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**APPEAL RESPONSE REPORT**

**PROJECT NAME/TITLE:** **OR PROPOSED ONSHORE EXPLORATION WELL DRILLING IN THE FREE STATE AND NORTH- WEST PROVINCES, SOUTH AFRICA**

**PROJECT LOCATION:** **ONSHORE EXPLORATION WELL DRILLING IN THE FREE STATE AND NORTH- WEST PROVINCES, SOUTH AFRICA**

**PROJECT REFERENCE NUMBER:** **ER REF 12/3/318**

**DATE PROJECT/ACTIVITY AUTHORISED:** 31st of July 2023

**DATE NOTIFIED OF DECISION:** 14th of August 2023

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| **DETAILS OF THE APPELLANT**  | **DETAILS OF THE APPLICANT** |
| **Name of appellant:** Natural Justice ; groundwork, VEJA, MACUA and MEJ-CON | **Name of applicant:** Rhino Oil and Gas South Africa (Pty) Ltd |
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| **GROUNDS OF APPEAL**  | **RESPONDING STATEMENT BY THE APPLICANT** | **COMMENTS BY THE DMRE/PASA** |
|  **FIRST GROUND OF APPEAL: THE EXPLORATION ACTIVITIES WILL RESULT IN UNACCEPTABLE, SIGNIFICANT IMPACTS ON THE ENVIRONMENT THAT CANNOT BE EFFECTIVELY MITIGATED**1. The well-documented negative impacts of gas exploration and production must be carefully considered. The Appellants emphasize the importance of the Strategic Environmental Assessment (SEA) conducted by CSIR, SANBI, and the Council for Geoscience for numerous government departments and agencies, including the DMRE, from 2015 to 2017. Specifically, the appellant draws attention to the cumulative risks identified in the "Scientific Assessment of the Opportunities and Risks: A Summary for Policy Makers, 2nd Edition" published in 2017.[[1]](#footnote-1)

***Significant impacts due to air pollution and greenhouse gas emissions are unacceptable***1. Whilst water pollution typically comes to mind when considering oil and gas drilling, significant levels of air pollution are also generated by these operations. In fact, the oil and gas extraction industry leads all other natural resource extraction industries in the total volume of air emissions each year.
2. The primary sources of air emissions (both continuous and intermittent) arising from the full life cycle of onshore activities consist of various factors. These include combustion sources used for power and heat generation, as well as the utilization of compressors, pumps, and reciprocating engines (such as boilers and turbines) found in onshore facilities, along with their support equipment like trucks, cranes, and dozers. Other contributors are emissions resulting from the flaring and venting of hydrocarbons, as well as intermittent emissions like well-testing emissions, safety flaring, and engine exhaust, in addition to fugitive and diffuse emissions.
3. In addition, the emissionof natural gas (as a greenhouse gas contributor) to the atmosphere during production and distribution, should be taken into account when the relative environmental merits of petroleum and natural gas are compared. This includes taking into account the entire full lifecycle of the oil and gas exploration and production operations, in which atmospheric emissions pose a significant concern. This is particularly relevant within exploratory well drilling. The risks posed by these emissions stem from a variety of sources, such as the persistent or intermittent burning of associated gas and excessive hydrocarbon volumes during well testing and development. Furthermore, continuous flaring is utilized to eradicate gas from storage tanks and pressure-control systems.
4. Statistically, 7 out of 1000 exploratory onshore wells results in a blowout. While that data is over 20 years old, the newer well blowout estimates from the last US EPA GHG Inventory were 1 of every 6400 wells drilled. However, 1 of every 840 oil and gas wells drilled were found to involve an uncontrolled release incident (including blowouts).[[2]](#footnote-2) A 2018 blowout of a gas well in the US (Belmont County, Ohio), which took 20 days to contain and necessitated residential evacuations, was the second-largest U.S. methane leak in history, emitting more methane in a single event than all but three European countries emit annually.[[3]](#footnote-3) Additionally, pressurized contents of a geologic formation literally explode out of the new well, endangering workers and residents in the area, and severely impacting environment and the project economics. The effects on human and animal health from flaring of gasses are also significant. Flaring occurs when gas is burned off to test a well’s potential, to deal with a well malfunction, or to separate gas from oil deposits. Research shows emissions from flaring contain more than 250 toxic compounds.[[4]](#footnote-4) These pollutants can travel 300 kilometres downwind, where they can affect the health of people and animals far away from the drilling site. These incidences, however, pose a special risk to the environment because of the hazardous nature of methane, the primary ingredient of natural gas. As opposed to the ocean environment, during a land-based blowout, methane will quickly disperse in the atmosphere but a prolonged leak can still produce both acute and chronic poisoning of living organisms exposed in that atmosphere.[[5]](#footnote-5)
5. Additionally, atmospheric emissions arise from the combustion of gaseous and liquid fuels in energy units, which consist of diesel-powered generators, pumps, gas turbines, and internal combustion engines situated on platforms as well as onshore facilities. Moreover, the evaporation or venting of hydrocarbons during numerous operations – including production, treatment, transportation, and storage – contributes to these emissions. A 2021 systematic review of the literature found that sources of methane emissions, which are located throughout the oil and gas supply chain, are nearly always also sources of other health-damaging air pollutants.[[6]](#footnote-6) Additional health damaging air pollutants can include: hydrogen sulfide (H2S); volatile organic compounds (VOCs); methane and ethane; benzene, ethyl benzene, toluene, and xylenes (BTEX); glycols; and polycyclic aromatic hydrocarbons (PAHs).[[7]](#footnote-7)
6. Given the possible impacts to air quality, it is imperative that a specialist air quality and climate impact assessment was prescribed to establish and quantify the annual aggregate greenhouse gas emissions that would arise from all facilities and onshore support activities across the entire full life cycle of the intended project, in accordance with internationally recognized methodologies. This would have enabled for the development of appropriate measures to reduce air emissions by selecting cost effective and technically feasible options for limiting or preventing emissions. Therefore all reasonable attempts should have been made to implement appropriate methods for controlling and reducing fugitive emissions within the design, operation, and maintenance of onshore facilities within the context of exploration and production, paying particular attention to evaluating the appropriate methods and technically feasible options for controlling, minimizing or preventing fugitive emissions within the design, operation and maintenance of the full life cycle of the wells and its accompanying facilities.
7. The air quality impact assessment would have needed to evaluate the air quality impacts by way of relying on the use of a baseline air quality assessment and atmospheric dispersion models, to establish potential ground level ambient air concentrations during facility design and operations planning. This specialist study would have evaluated the extent of adverse impacts to human health and the environment, as a result of the exploration drilling programme and the subsequent production activities following a successful find.
8. However, no specialist air quality or climate impact assessment was undertaken as part of the EIA process, and consequently the EIAR was missing crucial information required to form a complete assessment of the impacts of the proposed exploration activities.

***The assessment of air quality impacts is limited and deficient***1. The EIAR acknowledges that the majority of the well drilling target areas are mostly comprised of small farms, isolated farmsteads, and scattered communities with agricultural activities such as livestock grazing and crop cultivation.[[8]](#footnote-8) The EIAR thereafter concludes that the air quality associated to the area, is expected to be good. It follows however that atmospheric emissions may very well arise from combustion sources used for power and heat generation, as well as the utilization of compressors, pumps, and reciprocating engines (such as boilers and turbines) found in onshore facilities, along with their support equipment like trucks, cranes, and dozers.[[9]](#footnote-9) Other contributors are likely to be emissions resulting from the flaring and venting of hydrocarbons, as well as intermittent emissions like well-testing emissions, safety flaring[[10]](#footnote-10), and engine exhaust, in addition to fugitive and diffuse emissions. This eventuality is confirmed by the report where it is stated:

“*The quality of air within and near to major towns is expected to be reduced due to various factors such as vehicle emissions and industrial operations”.[[11]](#footnote-11)*1. Despite acknowledging that the quality of air within and near the major towns is expected to be reduced due to the various activities related to the exploration, the report assumes that the air quality in the target drilling areas will naturally be good due to their predominantly rural nature. However, this assumption oversimplifies the potential air quality impacts of well drilling activities, and likely production activities.
2. A comprehensive air quality impact assessment ought to have considered factors that contributed to emissions specific to well drilling; such as atmospheric emissions, venting and flaring, and fugitive emissions arising from the combustion of gaseous and liquid fuels in energy units, which consist of diesel-powered generators, pumps, gas turbines, and internal combustion engines situated on platforms as well as onshore facilities. These emissions might not be inherent to rural areas, and could lead to localized air quality issues.
3. Whilst the EIAR confirms that the quality of air within and near to major towns is expected to be reduced due to various factors such as vehicle emissions and industrial operations, this finding is unsubstantiated. Without a specialist air quality impact assessment, it is challenging to quantify the potential emissions accurately and predict their effects on the surrounding environment and communities.
4. While rural small farms, isolated farmsteads and scattered communities might be located in areas that generally have better air quality, the proximity of well drilling activities to small towns, isolated farmsteads and scattered communities is crucial to consider within the air quality impact assessment. Neglecting a thorough specialist air quality impact assessment as is clear in this instance, could lead to detrimental health effects for residents in these areas due to the exposure to hazardous emissions, which won't be mitigated solely by the rural setting.
5. The EIAR at section 6.8 does not adequately consider the variability of local conditions. While it acknowledges that air quality in major towns may be compromised by various factors, it does not appear to consider that the air quality in the target drilling areas is vulnerable to unique variables, such as prevailing winds, local topography, and unique weather patterns. These variables can influence the dispersion of fugitive emissions and significantly impact air quality. An accurate assessment of baseline air quality would have factored in these variables and may well have accounted for the likelihood of significant poor ambient air concentrations resulting from the design, operation, and maintenance of onshore facilities within the context of exploration and production.
6. The absence of a specialised air quality impact assessment highlights the inadequacy of the impact assessment in that air emissions likely to result throughout the planning, design, operation, decommissioning and closure phases, were not quantified or assessed. As a result, the EIAR and subsequently the DG concluded that though the air quality impacts would have reduced the air quality, the impact significance are of a generally low significance. This is a material flaw because:
	1. Without a specialised air quality impact assessment, the overall assessment remains incomplete and fails to adequately address the potential impacts of the project on air quality.
	2. The absence of a comprehensive assessment denies decision-makers and the public essential information about potential health risks.
	3. Different geographic and meteorological conditions can affect the dispersion and concentration of emitted pollutants. A generalized assumption that rural areas have good air quality neglects the potential for emissions to have more significant impacts in certain circumstances, especially if there are specific factors like local topography or wind patterns that can concentrate pollutants in certain areas.
	4. Decision-makers, such as the Director General in this context, rely on accurate and complete assessments to make informed judgments about project approvals. The lack of a specialised air quality impact assessment skews the decision-making process, as it fails to provide a comprehensive view of the potential environmental impacts, which can lead to uninformed decisions.
7. The absence of a specialised air quality impact assessment undermines the overall validity of an environmental impact assessment by neglecting a crucial aspect of potential environmental and public health impacts. It compromises the integrity of the authorization process, misrepresents the project's potential effects, and failed to provide the decision-maker and the public with the necessary information to make informed decisions. This renders the EIAR and the subsequent DG’s decision fatally flawed and therefore subject to review.
8. With regards to the issue concerning flaring[[12]](#footnote-12), flaring volumes for new facilities should be estimated during the design phase and tuned up during the initial commissioning period so that appropriate flaring targets can be developed, with the ability to revise the targets for additional development plans. The volume of gas flared for all flaring events should be recorded and reported.[[13]](#footnote-13)
9. The EIAR attempts to address the challenges of predicting flaring emissions by adopting a cautious prediction of the volume of flaring gaseous emissions at the exploration wells. However, it is unable to substantiate its modelling prediction, as it assumes that the flow performance is difficult to predict. The EIAR bases its prediction on regional analogues, finding that it predicts that 116,565 m3 of natural gas will be flared at each well over a three-week period. It then concludes that, as project-related emissions are likely to be below the 10,000 tCO2e threshold of the European Bank of Reconstruction and Development (EBRD), the impact is classed as very low.[[14]](#footnote-14)
10. The approach described above appears to use estimation based on regional analogues to predict emissions from flaring activities. However the accuracy of these estimates are questionable without a detailed analysis of the specific geological, operational and logistical factors that could affect flow performance and flaring efficiency. Relying solely on analogues might lead to significant discrepancies in emissions predictions, potentially underestimating the actual impacts.
11. Furthermore, the abovementioned approach suggests that the impact can be classified as “very low” based on emission being below the 10,000 tCO2e threshold of the European Bank of Reconstruction and Development (EBRD). While using thresholds is a common practice, solely relying on this indicator might oversimplify the potential environmental consequences. Impact assessments should consider the localized context and local air emissions standards, it should also consider the cumulative impacts and the potential for long term effects across the entire life-cycle and not solely on whether the emissions cross a numerical threshold.
12. The EIAR's assessment of emissions from flaring activities is flawed. It focuses on a limited list of pollutants, relies on estimations without sufficient grounding or substantiation, and uses a threshold as the primary indicator of impact. A more comprehensive and detailed analysis of the flaring volumes for all flaring events across the entire life cycle, was needed to ensure that the DG would receive a thorough understanding of the potential environmental consequences of the flaring activities. This failure to conduct a thorough assessment inhibited the capacity of the DG to make a reasonable and rational decision. It is for this reason that the DG's decision can be considered reviewable on the basis that it is irrational, as he/she failed to take into account relevant considerations.

***The geohydrological impact assessment is limited and deficient***1. Most agricultural activities in the region use groundwater and many are either partially or entirely dependent on groundwater. Additionally, some rural homes rely on potable water from groundwater resources. As stated in the EIAR, most farmers in the idea abstract groundwater from multiple, shallow boreholes across their properties.[[15]](#footnote-15)
2. Groundwater is likely to become even more of a vital water source in the area with climate change stressors on surface water supply in the region.[[16]](#footnote-16) Its protection is thus critical to continued agriculture and liveability in the Free State in the future.
3. The shallow aquifer systems in ERs are fractured and intergranular, meaning water flows between soil particles and fractured rock. This category of shallow aquifers is highly susceptible to surface contamination, as contaminants released at the ground level can quickly infiltrate into the groundwater system.
4. Exploratory drilling introduces the risk of groundwater contamination from both the ground level (from machinery or holding pond/tank spills) and below the surface. Drilling into deep geologic formations to access gas also invites the risk of shallow aquifer contamination from below, often called “subsurface migration”. Subsurface migration can happen through improperly cased wells that allow connectivity between deep and shallow aquifer systems. Such migration is extremely concerning for groundwater quality. Leakage of methane (the primary constituent of natural gas) through a freshwater aquifer can negatively affect groundwater quality by changing its chemistry and increasing the pH.[[17]](#footnote-17) In some cases, buildup of stray gas in groundwater can even lead to explosions and asphyxiation risks.[[18]](#footnote-18) In a US study in the state of Texas, nearly 70 percent of water wells located near an oil or gas well tested has measurable concentrations of chemicals associated with exploration, suggesting that drilling may have resulting in groundwater contamination.[[19]](#footnote-19)
5. Additionally, dolerites may act as potential pathways between contaminants occurring in both surface and groundwater activities during gas extraction. If the groundwater is contaminated with organic drilling fluids, this contamination may be irreversible. The possible links between the shallow and deep aquifers via geological structures and mine workings make the risk of contamination high.
6. Methane is not the only contaminant that can impact groundwater from subsurface migration. Gas deposits are often collocated with very saline waters, which are also brought to the surface during exploratory and production drilling (“produced water” or “brine”). Produced water can also contain high levels of heavy metals and naturally occurring radioactive materials, depending on the geological formation’s chemistry.[[20]](#footnote-20) The drilling process, by design, artificially creates a conduit to bring hydrocarbons, plus saline water and any associated contaminants, to the surface, where these could impact aquifers used as residential or agricultural water sources.
7. Underground explosions and blowouts can also occur during onshore well drilling, threatening groundwater quality for decades. In some blowout scenarios, the pressures generated do not escape at the surface but form an underground fracture network that allows the well to blow out underground.[[21]](#footnote-21) When these fractures reach the surface, they can contaminate shallow groundwater resources with a massive introduction of methane. For example, in 1965 a catastrophic underground blowout occurred during the conventional drilling of a gas well in the Netherlands, resulting in the uncontrolled release of large amounts of methane from the reservoir to the surface. Five decades later, shallow aquifers still have high concentrations of methane that experts have determined likely the result of ongoing leakage from the reservoir as a result of the blowout.[[22]](#footnote-22)
8. The EIA states that ‘In general, the proposed Target Areas are not located in a region with high levels of seismicity although minor earth tremors have been recorded in the recent past.’
9. Esterhuyse et al (2014) assessed the seismic vulnerability of the country for oil and gas extraction activities, and the area north of Welkom is identified as a high to very high vulnerability area for seismic activity. The seismic vulnerability is especially high south of Bothaville (<https://fracking.webmaps.africa/map.php>), where drill site-01A1 and drill site-02A1 are located. Seismic activity may be triggered during cracking or rupturing of rocks in the vicinity of the wellbore that creates micro-earthquakes, the interaction between the drilling activity and faults, or during fluid injection.
10. Regional seismicity and micro-seismicity present futher risks to the drilling pathways in use and the possible exposure of groundwater resources to drilling fluids, gas reservoirs and other contaminants.
11. The Geohydrology Impact Assessment reports’ computer simulations (models) of groundwater flow and contaminant transport are central to their ultimate identification of minimal risks posed by groundwater contaminants introduced by gas exploration wells and surface infrastructure. These models are deficient for predicting the likelihood of groundwater contamination from exploratory well drilling activities. While the assessments use the well-known and widely-used MODFLOW software to model three-dimensional groundwater flow in support of developing wells, the modelling performed has a troubling lack of site-specific details: it lacks both site-specific structural geologic features and measured aquifer parameters, as described below.
12. Groundwater and contaminants flow along preferred pathways of least resistance, and structural geologic features like fractures, fissures, and faults can serve as such pathways. As such, these features are important to include in best practice groundwater flow modelling. However, Rhino’s groundwater modelling has none of this detail. As an example of how structural geologic features can modulate groundwater flow, the Geohydrological Impact Assessment gives this possible explanation for observed discrepancies in borehole water levels that were in close to one another in the hydrocensus: “*[s]ome boreholes intersect different aquifer systems or geological features like faults or dykes. To account for these types of borehole responses, substantial monitoring data is required to understand the water level behaviour*.”[[23]](#footnote-23)
13. Acknowledging that the exploration activities proposed may attempt to locate some of these features in order to exploit gas deposits, it remains that the EIAR’s lack of site-specific structural geology is very concerning for a project that should rely on exactly these types of data to safeguard groundwater resources before drilling commences. The contamination plume simulations run in the Geohydrology Impact Assessment report (100 years in the future) are fundamentally flawed by the fact that the shallow aquifers are not well-represented by the modeled simple-porosity (intergranular) system. Instead, the real-world groundwater occurs predominantly in, and migrates preferentially along, fractures and other natural and human-caused discontinuities (dykes, boreholes, mines).
14. Groundwater flow modelling is also best accomplished with accurate and field-tested aquifer parameters, including recharge (the rate with which water is able to travel from ground surface to the water table) and hydraulic conductivities (the aquifer’s ability to allow for the flow of water to occur). Neither of these critical aquifer parameters were obtained with field measurements, and the modelling relied instead on database values. While the report acknowledges that “*aquifer tests would be required to obtain a better hydraulic conductivity range to calibrate against*,”[[24]](#footnote-24) the addition of such measurements and subsequent modelling improvement is not a mitigation measure proposed to reduce the risk of groundwater contamination.
15. The lack of field-tested aquifer parameters undermines both the groundwater modelling and the assessment of the shallow aquifer’s vulnerability, which the EIAR determined to be Low to Medium for ER 294[[25]](#footnote-25) and ER 318.[[26]](#footnote-26) The strategic values for the shallow aquifers for ER 294 and ER 318 were determined as Medium to High and Medium[[27]](#footnote-27), respectively, based on existing groundwater use.
16. The importance of groundwater quality to agriculture in the area should be assessed given the current dependence of farming communities on groundwater resources, which the EIAR’s hydrocensus documents, as well as a less water stable future which may be increasingly dependent on groundwater resources for agriculture.
17. The Free State is the breadbasket of South Africa as the dominant producer of maize (42%), soya (42%), sunflower (56%), groundnuts (45%), dry beans (26%), wheat (16%), and sorghum (20%).[[28]](#footnote-28) Maize is a staple food in many countries including South Africa, and maize production in the Free State is realized by both commercial and small-scale farmers. The Free State and its agricultural output are thus critical to local and national food security. However, agriculture in the province is dependent on water resources that are increasingly at risk from climate change impacts.
18. South Africa's agricultural sector already faces numerous natural and infrastructural water resource challenges.[[29]](#footnote-29) The Free State is vulnerable to droughts that have measureable impacts on water availability, agricultural production and livestock holdings.[[30]](#footnote-30) Research shows that rainfall variability is the major factor causing fluctuations in the Free State’s maize production.[[31]](#footnote-31) The South African government declared the Free State a drought disaster area in the 2015/2016 hydrological year,[[32]](#footnote-32) which resulted in record low maize production.[[33]](#footnote-33) Climate change projections for Southern Africa all indicate that droughts will become increasingly severe in the region, with worrisome implications for crop yields.
19. Climate simulations project that under a 1.5 °C global warming scenario, South Africa will be experiencing a precipitation decrease of approximately 0.4 mm per day.[[34]](#footnote-34) If this trend continues, it will lead to devastating reductions in domestic potential agricultural production, from around 15% up to 50% by 2080. Under such depleted rainfall scenarios, it is plausible that agricultural production in the Free State could shift to increasingly depend on groundwater resources. Protecting the quantity and quality of groundwater is critical to protecting future agricultural production and food security.
20. Given the overall lack of site-specific details in the EIAR’s aquifer vulnerability assessment and groundwater modelling, the best practice would be to assume a more conservative risk assessment for groundwater impacts, yet the EIAR maintained a “Low” significance both with and without mitigation.[[35]](#footnote-35)
21. The EIAR does not indicate any methane testing from current boreholes to indicate the presence of biogenic methane. It does not specify the geological formation that will be targeted, only the ‘Karoo formation (sandy)’. From what is shown, it seems that the whole Karoo supergroup will be a possible target, which includes biogenic gas in the Beaufort and thermogenic gas in the Ecca. However, there is not a proper 3D geological model of the expected target resource, and a clear indication of the anticipated drilling depth. Only fig. 6-3 (p. 95) that shows the very general simplified geological cross section of the Karoo. There is not enough information for the decision-maker to understand the resource characteristics and to check the validity of the Applicant’s claims that there would be only a very low impact on water resources.
22. A geologically detailed model with fault/fissure locations and field-tested aquifer parameters is needed to ensure that the DG would receive a thorough understanding of the potential environmental consequences of the proposed exploratory drilling. This failure to conduct a thorough assessment inhibited the capacity of the DG to make a reasonable and rational decision. It is for this reason that the DG's decision can be considered reviewable on the basis that it is irrational, as he/she failed to take into account relevant considerations.

***Conclusion***1. The EIAR and EMPr do not propose any mitigation measures or monitoring measures to manage potential air quality impacts or groundwater impacts.[[36]](#footnote-36) This is worrisome, as it suggests a gap in information related to both the air quality and groundwater impact assessments by both the EIAR and the DG key findings, and consequently the Appellants submit that the DG did not have sufficient information before him/her to determine the suitability of the assessment, or whether the decision to authorize activities without mitigation measures or monitoring measures was irrational.
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|  **SECOND GROUND OF APPEAL: THE ASSESSMENT OF NEED AND DESIRABILITY IS FLAWED AND MISGUIDED**1. **Addressing the need and desirability within the context of ecologically sustainable development should give consideration to the potential impacts of the proposed exploration for new onshore oil and gas resources throughout its life cycle[[37]](#footnote-37) (rather than ring-fencing the consideration of need and desirability to the exploration well drilling phase only).**

***Failure to consider the negative impacts of the full life cycle of oil and gas exploitation***1. **It is artificial to consider the need for and desirability of undertaking the proposed exploration activities without considering the impacts associated with further production activities which are intended to materialise from successful exploration. The only reason that Rhino Oil and Gas Exploration (Pty) Ltd wishes to undertake exploration is to discover reserves, which can be exploited.**
2. **As confirmed in the judgment of the Eastern Cape High Court in *Sustaining the Wild Coast and Others v Minister of Mineral Resources and Energy and Others, and Director: Mineral Development, Gauteng Region and Another v Save the Vaal Environment and Others,* the processes are discrete stages[[38]](#footnote-38) in a single process that culminate in the production and combustion of oil and gas, and the emission of greenhouse gases that will exacerbate the climate crisis and impact communities’ livelihoods and access to food.[[39]](#footnote-39) The court also confirmed that a comprehensive assessment of need and desirability of exploring for new oil and gas reserves from climate change and the right to food perspectives is relevant to a decision to authorise seismic survey activities.[[40]](#footnote-40)**
3. **Whilst the EAP attempts to denounce the applicability and relevance of the decision cited above as it relates to its interpretation of the link between exploration and production as discrete stages in the context of NEMA and the EIA regulations, the interpretation adopted by the High Court remains relevant and applicable until such a time as it is over-ruled by the Supreme Court of Appeal.**
4. **The principle of *stare decisis* is a juridical command to the courts to respect decisions already made in a given area of the law. The practical application of the principle of *stare decisis* is that courts are bound by their previous judicial decisions, as well as decisions of the courts superior to them. The importance of this principle is best illustrated by the words of Brand AJ, as he then was, in the case of *Camps Bay Ratepayers’ and Resident Association and Another v Harrison and Another*2011 (4) SA 42 (CC), when he said: ‘*Stare decisis* is therefore not simply a matter of respect for courts of higher authority. It is a manifestation of the rule of law itself, which in turn is a founding value of our Constitution.**
5. **The doctrine of stare decisis requires courts to follow and respect decisions that have already been made in similar legal cases. This applies to decisions made by the same court in the past, as well as decisions made by higher courts. Section 165(1)(5) of the Constitution further strengthens this principle by stating that "An order or decision issued by a court binds all persons to whom and organs of state to which it applies". This means that decisions and orders by a court are binding on all persons, including administrative officials, until they are set aside by a competent court. Therefore, the decision and order of a court must be complied with, regardless of whether the party against whom the order is granted believes it to be a nullity. If an organ of state genuinely believes that an order of court is a nullity, then it has a duty in the public interest to pursue an appeal to correct the illegality.**
6. **Until the decisions in Sustaining the Wild Coast and Others v Minister of Mineral Resources and Energy and Others, and Director: Mineral Development, Gauteng Region and Another v Save the Vaal Environment and Others, are appealed and the court's interpretation of the provisions of NEMA and the EIA Regulations as they pertain to the link between exploration and production is corrected, the processes of exploration and production should be interpreted as "discrete stages in a single process". This means that the potential impacts and risks of production activities must be considered and assessed at the exploration stage, as is typical of the lifecycle of a development project.**
7. **This also means that a balanced and proper assessment of need and desirability requires considering both the positive and negative impacts of the full chain of oil and gas exploration and production.**
8. **The EIAR justifies the exploration activities on the basis that gas production is needed and desirable. The needs and desirability analyses repeatedly reference the benefits the Free State and South Africa’s economy would reap from the production of oil and gas:**

**“*Gas developments in the Free State would re-invigorate local business and spur employment in the provision of services. It is envisioned that most of the work to be carried out in support of the proposed activity would be contracted to local suppliers, since they are likely to be the most locally experienced, flexible and efficient bidders, and therefore most cost-effective options. Whilst initially this is likely to have a relatively modest impact, the resource which could potentially be unlocked from this activity”[[41]](#footnote-41)*****and** **“*Domestic gas production would yield tax and royalty receipts while also avoiding imports and therefore a debit on the balance of payments, providing economic insulation against foreign currency fluctuations. Substantial gas projects are likely to attract foreign investment and trigger follow-on investment in infrastructure, skills development and local support services. Improving energy independence for South Africa is a key strategic consideration”[[42]](#footnote-42)***1. **Furthermore the EIAR notes that:**

**“*Identification and use of domestic natural gas reserves could enable South Africa to take steps to secure the country’s energy supply (through diversification), assist in reducing the emissions of greenhouse gases (by reducing the country’s reliance on coal for electricity generation) and reduce the need for the importation of gas. As such, exploration for additional domestic hydrocarbon reserves is consistent with the Integrated Resource Plan (IRP) (2019)”[[43]](#footnote-43)***1. **However, the EISA fails to consider the negative impacts of long-term oil and gas production, and downstream activities. Instead, the report portray the ostensible benefits of production and downstream activities, including electricity supply, but does not consider the significant time lag when commercial production would be achieved. By the time any resources discovered in the subject exploration block are ready for production, South Africa will have already needed to transition to renewable energy sources if the country intends to adhere to its international climate commitments. Oil and gas will not be as beneficial to South Africa’s economy as the EIAR claims in its need and desirability assessment. It therefore biases the evaluation of need and desirability in favour of the proposal.**
2. **While natural gas combustion is less carbon-intensive than that of coal, fugitive emissions arising from the production, transport, storage and use of natural gas have a much greater climate impact than CO2. In particular, over a 20-year period (which is particularly relevant since the next 20 years are a critical window for addressing the climate crisis) methane emissions, which make up approximately 70-90% of natural gas emissions, are projected to be 82.5 times as impactful as those of CO2.[[44]](#footnote-44)**
3. **In terms of the global carbon budget, cumulative carbon emissions between 2011 and 2050 need to be less than 1,100 GtCO2 for a 2°C target. The greenhouse gas emissions contained in current estimates of global fossil fuel reserves are about three times higher than this. A third of oil reserves, half of gas reserves and over 80% of current coal reserves should remain unused from 2010 to 2050 in order to meet the 2°C target.[[45]](#footnote-45)**
4. **In natural gas production, about 100 kg CO2e/boe are emitted. As with oil, there is a large variation between different sources of gas and different trade routes. The highest emissions intensity for natural gas production is about four times greater than the lowest.[[46]](#footnote-46)**
5. **In terms of the impact of using gas on emissions reduction, comparison between emissions from coal and gas often overlooks upstream emissions from gas extraction and transport. These emissions account for about 25% of the full life-cycle emissions of natural gas.[[47]](#footnote-47) Fugitive emissions (i.e. leaks and irregular releases of gas) and venting (intentional releases) account for most upstream emissions. The emissions are mainly methane (CH4) which has a much greater global warming potential than carbon dioxide (CO2). Recent research suggests that, globally, methane emissions from human activity have been underestimated.[[48]](#footnote-48) Taking upstream emissions into account, CO2e emissions from gas-fired generation are more than double those from using coal, over a 20-year timeframe.**
6. **The latest research on methane emissions related to natural gas production and transport has found that the actual methane leakage rates far exceed previous estimates.[[49]](#footnote-49)  Regional studies on upstream methane emissions related to the oil and gas sector in Canada and the United States show that previous studies underestimated methane emissions by 50–60%.[[50]](#footnote-50)**
7. **In addition to overall fugitive emission, unintended processing conditions along the supply chain of natural gas release huge amounts of methane from point sources. They are caused by malfunctions and equipment failures, and lead to disproportional emissions effects.[[51]](#footnote-51)**
8. **Collectively, emissions from the production of oil and gas totalled 5,227 million tonnes of CO2 equivalent (Mt CO2e) in 2017. This is equivalent to about 15% of total energy sector emissions from combustion. More than half of the emissions during oil and gas production (57%) are from the deliberate venting of methane and preventable fugitive emissions. Total emissions from the combustion of oil and gas were about 18 billion tonnes CO2e in 2017 (11.4 billion tonnes from oil and 6.7 billion tonnes from gas), amounting to about one third of all global greenhouse gas emissions.**
9. **Given that the world is quickly approaching several climate tipping points, to account for short-term warming impacts (for example, the 20-year time period) in addition to longer period warming (mostly calculated for 100 years) is of great importance.**
10. **Energy system models might find that when incorporating full-life cycle GHG emissions and the updated warming potentials of methane, results on natural gas change drastically. This might force scientists and policy makers to discard natural gas as anything besides a marginally used fuel, and consider other options, such as energy efficiency and sufficiency in net zero scenarios premised on rapid transition to zero carbon and methane resources.[[52]](#footnote-52)**
11. **The fundamental outcome of the need and desirability assessment should not be centred on the determination of whether gas technology will ensure security of supply for electricity. Instead, due to the climate crisis, this assessment should be centred on whether South Africa needs, or should rely on, gas to provide security of supply of electricity and whether alternative technologies could meet the same supply objectives with less harm and risk. Renewable energy and/or storage can replace gas to provide reliable and cost-effective generating capacity while greatly reducing the environmental and health risks associated with gas.[[53]](#footnote-53)**
12. **Gas is widely reported as having half the carbon emissions of coal when burned, however this only tells one part the story. The extraction, processing and transportation of gas emits methane into the atmosphere at every stage of the process. Methane is the second-largest driver of climate change after CO2 , contributing around a quarter of the 1.1 oC of warming the world has already experienced since pre-industrial times.[[54]](#footnote-54) Methane remains in the atmosphere for a much shorter time than CO2 , but is more than 80 times more powerful over a 20 year period.[[55]](#footnote-55)**
13. **Transporting gas as LNG also adds to its impact on the climate, as the process of super-cooling the gas to liquefy it is energy intensive. In the US alone, the seven currently operating LNG terminals have nearly equivalent emissions to nine coal power stations.[[56]](#footnote-56)**
14. **Given the ongoing risks of fossil fuel exploration and production exacerbating the climate crisis through accelerating green house gas emissions, it becomes necessary for projects undergoing environmental impact assessment to identify the environmental impacts associated with the entire life cycle of oil and gas beneficiation, from extraction to production. The lifecycle analysis could be beneficial to assess the overall greenhouse gas impacts, water scarcity footprint, human health damage , ecosystem impacts at each stage of the life cycle thereby providing valuable information to assist in decision making.**
15. **While exploration may not involve production activities, it is important to recognize that the cumulative negative impacts of the entire oil and gas life cycle can be substantial. Failing to consider these cumulative effects, which arise from activities downstream of exploration, can result in an inaccurate assessment of the overall environmental impact.**
16. **Decision makers need a comprehensive understanding of the potential consequences of approving an oil and gas project. With the EIAR focusing solely on exploration, it has disregarded the broader impacts that the project could have on the environment, public health and the local communities residing in proximity to the project. Approving exploration without considering the full life cycle, could lead to a decision that is not fully informed by all necessary and relevant considerations and which does not adequately protect all stakeholders.**
17. **The failure to consider the negative impacts of the entire life cycle of oil and has exploitation within the scope of the environmental impact assessment, is a critical oversight that raises significant concerns. The primary focus of the EIA on exploration activities while excluding production and downstream stages, fails to provide a comprehensive evaluation of the potential consequences associated with the oil and gas industry.**
18. **It is evident that exploration and production activities are intrinsically linked stages in the oil and gas process. While the EIAR restricts its assessment to the potential impacts of exploration[[57]](#footnote-57), it disregards the broader ramifications that stem from the subsequent production and eventual combustion of oil and gas. Legal precedents underscore the importance of recognizing this interconnectedness and conducting a thorough assessment that encompasses the entire life cycle.**
19. **Furthermore, the principle of “stare decisis”, which dictates the binding nature of previous legal decisions, reinforces the necessity of evaluating the full spectrum of oil and gas activities. Disregarding established legal interpretations and judgements that emphasize the importance of comprehensive assessments, risks rendering the EIA incomplete and inadequate in addressing potential environmental and societal impacts.**
20. **The EIAR’s reliance on the economic benefits of gas production to justify exploration activities, overlooks crucial time-related factors. The prolonged time lag between the discovery of reserves and their commercial production, coupled with the urgency to transition to net zero to meet global climate commitments, raises doubts about the need and desirability of gas production as a sustainable solution.**
21. **Moreover, the significant impact of methane emissions from production and utilization of natural gas cannot be overlooked. The cumulative emissions from oil and gas production substantially contribute to global greenhouse gas emissions, necessitating a holistic analysis that includes upstream, mid stream and downstream emissions to provide a true representation of the industry’s environmental footprint.**
22. **Ultimately, a well-informed decision making process requires a comprehensive assessment of the entire life cycle of oil and gas exploitation. Focusing solely on exploration neglects the broader impacts on the environment, public health, and the well-being of communities. To ensure responsible and accountable decision making by the DG, it is imperative for the EIAR to** **evaluate all stages from extraction to production, and to provide the DG with accurate information that reflects the full range of potential consequences. By doing so, the DG of the DMRE together with the DFFE can ensure the safeguarding of the environment, uphold South Africa’s commitment to combatting climate change, and protecting the interests of both current and future generations as obligated by NEMA and s 24 of the Constitution of the Republic of South Africa.**
23. **Unfortunately, the EIAR has not evaluated all stages of oil and gas exploitation from extraction to production, and has thus been unable to provide the DG with accurate information that reflects the full range of potential consequences. By failing to do so, the DG’s decision has failed to adequately give effect to his/her obligations to safeguard the environment, uphold South Africa’s international commitments to combatting climate change and ultimately failing to safeguard the interests both current and future generations.**

***Gas is erroneously assumed to be a transition fuel***1. **The need and desirability assessment assumes that the use of natural gas can serve as a transition fuel to assist the country in meeting its climate change commitments. Chapter 4 of the EIAR, particularly section 4.3.16 seeks to make a the case for the use of natural as a transition fuel. Reference is made to the following:**

**“*While gas is set to play a major role in South Africa's path to net-zero emissions, this report by the National Business Initiative, Business Unity South Africa and the Boston Consulting Group shows that a lack of supply threatens the country's decarbonisation strategy. This report unpacks the impact of including gas in the country's plans to reduce emissions from carbon-heavy sectors such as electricity, transport and industrial. It is envisioned that natural gas replaces coal and diesel fuel sources, which are more emissions-intensive. Eventually, gas would be phased out by 2050 and replaced by greener alternatives like green hydrogen once the latter is developed and becomes more affordable”* *South Africa’s potential future gas demand will be driven by four key sectors with proven use cases for gas as a transition fuel or lower emission feedstock”[[58]](#footnote-58)***1. **Reference is made to National Gas Infrastructure Plan as well as the Gas Masterplan Base Case Report which relate to the acceleration of local resources for the purposes of stimulating broader localised demand[[59]](#footnote-59), as well as increasing foreign direct investments with potential future exports.[[60]](#footnote-60)**
2. **Recent independent studies challenge the view that fossil gas is necessary for electricity generation and as a transition fuel. A summary of examples of these independent studies and their results are outlined below:**
	1. **“According to a study done by climate analytics TransitionZero[[61]](#footnote-61), the organization investigated the cost implications from switching from coal to gas, or from coal to dispatchable renewables. They have sought to calculate the fuel switch required to leapfrog fossil gas and transition directly to dispatchable renewables. Due to the declining cost of renewable energy and battery storage coupled with the increasing price volatility of gas, the study found that it is now cheaper to switch from coal-to-clean than coal-to-gas. Based on a global average derived from C3PI, the carbon price required to switch from existing coal to existing gas has so far averaged $235/tCO2 in 2022, while the carbon price to switch from existing coal to new solar PV or onshore wind plus battery storage was just -$62/tCO2. This represents an extraordinary decline of 99% since 2010.[[62]](#footnote-62) While commodity prices will continue to go up and down with investment cycles and geopolitics, supply chain disruptions and dated market regulations have highlighted the energy insecurity issues associated with coal and fossil gas. There are several reasons why this volatility could continue into the future independent of Russian aggression in Europe.[[63]](#footnote-63)**
	2. **Meridian Economics‘ ‘Hot Air about Gas – An Economic Analysis of the Scope and Role for Gas-Fired Power Generation in South Africa’ (June 2022) report points out that while South Africa’s large-scale use of gas appears to be central to current energy policy direction in South Africa, ‘this rests on a 2012 vision which pre-dates dramatic reductions in renewable energy costs and carbon emissions space’.[[64]](#footnote-64) The report goes on to state that independent analysis of the power sector across multiple recent studies shows that South Africa’s power needs can be met both now and in the future with very little use of gas, and that there is ‘no evidence to support the large-scale gas envisaged in the GMP; this is uneconomical even before carbon emissions are considered’.[[65]](#footnote-65) Meridian point out that ‘the assumption that gas-fired power generation would replace coal ignores the fact that other technology combinations are now better at replacing coal-fired power than gas, and it is against these technologies that gas-fired generation should actually be compared’.[[66]](#footnote-66) Meridian demonstrate that existing modelling provides no economic rationale for “big gas” in the power sector, and that ‘the impact of using large volumes of gas to generate power will be borne by electricity consumers and will essentially be a subsidy provided by power consumers to otherwise unviable gas use in other sectors’.[[67]](#footnote-67)**
	3. **The Vital Ambition Report[[68]](#footnote-68) by Meridian Economics in collaboration with the Council for Scientific and Industrial Research (“CSIR”) Energy Centre (“Vital Ambition Report”) states that gas to power is only justified in the South African energy mix in so far as it is required for low-utilisation flexible capacity (peaker plants) for balancing the system during peak power demand. The report confirms that no investments in gas infrastructure for energy production and generation is needed now or in the near future.[[69]](#footnote-69) Furthermore the 2019 IRP will likely need to be updated in the foreseeable future to align with South Africa’s 2021 Nationally Determined Contribution under the Paris Agreement and to keep pace with quickly evolving science and significant reductions in price for solar and wind energy. However, even the 2019 IRP, which is rooted in an outdated and scientifically and economically unsound understanding of the necessity for any gas in the energy mix[[70]](#footnote-70) , only projects the collective contribution of gas and diesel to the 2030 energy mix to be 1.3% combined.[[71]](#footnote-71)**
	4. **The use of fossil fuels must be phased out quickly due to the urgent need to address global warming. A recent study published in *Nature*, the world's leading multidisciplinary science journal, discovered that "by 2050, we find that nearly 60% of oil and fossil methane gas, and 90% of coal, must remain unextracted to stay within a 1.5 °C carbon budget." According to the study, "most regions must reach peak production now or within the next decade, making many operational and planned fossil fuel projects unviable."[[72]](#footnote-72)**
	5. **The International Institute for Sustainable Development’s (IISD) Gas Pressure: Exploring the case for gas-fired power in South Africa (March 2022) report points out that while there used to be a rational view that fossil gas would be necessary either during a transition to low-carbon energy or as part of the long-term energy mix for electricity production:**

**“…*.revolutions first in renewable energy costs and then in battery storage costs have upended this view. Analysis of the South African electricity system shows that gas supply is not technically necessary until at least 2035, if ever. In the last few years, either the risks associated with gas have increased, or the understanding of existing risks has increased. Consequently, South Africa may see significant negative outcomes from developing a large gas-to-power system now… the trend toward decarbonization, coupled with cost reductions for renewable energy and storage, creates risks for gas investment. Investment in gas can reasonably be expected to lead to higher costs for consumers, just transition challenges for workers, and losses for investors.[[73]](#footnote-73)*** **The ISSD report highlights some of the risks associated with gas-to-power investment in South Africa. These risks include significant contributions to climate change (as a consequence of CO2 and methane emissions when gas is burned), increasing international pressure to move away from gas due to climate impacts, financial risks linked with gas-to-power, the risk of reduced security of affordable gas supply, the risk of stranded assets, and the risk of creating an additional just transition burden (future gas workers and communities face a repeat of the transition hardships currently faced by the coal sector).[[74]](#footnote-74)*** 1. **As gas pipelines, LNG terminals and gas-fired power plants have a technical lifetime of several decades, they pose a particularly great risk for carbon lock-ins. Tong et al[[75]](#footnote-75) noted that if the currently existing energy infrastructure continues to operate as it has historically, approximately 658 GtCO2 will be released. These emissions would exceed the entire remaining carbon budget to limit global warming to 1.5 °C (420–580 GtCO2).**
1. **These above-mentioned studies highlight several key points:**
	1. **Changing Energy Landscape: The assumption that natural gas is essential for transitioning away from coal faces challenges in light of dramatic reductions in renewable energy costs and advancements in clean technologies. The cost of transitioning directly from coal to renewables has become more favorable than switching to natural gas due to declining renewable energy prices and increasing volatility in gas prices.**
	2. **Economic Viability: Independent analyses indicate that South Africa's power needs can be met with minimal use of gas, and there is no economic rationale to support the large-scale use of gas in the energy mix. Gas-fired generation is deemed uneconomical, and other technology combinations are more effective at replacing coal-fired power.**
	3. **Limited Role of Gas: The Vital Ambition Report and other studies emphasize that gas may be justified for flexible capacity to balance the energy system during peak demand, but investments in gas infrastructure for energy production are unnecessary. Even the 2019 Integrated Resource Plan (IRP) projects a minimal contribution of gas and diesel in the 2030 energy mix**
	4. **Climate Impact: The urgency of addressing global warming calls for phasing out fossil fuels, including gas, to stay within carbon budgets. Methane emissions from gas have a potent short-term climate impact, and the continued operation of gas infrastructure risks exceeding the carbon budget for limiting global warming to 1.5 °C**
2. **The Appellants submit that these studies have not been integrated into the need and desirability assessment.**
3. **The EIAR fails to take into account the fact that the science of climate change is constantly changing, and that new and relevant information is emerging that could support the development of policies that promote short-term and long-term reductions of GHG emissions through net zero pathways from oil and gas combustion. Implementation of policy remains subject to legislative requirements. A need and desirability assessment should have been undertaken based on the NEMA requirements, and not selected government policy.**
4. **From a methodological perspective, quantitative model-based scenario analyses are a valuable tool to assess energy systems transitions.[[76]](#footnote-76)[[77]](#footnote-77). Importantly, however, the implications of a given scenario depend on the underlying assumptions and accuracy of the models. To avoid poorly designed energy policies, new research on the climate impact of methane (for example, via leakage), non-business as usual assumptions and non-economic factors[[78]](#footnote-78) should be included in scenarios. In many of the scenarios referred to by natural gas proponents, these aspects remain largely unexamined.**
5. **While the increased use of gas as a ‘transitional fuel’ is promoted by government and vested interest groups, the Appellants submit that the increased use of fossil gas (especially in electricity generation) will lead to increased emissions of climate warming GHGs, and methane (CH4) in particular. While natural gas combustion is less carbon-intensive than that of coal, fugitive emissions arising from the production, transport, storage and use of natural gas have a much greater climate impact than CO2. In particular, over a 20-year period (which is particularly relevant since the next 20 years are a critical window for addressing the climate crisis) methane emissions, which make up approximately 70-90% of natural gas emissions, are projected to be 82.5 times as impactful as those of CO2.[[79]](#footnote-79) The desirability of using gas as a ‘transitional’ fuel is also questionable having regard to volatile international gas prices, as well as the potential risk of Carbon Border Taxes being introduced in the future.[[80]](#footnote-80)**
6. **This risk will impose restrictions on the export of products with a high carbon footprint, putting South Africa's economy at greater risk of developing gas to power rather than clean renewable alternatives. This invariably diminishes the need and desirability for promoting new gas development projects, as the negative climate impacts and financial risks undermine the potential for gas to represent a viable solution for South Africa’s ambitions to address development whilst respecting universal and regional climate change obligations.**
7. **The call for gas as part of the energy mix set forth in the 2019 IRP does not excuse the decision-maker from taking climate change impacts into account, including as part of the need and desirability assessment. The case for need and desirability must address climate impacts and cannot simply rest on the 2019 IRP as evidence of need or desirability as relied upon by the EAP in the BAR. In the judgment of the High Court in *Earthlife Africa*[[81]](#footnote-81), the court expressed that with respect to a decision maker’s reliance on the IRP when rendering a decision on an application for environmental authorisation, the following is important to acknowledge:**
8. **“Policy instruments developed by the Department of Energy cannot alter the requirements of environmental legislation for relevant climate change factors to be considered”.[[82]](#footnote-82)**
9. **Establishing the need and desirability of a proposed project, is a key objective of each stage of scoping and impact assessment and must account for South Africa’s 2021 NDC under the Paris Agreement. The EIAR must therefore provide a broad and robust analysis of multiple alternative literature on renewable energy resources and make a justifiable and reasonable case for a project’s need and desirability having considered the available literature, without relying solely on the 2019 IRP and other policy documents.**
10. **This invariably assists the decision maker to prioritise the granting of the best decision which will prioritize the integrity of the environment, and the social welfare, health and safety aspects of the socio-economic environment for present and future generations.**

***Conclusion***1. **The failure of the EIAR and the DG to adequately assess the need and desirability of using natural gas as a transition fuel is evident from the arguments, and policies advanced by the EAP. Neglecting recent scientific studies informed by the IPCC weakens the assessment's integrity. Prioritizing environmental well-being and sustainable development requires a comprehensive evaluation considering evolving knowledge and renewable energy potentials.**
2. **Independent analyses suggest South Africa's power needs can be met with minimal gas use. There is no economic basis to support extensive gas use in the energy mix. Other technologies such as solar, wind and battery storage are more cost effective, and sustainable in replacing coal-fired or gas powered energy production.**
3. **Furthermore, the belief that natural gas is vital for transitioning away from coal is questioned due to declining renewable energy costs and increasing gas price volatility. Transitioning directly from coal to renewables is economically favorable compared to switching to gas which will only result in stranded assets as the global community transition to sustainable and cost effective net zero emissions technology.**
4. **A thorough re-evaluation of the need and desirability assessment was essential by the EIAR, and the DG. The scope of the evaluation on the part of assessment should have encompassed an updated scientific understanding of climate change related risks, economic factors, and renewable alternatives. This would have enabled the DG to make an informed decision on whether to authorize the project or not based on the rationale that the project must be aligned with climate goals and sustainable development. Based on the key findings by the DG it is unclear on what basis the project was deemed needed and desirable, as insufficient reasons are provided.**

***Climate impacts and the precautionary principle in Gas-Driven Economic Development Evaluation have been neglected in the decision***1. **The Director General assumes that natural gas can act as a transition fuel to meet climate commitments, yet recent independent studies challenge this premise.[[83]](#footnote-83) This oversight dismisses the rapidly decreasing costs of renewable energy and battery storage, which make the need for gas as a transition fuel questionable.**
2. **The Director General fails to account for the substantial emissions of methane (CH4), a potent greenhouse gas, associated with natural gas production, transportation, and use and which poses a much greater short term climate change impact than CO2 emissions.[[84]](#footnote-84) Focusing solely on the carbon intensity of combustion misrepresents the overall climate impact of natural gas despite recent advancements in methane monitoring technologies revealing that gas extraction produces higher methane emissions than previously estimated. This focus is attributed to not having considered a climate change impact assessment, which was not included amongst the list of specialist reports received by the Department on the 5th of June 2023.**
3. **The assessment by the DG overlooks the full lifecycle impacts of gas-to-power plants, including the cumulative greenhouse gas emissions associated with every step of the process and neglecting potential methane leaks during gas extraction and transportation from wells to the LNG plant. Therefore, the failure to comprehensively assess environmental consequences distorts the evaluation of gas's viability as a transition fuel.**
4. **The Director General wrongly assumes a significant need for gas based on the Integrated Resources Plan (IRP), overlooking that the actual gas contribution projected in the IRP is minimal (1.3% combined with diesel). Recent reports further question the need for large-scale gas use in the energy mix.**
5. **The Director General’s key findings does not acknowledge the financial risks associated with investing in gas infrastructure. Studies show that gas investments may lead to higher consumer costs, stranded assets, just transition challenges, and losses for investors, particularly as renewable energy costs decrease. The Director General also fails to consider the risk of stranded assets as the world moves towards decarbonization. Ignoring the potential for gas infrastructure to become obsolete or economically inviable before yielding returns ignores the financial and environmental consequences.**
6. **Based on the reasoning of the DG’s key findings, it is clear that the assessment by the DG centers on gas technology for electricity supply security, rather than assessing whether South Africa truly needs to rely on gas for such security. This approach neglects the potential of alternative technologies such as wind, solar and batter storage, that pose fewer environmental and health risks.**
7. **The Director General’s key findings appear to not give adequate weight to the urgency of addressing the climate crisis. Failing to prioritize the rapid phase-out of fossil fuels, as demonstrated by scientific studies, undermines efforts to achieve climate goals and jeopardizes South Africa's sustainable development ambitions.**

***The EIAR failed to consider climate change implications in respect of need and desirability for gas*** 1. **The DG's assessment of the EIAR does not adequately address the emissions associated with gas export and import. This is a major problem, as it means that the true environmental impact of the project is being underestimated.**
2. **The assessment by the DG does not align with global efforts to achieve net-zero emissions by 2050. The IEA's roadmap clearly states that no new oil and gas fields should be developed beyond existing commitments to effectively address climate change.[[85]](#footnote-85)**
3. **The assessment by the DG, as evidenced by the information considered, also overlooks potential risks associated with investing in gas infrastructure, including volatile international gas prices and the possibility of carbon border taxes, which could render gas-based economic development financially and environmentally unsustainable.**
4. **Given the gap in relevant information relating to the assessment of the risk of climate change that was not before the DG, the evaluation by the DG of the need and desirability assessment overlooks the urgency of the global climate crisis, as highlighted by authoritative bodies such as the IPCC and the IEA. These entities emphasize the necessity of rapid and significant reductions in greenhouse gas emissions, rendering continued investment in fossil fuels incompatible with achieving climate goals.**

***Conclusion***1. **The DG's assessment of the need and desirability of the gas project exposes significant shortcomings in addressing climate change implications. The oversight of key aspects, including emissions assessment, alignment with international net-zero goals, and potential risks, undermines the integrity of the evaluation and contradicts the urgency outlined by leading climate authorities.**

***The EIAR failed to consider and evaluate the regional and municipal policies relevant to the need and desirability assessment***1. **In the need and desirability assessment, it is important that policies take cognisance of strategic concerns such as climate change and food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services.[[86]](#footnote-86)**
2. **Other relevant policies should have been included in the assessment of need and desirability, including the Free State Green EconomyStrategy. According to the Free State Green Economy Strategy, one of its stated goals is to provide for the facilitation of increased investments in renewable energy. The Free State Green Economy Strategy focuses on reducing health and environmental impacts from energy production and use, while ensuring the basis for long-term economic growth. Such an integrated strategy can increase provincial and national energy security and reduce carbon emissions while providing new employment opportunities that may more than compensate for jobs that disappear due to the reduced use of other sources of energy (e.g. fossil fuels).[[87]](#footnote-87)**
3. **The Free State Green Economy Strategy recognizes that renewable off-grid and mini-grid options tend to be more cost effective than expanding existing electricity grids in remote locations. The strategy also recognizes that the Free State province is rich in these renewable energy sources, such as small hydro, mini-wind, bio-energy, and the increasingly popular solar household systems (SHSs).[[88]](#footnote-88) Furthermore, the strategy acknowledges that the Free State Province has a huge potential to alleviate rural energy poverty and to displace costly diesel-based power generation through the development of renewable energy infrastructure.[[89]](#footnote-89)**
4. **The strategy also prioritises the support of its agriculture, tourism, and built infrastructure sectors, as well as the growth of the renewable energy sector, all to the benefit of the local communities and the economy. This all hinges on a climate resilient Free State province, which will be threatened by climate change impacts and biodiversity impacts brought on by this potential development. These impacts could destabilise environmental and socio-economic sustainability as established by the latest IPCC reports.**
5. **Given the above, it is improbable that the proposed gas exploration, and possible production which will lead to upstream gas infrastructure, is indeed needed and desirable. The potential threats a catastrophic gas leak, water and soil contamination, or decreased climate resilience poses to the Municipality's desired net zero carbon economy outweigh the potential benefits of this activity.**
6. **What is needed and desired for a specific area is best determined strategically and democratically. The strategic context informing the elements of need and desirability should first be addressed and determined during the formulation of the sustainable development vision, goals and objectives of the various provincial and municipal plans and policies. These greater considerations should be determined beyond the spatial extent of a specific and individual EIA process, and then considered in the context of an individual EIA.**
7. **It is in this context that it is submitted that the DG ought to have considered the Free State Green Economy Strategy, Free State 2030 Vision, in order to give effect to the underlying principles which are the consideration of the strategic context of the development proposal along with the broader societal needs and the public interest.**
8. **Furthermore, the Free State provincial authorities, through their district and municipal spatial development frameworks and Green Economy strategies, indicate their commitment to ensuring that there is a consideration and identification of climate change related impacts on the water-food-energy nexus.**
9. **In the comment and response sheet to Natural Justice’s comments relating to the need toconsider and evaluate the regional and municipal policies relevant to the need and desirability assessment , the EAP responded by stating the following:**

**“*The Free State Green Economy was developed with the intent to pursue a green economy agenda in order to address provincial challenges and align with the Free State Provincial Growth and Development Strategy and the National Green Economy Framework. The strategy provides a broad “platform to deal with poverty alleviation and sustainable utilization of natural and capital resources”. As a strategy document it has limited prominence or enforceability and cannot be implemented in isolation”[[90]](#footnote-90)*****and****“*The references quoted from the Free State Green Economy Strategy, and the direct applicability thereof to the scope and nature of the proposed EWP are considered to be of low relevance.The wells proposed as part of the EWP activities can be undertaken within the agricultural landscape present in the Free State. The activities would only be undertaken on properties where land owner agreement was obtained. The exploration activities will be undertaken in conjunction with ongoing agriculture and would have no direct or significant effect on the immediate land use or the strategic context”[[91]](#footnote-91)*****The above described response does not adequately address the EIAR’s and the DG’s failure to evaluate the alignment between the proposed project and the existing regional and municipal policies. The absence of any discussion on how the FSGES relates to or conflicts with the proposed EWP is a serious flaw. The Free State Green Economy Strategy (FSGES) is a comprehensive plan for sustainable development in the Free State, and it is essential to consider how the EWP would impact this plan. The EIAR and the DG ought to have made a concerted effort to understand the potential synergies and conflicts between the two plans.**1. **The above response by the EAP to Natural Justice’s comments, also minimizes the relevance of the Free State Green Economy Strategy, suggesting that it has limited prominence and enforceability. However, this overlooks the importance of assessing how such regional strategies could impact the viability and permissibility of the proposed project within the area. Neglecting to evaluate its enforceability on the part of the EIAR, diminishes the assessments thoroughness. This therefore renders the decision of the DG as irrational as the decision was not informed by a consideration of all relevant information.**
2. **While the EAP claims that the proposed activities would have no direct or significant effect on the immediate land use or the strategic context, the need and desirability assessment does not adequately analyze the potential implications of the project on the existing land use plans and policies of the region. The failure on the part of the EIAR and the DG to evaluate how the project aligns or conflicts with local land use objectives could lead to missed insights on potential conflicts.**
3. **The response by the EAP to Natural Justice’s comment, appears to focus on the specific activities proposed for the EWP within the agricultural landscape of the Free State. However, the need and desirability assessment fails to consider the cumulative effects of the proposed activities in the context of the larger regional and municipal policies. The absence of this analysis limits the assessment's and the DG’s ability to account for potential cumulative impacts and contextual fit, within the broader sustainability objectives of the region.**

***Conclusion***1. **The analysis of the need to consider and evaluate the regional and municipal policies relevant to the need and desirability assessment, lacks a comprehensive analysis of the relevance and impact of regional and municipal policies. The limited discussion on the Free State Green Economy Strategy, land use implications, and cumulative effects weakens the EIAR’s assessment's ability to comprehensively address the regional context and potential conflicts. The limited discussion on the Free State Green Economy Strategy limits the assessment's and the DG’s ability to comprehensively account for the regional context and any potential conflicts that may arise from the authorization of this project.**

***The EIAR failed adequately evaluate the alternatives investigated in establishing the need and desirability of the proposed project***1. **The Need and Desirability Guideline requires that:**

**“*the consideration of ‘need and desirability’ during an application process… must consist of a primary description of the relevant considerations… in relation to feasible and reasonable alternatives. During the actual assessment stages of an EIA process the need and desirability must be specifically assessed and evaluated, including specialist input/studies as required*.”[[92]](#footnote-92)** 1. **Reasonable and feasible alternatives include the option of not implementing the activity.**
2. **A proper assessment of the No-Go alternative should have identified and assessed the potential ecological and socio-economic benefits of the no-go option for commercial and small-scale farming and livestock dependent communities, as well as urban and rural dwellers/occupiers of land making up the area of interest. The assessment should also necessarily have included a consideration of alternative means to generate energy and provide sustainable feedstocks for associated industrial applications, including renewable energy alternatives that do not pose a significant inter-generational ecological and socio-economic risk. Despite ample credible data and information supporting the cost effectiveness and sustainability of renewable energy in tackling climate change and energy insecurity, the EIAR hastily dismisses these options. The EIAR insists that the only definitive method of seeking hydrocarbon reserves is through exploration drilling, without providing any evidence to support this conclusion. This undermines the essential objective of identifying feasible and reasonable alternatives, rendering the assessment of such alternatives unnecessary.[[93]](#footnote-93)**

***Renewable energy potential as a sustainable alternative***1. **South Africa has fantastic wind and solar resources and scaling up renewable technologies in the energy mix would have significant benefits in terms of cost-optimality and addressing generation constraints at Eskom. Embarking on a renewable energy industrialisation plan presents an enormous opportunity for the country to capitalise on these opportunities and stimulate economic recovery and create sustainable employment in the wake of the Covid-19 pandemic.[[94]](#footnote-94)**
2. **In the near term, a renewable energy rollout may require locational incentives to develop projects in areas with excess grid capacity, such as Mpumalanga and the Free State. These areas are better known for their solar resources, and this may result in a solar-heavy focus in the first few years.[[95]](#footnote-95) The Free State and Mpumalanga currently possess grid capacity openings in which solar installations could be built, in the immediate term, in order to ensure rapid connection to the grid and facilitate distribution of energy. On the 2 Jun 2023 it was reported that the MEC for DESTEA announced the following:**

**“*Kopanong Local Municipality in the Free State is endowed with abundance of land and sunlight, making it an ideal location for such projects*”. Said MEC Meeko: “*Our view is that these investments will go a long way in unlocking economic and business opportunities for the local SMMES. It will also create much-needed jobs, alleviate poverty, and address various social ills in Kopanong Local Municipality[[96]](#footnote-96)***1. **Furthermore, the Xhariep, Lejweleputswa and Mangaung regions have been identified as among the areas best receiving direct solar radiation kWh/m² in the country as depicted in the figure below.[[97]](#footnote-97)**

**A map of south africa with different colored areas  Description automatically generated****Fig. South Africa’s solar resource map obtained from Solargis[[98]](#footnote-98)**1. **South Africa, with an intention of generating over 1.7 GW of renewable energy by 2030 has incorporated the CSP technology into its energy mix. The inclusion of CSP technology is largely due to the enormous solar energy potential present in the country. Presently, few CSP projects exist in the country.**
2. **While some CSP projects exist in the country, the full potential of CSP technology has not been maximized. Fluri et al studied the potential of concentrating solar power in all provinces in South Africa. The study considered factors such as sunshine levels, proximity to existing transmission lines, local terrain and the ecosystem of the proposed sites. The Northern Cape region was selected as the most ideal region for the large-scale deployment of CSP technologies while the Eastern Cape and the Free state regions were identified as potential regions albeit to a minimum degree.[[99]](#footnote-99)**
3. **According to a study[[100]](#footnote-100) that evaluated incoming solar radiation for the purposes of understanding the potential for various provinces in South Africa to harness solar radiation for energy, the study found that The Northern Cape received the highest amount of incoming solar radiation throughout the year, followed by North West and Free State. The analysis was conducted on annual, seasonal, and monthly scales.**
4. **Overall the study provides insights into the variation of incoming solar radiation across the different South African provinces. Given the study concluded that the Free State and the North West received the second and third most incoming solar radiation throughout the year, presents a reasonable and rationale alternative to consider in light of the provinces potential in benefiting from renewable technology based on solar energy.**
5. **With the dedicated concentration of infrastructure development in coal regions such as Mpumalanga, accelerated renewable energy industrialisation could provide numerous socio-economic benefits to offset coal-sector job losses and stimulate economic activity.[[101]](#footnote-101)**

***Conclusion***1. **In conclusion, a robust need and desirability assessment must prioritize considering viable alternatives, notably renewable energy sources, which offer abundant wind and solar potential. The scalability of renewable technologies addresses Eskom's generation constraints and aligns with economic recovery goals post-Covid-19.**
2. **Facilitating a renewable energy rollout through incentives in grid-capacity-rich areas such as Mpumalanga and the Free State ensures rapid energy distribution. Regions like Xhariep, Lejweleputswa, and Mangaung exhibit exceptional solar potential, while Concentrated Solar Power (CSP) technology underscores South Africa's commitment to expanding its uptake of renewable energy through solar.**
3. **Studies emphasize CSP's viability, particularly in the Northern Cape, Eastern Cape, and Free State, where substantial solar potential resides. These alternatives, particularly the Free State, offer compelling options, aligning with the imperative for clean energy solutions. Prioritizing renewable energy in coal-dependent regions can mitigate job losses and stimulate economic activity, further highlighting the socioeconomic advantages of embracing cleaner alternatives.**

**A thorough assessment of the alternatives by the EAP would have allowed the DG to fully consider the advantages and disadvantages of each alternative option. This would have helped the DG to make a more informed decision about whether or not to approve the project** |  |  |
| **THIRD GROUND OF APPEAL: THE EIAR FAILED TO ADEQUATELY ASSESS AND CONSIDER THE CUMULATIVE IMPACTS OF THE PROJECT**1. The legislative framework itself indicates that a production right flows directly from an exploration right, meaning that the two processes are inextricably linked. The MPRDA closely connects the rights of exploration with production by granting a holder of an exploration right the exclusive right to apply for, and be granted, the renewal of the exploration right or a production right, subject to few conditions.[[102]](#footnote-102) Impacts related to production activities are therefore reasonably foreseeable impacts eventuating from exploration. Despite the fact that exploration and production activities are listed separately for the purposes of the EIA Regulations, in reality they are steps in a single process. It is therefore artificial to exclude consideration of the impacts of the production process.
2. It is critical that EIAR report considered the cumulative impacts across a landscape and regional spatial extent in advance of activity beginning and throughout all project activities, including exploratory well drilling all the way through production. This is particularly important in light of the numerous applications for exploring and exploiting of gas and helium reserves in the Virginia field by Tetra4 (Pty) Ltd and Renergen.
3. The EIAR and consequently the DG in this application, have seemingly adopted a fragmented and siloed approach to the consideration of this particular exploration and well drilling project individual impacts. An approach of this nature is very unlikely to consider the proliferation of projects which collectively have more harmful impacts spatially and regionally in their sum fundamentally changing the character of the region and its ecosystems.
4. Rhino Oil holds not only two exploration blocks in the Northern Free State but also a third exploration area (ER 350) that encompasses parts of the Eastern Free State.[[103]](#footnote-103) Presumably, Rhino Oil intends to exploit the gas reserves identified and extracted in line with their exploration and production objectives. It is highly likely that these projects, once they reach the production phase, will overlap and collectively generate impacts across the region, particularly concerning water quantity and quality, socioeconomic factors, air quality, and greenhouse gas emissions. However, despite the foreseeable consequences, EIAR for both ER294 and ER 318 have failed to take into account the potential contribution of the third exploration project (ER 350) to the overall impacts experienced in the region.
5. The EIAR asserts that as a result of the current lack of geological information, the scope and nature of future activities cannot be reasonably asserted.[[104]](#footnote-104) However, this approach overlooks the purpose of the cumulative impact assessment, which is to anticipate and account for potential future impacts and interactions early in the project life cycle ensuring comprehensive environmental considerations.
6. The above is wholly inconsistent and contradictory in respect of the approach taken by the EAP where in the same section the EAP notes the following:

“*Cumulative impacts of the proposed activities, in the context of other exploration activities, will be considered in the S&EIA, to the extent that this is feasible and 'reasonably foreseeable'. While it is foreseeable that further exploration and future production activities could arise from the proposed exploration activities”.[[105]](#footnote-105)*1. Several other gas and mineral industry projects are either currently operating or planned to operate in the vicinity of the aforementioned project areas. Among them includes the current proposed project, Renergen, a renewable energy company, holds the rights to extract and produce natural gas and helium in the Virginia area. Additionally, its natural gas subsidiary, Tetra 4 (Pty) Ltd, possesses a Production Right 12/4/007 for gas reserves production. Considering that the Mineral and Petroleum Resources Development Act (MPRDA) links exploration rights with production rights, granting exploration right holders the exclusive opportunity to apply for and obtain the renewal of exploration rights or production rights with minimal conditions, the impacts arising from production activities by Tetra 4 (Pty) Ltd and Renergen are reasonably foreseeable.
2. The EIAR also does not mention any of the extensive gold mining that has occurred in the area where gas exploration is planned. The mining stopes etc form man-made connections between shallow and deep aquifers, and between surface water and groundwater.
3. Despite the above being reasonably foreseeable in addition to further exploration and future production activities being reasonably foreseeable, the approach taken by the EIAR ignores the importance of scenario-based analysis in identifying potential impacts in order to guide effective decision-making. Failing to analyze potential scenarios, hampers the ability of the impact assessment and environmental management programme to anticipate and address impacts that may arise.
4. A map that clearly shows all additional oil and gas applications, as well as mining activities, in the exploration area should have been included in the EIAR for a clearer understanding of the cumulative risks associated with the project.
5. Although the EIAR asserts that the majority of the proposed exploration activities that have been made to date (aerial surveys, corehole drilling & seismic surveys etc) are restricted in nature, duration and scale, implying limited immediate impacts, this approach disregards the broader context of potential cumulative impacts which could arise from multiple overlapping activities, both within and beyond the immediate project scope.[[106]](#footnote-106)
6. The chosen approach adopted by the EIAR in assessing cumulative impacts, focuses solely on the proposed project’s potential impacts, neglecting to consider the cumulative impacts that could arise from other concurrent or future projects. Ignoring the interplay between different activities can lead to a fragmented understanding of overall impacts, preventing the DG from comprehensively evaluating all relevant considerations as they pertain to potential cumulative effects.
7. The EIAR fails to take into account the importance of anticipating potential impacts[[107]](#footnote-107), analysing different scenarios[[108]](#footnote-108), and considering the interconnectedness of projects.[[109]](#footnote-109) These are all key EIA regulation principles that are essential for ensuring that a comprehensive assessment of the environmental impacts is conducted.
8. The obligation to assess cumulative impacts as prescribed by Appendix 3, Section 3, entails looking beyond immediate project scopes and considering potential synergistic effects that could result from a combination of activities over time. The EIAR's assessment approach appears to be narrow, as it categorizes impacts as having very limited impact and very low significance. This has inevitably led the DG to underestimate the interconnected nature of projects in the relevant area, and the importance of considering cumulative impacts from other concurrent or future projects.

***Conclusion***1. The EIAR for the proposed exploration and well drilling project fails to consider the cumulative impacts of the project, both in terms of its own potential impacts encompassing the full life cycle, and the impacts of other projects in the area. This is a critical omission, as cumulative impacts can be significant and can have a lasting impact on the environment.
2. The result of the flawed assessment by the EIAR affects the efficacy of the DG decision in that the DG has not grasped a complete understanding of the potential environmental impacts of the project, both in term of its own potential impacts and the impacts of other projects in the area. This has lead to the DG underestimating the risks associated with the project, and making a decision to grant authorisation that is not in the best interests of the environment and communities.
3. The DG's ability to assess the effectiveness of the proposed mitigation measures has been hampered by the flawed assessment of cumulative impacts. This is because the measures have not been designed to address the potential for cumulative impacts to interact and have a synergistic effect.
 |  |  |
| **FOURTH GROUND OF APPEAL: THE EIAR FAILED TO ADEQUATELY ASSESS CLIMATE CHANGE CONCERNS, OR ALTERNATIVELY PROVIDED A DEFICIENT EVALUATION OF THE PROJECT’S COMPREHENSIVE CLIMATE CHANGE IMPLICATIONS**1. The EIAR and the DG have not adequately considered the climate change impacts of the project. This suggests that the assessment by both the FEIAR and the DG, has not met the requirements of section 24O(1) of NEMA which requires that all relevant factors, including the potential for pollution, environmental impacts, and environment degradation, be considered. The FEIAR nor the DG appear to have considered any relevant guidelines, departmental policies, environmental management instruments, or other information that was relevant to assess the potential of climate change impacts.
2. Although the EIAR included some climate policy in its analyses, it did not provide a critical analysis of the need and desirability from a climate change perspective, and did not assess the climate impacts associated with the full lifecycle of the project.
3. The EIAR concluded that whilst exploration activities will result in GHG emissions, the project related emissions are likely to be below the 10 000 tCO2e threshold of the European Bank of Reconstruction and Development, and therefore its impact on the climate being classified as very low.[[110]](#footnote-110)
4. Furthermore, the FEIAR went on to confirm that:

“*wells drilled to the target strata could create the opportunity for gas to escape to the surface. The accidental escape or release of gas from exploration wells is of concern as methane (one of the main constituents of natural gas) is a relatively powerful GHG with a high global warming potential (25 times that of CO2 over a 100 year period), contributing to climate change. As the accidental escape or release of GHG emissions are likely to be below the 10 000 tCO2e threshold of the EBRD, the impact significance is classed as “Very Low*”.[[111]](#footnote-111)1. This finding by the EIAR and consequently the DG, is flawed for the following reasons:
	1. The FEIAR’s reliance on impact thresholds set by the European Bank of Reconstruction and Development (EBRD) to classify impacts as "very low" overlooks the need for a comprehensive assessment. Climate change impacts, especially those related to greenhouse gas emissions, are not confined to arbitrary thresholds but must be evaluated considering their cumulative contribution to the broader climate crisis. The extraction and use of fossil fuels accounts for about 15–22% of total methane emissions.[[112]](#footnote-112) Along with natural and agricultural sources, it is one of the main sources of methane emissions that accumulate in the atmosphere. The latest research shows that the contribution of anthropogenic fossil fuel sources to total methane emissions has been underestimated in the range of 20–60%. According to the latest figures from the Intergovernmental Panel on Climate Change, the global warming potential (GWP) of methane is up to 87 times greater than that of CO2 in the first 20 years after emission, and up to 36 times greater in the first 100 years.[[113]](#footnote-113) Given the high global warming potential of methane, especially in the first 20 years, the use of natural gas as a (temporary) substitute for coal may even lead to an additional short-term temperature increase.[[114]](#footnote-114)
	2. The EIAR primarily focuses on emissions associated with on-site activities, disregarding the potential cumulative effects across the lifecycle of the project. A complete assessment should include emissions not only from exploration but also from production, transportation, and other phases, considering their collective impact on climate change. The latest research on methane emissions related to natural gas production and transport has found that the actual methane leakage rates far exceed previous estimates.[[115]](#footnote-115) The greenhouse gas (GHG) emissions advantage of natural gas over coal becomes marginal if approximately 3.2%[[116]](#footnote-116) to 3.4%[[117]](#footnote-117) of the gas produced escapes into the atmosphere before being burned. In addition to overall fugitive emission, unintended processing conditions along the supply chain of natural gas release huge amounts of methane from point sources.
	3. While the EIAR affirms the high global warming potential of methane, it does not adequately address the broader implications of methane emissions from exploration and production activities. Methane’s potency as a greenhouse gas and its impact in the short term climate change, make it a significant consideration, necessitating a more comprehensive analysis than what is presented. Many changes in the climate system become larger in direct relation to increasing global warming. They include increases in the frequency and intensity of hot extremes, marine heatwaves, heavy precipitation, and, in some regions, agricultural and ecological droughts; an increase in the proportion of intense tropical cyclones; and reductions in Arctic sea ice, snow cover and permafrost.[[118]](#footnote-118) As a result, the world could reach climate tipping points that could lead to abrupt and irreversible climate change as early as the next decade and, in the worst case, trigger a cascade of global tipping points, leading to a ‘hothouse’ scenario.[[119]](#footnote-119) Consequently, short-term reductions of methane emissions are a crucial component of climate mitigation efforts.
	4. The EIAR’s narrow focus on accidental methane gas escape and emissions, solely in the context of a specified threshold, undermine the holistic evaluation of climate change impacts. A robust assessment should consider not only the direct emissions, but also their indirect effects such as potential impacts on local ecosystems, water bodies and regional climate patterns.
	5. The EIAR’s initial assessment by the EAP exhibits limitations by overly relying on preset impact thresholds, focusing narrowly on certain emissions sources, and neglecting the broader context of climate change impacts. A comprehensive evaluation of climate change considerations by a qualified climate change scientist, through a specialist climate change assessment, would have accounted for a consideration of all phases of exploration and production activities, their potential cumulative effects, and their broader environmental and climatic implications. The assessment would have benefitted from recent climate science, and robust analysis of the aggravating impacts of methane emissions throughout the life cycle. However no specialist climate change impact assessment was conducted, therefore calling into question the final conclusions made by the EIAR.
2. However, despite the above confirmations and conclusions, based on the FEIAR the DG concluded that “The identification and assessment of potential impacts of the activity, including cumulative impacts, was adequately undertaken, and the proposed mitigation and management measures are aligned with potential impacts.” This is decision that is materially flawed
3. Although Section 24O of NEMA requires that in “an application for an environmental authorisation, the Minister, Minister responsible for mineral resources or MEC must…take into account all relevant factors, a CCIAs has not been conducted and this is of considerable concern especially in light of the urgency of the climate crisis and the need for the state to rapidly decarbonise and reduce GHGs in 4 order to limit global warming to 1.5°C. The appellants submit that the comprehensive assessment of both climate change and air quality impacts are of utmost importance for exploration and production projects in line with the Department of Forestry, Fisheries and the Environment’s draft National Guideline for the Consideration of Climate Change Implications in Applications for Environmental Authorisations, Atmospheric Licences and Waste Management Licences because of the undisputed climate impacts associated with those activities.
4. This submission is in line with the *Thabametsi judgement[[120]](#footnote-120)* the court acknowledged the need for a CCIA much broader than a simple assessment of anticipated GHG emissions. It confirmed the need for a comprehensive assessment, which assesses, inter alia, the project’s full life-cycle emissions, the carbon footprint of the project calculated for construction and decommissioning, the activities associated with the project, the physical risks from climate change to the project, and the ways in which the project might aggravate the impacts of climate change in the area.
5. The domestic or international markets for combustion of Rhino Oil and Gas South Africa (Pty) Ltd remain undefined and uncontextualized in the EIAR and the initial climate change assessment by the EAP.
6. Even more so, the general CCIA in the EIAR deviates from best practices and state of science in emissions and climate impact estimates.
7. South Africa is a signatory to the Paris Agreement, which commits countries to reducing their greenhouse gas emissions. South Africa’s Nationally Determined Contribution (NDC) under the Paris Agreement is to have annual greenhouse gas emissions in a range from 350 to 420 million tonnes of carbon dioxide equivalent by 2030.[[121]](#footnote-121) However, the countries policies and government actions are not aligned to meet this target.[[122]](#footnote-122)
8. This is of concern because South Africa, and the Free State and North West, are particularly vulnerable to the effects of climate change. The country is already experiencing more extreme weather events, such as droughts and floods. Climate change is also expected to lead to more water shortages, food insecurity and health problems.
9. The Climate Equiy Reference Project (CERP) assessed South Africa’s fair share of greenhouse gas emissions using the Climate Equity Reference Framework. This framework has been used by the South African government to justify its draft NDC update.[[123]](#footnote-123) The CERP study of South Africa’s NDC concluded that its fair share emissions is to be reduced by 274- 352 MtCO2eq by 2030.[[124]](#footnote-124) This suggests that South Africa would need to reduce its GHG emissions by at least 146 and 223 MtCO2eq below that level that is its fair share with regards to limiting warming to 1.5C. The study also concluded that South Africa has no excess emissions allocation that would allow its emissions to rise above the 1.5C without any mitigation.[[125]](#footnote-125)
10. As appears from the expert report of Professor Mark New, in the *Sustaining the Wild Coast* case, most of the discovered reserves of oil and gas cannot be burnt if we are to stay on the pathway to keep global average temperature increase below 1.5 degrees Celsius. Therefore, authorising new oil and gas activities in any form, with its goal of finding commercially exploitable reserves and consequently leading to production, is not consistent with South Africa complying with its climate change commitments, and is certainly not needed or desirable from a global or domestic perspective.[[126]](#footnote-126) A copy of this report is attached as Annex **D**
11. In order to combat climate change and keep global warming at or below 1.5 °C, gas-fired power production is neither a strategic nor an effective strategy, according to development goals for the electricity sector. In the next 10 years, significant ambition is needed to sufficiently reduce emissions within the necessary trajectory range and to get South Africa where it needs to be. Doing this requires a commitment to abandon fossil fuels as soon as possible – and certainly to avoid lock-in to new fossil fuel infrastructure which is not needed, which the Gas Master Plan and Upstream Petroleum Development Bill seek to accelerate. In addition, according to the Paris Agreement’s accounting rules[[127]](#footnote-127), gas exporters like the United States and likely South Africa, must count all emissions from upstream extraction, processing, domestic transport, and liquefaction at the LNG export terminal in their national emissions inventory (NEI). For importing countries, only emissions from regasification, local transport, and combustion are counted in their NEIs.
12. Energy system models might find that when incorporating full-life cycle GHG emissions and the updated warming potentials of methane, results on natural gas change drastically. This might force scientists to discard natural gas as anything besides a marginally used fuel, and consider other options, such as energy efficiency and sufficiency in degrowth scenarios.[[128]](#footnote-128)
13. The approval of the well drilling and exploration is not in alignment with progress towards meeting South Africa’s NDC or its fair share of emissions reductions. South Africa should rather harness its impressive scientific and technical capacity to develop and harness sustainable, renewable energy sources, in line with the country’s vast potential.

***Conclusion***1. The approval by the DG of the project’s application culminates in a materially flawed decision that ought to be set aside on the basis that the EIAR and theDG’s key findings , have given insufficient attention to climate change concerns, or alternatively have given a deficient evaluation of the project’s comprehensive climate change implications. The decision therefore violates the requirements of NEMA. In addition the EA approval is inconsistent with the requirements section 6(2) of PAJA, because the decision-maker failed to consider “relevant considerations”; and because the decision is unreasonable.
 |  |  |
| **FIFTH GROUND OF APPEAL: THE EIAR ASSESSMENT OF AGRICULTURAL IMPACTS AND THE CUMULATIVE EFFECTS IN THE PROPOSED AREA AND THE DG’S RELIANCE ON THE INADEQUATE ASSESSMENT, IS FLAWED** 1. **The proposed project is likely to have a negative impact on the agricultural sector, as outlined below and throughout this submission, but the full extent of the impacts is unknown. The EAP's assessment of the potential impacts is incomplete, as it does not have the expertise to assess the impacts on agricultural ecosystems. There is no assessment by an agricultural ecosystem specialist in the EIAR.**
2. **The Appellants in comments pointed out that Protocol for the specialist assessment and minimum report content requirements for environmental impacts on agricultural resources prescribed by the Minister pursuant to Section 24(5)(a) and (h) and 44 of NEMA[[129]](#footnote-129) NEMA , necessitated an assessment by and agricultural specialist. The Protocol requires that a site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist, and that for sites identified by the screening tool as being of “very high” or “high” sensitivity for agricultural resources, an applicant “must submit an Agricultural Agro-Ecosystem Specialist Assessment”, unless they meet one of three exceptions.[[130]](#footnote-130)**
3. **The EIAR did not comply with this Protocol. Appellants are not aware of any agricultural site sensitivity screening, much less an Agricultural Agro-Ecosystem Specialist Assessment. Indeed, the EIAR noted:**

**“*The area is home to significant commercial agriculture. Agricultural activities associated with the area include a combination of crop production, animal production, horticulture, dairy farming, game farming, aquaculture, fruit production and agro-processing. Major crops are maize, soybeans, wheat, sorghum, sunflowers, potatoes, groundnuts and wool. Much is dryland but there are areas of irrigated crops. The main vegetable is asparagus, both of the green and white varieties. The large majority of the land is used for extensive livestock grazing (cattle and sheep). Subsistence farming is mostly associated with the towns where residents run livestock on the townlands.”* [[131]](#footnote-131)** 1. **The Free State agricultural sector is the economic backbone of the province. Similar to the national agricultural sector, it is made up of crop and animal production, horticulture, dairy farming, game farming, aquaculture, fruit production and agro-processing. It is estimated that at least 14.5% of South Africa's commercial farming is conducted in the Free State, which is approximately 90% of the economy of the province.**
2. **According to a speech by the honourable MEC Thembeni Nxangisa of the Free State Agriculture and Rural Development, the value that agriculture plays as a driver of local economic development of the Free State is significant:**

**“*Agriculture provides 10.5% of the formal jobs in the province, which is the third most after Services and Trade. In the past quarter, Stats-SA indicated that agriculture and mining in the Free State lost the most jobs of all the provinces. Climate changes such as unpredictable torrential rain has further led to loss of livestock, field crops and other valuable farming assets”[[132]](#footnote-132)***1. **The Free State and its agricultural output are critical to local and national food security. The Free State is the breadbasket of South Africa as the dominant producer of maize (42%), soya (42%), sunflower (56%), groundnuts (45%), dry beans (26%), wheat (16%), and sorghum (20%).28 Maize is a staple food in many countries including South Africa, and maize grown in the Free State by both commercial and small-scale farmers.**
2. **The sector also faces numerous natural and infrastructural water resource challenges that threaten its viability.[[133]](#footnote-133) As such, it is important to ensure that the agricultural sector is protected from further harm. During a climate emergency, the critical importance of preventing threats to the agricultural sector cannot be overstated, including from soil and groundwater contamination.**
3. **Whilst the EIAR identifies impacts, and mitigation measures it intends to implement regarding agricultural impacts, the EIAR doesn’t mention the need for a specialised assessment, including from groundwater, climate change, air pollution, and soil contamination in the large portions of the ER area that consists of agricultural landscapes, many of which are high yielding potential.**

***Climate and groundwater impacts are unacceptable*** 1. **The protocol for the specialist assessment and minimum report content requirements for environmental impacts on agricultural resources prescribed by the Minister pursuant to Section 24(5)(a) and (h) and 44 of NEMA[[134]](#footnote-134) NEMA , necessitated an assessment by and agricultural specialist. The Protocol requires that a site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist, and that for sites identified by the screening tool as being of “very high” or “high” sensitivity for agricultural resources, an applicant “must submit an Agricultural Agro-Ecosystem Specialist Assessment”, unless they meet one of three exceptions.**
2. **The purpose of the agricultural component in the environmental assessment process is to preserve the agricultural production potential, particularly of scarce arable land, by ensuring that development does not exclude existing or potential agricultural production from such land or impact it to the extent that its future production potential is reduced.**
3. **The land's production potential must be evaluated on a scale of land capability (which equates to production potential) that is applicable across the country, because the need is to conserve the higher potential land in the country, not the lower potential land.**
4. **If land is of sufficient land capability to support viable and sustainable crop production, then it is considered to be above the threshold for being conserved as agricultural production land.**
5. **Another aspect to consider is the scale at which the significance of the agricultural impact is assessed. The change in production potential of a farm or significant part of a farm is likely to be highly significant at the scale of that farm but may be much less at larger scales. This assessment considers a regional and national scale to be the most appropriate one for assessing the significance of the loss of agricultural production potential because the purpose is to ensure the conservation of agricultural land required for national food security.**

***Impacts from gas drilling as unacceptable***1. **Nearly all rural residents in the target area, and within the region of the Free State have relied on groundwater for their drinking water, and many farmers also use it to irrigate crops and raise livestock. Contaminated groundwater from fluid spills and leaks at drilling sites not only puts these communities’ health in jeopardy, but also impacts their livelihoods.**
2. **The EIAR states that *‘The proposed well drilling will require the use and storage of water for specific activities. Such water will be obtained commercially, or if taken from a water resource limited to volumes less than the regulated limits.[[135]](#footnote-135)***
3. **The EIAR does not specify the possible volumes of water that may be required. How can a true risk assessment be performed and how can it assess whether water taken from water resources will be within regulated limits if there is no estimate of the possible volumes that will be required, and when it is not specified from what commercial sources the water would be obtained?**
4. **The EIAR also states that ‘*The project will require water for making water-based drilling muds to be used as backup for safe measure to maintain well control and for rig cleaning. This industrial water will be sourced by Rhino’s drilling contractor from authorized sources.[[136]](#footnote-136)***
5. **There is no indication of the anticipated water quality of the ‘simple’ industrial water or from where it is anticipated to be sourced for the purposes of well drilling. If the industrial water is of poor quality, it could contaminate shallow aquifers during a well breach.**
6. **With regards to the planned well localities, the EIAR states that ‘*The proposed well drilling activities would, by design, be located >200m from watercourses and could not alter instream flow nor the bed, banks or course of any watercourse. Given the nature and method, location, limited extent and short duration of the proposed well drilling activities it is considered unlikely that there would be a detectable influence on the characteristics of a watercourse. Thus there is no requirement for a Water Use Licence.[[137]](#footnote-137)***
7. **The Strategic environmental assessment recommends that gas extraction activities be ‘No closer than 1 000 m from water supply sources infrastructure (domestic, stock watering or irrigation supply borehole or downslope storage dam or water supply wellfields).’ (Hobbs et al 2016). The buffer distances proposed in the EIA and approved in the EA should be adequately assessed and revised in light of potential construction of well pads and supporting infrastructure (including roads and pipelines) following a successful find before any exploration activity is allowed. When this infrastructure covers farmland, it limits the available space for growing crops and raising livestock.**
8. **The EIA states that ‘The exploration wells are to be cased and grouted (see Figure 5-3 to Figure 5-5) so as to prevent the ingress of water from the near-surface aquifer. The relatively short exploration duration (~3 months) and anticipated low volume of any produced water further limits impacts to groundwater.’[[138]](#footnote-138)**
9. **The EIA dos not specify how the ‘anticipated low volume’ estimate was determined. It does not specify what volume constitutes a ‘low volume’? There is no information on the anticipated volumes of produced water expected, and so this risk cannot be properly assessed. This impact assessment cannot be verified without information on anticipated volumes of produced water expected. This risk assessment without the consideration of agricultural impacts within the parameters of an agricultural impact assessment, may have short term and long term implications for ground water reduction in resource availability for crop production and farmer livelihoods.**
10. **The EIA assesses the Degree to which impact may cause irreplaceable loss of resources as low. This assessment is possibly incorrect. If the groundwater is contaminated with organic drilling fluids, this contamination may be irreversible. The possible links between the shallow and deep aquifers via geological structures and mine workings make the risk of contamination high.**

***Impacts from soil contamination are unacceptable***1. **With respect to soil contamination despite multiple avenues for soil contamination and degradation from both planned operations (road construction, vehicle traffic emissions and dust, and deposition of air pollutants from gas wells and flaring) and accidental events (well blowouts, wastewater lagoon breaches, and chemical spills) at the well pad.**
2. **The EIAR notes that “exploration drilling requires the use of vehicles and equipment driven by engines using hydrocarbons. Some of the equipment has hydraulic systems with lubricants. Certain hazardous chemicals may also be used and stored on site. Each of these systems can leak and spillages can occur from containers and during refuelling. Such materials would contaminate the soils”.[[139]](#footnote-139)**
3. **During gas exploration, produced water (high salty “brines” trapped in subsurface formations) is brought to the surface which can contain carcinogens like benzene as well as high concentrations of dissolved heavy metals such as copper, cadmium, lead, chromium, mercury, silver, nickel and zinc.[[140]](#footnote-140) Near gas wells, such heavy metals can become elevated in surrounding soils at levels that threaten human health.[[141]](#footnote-141) The amount of produced water that comes up with gas is highly variable across geologic formations, and is unknown for the proposed drilling areas.**
4. **When spilled, produced water can greatly increase topsoil sodium and chloride loads and increase mortality rates in vegetative communities.[[142]](#footnote-142) The amount of produced water that comes up with gas is highly variable across geologic formations, and is unknown for the proposed drilling areas. However, for some conventional wells there is as much or more water by volume produced than gas[[143]](#footnote-143), resulting in a large reservoir of fluids that need to be stored and transported.**
5. **Because there are numerous potential soil contaminants, the EIAR should have included an assessment evaluating soil type, vulnerability, and baseline chemical composition. In particular, the best practice would be to establish the baseline levels of any heavy metals, which can occur naturally in soils due to their particular geology. However, there is no such baseline described in the EIAR, meaning that in the case of spills from the proposed activity, it would be difficult to establish the true impact. The absence of baseline data means that burden of proof and requisite testing could fall to farmers themselves.**
6. **A comprehensive assessment by a agricultural specialist would, assess the impact of multiple drilling sites on the portions of the ER area that consists of agricultural landscapes, many of which are high yielding potential. Even if the overall volumes of hazardous materials used and leaked at each site are relatively low, the cumulative impact of multiple sites impacted by multiple spills and leaks could be significant.**

***Impacts on waste are incomplete***1. **The EIAR contains very limited estimates regarding waste volumes.[[144]](#footnote-144) It states, “Drilling Wastes will be stored in above-ground skips and will be removed within 90 days. The removed wastes would be directed to appropriately licensed facilities.’ It also states that ‘Well testing may generate produced water which would be temporarily contained in tanks prior to management. Disposal of produced water would be at an appropriately licensed facility.”**
2. **The EIA is silent on the expected volumes of waste and the possible nature of the drilling wastes that may be generated. Volumes of waste that may be generated per well, should already be estimated in the EIA and management plans in the EIA and EA should be clear for handling these volumes of waste, as these volumes may exceed the volumes listed in GNR 921.**
3. **Information on the type of waste that is anticipated to be generated is not provided. Oil and gas extraction wastes may likely contain hazardous and toxic materials (Williamson & Esterhuyse 2018) and may be classed as a Type 1 hazardous waste (Oelofse et al 2016). The waste may also contain naturally occurring radioactive material (NORM) and may be highly saline and elevated in heavy metals. NORM waste may only be disposed of at a facility authorised by the NNR.**
4. **If the waste is radioactive and contains toxic materials above acceptable levels, and exceed certain volumes, it should be disposed of at a hazardous waste facility. Even though some of the specialist reports note that hazardous waste may be generated, the EIA does not mention the possibility that a hazardous waste management facility may need to accept wastes from these drilling activities.**
5. **The SEA for shale gas in the Karoo has flagged the capacity of hazardous waste facilities as a serious concern for the management of wastes from UOG drilling. It states that there are no specialised hazardous waste disposal or treatment facilities in the Karoo. The hazardous waste generated by oil and gas extraction is likely to be Type 1 hazardous waste (Section 7(3) of Regulation 635) which will have to be transported to a suitably designed and authorised hazardous waste disposal site in Gauteng, Port Elizabeth or Cape Town.**
6. **Since drilling in the Ecca formation of the Karoo would most probably generate radioactive waste that may contain heavy metals and a high salinity, the identification of licensed facilities that can accept such wastes, is a serious concern that should be addressed before allowing any drilling.**
7. **Disposing of these wastes in waste pits would not be acceptable, as it poses a large risk for surface water and groundwater contamination.**

***Impacts to livestock are unacceptable***1. **The EIAR does not contain any assessment on the activities’ impact to livestock, despite its acknowledgment that “[t]he large majority of the land is used for extensive livestock grazing (cattle and sheep),”[[145]](#footnote-145) and that the proposed Well Drilling ER area, is “largely used for livestock and domestic purposes.”[[146]](#footnote-146) Research demonstrates that livestock health is threatened by air pollution from oil and gas wells, including a 2001 study that linked well flaring with stillbirths and calf mortality in cattle.[[147]](#footnote-147) Livestock have also been fatally poisoned by spilled drilling waste and wastewater near well sites.[[148]](#footnote-148)**
2. **Despite these potentially significant impacts to agriculture from the project, the EIAR did not include an agricultural specialist report as required by the Protocol discussed above. This is a fatal flaw.**
3. **The Appellants submit that to assess the impact of exploration drilling on the agricultural sector, an agricultural specialist would consider the following factors:**
	1. **The types of crops grown in the region, and their vulnerability to damage from drilling.**
	2. **The amount of agricultural land adjacent to drilling sites.**
	3. **The quality of the soil in the region, and its potential to be affected by contamination from spilled drilling fluids or produced water (highly salty brines);**
	4. **The disturbance to soils and cops from underground pipeline construction and permanent infrastructure;**
	5. **The current and future dependence on groundwater resources for agriculture and its potential to be contaminated by drilling activities; and**
	6. **The economic impacts of crop or livestock damage or loss of productivity.**
4. **By considering all of these factors, an agricultural specialist would have provided the DG with a more comprehensive and robust assessment of the potential impact of exploration drilling on the agricultural sector. The Appellants submit that the EIAR has all but ignored the fact that agriculture is a key economic activity in the district when in fact it was required to assess the impact of the proposed project on it. Furthermore, there has been no attempt to assess the impact of the proposed project on existing jobs and livelihoods associated with the agricultural sector.**
5. **Accordingly, the Appellants submit that the DG’s decision was taken while material provisions prescribed by NEMA were not complied with and without having taken relevant considerations into account. The appellants therefore submit that the DG’s decision should be set aside.**
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|  **SIXTH GROUND OF APPEAL: PUBLIC PARTICIPATION IN THE ENVIRONMENTAL IMPACTS ASSESSMENT PROCESS WAS NOT MEANINGFUL OR EFFECTIVE**1. Rhino Oil and the EAP have failed to engage in meaningful consultation in violation of the principles of fair administrative decision-making and the right of interested and affected communities to be meaningfully consulted prior to a decision on authorisation being made, and in violation of section 2(4)(f) of NEMA. This principles stipulates that the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured. It is also inconsistent with section 2(4)(g) of NEMA, which requires that decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.
2. In terms of regulation 41(2) of the NEMA Regulations of 2014, the Applicant was required to identify and give notice to all potentially interested and affected parties. Furthermore, section 2(4)(f) of NEMA contains an important principle that requires participation of all interested and affected parties in EIA processes. According to the Applicant’s Scoping Report,[[149]](#footnote-149) 14 notices on targeted sides, adverts on 2 local newspapers which are only printed in Afrikaans and English, 1 advert in English and Afrikaans on government gazette, and 2 public meetings in two towns were posted, published, and held, respectively. The project will affect over 1200 properties identified in the three target areas.
3. Notably, the Applicant did not make use of Sesotho local radio stations, social media, churches etc. presumably because the EIA Regulations do not expressly refer to these methods, despite their popularity and reach amongst different communities. However, recent jurisprudence[[150]](#footnote-150) on public participation democratic process indicates that merely ticking the checklist does not necessarily result in meaningful and effective public participation. Therefore it was upon the Applicant and the EAP to ensure that the interested and affected parties are properly informed about the project to enable them to meaningfully participate in the EIA process. This could have been done by publishing information about the project in the dominant language (Sesotho) that the possible interested and affected parties speak.
4. It is not clear whether the I&APs that are recorded in the report are, landowners or persons in control of the land. We only know their names (except the anonymous ones), method used to communicate with them, their comments, and responses from the consultant. It is important to properly identify all I&APs in a manner that reveal the nature of their land rights as those may require compliance with other legislation to achieve equitable and effective participation. For instance, MACUA, and MEJCON (organisations that represents many mining affected communities) were unaware of this project despite being an potential I&AP. A broader approach (use of local radio stations and notices written in Sesotho) that goes beyond just ticking a checklist, in public participation processes was likely to reach organisations such as MACUA, VEJA and MEJCON.
5. The Applicant was also required to ensure that all people had the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, in line with section 2(4)(f) of NEMA. On the contrary, the EIAR details a public participation process that is similar to that which courts characterised as “ticking a checklist”. For instance, the report was only made available on the website, 4 libraries, 1 local municipality and two offices of Senwes.[[151]](#footnote-151) No attempt was made to notify non-landowners, occupiers and organisations such as MACUA, VEJA or MEJCON, about the project.
6. Consequently, less than 20 I&APs commented on the scoping phase part of the report which is unacceptable considering that approximately 1200 properties will be affected by this project. Insofar as their comments are concerned, a handful of them are centred around possible water pollution/contamination. In response to those comments, the Applicant’s consultants said that further investigations on possible underground water pollution will have to be conducted. It is not apparent in the final EIA Report that such further investigations were conducted. Some comments were merely a request for more information to be provided but the report does not tell us whether such information was provided to the I&APs or not.
7. Surely, merely recording public comments and responses thereto is not what is envisaged in section 4(f) of NEMA and its EIA Regulations. The EIA Report must reflect some evidence of the impact of public participation in the assessment. Otherwise, the PPP would just be a tick box exercise which would be unfortunate given the importance of public participation process in South Africa.
8. The importance of public participation can never be overemphasised. In *Federation of South African Fly Fishers*[[152]](#footnote-152), in the context of public participation in environmental processes, the Court held:

"Public participation in democratic process is not the exclusive preserve of educated members of society who can read English, or the privileged few who have access to the internet. Participative democracy is one of the foundational values of the Constitution and **everyone should be encouraged and enabled to participate**". Our emphasis. 1. In *Sustaining the Wild Cost NPC and Others v Minister of Mineral Resources and Energy and Others*[[153]](#footnote-153) the court said,

“In the first place, meaningful consultations consist **not in the mere ticking of a**  **checklist**, but in engaging in a genuine, bona fide substantive two-way process aimed at achieving, as far as possible, consensus, especially in relation to what the process entails and the import thereof. …” Our emphasis. 1. In *Mogale and Others v Speaker of the National Assembly and Others*[[154]](#footnote-154) the Constitutional Court declared legislation unconstitutional purely on procedural grounds (i.e. for lack of public participation in the legislative process).

***Conclusion*** 1. As apparent from the above averments on public participation, the applicant failed to identify all interested and affected parties as required by NEMA and its Regulations. Such failure resulted in inadequate participation by few interested and affected parties to the exclusion of many people like those represented by organisations such as MACUA, VEJA and MEJCON Less than 20 interested and affected parties commented on the scoping report that is about a project that will affect more than 1200 properties.

The Applicant evidently failed to meet the standard set by our courts on public participation in EIA processes. Only one conclusion can be drawn from the applicant's "ticking a checklist” approach and that is, the applicant had no intention to engage meaningfully with interested and affected parties. In light of all the aforesaid reasons, we submit that the applicant failed to comply with section 2(4)(f) of NEMA and regulation 41(2) of NEMA Regulations of 2014. |  |  |
| **SEVENTH GROUND OF APPEAL: IN AUTHORISING THE EXPLORATION ACTIVITIES, THE DG FAILED TO GIVE EFFECT TO THE NEMA PRINCIPLES AND THE CONSTITUTIONAL RIGHTS TO AN ENVIRONMENT THAT IS NOT HARMFUL TO HEALTH OR WELLBEING** 1. In granting the authorisation, the DG was obligated to take into consideration the environmental management principles as set out in section 2 of NEMA, as well as the objectives of the Integrated Environmental Management set out in Chapter 5 of NEMA; particularly the minimum requirements of sections 24(4)(a-c), and lastly section 6(2)(e)(iii) of PAJA which requires that administrative decisions be lawful, reasonable and procedurally fair and take into account all relevant considerations.
2. NEMA requires all decision-makers to secure sustainable development while promoting justifiable economic and social development, as required by section 24 of the Constitution of the Republic of South Africa. Sustainable development is defined as the integration of social, economic, and environmental factors into the planning, implementation, and evaluation of decisions. This integrated approach ensures that development benefits both present and future generations.[[155]](#footnote-155) To achieve this, decision-makers must have all of the relevant facts before them and be able to consider and balance these factors to ensure sustainable and justified development.
3. In addition, section 2 of NEMA sets out a number of principles which serve as guidelines by reference to which the D-G was required to take the decision to grant the environmental authorisation. These principles include the following:
	1. Development must be socially, environmentally and economically sustainable.[[156]](#footnote-156)
	2. Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.[[157]](#footnote-157) The “best practicable environmental option” is defined as meaning the one that *“provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*.[[158]](#footnote-158)
	3. Sustainable development requires the consideration of all relevant factors including:
4. that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions[[159]](#footnote-159)
5. that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied[[160]](#footnote-160)
6. The environmental health and safety consequences of a policy, program, project, product, process, service, or activity must be considered throughout its entire life cycle.[[161]](#footnote-161)
7. The social, economic, and environmental impacts of activities, both positive and negative, must be carefully considered, assessed, and evaluated before making decisions.[[162]](#footnote-162)
8. The precautionary approach is a key principle of environmental law in South Africa, described in NEMA as “a risk averse and cautious approach”. It is designed to protect the environment from harm, even in the face of uncertainty. In the case *of Earthlife Africa Johannesburg v Minister of Environmental Affairs and Others*, the court held that the precautionary approach required the government to take steps to address climate change, even though there was uncertainty about the extent of the risks.
9. Furthermore, in the case of *Sustaining the Wild Coast,* the court referred to remarks made by O Regan J in *MEC for Education, Kwa-Zulu-Natal and Others v Pillay* at para 157 as well as affirming the remarks made by Bloem J in *Sustaining the Wild Coast NPC* at para 32. Having referred to these judgements, the court at para 114 confirmed that it would be for the administrative functionary concerned to give due weight to these considerations in light of all the other factors serving before it.
10. We have set out above a number of respects in which the EIAR is fatally deficient. Consequently, in authorizing the decision in the absence of all relevant information, the DG has failed to give effect to the principles of NEMA, and to section 24 of the Constitution.
11. Consequently, the decision to issue the Authorisation is furthermore irrational and unreasonable, and thus in contravention of PAJA.
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**ARR comments by Case Officer Approved by Supervior**

Name & Surname: Name & Surname:

Date: Date:

Signature: Signature:

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1. This summary can be accessed here : <http://seasgd.csir.co.za/wp-content/uploads/2017/06/Summary-for-PolicyMakers_2ndEdition_05June2017.pdf> [↑](#footnote-ref-1)
2. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020: Updates Under Consideration for Anomalous Events including Well Blowout and Well Release Emissions. Available online at <https://www.epa.gov/ghgemissions/stakeholder-webinar-sept-2021-natural-gas-petroleum-systems-ghginventory> [↑](#footnote-ref-2)
3. Sudhanshu Pandey *et al.*, *Satellite observations reveal extreme methane leakage from a natural gas well blowout*, 116, Proc. Natl. Acad. Sci., 26376–26381 (2019) [↑](#footnote-ref-3)
4. S. Rana. 2008. Facts and Data on Environmental Risks: Oil and Gas Drilling Operations. Society of Petroleum Engineers. SPE Asia Pacific Oil & Gas Conference and Exhibition. See page 4 [↑](#footnote-ref-4)
5. See note 3 at page 4. [↑](#footnote-ref-5)
6. Drew Michanowicz et al., “Methane and Health-Damaging Air Pollutants from the Oil and Gas Sector: Bridging 10 Years of Scientific Understanding,” Technical Report (PSE Healthy Energy, October 2021), [↑](#footnote-ref-6)
7. [↑](#footnote-ref-7)
8. EIAR Report. Section 6.8. at page 104. [↑](#footnote-ref-8)
9. EIAR Report. Section 5.7.1 at page 85. [↑](#footnote-ref-9)
10. See note 9 above. [↑](#footnote-ref-10)
11. See note 8 above [↑](#footnote-ref-11)
12. It is widely acknowledged that flaring and venting of associated gascontributes significantly to greenhouse gas (GHG) emissions and has negative impacts on the environment. The environmental problems caused by flaring are mainly global, but to some extent also regional and local. For example, flaring/venting during oil production operations emits CO2, methane and other forms of gases which contribute to global warming causing climate change, and this affects the environmental quality and health of the vicinity of the flares. This negates commitments made by countries under the United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol. Global environmental impact is due to the burning of associated or solution gas, which produces carbon dioxide (CO2) and methane (CH4). These emissions increase the concentration of greenhouse gases (GHG) in the atmosphere, which in turn contributes to global warming [↑](#footnote-ref-12)
13. O. Ismail and G. Umukoro, "Global Impact of Gas Flaring," *Energy and Power Engineering*, Vol. 4 No. 4, 2012, pp. 290-302. doi: [10.4236/epe.2012.44039](http://dx.doi.org/10.4236/epe.2012.44039). [↑](#footnote-ref-13)
14. EIAR Report. Section 5.7.2. at page 86 and Section 7.1.1 at page 121 [↑](#footnote-ref-14)
15. EIAR report, Section 7.3.5 at page 136. [↑](#footnote-ref-15)
16. Christien J. Engelbrecht, Francois A. Engelbrecht & Liesl L. Dyson, *High-resolution model-projected changes in mid-tropospheric closed-lows and extreme rainfall events over southern Africa*, 33, Int. J. Climatol., 173–187 (2013). [↑](#footnote-ref-16)
17. Anthony W. Gorody, Factors affecting the variability of stray gas concentration and composition in groundwater, 19, Environ. Geosci., 17–31 (2012). [↑](#footnote-ref-17)
18. GV Chilingar, B Endres, Environmental hazards posed by the Los Angeles Basin urban oilfields: An historical perspective of lessons learned. Environ Geol 47, 302–317 (2005). [↑](#footnote-ref-18)
19. Hildenbrand, Zacariah et al. “A comprehensive analysis of groundwater quality in the Barnett Shale region.” Environmental Science & Technology. Vol. 49, Iss. 13. June 16, 2015 at results and discussion. [↑](#footnote-ref-19)
20. Mohsen M. M. Ali *et al.*, *Concentrations of TENORMs in the petroleum industry and their environmental and health effects*, 9, RSC Adv., 39201–39229 (2019). [↑](#footnote-ref-20)
21. RD Grace Blowout and Well Control Handbook (Gulf Professional Publishing, Houston, 2003). [↑](#footnote-ref-21)
22. Gilian Schout *et al.*, *Impact of an historic underground gas well blowout on the current methane chemistry in a shallow groundwater system*, 115, Proc. Natl. Acad. Sci., 296–301 (2018). [↑](#footnote-ref-22)
23. ER 318 Geohydrological Impact Assessment report, Section 7 at page 30. [↑](#footnote-ref-23)
24. ER 318 Geohydrological Impact Assessment report, Section 6.5.1 at page 26. [↑](#footnote-ref-24)
25. ER 294 Geohydrological Impact Assessment report, Section 10.2 at page 41. [↑](#footnote-ref-25)
26. ER 318 Geohydrological Impact Assessment report, Section 10.2 at page 49. [↑](#footnote-ref-26)
27. ER 294 Geohydrological Impact Assessment report, Section 10.3 at page 41, ER 318 Geohydrological Impact Assessment report, Section 10.3 at page 49. [↑](#footnote-ref-27)
28. Department of Agriculture, Forestry and Fisheries Republic of South Africa. Abstract of Agricultural Statistics 2022. [↑](#footnote-ref-28)
29. Schulze, R. E. (2016). “Water and the farmer 1: challenges in South Africa even before considering climate change,” in Handbook for Farmers, Officials and Other Stakeholders on Adaptation to Climate Change in the Agriculture Sector within South Africa. Section B: Agriculture's Natural Capital in South Africa: A Climate Change Perspective, Chapter B6, ed R. E. Schulze. [↑](#footnote-ref-29)
30. Christina M. Botai et al., Characteristics of Droughts in South Africa: A Case Study of Free State and North West Provinces, 8, Water, 439 (2016). [↑](#footnote-ref-30)
31. J. M. de Jager, A. B. Potgieter & W. J. van den Berg, Framework for forecasting the extent and severity of drought in maize in the Free State Province of South Africa, 57, Agric. Syst., 351–365 (1998). [↑](#footnote-ref-31)
32. https://pmg.org.za/committee-meeting/23605/ [↑](#footnote-ref-32)
33. Department of Agriculture, Forestry and Fisheries Republic of South Africa. Abstract of Agricultural Statistics 2022. [↑](#footnote-ref-33)
34. G. Maúre et al., The southern African climate under 1.5 °C and 2 °C of global warming as simulated by CORDEX regional climate models, 13, Environ. Res. Lett., 065002 (2018). [↑](#footnote-ref-34)
35. EIAR report, Section 7.3.4 at page 139. [↑](#footnote-ref-35)
36. As one example, it appears that the wells will only be monitored for a short period of time after closure, whereas wells typically start leaking 50 years after closure. [↑](#footnote-ref-36)
37. Section 2(4)(e) of NEMA stipulates that responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle. [↑](#footnote-ref-37)
38. Director: Mineral Development, Gauteng Region and Another v Save the Vaal Environment and Others (133/98) [1999] ZASCA 9 (12 March 1999). [↑](#footnote-ref-38)
39. *Sustaining the Wild Coast and Others v Minister of Mineral Resources and Energy and Others, at para 123* [↑](#footnote-ref-39)
40. See note 17 at para 124. [↑](#footnote-ref-40)
41. EIAR Report. Section 4.1.3 at page 30. [↑](#footnote-ref-41)
42. See note 19 above at page 33 [↑](#footnote-ref-42)
43. EIAR Report. Section 4.2.3, at page 37. [↑](#footnote-ref-43)
44. See the IPCC’s 6th Assessment Report (AR6), Working Group 1, Chapter 6 *The Earth’s Energy Budget, Climate Feedbacks and Climate Sensitivity*, Table 7.15 at p1017. Available online at: <https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07.pdf> [↑](#footnote-ref-44)
45. McGlade, C., Ekins, P. The geographical distribution of fossil fuels unused when limiting global warming to 2 °C. *Nature* **517**, 187–190 (2015). https://doi.org/10.1038/nature14016 [↑](#footnote-ref-45)
46. See note above [↑](#footnote-ref-46)
47. IEA (2020), *The Oil and Gas Industry in Energy Transitions*, IEA, Paris https://www.iea.org/reports/the-oil-and-gas-industry-in-energy-transitions, License: CC BY 4.0 [↑](#footnote-ref-47)
48. Hmiel, B., Petrenko, V.V., Dyonisius, M.N. *et al.* Preindustrial 14CH4 indicates greater anthropogenic fossil CH4 emissions.*Nature* **578**, 409–412 (2020). https://doi.org/10.1038/s41586-020-1991-8 [↑](#footnote-ref-48)
49. chwietzke, S. et al. Upward revision of global fossil fuel methane emissions based on isotope database. *Nature* **538**, 88–91 (2016). [↑](#footnote-ref-49)
50. MacKay, K. et al. Methane emissions from upstream oil and gas production in Canada are underestimated. *Sci. Rep.* **11**, 8041 (2021) [↑](#footnote-ref-50)
51. National Academies of Sciences, Engineering, and Medicine et al. *Improving Characterization of Anthropogenic Methane Emissions in the United States* (National Academies Press, 2018); <https://doi.org/10.17226/24987> [↑](#footnote-ref-51)
52. Keyßer, L. T. & Lenzen, M. 1.5 °C degrowth scenarios suggest the need for new mitigation pathways. *Nat. Commun.* **12**, 2676 (2021). [↑](#footnote-ref-52)
53. See, e.g., Union of Concerned Scientists, Turning Down the Gas in California (13 July 2018), https://www.ucsusa.org/resources/turningdown-gas-california?\_ga=2.79265367.2135392956.1587590973- 34786515.1587590973#ucs-report-downloads [↑](#footnote-ref-53)
54. <https://iopscience.iop.org/article/10.1088/17489326/ab9ed2#:~:text=Climate%20stabilization%20remains,et%20al%202016>). [↑](#footnote-ref-54)
55. <https://www.ipcc.ch/report/ar6/wg1> [↑](#footnote-ref-55)
56. 8 <https://oilandgaswatch.org/> & <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> [↑](#footnote-ref-56)
57. Comments 24 May 2023 and responses, at page 19. [↑](#footnote-ref-57)
58. EIAR Report. Chapter 4 at page 46. [↑](#footnote-ref-58)
59. EIAR Report. Chapter 4.3.14, at page 44. [↑](#footnote-ref-59)
60. EIAR Report. Chapter 4.2, at page 33 [↑](#footnote-ref-60)
61. M. Gray. 2022. “Fuel Switching 2.0: Carbon Prince Index for Coal-to-clean electricity. TransitionZero, accessible via <https://www.transitionzero.org/insights/fuel-switching-coal-to-clean> [↑](#footnote-ref-61)
62. See note 39 above. [↑](#footnote-ref-62)
63. M. Gray. 2022. “Fuel Switching 2.0: Carbon Prince Index for Coal-to-clean electricity. TransitionZero, accessible via <https://www.transitionzero.org/insights/fuel-switching-coal-to-clean> [↑](#footnote-ref-63)
64. Meridian report, page ii. Available online at: <https://meridianeconomics.co.za/wp-content/uploads/2022/06/Hot-Air-About-Gas.pdf> [↑](#footnote-ref-64)
65. See note 42. [↑](#footnote-ref-65)
66. See note 42 at page 1. [↑](#footnote-ref-66)
67. See note 42 at page 37. [↑](#footnote-ref-67)
68. Meridian Economics, 2020. A Vital Ambition: Determining the Cost of Additional CO2 Emission Mitigation in the South African Electricity System. See at <https://meridianeconomics.co.za/wp-content/uploads/2020/07/Ambition.pdf> [↑](#footnote-ref-68)
69. Gas and peaking resources contribute just 1.1% of total electricity generation in 2025, and 2.4% by 2035 according to the same Meridian report [↑](#footnote-ref-69)
70. Meridian Economics, Hot Air About Gas: An Economic Analysis of the Scope and Role for Gas-Fired Power Generation in South Africa (2022), pages 2-3, https://meridianeconomics.co.za/wp-content/uploads/2022/06/Hot-Air-About-Gas.pdf [↑](#footnote-ref-70)
71. 2019 Integrated Resource Plan, page 42. [↑](#footnote-ref-71)
72. Welsby, D., Price, J., Pye, S. et al. Unextractable fossil fuels in a 1.5 °C world. Nature 597, 230–234 (2021). https://doi.org/10.1038/s41586- 021-03821-8. [↑](#footnote-ref-72)
73. IISD report, piv. Available online at: <https://www.iisd.org/publications/report/south-africa-no-need-for-gas> [↑](#footnote-ref-73)
74. IISD report, pages 8 – 12. [↑](#footnote-ref-74)
75. Tong, D. et al. Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target. *Nature* **572**, 373–377 (2019). [↑](#footnote-ref-75)
76. Cherp, A., Vinichenko, V., Jewell, J., Brutschin, E. & Sovacool, B. Integrating techno-economic, socio-technical and political perspectives on national energy transitions: a meta-theoretical framework. *Energy Res. Soc. Sci.* **37**, 175–190 (2018). [↑](#footnote-ref-76)
77. Grubler, A. Energy transitions research: insights and cautionary tales. *Energy Policy* **50**, 8–16 (2012). [↑](#footnote-ref-77)
78. Hoffart, F. M., Schmitt, E.-J. & Roos, M. Rethinking economic energy policy research—developing qualitative scenarios to identify feasible energy policies. *J. Sustain. Dev. Energy Water Environ. Syst.* **9**, 1–28 (2021). [↑](#footnote-ref-78)
79. See the IPCC’s 6th Assessment Report (AR6), Working Group 1, Chapter 6 *The Earth’s Energy Budget, Climate Feedbacks and Climate Sensitivity*, Table 7.15 at p1017. Available online at: <https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07.pdf> [↑](#footnote-ref-79)
80. <https://cer.org.za/wp-content/uploads/2022/10/Natural-Gas-factsheet.pdf> [↑](#footnote-ref-80)
81. Earthlife Johannesburg and Another v. Minister of Energy and Others 2017 2 All SA 519 (GP) [↑](#footnote-ref-81)
82. See above at para 97. [↑](#footnote-ref-82)
83. Record of Decision for Environmental Authorization, at page 16. [↑](#footnote-ref-83)
84. Record of Decision for Environmental Authorization, at page 15. [↑](#footnote-ref-84)
85. IEA (2021), *Net Zero by 2050*, IEA, Paris https://www.iea.org/reports/net-zero-by-2050, License: CC BY 4.0 [↑](#footnote-ref-85)
86. DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa at page 4. Confirmed in the *Sustaining the Wild Coast* case*.* [↑](#footnote-ref-86)
87. Free State Green Economy Strategy at page 37, accessible here at <https://www.dffe.gov.za/sites/default/files/docs/greeneconomystrategy_freestate.pdf> [↑](#footnote-ref-87)
88. See above at page 38. [↑](#footnote-ref-88)
89. See note 31 at page 38. [↑](#footnote-ref-89)
90. Comments 24 May 2023 and responses, at page 27-28 [↑](#footnote-ref-90)
91. See note 74 above at page 28. [↑](#footnote-ref-91)
92. Page 9 of the Guideline. [↑](#footnote-ref-92)
93. EIAR Report. Page 90 and 144-145. [↑](#footnote-ref-93)
94. C. Renaud, Dr E. Tyler, A. Roff, Dr G. Steyn. 2020. Accelerating Renewable Energy industrialization in South Africa: What’s stopping us. Meridian Economics Report, at page 26. [↑](#footnote-ref-94)
95. See note above at page 26. [↑](#footnote-ref-95)
96. , <https://www.gov.za/speeches/free-state-governmnent-encourages-investors-invest-solar-plant-kopanong-local-municipality> [↑](#footnote-ref-96)
97. <https://www.globalafricanetwork.com/company-news/logistics-and-renewable-energy-are-vital-sectors-in-the-free-state-economy/> [↑](#footnote-ref-97)
98. Solar resource maps and GIS data for 180+ countries | Solargis, (n.d.). <https://solargis.com/maps-and-gis-data/download/south-africa> (accessed August 30, 2023). [↑](#footnote-ref-98)
99. T.P. Fluri. The potential of concentrating solar power in South Africa Energy Policy, 37 (2009), pp. 5075-5080, [10.1016/j.enpol.2009.07.017](https://doi.org/10.1016/j.enpol.2009.07.017) [↑](#footnote-ref-99)
100. SINGH, Jyotsna. Ranking South African provinces on the basis of MERRA 2D surface incident shortwave flux.*J. energy South. Afr.* [online]. 2016, vol.27, n.3 [cited  2023-08-30], pp.50-57. Available from: <http://www.scielo.org.za/scielo.php?script=sci\_arttext&pid=S1021-447X2016000300005&lng=en&nrm=iso>. ISSN 2413-3051. [↑](#footnote-ref-100)
101. See note 78 at page 36 [↑](#footnote-ref-101)
102. Section 82(1) of the Mineral and Petroleum Resources Development Act. [↑](#footnote-ref-102)
103. <https://www.dailymaverick.co.za/article/2022-10-19-farmers-alarm-over-free-state-drilling-plans-despite-no-fracking-pledge-by-rhino-oil-and-gas-company/> [↑](#footnote-ref-103)
104. EIAR Report. Section 3.2, at page 15. [↑](#footnote-ref-104)
105. EIAR Report. Section 3.2, at page 15. [↑](#footnote-ref-105)
106. EIAR Report. Section 7.5, at page 145. [↑](#footnote-ref-106)
107. Appendix 3, Section 3(j)(iv) of the EIA Regulations 2014. [↑](#footnote-ref-107)
108. Appendix 3, section 3(j)(i) of the EIA Regulations 2014. [↑](#footnote-ref-108)
109. Appendix 3, Section 3(j)(ii) and (iii)of the EIA Regulations. [↑](#footnote-ref-109)
110. FEIAR Report. Section 7.1.1, at page 20. [↑](#footnote-ref-110)
111. See note 106 above section 7.1.2 at page 122. [↑](#footnote-ref-111)
112. Hmiel, B. et al. Preindustrial 14CH4 indicates greater anthropogenic fossil CH4 emissions. *Nature* **578**, 409–412 (2020). [↑](#footnote-ref-112)
113. Myhre, G. et al. in *Climate Change 2013: The Physical Science Basis* (eds. Stocker, T. F. et al.) 659–740 (IPCC, Cambridge Univ. Press, 2013) [↑](#footnote-ref-113)
114. Zhang, X., Myhrvold, N. P., Hausfather, Z. & Caldeira, K. Climate benefits of natural gas as a bridge fuel and potential delay of near-zero energy systems. *Appl. Energy* **167**, 317–322 (2016). [↑](#footnote-ref-114)
115. MacKay, K. et al. Methane emissions from upstream oil and gas production in Canada are underestimated. *Sci. Rep.* **11**, 8041 (2021). [↑](#footnote-ref-115)
116. Alvarez, R. A., Pacala, S. W., Winebrake, J. J., Chameides, W. L. & Hamburg, S. P. Greater focus needed on methane leakage from natural gas infrastructure. *Proc. Natl Acad. Sci. USA* **109**, 6435–6440 (2012). [↑](#footnote-ref-116)
117. chwietzke, S., Griffin, W. M., Matthews, H. S. & Bruhwiler, L. M. P. Natural gas fugitive emissions rates constrained by global atmospheric methane and ethane. *Environ. Sci. Technol.* **48**, 7714–7722 (2014).. [↑](#footnote-ref-117)
118. Climate Change 2021: The Physical Science Basis, available online at: <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/>, PARA B.2. [↑](#footnote-ref-118)
119. Lenton, T. M. et al. Climate tipping points—too risky to bet against. *Nature* **575**, 592–595 (2019). [↑](#footnote-ref-119)
120. EarthLife Africa Johannesburg v. Minister of Environmental Affairs and Others, Case no. 65662/16, High Court of South Africa, Gauteng Division, Pretoria. Available at http://climatecasechart.com/wpcontent/uploads/sites/16/non-us-case-documents/2017/20170306\_Case-no.-6566216\_judgment-1.pdf at para 44, [↑](#footnote-ref-120)
121. SA NDC, https://unfccc.int/sites/default/files/NDC/2022-06/South%20Africa%20updated%20first%20NDC%20September%202021.pdf [↑](#footnote-ref-121)
122. Climate Action Tracker, Climate Action Tracker Country Summary: South Africa [↑](#footnote-ref-122)
123. Holz, Christian, Sivan Kartha, and Tom Athanasiou (2021) New Coal Power Generation in South Africa in Light of South Africa’s Climate Fair Share. Climate Equity Reference Project Working Paper Series. WP007. Version 1.0. Zenodo. [doi: 10.5281/zenodo.2595499, at page 2. [↑](#footnote-ref-123)
124. See note 118, at page 11. [↑](#footnote-ref-124)
125. See note 118, at page 8. [↑](#footnote-ref-125)
126. Mark New.2022. “Evidence that current proven reserves of oil and gas exceed CO2 budgets consistent with the Paris Agreement temperature targets” African Climate and Development Initiative (ACDI), University of Cape Town [↑](#footnote-ref-126)
127. C Swanson and A Lewin. 2020. “Sailing to nowhere: Liquified Natural Gas is not an effective climate strategy”. Natural Resources Defence Council Report, accessible via https://www.nrdc.org/sites/default/files/sailing-nowhere-liquefied-natural-gas-report.pdf [↑](#footnote-ref-127)
128. Keyßer, L. T. & Lenzen, M. 1.5 °C degrowth scenarios suggest the need for new mitigation pathways. *Nat. Commun.* **12**, 2676 (2021). [↑](#footnote-ref-128)
129. Section 24(5)(a) and (h) and 44 of NEMA, of the protocol for the assessment and minimum criteria for reporting on environmental impacts on agricultural resources [↑](#footnote-ref-129)
130. Section 2 and 3 of the Protocol. [↑](#footnote-ref-130)
131. EIAR, section 6.5.1.1, Agricultural Activities. [↑](#footnote-ref-131)
132. MEC Thembeni Nxangisa: Free State Agriculture and Rural Development Prov Budget Vote 2022/23, available at <https://www.gov.za/speeches/mec-thembeni-nxangisa-free-state-agriculture-and-rural-development-prov-budget-vote-202223>. See also https://www.statssa.gov.za/?p=16439 [↑](#footnote-ref-132)
133. Schulze, R. E. (2016). “Water and the farmer 1: challenges in South Africa even before considering climate change,” in Handbook for Farmers, Officials and Other Stakeholders on Adaptation to Climate Change in the Agriculture Sector within South Africa. Section B: Agriculture's Natural Capital in South Africa: A Climate Change Perspective, Chapter B6, ed R. E. Schulze. [↑](#footnote-ref-133)
134. Section 24(5)(a) and (h) and 44 of NEMA, of the protocol for the assessment and minimum criteria for reporting on environmental impacts on agricultural resources [↑](#footnote-ref-134)
135. EIAR p. 6 [↑](#footnote-ref-135)
136. See note above. [↑](#footnote-ref-136)
137. EIAR, p. 7. [↑](#footnote-ref-137)
138. EIAR, p 140. [↑](#footnote-ref-138)
139. EIAR Report. Section 7.1.4 at page 124. [↑](#footnote-ref-139)
140. Lekan Taofeek Popoola *et al.*, *Adsorptive removal of heavy metals from oil well produced water using citrullus lanatus peel: Characterization and optimization*, 39, South Afr. J. Chem. Eng., 19–27 (2022). [↑](#footnote-ref-140)
141. Keshav Krishna Aradhi *et al.*, *Spatial distribution, sources and health risk assessment of heavy metals in topsoil around oil and natural gas drilling sites, Andhra Pradesh, India*, 13, Sci. Rep., 10614 (2023). [↑](#footnote-ref-141)
142. Mary Beth Adams, *Land application of hydrofracturing fluids damages a deciduous forest stand in West Virginia*, 40, J. Environ. Qual., 1340–1344 (2011). [↑](#footnote-ref-142)
143. Groundwater Protection Council, U.S. Produced Water Volumes and Management Practices in 2021, available at https://www.gwpc.org/wp-content/uploads/2021/09/2021\_Produced\_Water\_Volumes.pdf [↑](#footnote-ref-143)
144. ESIA. Section 7.3.5, p 136 [↑](#footnote-ref-144)
145. EIAR Report (ER 318). Section 6.5.2 at page 97. [↑](#footnote-ref-145)
146. EIAR Report (ER 318). Section 6.6.2 at page 99. [↑](#footnote-ref-146)
147. Hitaj, Boslett and Weber (2014) at 3. [↑](#footnote-ref-147)
148. W. C. Edwards & D. G. Gregory, *Livestock poisoning from oil field drilling fluids, muds and additives*, 33, Vet. Hum. Toxicol., 502–504 (1991). See also https://coloradosun.com/2023/07/05/oil-spill-kills-cows-western-operating-colorado/ [↑](#footnote-ref-148)
149. Draft Environmental Impact Assessment Report dated 20 April 2023 page 18. [↑](#footnote-ref-149)
150. *Federation of South African Fly Fisheries v Minister of Environmental Affairs* (62486/2018) [2021] ZAGPPHC 575 (10 September 2021); *Sustaining the Wild Cost NPC and Others v Minister of Mineral Resources and Energy and Others* 2022 (2) SA 585 (ECG); *Earthlife Africa (Cape Town) v Director-General: Department of Environmental Affairs and Tourism and Another* [2005] ZAWCHC 7; 2005 (3) SA 156 (C). [↑](#footnote-ref-150)
151. Page 19 of the Environmental Impact Assessment Report. [↑](#footnote-ref-151)
152. [2022] ZAGPPHC 741 (6 October 2022). [↑](#footnote-ref-152)
153. 2022 (2) SA 585 (ECG). [↑](#footnote-ref-153)
154. [2023] ZACC 14. [↑](#footnote-ref-154)
155. Section 1 of NEMA. [↑](#footnote-ref-155)
156. Section 2(3). [↑](#footnote-ref-156)
157. Section 2(4)(b) of NEMA. [↑](#footnote-ref-157)
158. Section 1 of NEMA (definition of “best practicable environmental option”) [↑](#footnote-ref-158)
159. 1 Section 2(4)(a)(vii) of NEMA [↑](#footnote-ref-159)
160. 2 Section 2)(a)(vii) of NEMA [↑](#footnote-ref-160)
161. Section 2(4)(e) of NEMA [↑](#footnote-ref-161)
162. Section 2(4)(i) of NEMA. [↑](#footnote-ref-162)