



# Climate

## The Challenge: A Depleting Carbon Budget

Alize le Roux and Jakkie Cilliers

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Addressing the cause of climate change and acknowledging the need to adapt to its impact requires a comprehensive global approach and commitment focusing on climate change adaptation (making people, infrastructure and economies safer) and aggressive mitigation efforts (reducing carbon in the atmosphere). There has been a proliferation of international, regional and national efforts to address the unfolding climate crisis, and the imperative for aggressive mitigation efforts is well-established and understood. Still, these must be bolstered to change the Current Path's grim reality.

The implication of the Paris Agreement to limit global average temperature rise to below 2°C above pre-industrial levels and pursue ambitious efforts to limit it to 1.5°C requires that aggressive net-zero greenhouse gas emissions are achieved by mid-century, meaning removing as much carbon from the atmosphere as is being emitted. To have a 50% chance of keeping global warming within 1.5°C relative to pre-industrial levels, the IPCC 6AR **stated** that the world's remaining carbon budget as of 2020 was 500 gigatonnes of CO<sub>2</sub> (GtCO<sub>2</sub>). However, a recently completed study by the IIASSA[1] team **revised** this budget to 250 GtCO<sub>2</sub> as of the end of 2022.

The study highlights that if CO<sub>2</sub> emissions stay at 2022 levels (37.15 billion tons), the world's remaining carbon budget (250 GtCO<sub>2</sub>) will be exhausted by **2029**. 2023 broke yet another concerning milestone, recording the highest-ever emissions from fossil fuels.

Using data from the **IPCC's 6AR**, various studies and scenarios offer estimations of the CO<sub>2</sub> concentration range in 2050 for a 1.5°C limit of 330 to 400 ppm. Even in a net-zero scenario, CO<sub>2</sub> concentrations will continue to rise for several decades due to the stock and long residence time of historical atmospheric emissions, emphasising the importance of additional carbon capturing and sequestration efforts. In the Current Path forecast, even amidst a decrease in global carbon emission annually, emission concentrations would continue rising since the stock of CO<sub>2</sub> in the atmosphere continues to grow, albeit slower, to around 515 ppm by mid-century.

The implication is that instead of limiting global warming to 1.5°C above the pre-industrial level, the earth will be almost 2.2°C warmer in 2050. This highlights the importance of additional carbon capturing and sequestration efforts, drastic climate mitigation actions, and the necessity of aggressive adaptation financing and investment.

Coordinated global efforts are necessary to mitigate climate change, decrease carbon emissions, and reduce the escalating atmospheric carbon dioxide levels. The following section explores some of these approaches, including the impact of a global carbon tax and carbon sequestration technologies, before unpacking what this means for Africa and Africa's policy responses.

## Endnotes

1. International Institute for Applied Systems Analysis

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## About the authors

Ms Alize le Roux joined the AFI in May 2021 as a senior researcher. Before joining the ISS, she worked as a principal geo-informatics researcher at the CSIR, supporting various local and national policy- and decision-makers with long-term planning support. Alize has 14 years of experience in spatial data analysis, disaster risk reduction and urban and regional modelling. She has a master's degree in geographical sciences from the University of Utrecht, specialising in multi-hazard risk assessments and spatial decision support systems.

Dr Jakkie Cilliers is the ISS's founder and former executive director of the ISS. He currently serves as chair of the ISS Board of Trustees and head of the African Futures and Innovation (AFI) programme at the Pretoria office of the ISS. His 2017 best-seller *Fate of the Nation* addresses South Africa's futures from political, economic and social perspectives. His three most recent books, *Africa First! Igniting a Growth Revolution* (March 2020), *The Future of Africa: Challenges and Opportunities* (April 2021), and *Africa Tomorrow: Pathways to Prosperity* (June 2022) take a rigorous look at the continent as a whole.

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