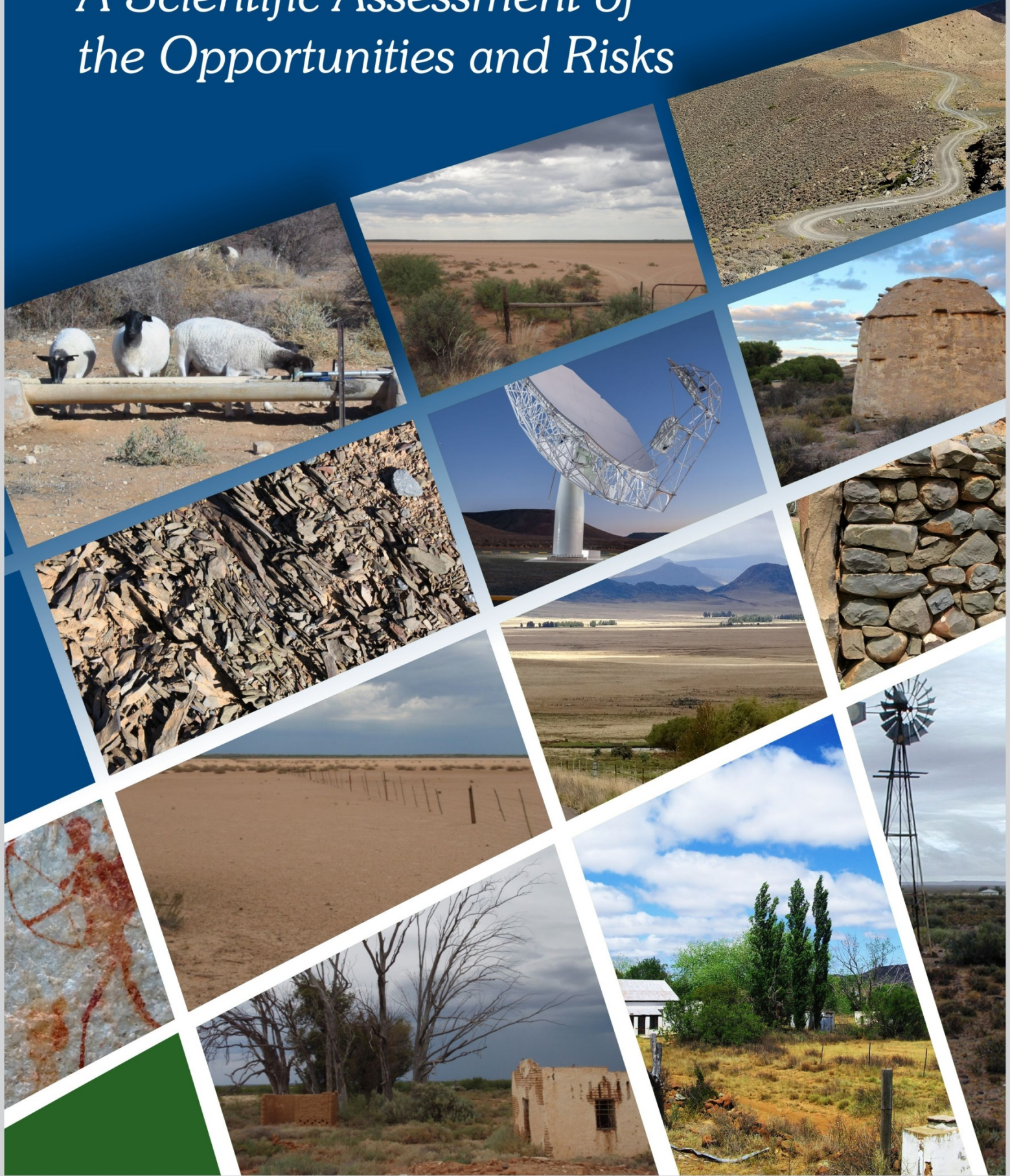


# Shale Gas Development in the Central Karoo:

*A Scientific Assessment of  
the Opportunities and Risks*





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## *A Scientific Assessment of the Opportunities and Risks*

The Central Karoo is an arid, extensive landscape, experienced by many people as a sanctuary of austere but captivating beauty. At the same time, the people who live in the region are mostly poor - high levels of unemployment and inequality characterise the local economies and social fabric. South Africa is investigating the opportunities for introducing more natural gas into the predominantly coal-dominated energy mix. One option is to exploit naturally occurring methane, liberated from deep shale layers in the Central Karoo through horizontal drilling and hydraulic fracturing technologies ('fracking'). Very little is known about the distribution and magnitude of the gas resource, or whether it can be extracted at economically viable rates. If shale gas development were found to be economically viable, the economic and energy security opportunities of a medium to large shale gas resource would be substantial; as would be the social and environmental risks associated with a gas industry in the Central Karoo. This has been presented to the public and decision-makers as a stark choice between economic opportunity on the one hand and environmental protection on the other. It has become a highly divisive topic, but one which has been, up to now, poorly informed by publically-available and trusted evidence. To address this lack of critically-evaluated information, a Strategic Environmental Assessment (SEA) for shale gas development was commissioned in 2015 by five national government departments of the Republic of South Africa. Phase 2 of the SEA process was undertaken as an independent 'scientific assessment' and is reported in this book. The 18 chapters were drafted by 146 authors and peer reviewed by a further 75 independent experts and also by stakeholders involved in the process. It is the largest scientific assessment ever undertaken in South Africa and has set a national precedent on how strategic issues of great importance and consequence should be dealt with if critical development choices are to be guided by evidence-based policies.

**Prof Robert (Bob) Scholes** is a systems ecologist at the University of the Witwatersrand. He has led many assessments over the past 25 years, including parts of the Intergovernmental Panel on Climate Change, the Millennium Ecosystem Assessment, the South African Assessment on Elephant Management, and the global Land Degradation and Restoration Assessments.

**Paul Lochner** is an environmental assessment practitioner at the CSIR in Stellenbosch, with over 25 years of experience in a wide range of environmental assessment and management studies. His particular experience is in the renewable energy, oil and gas, and industrial and port development sectors. He has been closely involved in the application of Strategic Environmental Assessment in South Africa.

**Greg Schreiner** started work at CSIR in 2011. He is interested in innovative and novel approaches to environmental assessment and management; and the social processes which underpin good decision-making. He has a Masters Degree in Environment and Development from the University of Cambridge. He has for the past 2 years managed the day to day processes of the shale gas SEA.

**Luanita Snyman-Van der Walt** has worked at the CSIR for the past 3 years as an environmental assessment practitioner focussing on environmental assessment and Geographic Information System analyses. She has a Masters Degree in Environmental Science from North West University and assisted in managing the shale gas SEA.

**Megan de Jager** holds a Masters Degree in Environmental Geography from the Nelson Mandela Metropolitan University. She is employed at CSIR as an intern on the shale gas SEA and is currently undertaking a PhD on baseline monitoring in the Central Karoo.

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# **Shale Gas Development in the Central Karoo**

## ***A Scientific Assessment of the Opportunities and Risks***

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Edited by Bob Scholes, Paul Lochner, Greg Schreiner,  
Luanita Snyman-Van der Walt, Megan de Jager

*Electronic publication*

## ***Authors***

*Selwyn Adams, Graham Alexander, John Almond, Katye Altieri, Megan Anderson, Emma Archer van Garderen, Doreen Atkinson, Karin Badenhurst, Dave Baldwin, Oliver Barker, Corinna Bazelet, Stephen Berrisford, Roger Bills, Tobias Bischoff-Niemz, Christy Bragg, Bill Branch, Peter Bruyns, Michael Burns, Clinton Carter-Brown, Albert Chakona, Matthew Child, Simon Clarke, Nicholas Clarke, Ralph Vincent Clarke, Henk Coetzee, Andrew Coetzer, Willem Coetzer, Jonathan Colville, Werner Conradie, Fahiem Daniels, Claire Davis, Elizabeth (Liz) Day, Jenny Day, Megan de Jager, Michael de Jongh, Richard Dean, Moctar Doucouré, Amanda Driver, Gerrie du Rand, Justin du Toit, Katie du Toit, Raymond Durrheim, Connal Eardley, Ismail Ebrahim, Dave Edge, Surina Esterhuyse, Justine Ewart-Smith, Saliem Fakir, Roger Fisher, Rebecca Garland, Dave Gaynor, Simon Gear, Caroline Gelderblom, Bettina Genthe, Cheri Green, Simon Hall, Michelle Hamer, Dai Herbert, Philip Hobbs, Danita Hohne, Stephen Holness, Liana Jansen, Adrian Jongens, Marthie Kemp, Mahlatse Kgatla, James Kinghorn, Menno Klapwijk, Gerrit Kornelius, Patricia Kramer, Kedibone Lamula, Quinton Lawson, Given Leballo, Anthony Leiman, Lehman Lindeque, Paul Lochner, Leslie London, Robin Lyle, Judy Maguire, Ashton Maherry, Antonia Malan, Norma Malatji, Mervyn Mansell, Sethulego Matebesi, Dave McKelly, Ian McLachlan †, Matthew Meas, Silvia Mecenero, John Midgley, Vunganai Midzi, Jolynn Minnaar, Musa Mlambo, David Morris, Muvhuso Mosetsho, Zainab Mowzer, Hlengiwe Mtshali, Bernard Oberholzer, Suzan Oelofse, Noel Oetlé, Mark Oranje, Jayson Orton, Anthony Osler, Braam Otto, Phil Paige-Green, Louwrens Pretorius, Domitilla Raimondo, Nick Rivers-Moore, Peter Rosewarne, Nigel Rossouw, Hanna-Andrea Rother, Melville Saayman, Igshaan Samuels, Catherine Schenk, Bob Scholes, Johan Schoonraad, Greg Schreiner, Roland Schulze, Leanne Seeliger, John Simaika, Andrew Skowno, Kate Snaddon, Luanita Snyman-Van der Walt, Barry Standish, Herman Staude, Maronel Steyn, Adrian Tiplady, Simon Todd, Daan Toerien, Krystal Tolley, Ikechukwu Umejiesi, Les Underhill, Dewidine van der Colff, Paul van der Merwe, Elsona van Huyssteen, Wikus van Niekerk, Simon van Noort, Lize von Staden, Hugo van Zyl, Susi Vetter, Andrew Wade, Mieke Willems, Harald Winkler, Jarrad Wright, Graham Young, Owen Zinaman*



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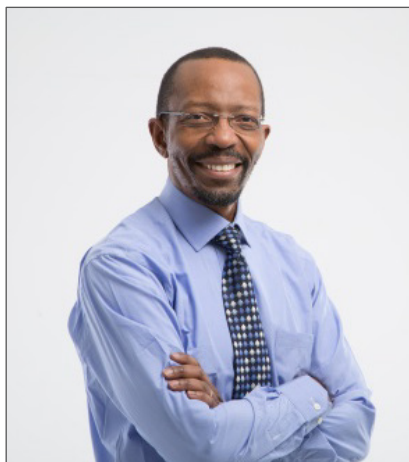
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## *Foreword*



Much has been said and written about the importance of evidence-based policy-making, about the benefits that will accrue from decisions that are based on sound evidence, and from the ability to accurately compare the real to the expected results of our actions. As scientists we have welcomed these developments - this is of course the world with which many of us are intimately familiar, a world where the facts matter and our theories and inventions have to prove that they are able to deal with reality. However, this welcome development brings with it a great responsibility. The consequences of getting it wrong, of making mistakes, are no longer limited to our academic standing amongst our peers, or to the opportunities we spurn by following dead ends. Now, the consequences are potentially much more serious, and may involve the lives and livelihoods of entire communities, the shape and size of our economy and the very ability of our environment to sustain human life.

The question of whether or not South Africa should exploit, through hydraulic fracturing, its natural gas reserves trapped within the deep shale layers in the Karoo Basin emerged in 2010. This question is a clear example of both the importance and complexity of working in the policy environment - the stakes could not possibly be higher, with important long-term consequences, either environmentally or economically, for South Africa's future. It is to the great credit of both parties - the policy-makers who will take responsibility for our course of action and the scientists who have been asked to advise them - which neither has baulked at the task that has been placed before them.

The result of this collaboration, reported on in this document, is a meticulous and multi-disciplinary assessment which presents, in an objective and balanced fashion, the opportunities and risks associated with shale gas development in South Africa across different scenarios. Over 200 of the best national and international scientists have, over 18 months, contributed to this study, and through a process of rigorous peer-review ensured that we have made the best use of the evidence and insights at our disposal.

The process has included close collaboration with government, non-governmental organisations and research institutions, and consisted of an extensive stakeholder outreach programme using multiple communication mediums. It is the largest scientific assessment undertaken in South Africa in terms of material scope and participation, both scientific and stakeholder based.

As CEO of the CSIR, the organisation which led this scientific assessment, I am extremely proud of the manner in which such an important national issue has been addressed. I also am grateful to my contemporaries at the South African National Biodiversity Institute (SANBI) and the Council for Geosciences (CGS) for their collaboration through the project. Recognition must go to Government, for commissioning the CSIR, in collaboration with other national scientific bodies, to co-ordinate this independent process. I am grateful to the participating scientists who gave so willingly of their time and expertise.

Most of all, I am grateful to the South African public, for their participation in this landmark process and in exercising their civil rights and duties by contributing so diligently. The collaborative philosophy in which the scientific assessment process has been undertaken has been an astonishing success. I hope that, when confronted with equally important choices, our policy-makers can look back on this exercise as a model for their future actions.

Dr Sibusiso Sibisi

A handwritten signature in black ink, reading 'Sibisi'.

CEO, CSIR

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## *Reviewers*

The process developed to generate the scientific material for this publication relied on a collaborative endeavour between authors, expert peer reviewers and stakeholders. This resulted in a 'co-production' of the evidence-base. The Editors would like to acknowledge and thank all the reviewers who made valuable contributions to the book. This includes the 75 national and international expert peer reviewers nominated to review specific First Order Draft chapters, indicated in the list below as <sup>PR</sup> (to denote 'peer reviewer') and the Chapter which they were responsible for reviewing. In addition, thanks are extended to the stakeholder reviewers who contributed to the Second Order Draft review process. They are also listed below with their affiliated institutions.

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Cyril O'Connor (University of Cape Town) <sup>PR</sup> Chapter 1

Onshore Petroleum Association South Africa (ONPASA)

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Hans van der Marel (Netherlands Institute for Radio Astronomy)<sup>PR</sup> Chapter 17  
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