

AfriForum, Wilderness Foundation and
Treasure Karoo Action Group *present*

*a methodological critique on
economic assessments of
large-scale interventions in
natural systems with
reference to shale gas mining*

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Introduction: "Econometrix document embraced by SA Government" - TKAG

Treasure Karoo Action Group (TKAG), et al, commissioned *De Wit Sustainable Options (Pty) Ltd* in April 2013 to develop "a methodological critique on the standard economic assessments of large-scale, complex and often risky interventions in natural systems, with some reference to shale gas mining". The driver for this methodological critique is the document¹ released March 02 2012, by Econometrix on behalf of its client RoyalDutch Shell BV and/or Shell South Africa (Shell): *Economic report: Karoo shale gas development could boost GDP and create hundreds of thousands of jobs.*

During years of research into shale gas mining TKAG has developed a view contrary to the assertions of Econometrix and its client, Shell. It is noteworthy that the release of this document coincides with information emerging from actual shale gas plays² in the United States. Such data, based on own company reporting to state and federal agencies is showing trends dissimilar to the often-euphoric claims of the proponents of shale gas mining.

A slide presentation compiled by TKAG and released with this synopsis is intended to assist in contextualizing the significant risk to a government, which would base energy and mining policy on a model propagated by the international oil and gas industry.

¹ <http://www-static.shell.com/content/dam/shell/static/zaf/downloads/aboutshell/econometrix/econometrix-pressrelease.pdf>

² A defined area, based on geological characteristics

Formal Synopsis

"Whether the model is valid and useful for policy decisions in the real world and whether the model is useful and valid with regards to its own standards"

This study provides an evaluation of the methodology used in *standard* economic assessments of larger-scale projects with economy wide impacts. A considerable amount of time and effort is spent on introducing alternative macroeconomic and sustainability modeling frameworks. However, as not all modeling frameworks can be referred to as *standard economic assessment* tools, the scope of evaluating models in more detail is subsequently narrowed to an evaluation of standard Computable General Equilibrium (CGE) models used to inform decision-making on development planning. CGE models are, in turn, built on a representation of the flows of transactions through the economy as captured in input-output (IO) tables or social accounting matrices (SAMs).

Such an evaluation focuses on two aspects, namely, whether the model is valid and useful for policy decisions in the real world and whether the model is useful and valid with regards to its own standards. These are quite different concepts, which will be introduced and discussed in detail in the unabridged report.

One example of a potentially large-scale, complex and risky intervention in natural systems is the process of hydraulic fracking for natural gas. In this document the issue will be very briefly introduced with an evaluation of the economic assessment methodology used to inform policy decisions in South Africa.

"The cautions and disclaimers presented by the modellers themselves"

In the South African context, and commissioned by Royal Dutch Shell BV, a group of researchers from Econometrix constructed a macroeconomic economic model with the objective of providing information and analysis into the economic opportunities that could occur if a large gas find can properly be identified and economically extracted in the Southern Karoo (Econometrix, 2012). The choice to develop an own model was based on the assumption that there is no macroeconomic model structure readily transferable to the South African environment.

The model structure is “basically Keynesian”, treating upstream gas production values as an injection into the existing flow of income of the domestic economy. A multiplier effect was calculated and the value of gross production distributed across gross value added, intermediate consumption, compensation of employees, employment levels and fiscal revenue generation. Upstream and downstream employment figures are calculated using the value added and a labour mix average earnings indicator for upstream employment, whereas downstream employment is calculated by means of a downstream value added as a portion of the mid-growth-rate scenario.

It is emphasised that the model is only illustrative of aggregate economic, employment and tax revenue quantities. It does not formally employ a benchmarked SAM, but does work on the basis of National Accounts, supplemented by input and use tables from Statistics South Africa. Certain key assumptions on assumed resource size, price of gas, exchange rates and share of gas exports are included in the report. It is assumed that no gas is exported, gas reserves are simulated for 20tcf (Scenario A) and 50tcf (Scenario B), and time frames are set up to consider either 20- or 25-year time spans. The results include direct and indirect and induced value creation and employment. The results are that estimated jobs range from 290 000 (Scenario A) to 700 000 (Scenario B), total value-added to the economy is estimated at R2.006bn (Scenario A) and R5.015bn (Scenario B), and contribution to tax revenue is estimated at R887bn (Scenario A) and R2.223 trillion (Scenario B). These figures are considerable in relation to the size of the South African economy.

The suitability of this specific Keynesian model to inform policy choices needs further attention. Two aspects, namely the caution and disclaimers presented by the modelers themselves, and a general evaluation as based on the evaluation criteria were considered.

“The Econometrix modellers realised the crude assumptions on which their model is built”

The Econometrix modelers realised the crude assumptions on which their model is built and go to great lengths in their document to explain the limitations of using such a highly theoretical model in

the complex reality of shale gas mining. Cautions and disclaimers by the Econometrix economists themselves give a sense of what the model was built for and what it is not meant to achieve.

It [the Econometrix report] falls short in many respects

The Keynesian demand model that was used is appropriate to illustrate some sense of possible economic impact of utilising gas resources within the

narrow ambits of very restrictive assumptions, but as a tool to inform policy-making on the issue of shale gas mining in the Karoo, it falls short in many respects. The implications for decision-making on larger-scale, complex, risky interventions such as shale gas mining can be summarised as threefold:

1. No one macroeconomic model, and certainly not simple theoretical models, can be used to base policy decisions on. Different models have different strengths and weaknesses; each model is focused on different aspects of reality. Intellectual monopolies in the modelling domain do not lead to better decisions, especially when potentially game changing shocks to broader socio-economic and ecological systems are anticipated.
2. There is a need for a more fruitful process between macroeconomic and sustainability modellers and decision-makers on the issue of shale gas mining, notably:
 - a) Macroeconomic models generally suffer from a crisis in credibility and an ethical code asking economists to clearly understand and communicate limitations, misinterpretations and misuse of their models is one way of addressing this situation.
 - b) Little or no information on shale gas mining in South Africa does not leave one with a singular option for aggregate abstraction, as much can already be learned and modelled from actual shale gas mining cases elsewhere in the world, assisted through the use of different modelling approaches and by narratives informed by the real world.
3. The choice for decision-makers is essentially how much uncertainty and risk they are able to justify (and within the appropriate legislative context), to reach a potentially large, but still uncertain benefit.

The implications for better economic decision-making are that there is need for:

- Unbiased economic assessment prior to decisions on exploration and development;
- Research on the overall growth potential for sustained development of various options;
- An acknowledgement of the fact that a large in-situ resource base does not per definition mean economic accessibility;
- Comprehensive and independent evaluations of production projections;
- The need for informed balance between short-term economic and employment gains on the basis of an extractive, non-renewable resource against negative impacts and costs of agriculture;
- A deeper understanding of the limitations and impact of (often unproven) assumptions on results in the economic models used to inform decision making surrounding tourism, environment and health, and the acknowledgement that delayed pollution and degradation costs are usually not carried by the industry.

The following are suggestions for possible further action:

- Invest in a decision-making process that accounts for externalities not included in the modelling approaches used to inform policy choices.
- Invest in alternative macroeconomic and sustainability modelling approaches and in several simulations of possible outcomes (e.g. System Dynamics Models, Agent-Based Models and Bayesian Network Models) instead of an optimisation of outcomes in relation to one modelling approach and only one aspect of sustainable development objectives (such as economic growth, job creation, equity or environment).
- Build a broad basis of trust and credibility in the space between various modelling schools and decision-makers.
- Invest in a policy learning cycle wherein information about highly uncertain and risky interventions and the technologies available to deal with such are incorporated in the policy process and in policy design.

TKAG, AfriForum and Wilderness Foundation made funding available for this research. Prof. James Blignaut applied an internal review of the report and his valuable inputs are appreciated.

The unabridged study, which will include the written brief of commission to De Wit Sustainable Options may be purchased directly from TKAG: Contact Elzane Grobbelaar – +27 (0)21-824-2935 – admin@treasurethekaroo.co.za