



The scientific assessment of shale gas development in South Africa

The 6th CSIR Conference
Ideas that work for industrial development

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Outline



1. Background
 - The need for an assessment
 - South African context
2. Scientific assessment
 - Collaboration and coordination
 - Integrated project governance
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3. Outcomes
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Background

The need for an assessment



Potential opportunities

- Economic benefits;
- Energy security;
- Reduced greenhouse gas (GHG) emissions (e.g. when replacing coal).



Potential risks

- Industry outpaces research, regulation, governance & infrastructure;
- Increased GHG emissions (leakage);
- Water use, contamination & legacy risk;
- Surface disturbance by physical infrastructure.

- **Global cautious approach to shale gas development (SGD)**
- **Need for trusted and transparent information gathering and sharing process**

Background

The South African context



2010
Exploration right applications to explore for shale gas in the Karoo

2015
Government commissions independent scientific assessment

Launch of Strategic Environmental Assessment in Parliament, May 2015



Scientific assessment

Collaboration and coordination



- 18 month independent scientific assessment
- Phase 2 of an overarching strategic environmental assessment

1) Preparation phase

Admin, governance groups, author teams, databases, library, Scenarios and Activities Chapter

2) Scientific Assessment

Organise relevant information per chapter, investigate, assess, write-up, peer review, revise and communicate, review by experts and stakeholders, review, publish

3) Decision Support Framework

Risk mapping, best practice principles, minimum information requirements, monitoring frameworks



Council for Geoscience
Leaders in Applied Geoscience Solutions



Engagement with government, stakeholders, governance groups, media communication

Scientific assessment

Integrated project governance



PROJECT EXECUTIVE COMMITTEE

Mandate: Project management

 environmental affairs Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA	 water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA
 mineral resources Department: Mineral Resources REPUBLIC OF SOUTH AFRICA	 science & technology Department: Science and Technology REPUBLIC OF SOUTH AFRICA
 agriculture, forestry & fisheries Department: Agriculture, Forestry and Fisheries REPUBLIC OF SOUTH AFRICA	 energy Department: Energy REPUBLIC OF SOUTH AFRICA
 Western Cape Government	 Province of the EASTERN CAPE
 NORTHERN CAPE PROVINCE REPUBLIC OF SOUTH AFRICA	 CSIR our future through science

PROCESS CUSTODIAN GROUP

Mandate: Process oversight

• **Government**

 environmental affairs Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA	 planning, monitoring and evaluation Department: Planning, Monitoring and Evaluation REPUBLIC OF SOUTH AFRICA
 economic development Economic Development Department REPUBLIC OF SOUTH AFRICA	 SALGA SOUTHERN AFRICAN LOCAL GOVERNMENT ASSOCIATION Inspiring service delivery

• **NGOs**

 karoo ACTION GROUP	 WWF	 safcei SOUTHERN AFRICAN FAITH COMMUNITIES' ENVIRONMENT INSTITUTE	 human rights commission
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• **Research & academia**

 WATER RESEARCH COMMISSION	 Nelson Mandela Metropolitan University for tomorrow	 SKA AFRICA SQUARE KILOMETRE ARRAY
 HSRC Human Sciences Research Council		

• **Industry**

 PetroSA	 BUSA BUSINESS UNITY SOUTH AFRICA	 AGRI SA
 FALCON OIL & GAS	 Bundu Gas & Oil Exploration Pty Ltd	 Shell

Scientific assessment

Public outreach



- ~600 stakeholders registered on the database
- Two rounds of public meetings (Graaff-Reinet, Beaufort West and Victoria West)
- Project website (<http://seasgd.csir.co.za>) for project updates and access to presentations, notes, and documents for comment
- Communication tools: Website, sms, radio, public meetings, newspapers, trilingual notices



NOTIFICATION OF PUBLIC BRIEFINGS FOR THE STRATEGIC ENVIRONMENTAL ASSESSMENT FOR SHALE GAS DEVELOPMENT IN SOUTH AFRICA

The Department of Environmental Affairs has appointed a project team, consisting of the Council for Scientific and Industrial Research, the South African National Biodiversity Institute and the Council for Geoscience, to undertake a Strategic Environmental Assessment for shale gas development. As part of the process, 3 public briefings sessions and 1 registered stakeholder workshop have been arranged in the study area.

KENNIGGEWING VAN PUBLIEKE UITREIKING VIR DIE STRATEGIESE OMGEWINGS-STUDIE VIR SKALIEGASONTWIKKELING IN SUID AFRIKA

Die Departement van Omgewingsake het 'n projekspan, bestaande uit die Wetenskap en Nuwerende Navorsingsraad, die Suid-Afrikaanse Nasionale Biodiversiteit Instituut en die Raad vir Geowetenskap, aangestel om 'n Strategiese Omgewings Ondersoek vir skaliegasontwikkeling uit te voer. As deel van die proses is daar 3 publieke uitreik sessies en 1 werkswinkel vir geregistreerde belanghablaarers wat in die studiegebied gaan plaasvind.

ISAZISO NGAMASUNTSWANA EENDABA KU-WONKEWONKE NGQVAVANYO OLUCHANGCISIWEYO LWEMVELO NGOFUNYANISO LWE SHALE GAS EMZANTSI AFRIKA

Abancediso lezothululo bonjule Council ye Scientific ne Industrial Research, iSouth African National Biodiversity Institute kanye ne Council ye Geoscience okube saphube athile livavanyo okwanganweyo lezemvelo ngqavanyo lwe Shale Gas. Malunga nokwaziwa, kuzokhona amaqanaba anathululo eentlangayo ezokusuntswana kanye ne ndabano enye yababizaleyo ngokuchaphazeka kuzabizela endaweni ezivavanyo.

Province	Town	Venue	Date and Time
1. Eastern Cape	Graaff-Reinet	Masakhane Community Hall	09 November 2015, 16:00 - 19:00
2. Northern Cape	Victoria West	Victoria West Town Hall	10 November 2015, 16:00 - 19:00
3. Western Cape	Beaufort West	Randstone Community Hall, de Vries Street	11 November 2015, 16:00 - 19:00
Western Cape	Cape Town	Isiko Museum	13 November 2015, 10:30 - 15:00

(Registered Stakeholder workshop)

Website: <http://seasgd.csiir.co.za/> | Email: seashalg@csir.co.za | Tel: 021 888 2432 | Fax: 021 888 8883



Scientific assessment

Scope – Study area



Study area of the scientific assessment



Scientific assessment

Scope – Topics



- **18 chapters**
- **146 expert authors**
- **75 peer reviewers**



Scientific assessment

Scope – Topics



CSIR CAPABILITIES

- Air quality and greenhouse gases
- Water resources (geohydrology)
- Human health
- Geophysics (seismicity)
- Waste management
- National energy planning
- Spatial planning & infrastructure



Scientific assessment

Methodology – Scenarios

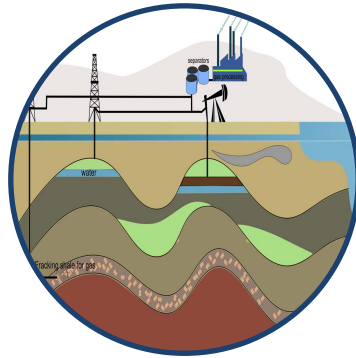


Shale gas scenarios



Reference case

- Dynamic Karoo in absence of shale gas development



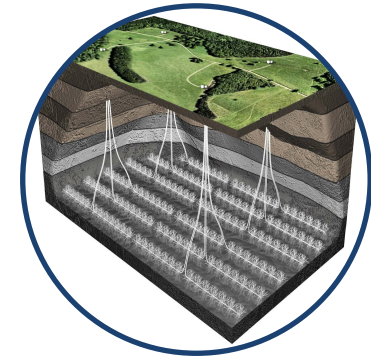
Exploration only

- Seismic surveys
- Test wells



Small Gas

- 5 tcf economically recoverable gas
- 1x combined cycle gas turbine



Big Gas

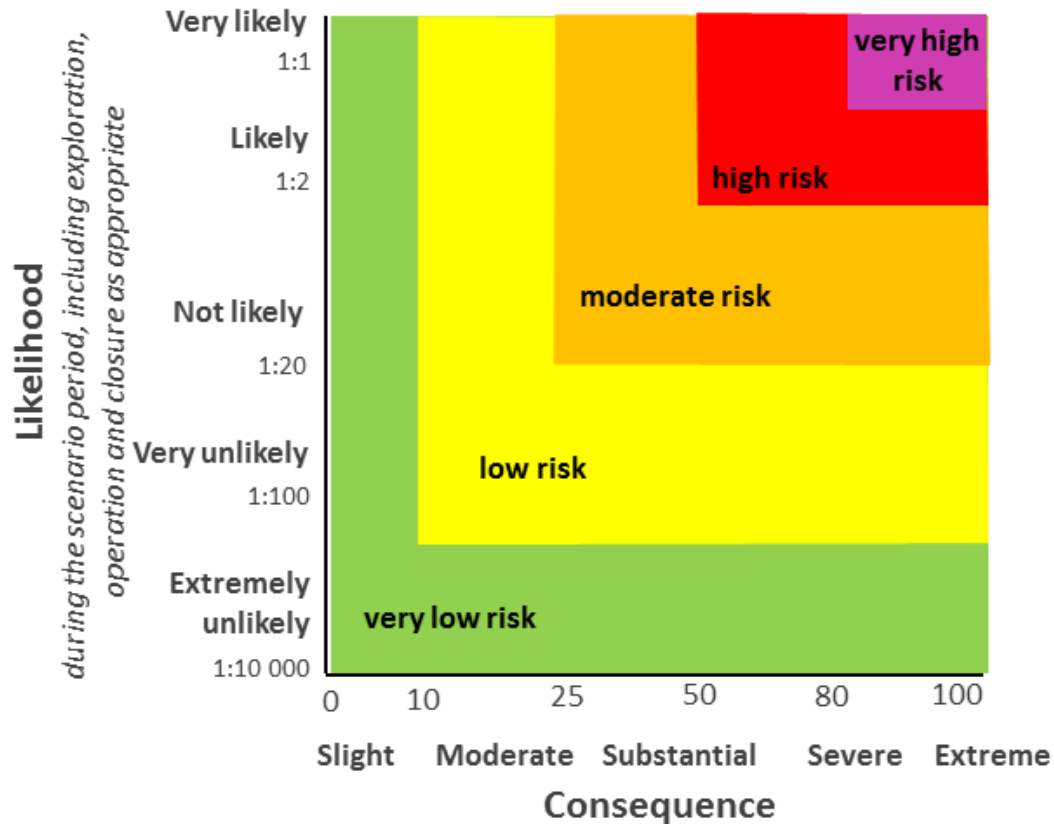
- 20 tcf economically recoverable gas
- 2x combined cycle gas turbine
- 1 x gas-to-liquids plant

Scientific assessment

Methodology – Risk & Opportunity



Risk assessment



- Assess without- and with mitigation, which assumes:

Without mitigation	With mitigation
Inadequate governance capacity	Effective implementation of best-practice principles
Weak decision-making	Adequate institutional governance capacity
Non-compliance with regulatory requirements	Responsible decision-making

Outcomes

Key risks



- Existing local water sources fully allocated → no water available for SGD
- Surface spills → most likely source of water contamination
- Local municipal landfills and water treatment facilities → not currently equipped to dispose of SGD liquid and hazardous waste
- SGD would deliver jobs → not very many (< 1 000) for unskilled local people
- Achievement of long-term macro-economic benefits → depending on how the proceeds from SGD are used
- Large investments in small towns → ‘boomtown’ conditions
- Increased volumes of heavy vehicles → deterioration of roads, necessitating higher levels of maintenance, law enforcement and traffic management – potential for rail

Outcomes

Overarching findings



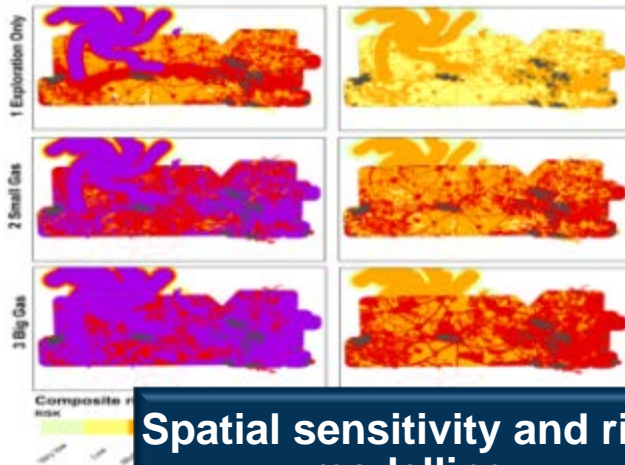
- **Exploration risks are manageable**
 - There are no fatal flaws associated with exploration activities, even those undertaken at a high intensity
- **Build institutional capacity**
 - The ability of South Africa to manage the risks of SGD depends on the strength of its institutions
- **Avoidance is best**
 - Most risk can be mitigated, even at production scale, if basic avoidance best practice principles are maintained



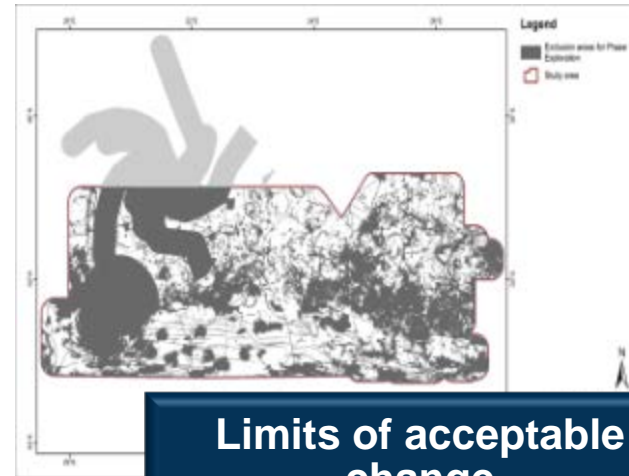
Outputs to support responsible decision-making



Decision Support Framework



Spatial sensitivity and risk modelling



Limits of acceptable change

Minimum Information Requirements in terms of the National Environmental Management Act (107 of 1998) as part of the application for an Environmental Impact Assessment (EIA) for Environmental Authorisation related to onshore shale gas exploration activities

Minimum Information Requirements

- Communicate to Government that production of shale gas is not a fait accompli, it could only occur following promising results during a detailed and comprehensive 10 year exploration programme.
- Promote strategic energy planning for shale gas development, should it prove to be a commercially viable resource.
- Implement good practice guidelines for air quality management.
- Develop standards for O&G activities.
- Develop, implement and maintain an air quality and O&G monitoring station in the Central Karoo.
- Install additional externcity monitoring stations in the study area.
- Develop a policy statement regarding the use of water in the Central Karoo.
- Ensure baseline and ongoing water monitoring data is adequately collected.
- Develop a policy statement regarding the disposal of waste in the Central Karoo.
- Develop a landscape biodiversity baseline monitoring programme.
- Develop an adequate financing and fund review model for abandoned or decommissioned wells.
- Ensure institutional capacity development and integrated governance.
- Develop guideline assessments and...

Strategic management actions

Conclusions

Learning and looking ahead



- **Scientific Assessment based on principles of saliency, legitimacy, credibility → effective for complex issues**
- **Produced evidence-based outputs to guide responsible decision-making on industrial development**
- **Strengthened CSIR capability in facilitating large, complex assessments that are of national interest**
- **Learning is being applied in other strategic and industrial development initiatives in support of the National Development Plan, such as:**
 - **Aquaculture development**
 - **Gas pipeline corridors**



Thank you

<http://seasgd.csir.co.za/>

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our future through science