MACHEnergy

MACH Energy Australia Pty Ltd
PO Box 2115, Dangar NSW 2309
ABN 34 608 495 441

t: +61 2 5517 1150
e: info@machenergyaustralia.com.au
www.machenergyaustralia.com.au

31 March 2022

Joe Fittell
Team Leader
Resource Assessments (Coal & Quarries)
Department of Planning, Industry and Environment

Dear Joe,

RE: MOUNT PLEASANT OPTIMISATION PROJECT – GREENHOUSE GAS EMISSIONS

This letter provides MACH Energy's (MACH's) response to the matters raised by the New South Wales (NSW) Department of Planning, Industry and Environment (DPIE) (now Department of Planning and Environment [DPE]) Climate and Atmospheric Science (CAS) regarding the estimated greenhouse gas emissions of the Mount Pleasant Optimisation Project (the Project) (letter dated 10 December 2021).

The DPE CAS provided eight improvement points for the greenhouse gas assessment for the Project (Todoroski Air Sciences [TAS], 2021), which primarily relate to provision of additional assessment detail. TAS has prepared responses to each of the eight points, and the TAS supplementary advice is provided in Attachment 1.

The DPE CAS also queried the consistency of the TAS (2021) greenhouse gas modelling with the Net Zero Stage 1: 2020-2030 Implementation Update, including the relative intensity of adopted fugitive emission factors and the available detail on proposed greenhouse gas mitigation measures.

Responses to these matters are provided below.

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

The DPE CAS queried the total Project Run-of-Mine (ROM) coal estimate and the adopted fugitive emission factor adopted in the Environmental Impact Statement (EIS) greenhouse gas assessment (TAS, 2021).

ROM Coal Estimate

Regarding the total ROM coal estimate in the Project EIS, 406 million tonnes (Mt) is the total approximate Project ROM production for the Project-life (i.e. 2023-2048), whereas 444 Mt (as described in the DPE CAS letter) is the estimated total ROM production over the life-of-mine of the Mount Pleasant Operation, incorporating the Project.

Fugitive Emission Factor

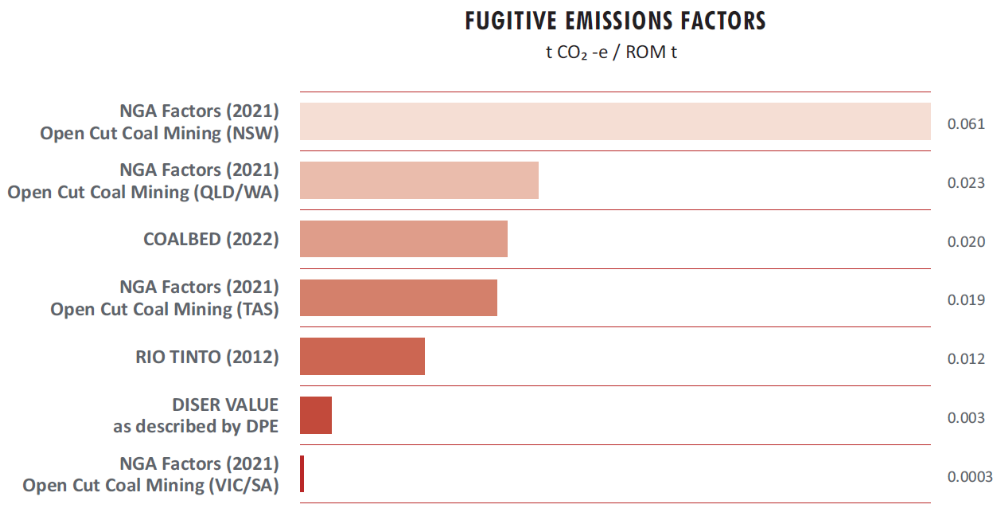
MACH notes that CAS has reported that the Department of Industry, Science, Energy and Resources (DISER) adopted 0.003 tonnes of carbon dioxide equivalent per tonne of ROM coal (t CO_2-e/ROM t) and 444 Mt of ROM for the Project in its future NZEM modelling, and suggested:

> *The proponent's fugitive emissions intensity for the Project appears to be relatively high for an open-cut mine. It would be helpful if the proponent could discuss the reasons for this in terms of the nature of the seams to be mined, the coal seam gas content levels in m3/t and %methane content of the gas to be encountered.*

MACH notes that the National Greenhouse Accounts (NGA) default factors for open cut coal mines in Australia range from 0.0003 t CO_2-e/ROM t for Victoria and South Australia, to 0.061 t CO_2-e/ROM t for open cut mines in NSW[1] (Chart 1).

It is unclear where the 0.003 t CO_2-e /ROM t quoted from DISER is derived, or if it could be a mis-quote of the Victorian and South Australian default value of 0.0003 t CO_2-e/ROM t for open cut coal mines in those states. Irrespective, it is clear that the site-specific value of 0.012 t CO_2-e/ROM t developed by the former owner of the Mount Pleasant Operation (Rio Tinto, 2012) and adopted in the Project EIS is considerably lower than the NSW default for open cut mines under the NGA Factors (Chart 1).

Chart 1
Comparison of Relevant Fugitive Emission Factors



[1] Department of Industry, Science, Energy and Resources (2021) *National Greenhouse Accounts Factors August 2021* (NGA Factors).

Notwithstanding, MACH has commissioned CoalBed Energy Consultants (CoalBed) to re-evaluate the fugitive factor adopted for the Project based on the revised Global Warming Potential (GWP) of methane and specifically based on the proposed Project mining sequence. In conducting this work, CoalBed indicated that alternative methods are available under the applicable Australian Coal Association Research Program (ACARP) Methodology[2] that can have a material influence on the site-specific fugitive greenhouse gas estimate. CoalBed has therefore completed a contemporary estimate of site-specific fugitive emissions using the more conservative of the available methods (i.e. CoalBed does not adopt the Low Gas Zone method that is available under the ACARP Methodology[2]).

CoalBed has evaluated the relative gas content and percentage of methane in coal seams at the Project using the SAS LOESS regression procedure. The result is an equation that can calculate gas content (Figure 1) and composition (Figure 2) for discrete depth intervals that then can be applied to the Mount Pleasant Operation geological model. Figure 1 indicates that the Mount Pleasant Operation coal seams have relatively low gas contents (i.e. generally below four cubic metres of gas per tonne of ROM coal [m^3/t] within the open cut mine extents, and on average approximately one m^3/t), with relative gas content increasing with coal seam depth.

Figure 2 indicates that the measured methane content varies significantly at shallow depths, however, the methane content in coal seams approaches 100% of gas content at depths above approximately 200 metres (m).

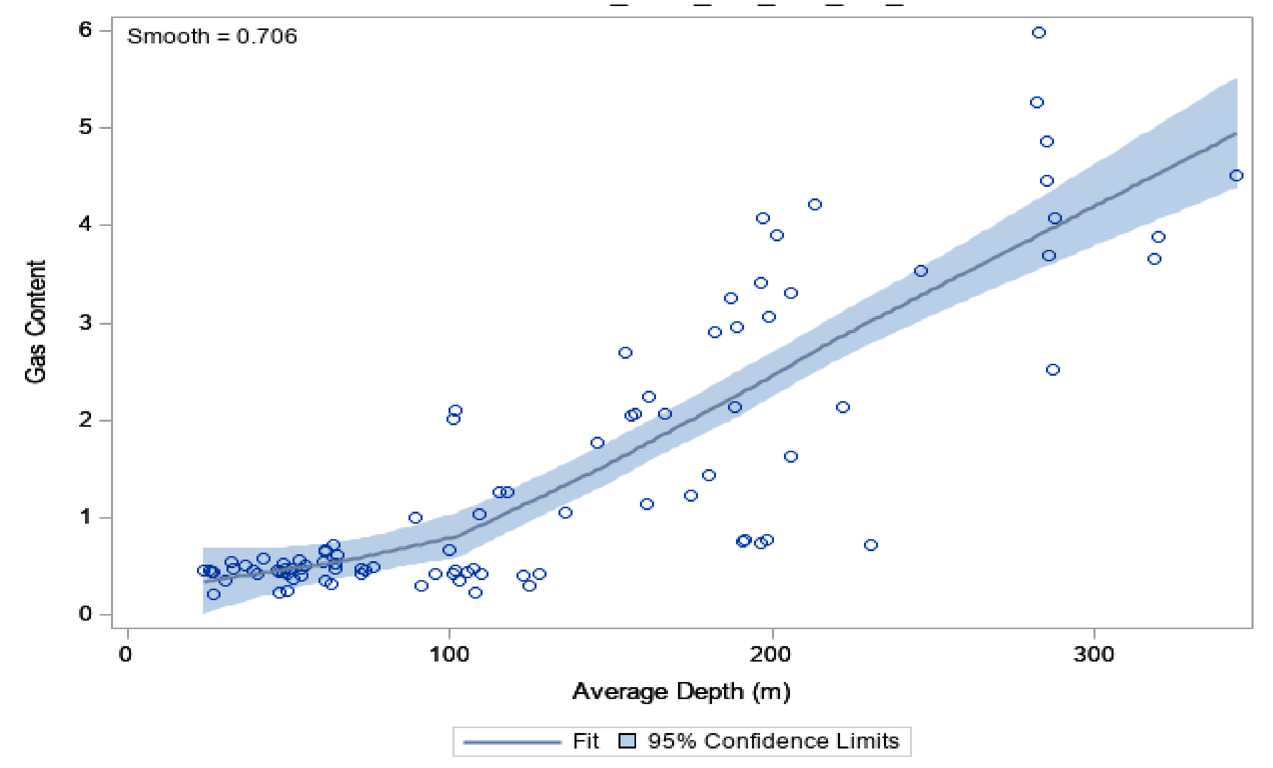


Figure 1: **Gas Content LOESS Regression Model Fit Plot for the Mount Pleasant Operation**

Source: CoalBed, 2022

[2] Australian Coal Associated Research Program (2011) *Guidelines for the Implementation of NGER Method 2 and 3 for Open Cut Coal Mine Fugitive GHG Emissions Reporting (C20005).*

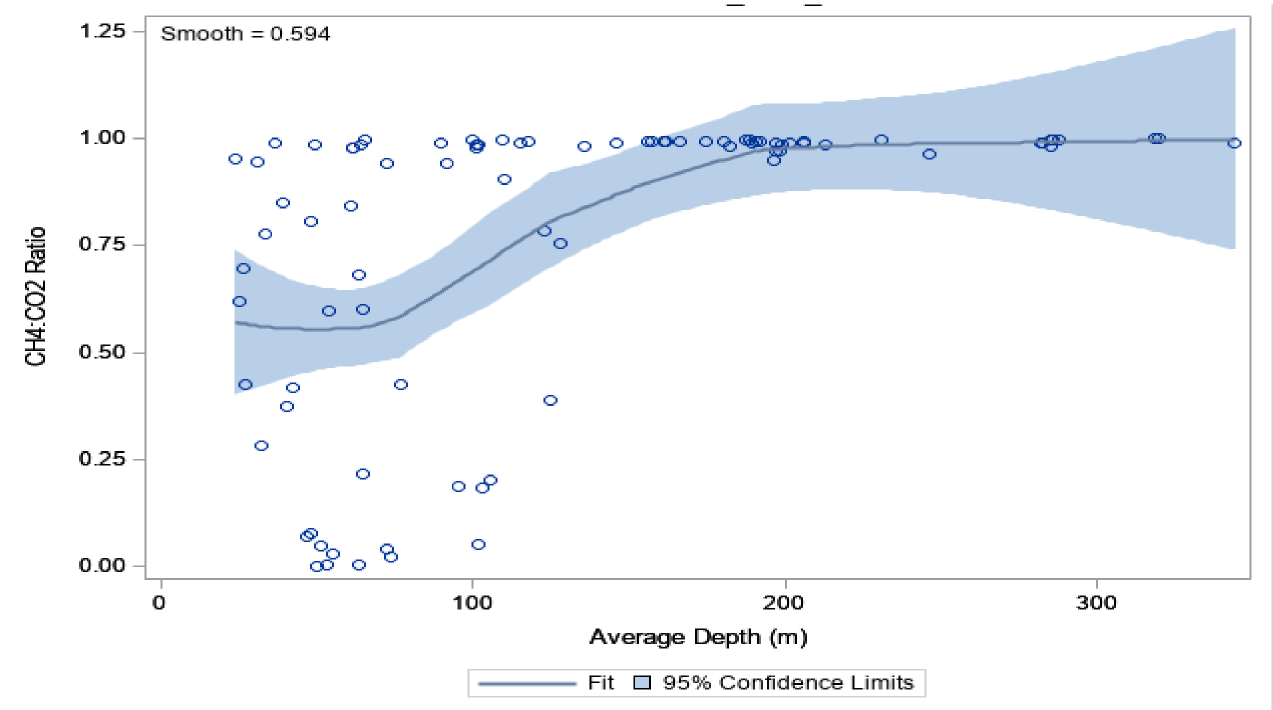


Figure 2: **Gas Composition LOESS Regression Model Fit Plot for the Mount Pleasant Operation**

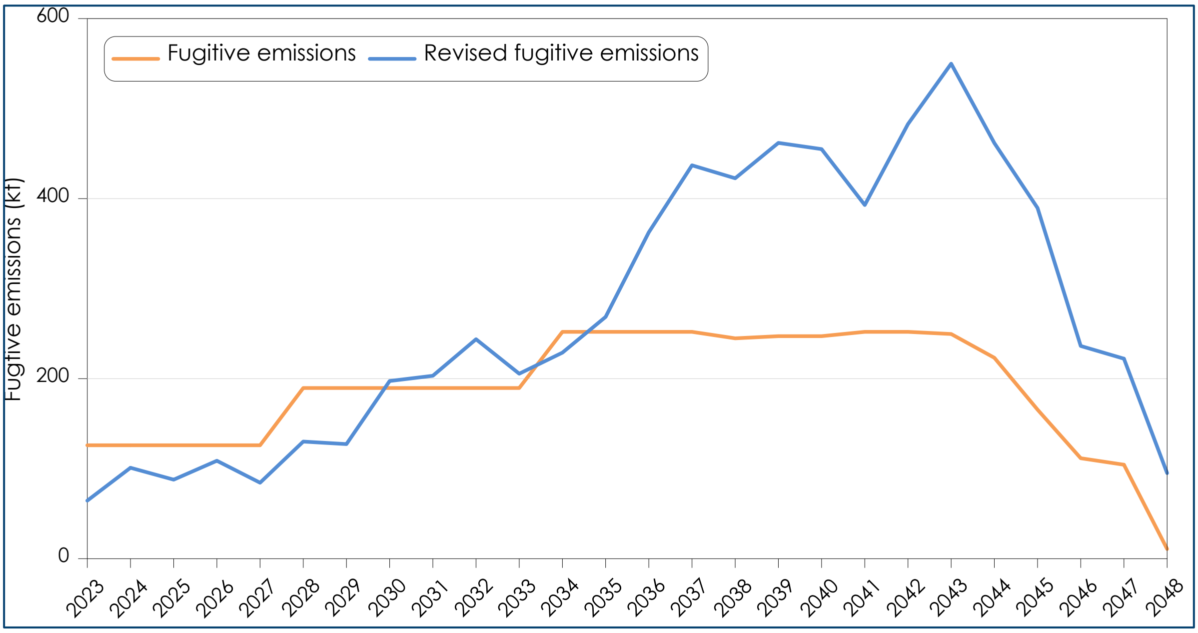
Source: CoalBed, 2022

Based on the more conservative assessment methodology and incorporating changes in the GWP of methane, CoalBed determined estimated fugitive emission estimates on a year-by-year basis for the Project. This analysis has resulted in a revised estimated <u>average</u> fugitive emission factor of approximately 0.0201 t CO_2-e/ROM t (Chart 1). This estimate is inclusive of assumed losses of 50% of in-place gas from any coal seams located below, but within 20 m of the Project open cut floor due to depressurisation effects associated with open cut mining.

The revised average fugitive emission factor using the more conservative methodology and higher adopted GWP of methane still remains low relative to the default NGA factor for NSW open cut mines (i.e. is approximately 33% of the NGA default fugitive factor) (Chart 1). Therefore, MACH considers the Mount Pleasant Operation incorporating the Project would have a low rate of fugitive greenhouse gas emissions, relative to other NSW open cut coal mines as indicated by the default NGA factor. Furthermore, the revised average fugitive emission factor is comparable to the default NGA default fugitive factors in other States in Australia, with the exception of Victoria and South Australia.

MACH also notes that the application of CoalBed's revised methodology has determined lower fugitive emission factors in the first 5-8 years of the Project life, and higher fugitive emissions in the latter part of the Project life (Chart 2), relative to the fugitive emissions estimate presented in the Project EIS.

Chart 2
Comparison of EIS and Revised Estimated Fugitive Emissions
Mount Pleasant Optimisation Project



Source: TAS 2022
kt = kilotonnes

Review of the Proposed Greenhouse Gas Mitigation Measures

In the letter dated 10 December 2021, the DPE noted:

> *The proponent needs to provide a deeper, quantified assessment of GHG mitigation and energy efficiency measures, particularly in regard to diesel consumption and fugitive methane emissions for the Project.*

Scope 1

Diesel Usage Mitigation

MACH acknowledges that the consumption of diesel is a major contributor to the Project's estimated Scope 1 emissions. It is noted however, that the input cost of diesel is also significant driver for MACH to maintain and improve diesel use efficiency over time.

Throughout the life of the Project, MACH would evaluate available feasible and reasonable mining technologies, with a particular focus on improving mining efficiency and environmental performance at the Mount Pleasant Operation. MACH is proposing to introduce Ultra Class fleet items (i.e. larger fleet offering lower fuel consumption per unit) from approximately 2027, which is anticipated to improve mining efficiency, including some diesel consumption efficiency improvement.

Furthermore, MACH operates in accordance with the *Air Quality and Greenhouse Gas Management Plan* (MACH, 2019), which outlines the following key measures to promote efficient diesel use at the Mount Pleasant Operation:

- optimising the design of haul roads to minimise the distance travelled between the pit and the coal handling and preparation plant;
- minimising the re-handling of material (i.e. coal, overburden and topsoil); and
- maintaining the fleet in good operating order.

MACH anticipates that DPE will propose draft conditions for the Project that would include the ongoing implementation and review of an Air Quality and Greenhouse Gas Management Plan, inclusive of a requirement to periodically review available greenhouse gas abatement technologies and to implement identified reasonable and feasible measures. MACH would be generally agreeable to a condition of this nature that includes periodic review and implementation of greenhouse gas mitigation measures that are determined to be reasonable and feasible for the Project.

Fugitive Emissions Mitigation

In the letter dated 10 December 2021, the DPE noted:

> *The proponent should discuss if pre-drainage of methane from the coal seams is feasible or not, providing detailed reasoning to support the judgement. If it is feasible, the proponent should consider beneficial uses of the methane besides e.g. flaring.*

When considering the feasibility of draining gas from multiple coal seams (i.e. multi-seam open cut mine), there are series of factors that need to be considered, that can be generally separated into two key elements:

- the physical properties of the target coal seams (including gas content, gas composition, saturation and permeability); and
- available methods to stimulate gas release from the coal seams, given its physical properties.

As has been identified above, the in-situ gas content of coal seams at the Mount Pleasant Operation is low, being generally below 4 m^3/t of ROM coal and on average approximately 1 m^3/t. Both the relative volume of gas in coal, and the methane content of the gas increase with increasing coal seam depth at the Project (Figures 1 and 2). The technical feasibility of flaring of extracted gas is a complex interplay of gas content, gas composition and abandonment pressure. Where in-situ gas contents are below 3 m^3/t the technical feasibility of gas drainage and subsequent flaring is more difficult to achieve.

As a comparison with some NSW underground mining operations, the estimated in-situ gas contents at deeper underground coal mines in NSW are reported to be more typically in the range of approximately 5 to 11 m^3/t of ROM coal (e.g. DPE [2022][3] reported Dendrobium and Wallarah 2 comparative results). Deeper underground mines will typically observe greater gas contents than open cuts such as the Mount Pleasant Operation, due to the inherent relationship between the depth of coal and in-situ gas contents.

MACH has identified the following currently available technologies as potential methods to extract/stimulate gas release from coal seams in advance of mining at the Project:

- Underreaming – involves the process of enlarging a vertical borehole at the intersections with the coal seam.
- Hydraulic fracturing (fraccing) – involves subjecting the target coal seam to a high-pressure fluid to cause a fracture and a propping agent to keep the fracture open.
- Cavitation – involves repeatedly subjecting the target coal seam to high pressure air, causing the coal to fragment and collapse into the borehole, causing a cave. The loose coal is then circulated out of the hole, and the process is repeated a number of times.
- Surface to Inseam Drilling – involves drilling a borehole through a medium radius arc which intersects the target coal seam at a tangent, then continuing the borehole laterally (or horizontally) within the seam, intersecting a pre-drilled vertical borehole (Figure 3).
- Tight Radius Drilling - involves the drilling of directional multi-lateral (or horizontal) boreholes from a shallow vertical open borehole and a water jet which causes the coal to cavitate (this technology has not yet been demonstrated at full commercial scale).

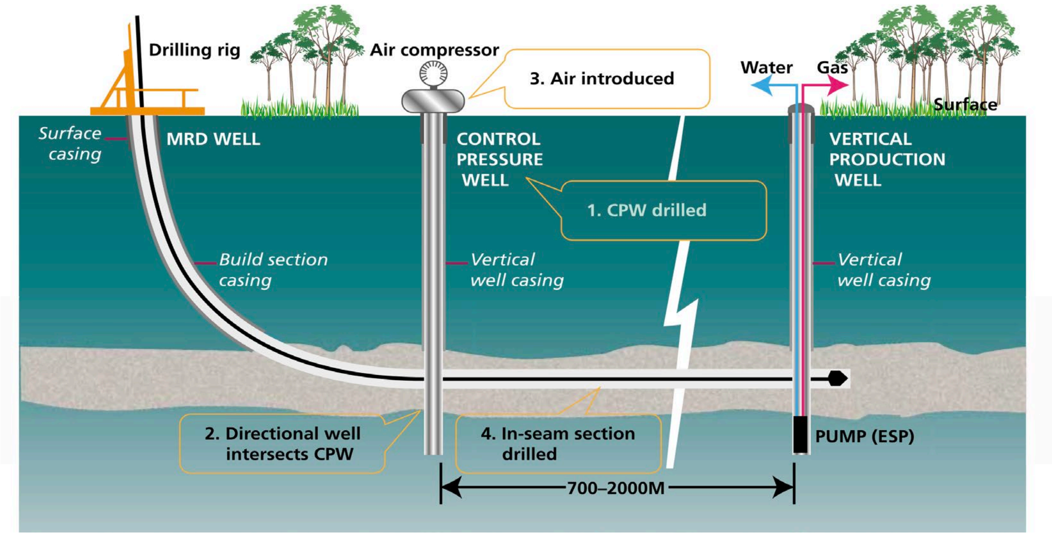


***Figure 3:* Schematic of Surface to Inseam Drilling**

Source: CoalBed, 2022

[3] NSW Department of Planning and Environment (2022) *Narrabri Underground Mine Stage 3 Extension Project SSD 10269 Assessment Report*.

Given the Project is a multi-seam open cut coal mine, any pre-drainage operation would likely rely on the development of vertical wells to connect multiple coal seams to any gas extraction point. This generally precludes surface-to-seam drilling as the number of target coal seams is far too high to employ this methodology economically in advance of mining.

As the in-situ gas contents and saturation levels are low at the Mount Pleasant Operation, significant depressurisation would be required in order to mobilise the gas. A substantial level of well stimulation (e.g. hydraulic fracturing) in advance of mining would also likely be required to facilitate connection to the reservoir. Even when employing hydraulic fracturing to stimulate gas flow, a material percentage of the in-situ gas (i.e. typically in the order of 20% of gas) will remain bound to the coal and only liberated during mining.

Further practical limitations are also posed by the existing mining operations of the Mount Pleasant Operation and Bengalla Mine, with each of these mining operations already affecting hydraulic pressures within the coal seams in the vicinity of the Project. Where these mines are already materially reducing hydraulic pressures in the coal seams, gas extraction in advance of mining would be generally impractical, due to the compounding effects of the open cut highwalls.

The potential feasibility of draining in-situ gas from coal seams in advance of the Project would therefore face the following contextual facts:

- the variable gas content of shallow coal seams suggests any mitigation efforts would necessarily need to be directed towards deeper coal seams with higher proportions of methane and higher gas contents (i.e. more conducive to flaring or beneficial use);
- any pre-drainage efforts would need to focus on areas of the Project open cut extent that are more distant from the depressurisation effects of the existing and approved Mount Pleasant Operation and Bengalla Mine advancing open cut pits;
- vertical extraction wells would need to be developed, utilizing suitable available technology to drain the relevant coal seams with each well;
- low gas contents and low gas saturation will require implementation of relatively high levels of advance depressurization and stimulation (i.e. advance dewatering and hydraulic fraccing) in order to stimulate sufficient gas liberation;
- the physical limitations of propagating fraccing, depressurization and gas liberation from each well will require many such vertical wells to be developed (i.e. a large-scale pre-drainage programme would be required), to provide sufficient drainage to materially reduce in-situ gas levels across the Project domain; and
- the inherently low gas contents and low gas saturation will result in a relatively high proportion of the in-situ gases still remaining locked in the coal matrix (relative to the effectiveness of extraction from a high-gas and highly saturated coal seam) to be liberated during mining, irrespective of the level of fraccing and advance dewatering employed.

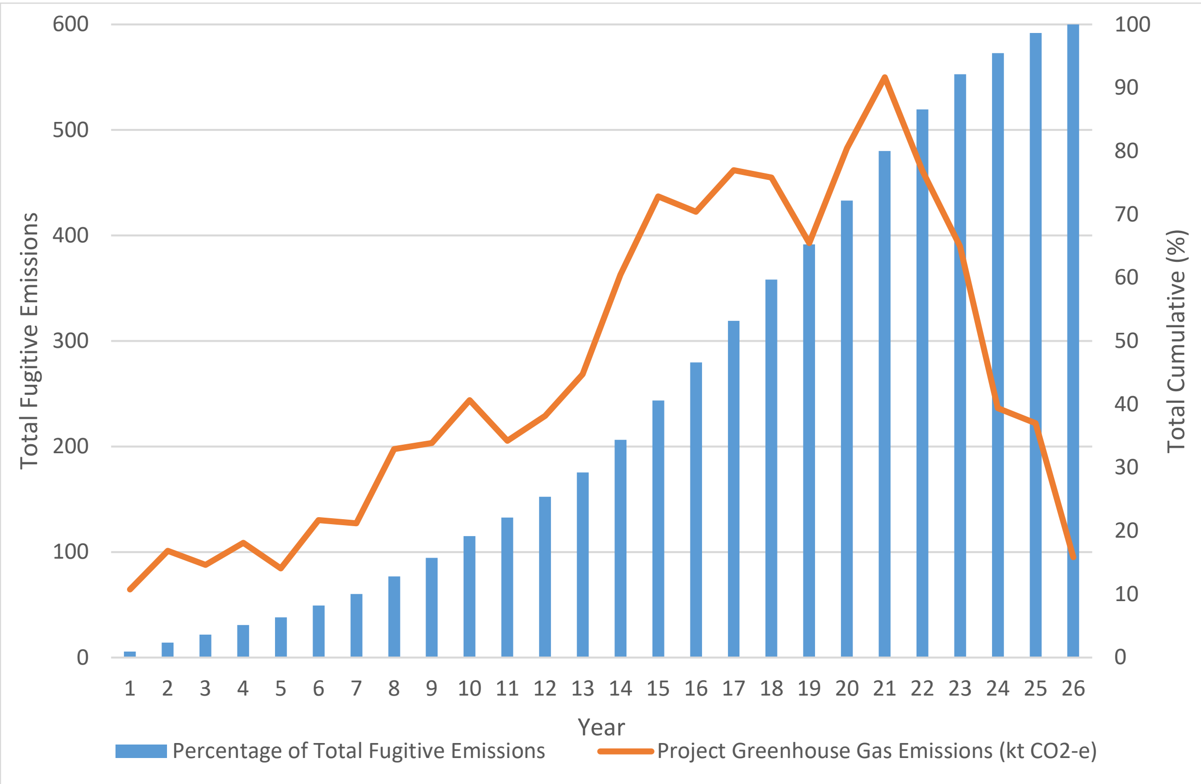
Given MACH's understanding of current drilling, fraccing, gas extraction and associated management costs, such an activity would be very capital-intensive with currently available technology (i.e. anticipated to cost $millions for each individual gas extraction well).

To date, MACH is not aware of any open cut coal mine in Australia that has demonstrated an economically efficient method of conducting pre-drainage of coal seams in advance of a multi-seam open cut mine in such a low-gas environment as is found at the Mount Pleasant Operation.

Notwithstanding, the majority of the estimated Project fugitive emissions would occur in the last 10-12 years of the Project life (Chart 3). As the majority of the Project fugitive emissions are expected to occur in the latter part of the Project life, MACH would continue to periodically evaluate technological advancements in fugitive emission abatement technology and would implement additional reasonable and feasible fugitive greenhouse gas mitigation measures that may become available over the life of the Project.

MACH anticipates that DPE will propose draft conditions for the Project that would include the ongoing implementation of an Air Quality and Greenhouse Gas Management Plan, inclusive of a requirement to periodically review available greenhouse gas abatement technologies and to implement identified reasonable and feasible measures. MACH would be generally agreeable to a condition of this nature that includes periodic review and implementation of fugitive greenhouse gas mitigation measures that are determined to be reasonable and feasible for the Project.

Chart 3
Timing of Estimated Fugitive Emissions
Mount Pleasant Optimisation Project



Scope 2 Emissions

MACH would also investigate whether it is reasonable and feasible to reduce Scope 2 greenhouse gas emissions associated with on-site electricity use over the life of the Project (e.g. evaluation of sourcing a proportion of site electricity from renewable or carbon neutral sources).

If the Australian emissions intensity of electricity generation reduces over time, Scope 2 emissions from the Project consumption of electricity would also be expected to reduce accordingly.

The Mount Pleasant Operation has already investigated the feasibility of installing a floating solar farm on its Mine Water Dam to provide an on-site source of renewable energy, and the suitability of this proposal is currently being evaluated by management.

Safeguard Mechanism

In their letter dated 10 December 2021, the DPE noted:

> *In addition to the requirements of the Safeguard Mechanism, the proponent should investigate the feasibility of purchasing offsets for the emissions from the Project which cannot be mitigated.*

The estimated emissions of the Project are inclusive of the continuation of the existing/approved Mount Pleasant Operation. As described in TAS (2022) (Attachment 2), the estimated annual average Scope 1 emissions of the Project (incorporating the reviewed fugitive emissions estimate) are 0.534 million tonnes of carbon dioxide equivalent (Mt CO_2-e). Therefore, the estimated <u>annual average</u> Scope 1 greenhouse gas emissions of the Mount Pleasant Operation incorporating the Project are within the Mount Pleasant Operation's current Safeguard Mechanism baseline emissions value of approximately 0.664 Mt CO_2-e.

It is noted that the maximum Project Scope 1 annual greenhouse gas emissions estimate is some 0.894 Mt CO_2-e in approximately 2043 and therefore the Mount Pleasant Operation incorporating the Project would be expected to exceed the current Mount Pleasant Operation safeguard level in this maximum year, and some eight other years in the latter part of the Project life.

Notwithstanding, it is acknowledged that the Mount Pleasant Operation's Safeguard Mechanism baseline value may change over time in accordance with the provisions of the *National Greenhouse and Energy Reporting Act* 2007 (NGER Act) and the applicable rules and regulations (Clean Energy Regulator, 2020). If a facility exceeds its baseline level, it is generally required to surrender Australian carbon credit units, equivalent to the exceedance, to the Clean Energy Regulator. MACH would continue to comply with the Federal Government's Safeguard Mechanism by remaining below its baseline set by the Clean Energy Regulator, offsetting its emissions above its baseline, or otherwise managing compliance.

Please feel free to contact me if you require further information.

Yours sincerely,

Chris Lauritzen
General Manager - Resource Development
Mount Pleasant Operation

ATTACHMENT 1

TODOROSKI AIR SCIENCES' RESPONSES TO MATTERS 1 TO 8

TODOROSKI AIR SCIENCES
Suite 2B, 14 Glen Street Eastwood, NSW 2122
Phone: 02 9874 2123
Fax: 02 9874 2125
Email: info@airsciences.com.au
Web: www.airsciences.com.au
ACN: 151 202 765 | ABN: 74 955 076 914

30 March 2022

Chris Lauritzen
General Manager – Resource Development
MACH Energy Australia Pty Ltd
Suite 1, Level 3, 426 King Street
Newcastle West NSW 2302

RE: Mount Pleasant Optimisation Project Greenhouse Gas Assessment – Additional Information

Dear Chris,

Todoroski Air Sciences prepared the *Mount Pleasant Optimisation Project Greenhouse Gas Calculations* (**Todoroski Air Sciences, 2021**) report (the GHG report). The Department of Planning, Industry & Environment (DPIE) has requested additional information to improve the GHG report and this letter responds to each of these requests.

Each of the requests are shown in grey italics and is followed by our response immediately below.

1) The proponent should provide assumptions for quantities of all materials consumed for the Project in the construction and operations phase. If these are significant, use embodied emission factors to calculate emissions from each material.

The quantities of all materials consumed for the life of the Mount Pleasant Optimisation Project (the Project) were estimated through the mine planning process in consideration of material usage rates at the existing Mount Pleasant Operation, and other mines where applicable. There is a combination of factors applied in the estimation processing including, but not limited to, the amount of material handled in each year, the position of the activity areas on the site extracted, and the amount of run-of-mine (ROM) coal processed.

Figure 1 presents a summary of estimated quantities of materials (excluding electricity) as presented in Table 2-1 of the GHG report. The amount of waste rock handled in each year has also been included for reference. We see from the figure that the amount of ROM extracted undergoes step changes from 10.5 million tonnes (Mt) in the first five years to 15.75Mt in the following six years before peaking at 21Mt for the next four years. The step changes in ROM extraction are not followed by the other materials due to the factors which influence the estimated requirements described above.

Figure 1 also demonstrates that the estimated quantities of materials account for the periods of construction that occur throughout the life of the Project. For example, there is an increase in estimated diesel, oil and grease usage in 2026 that corresponds with the anticipated Stage 2a expansion of the Mine Infrastructure Area and Coal Handling and Preparation Plant, as well as Raise 2 of the Fines Emplacement Area.

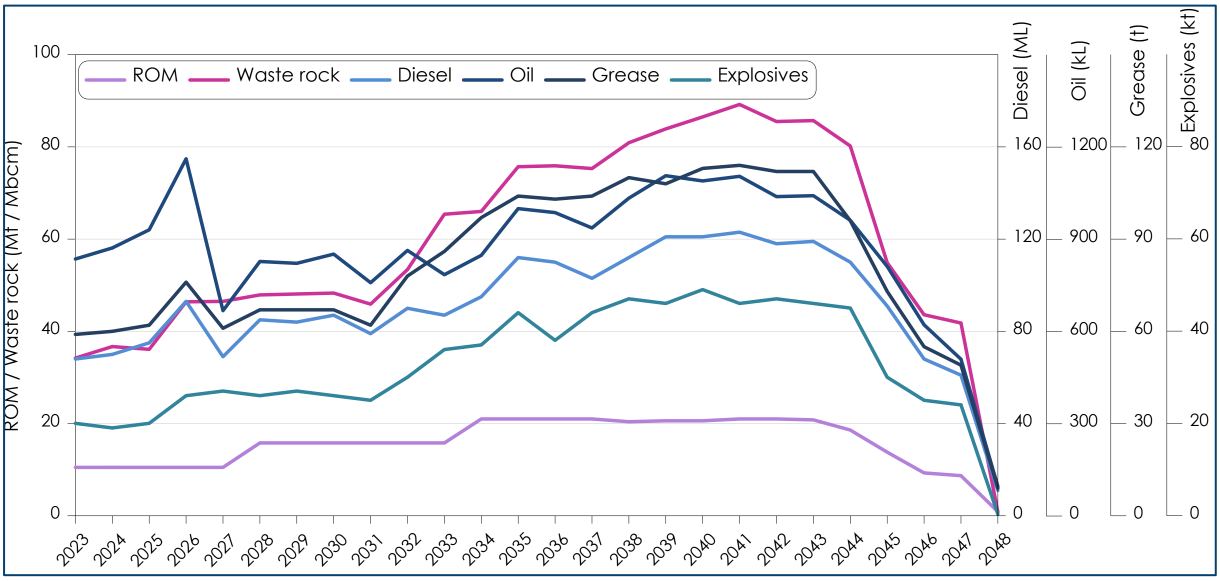


Figure 1: Summary of quantities of materials consumed for the Project

Given the various factors influencing the estimated materials quantities used in the GHG report, including the effects of construction activities, simplifying the material usage estimates to base assumptions is not somewhat simplistic. Notwithstanding, in consideration of the DPIE's request, the following usage rates have been calculated on an annual average basis over the life of the Project <u>inclusive of construction activities</u>:

- diesel: ~6.2 megalitres per million tonnes of ROM coal (ML/Mt ROM);
- oil: ~60.3 kilolitres per million tonnes of ROM coal (kL/Mt ROM);
- grease: ~5.4 tonnes of grease per million tonnes of ROM coal (t/Mt ROM); and
- explosives: ~2.0 kilotonnes per million tonnes of ROM coal (kt/Mt ROM).

2) The proponent should indicate the type and area of vegetation being cleared for the Project.

The type of vegetation cleared at the Project includes a mixture of grassy woodlands, dry sclerophyll forests (shrub/ grass sub-formation) and dry sclerophyll forests (shrubby sub-formation) and is classified as either woodland/ forest or native grassland, to align with vegetation clearance emission factors used to estimate the amount of carbon dioxide equivalent (CO_2-e) emissions released. The total ratio of different vegetation types for the entire area cleared is assumed to apply for an approximate 40 hectares (ha) of land that is on average subject to clearing in each year.

Further detail regarding vegetation clearance associated with the Project is provided in the *Mount Pleasant Optimisation Project Biodiversity Development Assessment Report* (**Hunter Eco, 2021**).

3) The proponent should list all assumptions for fuel consumption during the construction phase

Project construction activities have not been considered separately, as the mine is already operational. Similar to operational activities, estimates of materials consumed for construction activities are influenced by a number of factors, such as the number and type of construction equipment likely to be utilised and duration of construction activities.

Given the various factors influencing the estimated materials quantities for construction activities, including various types of construction activity and duration, simplifying the material usage estimates to base assumptions is not considered appropriate. Notwithstanding, in consideration of the DPIE's request, the following usage rates have been calculated for the peak construction year (2026), inclusive of operational activities:

- diesel: ~8.9 ML/Mt ROM;
- oil: ~110.7 kL/Mt ROM;
- grease: ~7.2 t/Mt ROM; and
- explosives: ~2.5 kt/Mt ROM.

4) Similarly, assumptions for fuel consumption over the decommissioning phase should be provided.

As noted in the GHG report, during the decommissioning phase the diesel, oil and grease consumed is estimated based on the ratio of personnel required during a peak operating year (i.e. Year 2041) to the anticipated personnel required for the decommissioning phase. The decommissioning phase is assumed to occur over a five-year period.

The calculated ratio is approximately 0.15 based on personnel requirements of 128 during the decommissioning phase and 830 during year 2041. This ratio is used to scale the diesel, oil and grease requirements for the decommissioning phase. The ratio assumes the personnel requirements are related to the mobile equipment requirements and hence diesel, oil and grease consumption in each phase. This may potentially overstate decommissioning emissions, as closure and rehabilitation activities are not anticipated to be as fuel-intensive as operation of a mine.

5) The proponent should indicate the source of the Scope 1 explosives emission factor and the density of grease assumed (since masses of grease consumed are provided).

The Scope 1 explosives emission factor of 0.18 tonnes of CO_2-e/ tonne of product is from the *National Greenhouse Accounts (NGA) Factors Updating and replacing the AGO Factors and Methods Workbook* (**Department of Climate Change, 2008**). We note that the version of the National Greenhouse Accounts (NGA) Factors document available at the time of preparation of the GHG report (**Department of Industry, Science, Energy and Resources, 2020**) does not include a factor for explosives use.

The density of 700kg/m^3 is assumed to apply for the greases consumed.

6) Assumptions for electricity consumption should be given.

As noted, the quantities of all materials consumed for the Project were estimated through the mine planning process and in consideration of usage at the existing Mount Pleasant Operation. Electricity usage was estimated using a similar process. **Figure 2** presents a graphical summary of the electricity consumed for the Project with the amount of ROM extracted. Based on these values, a factor of approximately 6.6 gigawatt hours GWh per million tonnes of ROM coal extracted can be determined (GWh/Mt ROM).

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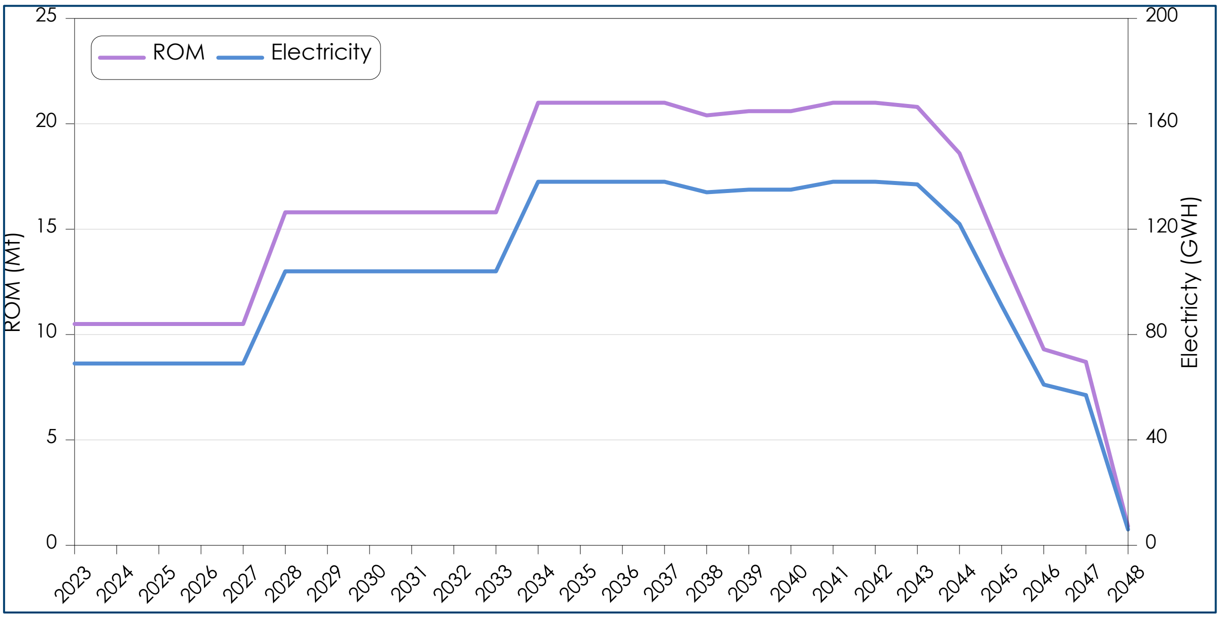

Figure 2: Summary of quantity of electricity for the Project

7) The proponent should provide the conversion factor for ROM to product coal volumes or a column of annual product coal figures so that the Scope 3 calculations can be verified.

The values for ROM, bypass, CHPP feed and product coal for the Project are summarised in **Table 1** and **Figure 3**. The amount of product each year is calculated as the bypass plus the processed coal from the CHPP. The percentage yield from ROM processed to product coal ranges from approximately 72% to 82% depending on the year (excluding 2048).

Table 1: Summary of quantities of coal for the Project (Mt)

Year	ROM	Bypass	CHPP Feed	Product
2023	10.5	0.4	10.2	7.8
2024	10.5	0.4	10.2	7.6
2025	10.5	0.4	10.2	7.7
2026	10.5	0.4	10.2	7.8
2027	10.5	0.4	10.2	7.9
2028	15.8	3.9	11.8	12.9
2029	15.8	3.9	11.8	12.5
2030	15.8	3.9	11.8	12.5
2031	15.8	3.9	11.8	12.5
2032	15.8	3.9	11.8	12.6
2033	15.8	3.9	11.8	12.6
2034	21.0	5.3	15.8	16.6
2035	21.0	5.3	15.8	16.6
2036	21.0	5.3	15.8	16.9
2037	21.0	5.3	15.8	16.7
2038	20.4	5.1	15.3	16.4
2039	20.6	5.2	15.4	16.6
2040	20.6	5.3	15.3	16.6
2041	21.0	5.3	15.8	16.8
2042	21.0	5.1	15.9	16.8
2043	20.8	5.3	15.5	16.4
2044	18.6	4.7	13.9	14.9
2045	13.8	3.6	10.3	10.9
2046	9.3	2.5	6.7	7.4
2047	8.7	2.1	6.6	7
2048	0.9	0.3	0.9	1

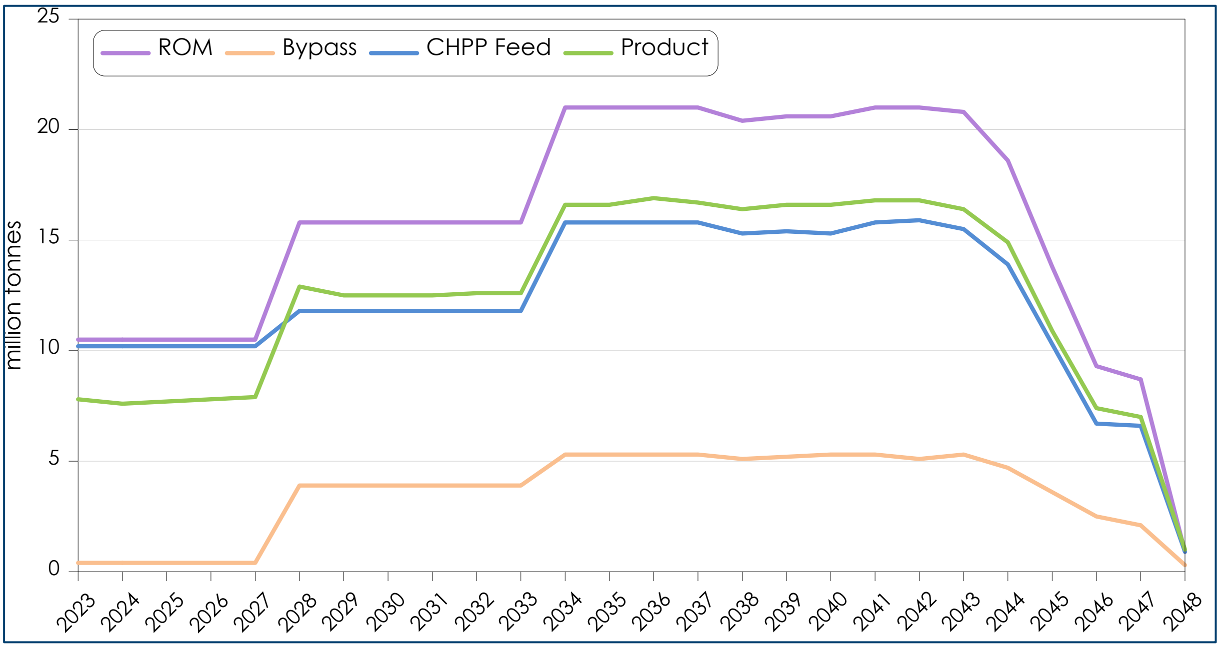

Figure 3: Summary of quantities of coal for the Project

8) The proponent considered the impact of annual mine emissions on total NSW emissions as at 2017. The proponent should provide updated figures for 2020.

The Project's estimated greenhouse gas emissions were compared to the latest total NSW emissions available at the time of preparation of the GHG report. The total NSW emissions for 2020 are currently not available, however the total NSW emissions for 2019 were published in April 2021 as 136.58 Mt CO_2-e (**Department of Industry, Science, Energy and Resources, 2022**).

The annual contribution of greenhouse gas emissions from the Project (Scopes 1 and 2) in comparison to the total greenhouse gas emissions of NSW for the 2019 period is estimated to be approximately 0.4%.

Updated fugitive emission estimates for the Project have been estimated based on contemporary site-specific fugitive emissions testing and presented in the *Mount Pleasant Optimisation Project Greenhouse Gas Assessment – Fugitive Emission Estimates* (**Todoroski Air Sciences, 2022**). The revised fugitive emission estimates for the Project results in an increase in the estimated annual average GHG emissions (Scope 1 and 2 excluding the decommissioning phase) of 0.62Mt CO_2-e. The Project contribution would be approximately 0.5% of the NSW GHG emissions for the 2019 period.

Please feel free to contact us if you would like to clarify any aspect of this letter.

Yours faithfully,
Todoroski Air Sciences

Philip Henschke

REFERENCES

Department of Climate Change (2008)
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ATTACHMENT 2

TODOROSKI AIR SCIENCES' REVISED PROJECT GREENHOUSE GAS EMISSIONS ESTIMATE

TODOROSKI AIR SCIENCES
Suite 2B, 14 Glen Street Eastwood, NSW 2122
Phone: 02 9874 2123
Fax: 02 9874 2125
Email: info@airsciences.com.au
Web: www.airsciences.com.au
ACN: 151 202 765 | ABN: 74 955 076 914

30 March 2022

Chris Lauritzen
General Manager – Resource Development
MACH Energy Australia Pty Ltd
Suite 1, Level 3, 426 King Street
Newcastle West NSW 2302

RE: Mount Pleasant Optimisation Project Greenhouse Gas Assessment – Revised Fugitive Emission Estimates

Dear Chris,

Todoroski Air Sciences prepared the *Mount Pleasant Optimisation Project Greenhouse Gas Calculations* (**Todoroski Air Sciences, 2021**) report (the GHG report). The GHG report estimated fugitive greenhouse gas (GHG) emissions for the Project based on historical site-specific fugitive emission sampling applying the Method 2 (**Rio Tinto, 2012**) with the projected amount of Run-of-Mine (ROM) coal extracted in each year.

Contemporary site-specific fugitive emissions testing has recently been conducted and is used to estimate the potential fugitive emissions for the Project (**CoalBed Energy Consultants, 2022**). **Figure 1** presents a comparison of the revised fugitive emissions estimates for the Project with the fugitive emissions presented in the GHG report. In comparison, the revised fugitive emission estimates show a noticeable increase in emissions from 2035 onward.

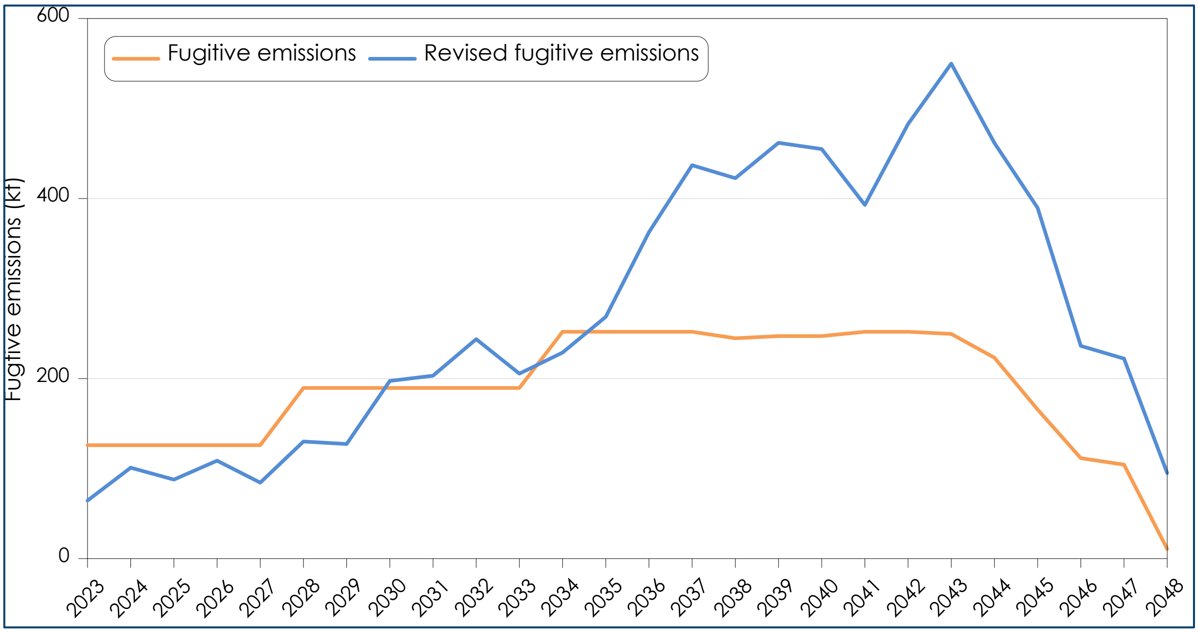

Figure 1: Comparison of fugitive emission estimates for the Project

The GHG emission calculations for the Project have been updated to incorporate the revised fugitive emission estimates. Emission estimates for the other parameters presented in the GHG report remain unchanged.

Table 1 summarises the estimated GHG emissions associated with the Project based on Scopes 1, 2 and 3 incorporating the revised fugitive emissions.

Table 1: Summary of CO_2-e emissions per scope (kt CO_2-e)

Period	Scope 1	Scope 2	Scope 3
Maximum Annual	894	112	45,142
Average Annual*	534	83	33,083
Total	**13,897**	**2,165**	**860,145**

*Excludes decommissioning phase

The estimates in **Table 1** indicate that with the revised fugitive emissions, the annual average Scope 1 emissions increase from 452 kt CO_2-e to 534 kt CO_2-e and the total Scope 1 emissions increase from 11,760 kt CO_2-e to 13,897 kt CO_2-e compared to the estimates in the GHG report.

The GHG report compares the estimated annual average GHG emission for the Project of 0.62 million tonnes of carbon dioxide equivalent (Mt CO_2-e) (Scope 1 and 2 excluding the decommissioning phase) with the estimated annual GHG emissions for Australia and NSW during 2017 of 534.7 Mt CO_2-e (**Department of the Environment and Energy, 2019a**) and 131.5Mt CO_2-e (**Department of the Environment and Energy, 2019b**), respectively. The Project contribution is approximately 0.1% and 0.5% of the annual Australian and NSW GHG emissions, reactively for the 2017 period.

More current estimates of the annual GHG emissions for Australia in the year to September 2021 and NSW for the 2019 period is of 505.5 Mt CO_2-e (**Department of Industry, Science, Energy and Resources, 2022b**) and 131.5Mt CO_2-e (**Department of Industry, Science, Energy and Resources, 2022a**), respectively. The Project contribution is approximately 0.1% and 0.5% of the Australian and NSW GHG emissions, respectively for these periods.

Please feel free to contact us if you would like to clarify any aspect of this letter.

Yours faithfully,
Todoroski Air Sciences

Philip Henschke

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