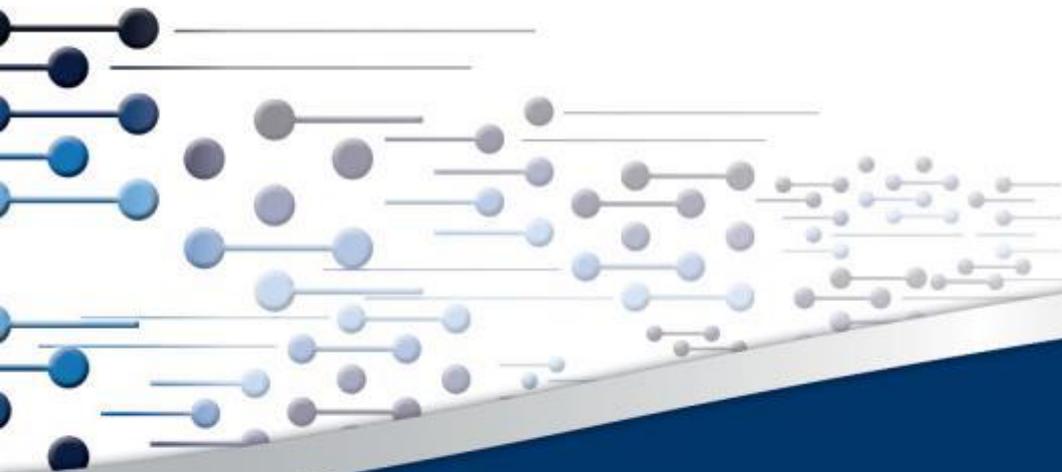


# Scientific Assessment of shale gas development in South Africa

*Presentation to Portfolio Committee on Science and Technology, Parliament, Cape Town*

*01 November 2017*

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# Outline

1. **Background**
  - South African context and need for an assessment
2. **Scientific assessment**
  - Collaboration and coordination
  - Integrated project governance
  - Public outreach
  - Scope and Methodology
3. **Outcomes**
  - Key risks, opportunities and over-arching findings
  - Support for responsible decision-making
4. **Way forward**
  - Future shale gas research needs?
  - Learning from this assessment?

# Acknowledgements

## *Collaboration & partnerships*

We acknowledge the collaboration amongst national and provincial government:



We acknowledge our partners in the Scientific Assessment:



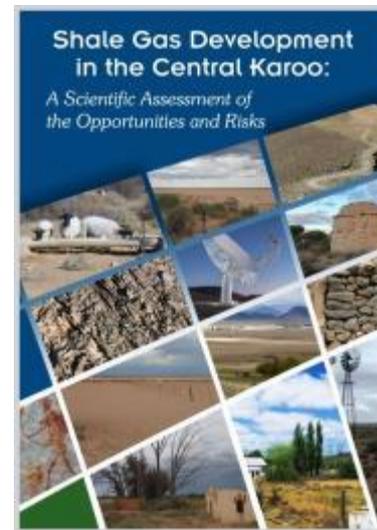
# Background

## *Previous presentations to Parliament*

**May 2015:** launch of the Strategic Environmental Assessment for shale gas development at parliament by DEA, DST, DOE, DWS and DMR

**May 2016:** presentation to parliament on draft outcomes

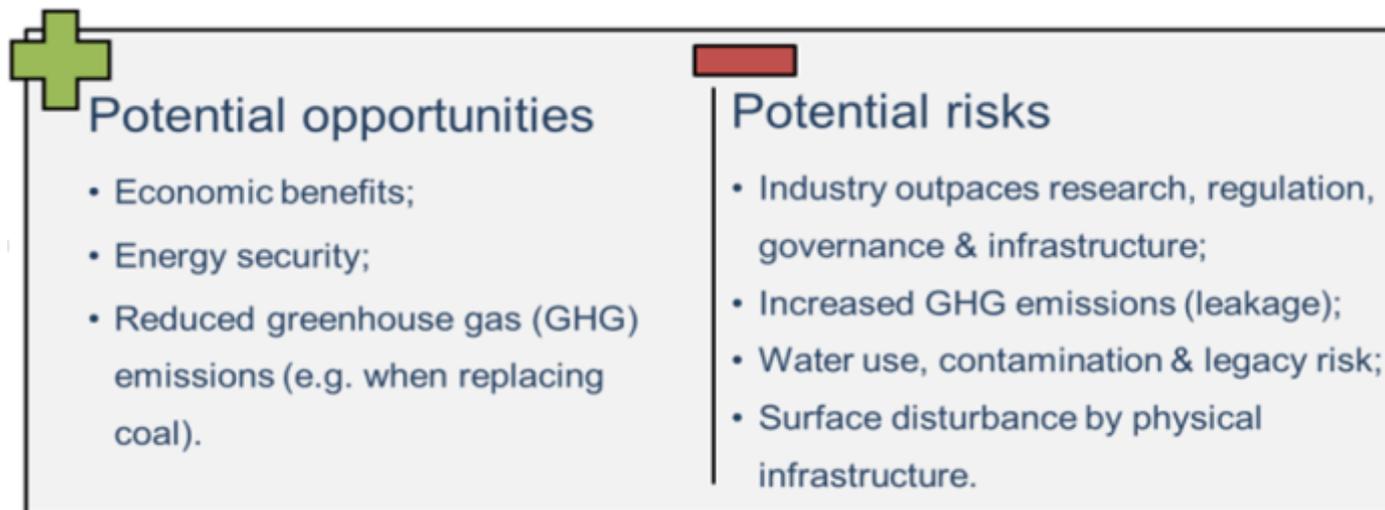
**Nov 2017:** presentation to parliament on outcomes and way forward



# South African context

## *What is the key problem statement?*

Shale gas development and “fracking” a polarised and contentious issue in SA → Difficult for society and government to interpret



**Need for trusted and transparent information gathering and sharing process that addresses the core question of “what are the risks and opportunities of shale gas development in the central Karoo?”**

# Need for a Scientific Assessment

## *Evidence to inform decision making*

**2010**

**Exploration Right applications to explore for shale gas in the Karoo submitted to DMR**

How to adjudicate in an informed & responsible manner?

**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

## *Principles*

- **Saliency:** the topic must be widely viewed as important and address the material issues raised by stakeholders
- **Legitimacy:** an independent, transparent, participatory and fair process, that is mandated by the ultimate decision-makers
- **Credibility:** multi-author teams led by reputable experts, rigorous peer review and evidence-based outcomes



Intergovernmental  
Panel on Climate  
Change (IPCC)



Millennium  
Ecosystem  
Assessment

# Scientific assessment

## Project governance

### PROJECT EXECUTIVE COMMITTEE

Mandate: Project management



### PROCESS CUSTODIAN GROUP

Mandate: Process oversight



# Scientific assessment

## *Public outreach*

- ~600 stakeholders registered on the database
- Scientific assessment chapters for review
- 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



**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 briefing sessions and 1 registered stakeholder workshop have been arranged in the study area.

**KEMNSIGEWING VAN PUBLIEKE UITREIKING VIR DIE STRATEGIESE OMGEWINGS-STUDIË VIR SKALIEGASONTWIKKELING IN SUID AFRIKA**

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

**ISAZISO NGAMASUNTIRWANA EENDABA KU-WONKEWONKE NGQAVANYO OLUCWANGCHIRWEYO LWENVELO NGQFUMYANISO LWE SHALE GAS EMZANTSI AFRIKA**

Abacandiso lewazifelo bonyula Council ye Scientific ne Industrial Research, South African National Biodiversity Institute kanye ne Council ye Geoscience okube kuzibuka ukhetho luvavanyo olucwanganisayo lewemiso ngqavanyo lwe Shale Gas. Mibanga ukuthetho, isobulokho amaqembu amabathu eentlangano ezinxaxaxileyo kanye ne sobho anye yabathetho ngokuchaphazela isobulokho endaweni ezinye.

Province	Town	Venue	Date and Time
1. Eastern Cape	Graaff-Reinet	Masakhane Community Hall	09 November 2015, 14:00 - 19:00
2. Northern Cape	Victoria West	Victoria West Town Hall	10 November 2015, 14:00 - 19:00
3. Western Cape	Beaufort West	Randstone Community Hall, de Vries Street	11 November 2015, 14:00 - 19:00
(Registered Stakeholder workshop)	Cape Town	Soko Museum	13 November 2015, 10:30 - 15:00

Website: <http://seasgd.csiir.co.za/> | Email: [seasgd@csir.co.za](mailto:seasgd@csir.co.za) | Tel: 021 888 2430 | Fax: 021 888 8800





# Scientific Assessment

## *Scope and methodology*

- 1) Scenarios & activities for SGD
- 2) Energy planning
- 3) Air quality & greenhouse gases
- 4) Seismicity
- 5) Surface & groundwater resources
- 6) Waste planning & management
- 7) Biodiversity & ecology
- 8) Agriculture
- 9) Tourism
- 10) Economy
- 11) Social fabric
- 12) Human health
- 13) Sense of place values
- 14) Visual, aesthetics and scenic resources
- 15) Heritage
- 16) Noise
- 17) Electromagnetic interference with SKA
- 18) Spatial & infrastructure planning

# Scientific assessment

## *Scope and methodology*



- 18 chapters
- 146 authors
- 75 peer reviewers
- x3 expert workshops



# Scientific assessment

## *Expert inputs from “team SA”*

### CSIR Capabilities

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

### Partners

- SANBI
- Council for Geoscience

### Other leading contributions:

- Wits University (Prof Bob Scholes)
- Nelson Mandela University
- University of Cape Town
- University of the Western Cape
- University of Free State
- University of Pretoria
- North West University
- National government depts (e.g. DAFF)
- Provincial govt (e.g. Western Cape DEA&DP)
- Square Kilometre Array (SKA)
- National Renewable Energy Laboratory
- SAEON
- WWF
- Shell
- EnviroServe

# Scientific assessment

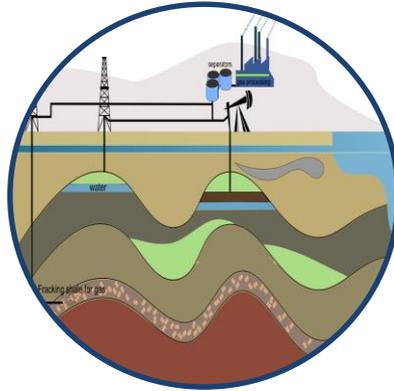
## *Methodology - scenarios*

### Shale gas scenarios



#### Reference case

- Dynamic Karoo in absence of shale gas development



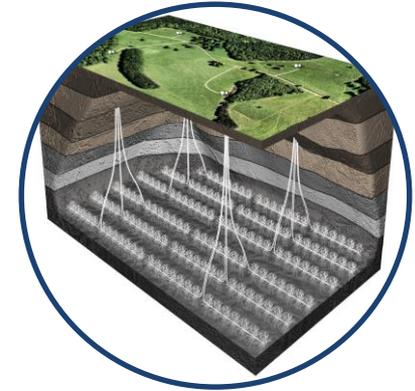
#### Exploration only

- Seismic surveys
- Test wells



#### Small Gas

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



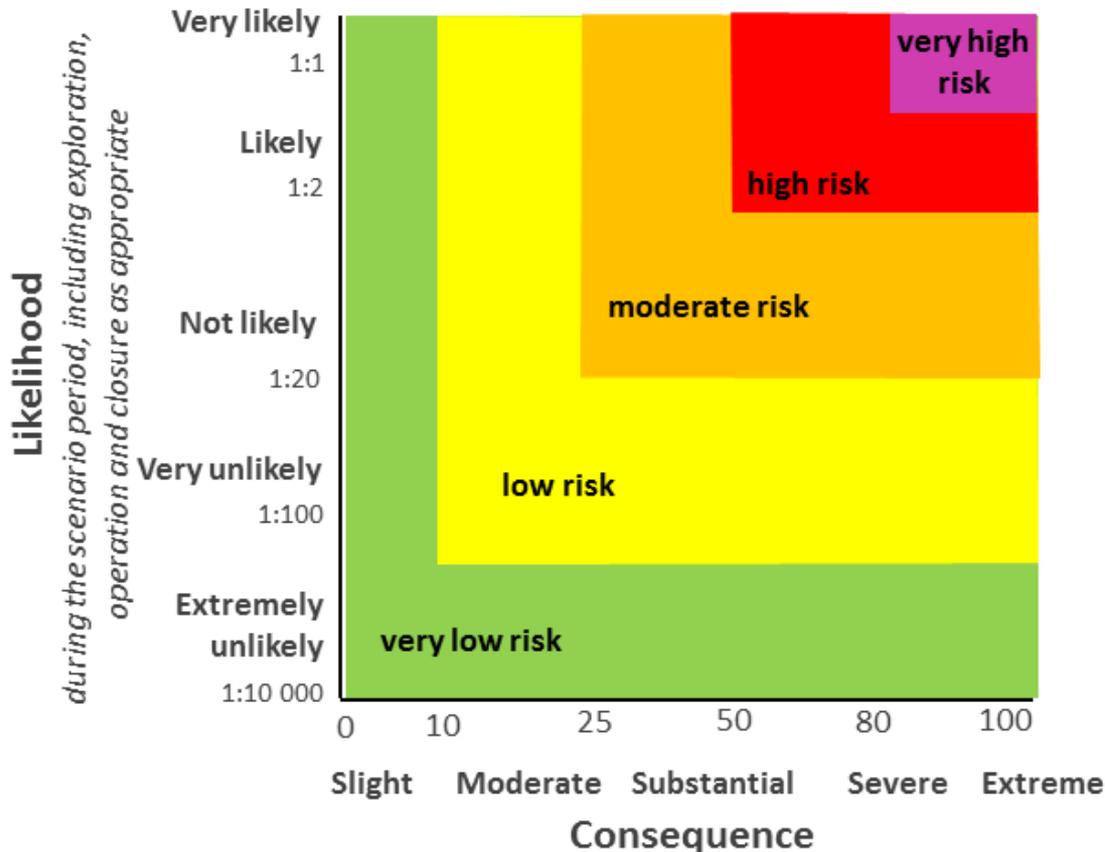
#### Big Gas

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

# Scientific assessment

## Methodology - risks and opportunities

### Risk assessment



*% reduction of non-human species populations or habitat, or reduction in a desirable attribute, resource or service*

Assess with- and without 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

## *Risks from exploration and production*

- 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
- 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

## *Opportunities from exploration and production*

- New **geohydrological data** for the central karoo, especially at depth
- **New knowledge**, skills and industrial development
- **Energy** independence, diversity and security
- Reduced **GHG emissions** with best practice
- Regional **biodiversity conservation, tourism and service infrastructure** planning and enhancement
- **Diversification of local economy** and associated social impacts e.g. improved health services
- Integrated and **aligned planning** with renewable energy and SKA priorities

# Outcomes

## *Possible employment opportunities?*

### Exploration Phase (seismics):

- Total eventual jobs: 500 - 750
- Local, direct jobs (initially, due to highly technical nature of work): 100 - 150

### Exploration Phase (appraisal and drilling):

- Total eventual jobs = 520
- Initial local, direct jobs = 80 – 180

### Small Gas:

- Direct jobs: 210
- Total eventual jobs (direct and indirect): 420, e.g. at power station (80 – 150)

### Big Gas (by 2050):

- Direct jobs: 1400
- Total eventual jobs (direct & indirect): 2 800
- Examples of indirect jobs: 300 at power stations and 750 – 900 at GTL plant

# Scientific assessment

## *Overarching findings*

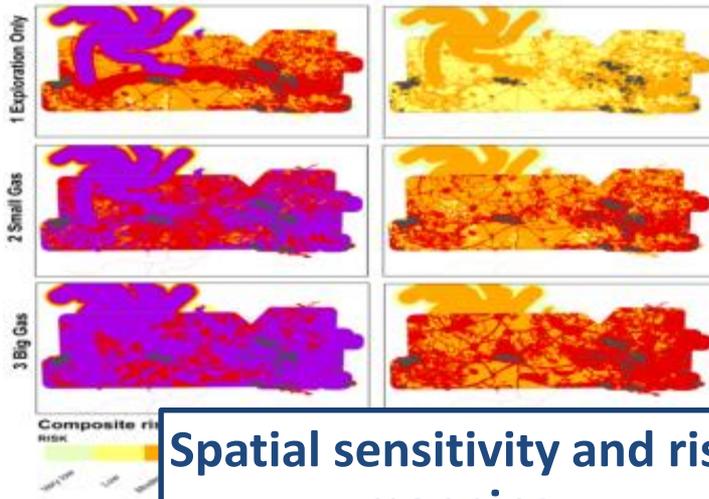
- **Avoidance is best**
  - Most risk can be mitigated, even at production scale, if basic avoidance best practice principles are maintained
- **Build institutional capacity**
  - The ability of South Africa to manage the risks of SGD depends on the strength of its institutions
- **Exploration risks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



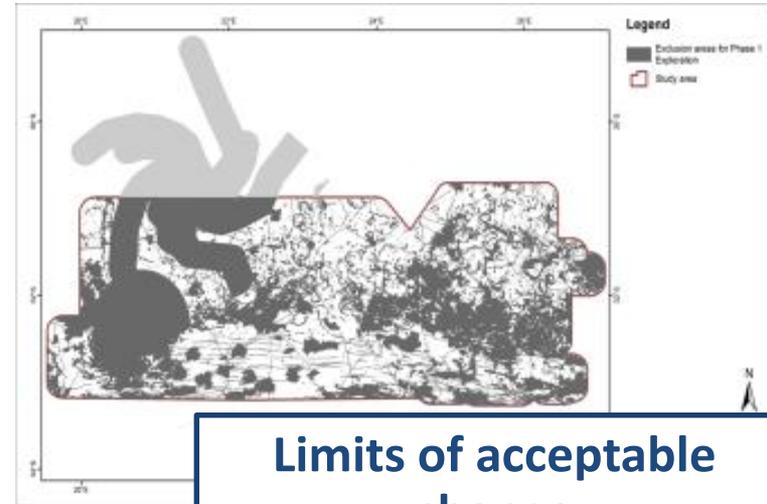
# Outputs

## Support responsible decision-making

### Decision Support Framework



Spatial sensitivity and risk mapping



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



Strategic management actions

# Way forward

## *Future shale gas research needs?*

*"Shale Gas Industry in South Africa: Toward a Science Action Plan"* from 31 August - 1 September 2017 in Port Elizabeth, hosted by ASSAf. Identified need for research plan for Shale Gas exploration and development.

### Opportunities identified at three levels:

- National scale → consolidate and coordinate a national Shale gas R&D programme
- Central Karoo scale → data management and coordination, including data from baseline monitoring, regulatory processes, research and exploration activities
- Local scale ("sweet spot") → generate an inter-active spatial 3D simulation model (surface and subterranean) that integrates outputs from all studies

# Way forward

## *Learning from this Scientific Assessment?*

- Value of the Scientific Assessment in providing an integrative, impartial, science-based process that provides credible input to inform decisions and policy-making
- Manages risks and saves costs to South African society
- Appropriate approach for controversial issues in the national interest
- CSIR is applying this approach on other national scale science-based assessments for government:
  - Aquaculture development (part of Operation Phakisa, with DAFF and DEA)
  - Gas corridors (with DPE, DOE, DEA, Transnet, Eskom & iGas)

Thank you

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

