



DOC21/680763-13, EF21/7956

Department of Planning, Industry and Environment

Via Major Projects Portal

Attention: Mr Jack Turner

3 September 2021

Dear Mr Turner

EPA ADVICE ON ENVIRONMENTAL IMPACT STATEMENT

SNOWY HYDRO - KURRI KURRI POWER STATION (SSI-12590060)

Thank you for your request for advice from Public Authority Consultation (PAE-25649655) on 9 August 2021, requesting the NSW Environment Protection Authority (EPA) review and comment on the Response to Submissions (RtS) in respect of the proposed Hunter Power Project - Kurri Kurri Power Station (Application SSI-12590060) at Hart Road, Loxford (Premises).

The EPA has reviewed the "Hunter Power Project Response to Submissions, Submissions Report" prepared by Jacobs Group (Australia) Pty Limited, dated 4 August 2021 (Submissions Report), including the Revised Air Quality Impact Assessment dated 30 July 2021 (Revised AQIA) and Revised Noise Impact Assessment (Revised NIA).

The EPA understands the proposal is for development of a gas fired power station, comprising the following.

- Two open cycle gas turbines (OCGTs) and all associated balance of plant infrastructure required for an operating power station; and
- A 132 kV electrical switchyard adjacent to the power station and connection into the existing 132 kV network.

Based on the information provided, the proposal will require an Environment Protection Licence under sections 47 and 48 of the *Protection of the Environment Operations Act 1997* (POEO Act) for scheduled activities under clause 17 of Schedule 1 of the POEO Act.

The EPA has reviewed the RtS and notes that it does not provide the information required by the Secretary's Environmental Assessment Requirements to adequately assess the potential impacts regarding air quality. Issues that have not been adequately addressed include:

1. Unclear cumulative impact concentrations;

Phone 131 555
Phone 02 4908 6800

Fax 02 4908 6810
TTY 133 677
ABN 43 692 285 758

PO Box 488G
Newcastle
NSW 2300 Australia

117 Bull Street
Newcastle West
NSW 2302 Australia

www.epa.nsw.gov.au
info@epa.nsw.gov.au

2. NO₂ and SO₂ criteria;
5. Validation and clarity of emissions; and
7. Background data and results given at 25°C.

The predicted impacts of the proposal are not presented in the Revised AQIA in a way to adequately evaluate the air quality impacts of the proposal and, as such, the EPA is not in a position to recommend conditions of approval. All methodology and results should be provided in a clear and thorough format as to ensure a robust understanding of the potential impacts of the project.

The EPA's detailed assessment of these issues and additional information required to assess the proposal are provided under Attachment A.

If you have any questions about this matter, please contact Hamish Rutherford on (02) 4908 6824 or email info@epa.nsw.gov.au.

Yours sincerely



MEGAN WHELAN
Manager Regulatory Operations Metro
Environment Protection Authority

Attachment A

Attachment A

AIR QUALITY

The EPA has reviewed the RtS Report and the Revised Air Quality Impact Assessment (Revised AQIA) for the proposed Kurri Kurri Power Station and provide the following comments.

1. Unclear Cumulative Impact Concentrations

The EPA recommended the AQIA include more detailed background air quality data for the modelled year if contemporaneous assessment is undertaken.

The EPA recommended the AQIA be revised to include a refined assessment for the most impacted receptors which evaluates the cumulative impacts from both the highest backgrounds and the highest increments, which includes, as a minimum:

- Time/date
- Project (only) increment
- The adopted background
- Cumulative (total) impact.

The Revised AQIA has not provided the detailed background air quality data, nor presented the predicted impacts in the recommended format requested. As with the original AQIA, the level of information included, and the format of the predicted impact results, do not allow for a thorough and robust assessment of the potential impacts of the proposal nor a clear understanding of what the results represent.

The EPA has identified some specific issues that obfuscate understanding of the results. These include cumulative impact concentrations less than maximum background concentrations (e.g. 24-hour SO₂) and the difference between maximum background and the cumulative impacts presented not corresponding to the incremental impacts in the contour plots (e.g. 1-hour NO_x).

The EPA recommends the proponent provide the results in a clear format that enables understanding of the potential impacts. The proponent should refer to Table 11.3 of the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW and provide a refined assessment for identified receptors which evaluates the cumulative impacts from both the highest backgrounds and the highest increments that includes:

- Time/date
- Project (only) increment
- The adopted background
- Cumulative (total) impact.

The EPA recommends the proponent address issues 2 and 7 as they work to address this issue.

2. NO₂ and SO₂ criteria

The EPA recommended the proponent note the revised Ambient Air Quality NEPM standards for NO₂ and SO₂ and include them accordingly in the assessment.

Although the Revised AQIA has acknowledged and outlined (although incorrectly) the new NEPM standards (Section 3.5), they have not been considered as assessment criteria for the proposal. The EPA has considered the new NEPM standards when reviewing the Revised AQIA and the predicted impacts presented in the results section remain below the new NEPM standards.

The EPA recommends as the proponent works to address issue 1, the new NEPM standards for NO₂ and SO₂ be considered.

3. Ozone Assessment

The EPA recommended the proponent conduct an ozone and inter-regional transport assessment. The ozone assessment must be conducted in accordance with *Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources*.

The Revised AQIA has included an ozone assessment (Section 6.7) following the approach in the *Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources*.

The ozone assessment determined that the proposal was within an ozone non-attainment area with average annual maximum concentrations of 98.9 ppb for 1 hour and 83.8 ppb for 4 hours (2016-2020) which exceeds the criteria in the Approved Methods.

The Level 1 assessment, based on 139 tonnes per year NO_x emissions, calculated the maximum ozone increments of 1.9 ppb (1 hour) and 1.2 ppb (4 hours) for gas and 2.7 ppb (1 hour) and 1.7 ppb (4 hours) for diesel which is greater than the screening impact level of 0.5 ppb.

The Revised AQIA has evaluated the predicted maximum ozone increase from the proposal against ozone results from photochemical modelling by DPIE (2020) that shows power stations cause increases in ozone concentrations in NSW GMR of 1 ppb. The Revised AQIA also considered the new NEPM 8-hour ozone standard and predicted that the proposal will contribute less than 1 ppb.

The Revised AQIA has provided measured ozone levels at Beresfield (2016-2020) with peaks occurring in the summer months, which the Revised AQIA attributes to bushfires, road traffic and other sources. The Revised AQIA concludes that the predicted maximum ozone contributions for the proposal are small, rare and will only occur in a few locations and are not at levels to cause exceedances over background levels.

The EPA considers that the issues previously raised have been adequately addressed.

4. Start-up and shut-down assessment

The EPA recommended that the proponent prepare a revised assessment which adequately considers emission variability, including evaluating emissions and impacts from plant start-up, shutdowns and variable load.

The Revised AQIA assesses the potential time periods of start-ups for the plant to be between 1 and 6 % of the year based on the 30-minute start-up time and 250 to 1000 start-ups potentially occurring.

For start-up on natural gas, the CO emissions peaks at 15 minutes then rapidly drop below the 100 % load value. NO_x emissions ramp up linearly to 100 % in the first 30 minutes with potential peaks. SO_x and PM₁₀ emission rates ramp up linearly to 100 % during start-up. All pollutant concentrations are expected to be less than or equal to the 100 % load emissions assessed with the exception of 1-hour CO. However, the predicted impacts of CO are low and this will be insignificant to ambient air quality.

For start-up on diesel, the emissions are similar to natural gas with the exception that NO_x emissions also are expected to be higher for the start-up hour than the 100 % assessed. This is due to NO_x concentrations peaking at 20 minutes after start-up before dropping to 100 % load concentrations 5 minutes later. The Revised AQIA states this represents a low risk of air quality impact because the predicted ambient NO₂ impacts are low. The emission rate of NO_x at 50 % load is 33.4 g/s compared to 49.4 g/s for 100 % load.

The Revised AQIA also undertook a sensitivity analysis of emissions characteristics of a 50 % load compared to a 100 % load to investigate the air quality effects associated with plant start-up and

running the plant continuously at half-load. The pollutant emission rates at half-load are all less than at full-load and would result in lower ground level concentrations even though exit velocities are lower for half-load. Ground level concentrations for SO₂ and CO at half-load were approximately half for both gas and diesel use compared to full load.

Plant shutdown duration is estimated to be 20 minutes and involves reducing then cutting fuel supply. The emissions during shutdown are considered to be insignificant compared to other operating modes.

The EPA considers that the issues previously raised have been adequately addressed.

5. Validation and clarity of emissions

The EPA recommended the proponent undertake a detailed control technology and emissions performance benchmarking against all relevant international guidance and technologies.

It was also recommended the proponent assess worst-case impacts based on final design. Where final plant design cannot be provided, the proponent must provide all information used to model impacts for all pollutants, including, but not limited to:

- the specific emission factor(s) and/or manufacturer emission parameters,
- all calculations and assumptions used to determine emission rates and concentrations,
- emission parameters provided at reference conditions and per stack.

Best practice controls and benchmarking

The Response to Submissions and Revised AQIA has included consideration and discussion of all available NO_x control technology. The proposed control: dry low NO_x (DLN) burners and water/steam injection, as well as selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR) and SCONO_x, have been outlined.

DLN burners are a well-established and used technology for gas turbines operating on natural gas that results in lower firing temperatures during combustion that consequently has less generation of thermal NO_x. DLN burners are considered Best Available Techniques (BAT) (BREF, 2017). Water/steam injection is commonly used for diesel fuel operation to control NO_x emissions by injecting water into the combustion chamber which reduces combustion temperature and hence the formation of thermal NO_x. Water/steam injection is considered Best Available Techniques (BAT) (BREF, 2017).

SCR is deemed not suitable for the project as it is a post-combustion control that is based on reduction of NO_x to nitrogen in a catalytic bed by reaction with ammonia. SCR also requires additional land for the site, would produce noise and the use of consumables. The optimal SCR temperatures (300-450 C) are not suitable for the OCGT with temperatures of 600-650 C. SNCR and SCONO_x are both deemed not suitable for similar reasons to SCR and are not recommended for OCGTs (BREF, 2017).

The Response to Submissions states that as there are no technically viable alternatives to DLN burners and water injection for open cycle gas turbines, there are no power stations which can be directly benchmarked against. Equipment manufacturers have guaranteed NO_x concentrations of 25 ppmv for DLN burners and 42 ppmv for water injection.

Worst-case scenario and emission parameters

The Revised AQIA has established that the 100 % load emissions scenario is the worst-case operating scenario.

The EPA considers that the Revised AQIA has not provided all the information used to model all the pollutants considered in the assessment. The AQIA has included the toxic air pollutants formaldehyde, acrolein and PAHs as emissions from the proposal (Sections 4.4.7 and 5.2). However, no emission concentrations or rates have been provided nor information on the methodology used to determine the emission rates.

Table 5.3 includes the chemical species modelled and lists VOCs as xylene but not the other toxic pollutants that the AQIA has assessed (formaldehyde, acrolein and PAHs).

It remains unclear how the predicted impacts of formaldehyde, acrolein and PAHs presented in the results section were modelled and assessed.

The EPA recommends the proponent provide all the information used to model impacts for all pollutants. This includes but is not limited to the methodology used to determine the emission parameters and predicted impacts, including any emission factors and assumptions for pollutants not provided by equipment manufacturers. Specifically, the proponent should provide clarity on the assessment approach of principal toxic air pollutants.

6. Unable to verify SO₂ emission calculations

The EPA recommended the proponent provides all information and calculations used in the determination of the SO₂ emission rates.

The Revised AQIA has included the assumptions used (fuel density and rate of consumption) to calculate the SO₂ emission rates.

The EPA considers that the issues previously raised have been adequately addressed.

7. Background data and results given at 25°C

The EPA recommended the proponent revise the AQIA to provide concentrations of criteria pollutants in µg/m³ at 0 °C.

The Revised AQIA states that the conversion from parts per billion to micrograms per cubic metre used 25 degrees Celsius as this reflects the conditions in the Hunter Valley. The Response to Submissions states that even if a 0 degrees Celsius conversion was used for background data, it would be immaterial to the outcomes of the assessment as the predicted results are all substantially lower than their impact assessment criteria.

The EPA considers that while 25 degrees Celsius may be more reflective of ambient temperatures in the Hunter Valley, the appropriate conversion from parts per billion to micrograms per cubic metre (µg/m³) is 0 degrees Celsius. This is outlined in the National Environment Protection (Ambient Air Quality) Measure which defines µg/m³ to a reference temperature of 0 degrees Celsius and an absolute pressure of 101.325 kilopascals. As previously advised, this was used to convert the concentrations of criteria pollutants in the *Approved Methods for the Modelling and Analysis of Air Pollutants in NSW* (Table 7.1).

The EPA recommends as the proponent works to address issue 1, background air quality data converted at 0 C is used for accuracy in comparison against criteria.

8. Validation of modelled meteorology

The EPA recommended the AQIA include all information regarding the methodology for the meteorological modelling. This must include presenting the adopted parameters and settings used to set up the model.

It was also recommended the AQIA include additional information to evaluate the performance of the modelling, including, but not limited to Calmet generated wind roses for the project site and for Beresfield or another suitable validation dataset.

The Revised AQIA has provided additional information on the methodology used from the meteorological modelling (Section 5.4). The TAPM modelling parameters are outlined in Table 5.1, Table 5.2 for Calmet and Table 5.3 for Calpuff.

Appendix B of the Revised AQIA provides comparisons between modelled and measured meteorological data.

The EPA considers that the issues previously raised have been adequately addressed.

NOISE

The EPA has reviewed the RtS Report and the Revised Noise Impact Assessment (Revised NIA) for the proposed Kurri Kurri Power Station and provide the following comments.

Amenity category

The amenity category for residential receivers in each identified noise catchment surrounding the proposal has been justified in Table 4.9 against a range of considerations, including future zoning as per the ReGrowth Kurri Kurri Rezoning proposal and associated subdivision, which is currently under consideration by the NSW Government.

The EPA notes that while NCA1 and NCA2 have been identified as 'Urban', and NCA5 has been identified as 'Suburban', alternatively identifying NCA1 and NCA2 as 'Suburban' and NCA5 as 'Rural' would not change the recommended noise conditions for these catchments.

Operational noise predictions

The EPA notes that the original NIA for the proposal (prepared by Jacobs (Ref IS354500 Rev 0 dated 6 April 2021) shows the predicted operational noise levels for the NCA3 Representative Residential Receiver as being 34 dBA and 39 dBA under standard conditions and noise-enhancing conditions, respectively (Table 6.4). The Revised NIA shows the predicted operational noise levels for this same location as being 32 dBA and 37 dBA, respectively (Table 6.4).

There is no explanation in the Revised NIA for this 2 dB reduction in predicted noise levels, and the modelling parameters appear unchanged between the original and revised assessments (SWLs in Table 5.2 and 5.3, noise model setup & meteorology in Table 5.5, assessed locations Table 5.6). The predicted one-third octave noise levels at NCA3 are also unchanged between the original and revised assessments (Revised NIA Table 5.4 and 6.8, original NIA Table 6.8).

This means there is a 2 dB reduction in noise which has the effect of bringing the predicted noise level (under noise-enhancing conditions) into compliance with the revised night-time criterion of 38 dBA, rather than a minor 1 dB exceedance.

The EPA considers that the issues previously raised have been adequately addressed.