



Application for Licence Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L8155/2004/2
Licence Holder	EDL NGD (WA) Pty Ltd
ACN	070 941 721
File Number	DER2015/001548-1
Premises	Broome Power Station Part of Lot 1049 on Plan 213567 2 – 4 McDaniel Road MINYIRR WA 6725
Date of Report	24/08/2022
Decision	Revised licence granted

Clarrie Green
**MANAGER, PROCESS INDUSTRIES
REGULATORY SERVICES**

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Amendment description

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the licence L8155/2004/2 granted to EDL NGD (WA) Pty Ltd (licence holder) for the Broome Power Station (the premises). This notice of amendment is hereby given under section 59B(9) of the EP Act.

In completing the assessment documented in this report, the department has considered and given due regard to its regulatory framework and relevant policy documents which are available at <http://dwer.wa.gov.au/regulatory-documents>.

1.1 Purpose and scope of assessment

This amendment report is limited to changes regarding:

- the extension of use of three CAT3152 diesel engines; and
- the addition of two more oily water separator (OWS) systems.

1.1.1 Premises background

Broome Power Station has operated since June 2007 and was constructed to replace the previous diesel-fired Broome Power Station operated by Western Power. The premises is located at Lot 1049 McDaniel Road in the Shire of Broome's industrial zone to the south of the Broome town site.

The existing licence was originally issued on 18 June 2007 and approved the operation of 17 individual 1.85 MW Caterpillar G3520 C natural gas-powered internal combustion engines (radiator cooled reciprocating engines). The generation of electricity at the premises is predominantly from the gas generators using liquefied natural gas (LNG) from the Maitland LNG Facility in Karratha. As a contingency, in the event that the continuous supply of LNG to the power station is interrupted, liquified propane gas (LPG) can be used. In the event that the LPG fuelled generators are unable to satisfy demand, diesel fuelled generators have been available to supplement the power generation and meet energy demands from the Broome community. The diesel engine configuration includes:

- F Station: 3 x diesel CAT3512 engines of combined capacity 3 MW;
- C Station: 2 x 1,250 MTU kVA diesel engines of combined capacity 2.5 MW; and
- D Station: 4 x Cummins 0.9 MW diesel fuelled generators of combined capacity 3.6 MW.

The three F Station engines have now been integrated into the existing station and can provide power generation if required at any point. Previously, these engines were only connected to the existing station on an emergency basis. A licence amendment was granted in May 2020 authorising the use of the F Station diesel engines as peak shaving generators for a maximum of 224 hours between October 2020 and April 2021, inclusive (as summer months are typically higher electricity demand periods). The assessment concluded that there was potential for the National Environment Protection (Ambient Air Quality) Measure (NEPM) to be exceeded if diesel generators were operated continuously. Limiting hours of operation until April 2021 was deemed sufficient time for the licence holder to either demonstrate compliance with the NEPM criteria during operation of the diesel engines, or plan for other options to meet increased electricity demands in Broome.

1.1.2 Amendment details (from application)

Extension of use of three CAT3152 diesel engines

On 30 April 2021, the licence holder submitted an application to the department to amend licence L8155/2004/2 under section 59 and 59B of the EP Act. The application seeks approval

to operate the three CAT3512 diesel engines as standby, emergency and (if required) peak generation engines, during the summer months (October to April, inclusive) indefinitely, or until such time as renewable energy options comes online. Specifically, in conjunction with the 17 natural gas gensets, the licence holder proposes that of the three diesel engines:

- one will be available for peak shaving between October and April (inclusive) without limit;
- two will be available to run for peak shaving simultaneously between October and April (inclusive) for a maximum of 224 hours; and
- all three may be operated individually or simultaneously for emergency standby purposes.

A requirement of the previous amendment (granted May 2020) was that an air quality assessment be conducted to assess the risk of the cumulative impact of the exhaust emission pollutant substances exceeding NEPM concentrations at the nearest sensitive receptors. It was noted by the Department of Water and Environmental Regulation (the department) in the assessment that the most constraining NEPM standard is that for NO₂, expressed as a one-hour average.

Therefore, in order to demonstrate compliance with the NEPM the amendment application is supported by air modelling of the three peak shaving diesel engines during the proposed increase in operation in conjunction with the operation of the 17 natural gas gensets. The modelling is informed by actual emissions testing of the engines conducted in line with the May 2020 amendment.

Addition of two more oily water separator systems

The application also seeks to add two more oily water separator systems to the licence that were inherited from Horizon Power when the site boundary was adjusted in May 2020 (licence currently authorises only one oily water separator system).

This amendment report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the premises. As a result of this assessment, amended licence L8155/2004/2 has been granted.

The amended licence issued as a result of this amendment supersedes the existing licence previously granted in relation to the premises. The amended licence has been granted in a new format with existing conditions being transferred, but not reassessed, to the new format.

2. Air quality impact assessment

In accordance with current licence requirements, Etkimo Pty Ltd, on behalf of the licence holder, conducted air emissions testing. Thirteen of the 17 natural gas gensets were tested in 2020, with the remaining four tested in 2018. The emissions from the three diesel gensets were also tested in 2020. The results of these tests informed the air quality assessment submitted with the current licence amendment application. The tested substances were oxides of nitrogen (NO_x) as nitrogen dioxide (NO₂), carbon monoxide (CO), sulphur dioxide (SO₂) and particulate matter (PM₁₀). Based on the modelling parameter 'emission rates' of these substances, it has been concluded that the risk of exceeding the one-hour NEPM for NO₂ at the nearest sensitive receptor is by far the most constraining. Therefore, only modelling outcomes for NO₂ are presented in the assessment.

In the absence of any background air quality data for Broome, the assessment uses an initial scenario of the emissions from the 17 natural gensets as a baseline over which subsequent scenarios that include the emissions from up to two of the three diesel gensets can be assessed for compliance with the NEPM at the nearest sensitive receptors. The CALPUFF dispersion model was used, coupled with a recent representative year of meteorological data from the two nearby Bureau of Meteorology Automatic Weather Stations (BoM AWS).

The modelled data presented some ground level concentration exceedances for predicted one-hour NEPM with the addition of the diesel gensets. However, the emissions testing indicated that the initial proportion of NO₂ in NO_x as discharged from the diesel gensets was approximately 11%, while the model assumed 100%. The licence holder has attempted to justify the NEPM exceedances by referring to the conservatism of modelling assumptions. This is generally not an acceptable approach to the interpretation of dispersion modelling results. In addition, the NO₂ standards that the licence holder used to compare with modelled ground level concentrations (GLCs) (NEPC, 2015) have been superseded (NEPC, 2021), which would make the percentage and frequency of modelled exceedances higher than predicted. As a result of this, it was recommended to the licence holder that the modelling assessment be revisited, including application of more realistic levels of conservatism along with representative modelling scenarios.

Table 1 provides revised scenarios modelled and GLC exceedances of NO₂. The re-modelled GLCs are compared to the one-hour and annual average ambient NO₂ standards stated in the NEPM (NEPC, 2015); these standards are based on the protection of human health.

Table 1: Modelled scenarios

Scenario	Description of scenario	Predicted NEPM exceedances ¹ (1 hr averages)
1 (Baseline scenario)	No peak shaving. Emissions from natural gas fired gensets (17) in isolation are continuous, 24 hours per day all year.	0 exceedances, with the highest predicted concentration at 89% of the NEPM standard.
2	Addition of peak shaving with a single diesel genset operating continuously October to April.	0 exceedances, with the highest predicted concentration at 93% of the NEPM standard.
3	Scenario 2 above, with addition of second diesel genset operating continuously October to April, which operates 9am to 9pm only.	0 exceedances, with the highest predicted concentration at 97% of the NEPM standard.

¹ at any sensitive receiver

2.1 DWER technical review

A review of stack testing data by the department's air quality specialists identified significant variability of in-stack emission rates recorded from the gas generators. For instance, the NO_x emission rates measured for identical gas-fired generators vary between 0.47g/s and 0.99g/s while NO₂/NO_x ratios vary from 2% - 84% and 6% - 12% for gas and diesel generators, respectively (Table 2). Conservative ratios of 84% and 12% were used for gas and diesel generators in the modelling (Table 2). In-stack emission rates recorded during different periods for the same generator units also show significant variability. For example, the NO_x emission rates measured in 2018 for EGM01 and EGM03 generators were 0.93g/s and 0.85g/s, while the NO_x emission rates recorded in 2021 for the same generators decreased to 0.47g/s and 0.61g/s, respectively (Table 2 and 3). The 2021 emission rates (lower emission rates) were used in the modelling. These stack emission variations are most likely related to variations of generator loads used in the modelling.

Based on the maximum predicted one-hour NO₂ levels at the nearest receptors being high and the level of variance between in-stack emission rates, there is a potential risk for NO₂ NEPM exceedances.

To reduce the risk of ground level impacts, the review identified the below controls to reduce air emission risks to acceptable levels:

- Limited operational hours of the second genset (total maximum of 224 hours between October and April, (inclusive) between 9am and 9pm, with a maximum number of hours over a shorter period). The recommendation aims to reduce the likelihood peak emissions during worst case meteorological conditions, and therefore reduce the likelihood of NEPM exceedances at receptors.
- A formal load management plan be devised that ensures all generators are operating at loads recommended by the manufacturer.
- Should backup diesel gensets (F stations) be used in the interim to meet energy demands from the Broome community, it is recommended that the F3 station is not made available for peak shaving without limit, as stack monitoring data indicate that the F3 station produces about 60% more emissions than the F2 and F1 stations.
- Ongoing requirement for annual emission testing to ensure that subsequently tested emissions of NO_x as NO₂ are not notably higher than those assessed.

The licence holder also notes that the requirement for the use of the three diesel gensets will likely reduce beyond 2023 due to the increase in solar power in the region, and therefore envisage the risk will also reduce with demand after about two years. A key finding of the technical review was that a plan aimed at achieving lower emission levels through future improvements to operation and infrastructure at the Premises is a more reliable approach to ensuring potential impacts are minimised.

Table 2: Tested emission rates 2020- 2021

Table 1: Tested substances mass emission rates, discharge temperature, velocity and stack diameter (provided in the current assessment)

	Unit	Total NOx as NO2 Mass rate (g/s)	NO as NO2 Mass Rate (g/s)	NO2 Mass Rate (g/s)	Proportion NO2 in NOx	NO2 at 84% NOx (g/s)	CO Mass Rate (g/s)	SO2 Mass Rate (g/s)	PM Mass Rate (g/s)	Exit Velocity (m/s)	Exit Temperature (degC)	Exit Temperature (K)	Internal diameter (m)	Stack Height (m)	Test Year
Gas-Fired Gensets	EGM01	0.47	0.14	0.33	70%	0.39	0.8	0.02	<0.002 (1)	33	438	711	0.44	17	2021
	EGM02	0.69	0.35	0.34	49%	0.58	1.6	0.038	<0.0020	35	434	707	0.44	17	2020
	EGM03	0.61	0.10	0.51	84%	0.51	0.9	0.063	<0.002 (1)	35	452	725	0.44	17	2021
	EGM04	0.92	0.55	0.37	40%	0.77	1.4	0.029	<0.0020	36	466	739	0.44	17	2020
	EGM05	0.85	0.44	0.42	49%	0.71	1.5	0.057	<0.0020	36	448	721	0.44	17	2020
	EGM06	0.78	0.50	0.28	36%	0.66	1.3	0.014	<0.0020	35	434	707	0.44	17	2020
	EGM07	0.73	0.41	0.32	44%	0.61	1.4	0.023	<0.0020	35	455	728	0.44	17	2020
	EGM08	0.70	0.28	0.42	60%	0.59	1.3	0.071	<0.0020	34	440	713	0.44	17	2020
	EGM09	0.77	0.23	0.54	70%	0.65	1.1	0.06	<0.002 (1)	32	454	727	0.44	17	2021
	EGM10	0.99	0.58	0.42	42%	0.83	1.7	0.055	<0.0020	35	420	693	0.44	17	2020
	EGM11	0.77	0.30	0.47	61%	0.65	1.1	0.046	<0.002 (1)	32	422	695	0.44	17	2021
	EGM12	0.93	0.82	0.083	9%	0.78	1.3	<0.01	<0.0020	34	459	732	0.44	17	2020
	EGM13	0.75	0.65	0.11	15%	0.63	1.3	<0.01	<0.002 (1)	33	452	725	0.44	17	2020
	EGM14	0.72	0.40	0.32	44%	0.60	1.5	0.015	<0.0020	35	420	693	0.44	17	2020
	EGM15	0.59	0.47	0.120	20%	0.50	1.1	<0.01	<0.002 (1)	33	464	737	0.44	17	2020
	EGM16	0.60	0.58	0.023	4%	0.50	1.2	<0.01	<0.0020	34	462	735	0.44	17	2020
	EGM17	0.56	0.55	0.0088	2%	0.47	1.3	<0.01	<0.002 (1)	34	451	724	0.44	17	2020
Sub-Total Mass Rate for All Gas-Fired units (g/s)						10.4	22	0.52	0.017						
Diesel-Fuelled Gensets	Unit	Total NOx as NO2 Mass rate (g/s)	NO as NO2 Mass Rate (g/s)	NO2 Mass Rate (g/s)	Proportion NO2 in NOx	NO2 at 12% NOx (g/s)	CO Mass Rate (g/s)	SO2 Mass Rate (g/s)	PM Mass Rate (g/s)	Exit Velocity (m/s)	Exit Temperature (degC)	Exit Temperature (K)	Internal diameter (m)	Stack Height (m)	Test Year
	F1-NE	1.2	1.1	0.093	8%	0.14	0.086	<0.001	0.0045	39	465	738	0.20	6.5	2020
	F1-SW	1.3	1.2	0.098	8%	0.16	0.079	<0.001	0.0037	39	465	738	0.20	6.5	2020
	F2-NE	1.3	1.2	0.098	8%	0.16	0.095	<0.001	0.0062	40	459	732	0.20	6.5	2020
	F2-SW	1.3	1.2	0.075	6%	0.16	0.099	<0.001	0.0059	40	463	736	0.20	6.5	2020
	F3-NE (2)	2.0	1.8	0.23	12%	0.24	0.19	<0.004	<0.0006	60	491	764	0.20	6.5	2020
	F3-SW (2)	2.0	1.8	0.23	12%	0.24	0.19	<0.004	<0.0006	60	491	764	0.20	6.5	2020
	(3) Sub-Total Mass Rate for 2 highest of 3 diesel gensets (g/s)					0.79	0.74	0.006	0.021						
Total Mass Rate (g/s)						11.2	22.5	0.52	0.038						
AGV with shortest averaging time, µg/m3						151	30000	524	23						
Total Mass Rate ÷ AGV						0.07	0.0008	0.0001	0.003						

Notes:

(1) Not tested, so adopt average of other gas fired gensets

Each of the three 1MW CAT3512 diesel fuelled gensets (F1, F2 and F3) have two exhaust stacks located about 2 metres apart, one to the North-East and one to the South-West.

(2) For F3 only one of the two stacks were accessible, therefore the tested emissions were adopted for both stacks.

The two F station diesel gensets with the highest emission rates were selected to be assessed as running simultaneously.

(3) Only 2 of the 3 diesel gensets will be running simultaneously.

Table 3: Tested emission rates 2018 - 2020

Table 2: Tested substances mass emission rates, discharge temperature, velocity and stack diameter (provided in the previous assessment)

Unit	NOX as NO2 Mass rate (g/s)	CO Mass Rate (g/s)	SO2 Mass Rate (g/s)	PM Mass Rate (g/s)	Exit Velocity (m/s)	Exit Temperature (degC)	Internal diameter (m)	Stack Height (m)	Test Year
EGM01	0.93	1.5	<0.0084	<0.0031	33	420	0.44	17	2018
EGM02	0.69	1.6	0.038	<0.0020	35	434	0.44	17	2020
EGM03	0.85	1.6	<0.0091	<0.0031	38	454	0.44	17	2018
EGM04	0.92	1.4	0.029	<0.0020	36	466	0.44	17	2020
EGM05	0.85	1.5	0.057	<0.0020	36	448	0.44	17	2020
EGM06	0.78	1.3	0.014	<0.0020	35	434	0.44	17	2020
EGM07	0.73	1.4	0.023	<0.0020	35	455	0.44	17	2020
EGM08	0.70	1.3	0.071	<0.0020	34	440	0.44	17	2020
EGM09	0.72	1.3	<0.0089	<0.0030	36	438	0.44	17	2018
EGM10	0.99	1.7	0.055	<0.0020	35	420	0.44	17	2020
EGM11	0.72	1.4	<0.0087	<0.0034	35	422	0.44	17	2018
EGM12	0.93	1.3	<0.01	<0.0020	34	459	0.44	17	2020
EGM13	0.75	1.3	<0.01	<0.002 (1)	33	452	0.44	17	2020
EGM14	0.72	1.5	0.015	<0.0020	35	420	0.44	17	2020
EGM15	0.59	1.1	<0.01	<0.002 (1)	33	464	0.44	17	2020
EGM16	0.60	1.2	<0.01	<0.0020	34	462	0.44	17	2020
EGM17	0.56	1.3	<0.01	<0.002 (1)	34	451	0.44	17	2020
F1-NE	1.2	0.086	<0.001	0.0045	39	465	0.20	6.5	2020
F1-SW	1.3	0.079	<0.001	0.0036	39	465	0.20	6.5	2020
F2-NE	1.3	0.096	<0.001	0.0063	40	459	0.20	6.5	2020
F2-SW	1.3	0.099	<0.001	0.0059	40	463	0.20	6.5	2020
F3-NE (2)	2.0	0.19	<0.004	<0.0006	60	491	0.20	6.5	2020
F3-SW (2)	2.0	0.19	<0.004	<0.0006	60	491	0.20	6.5	2020

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this amendment report are detailed below. Table 4 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence holder-proposed controls

Emission	Sources	Potential pathways	Proposed controls
Noise	Operation of 3 x diesel generators	Air/windborne pathway	Operation will be for not more than 224 hours during the period October to April for 2 x diesel generators.
Combustion gases (NO _x , SO _x , VOCs, CO)			
Hydrocarbons	Spills associated with operation of diesel generators and OWS systems	Direct discharge to land; overland runoff	Existing licence conditions requiring hydrocarbon contaminated stormwater to be directed to the OWS system prior to discharge to an infiltration sump. The licence also specifies a treated stormwater discharge limit of <15mg/L TRH and associated

Emission	Sources	Potential pathways	Proposed controls
			annual sampling and analysis of discharge from OWS System by a NATA accredited laboratory.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), the delegated officer has excluded employees, visitors, and contractors of the licence holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 5 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental siting* (DWER 2020)).

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from premises
The nearest town of Broome	2 km northeast of the premises.
Accommodation units	550 m east of premises
Residential areas	800 m north and west of the premises
Environmental receptors	Distance from premises
Ramsar wetland: Roebuck Bay	1.2 km east of premises
ANCA wetland: Dampier Creek	6 km northeast of premises
Environmentally Sensitive Area (declared rare fauna)	2 km south of premises

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the licence holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the licence holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the licence holder's controls are not deemed sufficient. Where this is the case, the need for additional controls will be documented and justified in Table 6.

The amended licence L8155/2004/2 that accompanies this amendment report authorises emissions associated with the operation of the premises. The conditions in the amended licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 6: Risk assessment of potential emissions and discharges from the premises during operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence holder's controls sufficient?	Reasoning	Regulatory controls
Source/ Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder's controls				
Operation of 3 x diesel engine generators during peak demand times	Noise emissions from generators when running	Air/windborne pathway causing impacts to health and amenity	Closest receptors 550 m east and 800 m north and west of premises	Refer to Section 3.1.1	C = Moderate L = Rare Medium Risk	Y	Previous risk assessment for noise for the three generators was based determined the noise outputs from operating the existing power generation equipment simultaneously would not exceed the Environmental Protection (Noise) Regulations 1997 (Noise Regulations).	No additional controls applied through the Part V licence. The general provisions of the <i>Environmental Protection Act 1986</i> and the Noise Regulations continue to apply.
	Air emissions: combustion gases (NO _x , SO _x , VOCs, CO)			Refer to Section 3.1.1	C = Moderate L = Possible Medium Risk	N	Refer to Section 3.3	Refer to Section 3.3
	Spills of hydrocarbons associated with operation of diesel generators	Overland runoff causing soil and groundwater contamination	Shallow groundwater	Refer to Section 3.1.1	C = Minor L = Rare Low Risk	Y	Existing stormwater mitigation controls are likely to be sufficient at mitigating potential hydrocarbon / contaminated stormwater emissions from operation of the diesel generators. OWS sampling results provided in application indicated results well below licence discharge limits.	Consistent with commitments made by the licence holder. The general provisions of the <i>Environmental Protection Act 1986</i> and Environmental Protection Regulations 2004 (Unauthorised Discharges) apply during operations.
Oily water separators	Spills of oily wastewater	Overland runoff causing soil and groundwater	Shallow groundwater	Refer to Section 3.1.1	C = Minor L = Rare	Y	OWS sampling results provided in application indicated results well below	Consistent with commitments made by the licence holder.

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence holder's controls sufficient?	Reasoning	Regulatory controls
Source/ Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder's controls				
		contamination			Low Risk		licence discharge limits.	The general provisions of the <i>Environmental Protection Act 1986</i> and <i>Environmental Protection Regulations 2004</i> (Unauthorised Discharges) apply during operations.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020).

3.3 NO₂ emissions

The Delegated Officer considers that the current licence conditions are insufficient to manage the change in operations to allow for the extension of use of the three CAT3152 diesel engines. Therefore, further controls are to be implemented to reduce the risk of ground level impacts of NO₂. Although modelling assumptions and scenarios presented are appropriate and no NEPM exceedances at sensitive receivers are predicted, the maximum predicted one-hour NO₂ levels at the nearest receptors are high (97%, 86% and 77% of the NEPM standard). This indicates a potential risk for NO₂ NEPM exceedances. NO₂ background concentration data is not available, which introduces an element of uncertainty to the assessment process. The premises is located very close to sensitive receptors with the nearest human receptors only 550 m to the east.

3.3.1 Operational limits

Based on modelling results being close to NEPM, and the advice from the department's specialist air quality experts (refer to section 2.1), the Delegated Officer has determined that additional regulatory controls are necessary including limitation to hours, emission testing frequency and restrictions on which diesel gensets are to be used for peak shaving without limit.

Load management

Emission data recorded at the generator stacks, specifically the NO_x and NO_x/NO₂ ratio, varies considerably between each identical generator and as well as between old and new stack testing data. The Delegated Officer considers that load management is necessary to ensure that all generators are operating at their optimum load (between 70 and 100 percent), as per the manufacturer's specifications (Jabeck 2014) and underloading generators may result in decreased efficiency, impacting emissions. Modelled data assumes that all generators are running at 100 percent, therefore it is assumed that without load management, the emission profile and performance may be negatively impacted. There are some difficulties in achieving optimum load at all times so the use of a supervisory control and data acquisition (SCADA) automated operating system, ensures load optimisation, as it automatically starts and stops the generators based on station load requirements. The Delegated Officer is satisfied that the automated operating system is an appropriate control for continued load management and other controls will need to be implemented to reduce the risk of emission impacts.

Planned improvements

The Delegated Officer notes that the operation of diesel generators for peak shaving and emergency standby is a higher contributor to NO₂ emissions per megawatt hour when compared to gas-fired engines. In addition, that the licence holder has confirmed that diesel engines are a medium term/interim solution to servicing Broome energy demands and that renewable options of energy generation will be considered in the future.

The licence holder has recently installed and is currently commissioning a 4.3 MW Battery Energy Storage System (BESS) within the premises, that is expected to come online in September 2022. The BESS is designed to enable more solar panel photovoltaic (PV) systems to be installed by consumers with surplus energy feeding into the network via battery storage. The BESS will pick up load changes from the renewables on the system, mitigating the load change presented to the power station. Storage infrastructure allows energy to be released at times of peak demand, alleviating the reliance on non-renewable forms of power generation.

Table 1 of this report identifies that even without diesel generators the premises is likely to be a significant contributor to NO₂ levels at receptors, modelled as potentially contributing to 89% of the NEPM standard. Applications for any future expansion is likely to require consideration of alternatives to diesel generators to demonstrate the NO₂ emissions are being minimised from the premises and that risks to public health are being adequately managed. Alternatively, if further reliance on diesel engines is proposed, the licence holder will be required to present significant additional controls for the management of emissions, in the absence of long term

monitoring, to demonstrate that risks are being managed.

4. Consultation

Table 7 provides a summary of the consultation undertaken by the department.

Table 7: Consultation

Consultation method	Comments received	Department response
Shire of Broome advised of proposal on 14 July 2021	None received	N/A
Licence holder was provided with draft documents on 16 March 2022.	8 April 2022 and 11 August 2022 (DWERDT588886 and DWERDT643340) Refer to Appendix 1	Refer to Appendix 1

5. Conclusion

Based on this assessment, the Delegated Officer has determined that an amendment to the existing licence will be granted, subject to additional controls to minimise the impact of ground level impacts and conditions commensurate with the determined controls and necessary for administration and reporting requirements. The Delegated Officer considers that additional controls will mitigate emission impacts however for any further amendments sought that involve an increase in diesel power energy generation, it would be expected that significant controls are also proposed by the applicant.

5.1 Summary of amendments

All proposed changes have been incorporated into the amended licence as part of the amendment process. The following additional operating requirements and limits have been added to the licence, to reduce likelihood of high emissions occurring during worst-case meteorological conditions:

- SCADA automated control system to ensure that the power station generator load is managed to optimum levels of both gas and diesel engines;
- a 64-hour cap across any consecutive 2-month period (between October and April (inclusive) between 9am and 9pm) for two diesel generators (F1 and F2) running simultaneously;
- diesel engine F3 is authorised for emergency operation only, due to its higher emissions of NO₂; and
- annual monitoring of NO₂ emissions from diesel generators, which are identified as a higher risk contributor to emissions and therefore potential NEPM exceedances.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.

4. Jabeck B 2014, *The Impact of Generator Set Underloading*, Caterpillar Inc, accessed 9 February 2022. https://www.cat.com/en_AU/by-industry/electric-power/Articles/White-papers/the-impact-of-generator-set-underloading.html.
5. National Environment Protection Council (NEPC) 2015, *National Environmental Protection Measure (NEPM) for Ambient Air Quality*, Department of the Environment, December 2015.
6. NEPC 2021, *National Environmental Protection Measure (NEPM) for Ambient Air Quality*, Department of the Environment, April 2021.

Appendix 1: Summary of licence holder's comments on risk assessment and draft conditions

Condition	Summary of licence holder's comment	Department's response
Infrastructure and equipment requirements table	The licence holder requested changes to operational requirements for peak shaving for the 3 x CAT3512 diesel fuelled engines changes from a maximum of 32 hours per month to a maximum of 224 hours for the period due to the likelihood of needing to respond to a small number of peak shaving events that one even in each month.	The Delegated Officer is satisfied that having a cap of 64 hours per any 2-month consecutive period is sufficient to for mitigation of NO ₂ NEPM exceedances, provided that additional controls are in place.
	Following further info requested by DWER: Over the last two years, the licence holder has required significantly less than the requested annual allowance of peak shaving hours however, data does not provide an indicator of future peak shaving requirements and believes the requested allowance will enable for unpredictable circumstances. The licence holder suggested based on previous year's usage a maximum of 64 hours per 2-month consecutive period is more achievable while still maintaining some control over air emissions.	
Operational limits table	The licence holder requested the removal of the requirement to operate the 17 x 1.85 MW Caterpillar gas engines between 70 and 100 percent load due to not having any control over changes in load and the possibility that they will need to operate outside of this load level.	Refer to section 3.3.1 - Load management
	Following further info requested by DWER: The licence holder provided information on the use of the SCADA control system for the management of load optimisation.	
	The licence holder requested changes to wording to emergency or standby operational limitations for the 3 x CAT3512 diesel fuelled engines.	The licence has been updated accordingly.

Condition	Summary of licence holder's comment	Department's response
	The licence holder requested changes to operational limitations for peak shaving for the 3 x CAT3512 diesel fuelled engines changes from a maximum of 32 hours per month to a maximum of 224 hours for the period due to the likelihood of needing to respond to a small number of peak shaving events that one even in each month.	Refer to the above response regarding the infrastructure and equipment requirements table.
Monitoring of point source emissions to air table	The licence holder requested that monitoring frequency of NO _x (as NO ₂) for 17 x 1.85 MW Caterpillar gas engines be changed from annually to triennially as not all engines are available to be tested at the same time so annual testing would require emissions specialist to come out multiple times in a year.	The Delegated Officer has considered the limitations of the licence holder's ability to monitor gas engines annually. Licence conditions have been amended to require triennial monitoring for gas engines, provided that the monitoring of diesel engines remains as annual due to the higher emission rate and risk of potential NEPM exceedances.
	Following further info requested by DWER: The licence holder provided information on the impracticability of testing gas engines for NO _x annually and advised there are no limitations to annual monitoring of diesel gensets.	
Load management plan condition	The licence holder requested the removal of the requirement to submit a Load Management Plan due to not having any control over changes in load. Further information was provided to demonstrate that load management is undertaken using a SCADA system that triggers additional engines to turn on as required, ensuring the optimisation of engines that are already operating.	Refer to section 3.3.1 - Load management
Improvement plan condition	The licence holder requested the removal of the requirement to submit an Improvement Plan due to the replacement of engines being subject to agreement with the customer, Horizon Power. Furthermore, there will always be a requirement for diesel engines from an emergency/standby perspective.	Refer to section 3.3.1 - Planned improvements
	Following further info requested by DWER: The licence holder provided information on improvements currently being implemented to enable the use of more renewable sourced energy for the town of Broome and how this will reduce reliance on diesel engines.	

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY				
Application type				
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L8155/2004/2	
		Relevant WA number:	N/A	<input checked="" type="checkbox"/>
Date application received	30 April 2021			
Applicant and Premises details				
Applicant name/s (full legal name/s)	EDL NGD (WA) Pty Ltd			
Premises name	Broome Power Station			
Premises location	2-4 McDaniel Rd MINYIRR WA 6725			
Local Government Authority	Shire of Broome			
Application documents				
HPCM file reference number:	DER2015/001548			
Key application documents (additional to application form):	Air quality assessment of additional electricity generator set exhaust emissions to air (Etkimo) Updated site layout drawing			
Scope of application/assessment				
Summary of proposed activities or changes to existing operations.	<p>EDL is seeking approval to extend the use of three CAT3152 diesel engines, which were originally installed as emergency standby generators. In May 2020, they were authorised for limited use for peak shaving purposes (maximum 224 hours during Oct 2020 – Apr 2021), to enable time for the licence holder to either demonstrate compliance with the Air NEPM or plan for alternatives to meet power demand during peak periods.</p> <p>This application includes the results of air modelling from actual emissions, in order to demonstrate compliance with the Air NEPM and support the ongoing operation for peak shaving purposes, until proposed renewable generation comes online at the premises (post 2023).</p> <p>The application also seeks to add oily water separators to the licence that were inherited from Horizon Power when the site boundary was adjusted in May 2020.</p>			
Category number/s (activities that cause the premises to become prescribed premises)				
Table 1: Prescribed premises categories				
Prescribed premises category and description		Assessed production or design capacity		
Category 52: Electric power generation		37 MW in aggregate		
Legislative context and other approvals				

Has the applicant referred their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Not a significant proposal
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Existing applicant
Has the applicant obtained all relevant planning approvals?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Not specified – refer to Shire of Broome
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A – no clearing proposed
Is the Premises subject to any other Acts or subsidiary regulations?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Dangerous Goods legislation
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	