, cost trajectories are translated to net present values to facilitate comparison and to calculate a total cost estimate for each scenario.

Modelling the carbon tax on liquid fuel

Given that the carbon tax rates and allowances applicable to the carbon fuel levy on petrol and diesel have already been published as legislation, it is assumed in the "Net Zero" trajectory that the higher carbon tax rates only impact the cost of petrol and diesel from 2026.

VSA petrol and diesel demand is assumed to remain constant under both scenarios, but VSA's electricity demand from the national electricity grid will vary by scenario and the actions undertaken by VSA.

Demand for electricity and diesel for use in generators has been adjusted based on an assumption provided by VSA that loadshedding will improve from 2024 levels but will not completely stop.[2]

1 DFFE (2024) 'South Africa's 2021 Grid Emission Factors Report', Government Gazette, 50071(2 February 2024), pages 34–50.
2 Based on VSA input, a step-change adjustment in demand for these two variables was applied to 2025 data, indicating a 2.5% increase in annual electricity demand and a 20% decrease in annual diesel demand from generators.

Results from the carbon tax model

Carbon tax, grid emissions intensity and electricity demand

As expected, the financial implications of the carbon tax for VSA under the different scenarios from Table 1 are directly linked to the speed at which the GHG (carbon) emissions intensity of the South African electricity grid decreases (see Figure 10 on the right).

As fossil fuels in the grid decline, so too does the grid GHG emissions intensity.

The second factor that impacts the VSA carbon tax burden is the amount of electricity that VSA actually purchases from the grid. As stated previously, this is calculated as VSA's total electricity demand minus on-site own renewables, renewable energy purchased via PPAs on-site, and renewable energy wheeled across the grid from renewable energy providers (which includes both traditional wheeling and the new virtual wheeling model VSA is pioneering with Eskom).

The projected grid electricity required by VSA is shown in Figure 11.

Figure 10: Emissions intensity of electricity grid

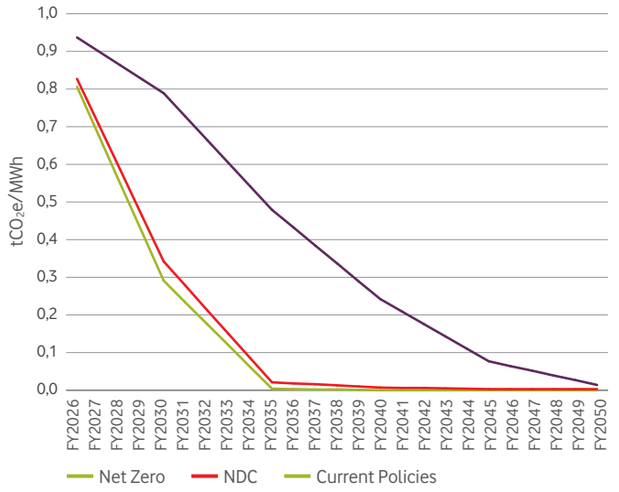
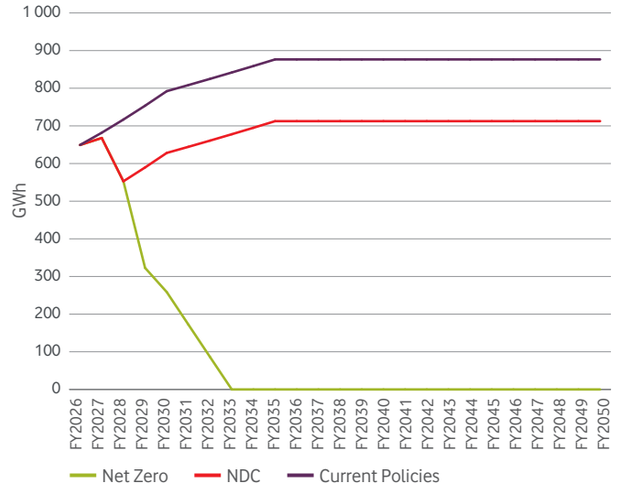


Figure 11: Grid electricity demand by scenario

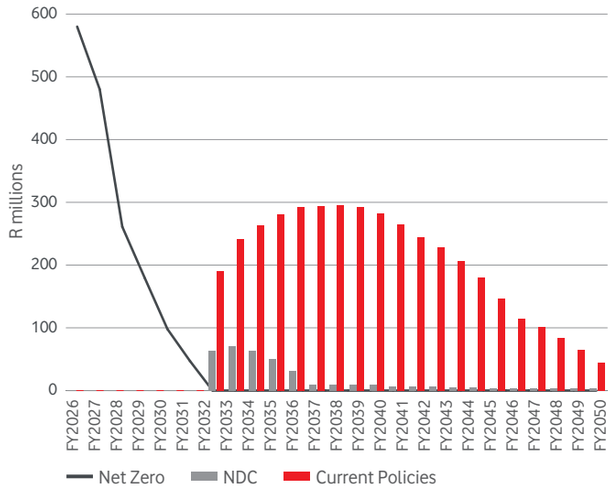


Source: Carbon Calculated/Enuity Renewable Energy and Carbon Tax Models

The impact of grid decarbonisation is further emphasised when comparing the "Current Policies" and "NDCs" scenarios in Figure 12 below. Even though the differential in demand for grid electricity between the two scenarios reaches a constant level, and the effective carbon tax rate is the same for both scenarios, the slower pace of grid decarbonisation under the "Current Policies" scenario relative to the "NDCs" scenario leads to significantly higher carbon tax costs for VSA in the "Current Policies" scenario.

The scale of the difference will become clear when looking at the present value of the two costs streams in Figures 13 and 14 in the following section.

Figure 12: Annual carbon tax cost passed through via electricity prices



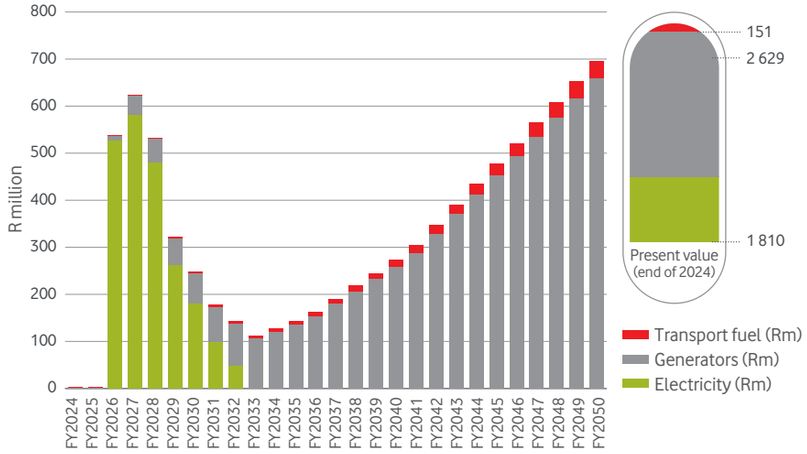
Key takeaway:

Carbon tax implications are, among others, a factor of; a) the amount of electricity purchased from the South African grid (Eskom); b) the rate at which the South African grid decarbonises; c) the final trajectory of the carbon tax price; and, d) when or whether a carbon tax is passed through to the consumer in the price of electricity.

Projected carbon tax costs under the "Net Zero" scenario

Figure 13 below shows VSA's projected total carbon tax costs from electricity, diesel used in generators, and petrol and diesel used for transport under the "Net Zero" scenario, which projects rapid electricity grid decarbonisation and a concurrent rapid increase in the price of carbon taxes of all other fossil fuels (diesel and petrol).

Figure 13: Carbon tax costs in "Net Zero" scenario

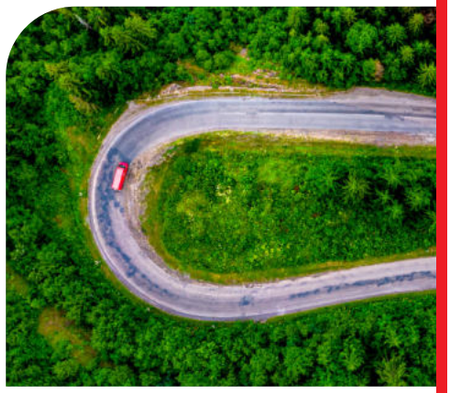


A combination of ambitious electricity grid decarbonisation, and VSA procuring an increasing amount of renewable energy via virtual wheeling, lead to carbon tax costs associated with electricity declining quickly from a peak in 2027 to zero in 2032.

In fact, despite significantly higher carbon taxes being passed on much faster in this scenario, the present value of carbon tax costs passed on via electricity prices is slightly lower under this scenario (see Figure 13).

Rapidly increasing effective carbon tax rates and a lack of action to reduce demand, however, leads to the amount of carbon tax passed on via diesel for use in generators increasing from negligible levels in 2024 and 2025 to very significant levels by 2050.

The "Net Zero" scenario generates the highest total VSA carbon tax cost impact on a present value basis. The impact is roughly double that experienced in the second most costly scenario ("Current Policies"), and more than 60 percent of the total carbon cost impact, at present values, is attributed to the carbon fuel levy on petrol and diesel – with the vast majority of the impact (95%) originating from diesel used in generators under assumed consumption levels provided by VSA.



Key takeaways under a "Net Zero" scenario:

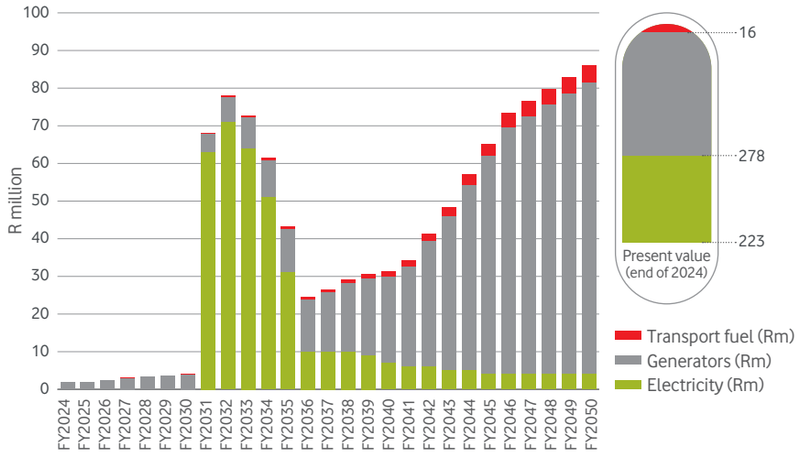
- Carbon tax rate increases immediately and rapidly
- Electricity-based carbon tax is minimal due to effective decarbonisation of the South African electricity grid & increase purchase of renewable energy by VSA
- Petrol and diesel consumption (especially in generators) as projected by VSA, is heavily taxed resulting in this scenario causing the highest carbon tax liability for VSA.

Projected carbon tax costs under the "NDCs" scenario

A combination of VSA purchasing additional renewable energy supply much lower effective carbon tax rates; and, ambitious grid decarbonisation leads to carbon tax costs being significantly lower in the NDC scenario (Figure 14).

Carbon costs incurred via petrol and diesel prices (predominantly linked to use in generators), however, is still larger than indirect carbon costs incurred via electricity usage (on a NPV basis).

Figure 14 Carbon tax costs in the NDC scenario



Key takeaways under an NDC scenario:

- Carbon tax rates are significantly lower under an NDC scenario than a "Net Zero" scenario
- VSA meets its renewable energy target
- The South African electricity grid decarbonises relatively quickly in alignment with the country's NDC commitment
- Petrol and diesel (especially generators) incur the highest carbon taxation under the NDC scenario.

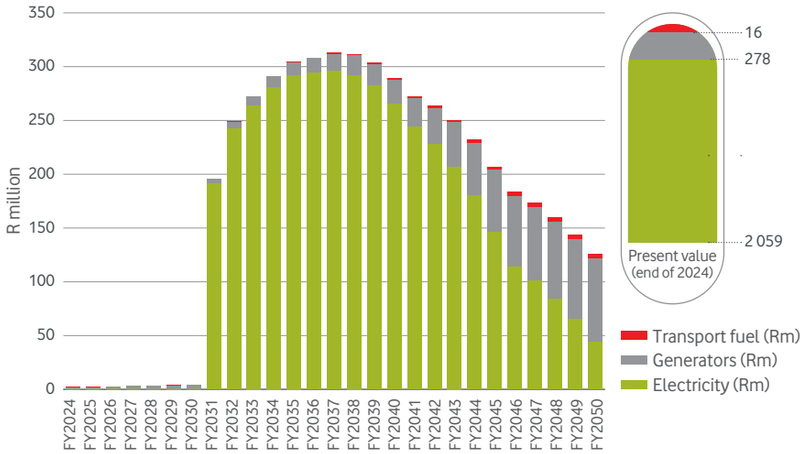
Projected carbon tax costs under the "Current Policies" scenario

Due to the slow pace of grid decarbonisation in the "Current Policies" scenario, the carbon tax costs passed via electricity prices will be significantly higher than under the "NDCs" scenario (present value of R2,059 million versus R223 million).

Carbon tax costs incurred via petrol and diesel are the same between the two scenarios because there is no difference between volumes or effective carbon tax rates between the two scenarios.

However, Figure 15 shows that while carbon costs in the "Current Policies" scenario are almost four times larger than in the "NDCs" scenario, they are only about half the costs that would be incurred in the "Net Zero" scenario without mitigation measures.

Figure 15: Carbon tax costs in the "Current Policies" scenario



Key takeaways under a "Current Policies" scenario:

- VSA meets its renewable energy commitments by purchasing RECs, as opposed to virtual wheeling, thereby still consuming carbon intensive electricity from the South African grid
- The comparatively slow rate of decarbonisation of the South African electricity grid incurs a high carbon tax cost to VSA
- Carbon tax on VSA petrol and diesel consumption remains the same as for the NDC scenario.

Summary: total carbon tax comparison under the three climate scenarios up to 2050

The table alongside presents a summary of the NPV of the carbon tax under the different scenarios.

Table 3: Summary of NPV of carbon tax under the different scenarios

Scenario	Rate of grid decarbonisation	NPV of carbon tax
"Net Zero"	Fast and early	R4.59bn
"NDCs"	Slightly slower	R0.52bn
"Current Policies"	Slow	R2.35bn

Financial analysis: flood events

Background

VSA's 2023 TCFD report highlighted the likelihood of increased flood events under different climate change scenarios, and that these could potentially be of material financial impact. This was based on the cost of historical flood events; being physical damage to VSA assets and disrupting service to customers for lengthy periods of time.

The question to be asked is whether future flood events, which are predicted to increase in number, duration and intensity, could be of such scale to be financially material to VSA, and what determines financial materiality within the VSA risk management regime.

Key features of such an analysis include climate projections (that forecast the frequency, duration and intensity of future floods); granular data information and GIS site locations of physical assets; records of damage caused by relevant historical events; the financial impacts of such events; and relevant stakeholder involvement, both internally and externally.

What is at risk?

Flood events can severely disrupt critical telecommunications infrastructure. Damage to base station towers, fiber-optic cables, and other network components can lead to widespread service outages. These outages incur significant costs, including the expenses of repairing damaged infrastructure as well as the lost revenue and productivity from network downtime. Additionally, flood-related damage to supporting infrastructure like power and transportation can further hamper restoration efforts, driving up overall recovery costs. Despite cellular services generally being resilient to flood events, whereby surrounding base stations can pick up traffic volume from affected base stations, loss of revenue does take place when full network functionality is impacted.

Outside of the network infrastructure, consideration needs to be given to flood impacts on large permanent assets such as data centres and/or offices.

VSA, like other cellular providers globally, has been impacted by flood events in the past. These financial impacts have varied due to the severity of the flood event and the geographic area of impact. In the last three financial years (2023-25), three flood events have caused sufficient damage to the network infrastructure and services for VSA to post insurance claims for financial compensation.

Table 4: Flood events in past 3 years that have incurred VSA financial losses

	Date	Region/site	Property damage (Rm)	Increased cost of working (Rm)	Loss of revenue (Rm)	Total claim (Rm)[1]
2023	April 12 2022	KZN, various	14 498 529	3 163 607	4 732 398	22 394 534
2024	June 03 2024	Eastern, various	4 506 602	6 885 642	0	11 392 244
	July 06 2024	Western, various	4 344 830	9 650 723	5 699 060	19 694 613

The financial impact of the above flood events on VSA's operations includes revenue loss calculations that exclude planned promotions.

"Increased Cost of Working" covers expenses related to service restoration, such as helicopter deployment for backup power and infrastructure repairs, with costs pre-approved by insurers. Insurance cost analysis of these flood events indicated that **revenue loss** occurred in only two instances.

Commercial clients using VSA's cellular network were primarily affected, while enterprise revenue loss was not quantified due to contractual complexities. **Network resilience is maintained through mast "ring" configurations, ensuring service continuity by leveraging nearby infrastructure.**

VSA is covered under Vodacom Group insurance, syndicated through Zurich Insurance in London.

1 The financial impact of floods on VSA's operations includes revenue loss calculations that exclude planned promotions. "Increased Cost of Working" covers expenses related to service restoration, such as helicopter deployment for backup power and infrastructure repairs, with costs pre-approved by insurers. Insurance cost analysis of these flood events indicated that revenue loss occurred in only two instances. Commercial clients using VSA's cellular network were primarily affected, while enterprise revenue loss was not quantified due to contractual complexities. Network resilience is maintained through mast "ring" configurations, ensuring service continuity by leveraging nearby infrastructure. VSA is covered under Vodacom Group insurance, syndicated through Zurich Insurance in London, with discussions planned regarding climate modelling and insurance pricing strategies.

Financial mitigation through insurance

In consultation with Vodacom Group Risk Management, which also oversees VSA, and Vodacom Group insurance engineers it was acknowledged that flood events have (marginally) increased in frequency and severity and that, despite anticipation of continued increase in frequency and severity, it was felt that such events were not high risk from a financial perspective due to sufficient and comprehensive insurance coverage. The financial impacts of other extreme events such as fires and wildfires are of magnitudes higher than that of floods.

VSA's existing insurance excess on any single event claim is capped at **R7.5 million**. This excess can be used as a proxy for the real financial impact to VSA for each of the above **flood events and are not deemed to be financial materiality to VSA.**

Vodacom Group carries comprehensive insurance for all extreme events, of which flood risk is just one "peril". Its insurance coverage is syndicated across numerous insurance companies who are underwritten by the large international reinsurance firms such as MunichRe and ZurichRe.

Will floods increase insurance costs?

While it is not possible under the scope of this project to ascertain exactly what flood risks contribute towards VSA's comprehensive insurance premiums and excess liabilities. It is, however, the perspective of Vodacom Group Risk Management and its insurance brokers that the cost of flood risk is ameliorated in its incorporation into the overall insurance policy of Vodacom Group.

This perspective is supported by recent reinsurance industry claims that since 1970 the number of annual extreme weather events has increase by a factor of 5, while the cost per-extreme weather event has increased by 77%, adjusted for inflation, over the past 50 years (World Economic Forum, 2025).

SwissRE does claim that increase in extreme weather caused by climate change is creating the need for insurance premiums to keep up with the changing environment (Swiss Re Institute, 2024). The company further states that losses resulting from extreme weather-related claims are expected to spike by 35% to 120% by 2040 (BCG, 2023). This aligns with Zurich RE's half year report of 2024, with the prices of their Property and Casualty insurance premiums increasing by 5%, the main reason for the increase was attributed to higher weather-related claims. This is evident by the loss ratio increasing by half a percentage point.

With the number of extreme weather events increasing and the cost of these events increasing, insurance companies are re-evaluating their premiums. The Boston Consulting Group notes that climate change is projected to increase insurance premiums between 30% to 60% (excluding inflation) by 2040 (BCG, 2023). This, however, is because of all extreme weather events, not just flooding.

Increasing frequency and cost of extreme weather event

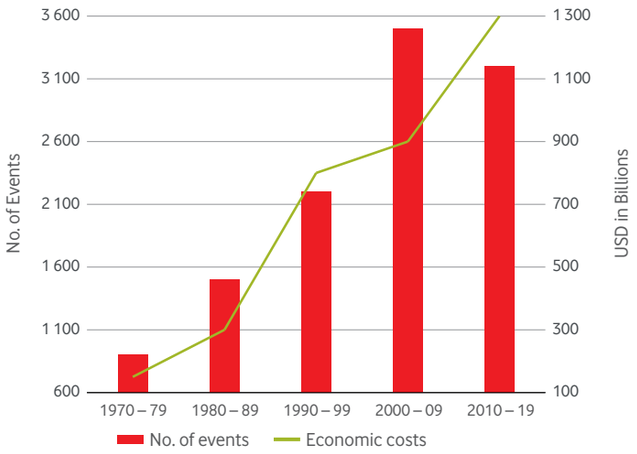


Figure 16: Increased frequency of global extreme weather events and associated economic costs (World Economic Forum, 2025)

Losses from floods 1980 – 2023
APAC/South Africa (US$ bn, inflation-adjusted)

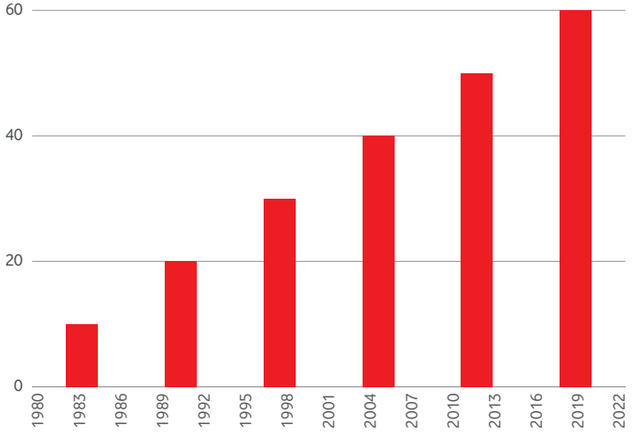


Figure 17: Economic and insured losses from flood events in APAC and South Africa regions (MunichRe, 2023)

Key takeaways on flood risk costs

- Future flood events are predicted to increase in frequency, duration, and intensity and these can disrupt infrastructure (data centres, base station towers, fibre-optic cables), leading to network outages, repair costs, lost revenue, and operational downtime.
- Three major flood events in South Africa (2023-2025) have led to VSA insurance claims for financial losses, totalling R53 million.
- Flood events are not seen as high financial risk for VSA due to strong insurance coverage - excess costs per event is capped at R7.5 million.
- Insurance coverage ensures these costs are not a material financial risk to VSA.
- Insurance coverage ensures these costs are not a material financial risk to VSA.
- No significant decline in consumer spending has been recorded on VSA services post-floods.
- Further research needed to assess long-term financial risks from extreme flood events.

Conclusion

VSA has demonstrated a clear commitment to aligning its climate strategy with the TCFD framework. Through its structured approach to identifying and assessing high priority CRROs, VSA has taken proactive steps to understand and mitigate the financial impacts of climate change on certain areas of its operations. The company's adoption of scenario analysis, in line with global best practices, has enabled it to assess potential transition and physical risks, including carbon taxation and extreme weather events like floods, as well as opportunities such as the transition to renewable energy.

The findings from this project highlight that while there are financial risks associated with climate change, particularly in terms of regulatory and physical impacts, there are also significant opportunities for cost savings and business resilience through strategic investment in renewable energy solutions. The implementation of virtual wheeling and renewable energy procurement positions VSA to meet its decarbonisation commitments while maintaining operational stability. Furthermore, the evaluation of flood risk underscores the importance of climate adaptation measures to safeguard critical infrastructure and services.

As VSA continues its journey towards a low-carbon, climate-resilient future, ongoing improvements in data collection, risk assessment, and strategic planning will be crucial. By integrating the financial impacts of climate considerations into its core business strategy, VSA is not only strengthening its resilience but also reinforcing its leadership in sustainable corporate governance within the South African telecommunications sector. The insights gained from this report will serve as a foundation for future climate-related financial planning, ensuring that VSA remains agile and well-prepared in an evolving global climate landscape.

References

A	Aguado, J. (2024) 'Economic impact of floods in Spain could rise to over 10 bln euros', Reuters, viewed 11 February 2025, https://www.reuters.com/world/europe/spanish-banks-withstand-impact-recent-floods-central-bank-says-2024-11-05/.
B	Boston Consulting Group (2023) 'An Insurance Risk Framework for Climate Adaptation', BCG, viewed 11 February 2025, https://www.bcg.com/publications/2023/an-insurance-risk-framework-for-climate-adaptation.
C	Climate Action Tracker (2024) 'Temperatures', Climate Action Tracker, viewed 11 February 2025, https://climateactiontracker.org/global/temperatures/
	Cosatu, Naledi and Project 90x2030 (2018) Just energy transition: Community ownership, Jobs and the future of Renewable Energy Systems, available online at https://www.tips.org.za/just-transition/item/download/2062_298240ec9acde44e55eafbf0b28db7e5.
D	Department of Forestry, Fisheries and Environment (2024) South Africa's 2021 Grid Emission Factors Report. Government Gazette, 50071(2 February), pages 34–50.
	Department of Mineral Resources and Energy, Department of Trade, Industry and Competition, and Department of Science and Innovation (2022) South African Renewable Energy Masterplan (SAREM): Draft. Available at: https://greencape.co.za/assets/SAREM-Draft-March-2022.pdf (Accessed: 10 February 2025).
G	Gilbert, P. (2022) 'SA floods wreak havoc on telecoms networks', Connecting Africa, viewed 11 February 2025, https://www.connectingafrica.com/connectivity/sa-floods-wreak-havoc-on-telecoms-networks.
I	Intergovernmental Panel on Climate Change (2018) Global warming of 1.5°C: An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways. Edited by V. Masson-Delmotte, P. Zhai, H.-O. Pörtner et al. Geneva: World Meteorological Organization. Available at: https://www.ipcc.ch/sr15/ [Accessed 10 February 2025].
M	McLeod D. (2022) 'Floods knock out telecoms infrastructure in KZN', TechCentral, 12 April 2022, https://techcentral.co.za/floods-knock-out-telecoms-infrastructure-in-kzn/210004/
	Muñoz, M. (2024) 'Spain's devastating floods will cost insurers over $3.8 billion', Insurance Journal, viewed 11 February 2025, https://www.insurancejournal.com/news/international/2024/11/08/800552.htm.
	Munich Re (2025) 'NatCatSERVICE', Munich Re, viewed 11 February 2025, https://www.munichre.com/en/solutions/for-industry-clients/natcatservice.html.
N	Network for Greening the Financial System (2024) Phase 5 Scenario Explorer. Available at: https://data.ene.iiasa.ac.at/ngfs (Accessed: 10 February 2025).
S	South African National Treasury (2022) Budget review 2022. Pretoria: National Treasury. Available at: https://www.treasury.gov.za/documents/national%20budget/2022/review.pdf [Accessed 10 February 2025].
	South African National Treasury (2024) Carbon Tax Discussion Paper: Phase Two of the Carbon Tax. Available at: https://www.treasury.gov.za/public%20comments/TaxationOfAlcoholicBeverages/Phase%20two%20of%20the%20carbon%20tax.pdf (Accessed: 13 November 2024).
	Swiss Re Institute (2024) 'Sigma 1/2024: Natural catastrophes in 2023', Swiss Re Institute, viewed 11 February 2025, https://www.swissre.com/institute/research/sigma-research/sigma-2024-01.html.
T	Telecompaper (2024) 'Over 200 Telefónica base stations destroyed by storm', Telecompaper, viewed 11 February 2025, https://www.telecompaper.com/news/over-200-telefonica-base-stations-destroyed-by-storm--15174530.
	Telecompaper (2024) 'Spanish MNOs restore bulk of flood-hit communications networks', Telecompaper, viewed 11 February 2025, https://www.telecompaper.com/news/spanish-mnos-restore-bulk-of-flood-hit-communications-networks--1517996.
P	Presidential Climate Commission (2024) The State of Climate Action in South Africa. Available at: https://www.climatecommission.org.za/publications/the-state-of-climate-action-in-south-africa (Accessed: 20 January 2025).
V	Vivid Economics (2021) Transition Risk in TCFD Reporting: An example transition risk disclosure based on an illustrative South African portfolio. Report prepared as part of South Africa-UK PACT supported project 'Aligning South Africa's climate-related financial disclosure with global best practice'. South Africa-UK PACT. (Accessed: 6 June 2021). A copy of the report can be requested via email: sustainability@vodacom.co.za
	Vodafone, 2024, Climate Transition Plan 2025-2027, Newbury, Vodafone
	Vodacom Group (2024) 'CDP Climate Change Questionnaire 2023'. Available at: https://www.vodacom.com/pdf/social-report/2023/vodacom-group-cdp-climate-change-questionnaire-2023.pdf? (Accessed 20 January 2025).
	Vodacom South Africa (2023) Sustainability Report 2023. Available at: https://vodacom.com/sustainability-reports (Accessed: 10 February 2025).
	Vodafone. (2024) Climate Transition Plan 2025-2027. https://assets.ctfassets.net/q7ob9vms4z5k/2OdF9uYwLFlnioEyDe17bW/b9ed34da311368fb0851d2f2f1122454/vodafone-group-climate-transition-plan-2025-2027.pdf
W	Wesgro (2022) 'Economic impact of flooding in KwaZulu-Natal', Wesgro, viewed 11 February 2025, https://www.wesgro.co.za/uploads/files/Wesgro-Research_Economic-Impact-of-Flooding-in-KZN_2022.05.pdf.
	Whitt, J. & Gordon, S. (2023) 'This is the economic cost of extreme weather', World Economic Forum. Available at: https://www.weforum.org/stories/2023/01/extreme-weather-economic-cost-wef23/. (Accessed; 11 February 2025)
	World Meteorological Organization (2025) 'WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level', WMO, viewed 11 February 2025, https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level.
	World Economic Forum (2025) The Global Risks Report 2025, World Economic Forum, viewed 11 February 2025, https://www.zurich.com/knowledge/topics/global-risks/the-global-risks-report-2025
	World Meteorological Organisation (2025) WMO Confirms 2024 as warmest year on record at about 1.55□C above pre-industrial level. Available at: https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level (Accessed: 18 March 2025)
Z	Zurich Insurance Group (2024) 'Half Year Report 2024', Zurich Insurance Group, viewed 11 February 2025, https://edge.sitecorecloud.io/zurichinsur6934-zwpcorp-prod-ae5e/media/project/zurich/dotcom/investor-relations/docs/financial-reports/2024/half-year-report-2024.pdf.

Appendix A:

List of model inputs and assumptions

Parameter	Number	Units
Electricity demand		
FY 2024 total electricity demand	590.10	GWh
Baseline electricity growth assumptions (not considering loadshedding) in %		
2025-2030	5%	
2031-2035	2%	
2035-2040	0%	
Impact of Load shedding on demand relative to 2024 values		
Input values	Liquid fuel	Electricity
Medium	-20%	2.5%
Onsite renewables – Vodacom owned		
On-site generation at end of FY 2024	0.42	GWh
On site generation planned for Century City, assumed to come online beginning FY 2026	0.83	GWh
Onsite renewables – PPAs		
Rosslyn PPA	1.196	GWh
Silverton PPA	1.49	GWh
Mt Edgecombe	0.87	GWh
Midrand solar campus FY 2024	5.27	GWh
Midrand solar campus from FY 2025 onwards	9.00	GWh
Cost: Rosslyn PPA	1.662	R/kWh
Cost: Silverton PPA	1.659	R/kWh
Cost: Midrand solar campus	1.480	R/kWh
Cost: Mt Edgecombe, assumed to be average of the other sites	1.601	R/kWh
Escalation Rosslyn and Silverton first 4 years	3%	
Escalation Rosslyn and Silverton from year 5 onwards	2%	
Mt Edgecombe and Midrand escalation, assumed at CPI	5%	

Parameter	Number	Units
Grid renewables – Wheeled PPAs		
PowerX NMB	1.00	GWh
PowerX CPT	3.60	GWh
Cost- PowerX NMB	1769.00	R/MWh
Cost - PowerX CPT	1320.00	R/MWh
Escalation in Wheeled PPA	See below	
Virtual wheeling online at start of FY 2027	14.00	GWh
Additional virtual wheeling online at start FY 2028	150.00	GWh
Cost of virtual wheeled power online at start of FY 2027	882.00	R/MWh
Cost of remaining virtual wheeled power	1019.10	R/MWh
Grid emissions factor		
National Generation Grid Emission Factor (NGGEF) (2021)	0.985	tCO_2e/MWh
Grid emissions factor decline: 2021 grid emissions factor scaled by proportion of fossil fuels remaining in the electricity grid		
RECs		
Average cost of RECs	27,830	R/GWh
REC Escalation (assumed half of CPI)	2.52%	
Full Carbon tax pass through year into electricity price		
NDC	2031	
Net Zero 2050	2026	

Appendix A: List of model inputs and assumptions continued

Parameter	Number	Units
Liquid fuels - Scope 1		
Diesel Consumption Generators	15,353,256	litres
2025-2030	0%	Growth in annual demand for generators (not considering loadshedding) in %
2031-2035	0%	
2036-2040	0%	
2041-2045	0%	
2046-2050	0%	
Transport	474,228	FY24 Fleet Diesel - litres
Transport	283,277	FY24 Fleet Petrol - litres
2025-2030	0%	Growth in annual vehicle fuel demand in %
2031-2035	0%	
2036-2040	0%	
2041-2045	0%	
2046-2050	0%	
Other assumptions		
CPI	5.04	%
Discount rate	5.04	%

Parameter	Number	Units
Grid electricity costs, also used for escalation in wheeled PPAs (not virtual PPAs)		
Average grid electricity price paid by Vodacom in 2024	2.40	R/kWh
SMYPD increase FY 2025	12.7%	
MYPD increase FY 2026	34.5%	
MYPD increase FY 2027	8.2%	
MYPD increase FY 2028	9.4%	
Increases thereafter (CPI)	5.04%	
Carbon tax assumptions		
Long-term target value target value	$120.00	USD
Long-term target date	2050	
ZAR/USD average exchange rate (2024)	18.3315	
Reduction in basic tax-free allowance for combustion emissions (2036 - 2045)	2.50%	
Reduction in basic tax-free allowance for mobile emissions from road transport (2031-2040)	2.50%	% points per annum
Reduction in basic tax-free allowance for mobile emissions from road transport (2041-2050)	10%	% points per annum
Performance allowance (Phase 2 onwards)	0%	
Offset allowance (Phase 2 onwards)	0%