

Mr Steve O'Donoghue
Director Resource Assessments

By email: Stephen.ODonoghue@planning.nsw.gov.au

Monday, 27 February 2023

Dear Steve

Subject: Advice in relation to the Hunter Valley Operations Continuation Project, Predicted Greenhouse Gas Emissions

The DPE Science, Economics and Insights Net Zero Emissions Modelling (NZEM) team has received the request for advice in relation to the Greenhouse Gas (GHG) Assessment for the Hunter Valley Operations (HVO) Continuation Project (the Project). Our high-level review of the key documents is provided for your consideration in Appendix 1, with a summary of our findings and recommendations as follows.

Technical review of estimated greenhouse gas Scope 1, 2 and 3 emission calculations

The GHG Assessment was prepared by Jacobs (final version 9 November 2022). This addressed the relevant emission sources and scopes. Emissions estimates were consistent with contemporary practice and the emission factors in general appear to be adequate for the calculations. However, some improvement points are noted:

- I. More detail is required on the calculation of fugitive emissions for the Project in light of large forecast increases in these emissions after 2030. The annual fugitive emissions from HVO North and South should be reported separately along with the relevant emission factors for each mine.
- II. The likely changes in the fugitive emissions factor should be discussed as each pit deepens over time. Will the stated fugitive emissions factor of 0.014 tCO₂-e/t ROM from Table 22 of the GHG Assessment remain relevant over the Project lifetime? The Proponent should provide annual fugitive emission factors for each mine over the life of the Project. These factors should be based on core samples, gas composition measurements and any associated gas reservoir modelling.
- III. More detail is required on the diesel consumption associated with the Project (i.e. for stationary and mobile purposes). Having more detailed information on the sources of diesel consumption will better inform potential abatement measures.
- IV. The Proponent should revise forecasted scope 2 and 3 electricity emissions from 2023 to 2035 using DCCEEW's Australia's Emissions Projections 2022 forecasts. These forecasts take account of the expected rapid decarbonisation of the NSW electricity grid.
- V. The Proponent should consider the recently proposed Safeguard Mechanism reforms, in particular the annually declining baselines that will apply to all existing and new safeguard facilities until 2030, with limited exceptions. NZEM recommends that the Proponent consider including a new set of annual emissions projections that include the impacts of the declining baseline.

Other improvement points have been noted in Appendix 1.

Consistency with NZEM modelling for Net Zero Plan Stage 1: 2020-2030 Implementation Update

The 2022 emissions projections update for NSW (which includes an estimate of Project emissions) was developed by NZEM prior to the Project being exhibited in January 2023. The currently approved Hunter Valley Operations mine emissions forecasts were accounted for in the 2022 emissions projections update. While emissions from the Project were also factored in, NZEM's estimates were lower than those reported in the EIS.

The most significant difference is in the estimates of future fugitive emissions from the Project. Over the years 2023-2050, the total fugitive emissions were forecast by the Proponent to be approximately 4.6 million tonnes CO₂-e (MtCO₂-e) higher than estimated by NZEM.

The GHG Assessment, estimated the annual average scope 1 and 2 emissions from the Project will increase NSW emissions by approximately 1.26 MtCO₂-e or 0.95% (based on the 2020 NSW emissions inventory). In 2044, the Project emissions will exceed 2 MtCO₂-e or 1.5% of NSW 2020 emissions.

The annual average diesel emissions over the Project lifetime were 0.09 MtCO₂-e higher in the EIS compared to the 2022 emissions projections update. In Year 2040, the diesel emissions reported in the EIS were approximately 0.24 MtCO₂-e higher than the NZEM estimate.

Because the Proponent is proposing to mine deeper (and potentially gassier) seams at HVO North, NZEM will need to at least double the estimates of the fugitive emissions for the Project from 2040-2050.

NZEM acknowledges that open cut mining is a hard to abate sector. However, the large increase in emissions from this Project in the mid-2040s will require other parts of the NSW economy to decarbonise to remain on track with the NSW Government's target of net zero emissions by 2050.

NZEM's coal mining emissions projections have been developed using coal production forecasts provided by the Mining, Exploration and Geoscience (MEG) group in the Department of Regional NSW (DRNSW). NZEM will update emissions forecasts upon receipt of approved Project run-of-mine (ROM) coal volume projections from MEG.

Review of the proposed GHG mitigation measures

NZEM considered the measures to minimise the Scope 1 and 2 emissions from the Project and any additional measures that could be implemented to mitigate Scope 1 and 2 emissions to the greatest extent practicable over the life of the project. Our review is provided in Appendix 1.

The reduction measures described by the Proponent for reducing emissions from diesel-powered equipment include:

- minimise length of haulage routes
- optimise ramp gradients
- fuel efficient haul trucks and other mobile plant
- use of overland conveyors to replace trucks
- consideration of biofuels.

In the EIS, the Proponent has only given cursory consideration to hydrogen- and electric-powered trucks. Given that the Project extends the life of the HVO Complex to 2050 and that there will likely be significant advancements in mining technology over this period, it is strongly recommended that the Proponent commit to a regular review of best practice technologies in relation to low emissions alternatives to diesel-powered equipment and transition the mining fleet accordingly in line with best practice.

The Proponent has ruled out pre-drainage of coal seams as economically unviable for a multi-seam open cut operation. However, the Proponent has provided no evidence or explanation for this in the EIS.

Given the very large growth expected in fugitive emissions from the HVO Complex over the next 20-25 years, the Proponent must provide a comparison of the costs and benefits of pre-drainage to support the claim that it is not an economically viable option. The Proponent should also carry out in the first instance a feasibility study to assess the gas resource in the seams and the potential to extract that gas for beneficial use.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Ruby Kan', with a stylized, cursive script.

Ruby Kan

Acting Director Climate and Atmospheric Science

Environment and Heritage Group DPE

Appendix 1 – Overview of GHG Assessment documents

The Net Zero Emissions Modelling team (NZEM) in the Climate and Atmospheric Science (CAS) Branch of Science, Economics and Insights at the NSW Department of Planning and Environment has reviewed the Greenhouse Gas Assessment in Appendix H, prepared by Jacobs – final version 9 November 2022¹.

The Project concerns the continuation of open cut mining beyond the currently approved extent, depth and life at the Hunter Valley Operations (HVO) North and South mines (or collectively the HVO Complex). The HVO Complex is situated 24 km north-west of Singleton in the Hunter Valley, New South Wales (NSW).

The HVO North and South mines were approved under separate development consents but are operating as one integrated complex:

- the existing HVO North mine was approved to extract up to 22 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal to June 2025
- the existing HVO South mine was approved to extract up to 20 Mtpa of ROM coal to March 2030.

Mining is presently conducted at the HVO complex using dragline and truck and shovel methods. The ROM coal is processed at the Hunter Valley (HV) Coal Preparation Plant (CPP) or Howick CPP near HVO North. Product coal is transported by conveyor to various load points and then via rail to the Port of Newcastle for export.

The existing HVO Complex is considered a large facility emitting over 100,000 tCO₂-e per annum of scope 1 emissions. It is therefore subject to emissions reduction requirements under the Commonwealth's Safeguard Mechanism.

The Project seeks to continue open cut mining operations at the Complex by:

- Mining HVO North to 2050
- Mining HVO South to 2045 with a maximum extraction rate of 18 Mtpa.

The Project allows increased coal recovery from existing operations (mining through previously mined areas) and extracting coal from deeper seams within HVO North. The extension of the HVO South mine is to enable better mine sequencing and reduced mining rate. A number of infrastructure upgrades and changes will be required to facilitate the Project.

Approval for the Project was sought under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Secretary's Environmental Assessment Requirements (SEARs) in relation to the Project's greenhouse gas (GHG) emissions requires consideration of the likely GHG emissions of the development.

The GHG inventory was prepared by engineering consultancy Jacobs¹ according to the principles of the GHG Protocol. It was calculated using the 2021 National Greenhouse Accounts (NGA) Factors² as required by the SEARs. These NGA factors are based on the latest AR5 global warming potentials and are therefore considered the most appropriate for the GHG calculations.

Scope of emissions

The GHG Assessment covers scope 1 direct emissions from:

¹ <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-11826681%2120221219T093437.518%20GMT>

² <https://www.dccew.gov.au/climate-change/publications/national-greenhouse-accounts-factors-2021>

- fugitive methane emissions from coal mining
- combustion of diesel in mobile and stationary sources
- loss of carbon sink due to vegetation removal
- blasting emissions

It also covers Scope 2 emissions from the generation of purchased electricity consumed by the Project.

Scope 3 indirect emissions include:

- extraction, production and transport of diesel consumed at the Project
- purchased grid electricity used by the Project
- transportation of product coal to port by rail and shipping it to overseas consumers
- combustion of product thermal and coking coal by end users
- embodied energy of materials
- transport of materials to site.

Activity Data

Detailed annual activity data is provided in Appendix G of the GHG Assessment. This gives the annual diesel, explosives and electricity requirements for the Project as a function of ROM coal production to 2050. Annual scope 1 fugitive emissions and scope 3 emissions from rail, shipping and product coal consumption are also provided.

A check was performed on the data provided in Appendix G. NZEM found that:

- It was not possible to verify the diesel consumption figures as a function of annual ROM production as usage factors were not provided. Although data was provided in Tables 20 and 21 of the EIS for diesel consumption in certain years, these figures seem to differ from what is given in Appendix G. Given that emissions from this source are of the order of 0.4 to 0.7 million tonnes carbon dioxide equivalent (Mt CO₂-e) per annum, the Proponent must clarify this data as errors will be significant.
- The quantity of explosives could not be verified as the basis for consumption has not been described.
- The quantity of electricity consumed could not be verified as the basis for consumption has not been described.
- The information provided for Scope 3 rail and shipping activities and product coal combustion was adequate.
- The information provided for land clearance was adequate, however data on diesel consumption during construction activities was not presented and therefore inadequate. However, emissions from this source are relatively small and immaterial to the overall GHG accounts for the Project.

GHG emission factors and calculations

NZEM reviewed the GHG emissions calculations based on the activity data provided. Several improvement points were noted, the most serious of which applies to the Scope 1 fugitive emissions calculations and the Scope 2 grid electricity emissions calculations.

For fugitive emissions, NZEM notes that:

- applying the stated fugitive emissions factor of 0.014 tCO₂-e/t ROM from Table 22 of the GHG EIS to the ROM figures did not reproduce the emissions reported in Appendix G.
- the Proponent does not indicate if core sampling and gas composition analysis has been carried out to determine the methane content of the deeper Barrett seam proposed to be mined at HVO North operations. This would verify if the stated fugitive emissions factor is appropriate.
- the Proponent does not comment on whether the fugitive emissions factor changes over time (as a function of mining depth) and whether the factor is applicable to both North and South mines.
- for transparency, annual fugitive emissions factors and GHG emissions should be reported separately for both HVO North and South mines in the GHG Assessment. The emission factors should be based on core samples, gas composition measurements and any associated gas reservoir modelling.

If, as stated in Section 9.2 of the main EIS document,³ the Proponent calculates fugitive emissions using NGERs Method 2, then it should be straightforward for the requested data to be provided.

Furthermore, in Appendix G, the Proponent estimates annual fugitive GHG emissions to be of the order of 0.2-1.51 Mt CO₂-e over the life of the Project. The maximum stated fugitive GHG emissions occur in Year 2045. This suggests that fugitive emissions are forecast to be approximately 8 times higher than what was reported for the Year 2023.

Given the large forecast increase in fugitive emissions for the Project beyond 2030, significantly more information should be provided on the fugitive GHG emissions. The information presented in the EIS GHG Assessment is inadequate.

In relation to the Scope 2 and 3 grid electricity emissions calculations, NZEM notes that:

- the future scope 2 and 3 emissions factors beyond 2023 are incorrect in light of the rapidly decarbonising electricity grid in NSW.
- the Proponent should revise the forecast scope 2 and 3 electricity emissions from 2023 to 2035 using forecasts published by the Department of Climate Change, Energy, Environment and Water (DCCEEW).⁴
- Table 38 in ref. 4 gives the projected scope 2 NSW grid electricity emission factor in 2035 as 0.02 kg CO₂-e/kWh. The scope 2 and 3 factor in 2035 (ref. 4, Table 39) is also 0.02 kg CO₂-e/kWh. The Proponent could assume these emissions factors remain at 0.02 out to 2050.

In reviewing the other GHG calculations, NZEM finds that:

- diesel emissions are lumped for both stationary energy and mobile sources. However, given that the emissions projections are based on current operations, it should be possible for the Proponent to split the diesel emissions into the two sources.
- The explosives emission factors were identical to those in the 2004 AGO Factors and Methods workbook. The emissions were correct although the proponent should state what explosive is used (we assume emulsions).

³ <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-11826681%2120221219T125202.406%20GMT>

⁴ Australia's Emissions Projections 2022, Department of Climate Change, Energy, Environment and Water (DCCEEW), December 2022. <https://www.dcceew.gov.au/climate-change/publications/australias-emissions-projections-2022>

- the Scope 3 rail transport, shipping transport and combustion of product thermal and coking coal emissions are correct.
- the Scope 1 emissions from land clearance are correct but emissions from construction could not be assessed due to lack of information. However, construction related emissions are relatively small and immaterial to the GHG accounts for the Project.

Overall NZEM finds the Proponent's approach to be reasonable but more information on the fugitive and diesel emissions from the Project are required and the Scope 2 and 3 emissions from the consumption of grid electricity need to be re-calculated.

Addressing the above matters will enable a more in-depth analysis of possible abatement measures to be made.

Project impact

In Section 8.2 of the GHG Assessment,¹ the Proponent provides an account of the Project impact (including existing operations) in relation to NSW and Australia's GHG emissions based on the National Greenhouse Gas Inventory for 2020.⁵

The annual average Scope 1 and 2 emissions from the Project were 1.26 Mt CO₂-e as stated in Table 32 of the GHG Assessment.

The Project's average Scope 1 and 2 emissions represent 0.25% of Australia's 2020 emissions and 0.95% of NSW emissions.

In Year 2040, the maximum Scope 3 emissions due to the combustion of product coal in overseas markets amount to 68 Mt CO₂-e.

GHG mitigation measures

Section 9.5 of the GHG Assessment addresses mitigation of GHG emissions. The Proponent provides a very brief assessment of GHG mitigation opportunities such as reduced fuel consumption by mobile plant and equipment.

In Section 9.4.1 of the main EIS document, the Proponent provides a more detailed list of GHG mitigation measures. These measures also target reducing fuel consumption and include:

- minimise length of haulage routes
- optimise ramp gradients
- fuel efficient haul trucks and other mobile plant
- use of overland conveyors to replace trucks
- consideration of biofuels

In Section 9.4.3 of the main EIS document, the Proponent has committed to regular reviews of "reasonable and feasible" abatement measures over the life of the Project. The stated measures to be considered include renewable electricity sources and battery storage, and fuel switching to hydrogen and electricity.

In the EIS, the Proponent has only given cursory consideration to hydrogen- and electric-powered trucks. Given that the Project extends the life of the HVO Complex to 2050 and that there will likely be significant advancements in mining technology over that period, NZEM strongly recommends the Proponent commit to a regular review of best practice technologies in relation to low emissions alternatives to diesel-powered equipment and transition the mining fleet accordingly in line with best practice.

⁵ <https://www.dccew.gov.au/climate-change/publications/national-greenhouse-accounts-2020/state-and-territory-greenhouse-gas-inventories-2020-emissions>

As discussed above, more details are needed on the diesel consuming activities to allow better identification of mitigation opportunities.

Finally, the Proponent has ruled out pre-drainage of coal seams as economically unviable for a multi-seam open cut operation. However, the Proponent has provided no evidence or explanation for this in the EIS.

Given the very large growth expected in fugitive emissions from the HVO Complex over the next 20-25 years, the Proponent must provide a comparison of the costs and benefits of pre-drainage to support the claim that it is not an economically viable option. The Proponent should also carry out in the first instance a feasibility study to assess the gas resource in the seams and the potential to extract that gas for beneficial use.

The Safeguard Mechanism

HVO is currently designated a large facility as it emits over 100,000 tCO₂-e of Scope 1 emissions annually and is therefore subject to the Commonwealth's Safeguard Mechanism.

HVO acknowledges in Section 9.4.2 of the main EIS document that:

- it will have a declining emissions baseline over time,
- if unable to reduce emissions below the baseline it will be required to acquire and surrender credits
- it will be required to offset that portion of its emissions that exceed the declining baseline.

It should be noted that on 10 January 2023, the Commonwealth Government announced further details of proposed reforms to the safeguard mechanism, intended to commence on 1 July 2023.⁶

A key feature of the reforms is a proposed annually declining baseline rate that will apply to all existing and new safeguard facilities until 2030, with limited exceptions.

After 2030, decline rates are anticipated to be set in five-year blocks, and aligned with updates to Australia's commitments under the Paris Agreement. For example, the decline rates for 2031 to 2035 will be considered during 2026-27 following Australia's next updated commitment in 2025.

NZEM recommends that the Proponent keep a watching brief on the passage of the Safeguard Mechanism legislation reforms through the Commonwealth Parliament. The Proponent should consider including a new set of annual emissions projections that include the impacts of the declining baseline.

⁶ Corrs Chambers Westgarth. *Explainer: recently announced reforms to the Safeguard Mechanism and implications for industry*, 19 January 2023.
<https://www.corrs.com.au/insights/explainer-recently-announced-reforms-to-the-safeguard-mechanism-and-implications-for-industry#:~:text=As%20set%20out%20in%20the,emissions%20as%20much%20as%20possible.>